

An Aide Mémoire to
FIREARMS IGNITION
IDENTIFICATION
— 1400-1900 —

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An Introductory Manual

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As with other subjects, the pioneer writers made many mistakes, most of which have been corrected by those who came later; but many have been copied and reprinted as though proved. Much has been published about arms and armor that is very contradictory. Not only do different writers disagree with each other, but they frequently disagree with themselves and call the same things by different names, and different things by the same one.

George Cameron, Stone: *A Glossary of the
Construction, Decoration and Use of
Arms and Armor in all Countries and in all Times.*
Portland, Maine: The Southworth Press, 1934, page v.

There have been many arms historians over the past half century who have provided English speaking arms historians with the written words that would provide the kind of background to their study that had been provided by Continental historians for almost a century. No one has been more dedicated and researched in a greater variety of areas than Claude Blair, a friend and mentor during that half century. His work will be found throughout this Mémoire.

This book is dedicated to Claude Blair.

This book is **incomplete**. Our father, Jim Gooding, passed January 7th, 2012. At that time much work on the book had been completed, but more work was needed to produce a “finished product”. Attempts were made to produce a book that was closer to what he would have desired. Quite simply, our father was a perfectionist, so in respect to his memory, these efforts were appropriate. Unfortunately, this sequence did not reach a state of completion.

Consequently, with relatively minor edits, we are providing this draft monograph, in the main so that the fruit of his hard work and efforts are not lost forever. That is, despite its many imperfections (which will be obvious to those who read through this work), it is our hope that researchers and academicians will be able to take advantage of this study and enjoy our father’s accounting of the history and technology which this text covers.

We wish to thank Will Adyee-White and the American Society of Arms Collectors for their generous assistance in bringing this project to fruition, and for hosting this monograph on the ASAC website.

Nota Bene – This manuscript is released posthumously, and we are unable to provide any additional resources that could aid individuals who wish to further research this material.

Robert James Gooding, and Carolyn Jane Miller (nee Gooding),
November 2025.

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Preface

A Raison d'être

Every ten years or so over the past half century, I have been called upon to produce a short lecture on the history of firearms for museum workers, collectors' groups, college students, and the like. I have considered each of them to have been prepared with the latest, most up-to-date information, but each evidenced the tremendous amount of data that had been accumulated in the previous decade. I expect this study to be no exception. There is still so much to be answered

This *Aide Mémoire* began because of the writer's need to provide a catalogue of the reference collection which is included here as Chapter 14; the need for a consistent reference on terminology as it relates to firearms, and perhaps to clear up some of the inconsistencies that seem to have crept into the English language over the last century.

It may be said that the germ which created the need was acquired in 1939 when the writer was given access to "the artifact study collection" in the Childrens' Room" at the Royal Ontario Museum of Archaeology,¹ along with permission to handle a fascinating detached wheel-lock, complete with its spanner and pyrites in place (see next page). The interest was compounded in 1948 when, as a full-time employee in the Conservation Department working under William Todd, I was able to arrange that the part of the Herbert J. Jackson collection of detached locks which was not on display, was moved to my laboratory for 'storage.'

This *Aide Mémoire* could not have been completed if it had not been for the help, over a long period of time, from a lot of very good friends and mentors. I must specially mention the late Howard Blackmore with whom I travelled when I was in England and he was in Canada, and Claude Blair who was always available on the end of the telephone line and always replied to letters. For more than 50 years, their expertise has been available. My friendship with Peter Scott-Edeson goes back only a little more than 30 years but his knowledge of English firearms of the 18th and early 19th centuries is unsurpassed. His work in the archives and libraries of England has been freely shared, and his assistance when I was in the U.K. made it possible to open doors I would not otherwise have known existed, and, more recently, Brian Godwin, arms historian for the British National Trust, whose knowledge of English firearms of the 17th century is unsurpassed and who gave me complete access to his photo archives has been most helpful on all aspects of this project; and Robert E. Brooker who gave advice and access to his very extensive collection of European military pistols. My first contact with Robert Held came in 1972 with a telephone request to reprint two articles from the *CJAC*² in his forthcoming *Arms and Armour Annual*. His frequent letters since then have provided much of the information contained herein on firearms design and production in Italy.

I would be very remiss if I did not acknowledge the important assistance of Elena Yablonskaya, curator of arms at the Kremlin Museum who made it possible to obtain a

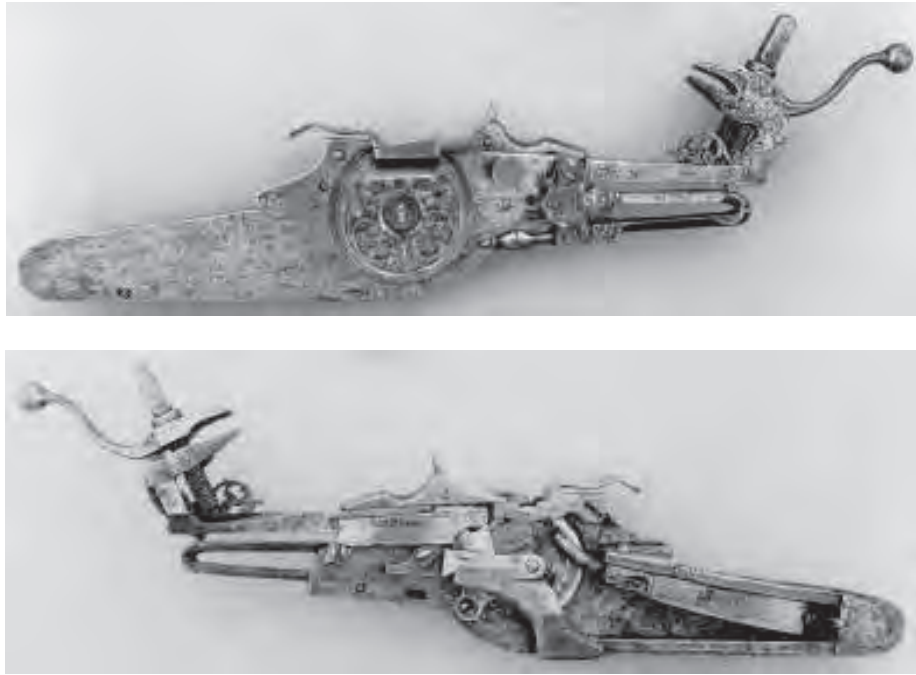


Fig. 1. A detached wheel-lock decorated with a gilt brass wheel-cover with pierced decoration which fits around the pan and a dog-to-spring bridle with a putto head in relief. Below the pan cover is an engraved, gilt brass pin with a flat disk top which will release the catch to allow the pan to close. In Wrangle's Armoury at Skokloster Slott in Sweden there is pair of wheel-locks with barrels by Martin Gummi of Culmbach, Bavaria, dated 1648 which have brass decorations cast from the same pattern as this one from the Herbert J. Jackson collection. *Royal Ontario Museum collection*. No. 925.27.46

quality scan of Plate 30 from an original printing of Josif Gamel's *Description of the Tula Weapons Factory* published in Russian in 1826, and other illustrations; Dr. Nils Drejholt of the Livrustkammaren, the Royal Armoury in Stockholm, who located and translated the Eherensvard paper for me and made it possible to study and photograph the very early firearms in that collection; Dr. Alfred Geibig of Kunstsammlungen der Veste Coburg for photographs of the earliest dated snaphance gun; Mr. Jan Piet Puype, Curator Emeritus at the Leger Museum, Delft; Graeme Rimer and the late A.V.B. Norman, The Royal Armouries at the Tower of London.

Closer to home I have had considerable assistance from long-time friends: Donald Blyth, John Burgoyne, Keith Dill, Ross Egles, Deane Taylor, Jeff Paine, Craig Ross, David Weaver, all of the other members of The Canadian Guild of Antique Arms Historians, and all of the authors who contributed articles to *The Canadian Journal of Arms Collecting*. To this distinguished group must be added :

Will Adye-White	Louis H. Cherepy Sr.	Lewis H. Gordon, Jr.
David H.L. Back	Richard Chubb	David F. Harding
De Witt Bailey	John S. Cooper	Peter Hawkins
Robert E. Brooker	Anthony D. Darling	Arne Hoff
Adrian B. Caruana	Tony Gibbs-Murray	Herbert G. Houze
A. Colin Carpenter	André Gibeault	Gordon T. Howard
René Chartrand	Alex Glendinning	Anthony (Toby) Jack

Lloyd Johnston
Harold Jonah
Nicolai Krijanovsky
Paul Lederer
Amand Leveau
Bernard Malric
Paul Murray
David Prawdzic
Mark Murray-Flutter

W. K. Neal
Stuart J. Newby
Michael Newland
Joseph L. Salter
Ronald Serbin
Peter Smithurst
David A. Stewart
David S. Stewart
Robert Sule

G.. Dean Taylor
A.W.F. Taylerson
Henk L. Visser
David J. deM. Williams
David Winks,
J. Patrick Wohler
John Wohler

There are many others who should be acknowledge but the passage of so many years has dimmed them from memory. I hope I will be forgiven.

S. J. Gooding
Bloomfield, DATE.

NOTES

1. At that time, there were four separate museums housed in the same building: The Royal Ontario Museum of Archaeology, The Royal Ontario Museum of Zoology, The Royal Ontario Museum of Palaeontology; and the Royal Ontario Museum of Geology.
2. CJAC: *The Canadian Journal of Arms Collecting*, 1963-1972; *The Canadian Journal: Arms Collecting*, 1973-1974; *Arms Collecting*, 1974-2003.

A partial list of those
upon whose shoulders we have stood

Jos. Alm	1889-1957	Sweden
Claude Blair	1922-2010	England
Clement Bosson		Geneva
David H.L. Back	1922-	England
Howard Loftus Blackmore	1917-1999	England
Anthony.D. (Chuck) Darling	1931-1992	U.S.A.
Bashford Dean	1867-1928	U.S.A.
Harold Arthur Dillon	1844-1932	England
Chas. ffoulkes	1869-1947	England
Steven V. Grancsay	1897-1980	U.S.A.
Robert Held	1927-	U.S.A./Italy
Arne Hoff	1906-1997	Denmark
John F. Hayward	1916-1983	England
Thomas Temple Hoopes	1898-1981	U.S.A.
Sir Guy Francis Laking,	1875-1919	England
Torsten Lenk	1890-1957	Sweden
Åke Meyerson	1910-1991	Sweden
Sir James Mann	1897-1962	England
Sir Samuel Rush Meyrick	1783-1848	England
A.V.B. (Nick) Norman	1930-1998	England
William Keith Neal	1905-1989	England
C. Meade Patterson	1919-1998	U.S.A.
Harold L. Peterson	1922-1978	U.S.A.
Jan Piet Puype	1939-	Netherlands
H.B.C. Pollard	1888-1966.	England
James E. Serven	1899-1985	U.S.A.
Samuel E. Smith	1912-1983	U.S.A.
Johan F. Støckel	1867-1960	Denmark
Leonid Tarassuk	1925-1990	Russia/U.S.A.
Moritz Thierbach		
Henk Visser	1923 -2006	Netherlands
Charles E. Whitelaw	1869-1939	Scotland
Stuart Phyr		
Donald LaRocca		

Foreword

An Introduction to the vocabulary

This book has been designed to provide an introduction to the evolution of firearm ignitions; as a guide to the identification of the country or region of origin based on the lock; and to provide the terminology to prepare a description of an antique firearm. Actually, it might be considered as 14 small booklets with the text of each followed by a related bibliography and a catalog of related photographs. Each ignition will be covered independently. This may necessitate repeating some evidence but it will remove the need for the reader to back-track, seeking justification for statements made. It must be remembered, the export of locks to foreign gunmakers was common from very earliest times so other physical features must be considered as part of the identification process..

It will track the development of firearm ignition from 1411, the date of the earliest illustration of a gun lock mechanism, through the matchlock, wheel-lock, flint-locks, and percussion locks, to the introduction of the early self contained cartridge and into the metallic cartridges in the first half of the 19th century.

Although it is intended to contain information only on the ignition, the other major and minor gun components, especially stock design, must also be considered to achieve the goals mentioned above. Some of that information will be found in the appendices and the selected bibliographies.

The people who worked with guns in 17th and 18th century Europe, that is the sportsmen, the gunmakers, the collectors (apparently there were a lot of them), along with the cataloguers of their collections, and the purchasing agents for the military along with their warehouse keepers, had a rudimentary system of identification for some of the many variations available. Above all, there are descriptions included in orders to the gunmakers and the inventories of military stores which have provided some of the words used to identify different types.

Although the records are not as detailed or as clear as we now would like them to have been, some terminology did exist. There is some doubt about the universality of that terminology but that is a different problem.

The literature of the period, although sparse, tells us of the French lock, English lock, Scottish lock, and the Spanish locks to name just a few. Each of these families is recorded. Because a number of collections and the contemporary, or early, catalogues of them have survived, it is possible (with considerable limitations), to identify what the cataloguer identified as some of these types.¹

As might be expected, most of the national identifiers noted above were not usually used at home because they were not needed; they were assigned by foreigners to

N.B. In the text, a letter, accompanied by a figure, in [square brackets], will make reference to illustrations in another chapter: [Mxx] will make reference to a related lock mechanism in Chapter 14; [Pxx], [Txx], or [Cxx] (pellets, tubes, caps) will be found as a "Percussion Primer" in Appendix IX.

identify something different from that they considered the norm, and based their description on the country of origin.

Words and spelling will play a major roll in this study and the etymology of lock names will be covered in greater detail in the appropriate chapters and appendices. But here, it is appropriate to clarify the three words which seem to cause the greatest confusion — snaphance, snaplock, and flintlock — as they will be used without further explanation until that point is reached.

Early gun locks can readily be placed in the order of evolution based upon the four major sources for ignition;

1. Match	2. Pyrites	3. Flint	4. Fulminants

and that is the order they will appear in the chapters. The matchlock with its match, the wheel-lock with its pyrites and wheel, and the many forms of percussion, are readily identified by their obvious features.

But the flint-locks which evolved shortly after the invention of the wheel-lock and appeared in many forms developed over more than 300 years are another matter. They have been grouped and roughly identified by arms historians as:

Snaphance	Flint-lock	Miquelet

Mechanically, each of these have been identified as “snaplocks” based on the snapping action of the cock but this is quite unsatisfactory. Technically, each group are also flint-locks and should have that definition expanded to include the sub-type

.....

On the Continent, a flint-using firearm first appeared in the early 16th century but a name for it has not been located until 1547 when it was called, in Sweden, a snapplås. It was first given the name *snaphance* in England in a document dated 1580

Before the end of the 16th century, the word snaplock or snaphance⁴ (in a suitable translation) had been adopted throughout much of Europe. Snaphance was probably in use in England long before 1580 and continued in use by the military through the next century, even though at least two major improvements were made to the original lock design before 1640. They are now known to armshistorians as the First and Second Type ‘English Lock.’⁵ The word ‘snaphance’ ceased to be used for the ‘English Lock’ towards the end of the 17th century or beginning of the 18th century, by which time the English lock had been replaced by the French lock (i.e. the flintlock), a descriptive term that continued to be used for almost another century. But in much of Europe, “snaphance” has continued to be used and extended to include many other forms of flint ignition—miquelet and doglock, to name two—words which have a historic provenance of their own.

The wheel-lock, which did not play a particularly large roll in the British army, was known as a “firelock” until that word disappeared from service in the early years of the 17th century and the name ceased to be used. But in the last quarter of that century, the word reappeared, to become that used to describe the soldiers’ musket. It was common enough by 1701 when Nicholas Boon wrote his *Military Discipline, the Complete Souldier*³ for him to use it without comment, and it did not disappear until the mid 19th century when smoothbore muskets were replaced by rifled muskets.

Chapter Ten will look at the arms of the Islamic world, an area that for many years

The Vocabulary — Flint, and Pre-Flint Ignitions

When putting the outline for this book together, it was planned, as far as possible, to incorporate foreign language terminology into the appropriate chapters. But when you get into the early arms and although the words look and sound similar, they did not mean the same and in many cases were not time-related in meaning. But that did not stop many modern writers from using them as if they were interchangeable. Although the spelling which follows is consistent with the Oxford English Dictionary, many writer have elected to remove hyphens and join the modifying and root noun.

Matchlock: Any firearm fired by a match of fibre, or other material.

Snap-matchlock: A matchlock with a snapping action of the serpentine.

Wheel-lock: Any firearm ignited by a stone scraping against a wheel is a wheel-lock. The spelling was always wheel-lock in article titles published between 1953 and 1994.in the *Journal of the Arms & Armour Society* In 1994 the spelling became wheellock. The former is the preferred spelling.

Fire-lock: the term which formerly had been used to distinguish the wheel-lock from the matchlock and snaphance. Later used in England to refer to the flintlock musket

Flint-lock (with hyphen): Any of the family of ignitions fired by a stone striking against a steel, frizzen, or other ‘hammer.’ For clarity, it must have an expanded description unless referring to the entire flint family when “flint locks” is usually preferred.

Snaphance: A flint-lock with a frizzen (steel) on the end of an arching steel-arm and a separate pan-cover turned off manually or made to slide forward mechanically. Usually (but not always) with a horizontal sear

Snaplock: A word originating from the snapping action of the serpentine, cock, or hammer. A term often used indiscriminately to refer to a flint-using ignition but also used as snap matchlocks, to identify one of the family of early match locks.

English lock: A group of distinctive 17th century flint-locks, normally restricted to

England, fired by flint, with a lateral acting sear, and a one-piece frizzen and pancover. Known by contemporary users as ‘snaphance.’

French Lock, French flint lock: From at least the mid 17th century, the term used to identify (except in France), the lock which is now identified as “flintlock.” It is still a recognized and acceptable term.

Flintlock: The term flintlock is used in this work to mean a mechanism for igniting firearms by striking a steel or battery with a flint. The steel and pan-cover are made in one piece, with a sear moving vertically. The tooth of the sear engages in notches cut in the tumbler to set the weapon at half and full cock. (Lenks description).

Miquelet: A group of distinctive locks originating mainly in the Mediterranean and Islamic regions, distinguished by an external mainspring, a horizontal sear passing through the lockplate acting on the cock, and a one-piece frizzen and pancover, Other locks, originating mainly in northern Europe with similar characteristics but different appearance are flint-locks and must be identified with a descriptive or modifying noun(s). Since other locks may have similar characteristics, it must look like a Mediterranean miquelet lock.

Dog lock: Any of the forms of flint-lock or percussion locks having a catch or hook acting on the cock as a primary or secondary safe device. Normally requiring an expanded description of the ignition.

was sadly neglected in English and only within the past two decades has had any serious attention. It will provide a finger to point the reader, a guide, to the identification of work produced in the area of the Mediterranean Sea and further east. It was originally intended to incorporate this subject by ignition type but it quickly became obvious that there were so many distinctive characteristics to be considered that it was not practical.

Chapter 13 on the manufacture of gun locks began with a note found more than 50 years ago in the “1739 Armourer’s Indent” in the records of the Hudson’s Bay Company which listed “moulds for gun cocks,” a previously unknown term. It has been subsequently expanded to include references from at least seven contemporary descriptions of lock manufacturing techniques of the 18th century and 19th century.

Chapter 14 is a catalogue recording items in the writer’s research collection which in museological terms is an Accession Record: each item was entered in numerical order as it was acquired. That worked well until the number reached a couple of hundred when locating one became difficult. The problem was solved by the simple index which begins following the introduction to the chapter. Where a lock illustrated in this chapter has been used elsewhere to illustrate a discussion point, the caption will include the Accession Number in square brackets.

Locks are usually identified by their appearance when mounted on a gun or pistol with the front of the lock towards the muzzle and the rear (more frequently called the tail), towards the butt. To confuse things, the front external view of the lock is also that seen when mounted and the back is the internal view. The form of the internal components are just as distinctive – and perhaps more important than – the exterior view. The locks in this chapter include two views of each because the inside of the lock will often answer more questions than the outside.

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Throughout this book, an effort has been made to clarify the name applied to each of the ignition and lock variations. In 1983, Claude Blair wrote:

Perhaps no aspect of the study of early firearms has given rise to more confusion than the different ways in which modern writers apply the terms ‘snaphance’ and ‘flintlock.’ There can be no doubt that, historically, the two words were used synonymously for any type of lock that operated by striking a flint against a steel, whatever the precise details of its mechanism.⁶

There is evidence to dispute the “historic” use of “flintlock” and this will be discussed later, but his argument is valid. The point of establishing criteria for a lock category is to include all that can be readily identified without making it either too all-embracing, or too exclusive.

The earliest of the flint-using locks which appeared in the first half of the 16th century are now known in English as ‘snaphance.’ the word first encountered in a 1580 manuscript but obviously used much earlier.

Most definitions include a separate steel and pan cover and a horizontal acting sear—which for a starter would eliminate some of the very early Swedish survivors and most Italian snaphance. Therefore, in order to be considered a snaphance in this *Mémoire*, a lock need only have the steel or frizzen, mounted on an arched arm rising from the lockplate. To be fully identified, it will require a modifier or modifiers: i.e. “an Italian snaphance with a box sear,” etc. This will be discussed in Chapter Seven but this brief



A020 Fig. 3. Illustration with the related text from *Jahrbuch des Bernischen Historischen Museums in Bern*, XXV. 1945 showing the late use of the word “snaphance” to identify a very fine Caucasian miquelet carbine.

definition will suffice for the present.

Snaphance; with a national or regional equivalent, was brought into a number of languages to identify the earliest flint-locks. In English, over time and as new patterns of lock were introduced, new words or phrases were created to identify the type.

Snaplock is also an old and good word. The earliest document yet discovered which describes a flint-using arm is dated 1547 when the King of Sweden ordered a *snaplås* be given to his hunter. But it is frequently used by modern writers where another would be more accurate, as it did not turn up in English until the last half of the 20th century. The use of “snaplock” will be discussed in more detail under the Swedish snaphance lock in Chapter Four.

In the 1930s and 1940s, there was a tendency in America to drop the hyphen when a noun was used to modify another noun. I have not felt comfortable with that: the Oxford English Dictionary has not recognized it for flint-lock, and, in this case, as will be pointed out later, it has contributed to some of the confusion in the terminology of the subject.

Flint-lock; with the hyphen, (or flint lock without the hyphen), when referring to the entire flint family, will be used to describe any flint-using mechanism with the exception of the flintlock. For consistency, wheel-lock will be used with the hyphen.

Flintlock; when the word flintlock is used it will refer only to the lock which from the mid 17th century had been universally (except in France), known as the “French

Lock,” but was applied in 1939 to the lock with a one-piece steel and pan cover, and a vertical acting sear, by Torsten Lenk in *Flintlaset dess uppkomst och utveckling*.⁷

• • • • •

There are two branches on the family tree with flint ignitions in the major part of this study: “*The Snaphance*” which probably originated in a Germanic language area of central Europe in the early 16th century and “*The Flintlock*,” about which considerable evidence suggests was originated by a member of the le Bourgeois family of gunsmiths at Lisieux in Normandy and later of Paris. Each has distinctive characteristics, not all of which are held by every example. These will be covered at the proper time.

Within each class there were countless variations, both evolutionary in nature and geographical preferences, some of which have been studied to a greater or lesser degree and the literature on some is abundant; many others are waiting for detailed study. The purpose of this first chapter is also to provide a brief historical outline, record characteristics, and provide an introduction to their dating. But, above all, it is to provide the vocabulary necessary to distinguish one from the other.

The etymology of these four words will be frequently discussed, where appropriate, but it is important to recognize that in this study, if one is used, it will make reference only to a ignition with the above characteristics. (See also the chart on the previous page).

NOTES

1. Grancsay, Drejholt, etc. List Royal Catalogues
2. This was quoted by Lt.-Col. Henry W.L. Hime, in his *Gunpowder and Ammunition—Their Origins and Progress* published in 1904 which he demonstrated using a complicated algebraic-like formula (see Chapter 5, note 1).
3. Boon, Nicholas. *Military Discipline, the Compleat Souldier, or Expert Artillery-man: containing the several postures and exercises of the musket and fire-lock...* Boston: Author, 1701.
4. Godwin, Brian C., John S. Cooper & Michael G. Spencer. “The English Flintlock; its Origins and Development.” *The Park Lane Arms Fair*, No. 20, 2003. pp. 49-90.
5. *Ibid.*,
6. Blair, Claude (Ed). *Pollard’s History of Firearms*. Feltham: Country Life, 1983, p. 67.

Chapter 1

An Introduction to Ignition

Sulfur, Charcoal, Saltpeter, Gunpowder, Hand cannons, Etc.

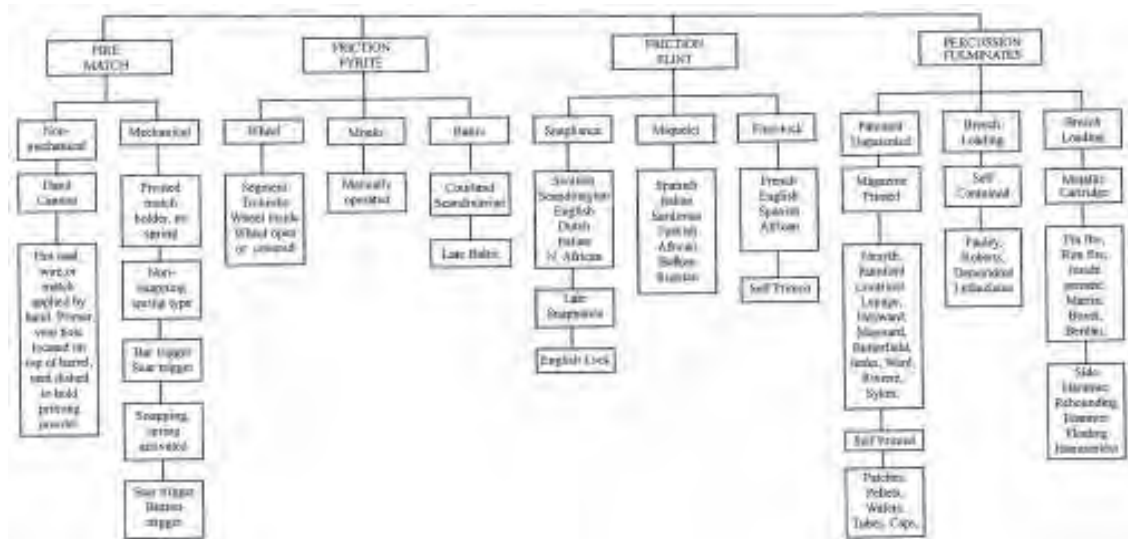


A212-2Fig. 1.1. Hand cannon from a manuscript of 1468. There are many contemporary descriptions of hand cannons in use but none describing how the soldier maintained a point hot enough to ignite the priming. *The Quinte Curce collection, The British Library*

Any study of arms created in the period prior to the 15th century when this study begins, must be treated as a two-pronged attack dealing first with gunpowder on one side and the gun on the other. Dr. Joseph Needham, after whom the East Asian History of Science Trust named their Research Institute, and editor of the *Science and Civilization in China*¹ has, using archaeological and documentary evidence, traced the evolution of firearms beginning with the pre-gun fire-producing weapons and much of what follows is based on that work.

Gunpowder (during almost the entire period covered by this *aide mémoire*), was an amalgamation of sulfur, salt peter and charcoal.² In England by the mid 18th century, the Board of Ordnance which in England was “responsible for all manner of warlike stores” considered that the most effective formulation was 10% sulfur, 15% charcoal, and 75% saltpeter.³ But that had not always been the case.

When the combined sulfur-charcoal-saltpeter was introduced sometime in the mid 9th century, it contained relatively little Saltpeter which produced a loud noise and considerable flame. At that time it was an effective tool to be added to similar fire-related weapons of war including sulfur, bitumen, naphtha, and Greek fire, but it did not create the gas required to expel a projectile. That required additional Saltpeter, a discovery which took almost 500 years before it was made. Dr. Needham recorded “it was...around +850, that the early alchemical experiments on the constituents of gun-



A094 Fig. 1.2 “Six and One-half Centuries of Firearms Ignition Progress,” a chart compiled by Louis S. Cherepy Sr. which graphically records the developments included in this Aide Mémoire

powder, with its self contained oxygen, reached their climax in the appearance of the mixture itself.”⁴ Later, he summarized the history up to the introduction of the hand cannon.

The moment has now arrived when we must pause and look back over the way we have come. We have been able to show that there was no great break in continuity between the oldest slow-burning incendiary weapons, through the quick-burning ones such as the petrol flame-throwers, to the deflagration of the first gunpowder mixtures. Sulphur and charcoal were both of very ancient use; it was the addition of saltpeter which gave a new turn to the story. But for a long time the compositions seemed be no more than better incendiaries, when it was found that they would explode when placed in weak-walled containers, still later that the explosion could be strong enough to break cast-iron bombs and grenades into fragments. In due course, explosive mixtures were produced of sufficient power, when used in land-mines and the like, to give brisant explosions capable of destroying fortifications and breaking down city gates. Eventually the true propellant property of optimally fast burning within the bore of a metal-barrel hand-gun or bombard was attained, capable of sending on its way a projectile, whether simple or composite, which perfectly occluded the charge. We saw too that the barrel, first of bamboo and only later of metal, long preceded the true gun, for advantage was taken of the incendiary property of gunpowder compositions to make those five-minute flame-throwers the fire-lances and eruptors, ancestors respectively of the gun and the cannon.⁵

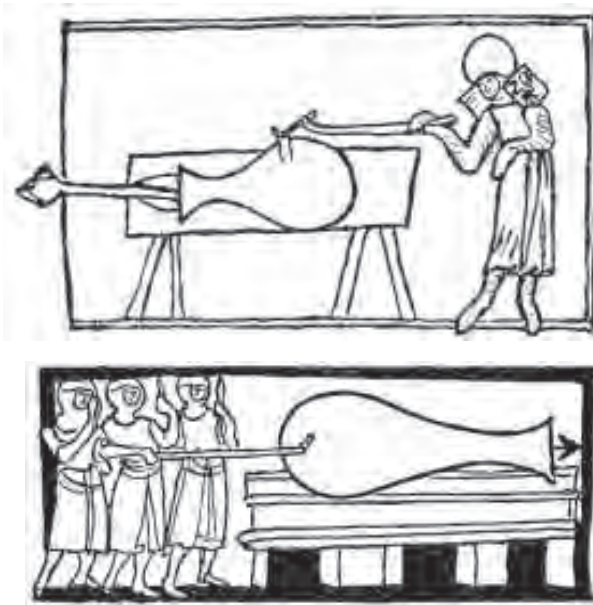
This took about 400 years, based on the years between the introduction of S-S-C in the 9th century with a date for the introduction of gunpowder being calculated by discovery of what is certainly one of the earliest firearms. It was found by archaeologists in Heilungchiang province, Manchuria and was part of a hoard considered to have been buried because of a rebellion that took place in 1287 thus suggesting a date prior to A.D.1290. The gun is much like the hand cannon illustrated in Fig. A1.5, measuring approximately 12 inches (30 cm) long and weighing approximately 8 pounds (3.6 kg). There are no barrel rings and the bulbous breech is somewhat larger and egg shaped.⁶



A651 Fig. 1.3. (above left). Bronze cannon with an engraved inscription providing the date A.D. 1332. It is 14 inches (35cm) long and 4.5 inch (11.4cm) diameter at the muzzle. It is considered to be the earliest surviving dated gun. *National Historical Museum, Beijing*

A 652 Fig. 1.4. (lower left). Bronze hand cannon with an engraved inscription dating it to c.1409. *Royal Arillery Museum, Woolwich.*

A646. Fig. 1.5. (right). A bronze hand cannon approximately 12 inches long with an engraved inscription indicating manufacture in the *hung-wu* era of the Ming Dynasty (A.D. 1368-1398). The barrel is cast with a muzzle ring and two rings towards the breech. There is a bulbous form in the area of the breech, a small touch-hole, and a socket for a wooden tiller. *Royal Ontario Museum, Toronto.* 920.1.23.



A660, 661. Fig. 1.6, 1.7. The earliest illustrations of a cannon. Renderings by Howard L. Blackmore after the two images from illustrated manuscripts by Walter de Milemete dating from 1327. The first from *De Nobilitatibus, sapientiis et Prudentiis Regum* in the library of Christ Church, Oxford, the second from *De secretis secretorum Aristotelis* in the British Library, London. Later 14th century records suggest that the match in this case was the tip of a heated iron predecessor of the linstock.

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Moving now to Europe, there is a gap for about the last two decades of the 13th century and the first two of the 14th century — approximately a half-century, about which almost nothing can be documented.

A large part of the problem can be attributed to language; all development in this period took place where the written word must be translated, first into a current version of the original. The size of the vocabulary of man during the period when firearm development was in progress was not large enough to satisfy our needs and by today's standards was often ambiguous. Illustrations, if they ever existed, appear to have not survived. This is a job for the specialist by avocation in the area, and a linguist by heredity or vocation—preferably both and there are not enough of them doing the work for the job that has to be done.

The earliest firm evidence to support the existence of firearms in Europe is as good as you can get: A document in the Archivio di Stato of Florence which includes a record of payments made to Rinaldo di Villamagna, a “master of bombards, for making iron balls, casting cannon, and obtaining gunpowder” made in 1326, and two illustrations from illuminated manuscripts in England by Walter Milemete dated 1327.

Walter de Milemete

Two illuminated manuscripts by Walter de Milemete, chaplain to Edward III (1327-1377), King of England, contain the two earliest images of European firearms. The first, dated 1326 (January, 1326/7), the property of Christ Church, Oxford but now housed in the Bodleian Library, Oxford, is found in *De Nobilitatibus, sapientiis et Prudentiis Regum*, inscribed and dated for presentation to the king on his coronation in 1327. The second, *De Secretis Secretorum* is unsigned, unfinished, and undated, but known to have been compiled by de Milemete, 1327, in The British Library, London.

Both show a vase-like gun barrel of brass or bronze resting on a flat table with no means of attachment, the Oxford gun is manned by a single gunner, the London gun by



A656 Fig. 1.8. The Loshult gun, perhaps the earliest surviving European gun, was found at Loshult in southern Sweden in 1861. It is almost 12 inches long and weighs nearly 20 pounds. *Statens Historiska Museum, Stockholm, No. 2891*

a gunner and two assistants. All men are wearing mail covered by a cloth garment. In both illustrations, the projectile is a steel headed arrow and the gunner is about to ignite the charge using a rigid match, perhaps of metal or perhaps of wood. In the Oxford rendering, he is targeting the entrance to a fortress.

The accuracy of objects in illuminated manuscripts must always be viewed with considerable suspect; they are invariably miniatures and distorted to serve the intent of the artist. This has resulted in considerable discussion about the size of the guns, with estimates based on the relative height of the gunners.

There have been many attempts to interpret the Milemete illustrations which are listed below in the recommended reading. Each should be consulted but the last paragraph in an article by Wilfred Tittmann published in the *Journal of the Ordnance Society*, is worthy of reprinting.

I hope I have been able to convince the reader that the guns illustrated in the Milemete manuscripts are of exaggerated form, that they are not true to scale neither in relationship with their depicted surroundings nor with the guns of their time and that therefore they cannot serve as reliable technological sources. However, with all restrictions that scholarship requires, they are contemporary testimonials of very early firearms, they are the earliest known dated depictions of them in the West, and they do show a reasonable military deployment (even if not to scale) – in that they show the firing of arrows from gunpowder weapons which are about to go into action immediately in front of the gate of a castle or town.⁷

The Loshult Gun

The Loshult gun was found by farm workers in 1861 at Loshult in Skåne, southern Sweden. It is relatively small, measuring 12 inches (30 cm) in length with a bore diameter of 1.4 inch (36mm), weighing approximately 20 pounds (9.07 kg).⁸ It is now in the Statens Historiska Museum, Stockholm.

There were no associated artifacts which would help to date it and no written record relating to it or any contemporary European arms have been found.. With a little imagination it could be related to the Milemete guns but there is no justification for that suggestion, although it is assumed to be approximately contemporary with the Milemete illustrations or perhaps slightly earlier.



A837 Fig. 1.9. The Szechuan Bombard. In his 1988 article in *Science and Technology*, Dr. Needham wrote "... a bombard held by a small demon with two horns. The bombard or handgun is being let off, as appears from the blast issuing to the right from its muzzle, and a projectile is also represented in the flames ...the sculpture is indeed that of a bombard, and the date must be as early as A.D. 1128" Photo courtesy Howard L. Blackmore.

The Szechuan Bombard

In 1985, Robin Yates, a graduate student at Oxford,[1] returned from China with pictures of the large, life-like statues dateable to as early as A.D. 1128 from a Buddhist cave temple in Szechuan. One of the figures carried something reminiscent of the gun illustrated in the Milemete miniatures. This was introduced by Dr. Needham as a firearm in *Science and Civilization in China* published that year and later expanded upon its history.[2] Other suggestions have been proposed which contradict that theory. [3]

Notes and recommended reading

1. *Science and Civilisation in China* is a monumental series of books, under the editorship of Joseph Needham (1900-1995), published by Cambridge University Press. Volume V, covering chemistry and chemical technology, Part 7 is titled *Military Technology: The Gunpowder Epic*, edited by Joseph Needham, Ho Ping-Yu [Ho Peng-Yoke], Lu Gwei-djen and Wang Ling. It is a history, in just under 750 pages, published in 1986. Henceforth to be referenced "Needham, 1986."
 2. For some reason, the various formulae created with these three ingredients have also been called 'gunpowder' even though produced more than three centuries before their application to the discharge of firearms. This could be compared to saying that a martini, is a cocktail consisting of an ounce of gin and a dash of vermouth, and a cocktail made with an ounce of vermouth and a dash of gin, would still be a martini. There must be another, more accurate word (I have elected to use "SSC"), that could be used to identify the pre-gun powder mix of saltpeter, sulfur, and charcoal or the term proto-gunpowder, a description occasionally suggested in another context, by Dr. Needham. The first practical smokeless powders were introduced in the 1880s.
 3. Partington, J.R., "Gunpowder" in *Encyclopedia of Firearms*, (H. L. Peterson, Ed.) New York, E.P. Dutton, 1964, pp. 146-150.
- 6 Chapter 1 — Introduction

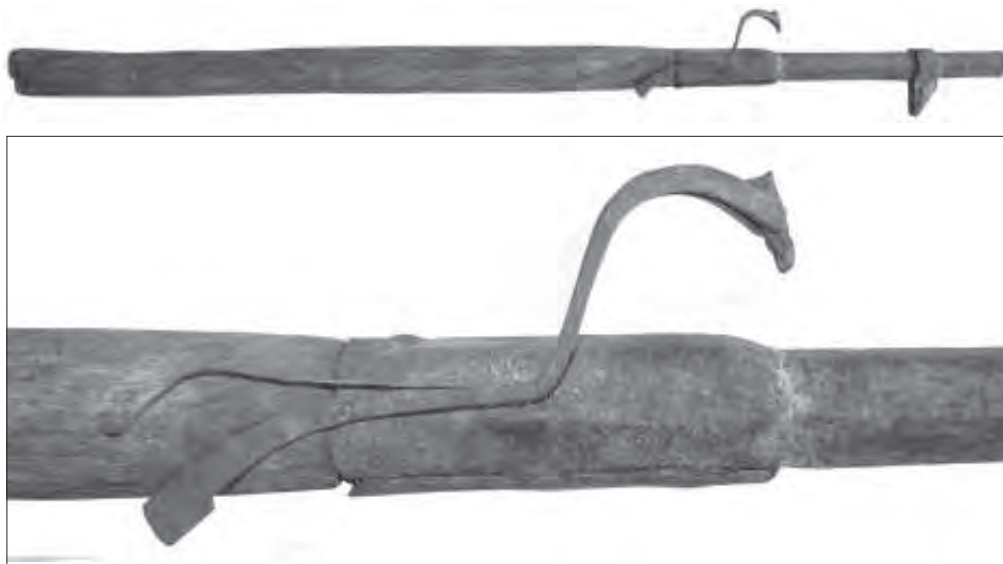
4. Needham, 1986, p. 7.
5. *Ibid.*, p. 342.
6. *Ibid.*, p. 293, Fig. 84.
7. Tittmann, Wilfred. "The Guns of Archbishop Baldwin of Trier 1331/32 and the Guns in the Milemete Manuscripts of 1326/27: Some Critical Comments." *Journal of the Ordnance Society*, Vol. 17, 2005, p. 79.
8. A detailed discussion of the construction, an analysis of the metal, and the results firing a reproduction of the Loshult gun, with powder of contemporary composition, has been recorded by Peter V. Hansen, "Casting and Firing a Replica of the Loshult Gun." *The Journal of the Ordnance Society* . 5-18, Vol. 14, 2002.

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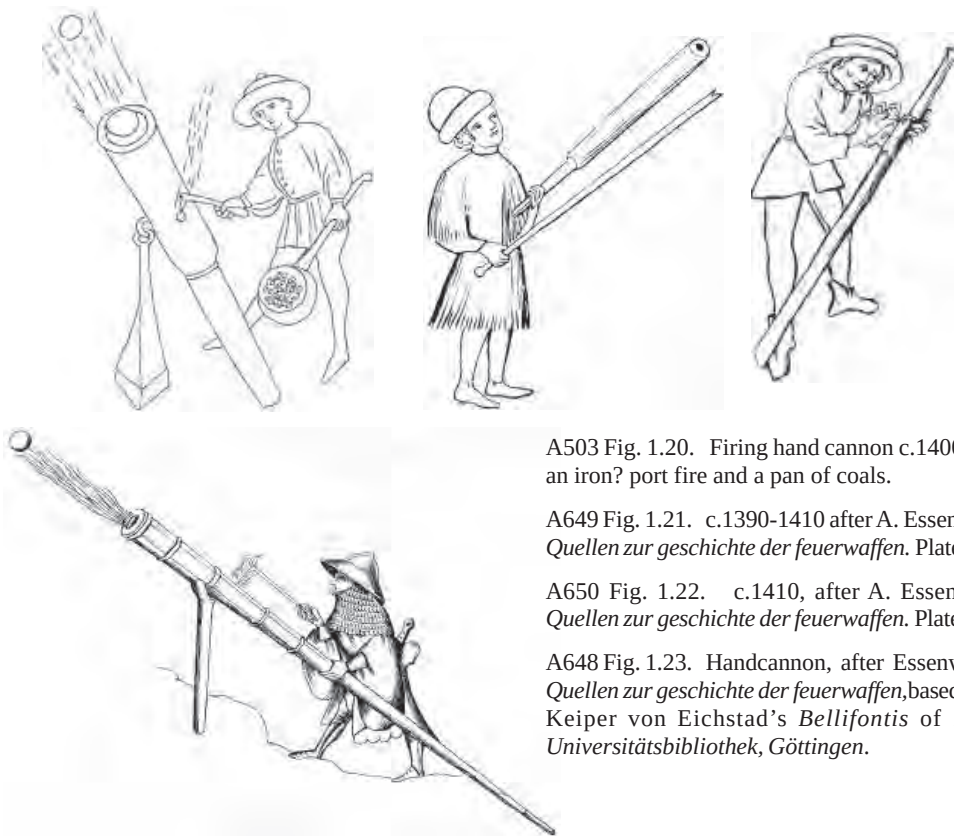
1. Now Professor Robin D.S. Yates, East Asian Studies, McGill University, Montreal, Canada., Department of East Asian Studies.
2. Joseph Needham, "The Oldest Representation of a Bombard" *Technology and Culture*, Vol. 29, No. 3 (July 1988), pp. 594-605.
3. Howard L. Blackmore. "The Oldest Dated Gun." *Arms Collecting*, Vol. 34, No. 2 (May 1995), pp. 39-47.

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- Rietsche, Bernhard. "Meine Gotischen Handfeuerrohre." *Park Lane Arms Fair*, No. 24, (2007), pp. 47-56. A well illustrated and detailed catalog of "handguns" dating from the 14th to 16th century based upon 14 specimen from the author's collection.
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A370 Fig. 1.18, 1.19. An early 15th century hand cannon, altered, probably about 1430, by the addition of a serpentine match holder and the barrel hook. The tiller appears to be contemporary; the touch-hole is on the top of the barrel. This may be the earliest surviving matchlock. *Michael Trömmner collection, Abensberg.*



A503 Fig. 1.20. Firing hand cannon c.1400 with an iron? port fire and a pan of coals.

A649 Fig. 1.21. c.1390-1410 after A. Essenwein. *Quellen zur geschichte der feuerwaffen.* Plate B.I.c

A650 Fig. 1.22. c.1410, after A. Essenwein. *Quellen zur geschichte der feuerwaffen.* Plate B.I.d

A648 Fig. 1.23. Handcannon, after Essenwein's *Quellen zur geschichte der feuerwaffen*, based upon Keiper von Eichstad's *Bellifontis* of 1405. *Universitätsbibliothek, Göttingen.*



A647-2A mounted knight in armour firing a mid-15th century handgun dated 1449. After a manuscript in *Graf Wilezek library, Vienna*

The Matchlock

Luntlås, lontslot, platine a mèche, das luntenschloß

The Matchlock: luntlås (Danish); lontslot (Dutch); platine a mèche (French); das luntenschloß (German); acciarino a miccia; acccianino a la micheletta (Italian); fusile de mecha; (Spanish); luntlås (Swedish).

Matchlock is the name given to the earliest gun that, based upon early illustrations, was ignited by a red-hot metal rod or, more likely, a glowing coal on the tip of a punk-wood stick.¹ Later, a cord or match (Match, or Match-cord, Slow-match) clasped in the jaws of a curved arm known as the serpentine, became the igniter of the priming powder. This does not mean that the mechanism became immediately accepted: the hand held match remained for many decades.

The earliest illustration of such a mechanism is found in the *Codex Vindobana*, a 1411 dated illuminated manuscript in the Vienna Nationalbibliothek. The device consists of a simple arm to carry the igniter on one end of an offset bar of iron which is pivoted in the offset and leading to a trigger laying under the tiller or stock. The long bar with one end altered to hold what appears to be a metal pin that would have been red heat and the other end curved to take on the appearance of the trigger reminiscent of those on the crossbows which had been in use for more than 200 years. Squeezing the trigger would move the serpentine gently down into the pan to ignite the priming and discharge the gun. This cannot be described as a lock but it was certainly a major step in that direction and, although other mechanisms were soon created. Illustrations of that primitive arrangement were created over more than 50 years, indicating that it had not been completely abandoned.

Gunmakers being what they are, there would have been considerable experimentation before 1500 in an effort to improve the method of firing, but no record until the Mertz manuscript of 1471 has apparently survived.² Nevertheless, it is known that by the end of the century, mechanisms had appeared that served the purpose to the satisfaction of the military throughout most of Europe.

Before dealing with the lock mechanism it would be desirable to look at the forms of matchlock ignition. Walter de Milemete's 1327 illuminated manuscript of a gun provides the earliest evidence in the illustration of a canon being discharged with an ember in some form of heat on the tip of a curved handle. All of the cannon or hand-cannon illustrations available that were produced in the decades which follow show the same method of discharge with a rod, probably of iron. It has been assumed that the tip of the rod would be "red heat," which would have been most effective. Maintaining a fire to achieve that state would not have been difficult during a siege but would have been quite impractical for soldiers on patrol.



A201 Fig. 2.1 (Right) The earliest illustration of a gun discharged by a mechanism of any kind is found in *Kunstauss Buchsen zu Schiessen*, a 1411 dated manuscript in the Bayerisches Staatsbibliothek in Munich.

A217 Fig. 2.2 A centaur by Jean Froissart (c.1337-c.1410) from a manuscript dated to 1568 in the Breslau State Library.

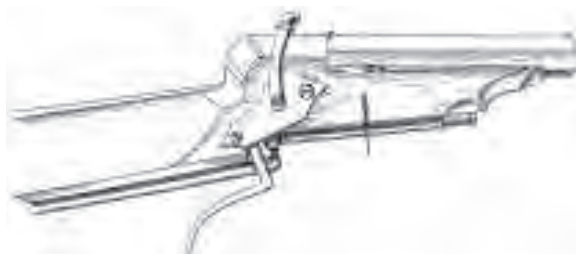
The alternative which appears was most common, is the slow burning cord made familiar by Jacob de Gheyn's series of illustrations prepared for *The exercise of Arms For Calivres, Muskettes, and Pikes After the order of his Excellence Maurits Prince of Orange Counte of Nassau etc*, first published in 1607,³ but perhaps engraved as early as 1595. He illustrates the loading and firing of a matchlock and the motions necessary to manipulate the match. His engravings are of such high quality and have been reproduced so often that they provide the image which immediately comes to mind with any reference to a matchlock.

A single illustration of a knight on horseback, dressed in armour, and about to fire a handcannon confirms that the match as illustrated by de Gheyn was available at an early date. The illustration from *Tractatus Pauli sanctini Ducensis de re militari et machinis bellicis* in the Bibliothèque Richelieu. It has been dated by Clephan about 1428 or perhaps a little later.⁴

No early description of the match has been found but M.A.G. de Jong has recorded that Zeeland depended almost entirely in the match spinning mills in Gouda for slow-match. Until the end of the 16th century, three Gouda merchants sold their slow-match directly to the arsenals in Zeeland. In 1597, the merchants Adriaensz, Dircksz, and Pietersz, delivered 25,590 puns [pounds] of slow-match to the arsenal in Veere⁵

Casimir Simionowicz writing in 1650 has given us a description of its manufacture. The match, known as slow-match, was made of hemp or flax and later from cotton. It is probable that each maker had a recipe he considered best but this description by Siemienowicz can be considered a starting point.

Let there be first twisted some Rope, of half an Inch Diameter, made of the second Combings of Flax or Hemp, free from any of the Stalks. Then take of Ashes of *Oak*, *Ash*, *Elm*, or *Maple*, three Parts, of *Quick Lime* [Calcium Oxide] one Part, and make a *Lye* of it as usual; to this you shall add one Part of *Saltpeter* [potassium nitrate]; and of the Juice of Horse or Ox-Dung well filtrated, and gently expressed through a Woollen



A202 Fig. 2.3. Above. The earliest illustration of a gun discharged by a self contained lock is found in *Kunstaus Buchsen zu Schiessen*, a 1471 dated manuscript in the Bayerisches Staatsbibliothek, Munich. This rendering was published in *Quellen zur geschichte der feuerwaffen* by A. Essenwein, in 1872.

Cloth, or Sieve, 2 Parts. These Ingredients being well incorporated, shall be poured upon the Rope in a Brass Cauldron, well fixed upon a Furnace; the Fire shall be at first lighted under it by Slow Degrees, till it is arrived to the highest Pitch. Thus it must boil continually for the Space of two or three Days, being constantly fed with fresh Supplies of your *Lye* as fast as it is wanted, lest either your *Match* or *Cauldron* should burn. In short, your *Match* having undergone this Ebullition, you shall take it out of the Liquor, and wring it well, continually wiping of the Liquid which squeezes out of it with a Linnen Rag; and then hang it upon long Poles to dry in the Sun; after which it may be laid up in some convenient Place till wanted.⁶

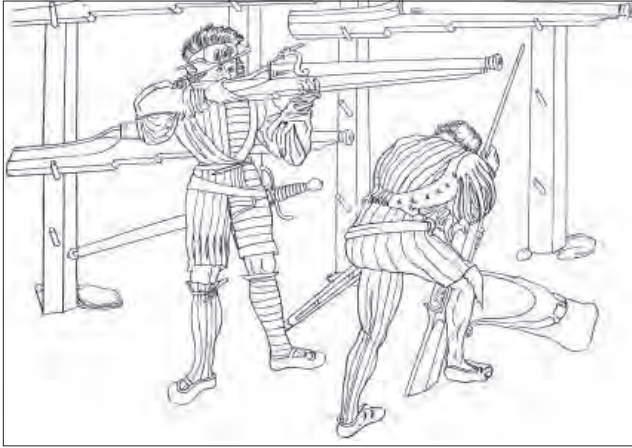
A later description of slow-match production prepared by J. W. Bailey, Acting Professor, Chemistry &c., for the students at the U.S. Military Academy at West Point in 1839 repeated much the same process but including cotton and hemp as the cord material and adding one-sixteenth part of Nitre [potassium nitrate/saltpeter] to the mix. He noted that “If one inch of the match thus prepared will burn twelve minutes [five inches/12.5cm, per hour], with a hard live coal, it may be considered of a good quality” and “match made of cotton rope does not require so much preparation and burns well ... To prevent the fire from running along the knap, it is necessary to cover it with a coat of sizing, which is made of glue dissolved in warm water, to be put on with a rag, rubbing the knap always in the same direction.”⁷

Contemporary illustrations suggest that the match in this form was not the universal method of choice. By the mid 16th century, illustrations of musket-carrying infantrymen were becoming common and the igniter shown in their muskets are usually short – probably under about six inches (15cm), probably round, of relatively small diameter, and rigid. Wood punk, a form of charcoal made from the wood of dead, rotting, trees by ‘cooking’ in a closed container in the usual way until it turns to charcoal, produces a coal that holds a spark well and is not easily extinguished. In cooking, the wood loses some diameter and weight but if branches of a suitable diameter were selected, the result would conform to the illustrations.

.....

Early in the 16th century, iron founders in Europe had created water driven rolling and slitting mills to produce wrought iron bars economically and in quantity. By about 1510, they would have been available in the major centres.

Gunmakers took full advantage of the new technology and produced locks that required very little labour. For many years, the lockplate for a matchlock was a simple strap of iron with parallel sides and square ends. Most plates were straight, some were



A369. Fig. 2.4 The arsenal of Maximillian I, c.1500, illustrating an early, rigid form of match. After Essenwein's *Quellen zur geschicht der feuerwafen*, based upon the original illustrations in *Maximilianische Zeugbücher* illustrated by Jörg Kölderer, Innsbruck, c.1502-07, Austrian National Library, Vienna, Cod.Vind.

A225 Fig. 2.5 "Hold your piece well." Plate 36 of the Caliver Drill from Jacob de Gheyn's 1607 printing of *The exercise of arms for calivres, muskettes, and pikes*, illustrating the use and handling of the matchlock and the manipulation of the match between his fingers and extra match hanging from his belt.



curved to conform to stock design, many had square ends but many ends had simple or complex shapes, depending upon the artistic bent of the lockmaker. Mechanically, locks were very simple with only six or seven parts.

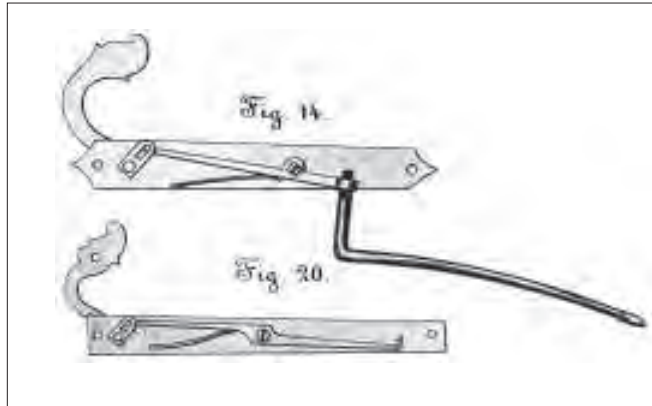
Three lock types with numerous minor mechanical variations, of a matchlock ignition may be encountered. Generally, the three categories are:

sear matchlock match-tricker lock snap matchlock

There is insufficient documentation to provide firm dating but that order of evolution is probably correct.

In central Europe, all three lock patterns were available by about the beginning of the 16th century, but it appears as if they shared popularity almost equally for the next 100 years, probably dictated by local preferences. By the end of the 15th century, the forward moving serpentine was being replaced by one pivoting at the front of the lock plate; by mid century, the sear lock with its long trigger had lost favour in most areas but as late as 1697 it was listed and illustrated on the "Mousquet de rampart." in the record of French military arms provided by St. Remy in his *Memoires de Artillerie* and in 1696, in the hands of an enlisted man in *l'Art Militaire François pour l'infanterie*.⁸

The pan for priming powder during much of the earliest years was, at first, placed in a depression on the top of the barrel. Soon, a purpose built pan became part of the barrel and in time, the pan became an integral part of the lockplate. These cannot be considered dateable characteristics but more, an indication of the training or preferences of the unidentified gunmaker. The barrel pan was present until well into the 16th century. If a pan cover is present it must be manually removed when the proper time



A224 Fig. 2.6 The Sear Lock (Fig. 14) and the Match Tricker Lock (Fig. 20) from *Die geschichtliche entwicklung der handfeuerwaffen* by M. Thierbach, 1886.

comes and it is frequently fitted with a flash-guard on the swivel post to deflect the flash away from the shooter. It is difficult to believe that a musket would be produced without some method of keeping the powder in the pan but that appears to have been the case.

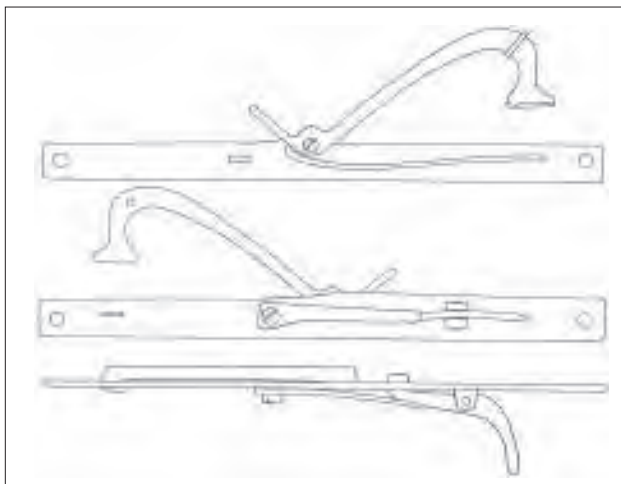
The identification of matchlocks dating from the 15th or early 16th century, only a few which have survived, is virtually impossible: they are not marked with either name or date, there is almost never any firm documentation, and there is little chronological background on which to base research. There are a few decorated and dated matchlocks from the last decades of the 16th century, and some archaeological evidence has been useful in determining an order of evolution.

Improvements in the linkage system and the design were added, and although the wheel-lock and the snaphance were soon created, the matchlock remained the ignition for most of the armies of Europe throughout the 17th century. It was not completely replaced in Europe until the early years of the 18th century but it continued in service in India where native troops in the East India Company army were issued with them until the middle of the 19th century, in China and Japan until almost the end of that century, and in the Levant until the early 20th century. The reasons for its long survival can be attributed to economy: it was inexpensive to produce and it was so simple that virtually nothing could get out of order,

The Sear Lock

The match (slow-match) as it was known in English, clamped in the serpentine of the sear lock was activated by a direct link from the serpentine connected to an arm resting parallel to the butt which when squeezed toward the stock allowed the serpentine to be gently, and under some control, drawn into the pan which held the priming powder.

Two variations of the end of the serpentine which held the match will be encountered. The most common is a vertical split running more than two inches into the arm, into which the match was placed and held in position by either a thumb-screw provided to tighten the jaws, or a sliding ring that would hold the jaws closed. Most frequently, the jaws were the shape of a monster The second is a short round tube approximately three-eighths inch diameter which would be suitable for either a cord or punk match but in was probably designed for a punk stick [M099].



A222 Fig. 2.7 A simple snap matchlock on which the tail of the serpentine is held at the cocked position by the lateral acting sear. The spring pressure on this from of lock is always light in order to mover the match quickly but without too much pressure.

Inside the lockplate, a link between the serpentine and the sear arm provided movement to the match when the trigger arm was activated and a light-pressure spring held all in the ‘ready’ position until required. A sear link on the square of the serpentine connected with a pin to the sear arm which was in turn pivoted on a peg protruding from the lock plate. The flat sear spring was locked in position by a pair of tenons forced into holes in the lock plate and then welded, to provide pressure against the sear arm.

The long trigger bar of the sear lock was threaded at the end that was then turned into the end of the sear arm. It had to be removed in order to take the lock from the stock.

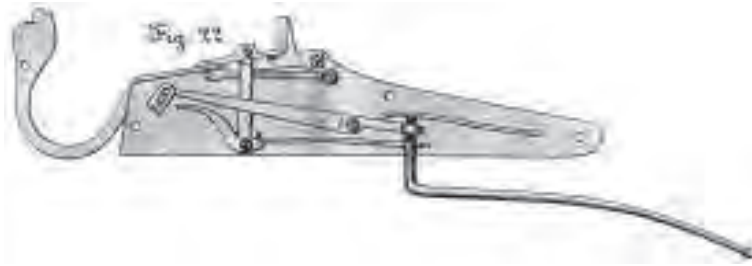
The Match Tricker Lock (a.k.a. the Trigger Lock)⁹

In the English army during the early years of the 17th century, the sear lock was “gradually replaced by the trigger lock.” This does not mean that the trigger lock was a recent development, it means only that the Ordnance was very conservative and slow to react.¹⁰ The only mechanical difference between this and the sear lock was the replacement of the long trigger under the stock with what was to become a conventional trigger and trigger guard. This was a development which appeared before the end of the 14th century and continued in one form or another until well into the 17th century.

The additional safety that the tricker lock gave to the matchlock, with its smaller trigger and trigger guard, made it much more desirable than the sear lock, but it was not readily accepted to the point where it replaced the latter. In England, it was not until the 1630s that a program of replacing the sear with the tricker was undertaken, and in the 1660s, a more modern lockplate form with a rounded surface imitating the new French locks being made at the time was introduced.

The Snap Matchlock

A ‘snap-matchlock’ with a spring-activated serpentine was probably considered to be an improvement. Pressure on the trigger released the serpentine to fall gently but quickly, depositing the match into the priming powder in the pan. It may have appeared during the late 15th century but based upon a single dateable survivor in the Landeszeughas, Graz it can be shown to have existed by 1525, and over the years was produced with a



A221 Fig. 2.8 A sear matchlock with “drawing pan lid,” a name used by the British Ordnance Department in the 1660s. In all of this class, the action of the sear activated a lever which moved the pan cover from over the pan. Illustration after Thierbach,

number of local and national variations. By the end of that century it was probably at least obsolescent for military purposes but it may have continued for the benefit of the sportsmen.

The advent of the snap matchlock allowed the replacement of the trigger with a built-in release button on the lock plate although, like the other trigger mechanisms, it did not become universal.

Matchlock “with drawing pan lid”

A class of European matchlock which has not survived in large numbers is one on which the pan cover was moved out of the way of the match on pulling the trigger. One lock of the type was illustrated by Joseph Alm in *Eldhandvapen* (1933) and again in *Armens eldhandvapen foor och nu.* (1953). His source was almost certainly M. Thierbach’s, *Die geschichtliche entwicklung der handfeuerwaffen*, published in 1886, who wrote:

“Fig. 22 [Fig. 2.8] shows the inside view of one of that kind of lock from the end of the 16th century, 1580-1600, at the museum at Darmstadt. It has the same long trigger lever. There is an arm bent forward on the foot of the sliding pan cover on which the front arm of the rod acts when the trigger is pulled, as it rotates downward around a screw. The pan cover glides forward until it is caught by a stud on the pan cover spring and held fast by it, holding the pan open for the match in the cock. If the pan is to be closed again, one pushes on the protruding push button which raises the pan cover spring with its stud, freeing the sliding pan cover which is pushed back over the pan by the second spring lying under the foot.

“There is a similar lock from the beginning of the 17th century, 1600-1620, (A.IV.5) in the city museum at Braunschweig. It differs from the one above only in that it isn’t fired by the long lever, but has a short trigger in the stock and the rear end of the rod is bent at a right angle for it. The sliding pan cover is not set up to be pushed back by a spring, but rather has to be closed again by hand.”¹¹

The late Howard Blackmore recorded that in 1664, the Ordnance informed the gunmakers that the snaphances were to be altered “to ye new patterne of Matchlock Musqt. with a Drawing pan lid” He continued “Another description was ‘with ye pann cover to draw with ye tricker’.”¹² There were no surviving examples in the Tower of London and only lock he knew of with that feature was a 17th century replacement for the wheel-lock on what is known as “Henry VIII’s gun.” An illustration of that lock appears in an article by Claude Blair in *The Royal Armouries Year Book No. 7.*¹³



A578 Fig. 2.9. A typical matchlock of Afghan origin, based upon the stock design. The match cord, measuring approximately .2 inch (5mm) diameter, was originally covered with a decorative blue silk (?) covering, most of which has disintegrated over time. It is wrapped around two brass match cases, one designed with holes to provide air and protect the glowing match, the other without holes to extinguish the match. *John C. Denner collection.*

The longevity – that is the survival of the matchlock long after there were good alternatives – can only be explained by the belief that it was a good system. An added advantage was undoubtedly the relatively low cost of manufacture, the simplicity of a system that created few problems requiring complicated repairs, and a weapon requiring very little time to train large numbers of men in its use. Robert Elgood quotes from the travels in the Middle East of T. Burckhardt in the 1820s another good reason to retain the matchlock: “the Bedouin preferred matchlocks and converted flintlocks back to matchlock when they found them because they were less likely to misfire.”¹⁴

The matchlock was so reliable that many customers gave orders to their gunmakers to produce matchlocks as a back-up ignition with wheel-lock, snaphance, or flintlock. These will be covered briefly at the appropriate point.

.....

The abu-Fatiylah in the Near East and the Far East.

As Dr. Needham and his team of researchers has convincingly shown in the introduction to Chapter One, the origin of cannons and hand cannons can be traced to the late 13th century in China, but the earliest small arms are first known from a European source in the early years of the 15th century.

The matchlock illustrated in 1411 (Fig. 2.1) was soon replaced in Europe, but with relatively minor alterations it turned up in the Middle East where it was identified in Arabic as *abu-fatiylah* — “Father of the Match.” That is a rather lengthy translation, and since *abu-fatiylah* is the name used historically throughout much of the Arab world, that is the name by which it will be known in this study when referencing the type. Usually it will be replaced by the regional description, i.e. “Indian matchlock,” where it was known as *bandúk toradár*.¹⁵

The alterations to 1411 were relatively minor but very significant; moving the rear



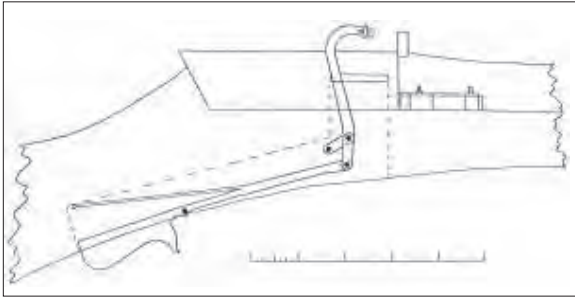
A723 Fig. 2.10 These stock forms identified with the *abu fatiylah* matchlock as illustrated by Lord Egerton of Tatton represent only a small portion of those which will be encountered as they tend to concentrate on the central regions of the Sub Continent, neglecting the extreme north and south. From the top, with the region followed by the village. 1. Northern, Punjab, Delhi. 2. North West Province, Pijnûr. 3. South central, Mahrattas. 4. South central, (revolving gun), Indore. 5. South central, Iodhpur. 6. Rajput, Udaipur.

A720 Fig. 2.11 A group of Indian matchlocks from the exhibition of Indian crafts and trades organized in the Punjab in 1864 from the catalogue compiled by B. H. Baden-Powell. His text accompanying it stated "The stock of a native gun is an unimportant part, and is generally narrow in form as will be seen from the plate. The only identifiable gun is that in the center is described: "One of the long guns from the Derajât has a sort of knob or pad at the end to protect the user from effects of the recoil."

pivoted serpentine to inside the stock and creating a trigger bar with a simple combination of levers to activate the match-holder requiring only tightening the grip on the small of the stock, along with incorporating a spring to return the match after release of the trigger, all of which gave the shooter considerable control over aiming and firing. The pan was formed as part of the barrel and the pan cover was usually pivoted, to be manually turned off. Others would have been provided with a cover either pivoted on the pan or a clip on a chain to be slipped over the pan by the shooter.

It is not known where, or when, this improvement appeared but it must have been a date in the first half of the 15th century; Professor Paul Wittek recorded that "Mehemmed II (1473-1481) is said to have used [muskets] against Constantinople" and "by 1465 muskets must have been well known to the Ottomans and no longer regarded as a novelty"¹⁶

The *abu-Fatiylah* form was used from the Ottoman Empire in the west to China in the east. This does not confirm that the design originated in Anatolia but it provides a strong suggestion and the constantly expanding borders of the Ottoman Empire spread *abu-Fatiylah* at least as far east, as western China. From its arrival on the scene, the mechanism continued virtually unchanged and was still in use in many of the same



A210 Fig. 2.12. The simple mechanism of the Eastern matchlock as illustrated by G. C. Stone in his *Glossary of the Construction, Decoration and Use of Arms and Armor*, 1934.

areas until well into the 20th century.¹⁷ Identification of the country of origin by this form of matchlock is impossible, but in time, stock designs will be better recognized.¹⁸

Indian matchlock

In much of the period covered by this study, India was known as Hindustan, or the “Sub Continent,” stretching from the Indian Ocean in the south, to the Himalayan mountains in the north, and included numerous races of people many of which influenced weapons design.

On December 31, 1600, an English Royal Charter, under the name *Governor and Company of Merchants of London Trading into the East Indies*, (aka, the [English] East India Company) was granted by Queen Elizabeth I. The Company expanded its territory as the years passed and created a company army which until well into the 19th century Indian native troops were armed with matchlock muskets of the type used in the Ottoman Empire 300 years earlier.

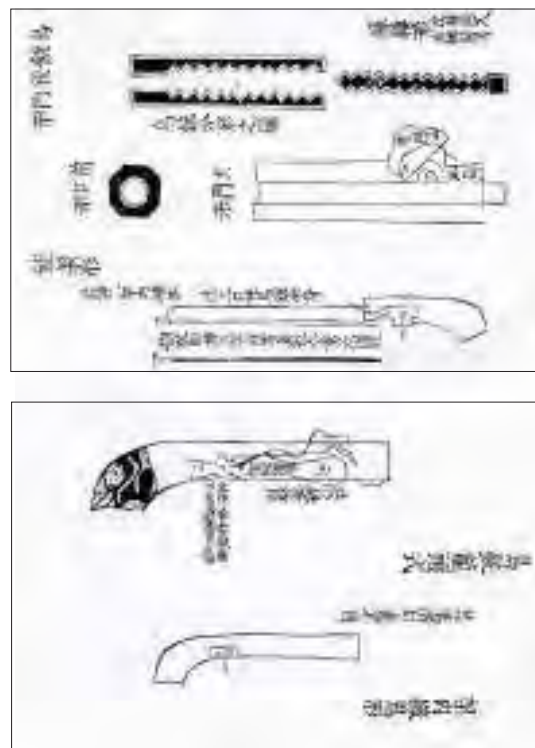
After 1858 when governance was taken away from the East India Company, the British territories in India became known as the British Raj which included the areas under regional Princes and British governors.

Lord Egerton of Tatton,¹⁹ who began his serious study of Indian arms in 1855, wrote in *Indian and Oriental Arms and Armour*, “I have therefore tried to arrange this collection as far as possible from an ethnological point of view, as it ... gives some idea of the number of different races of which our Indian Empire is composed.” He continued, “If I had tried to arrange the collection on an historical basis, as is usually done in the case of European arms, I should have had great difficulty in determining the date of the specimens. For not only do we find in India the rudest and most civilized races living side by side, but from the stationary character of Indian art, the changes produced during the period of several centuries may be less strongly marked than those affected during a few generations in Europe.” In his introduction to the 1968 reprint, H. Russell Robinson, Oriental specialist at the Tower of London, wrote, “without this book we would indeed know very little about Indian arms and armour.”

Most 20th century collectors randomly identify most *abu fatiylah* as Indian. This is not surprising. Every Indian ruler maintained a many-thousand-man standing army, most of which were armed with matchlocks and in their arms stores would have been many thousand more to be available in time of need.^{FN} Large quantities of Indian matchlock muskets would have come onto the market in the last half of the 19th century so that in many cases the collector would be correct although identification of where they originated in India is still question with not many answers.



A705c Fig. 2.13. (left) The translation of the text accompanying the illustration provided by Chao Shih-Chên in his 1598 *Handbook* records that it is of Turkish origin which “on pressing the trigger, the cock falls, and after ignition it rises again....When firing one should only squeeze the trigger, not pull it, ...the touch-hole is slightly further away from the place where the eye takes aim (than in the case of the Japanese bird-beak gun), and hence the smoke and flame developed when the musket is fired affects the eye and startles the musketeer less. Needham, Fig. 174.



A705bc Fig. 2.14, 2.15. (right) Two illustrations of the Bird-Beak guns contained in the manuscript *Chou Hai Thu Pien* by Chêng Jo-Tsêg produced in 1562. Dr. Needham’s translation of the text might make it possible for him to interpret the mechanisms of these two 1562 illustrations, otherwise, it is impossible (Needham, 1988, (Fig 170, 171).

Baden-Powell described the matchlock as “fired by a *falita* [a typographical error for *fatila*] or slow match, and called *bandúk tora dár* this latter word is said to be derived from the *taur* or *tor* the Elephant creeper, the fibrous stalks of which, when dry, were used for slow matches.”²⁰ He was not quite correct when he wrote “The locks of guns need no remark. There is first the simple matchlock, which consist merely of a trigger, with a small bar, which allows the piece of hooked metal which holds the ‘*falita*’²¹ or match, to drop and come into contact with the pan; ...”

The lock of one *fadiylah* is much the same as any other and regional differences are only embodied in the shape and decoration of the stock and barrel. The 19th century research of Lord Egerton of Tatton and the 20th century research of Ian Bottomly have provided a good start, and in some cases, the illustrations in Appendix XVI may be of assistance.

Chinese matchlock

It has usually been considered that small arms arrived in China from Japan shortly after their introduction in that country by Portuguese travelers in 1543. But Dr. Needham suggests,

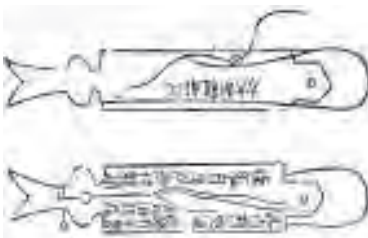


A717 grey Fig. 2.16 The trigger bar curves away from the stock at a greater distance than would be expected and the hole for the serpentine is covered by an iron plate. The pan has a crude cover that swings from the front to open. *Royal Literary & Scientific Institution, Bath, U.K*

“perhaps the first muskets to reach China were neither Portuguese nor Japanese, but Turkish? This possibility arises from the accounts ... in *Shen Chhi Phu* (Handbook of the Magically Efficient Tools, i.e. Muskets) finished in 1598. The background story takes us from the South-east to the far North-west of China, and it starts at the beginning of the 16th century. The people of eastern Sinkiang were Uighurs, mostly Muslim, of Turkic speech, and naturally had relations with the Islamic culture-area that reached as far West as the European Balkans including old Byzantium, now Istanbul.”²²

The 1598 “*Handbook*” contains four full-page musket illustrations, three of which are not really identifiable, but the fourth, illustrated above (Fig. 2.14), when combined with a translation of the accompanying text, is obviously an *abu-Fatiylah* of a form found in the Near East and similar to a matchlock collected in Tibet in the 20th century.²³

Dr. Needham’s conclusion was that the matchlock was introduced to China from two different directions: in the early 16th century from Turkey by way of the Muslims of Sinkiang, forming a tradition known only in the north and north-west; and later, in the south and south-east, either by Japanese pirates or directly by Portuguese merchant-adventurers.



A719 Fig. 2.17 Dr. Needham’s translation of the text might make it possible for him to interpret the mechanisms of these two 1562 illustrations, otherwise, it is impossible.

The Bird Beak Matchlock

The muskets introduced to south east China in the early 16th century were given the name “Bird-Beak Guns,” probably for the same reason the striking cock of the snaphance was called the ‘hen.’ Chêng Jo-Tsêg’s 1562 illustrations of the mechanism of the



A718 Fig. 2.18. A typical Japanese matchlock with an external mainspring and all parts made of brass. The pan, as on all Japanese matchlocks, is attached to the barrel and the pan cover is hinged from the front, to be manually removed. *Private Canadian collection.*

bird-beak gun. A footnote reads that it “shows the general spring and trigger (*kuei chhêng*) while the forward-falling cock is a ‘dragon-head’ (*lung thou*) with the spring acting on its other end (*lung wei*). after release from a sear lever (*kou*). In a footnote, Dr. Needham wrote “the artist did not draw the whole mechanism very clearly.”²⁴

Based upon surviving examples and some literature, the pan of the southern Chinese matchlock was forged integrally with the barrel, the lock had an external main-spring and a forward falling serpentine controlled by a trigger behind the lock in the classic manner. Many, but not all, southern Chinese matchlocks had a short pistol-grip stock which are even more pistol-like on some survivors but this may be an indication of a progressive improvement. These stocks are represented in Fig. 2.16

He continued, (p. 440).

From the first coming of the musket into southern China, it was dubbed the ‘bird-gun’ or ‘bird-beak gun.’ ... The term bird beak must have been derived, one would think, from the pecking action of the cock that held the match, ... The first illustrations and descriptions appeared in two books printed in the same year (1562) Chêng Jo-Tsêng’s *Chhou Hai Thu Pien* and Chhi Chi-Kuang’s *Chi Hsiao Hsin Shu*. ... the forward-falling cock is a ‘dragon-head’ with the spring acting on its other end after release from a sear lever.

Japanese Matchlocks — The Tanegashima

Dr. Needham wrote, “There is some evidence that hand-guns in small numbers reached Japan from China during the 15th century, and a well-authenticated case is the presentation of a *thieh phao* (the common name for a musket) to a feudal lord in 1510 by a Buddhist priest recently returned from China.”²⁵

The Portuguese matchlock was introduced to Japan in 1543 by Fernão Mendes Pinto,²⁶ a Portuguese traveller, and the matchlock gun quickly became part of the Japanese arsenal. The name it was given, *Tanagashima*, was that of an island just off the southern tip of Japan where Pinto landed, and gifted his gun to the Princely ruler. It arrived at a time when the snap matchlock was the European standard and the Tanagashima incorporated a similar serpentine activated by a spring pressing up on the tail and a sear protruding through the lock-plate to hold it at the ready position.

Mr. Shigeo Sugawa, who has studied the arm for more than 30 years, has identified six major lock variations.²⁷ Basically, they may be divided into those with an external spring and those with an internal spring. The former all have typical ‘V’ springs; the



A377 Fig. 2.19. Japanese matchlock (Tanagashema) with a hammer hardened brass external mainspring and an iron sear. *Brian C. Godwin collection.*



A378 Fig. 2.20 Japanese matchlock with coiled internal mainspring. All components are brass. The lock is held at the rear by a tapered brass pin, which passes through the lockplate and stock into a brass disc set into the opposite side of the stock. The front end of the lockplate is retained by the rear brass barrel band. *Bath Royal Literary & Scientific Institution, Bath.*

latter with coiled springs.

A flat, undecorated lock plate, tapered slightly and curved to conform to the stock shape is typical. The pan was forged as part of the barrel and a pan cover that surrounded the pan was pivoted from the front.

The long tail of the serpentine found on Continental matchlocks was retained and the match was fed through an open tube on the arched neck. The breech plug was the only component secured by threads; all lock components were fastened by tapered pins and the lock was fastened to the stock by a tapered brass pin pressed into a brass rosette on the left side of the stock and at the front by the rear barrel band. The pan was forged as part of the barrel and a pan cover that surrounded the pan was pivoted from the front

Lock plates and serpentes are usually of brass although steel is the occasional alternative. Steel internal or external springs are the norm but hammer hardened brass flat or 'V' form and coiled brass internal springs are also to be expected. The trigger/sear mechanism, either, ball trigger working in the usual way or a button trigger release which pushed the sear nose out of contact was uncomplicated and varied according to regional or the gunmaker's preferences. A refinement not found on the European matchlock was an arrangement in the mechanism on some which made it possible to reduce or increase 'the pull,' the amount of pressure required on the trigger to disengage the sear.

The East Indies

It we use Japanese matchlocks as a starting point, those produced in the East



A700 Fig. 2.21. A Malayan matchlock with pierced brass plate and dragon shaped serpentine. The pan was probably covered with a brass clip to retain the powder. *Courtesy Oriental Arms, Haifa.*



Fig. 2.22, 23. Two Vietnamese matchlocks with brass lockplate and serpentine. The external mainspring producing upwards pressure on the tail of the serpentine provided the action. *Courtesy Oriental Arms, Haifa.*

Indies were structurally similar but varied considerably in form and decoration, usually with external flat or v-mainsprings, conventional triggers, with or without guards and short butt stocks. The few illustrations which follow are representative but considerably more research is required on both design and decoration.

Notes and Recommended Reading

1. The Oxford English Dictionary defines 'punk' as "Soft decayed or rotten wood, esp. as used for tinder; touchwood; (also) and of several kinds of bracket fungus which when dry may be used as tinder." Today, punk sticks are available for lighting fireworks and are the distant successor to the sticks used in the early 16th century matchlocks. Before a dying tree reaches the 'soft, decayed' stage it is still quite hard but the grain breaks down and is easily broken. In this state the wood or 'punk' in stick form can be readily

- ignited but it burns slowly and does not break into flame. Two timed trials with an untreated stick of basswood punk burned approximately one inch (2.5cm) in ten minutes, not much different than the slow match described above.
2. The earliest illustration of a gun fitted with a self contained lock is found in *Kunstauss Buchsen zu Schiessen*, a 1471 dated manuscript in the Bayerisches Staatsbibliothek, Munich. See below; Foley
 3. de Gheyn, Jacob. *The exercise of arms for calivres, muskettes, and pikes*. The Hague, 1607
 4. Clephan, Robert Coltman. An outline of the history and development of hand firearms from the earliest period to about the end of the fifteenth century. London, New York: Walter Scott Publishing, 1906, p. 34.
 5. de Jong, M.A.G., "Arms Trade and Production in Zeeland, 1572-1630." *The Arsenal of the World*, Amsterdam: Batavian Lion International, 1996. p. 24. (Puype & van der Hoeven, Ed.)
 6. Siemienowicz, Casimir. *Great Art of Artillery*, p. 123. First printed in Latin as *Ars Magna Artilleria* at Amsterdam in 1650, French and Italian in 1651, English, translated from the French by George Shelvocke, in 1651 (1661?), and German in 1676. A smaller edition from the English published in 1729 was reprinted by SR Publishing in 1971, for which, this quote has been taken.
 7. Knowlton, Lt. Miner and Bailey, J. W. *Military Pyrotechny, for the use of The Cadets of the U.S. Military Academy*,. Lithographed by George Aspinwall, West Point, 1839.
 8. St. Remy, Pierre Surirey de. *Memoires d'artillerie* Paris, 1697, pp. Vol. 1, Pl. 94; *l'Art Militaire François pour l'infanterie*, Paris, Pierre Giffart, 1696, pl. LXVI.
 9. The terminology we adopt to identify unfamiliar objects – objects which neither we nor our associates encounter frequently, is invariably influenced by our first encounter and subsequent identification of that object. That is why I prefer "match tricker lock" to "trigger matchlock." That is probably why I use both.
 10. Blackmore, Howard L. *Guns and rifles of the world*. London: Batsford, 1965, p. 11
 11. Thierbach, M. *Die geschichtliche entwicklung der handfeuerwaffen* **Graz**: Acad. Druck u. Verlagsanstalt. 1886/1965.
 12. Blackmore, Howard L. *British military firearms*. London: H. Jenkins, 1961, p. 30.
 13. Blair, Claude. "King Henry VIII's chamber-pieces," *The Royal Armouries Year Book* No. 7 (2002). p. 22.
 14. Elgood, Robert. *Islamic Arms and Armour of Arabia*. Ashgate/Scolar Press, 1994. p. 40.
 15. G. N. Pant, quoting H. Baden-Powell in his *Arts in the Punjab* (1868), records that the matchlock musket was known as *Bandook Toradar*.
 16. Wittek, Paul. "The Earliest References to the Use of Firearms by the Ottomans." an appendix in Ayalon, David, *Gunpowder and Firearms in the Mamluk Kingdom*. London, Vallentine, Mitchell, 1956, pp. 135-143. Professor Wittek noted that the appendix was "the result of a very hasty perusal of the main sources and reference books available. My conclusions have therefore to be regarded as tentative and provisional."
 17. R. J. Richmond records "As late as 1956 Colonel Smiley writes that in the store rooms of the fort at Bait al Falaj [in Oman] he 'found a huge hoard of ancient silver embossed muskets.' There were nearly 4,000 guns of various vintage and many of them, like the muzzle loaders with their delicate silver chasing, were valuable museum pieces.' When he suggested that they could be sold abroad, he was informed that the guns were being kept for a purpose and they would be used in the future if necessary."
 18. Bottomly, Ian. "A tentative classification of Indian Matchlock guns." *Royal Armouries Yearbook*, No. 7.
 19. Egerton, Lord of Tatton. *A Description of Indian and Oriental Arms and Armour*. London: W.H. Allen, 1896. Originally prepared as a catalogue of the collections exhibited in the India Museum at South Kensington in 1880. With the expansion of that collection, Lord Egerton filled the need for a complete new study and this book was published in 1896. It was reprinted with H. Russell Robinson's introduction by Arms & Armour Press in 1968 and again by Dover Publications in 2002. It is still the most important English language book on Indian arms.
 20. Baden-Powell, Baden H. *Hand-book of the economic products of the Punjab, with a combined index and glossary of technical vernacular words. Prepared under the orders of government, by Baden H. Powell*. Roorkee: Thomason Civil Engineering Press, 1868-72.
 21. This is B-Ps spelling. Later Indian authors spell the work "fatila"
 22. Needham, 1986. pp. 440-444.
 23. Dunning, R.W. "The Match-lock of Tibet." *The Canadian Journal of Arms Collecting*. Vol. 4, No. 1, (Feb. 1966) pp. 3-4. In 1947, Dr. R. W. Dunning led a photographic expedition to Gyantse, Tibet where he acquired a matchlock gun and pistol that had until recently been in use. The former owner demonstrated its accuracy He

- wrote: "The first time he pulled the trigger, the wick which had been previously lighted by tinder and flint, failed to touch the firing pan. It had not been set properly. This necessitated an adjustment to the wick, and on the second attempt the gun went off. When the ball was recovered it was found to have missed its target [at 40-50 yards] by approximately two inches." See also van der Molen, Bert. "The History of the Kaul State Arsenal," *Man at Arms*, Vol. 31, No. 6 (December, 2009) p, 37.
24. Needham, 1986, Fig. 168
25. *Ibid.*, p. 430.
26. Daehnhardt, Rainer. *The Bewitched Gun – Espingarda Feiticeira*. Lisbon: Texto Editoria, 1994.
27. Sugawa, Shigeo *The Japanese Matchlock*, Tokyo: Author, 1991.
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PHOTO INDEX — MATCHLOCK



A089 English military snap-matchlock of Ventian manufacture, c.1550.



A213 Fig. 2.26. The pan (*bassin* in French) and pan cover which forms part of the lock plate, of a late 16th-early 17th century German matchlock. *Courtesy Jean René Clergeau.*



A238 *William G. Renwick collection.*



A100 ML-1 a-b Neg in file
179
A100



A368 Fig. A late 16th century German snap matchlock activated by a spring pressing up on the tail of the serpentine and controlled by a button trigger. *Michael Trömner collection, Abensberg.*

A368a,b.M Trömner collection



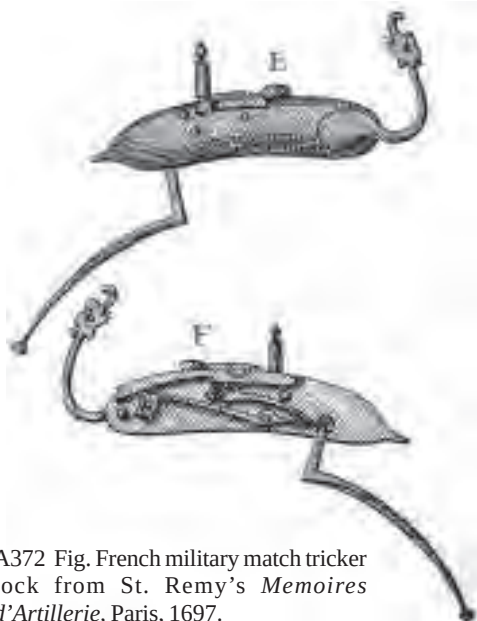
M099



A243 English military matchlock introduced in the 1660s. *Royal Armouries, Leeds*



A225 Fig. One of a small group of snap matchlocks with an automatic frizzzen-like pan cover. Made by Muhammad Ali, one of the gunmakers working at Seringapatam for Tipu Sultan in 1797/78. The pan cover is fitted with a roller bearing which rides on a standard frizzzen spring. When the trigger is pulled, the serpentine is rotated downwards by the pressure of the trigger finger. The movement of the tumbler, through the linkage, also cantilevers the pan cover open. When the trigger is released the serpentine returns to the upright position under pressure of the sear spring. The pan cover may then be operated manually. *Courtesy Robin Wigington*



A372 Fig. French military match tricker lock from St. Remy's *Memoires d'Artilerie*, Paris, 1697.



A280-1 Sear matchlock, Italian military, probably Brescia, first half of the 17th century. *Robert Held photograph.*



A281-2 Match tricker lock from an Italian hunting arquebus. *Robert Held photograph.*



A127

Chapter 3

The Wheel-lock

The first self-igniting firearm

The Wheel-lock: hjullås (Danish); radslot (Dutch); platine à rouet (French); Radschloß (German); piastra a ruota acciarino a ruota (Italian); fecho de roda (Portuguese); hjullås (Swedish).

Iron Pyrite (a.k.a. pyrite, iron pyrites, pyrites, fool's gold, FeS_2) is available in nature almost everywhere and has long been recognized as a mineral which when rubbed against a hard object would produce a spark. But it took about 100 years before someone applied it to the lock of a gun, thereby providing ignition of the priming powder by the scraping of a fire stone or sparking stone, against a rapidly revolving wheel to create the "wheel-lock."

The wheel, a steel disk, usually less than about two inches (50mm) diameter and one-quarter inch (7mm) thick, with three or four grooves around the edge and a perhaps few random grooves across-ways, is connected to a sturdy mainspring by a flat-link chain. The wheel is spanned by winding with a wrench, spanner, or key, which winds the chain around an eccentric form on the axel, and is held under tension by the sear.

The sear nose, which usually passes through the lockplate to engage a hole in the wheel which, when released, allows the wheel to rotate about three-quarters of a turn. The pyrites, rubbing against the wheel creates the spark to ignite the priming in the pan.

Various methods of holding the wheel to the interior or exterior of the lockplate, internal or external mainsprings, combination match and wheel-locks, locks designed for superimposed loading, and locks with two dog arms are variations which can be expected.

Early references to the history of the wheel-lock suggest it was introduced in Nuremberg in 1517 and that is the date used by most historians until well into the 20th century. Claude Blair, then Keeper of the Department of Metalwork at the Victoria and Albert Museum, London, first published his research on the wheel-lock in the Journal of the Arms and Armour Society in 1961. He traced the earliest publication of that 1517 date back to 1697 when it was recorded in a history of Nuremberg by one J.C. Wagenseil,¹ but he suggests that the statement must have been based on a tradition current not later than the beginning of the 17th century because "Johann Guler von Weineck gives a brief history of firearms in a work published in Zürich in 1616," in which he states:

After discussing the alleged invention of gunpowder and guns by Berthold Schwarz, he [von Weineck] goes on to say that "Thereafter in the year 1517 the ingenious firelock was introduced in Augsburg and Nuremberg."²

A number of early documents originating in Europe and Asia illustrate the existence of a method of creating fire from pyrites with a revolving wheel, but only two relate to this study.

One, included in what is known as the Löffelholz manuscript, was, prior to 1939, in



Fig. 3.1. One of the prototype wheel-mechanisms included in the Löffelholz manuscript. There was probably a square end to the axel on the other side of the wheel, and the socket on the ring of the cord would serve to turn both it, and the screw on the dog-head. *Staatsbibliothek collection, Berlin*

the Staatsbibliothek in Berlin. It was lost or destroyed during the 1939-1945 war but a photographic copy has survived and all available information is from that record. It consisted of a bound collection of drawings, the title page of which bears the arms of Martin Löffelholz with those of his first wife, Anna Haugin and is dated 1505. It is assumed that 1505 is the date the book was bound and thus serves as a terminal date for the illustrations. Two illustrations of wheel-ignited tinder lighters were included in the book which with mechanical alterations, could have been applied to firearms.

The earliest recorded illustration of an actual wheel-lock is a sketch in a collection of manuscript drawings by Leonardo da Vinci (1452-1519) and they too have been bound with no apparent chronological organization.³ Da Vinci, who has been described as having, among many other talents, those of an artist, engineer, and inventor, kept a record of much of what he thought and his creations; those records were dispersed and portions are now in institutions in Europe and America.⁴

The sketch of significance to this study is now found as 'Folio 56v.b' in the papers known as the Codex Atlanticus in the Biblioteca Ambrosia at Milan, in a collection of some 4,000 pages of da Vinci's work. Two wheel-mechanisms are illustrated on the same page, one of which is obviously of a detached wheel-lock (Fig. 3.xx) and it has been suggested that the other is also. A reproduction of the complete Codex Atlanticus was published, 1894-1914, and 'Folio 56v.b' was brought to the attention of arms historians about ten years later.⁵

Many attempts have been made to date the drawings based on logic, the order in which the drawings have been bound (although this has been shown to be at random), an educated guess, and style changes in the handwriting of the author. But there is really no satisfactory way of dating the drawings,

Many years ago, Jack Hart in Guernsey made a working model based on the lock illustrations. It has been suggested that, based upon Mr. Hart's reconstruction, the da Vinci lock must have been experimental because some small, but essential changes, had to be made to the mechanical arrangements. It is therefore considered to be a prototype of the wheel-lock and must therefore date to the very early 16th century.⁶

The design of the mainspring, which has been described as "naïve," was not adequate and stresses would not allow a spring to be produced which would allow it to survive. It is true that the first two springs did break but a third attempt was successful and the lock which is now in the Collin Carpenter collection in Devon. Mr Carpenter, who acquired the lock more than forty years ago, has told me that it sparked nicely after he hardened the wheel.⁷

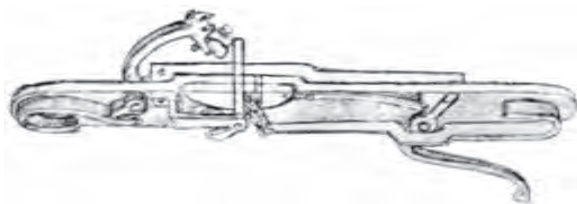


Fig. 3.2. The illustration of a wheel-lock from the *Codex Atlanticus* by Leonardo da Vinci. There is controversy over the dating of the drawings but they were almost certainly produced in the first decade of the 16th century. *Biblioteca Ambrosia, Milan,*

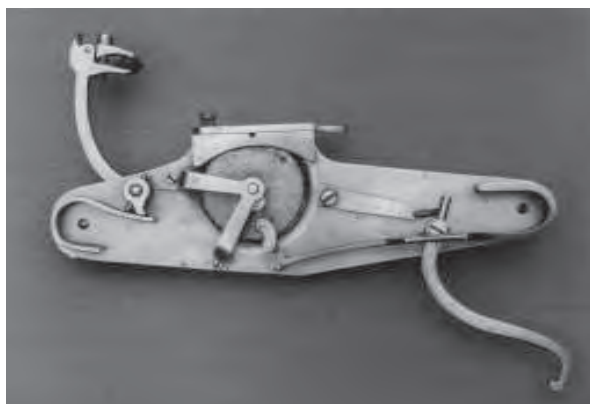
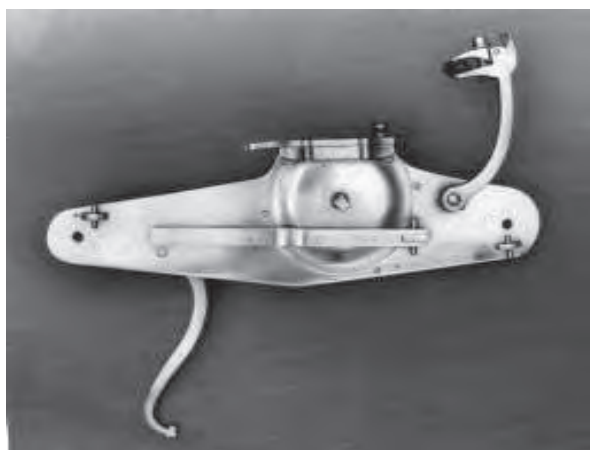


Fig. 3.3, 3.4. A reproduction of the wheel-lock illustrated by Leonardo da Vinci, made by the Honourable Jack Hart of Guernsey. *A. C. Carpenter collection*

Additional weight in support of Mr. Hart's theory has been added by W. E. Flewett⁸ suggesting that da Vinci's drawing was made from an existing lock which once again raises the question about the date when the drawing was made.

Nevertheless, the above records indicate an early beginning for the wheel-lock, perhaps at, or just before the turn of the century, but the earliest date that can be assigned to its actual existence is 1507, a date which is based on the acquisition by Cardinal Ippolito d'Este, I, Archbishop of Zagreb of "a gun of that kind that is fired with a stone."⁹

Much wheel-lock dating has been done using a Darwinian approach based on mechanical differences which in itself is not bad. But more research is yet to be done.¹⁰ Gunmakers, and especially those in the lock making department were innovative crafts-

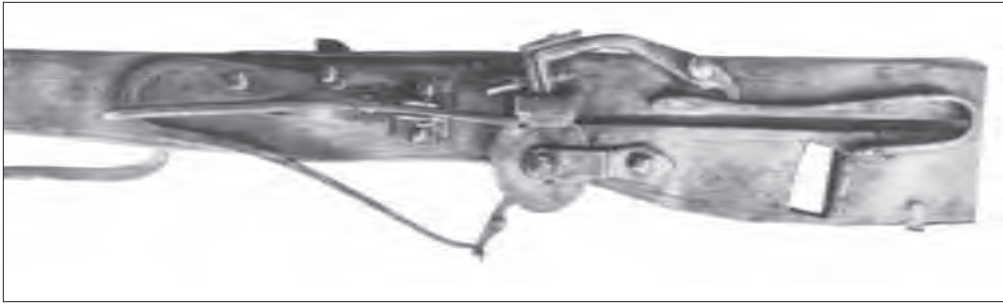


Fig. 3.5. An early 16th century wheel-lock from a combination crossbow and pistol, one of a group of similar arms. The Doge's Palace, Venice.

men and the features used in one community might have changed frequently but not in others. Surviving specimen with significant identifiable characteristics are not common and putting them in order — either of evolution, or of local of origin, is not without problems. By 1500, commerce between communities as far apart as the Low Lands and the Alps” and from Italy, across the Alps and north through central Europe, was apparently commonplace.

Dating, closer than a quarter century cannot be expected, but dating to a particular decade is probably not prudent, unless there is a name, a date or other documentation engraved on or stamped in manuscript, form relating to the arm.

Until the required research has been done it is necessary to work with the systems but it is not off to a good start. Leonardo's sketch presents a lock with an internal mainspring as would be expected. But the earliest surviving wheel-locks all have external mainsprings. This might not change the accepted date for Leonardo's sketch but it does raise the question.

Three combination crossbow/wheel-lock guns have survived in the collections at the Palazzo Ducale, (the Doges Palace), in Venice, one of which can be dated c.1510 based upon a comparison of the etched decoration on it with the decoration on armour which can be more accurately dated.

Lacking a dated lock and the associated firearm, or a signed gun, pistol or lock with any related written record, tracking the evolution of the wheel-lock can only be accomplished by

Despite the fact that considerable research has been done on the wheel-lock, there is really very little known about its development just before and just after the date of the da Vinci sketch. The existence of small, unrelated groups of combination arms—wheel and battle-axe, wheel and crossbow,—with prototype or early characteristics, but no signed or dated guns made prior to 1530 have been found.

Two of the former and three of the latter are located in the collections at the Palazzo Ducal, Venice and others are known. For reasons that will be discussed in a moment, the wheel-axe combinations are considered to be earlier than the crossbows. There are some related or common characteristics in the groups suggesting that these were the starting point in the evolution.

1. All have external mainsprings (not to be confused with the later Tschinke locks). This, in part, would be dictated by the function of the stock which would require as much strength as possible consistent with minimum bulk.

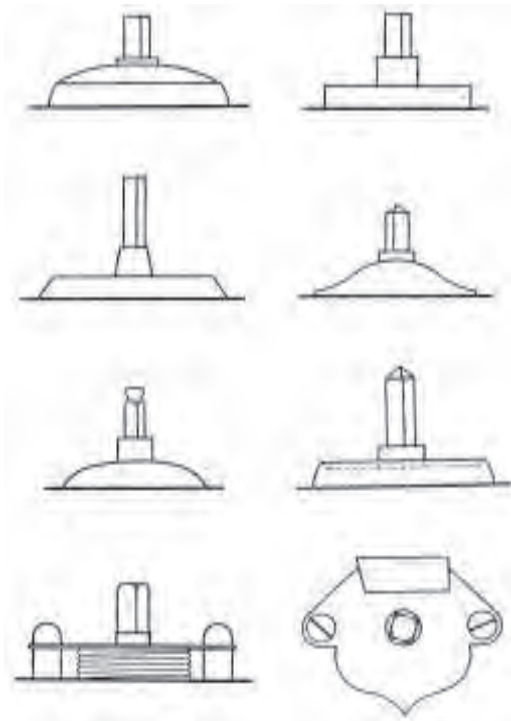


Fig. 3.6. In 1953, Clement Bosson catalogued 149 wheel-lock pistols in the collection of the Musée d'Art and d'Histoire in Geneva. Many bore town marks—Nuremberg, Augsburg, or Strasbourg—many did not. Some were dated, or dateable by marks of known gunmakers active between 1563 and 1578. He typified the spindle covers on these southern European wheel-locks into the seven groups illustrated here. He also illustrated dog design and included 50 makers' marks.

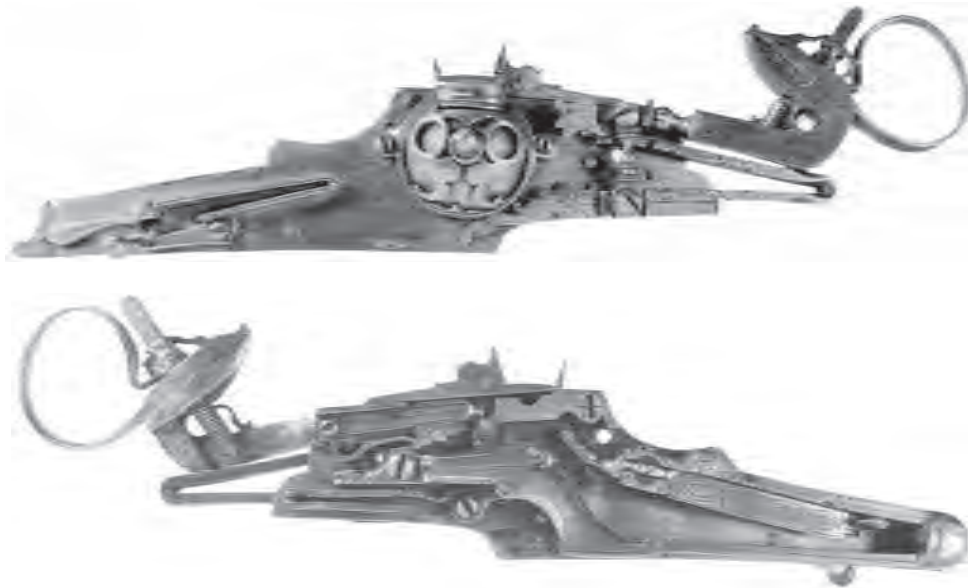


Fig. 3.7. A lightly engraved German wheel-lock mechanism from a rifle, late 16th century. The external domed wheel has a pierced steel cover of Bosson Type I. It is fitted with a turning safety behind the wheel which blocks the trigger bar, preventing its movement and accidental discharge. *Keld Weigelt collection*

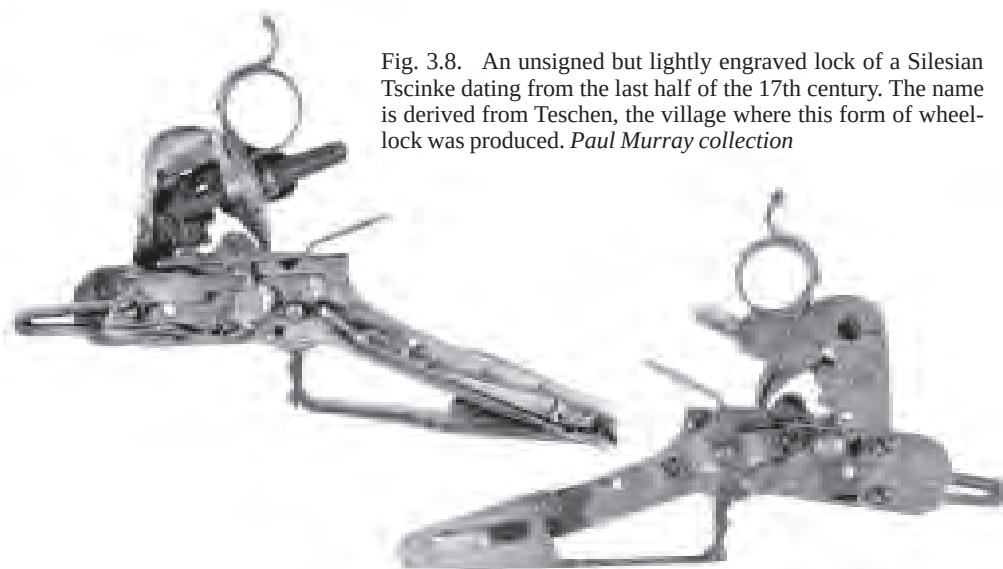


Fig. 3.8. An unsigned but lightly engraved lock of a Silesian Tscinke dating from the last half of the 17th century. The name is derived from Teschen, the village where this form of wheel-lock was produced. *Paul Murray collection*

2. All have a pancover requiring manual removal in the manner of the contemporary matchlock.

3. All have moveable top jaws with the jaw screw threaded into the solid lower jaw. This component on the da Vinci lock is actually hinged to the body of the dog while all five of the above are in the manner soon adopted for all flint-using arms.

.....

Although the wheel-lock was obsolescent by the mid 17th century throughout much of the Continent, it remained popular with some hunters and target shooters in parts of central Europe for at least another century. In England, the Ordnance began selling off their wheel-locks by auction in the 1650s.

The French Wheel-lock

Early in the 17th century, an unidentified French gunmaker produced a wheel-lock with a new construction that separated the mainspring from the lockplate which appreciably reduced the heavy bulk of the lock.

The wheel on the new lock was surface mounted and usually held in place by a wheel-clip. The earlier wheel, on an axel that must be supported at each end within the lock, left little room for basic design change to the lockplate with the result that internally, most wheel-locks have a basic configuration. The hub for the right end of the axel must serve the wheel and there must be a support, a wheel bridle, for the other end. This, on most locks restricts the internal design. On this French version, the right axel socked remained with the wheel and lockplate but the socket for the left end of the axel was removed from the plate and created in a decorative steel plate that was inlet into the left side of the stock. The spring was disconnected from the lock proper except for the hook in its position on the working arm of the spring. This allowed the lock to be removed as required, leaving the spring in place.

The placing of the mainspring is the unique characteristic of the French wheel-lock: an opening for it is cut into the wooden stock where it fits loosely. The hook on the long arm of the spring slips over the swivel on the chain, the other arm, that is the passive

What about the German wheellock, Italian wheellock and Japanese wheellock?
Also enclosed, concealed or waterproof and self winding wheellocks? BCG. (Brian Godwin)

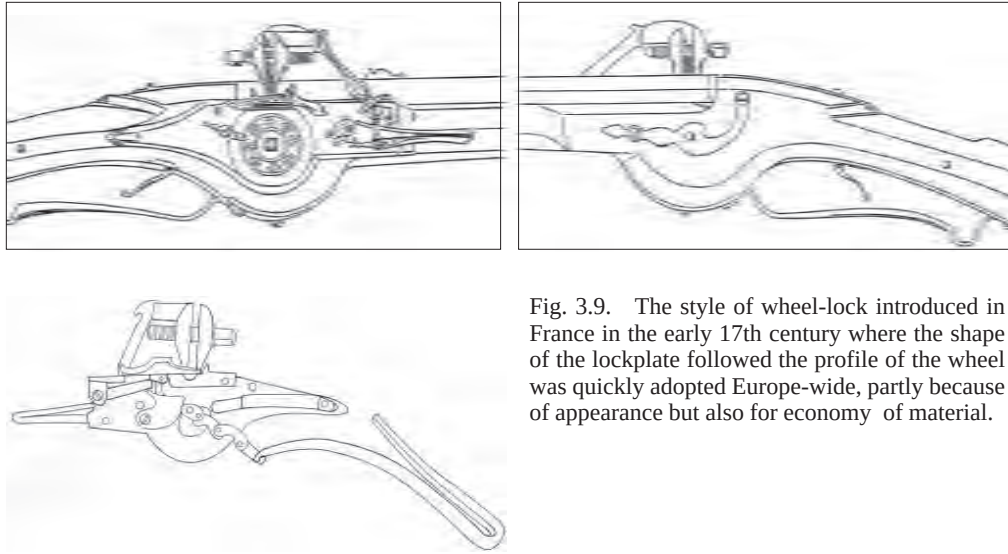


Fig. 3.9. The style of wheel-lock introduced in France in the early 17th century where the shape of the lockplate followed the profile of the wheel was quickly adopted Europe-wide, partly because of appearance but also for economy of material.

branch which is straight and shorter, is lodged in the stock and presses against the wood. A pin, passing through the stock and the “V” of the spring, secures that end. The stock opening into which the spring is set is covered with a steel plate for strength and it serves also as a base for the trigger guard.

This configuration allowed a newly designed lockplate, a lock with wheel profile, created a form of lock that remained popular throughout most of Europe for more than a century. Initially it was used only on the wheel-lock but as old ignitions were improved or new ignitions developed, they too were adapted to a lock plate of wheel profile for matchlocks, snaphances, flintlocks, and flint-locks.

FN# I am grateful to Kevin Gladysz for translations which made these paragraphs possible.

The Tschinke

Tschinke is the name given to a small caliber, long barrel, short butt stock, wheel-lock gun named after Teschen (Tešín), a town on the Olza River (between Poland and Czech Republic) in Silesia, the center where it was made. Teschen, in German, is Tschinka. It was probably first made in the last half of the 16th century and by about 1620 had achieved its classic form. Earlier collectors called it the Courland or Kurland lock and it is identified by the external mainspring on the lock and a very short stock designed to be held at the cheek, in a rifle-like manner.

No 16th century examples have been located but later lock characteristics are so reminiscent of the 16th century locks mentioned earlier that there was probably little change in the 17th century.

The wheel of the Tschinke is mounted on the outside of the plate and retained by a saddle; the mainspring, also on the outside, along with the dog (which is usually engraved with a bird's head), are covered with a partial, decorative, plate. Before the lock can be spanned, the internal sear must be set by pushing on a round-headed button nearly in line with the “V” of the spring to clear it for action.

Notes and Recommended Reading

1. Blair, Claude. "Further Notes on the Origins of the Wheellock," *Arms and Armour Annual*, (Robert Held, Editor), 1974, 44, note 2; **in this article, Dr. Blair has taken all of the other early sources suggesting an early date for the introduction of the wheel-lock and proven them inaccurate. The 1507 date of this quotation is the only one he considered valid, p. 35**
2. (1961) Blair, Claude. "A Note on the Early History of the Wheel-lock." *Journal of the Arms & Armour Society*, Vol. 3, No. 9, (March 1961), p. 221.
3. The sketch of significance to this study is found as 'Folio 56v.b' in the papers known as the Codex Atlanticus in the Biblioteca Ambrosia at Milan,
4. In addition to Milan, collections of da Vinci papers are located Madrid, London (Royal collection at Windsor Castle and Victoria and Albert Museum,
5. Feldhaus, F. M. *Die Technik, Leipzig and Berlin*, 1914 p.445-446.
6. Blair, Claude "New light on the early history of the wheellock in Italy." *Waffen-und Kostumkund*, 37, Jg. 1995, pp. 37-38; Foley, Vernard. The Invention of the Wheellock. *JAAS*, Vol. 11, No. 4, pp. 207-248.
7. This theory probably did not take into consideration the unimaginably high degree of skill acquired by early blacksmiths. Mr. Carpenter and the late Howard Blackmore initially mounted the lock on a wooden panel, firing it many times. It was also demonstrated it in "The Gun," a BBC television series produced in the 1970s or 1980s in association with the Imperial War Museum.
8. Flewett, W.E. New Light on Leonardo's Wheellock Drawings. *JAAS*, Vol. XVIII, No. 4, pp. 137-144.
9. Although the 'stone' might also indicate the existence of a snaphance, that date is more than 20 years earlier than even Dr. Hoff considered the possible-earliest date for the next new ignition.
10. Dr. Blair, has suggested a number of areas and provides background on where research should be undertaken: "New light on the early history of the wheellock in Italy." *Waffen-und Kostumkund*, 37, Jg. 1995, pp. 44-47.

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Notes and Recommended Reading

In the bibliography which follows, five of Dr. Blair's articles on the wheel-lock are recorded. Although the title "Further Notes on the Origins of the Wheellock" suggests only an expansion of earlier articles by Claude Blair, it and "New light on the early history of the wheellock in Italy," are actually stand-alone articles providing an excellent, well illustrated, survey of the earliest known wheel-locks. Dr. Brooker's catalogue of the wheel-locks in the collections at the Landeszeughaus in Graz should also be consulted.

(1961) Blair, Claude. "A Note on the Early History of the Wheel-lock." *Journal of the Arms & Armour Society*, Vol. 3, No. 9, (March 1961), pp. 221-256.

(1964) Blair, Claude. "A Further Note on the Early History of the Wheel-Lock". *Journal of the Arms & Armour Society*, Vol. 4, No. 9, (March 1964), pp. 187-188.

Kruczek, Jan. *Rusznikarstwo szkoty cieszyy cieszyńskiej. Poland: Muzeum Zamkowe, 2001.*

The sickle shape of the dog spring " that loop around the wheel fond on wheel-locks of the 2nd quarter of the 16th century

Howard Blackmore recorded that by the end of the 16th century, gunmakers had gathered in the Minories Road area in London. These grouping of specialist trades took place in pocked on the continent the import of locks from these communities was significant at least by the early 17th century and probably from the late 16th century.

XXXXXX Thomas Temple Hoopes, at that time employed at the Arms and Armor Department, Metropolitan Museum of Art, New York, may have been the first, in 1934, to write in English and identify 56 as a wheel-lock with attribution to da Vinci. The illustration, one key to dating the wheel-lock, was placed in no particular order so it cannot be dated by that means. Although for many years it was considered that da Vinci was the inventor,^{1,2} it is now considered by some that one of the illustrations is of an existing lock and the accompanying illustration da Vinci's idea for its improvement.³

Although the wheel-lock was obsolescent by the mid 17th century throughout much of the Continent, it remained popular with some hunters and target shooters in parts of central Europe for at least another century.

ADD ON

Spencer, M.G. & Spencer, O.E. A Florentine Wheellock. JAAS, Vol. XVIII, No. 4, pp. 145-150.

Garrett, Richard. "Tchinke Silesian Pistols," Classic Arms and Militaria, Vol. 11, No. 2 (March/April 2004) pp. 20-2. An informative article on Silesia and Bohemia, but inaccurately titled.

CAPTION: The illustration of a wheel-lock from the Codex Atlanticus by Leonardo da Vinci. There is controversy over the dating of the drawings but they were almost certainly produced in the first decade of the 16th century.
 XXXXX

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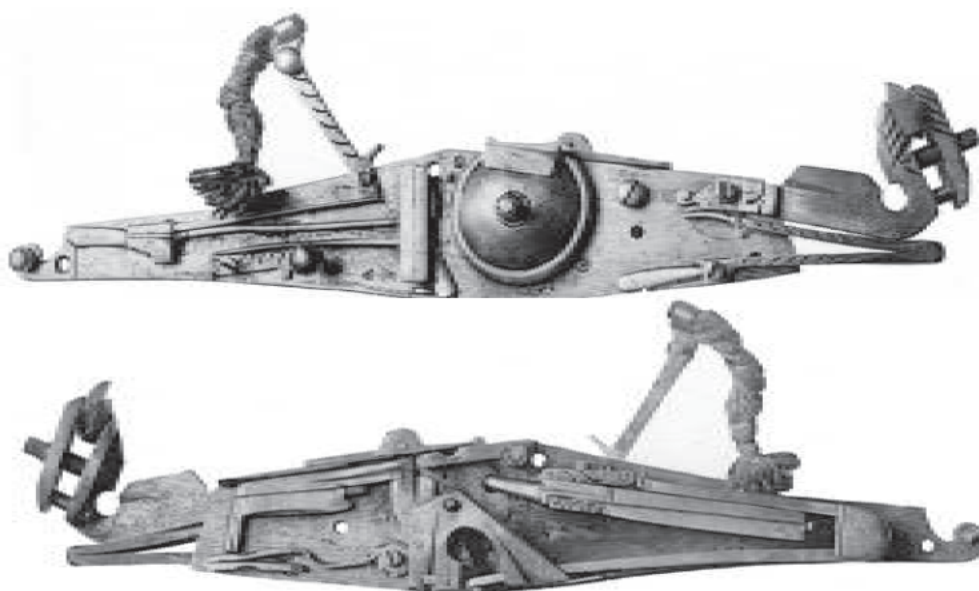
"Retaining its original lead-pyrites holder. This consists of a piece of lead approximately ¼ inch thick shaped in plan to the jaws, which it fills completely, and slotted vertically at the front for the pyrites which has not been preserved." The lock is not signed but the barrel is stamped on the breech with the date 1575 Blair 1974, p. 249.

A second illustration of the lead wrapper for a pyrites igniter appears in Feuerwaffen I by Dr. Arne Hoff

PHOTO INDEX — WHEEL-LOCKS



A569 Fig. An unsigned but lightly engraved lock of a Silesian Tscinke dating from the last half of the 17th century. The name is derived from Teschen, the village where this form of lock was produced. *Paul Murray collection.*



A133 A central European matchlock and wheel-lock combination having an external wheel with a domed wheel cover. Second quarter of the 16th century. *Herbert J. Jackson collection.* (Plate 10-11).



A445 A German, probably Augsburg, lock of the last decade of the 16th century. It is inscribed on the inside with the unidentified initials "H.D.A." The external wheel is retained by a narrow ring fastened on each side. *Herbert J. Jackson collection*, 925.27.39



A433 A mid-17th century German wheel-lock. The wheel is covered by a gilded brass guard which fits around the pan with pierced decoration. The ends of the dog spring are covered by a sculptural gilded brass bridle with a lotto head in relief. Below the pan cover is a gilded brass cat with a lot disk top. Formerly in the Herbert J. Jackson collection. *Royal Ontario Museum collection*, No. 925.27.46



A134 Fig. A double wheel, lock which is probably from a gun designed for superimposed loading but there is a slight difference in the level of the two pans which might have served a double barrel, over/under gun. There are no marks but lockplate shape suggests south German of the late 16th century. *Herbert J. Jackson collection*. *Royal Ontario Museum*, No. 925.27.30



A102 Fig. A mid 17th century, probably Dutch, military pistol lock, made as plain as it could be with external wheel and lockplate of wheel profile. (Puype 1996, Vol. 1, Pt. 1, pp. 612-626).

USED ELSEWHERE



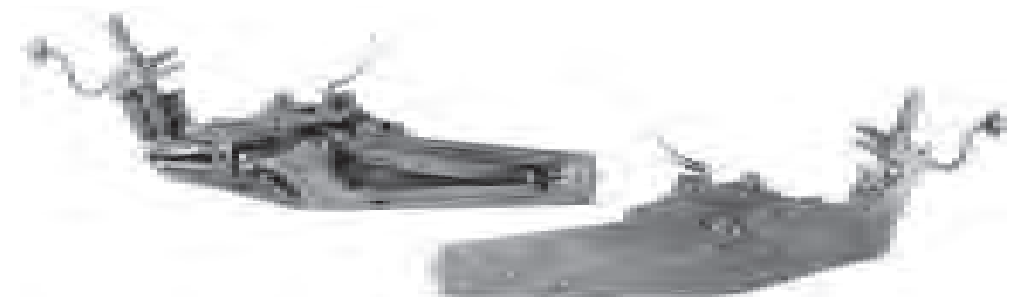
A204 Fig. 3. A lightly engraved German wheel-lock mechanism from a rifle, late 16th century. The external domed wheel has a pierced steel cover of Bosson Type I. *Keld Weigelt collection*



A205 Fig. Lock mechanism from a Prussian wheel-lock rifle. The barrel signed Hans Jurgen Ahl. in Osterwiek, 1720 According to Støckel he is recorded in Osterwiek from 1672. The lock is plain with light engraving of high quality. *Keld Weigelt collection*.



A206 Fig. 3. A mid 18th century detached wheel-lock from a German rifle. The plate engraved with a hunting scene with a hunter on horse and dogs chasing a stag. The dog-cover is engraved with the figure of Diana. *Keld Weigelt collection*.



A207A207 Fig. 3. A detached lock with an external wheel signed in the lower left corner of the lockplate, Johan Mendel who according to Støckel was a German gunmaker active in Prague, 1665-1675. The etched decoration of the lock shows a person in a wagon drawn by two exotic birds. The square of the spindle is the center of the sun, surrounded by several signs of the zodiac. *Keld Weigelt collection*.



A135 Fig. A relatively heavy, south Italian double dog wheel-lock for a single barrel gun, the second dog being for insurance in the event that the first was out of commission. The chiselled vines and flowers are typical of Neapolitan work. The pan cover, which is held in place by two pins, is chiselled *en suit*. *Herbert J. Jackson collection. Royal Ontario Museum, No. 925.27.44.*



A136 An unsigned, southern Italian wheel-lock of c.1630 with a plain central portion to the lockplate but chiselled vines, foliage and flowers on the rear, the wheel cover, the dog-spring and the dog. *Herbert J. Jackson collection.*



A502 German Target rifle with the Nuremberg town mark and an unidentified maker's mark. The ivory butt plate is dated 1585 which may be the date of manufacture, or it may be a date commemorating the engraved conquest. *ex Roy G. Cole collection*



M001 A 17th century Brescian wheel-lock marked on the inside of the plate with the initials FG and lily which the late count Nolfo di Carpegna, suggested might be the mark of Francesco Garatto of Brescia. He has since revised this opinion and considers it unidentified. It is one of the seven locks by this maker he recorded. (di Carpegna, 1997, pp. 59-60, No. C1). *Paul Murray collection.*



A148 Fig. A double dog lock, possibly Flemish, probably late 16th century. The external wheel is retained by a single screw on the lower edge. *Herbert J. Jackson collection. Royal Ontario Museum, No. 925.27.45*



A130 Fig. Double WL Herb Houze interior only



A208 Fig. 3. Detached wheel-lock of mid 17th century central European style, engraved with a gentleman and his dog, he carrying a rifle and, to the left, a stag and a doe. The flat, external wheel is floral engraved with what may be an animal on the lower edge. The lock plate is engraved J.C.W between the wheel and the pancover-return button. *Keld Weigelt collection.*



209

A209 Keld 1931 Italian Wheel Lock mechanism from a heavy gun ca. 1580 *Keld Weigelt collection*

The sickle shape of the dog spring “ that loops around the wheel fond on wheel-locks of the 2nd quarter of the 16th century



A208 Fig. 3. Detached wheel-lock of mid 17th century central European style, engraved with a gentleman and his dog, he carrying a rifle and, to the left, a stag and a doe. The flat, external wheel is floral engraved with what may be an animal on the lower edge. The lock plate is engraved J.C.W between the wheel and the pancover-return button. *Keld Weigelt collection.*



A209

Keld Weigelt collection.

The sickle shape of the dog spring “ that loops around the wheel fond on wheel-locks of the 2nd quarter of the 16th century

~~Although the wheel-lock was obsolescent by the mid-17th century throughout much of the Continent, it remained popular with some hunters and target shooters in parts of central Europe for at least another century.~~

~~N.B. The 'X' number preceding a section is only a number that will be removed before going to press. Some captions will be added; spacing to remove widows will be a last step. Each chapter will be accompanied by a photo file—related pictures with short captions." There is still time for additions and corrections.~~

~~26 November, 2010~~

Chapter 4 The Snaphance

Snaphance, Snaphaunce, Chenapan, alla Fiorentina, etc.

The Snaphance: *snaplås bøsse* (Danish); *snaphaanslot*; *snapslot* (Dutch); *chenapan* (French); *schnappschloß*; *schnapphahnschloß* (German); *acciarino alla fiorentina*; *batteria* (Italian); *snaphans*; (Portuguese); *snapplås*; *snapphane lås* (Swedish).

Members of the snaphance family are not difficult to recognize by their most obvious visible characteristics: a separate steel at the end of an arched arm, and a separate pan-cover designed to be moved clear of the pan by hand or mechanically. These are the only features required to identify a snaphance. But a quick glance at Figure 4.1 on the next page will provide an indication of the large number of variations that will be encountered.

There is good evidence that the mechanism which is now known in English as the snaphance, had been developed well before the middle of the 16th century, and perhaps as early as the first quarter of that century. It was almost certainly created in one of the kingdoms of central Germany but the earliest evidence of where they were being made does not turn up in England before the early 1570s.

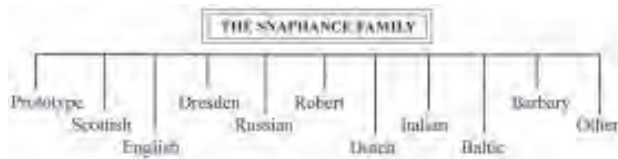
There is no documentation of what development took place during the quarter century between, say c1530, and a single survivor considered to be dateable to 1556, or even longer before the first dated or dateable snaphance of the early 1570s was produced.

.....

Before identifying the snaphance it would be useful to look at how the word has been used over the years. During more than a half century, the late Dr. Arne Hoff, (1906-1997) Director of the Tøjhusmuseet in Copenhagen, researched and frequently wrote on the ignition which he would spell "Snaphaunce."¹ He found that it had first been found in a document in New High German dated 1494 as '*snaphaan*.' In central Europe at that time it was used to describe a "highwayman, or a brigand on horseback."² Apparently, sometime in the next half century, the meaning was expanded to include the flint-lock firearm used in that line of business.

It was also found with a related form or meaning in the literature of Germany, Sweden, Denmark, France, and Scotland and it is first recorded in England in 1538. In each instance, one meaning for the word referred to robbers and those of like vocation.³

There are many who have written that the word had its origin because it was the weapon of choice by chicken thieves; and by others comparing the resemblance of the action of the cock to a chicken snapping to pick up food. Variations of the story have been appearing in print over the centuries but none with any evidence. The more logical explanation is that in German, Dutch, Swedish, and Danish, *haan*, *hahn*, or *hane* is the word for a cock or rooster, and the snapping action of the mechanism, when joined, produces snaphance when adopted into English.



A198 Fig. 4.1 The snaphance is readily recognized by the characteristic steel/frizzen mounted at the end of an arched supporting arm. Most, but not all, will have a sliding pan cover and a laterally acting sear. Further identification must be based upon the country of origin, the shape of the lock, and internal characteristics.

The foreign language paragraph at the beginning of this chapter provides an indication of the universality of words related to ‘snaphance’ and their use over a number of countries during more than 300 years. It can be assumed that almost everyone who used the word knew exactly what it meant and there was no reason to expand upon it. A problem with this is that although the meaning was the same across most of Europe, the type or design of the gun which it identified did not remain the same. Before looking at the variations it is advisable to look at the use of the word.

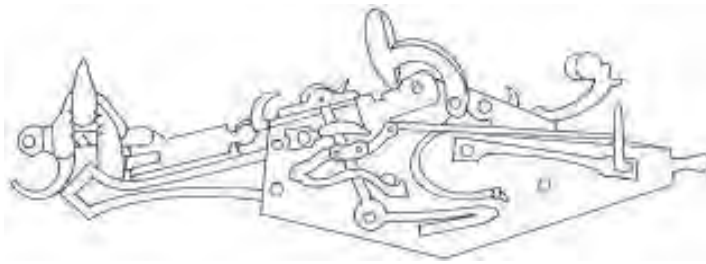
In the late 16th century and early 17th century, when the use of a flint-stone had become common, (although it did not replace the matchlock), other words, combinations, or spelling, were adopted for the same purpose.

One other obvious choice, based on the snapping action of the lock, combined that action with “lock” an existing word, to produce ‘snaplock’ which in Swedish is *snappelås*. That word appeared in what is for the first time a name is given to the ‘new’ flint-using firearm when it was included in a Swedish royal document in 1547.⁴ Dr. Nils Drejholt, Head Curator at Livrustkammaren in Stockholm, who has catalogued the guns in the Swedish Royal collection, has recorded that the usual contemporary catalogue description is *bössa med snaplåhs* (gun with snaplock). The word ‘snaphaunce’ does not appear in any official records until well into the 18th century. Dr. Drejholt wrote:

I have tried to look into Swedish sources to see

A261 Fig. 4.2 (Left, top to bottom): Snaphance locks by country of origin: Sweden, Sweden, Italy, England, Russia, Italy, Scotland, France; Italy, Russia. All are classed as snaphance but this illustration indicates the great variation of snaphance design. The only feature common to all is the steel fastened perpendicular to the arched steel arm and they are identified by other features; some common, some unique.





A641 Fig.4.3 A snaphance by Johann Krabbe, Master Gun smith at Spandau, Principality of Brandenburg, in 1585-1586. *Herzog August Bibliothek, Wolfenbüttel, Code-Buelf, 158 Extrav.*

when and how *Snaphane* was used. The Word Book of the Swedish Academy (the word list of Swedish language as the *OED*) uses *snapplås* as the main word – saying that *snapphanelås* seems to be a romantic fairly late use, actually more referring to the guns as used by the Snapphanar [a person with criminal intent] than an actual name of the lock type. This is also consistent with our own inventory texts. During the 17th Century, in the inventories of 1654, 1663, 1671, 1683, 1696 and 1708 the term used is *snapplås* or *snappelås*, and this terminology is then copied in later inventories, only to be replaced during the 19th Century with *snapphanelås*. The first time the term appears in our inventories is in 1730 for items coming into the armoury at the beginning of the 18th Century.⁵

On the Continent, ‘snaphance,’ seems to have been abandoned and *steinschnappschloss* or *schnappschloss* adopted. But, in the 17th century inventory of Wrangel’s Armoury at Skokoster (1645-1653), where German was the primary language, flint arms are usually listed recorded as *flindtschloss*.⁶

In Scotland, ‘snapwork,’ ‘snaps’ or ‘snapper’ identified the snapping lock and a gunmaker was called a snapmaker.⁷ Claude Blair has written, “The snaphance lock must thus have been in sufficiently wide use in Scotland by 1568 to be mentioned without explanation in a poem intended for popular consumption.”⁸

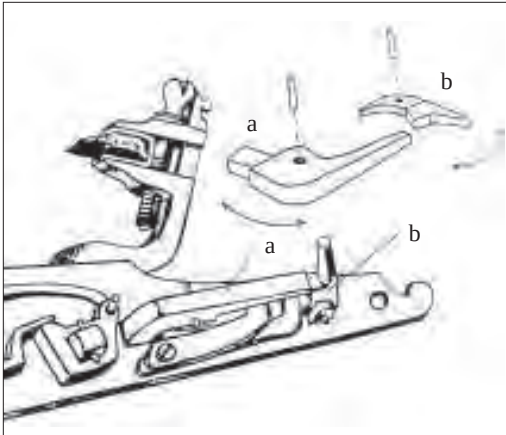
In England “snaphance,” a word with an action-related meaning in a document of 1580 preserved in the archives of St. Paul’s Cathedral, London, which records that “the Dean and Chapter equipped nine light-horsemen for service in Ireland with ... nine cases of snaphaunces at 40s the peece.”⁹ The name continued to be used, retaining the same meaning but being applied to the next two generations of flint-using locks until at least the last decade of the next century (Chapter 5)

In Holland, Jan Piet Puype, Chief Curator Emeritus at the Legermuseum/Army Museum at Delft in the Netherlands has found no reference to the snaphaunce/snaphance before the end of the second decade of the 17th century.¹⁰

The snaphance in France has been given the name *Chenapan* which as Dr. Hoff pointed out is translated as a brigand, thief, or term with a related meaning. When it first appeared in relation to a flint-lock has not been found.

Returning to England, it is not known when the word was first used. It was probably at the same time the snaphance, a title with obvious Germanic origins, suggests that the ignition had arrived on England’s shores with German gunners, not necessarily gunmakers, in the service of Henry VIII, or English mercenaries returning from the Continent in the mid 16th century: a date probably during the later years of the reign of King Henry VIII (1509-1547).

Diverse of our English Captains and Gentlemen that have served in the Tumultuarie Warres of the Lowe Contries, or peradventure some time in the civill warres of France, do praise and magnifie the shot of Carabins, or Argolettiars (as they terme them) and



A636 Fig. 4.4 The 2-piece sear common to all English snaphances. The primary sear 'a' is locked in the cocked position by the secondary sear 'b.' When, on drawing the trigger, the support of the secondary sear is withdrawn, the bevelled nose of 'a' is forced out of engagement with the tail of the cock by the force of the mainspring. *Courtesy Brian C. Godwin*

of Reisters, which are Pistollotiers. Composed by Sir John Smythe, Knight 1589.¹¹

This suggests that the word “Snaphance” had a meaning in England but that meaning had been replaced at an early date by other European arms users or collectors. Perhaps Dr. Drejholt’s observation that ‘snaphance’ appeared, or reappeared in Sweden during the 19th century should be looked at more closely because in the literature of the Continent, it is used to identify many different forms of ignition.

The snaphance, as we know it today, continued in service in England, apparently without much change, until the invention of what is now known as the English lock (Chapter 5), with its one-piece steel and pancover (frizzen) and lateral acting sear in the second quarter of the 17th century. The snaphance name was transferred to the new lock (later to a second version of it), and continued to be used until about 1700 when “firelock” became the proper noun used to identify the flintlock.

It is not known exactly when the English lock went out of service but a price list (Fig. 5.1) for the repair of “matchlock muskets, snaphance musquetts, and snaphance muskettes extradordna” provided to the Board of Ordnance by the London Gunmakers’ Company in 1683 proves that they were still in store under that name although it gives no indication how long they had been held in reserve. In any event, the arms remained but the word snaphance disappeared, to be replaced by ‘firelock’ shortly after that date.

With the passing of 150 years, identification of the snaphance was lost in England. Historians knew it was a flint-lock musket but it was not until 1824 that a description of the English snaphance was produced for those with an interest in arms history.

There was no need for owners or users of a snaphance to describe their gun’s ignition as there was no flint-using alternative. A contemporary manuscript might mention the type of gun or pistol, a musket, caliver, dag, etc., based on the name for the entire gun rather than a word for the type of ignition. But no early description of a snaphance lock has been found.

John Cruso, a contemporary writer, in his *Militarie Instructions for the Cavalrie* published in 1632, described the loading and firing of a snaphance pistol and was probably this reference found by Sir Samuel Rush Meyrick (1783-1848) which let him to the identification of the English snaphance and then brought it into the vocabulary of English arms collectors and historians.

Meyrick was not the first gun collector but he was one of the first arms historians to publish on the evolution of firearms based upon his research in the early literature. He



A505 Fig. 4.5 Illustration of the Snap-haunce lock “discovered” in his son’s collection by Sir Samuel Meyrick in Skelton’s *Engraved Illustrations of Antient Armour from the Collection of Goodrich Court, Herefordshire*, (Vol. 2, Plate CXVI).

has been described as “the father of the study of early arms and armour.” In 1826 he was asked to assist in the revision of the exhibits in the national collection of arms and armour at the Tower of London and in 1828 he was requested by King George IV, an active gun collector in his own right, to re-arrange the armour at Windsor Castle. In 1832 he was created a Knight of the Hanoverian Guelphic Order and a Knight Bachelor. As it relates to this study, he was the first to identify and provide a brief description of the snap-haunce. On page 89, Vol. III, of *A Critical Inquiry into Antient Armour* published in 1824. He wrote:

I imagine that I have discovered both snap-haunces and tricker-locks in my son’s collection. The first is where a moveable hammer is placed beyond the pan in imitation of the cock to a wheel-lock, and brought down upon it in the same manner. The cock being placed according to the present mode, strikes against it on pulling the trigger; and it is curious to remark that this hammer is furrowed in imitation of the wheel in a wheel-lock.¹²

and again on page 101:

The snap-haunce differed from the modern firelock, in the hammer [frizzen] not forming the cover of the pan.

This was expanded slightly by his friend, T. D. Fosbroke, who lived on the opposite bank of the River Wye and who wrote in his *Encyclopaedia of Antiquities* published in 1825:

In the reign of Charles I [1625-1649] the *snap-haunce* was introduced. It had a moveable hammer placed upon the pan in imitation of the cock to a wheel-lock, and brought down upon it in the same manner. The cock being placed according to the present mode, strikes against it on pulling the trigger, and it is curious to remark, that this hammer is furrowed in imitation of the wheel in the wheel-lock. The *snap-haunce* differs from the modern firelock, in the hammer not forming the covering of the pan.¹³

Meyrick slightly expanded on these features in a paper read before the Society of Antiquaries on February 7, 1827 and included them in the compilation of engravings produced by Joseph Skelton in 1830¹⁴ where he described them

A snap-haunce musket, a Dutch invention, which derived its name from the troops who made use of it. These were at first a set of marauders termed Snap-haan or Poultry stealers,” and their weapon was an improvement on the match-lock musket with some contrivances suggested by the wheel-lock.

He probably thought he was also describing the 16th century English snap-haunce when he wrote that he had discovered a snap-haunce in his son’s collection, but the lock on which he based his thesis has now been identified as one of the guns made by Simon, or his son, Jacques Robert in southern France. That gun is now in the Pitt Rivers museum collection at Oxford.¹⁵ The identification of its lock (Fig. 4.3) as Meyrick’s model

“Now concerning the snap-hane pistoll, those postures wherein it differeth from the fire-lock, pistoll, are these as in figure,

18. *Bend your cock.*

Holding the pistoll in the bridle-hand, (as before hath been shewed) with the right hand he is to bend the cock.

19. *Guard your cock.*

With the right hand he is to pull down the back-lock so to secure the cock from going off.

20. *Order your hammer.*

With the right hand he is to draw down the hammer upon the pan.

21. *Free your cock,*

With the right thumbe he is to thrust back the back-lock and so to give the cock libertie.”



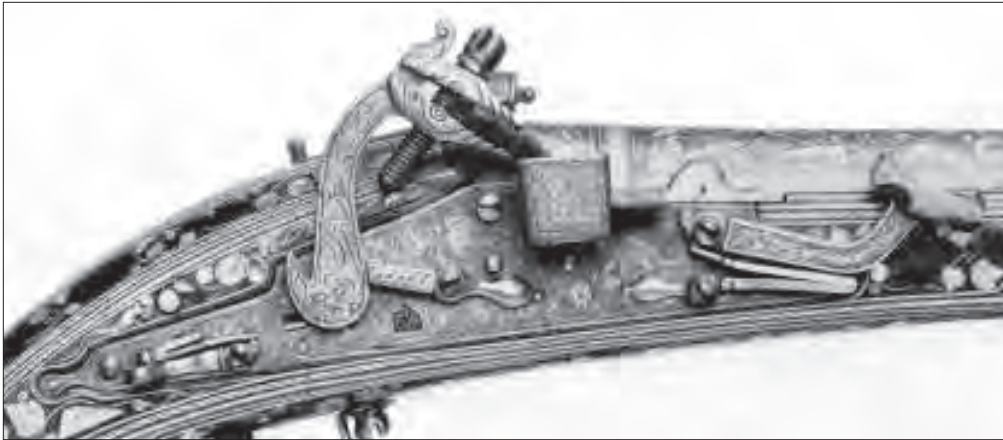
A662 Fig. 4.6 This transcript from John Cruso’s *Militarie Instructions for the Cavalrie* published in 1632 provides the key to identification of the English snaphance. The action “to pull down the back-lock so to secure the cock” and “to draw down the hammer (the steel) upon the pan” can refer to only the snaphance lock

is confirmed by Fosbroke who described the “furrowed” steel, and the lock showing that feature is illustrated by Skelton in *Engraved Illustrations of Antient Armour from the Collection of Goodrich Court, Herefordshire* shows that feature.

It is the characteristics Meyrick provided which arms historians now most often use to identify most snaphance locks. On all of the English examples, and many others, there is an internal mainspring and a lateral acting sear with a full cock stop passing through the lock plate, engaging a tail on the cock. The fall of the cock is stopped by a buffer. The frizzen (the contemporary term was “steel” or “battery”), is perpendicular to an arching arm attached by a screw to the lock plate with resistance provided by a smaller spring. The pan cover is a separate piece (a feature adopted from the wheel-lock as noted by Meyrick), which slides back as the cock falls to expose the priming. On many later variations there is a safety lever behind the cock to prevent accidental discharge.

When the barrel is loaded with powder and ball and the pan filled with powder, the pan cover closed and the steel put into place over the pan, the gun is ready to fire. Internally, when the cock is drawn activating the crescent shaped tumbler, the main-spring is put under tension in the usual manner. When the trigger is pulled, releasing the primary sear bar, the sear is withdrawn from the tail of the cock allowing it to fall. Simultaneously, a rod attached to the tumbler moves forward to catch on the pan cover swivel, activating the cover, to push it off the pan, exposing the priming powder to the sparks falling from the frizzen.

Meyrick’s identification of the snaphance was quite correct as far as it went. In his 1827 paper read before the Society of Antiquaries, he suggested a date sometime during



A511Fig. 4.7 The earliest dated English snaphance known, a petronel bearing the lock mark “RA under a fleur-de-lis,” is dated 1584. *Tøjhusmuseet, Copenhagen*. No. 19824.

1547 have survived and it has been possible to examine four of them. The frizzen on those four show no sign of having been struck with a flint and it has been suggested that the alternative – pyrites – was used. To counter that thesis, it has also been suggested that the reason no signs are evident is that many guns were made for royalty and the aristocracy but they were never used. And it must also be remembered that Miller Christy writing in *The Bryant and May Museum of Fire-making Appliances* (1926) records that fire making by flint and steel had been done for “approximately three thousand years.” It was this process which originated the term “steel” for the component of the snaphance that on later flint-lock forms was known as the hammer, battery, or frizzen.

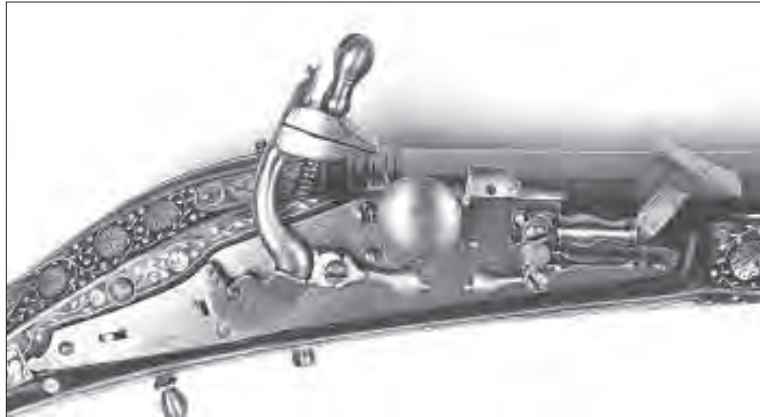
It was decided quite early that after a general outline, each regional form of snaphance had to be covered separately: there were too many differences to do otherwise. For clarity, the order eventually selected was to be based upon what might be the order of the development, but there is no certainty that this is so. It was not the order I would have preferred as there is much more data available on the English snaphance than the others and for this reason it is suggested that the paragraphs on The English Snaphance be looked at first, to be able to put the others in perspective.

The English Snaphance

Snaphance, a title with obvious Germanic origins suggests that the ignition had arrived on England’s shores with German gunners, not necessarily gunmakers, in the service of Henry VIII or English mercenaries returning from the lowlands in the mid 16th century.¹⁷

Although the first flint-locks were probably being produced in England by about 1550, no contemporary English name for the new ignition has yet been found until 1580 when a document preserved in the archives of St. Paul’s Cathedral, London, records that the Dean and Chapter equipped nine horsemen for service in Ireland, with “9 cases of snaphaunces at 40s the peece.”¹⁸ It is unlikely that troops would have been sent on a mission with untried arms and this suggests that the snaphance in England was long past the experimental stage. They have been identified in Scotland in a document which can be dated prior to 1568 but when they were introduced in England is yet to be discovered.

Dr. John Cooper, in his research on the English lock found a document dated Febru-



A294 Fig. 4.8
The lock on an English
snaphance pistol,
c.1610. *Kremlin
Armoury Chamber,
Moscow*. No. OR2955.

ary, 1570, which, although not quite as clear as one would like, almost certainly makes reference to 18 flint-lock “calivers” of the type we now call “snaphance” and four wheel-lock pistols, which required repairs.

A brief noate of the most necessarie munitions to be provided at this present in the office of the Ordinance videlicet. ... Calivers complete whereof 4 lacking stanes [stones] 2 lacking pannes [pans?] their scrapers [steels?] 2 having their stockes broken and 7 without stocks whereof 3 broken. Dagges [wheel-locks] furnished with keyes and moulds whereof 4 wanting purfs[?] [purses?] and charges [cartridges].¹⁹

It appears that “snaphance” was the only word used in England to identify the flint-lock introduced in the 16th century. In the second quarter of the 17th century, probably in the early 1630s, a new lock design, almost identical to the snaphance but with the steel and pan cover combined, appeared in England. It too was known as ‘snaphance’ and the name continued to be used through that and a second variation of it until about the end of the 17th century.

Because the one name was used over more than a century, (1580-1680) for the three variations, it is not known when the original snaphance, the one we deal with in this chapter, was taken out of service but there were still snaphance muskets in government stores in 1683.²⁰

After 1700, ‘snaphance’ disappeared from the common vocabulary although the existence of such an arms was known to historians. It was not until S.R. Meyrick published his theory that it came back into use as a gun related item.

Meyrick’s identification of the snaphance was quite correct as far as it went. He hit on a date during the reign of Queen Elizabeth (1558-1603) which was pretty close, and he did identify the version of the flint-lock introduced in England in the 16th century. He apparently did not realize that there were other forms of lock which historically also went by the name snaphance and he created the problem that English speaking arms collectors since then have given the name to any flint-using arm with and obviously visible separate steel and pan cover, and used him as the authority.

In every-day-Europe the term continued, in one form or another, for an additional two or three centuries. In England, the Meyrick snaphance was obsolete by about 1640²¹ when a new flint-lock design appeared. It is now known as the ‘English lock,’ to be discussed later, but the word snaphance was adopted as the name for the new lock.

The transfer of meaning went through many generations of ignition evolution. It



A291 Fig. 4.9 A small English snaphance pistol, c.1615. The barrel, lockplate, and pan are brass. The tail of the plate has the typical English monster hear form *Palazzo Ducale collection, Venice.*

took 300 years and it may take nearly that long to separate the meanings and clarify the vocabulary we now use for the many ignition variations created during those three centuries.

A check-list of English snaphance characteristics.

When Meyrick identified the snaphance, he provided a basic description, adequate for all future arms historians to recognize one when they saw it.

The first is where a moveable hammer [frizzen] is placed beyond the pan in imitation of the cock to a wheel-lock, and brought down upon it in the same manner. The cock being placed according to the present mode, strikes against it on pulling the trigger ... The snaphaunce differed from the modern firelock, in the hammer not forming the cover of the pan.

The details he provided were adequate enough that over the next 100 or so years, the snaphance became immediately recognizable and distinguishable from all other flint-using ignitions. But, as illustrated in fig. 4.1, there are also many variations. Where they vary from the basic English snaphance will be discussed where appropriate.

- :: The lockplate of the earliest dated survivor (1584, fig. 4.7) is typical of those which followed with a flat plate profile and often with a decorative tail, straight along the bottom edge, and a hump along the top edge to accommodate the push bar on the inside. The push bar is designed to remove the pan cover on firing: it swivels on a pin on the tumbler and pushes the pan-cover off the pan as the cock falls forward on firing.
- :: A simple cock with a tail to be held in cocked position by a sear passing through the lockplate, and a buffer on the plate to prevent its moving too far forward. (cock shapes will be discussed later).
- :: A perpendicular steel on an arched steel-arm, without pan cover, curving to come into contact with the pan.
- :: A pan cover activated by an internal bar attached to the tumbler
- :: Internal mechanism with a horizontal primary sear passing through the lockplate to hold the tail of the cock and a secondary sear-bar to be activated by the trigger.
- :: A square flash-guard on the pan to about 1600, thereafter round.
- :: At least four forms of safety, none of which are common, may be found:
- :: Cruso, in 1634 mentions the use of the dog catch or "back ketch" as he called it, to hook into the tail of the cock and to hold it safe at half-cock. This feature is found on only a



A003 Fig. 4.10. This, the earliest surviving snaphance, is one of 35 muskets made in the government arsenal at Arboga in 1556 which were mounted with Nuremberg barrels. The pan, which is missing, would have had a cover pivoted towards the front requiring it to be removed manually for firing. It would be described as a *laglås* (lay lock) with an external mainspring. *Livrustkammaren, No. LRK16317*

very small percentage of English snaphance locks and the dog may catch on the back, underside, or breast of the cock.

- :: An 'L' shaped catch on the left side of the stock designed to lock the sear bar in the full-cock position
- :: A sliding safety penetrating the lockplate, behind the cock, to engage the secondary sear on order to prevent its movement.
- :: A rotating, spring activated "swing-over" safety intended to engage the tail of the cock.
- :: A "monster head" design on the tail of the lockplate with the eye represented by the rear stock pin appears in the last decade of the 16th century.
- :: Cock designs, generally speaking, fall into two forms although the opinions as expressed by the gunmaker allowed for considerable variation and there was considerable overlap. Initially they had a flat surface with square edges and a matching steel-arm. Before the end of the 16th century a cock with a flat lower half and a round neck area, separated by a decorative band appeared and both were used until the last snaphance locks were being made. The moveable top jaw is found on all known English snaphance locks but there could have been almost a half century of production, about which nothing is known.²²

The Swedish Snaplock/Snaphance

For more than a century, arms historians in Sweden have published on firearms evolution working with large, well-documented collections that date from the first half of the 17th century. A catalogue of the collections at Skockloster Castle formed by Field Marshal Count Nils Bielke (1644-1716) and his sons Carl Gustaf (1683-1754) Ture Gabriel (1684-1763) by Dr. Åke Meyerson and Dr Lena Rangström was published in 1984. The first two volumes of the collection at Livrustkammaren, (The Royal Swedish Armoury) compiled by Dr. Nils Drejholt were published in 1997 and 2007 and the third is ready for printing. The advantage to this writer of these volumes is that they have been published in English with transcripts of the German or Swedish from original inventories compiled between 1654 and 1867.

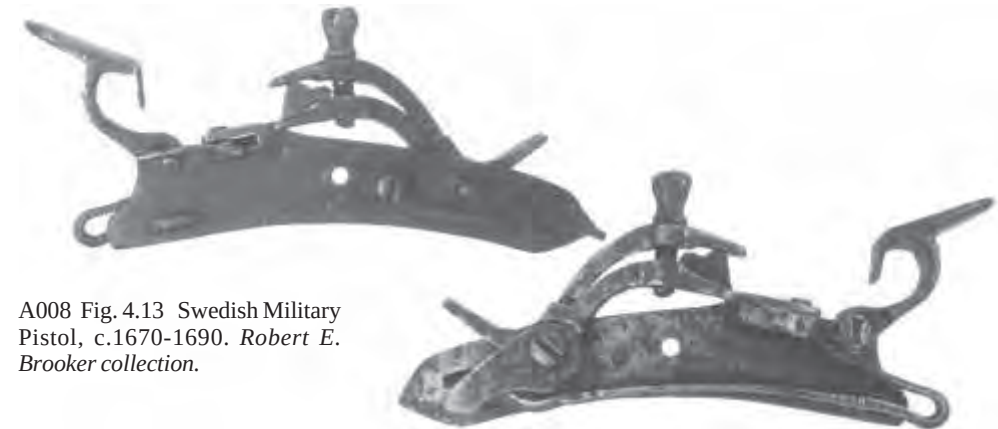
In the 16th century, most gunmaking in rural Sweden, as probably almost everywhere else, would not have been a full-time job but served as a supplement to farming income. The few full-time smiths were either employed at royal castles and by aristocrats, or were active in town Guilds supplying a service to local customers.



A004 Fig. 4.11 Swedish snaphance musket with combined mainspring/steel spring, and automatic sliding pan cover. c.1600. *Livrustkammaren, No. LRK 3704.*



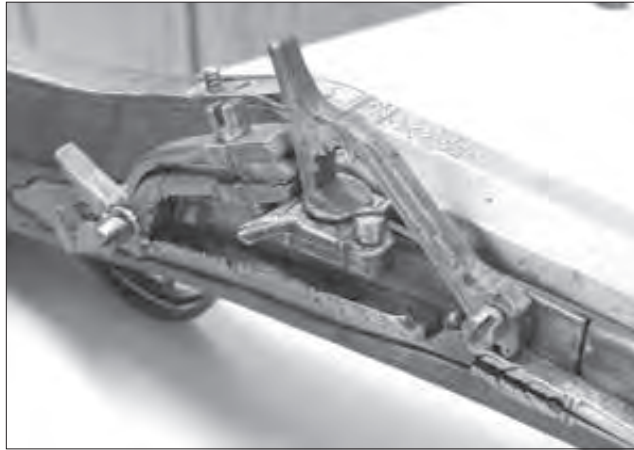
A002 Fig. 4.12 One of the locks from a Swedish superimposed-load gun, c.1550. *Livrustkammaren, No. LRK 16308*



A008 Fig. 4.13 Swedish Military Pistol, c.1670-1690. *Robert E. Brooker collection.*



A014 Fig. 4.14 Swedish Naval snaplock pistol, c. 1600-1650 *Robert E. Brooker collection.*



It might have served as a pan cover but its appearance with manually removed pan covers suggests its primary function was to hold the cover in place until it needed to be removed.

It is found on 16th century Russian arms

A791 Fig. 4.15 In the mid 16th century, an appendage was applied to the lower edge of the steel that has been called a “foot” or “pressure plate” *Livrustkammaren*, No. LRK 16308

In 1551, King Gustav I of Sweden (Regent, later King Gustav I Vasa, 1523-1560) established a Royal Armoury at Arboga for the production of firearms, and other articles of war. He brought in gunsmiths from rural areas, other Scandinavian countries, and German craftsmen who hired to work for the king. German was a second language and the one used in many of the records of the 16th and 17th century.

At the reorganization of the Swedish state during the reign of King Gustavus Adolphus (1611-1632) central factories were created in each gunmaking region of Sweden, Jönköping in the south and Örebro, Norrtälje and Söderhamn in central Sweden, and the peasant gunmakers were more or less forced to settle there.

Dr. Hoff suggested that the snaplock existed by about 1530 and one of the earliest references to such a lock has been found in a Swedish royal document which can be dated to 1547 where it is called a *snaplås* (snaplock).

On February 2, 1552, King Gustav Vasa ordered that “a good rifle with *snaaplås* is to be given to the Hunter, Bengt Månsson;”²³ a single musket has survived at the Livrustkammaren in Stockholm which is considered to be one of 35 made in 1556 on the orders of the king which had Nuremberg barrels, and stocked with locks made in the government arsenal at Arboga. It is described in the Royal Armoury catalogue compiled in 1654 as “1 Långh bössa om 3½ span med *snaplåhs*” (1 long gun of 3½ span with snaplock).²⁴ The survivor (LRK 16317M Fig. A003) 68½ inch (1740mm), barrel of .59 caliber was made in Nuremberg and it was stocked in Arboga with a Swedish-made lock.

The exterior surface of the lock plate is flat and filed smooth, with an angled front end and a simple, decorative pointed back end. Inside, it bears the marks the forge-smith left with the cross-peen hammer used to expand and flatten a bar to the desired width and thickness. The cock is long in the neck with decorative filing between the jaws, a fillister head flint screw, and a long tail to be acted upon by the sear.

The long leg of the external ‘V’ mainspring provides upward pressure on the tail and the simple internal sear working through the lock-plate on the tail of the cock is activated by pressure on a button behind the cock which releases the sear. The pan is missing but it would have had a pan cover pivoted from the front to be turned off manually. The steel, angled from a long steel arm, is flat. There is no doubt about the Swedish name for



A 552a Fig. 4.16

the snaphance.

On other versions, the steel on some locks have a two-piece pan cover; a swivel pan cover with attached steel. On some the steel had been replaced by a frizzen similar to that of flinlock form with safety provided by pivoting the face to the side, removing it from harms-way.. In Swedish, these are known as *springlås*: (springing or jumping lock): where the steel is pivoted on the pan cover and turns aside for safety. It must be turned back for firing, and *läglås*: (lay lock) where the pan cover is pivoted and the steel laid back for safety. For firing; the pan cover must be turned off the pan and the steel moved back over the pan for firing. To summarize:

utfjäderslås: (outer spring lock) An external mainspring

infjäderslås: (inner spring lock) Internal mainspring

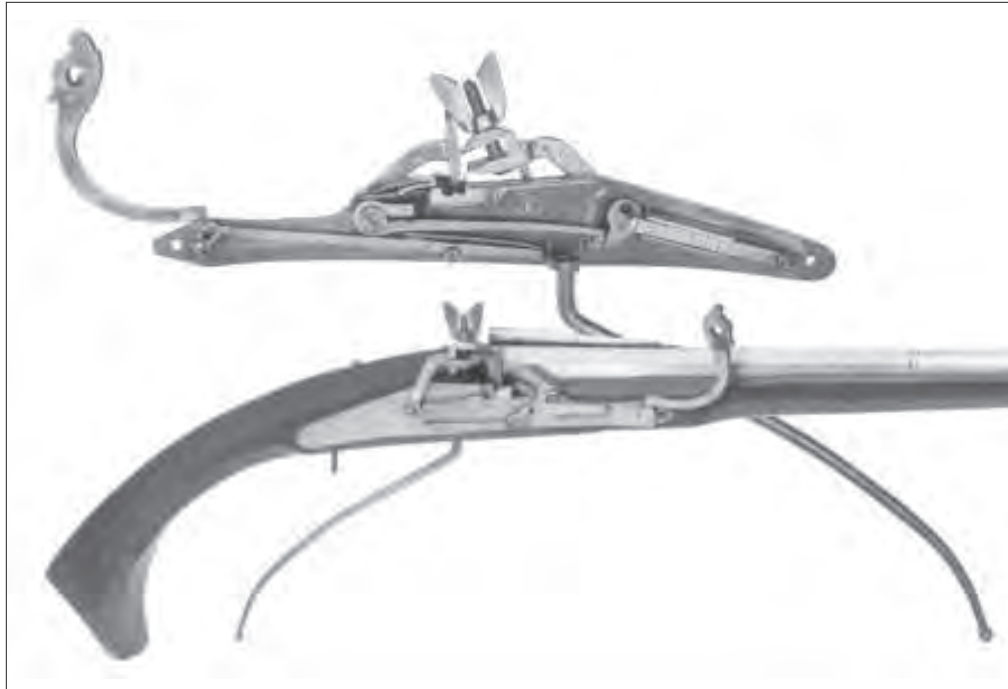
springlås: (springing or jumping lock): where the steel is pivoted on the pan cover and must be turned aside for safety and turned back for firing.

läglås: (lay lock) where the pan cover is pivoted and for safety, the steel must be laid back along the side of the barrel. For firing, the steel had to be moved back over the pan the pan cover had to be manually turned off the pan.²⁵

Earliest dated snaphance muskets

A small number of examples of a 16th century combination matchlock and snaphance lock, some of which are dated 1572, have survived to provide the earliest dated examples of the ignition. Working from Hoff's c.1530 date would provide about 40 years for improvements before these early snaphances were produced.

Three complete muskets with combined match and snaphance ignition have survived in museums at Veste Coburg and Nuremberg in Germany and Copenhagen in Denmark,²⁶ each of which is dated 1572 on the barrel.



A037 Fig. 4.17 One of the three combination matchlock and snaphance and muskets dated 1572 in the Tøjhusmuseet in Copenhagen, the Germanisches Nationalmuseum in Nuremberg and the Kunstsammlungen in Veste Coburg. This, from the *Kunstsammlungen der Veste Coburg* collection, No. IV.D.117.

Thierbach, in 1886, recorded that there was one in Dresden dated 1571 on the barrel. The dates on the two have been confirmed but the Dresden example has not been located. I have correspondence from Dr. Roosens of the Rüstkammer who told me that the one in Dresden it is not in his museum. He suggested the military museum and the officer in charge at the Militärhistorisches Museum der Bundeswehr has confirmed that it is not there. He suggested if I wanted to check further I should perhaps look in Russia. Is it possible that Thierbach misread his notes or there never was one in Dresden?

There is an undated, restocked, and perhaps rebarrelled example in the Bayerisches Armeemuseum at Ingolstadt²⁷ and a detached lock somewhere in a private collection.

The following description is based on a detailed examination of the detached lock illustrated in *The Gun Collector*²⁸ a small but important, magazine published irregularly in Madison, Wisconsin during the 1940s and 1950s under the editorship of G. Charter Harrison, Jr. Mr. Harrison was an knowledgeable student of arms history and it is assumed that he was the author of the note he published on what may be the fifth (or sixth?) surviving example of this mechanism in issue Number 38, published in 1951. He did not identify the owner or location but his description reproduced below, although somewhat abridged here, is informative. His edited text follows:

The matchlock is the typical sear mechanism activated by the long bar resting beneath the stock and with a decorative head on the pivot of the serpentine.

The snaphance has many characteristics carried over from the wheel-lock, the most obvious of which is in the shape of the frizzen which is actually a segment of a wheel.

Its face is convex, narrow (0.375 inch/2cm wide), cut with four V shaped grooves. Like the wheel-lock, the ridges are notched.

The lock itself is sizeable, measuring 12 inches (30.48cm) in length.

The lateral acting sear engages a hole in the tumbler exactly as the wheel had been held in the wheel-lock.

The top jaw of the flint jaws is the moveable clamp and the top jaw screw enters from below, to be secured in place by the wing-nut.

A separate pan cover is found which while it is like the sliding pan cover on the wheel-lock, is actually pivoted at the bottom of the lock plate. A spring snaps the cover open when the release is tripped. Releasing is done by a “walking-beam” placed on the outside of the lock plate between the cock and the pan. When the cock falls, a projection at the base presses in on one end of the release bar, causing the other end to fly outwards and trip the pan cover.

The springs on these locks are either flat single arm, or ‘U’ shaped and held to the lockplate by rectangular openings in the plate; only the mainspring is held by a screw.

The serpentine and the cock are fastened by pins.

While it is obvious that a quantity of similar muskets were made but there is no information on numbers or purpose. On the Harrison lock, most parts are punched with two dots although on one part there is four; the Veste Coburg musket bears the barrel mark ‘N F’²⁹ while the Nuremberg musket is marked ‘WW’ under the barrel and ‘MF’ in addition to the date.³⁰

In 16th century central Europe, there was more than 100 kingdoms of varying size and importance. Dr. Hoff suggests these were “almost certainly made in one of those German States” but he offers no suggestions. This is a logical suggestion as each prince, duke and administrator, not to mention many of the wealthier aristocrats maintained a private army. In addition to their standing army, many of these individuals maintained personal gunmakers who had to earn their keep.

It has been suggested that they might have been made by Simon and/or Jacques Robert, Gunmakers to the Duke of Savoy. There is no documentation to support this but their work will be discussed in the paragraphs on the following pages.

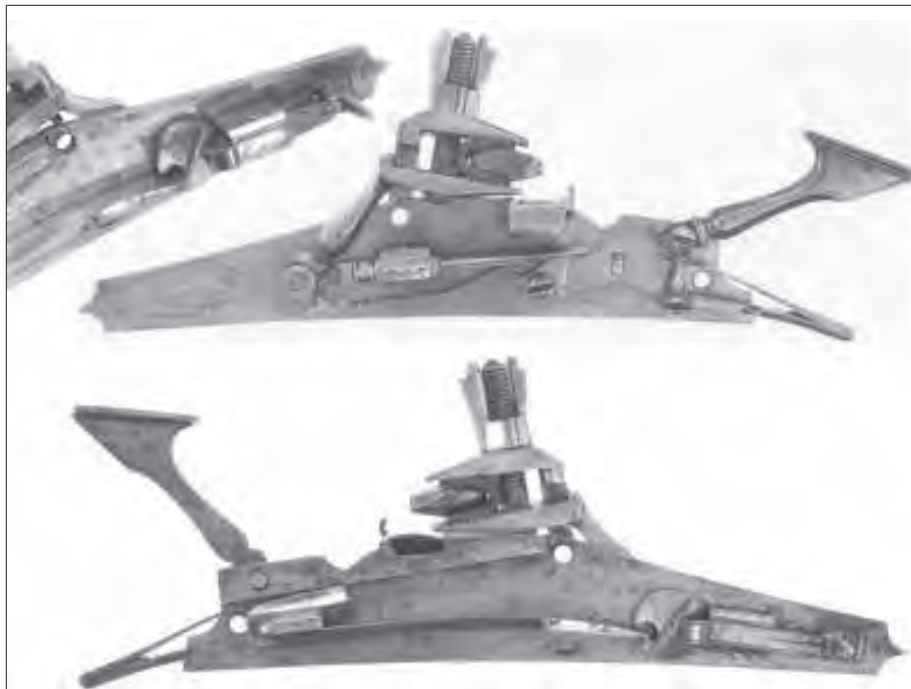
The Simon & Jacques Robert snaphances³¹

Simon Robert and his son Jacques were French gunmakers who first turn up in the papers of the Dukes of Savoy in 1561 when a payment was made to Jacques on behalf of Duke Emanuele Filiberto (1528-1580). In 1573, Simon was authorized take water from “the canal through which the waters of the Stura pas in the vicinity of the Duke’s pleasance called the Palco” to build a trip-hammer with a mill suitable for grinding and a third wheel for operating a bellows.

Since *fuscili*, fusil in English, could refer to any flint-using arm, it took more than a century to identify their snaphance; it was not until Claude Blair collected additional data from other sources to provide more precise identification. The documentation was spread far and wide: Madrid in Spain, London, and Goodrich Court in Pembrokeshire, England, and the archives at Turin in Italy. The key to the search was a full-length portrait painted in 1590 or 1591 of the four-year-old Philippo Emanuele (b.1586), Prince of Piedmont, eldest son of Carlo Emanuele I (1562-1630) Duke of Savoy, now in the Museo del Prado, Madrid. The portrait shows the lock side of a gun fitted with a distinctive snaphance lock, the snaphance mentioned earlier by S.R. Meyrick as “in his son’s collection,” in

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A039 Fig. 4.18 The Pitt Rivers snaphance with a Roberts lock, formerly in the collection of Samuel Rush Meyrick and the one on which he based his identification of the type. The upper branch of the mainspring is missing. *Photos courtesy Brian C. Godwin*

No. XII-736



A038 Fig. 4.20 The Roberts snaphance lock mounted in pistol with a Nuremberg town-mark on the barrel. *Royal Armouries Museum collection,*



A039 3Q Fig. 4. The Pitt Rivers Roberts lock is fitted with the iron pyrites firestone that was in place in the 1820s when the illustration was engraved for Joseph Skelton's catalog of arms in the Meyrick collection at Goodrich Court, Herefordshire. It is unlikely to be contemporary with the gun but it may be appropriate. It probably would have been mounted in a lead wrapping. B.C. Godwin photos.

England, and arms with similar locks in a few other collections, including a pistol in the Royal Armouries at the Tower of London.

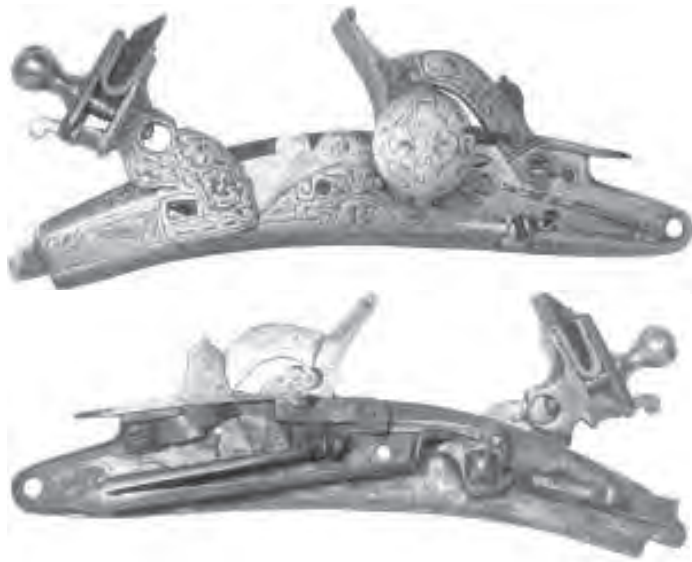
Since the Prince was only in his fifth year when the portrait was painted, the gun illustrated must have been a miniature one made specially for him. For obvious reasons it is extremely probable that such a piece would have been made by one of the Court gunmakers, and the fact that it is fitted with a snaphance at a period when we know that such locks were rare in Italy, but were being produced for the Prince's father by two such makers, converts the probability into a virtual certainty. We can therefore attribute the gun with some confidence to Simon and/or Jacques Robert. And, there was a well-published single gun and a pistol in England which were apparently related to the gun in the portrait of the Prince.³²

A large body of research collected by Angelo Angelucci, an early Italian arms historian, was published, in part, in the 1860s with additional material published in 1954³³ which indicated that by 1575, Simon and Jacques were well established gunmakers. That document covered a payment "owed Simone by His Highness for the remainder of the *archibugi et fucili* ([a wheel-lock or matchlock?] arquebus and flint-lock) supplied by him..." and Giacomo Robert was described as master gunmaker to His Highness.

There are at least six related examples of the Robert lock which have survived. Each with the same basic construction but with minor mechanical differences and different decorative details. These might be indicative of different workshops, different lock-makers within the same workshop, mechanical improvements, a lockmaker or a customer with changing tastes, etc.

Externally, the lines of the snaphance are beginning to evolve. The cock, a straight, though decorative post, having a loop at the foot punched with a hole to accept the square of the tumbler which is locked in place by a pin passing through each, rising to the jaws stretching at an obtuse angle from the post. The stone is retained in place by a moveable top jaw with a square tenon fitting into a mortise in the cock body. It is held in place by a threaded pin entering from the underside of the lower jaw and tightened by a winged nut from the top.

The steel or frizzen is flat with six or seven deeply cut grooves. It is pivoted on a single screw and controlled by a V-spring, which with the steel arm, are jointly supported



A517 Fig. 4.24 Scottish snaphance dated 1683 by the maker "IS" Roy G. Cole collection.

by a decorative, turned bridle.

The sliding pan cover is somewhat rounded and pivoted on a bar activated by a rod pushed forward on the fall of the cock. Dr. Blair describes it:

The pan-cover is made in one with a flat vertical lever, pivoted at the bottom below the pan, so that it moves in an arc; it terminates in a toe which engages over the tip of a horizontal leaf-spring set parallel to the lower edge of the plate below the pan. When the cover is allowed to move freely this spring keeps it forward in the open position. Set between the spring and the pan is a longitudinal sear-lever – again like the heel-sear lever of a wheel-lock – working laterally in a lug attached to the plate. The sear on this engages, like a hook, over the pan-cover lever and retains the pan-cover in the closed position when it is pushed back with the cock at full cock. As the cock falls ... a lug at its base depresses the rear end of the pan-cover sear-lever and so lifts the other end and allows the pan-cover to spring open.³⁴

Internally, the 'V' spring is wrapped around a stud with the hook of the working arm resting in a pocket cut into a thick, circular tumbler. The nose of a lateral acting sear with a separate trigger bar, is designed to rest on a shelf or ledge cut into the surface of the tumbler.

The Meyrick lock at the Pitt-Rivers museum is the only one bearing a mark and it may have incorporated the letter 'J'. It is a mark also found on a number of wheel-lock arms and it has been suggested that it is the mark of Jacques Robert but there is as yet, no supporting evidence for that thesis.

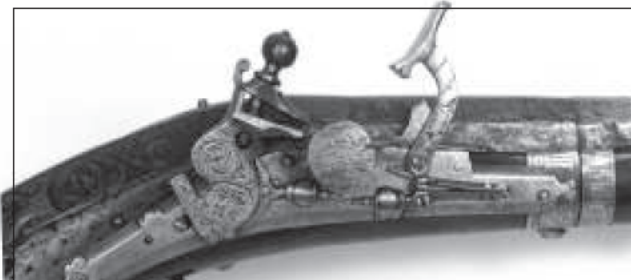
The Scottish "Snaps"

Cannons were being imported for use in Scotland by the last quarter of the 14th century and by about the mid 15th century a cannon founder was operating, perhaps only briefly, in Edinburgh. By 1530 an act had been passed prohibiting the shooting of wild fowl indicating at least matchlocks and perhaps early flint-locks were in the hands of the population, and a few gunmakers were probably active in some of the more populous centers.

A mention of pistols is first found in 1549 and only a little later they were also described as "dags." They could possibly have been fitted with snaphance locks but it is



A262 Fig. 4.19 Snaphance lock from a Scottish gun with an engraved brass stock, dated 1624 by James Low of Dundee, and the interior of a similar mechanism illustrating the relationship with the English snaphance. *Royal Museum of Scotland collection, Edinburgh* No. LH419.



A263 Fig. 4.20 A breech-loading rifled by Gulielmus Smith of Bellachasatel, dated 1686. *Royal Museum of Scotland collection, Edinburgh*, No. LNA 30



A264 Fig. 4.21 A Scottish snaphance gun engraved *Me fecit uielmus Smith* on the lock and dated 1674 on the fence. The barrel is dated 1637. *Royal Museum of Scotland collection, Edinburgh* No. LNA 26.



A265 Fig. 4.22 A Scottish snaphance engraved with the initials *IS* on the lockplate and the date 1675 on the pan. *Royal Museum of Scotland collection, Edinburgh* No. LNA 32.



A267 Fig. 4.23 This Scottish snaphance gun is dated 1667 on the barrel and 1671 on the fence. It is stamped *IT* and intertwined *IS* on the barrel. *Royal Museum of Scotland collection, Edinburgh* LNA 27.

more likely that they were of wheel-lock ignition as almost 20 years were to pass before there is a document recording the existence of the snaphance in Scotland.

Snaphance firearms, known simply as “snaps,” “snapwork,” or “snappies,” first appear in the literature as early as 1568, more than a decade before the “snaphaunce” is documented in England although they were certainly known there. Dr. Blair records their early use:

...The second earliest [use of the word in Scotland], though in an English source, comes from a Scottish context. Queen Elizabeth I’s agent in Scotland, Henry Killigrew, ... by a letter of 19 August, 1575, to Lord Burleigh writes: “The Regent has Sixe fayer muskets come out of fflanders to serve for patternes to make other by ffor wh^{ch} purpose his Artificers are skilfull And as for dagges, otherwise called snaphaunces, they have furnished the most part of the gentlemen and horsemen of the Realm.”³⁵

The earliest dated Scottish snaphance, known as the Breadalbane gun, bears the date 1599 on the breech but there is good argument that it was restocked and probably had a new lock fitted at the time.

Almost all surviving flint-using firearms produced by Scottish gunmakers prior to the early 19th century are of a design or pattern that is readily recognized as of Scottish origin. Roughly speaking they may be divided into two groups: pre 1700 almost all of which are snaphance, and post 1700, those known as Highland pistols, are flint-locks with lateral acting sears.

The Dutch Snaphance

The influence of Dutch gunmakers during the 17th century was far greater than would be expected if based on the size of the country. Nevertheless, Jan Piet Puype and Marco van der Hoeven, as editors, wrote in *The Arsenal of the World*, “A large part of the wealth the Dutch Republic earned in the Seventeenth Century – The Golden Age – was made as a profit on the arms trade.”

As suppliers of military firearms to many Continental armies, the reputation of Dutch gunmakers grew and the growth of funds from that source created the need and the means to support a large group of highly skilled artisans.

Although the matchlock was the primary military arm until the last years of the 17th century, the wheel-lock was available more than a century earlier. But a flint lock, that is the snaphance, did not appear until at least a half century after it is first mentioned in England. Surviving snaphance arms are mechanically like those described by Meyrick and for some unexplained reason there are writers who have identified them as the “Anglo-Dutch” snaphance. This is a provenance which has been claimed for them since at least the late 18th century although it apparently has little basis in fact. Jan Piet Puype, Senior Curator Emeritus at the Army Museum, Delft, who has studied and written extensively on Dutch firearms, recently confirmed that he has found no documentation on the presence of the snaphance in Holland until almost the end of the first quarter of the 17th century. But after that date, the snaphance was a popular Dutch ignition for sportsmen and gunmakers produced a large group of extremely well-made and attractive sporting guns.

As noted in the introduction to this chapter, Dr. Puype and Dr. Hoff both have confirmed their belief that the snaphance did not appear in Holland until well into the first quarter of the 17th century, perhaps not much before 1622 when Prince Maurits created a special unit armed with flint-lock guns. Snaphance muskets were never regular issue



A454 Fig. 4.25 A Dutch snaphance of c.1620 with a straight lower edge and the typical hump back. The pan has a fluted shell shaped fence with engraved lines and the sliding pan cover has an enlarged ridge which provides a thumb rest to ease closing the pan. The swing-over safety. The design and mechanism is identical to the typical English snaphance. The frizzen may be a replacement. *Herbert J. Jackson collection, Royal Ontario Museum, No. 925.27.19*



A499 Fig. 4.26 A Dutch snaphance of the second quarter of the 17th century from a pistol. The lockplate with wheel profile is flat with chamfered edges marked with the initials 'W S' surmounted by a crown; the cock is round with a flat base as found on English snaphance of the previous century. The fence is in the form of a fluted shell. *Henk L. Viser collection, No. HV-79.*

to the Dutch army although beginning about that time, some special troops were armed with them.

Dr. Hoff, after recording some of the stories on how the name originated wrote:

A legend of this type, with all the clear-cut facts, names, dates and so on, is unlikely to be contemporary and should not be give much significance. Much more probably as an explanation is that the term is connected with the abrupt snapping down of the cock, which in Dutch, German and the Scandinavian languages is called *haan*, *hahn*, or *hane*. The snapping down of the cock represents in fact the most conspicuous difference from the wheel-lock in which the cock is turned down and placed over the pan cover before the firing. Popular etymology probably soon merged the two meanings of the word snaphaunce into one and explained the lock term as a derivation of the word meaning robber to describe the weapon used by the robber.³⁶

The Russian Snaphance



A570 Fig. 4.27 One of the pre 1608 snaphance locks manufactured at the Troitse Sergievsk Monastery in the 16th century and deposited at the State Museum on April 20, 1830. *The Kremlin Armoury collection.*

By the last quarter of the 16th century, gunmakers were located in many of the smaller towns in Russia, and an extensive arms-making operation at the Troitse Sergievsk Monastery at Zagorsk, approximately 300 Km north of Moscow.

In the last decade of that century, 30 gunsmiths were settled on the outskirts of the town of Tulla and the government, which was interested in increasing supplies of nationally produced arms, helped the craftsmen to take up their new residence and granted them various privileges to produce military weapons.

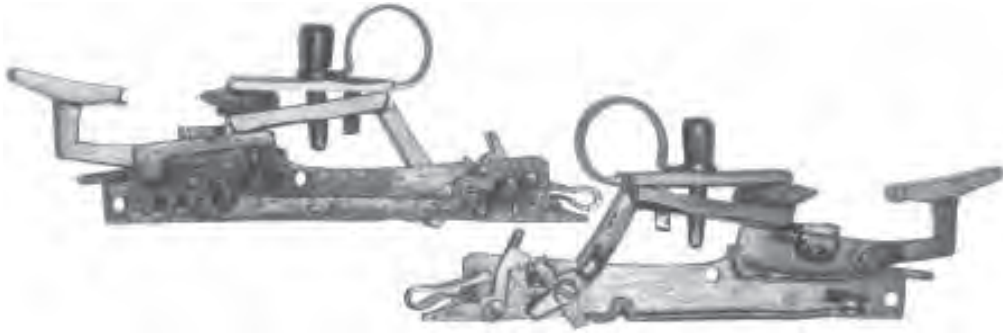
During the last years of the 16th century and much of the 17th century, Russia encouraged foreign gunsmiths to work and settle there. Most were masters trained in the Netherlands, Poland, or England and in 1815 it was John Jones, a Birmingham gunsmith who moved to Tulla and brought that arsenal into the industrial age with the introduction of drop forging lock components and rolling barrels.³⁷

Some data on arms production at the Troitse Sergievsk Monastery is available: in 1642-1642 there were nine men – five monks and four “outsiders” working at arms making. N.V. Gordieff wrote:

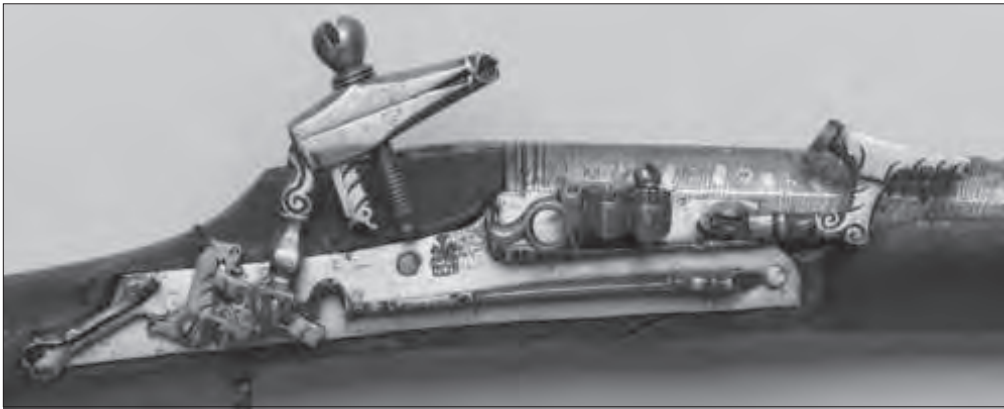
To characterize the production of the armoury, it is interesting to note that in the inventory there are listed locks for matchlock muskets in the amount of 90 pieces and 77 locks [flint-locks] ready to be installed to the already prepared barrels. Thus it can be established that the armoury was producing at that time a considerable number of flint locks.³⁸

The earliest firearms to have survived are a group of 28 muskets used in the defense of the Monastery during the Polish attacks of 1608 which were turned over to the State museum, now the Kremlin Armoury, in 1830. All are of simple snaphance pattern with external mainsprings applying pressure to the toe of the cock. Some of the springs were flat and others of ‘V’ form, held in the cocked position by a sear passing through the lockplate to act on the heel of the cock. The pan cover was pivoted at the front and removed manually.

During the 17th century, Russian gunmakers continued to be influenced by foreign gunmakers employed for extended period of time, many of whom lived out their entire life in Russia. The lock form of wheel profile popular in the Netherlands was especially popular and usually accompanied by decoration of uniquely Russian style.



A021 Fig. 4.28 Lock from a *Samopal* a light weight, small calibre, smooth bore, hunting gun, popular in rural Russia and Scandinavia until well into the 20th century. *George A. Snook collection.*



A540 Fig. 4.29



A544a Fig. 4.30



A545a



A009 Fig. A Russian sporting snaphance with lock of wheel profile showing the influence of Dutch gunmakers, c.1650. *Robert E. Brooker collection*

The Italian *alla Fiorentina*

By the beginning of the 16th century, the arms making center of Gardone in the Trompia valley in the Venetian province of Lombardy (Fig. 7.6), was producing armour, swords, pole-arms, gun barrels and complete matchlock muskets. In 1542, the Venetian Senate gave the barrel makers of Gardone the exclusive right to barrel manufacture and the gunmakers of Brescia (pronounced brey [rhymes with grey]-shaw), a city about 10 miles south of Gardone, were given similar rights to the manufacture of locks and complete firearms. There was a number of “Gardone” in Italy: this one is usually described as “Gardone Val Trompia)

Early gun production incorporated locks imported from Austrian, Swiss, German and perhaps Dutch lockmakers, but by the early years of the 17th century the characteristic lozeange shape of Italian wheel-locks were popular and details were carried over into local production of early snaphance locks.

By about 1640 or 1650, the snaphance as defined by Meyrick was obsolete, or at least obsolescent in England and most of Europe with the exception of Scandinavia, the Netherlands and areas influenced by Dutch gunmakers. By the middle of the 17th century, most gunmakers were busy producing “the French lock” for their customers —



A557 Fig. 4.31 Unsigned snaphance, chiselled with monsters and foliage, 1625-40, probably from the Trompia Valley north of Brescia but possibly from Naples and south. *Private collection, Italy*



A551 Fig. 4.32 Snaphaunce lock from an unsigned fowling piece, 1640-60, probably Brescian but perhaps Milanese, handsomely engraved with foliage and serpent-headed scrolls, the lock plate of contemporary Brescian wheellock shape, and the fall of the cock arrested by an external buffer screwed onto the plate below the pan. *Private Collection, Italy. [RUH p. 86]*

most, that is, with the exception of gunmakers in Italy.³⁹

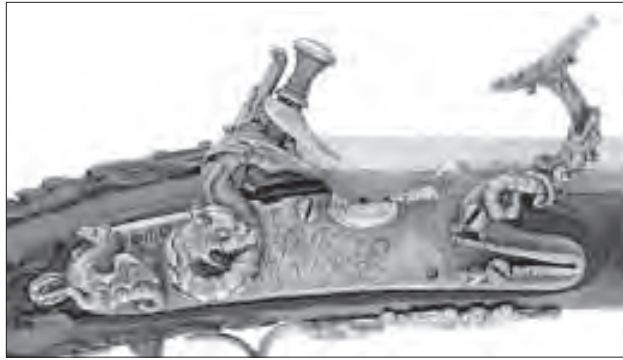
Evidence is sketchy but it appears that wheel-lock manufacture in Brescia did not begin until the last half of the 16th century. It is probable that the snaphance was introduced to Italian sportsmen in the last decades of the century through Brescia, incorporating some of the characteristics of the wheel-locks made there. Gun production in that city flourished, reaching high levels of quality during the 1640s and declined just before the end of that century with few Brescian gunmakers working into the 18th century.

About the time that the snaphance ignition was in decline in Europe it was gaining importance elsewhere in Italy so that a number of regional variations are now recognized. Snaphance production continued in Tuscany until at least 1830.

• • • • •

Italy is not a large country and although its distinctive shape on a map makes it easy to identify, it was not one country until the unification in 1861. Its unique geography — 775 miles from north-west to south-east, and only about 150 miles across at the widest point, with two mountain ranges — the Alps to the north and the Apennines running lengthwise through the center including. It consisted of eleven or more independent kingdoms (depending upon the date), with settlements separated by difficult mountain roads.

In the influential Venetian republic to the north was located the gunmaking center of Gardone Val Trompia (see Fig.7.6) which in the 16th century provided a large percentage of the military matchlock muskets required in Europe.⁴⁰ In the 17th century, with the exception of Brescia, and Naples where there was a large government arsenal, there was no single major gunmaking centre. But spread through the mountainous country side, mostly in the north, there were a few pockets where gunmakers collected and where romanlocks were produced in quantity. The manufacture of snaphance sporting guns was almost completely restricted to Tuscany and the surrounding area. The city of



A548 Fig. 4.32 An unsigned lock from a Brescian coaching carbine, dating 1660-1680 with a solid walnut-root stock. The lock and other elements are chiselled in the form of dragons and fable creatures in a rather rustic imitation of the work of Carlo Bottarelli. *Private Collection, Italy*



A549 Fig. 4.33 Snaphaunce lock by master gunsmith Matteo Cecchi called, as an alternate surname, Acquafresca of Bargi near Bologna, 1680-90, mounted in the middle or late 18th century on a small Austrian pistol with fine engraved silver furniture. *Private Collection, Italy.*



A559 Fig. 4.34 Snaphaunce lock signed and dated 1683 on the inside, by master gunsmith Matteo Cecchi, also known as Acquafresca of Bargi near Bologna, from one of a pair of nearly overly sumptuous silver-and-gold-mounted, ebony-stocked pistols all of Acquafresca's making preserved in the *Bayerisches Nationalmuseum* collection, Munich.

Firenze, Florence in English, was not a major gunmaking center although the snaphance was so popular there that after about 1670, the name became synonymous with the Italian snaphance as *alla fiorentina*, (in the Florentine style). Snaphance production has been described:

World-wide, snaphaunce-types (sic) come in florid profusion, but the Italian ones divide really only into (a) Brescian and affinities, and (b) Tuscan and ditto. All the Brescian-and-relatives species almost always have round-section locks and cocks, the Tuscan ones both round (especially Tusco-Emelian from Anghiari and Brento) and flat (from Florence on to the west and south). But obviously it's not as neat and simple as that, but it'll do for a wobbly guideline. Within each, there are eight distinct sear-and-tumbler arrangements, in part sketched and published by Nolfo di Carpegna in the 1970-71-72 A&A Society Journal articles,⁴¹ in part unpublished; the most en-



A552 8. From a coaching *sgavezzo* (folding-butt carbine) by Michele Lorenzoni who was active about 1685 to 1733. He was the renowned Florentine gunsmith and probably the inventor of the repeating system bearing his name. It is engraved *Michele Lorinzoni, senis* below the pan, *A Firenze* above the frizzen spring, and dated 1694 on the sear box. The word “*senis*” after the name, is a plural ablative of place (*Siena* was always declined in the plural), meaning “in” or “from Siena,” his birthplace. *Private Collection, Italy*.

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The simplest and most prevalent has a notched tumbler and a sear like a conventional flintlock; the most interesting but also most complicated is called a scatola, ‘in a box,’ found only in Tusco-Emilian locks. This latter one, a mini-monument to the need for complicating simple matters, consist of ten delicate elements that perform in three phases what flintlocks achieve with five simple elements in two phases.



~~XXXXXXXXXX~~
~~TO BE EXPANDED~~

M172 Fig. 4.36 An unsigned, Tuscan snaphance engraved with vines on the cock, steel arm, and lockplate in front of the cock and behind the cock, with a bulding probably a residence.



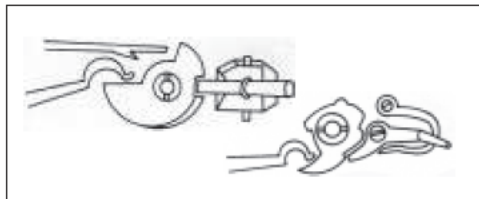
M077 Fig. 4.37 A finely chiselled snaphance, c.1730-40, engraved “*brento*” on the inside of the right plate, to Francisco Negroni of Brento, a village on the road between Florence and Bologna



A558a-f M044 Fig. 4.39 C.O. A lateral acting sear working through the lockplate to engage a notch on the back of the cock. The movement of the cock is stopped by a buffer forming a part of the pan.



M077 Fig. 4.40 Brento The Tusco-Emellian Box Lock. A two-piece sear held in the engaged position by an additional internal spring. The movement of the cock is stopped by the shoulder of the cock.



A558 Fig. 4.41 Two tumbler and sear mechanisms illustrated by Dr. Nolfo di Carpegna in his 1971 study published in the *Journal of the Arms and Armour Society*.



M110 Fig. 4.42 Bramanti A one-piece vertical sear operating in the manner of the flintlock to engage a broad step on the tumbler but no half-cock.



M050 Fig. 4.43 An Italian snaphance engraved CZ and dated 1768 on the inside of the plate under the mainspring. The vertical acting sear pivoted at the top, with a broad nose on the sear which appears to act as a stop for the movement of the cock is non functional.



M172 Fig. 4.44 Engraved building A vertical acting sear with a wide ledge to accept the sear nose. Movement of the cock is arrested by the shoulder of the cock.

dearing is the Tusco-Emelian (especially Anghiari and Brento) box type, delicate and almost always very well executed, but so needlessly complicated.⁴²

The vocabulary used to identify Italian snaphance locks is based upon the region where they originated. This is more pronounced when dealing with the later flint-locks and miquelets, but with the snaphance it is confined to Tuscany, and Emilia, the two northern most provinces the two provinces within the 'Boot,' and Anghiari, a region in the former. The regions are recorded as follows and located on the map Fig. 7.6.

Tuscany: A republic located on the north-west coast of Italy with the political, cultural, and economic center at *Firenza* (Florence). During the period of interest in this chapter it was the leading commercial and banking center in the Mediterranean area, under the hereditary control of the Medici family (1530-1737). Snaphance pistols and



A554 Fig. 4.45 Brescia, 1660-80, mounted on a large (20 inch/51cm) holster pistol by Giovan Antonio Gavacciolo with a barrel by Giovan Antonio Beretta, a linear ancestor of today's Franco and Pietro Beretta. It has a conventional tumbler and sear with an early form of bridge. The chiselled motifs are unusual and exactly match those of a snaphaunce fowling piece, presumably part three of a trio. *Private collection, Italy.*

long arms with flat plates, flat cocks, and flat steel arms of rectangular section; large slightly rounded cock screw head providing a convenient area for additional engraving that is secured on the inside by a decorative nut on a threaded tumbler axel. The usual mechanism consists of a vertical sear acting on a half-round tumbler with a single, full cock position. The pan-cover push-rod is activated by a lip on the top (at full cock) of the tumbler. The pan was closed by hand.

Tusco-Emilian: Gunmakers located in towns and villages on a road through the Apennine mountain range between Florence and Bologna, with gunmaking families at Bargi (Aquafresca), Brento (the Negroni family), Lioano, (Ghini family) about 6 miles (10 Km) south of Brento, Casalechio di Reno, Sabionse, Susinana, and others. The plate, cock, and steel arm is frequently round with chiseled figures and floral decoration or flat with engraving only. "Between 1720 and 1820, take or give a year, Tusco-Emilian snaphaunces remained essentially unchanged: type for type, most were much the same in all significant aspects and varied only in small detail, and even there not to any great depth. ... Nearly all ... the decorative motifs of the early eighteenth century lived on into and beyond Napoleonic times; mechanism of 1720 were still being made, substantially unaltered, in 1820."⁴¹

Anghiari was a walled city about 60 miles (100 Km) south of Florence. In his "Summary" of Italian firearms published in 1997, Nolpho di Carpegna recorded, when writing on Anghiari :

In the history of firearms there are few similar cases of a small centre that poured forth such strongly characteristic work accompanied by so many exact references – dated



M050 Fig. M050 Fig. Fig. 4.35 An Italian snaphance engraved CZ and dated 1768 on the inside of the plate, under the mainspring. Cassiano Zannotti of Lugo, Emilia and later, Bologna, was born 1706, son of Pietro. He died in 1786. The movement of the pan-cover on the Italian snaphance was accomplished by the same push-bar used on the English snaphance, but rather than being pivoted on the tumbler, it was activated by contact with a lip on the tumbler acting on a catch on the bar. On the majority of locks, the cock was arrested in its fall by a shoulder landing on the bolster of the lock plate but on this one, a buffer is attached under the pan by screws.

and signed products, ascending serial number sequences and ample documentation in the town archives.⁴²

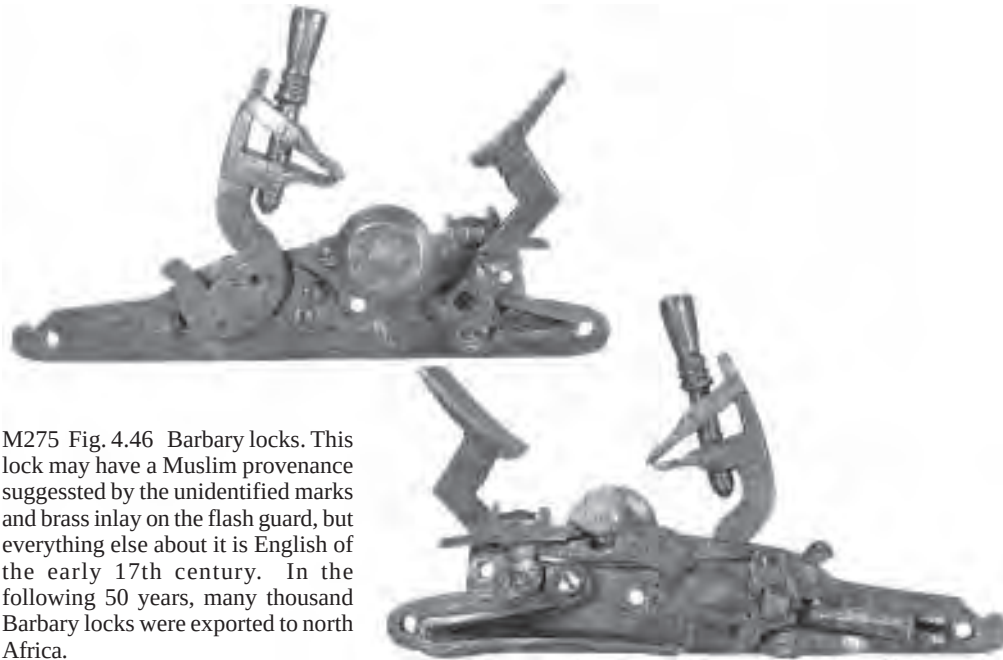
He pointed out that, based upon archival records, five major families of gunsmiths had been active in Anghiari between 1735 and 1833 with as many as 32 gunmakers active there. He also suggested that a large number of their surviving work bearing dates or serial numbers have also been recorded. He found that a member of the Negroni family ~~(see Fig. 4.35)~~ had resided there prior to the earliest dated arms and before moving to Brento, which might explain one of the styles popular in the area.

The Barbary lock

'Barbary lock' is the name assigned by English gunmakers (or their major customers, the early English trading companies), to a snaphance lock of the pattern initially sold in Morocco but later popular all along the coast of North Africa as far east as Egypt and perhaps into the Levant. From at least the early 17th century they were imported, mainly from England, as complete guns or unmounted locks to be set up by Arab craftsmen. Two styles are known which will be discussed more fully in Chapter 10

Quantities were considerable. The earliest shipments found in the records of the London Gunmakers' Company which received its Charter in 1637 but was not fully organized until 1656 when the Charter was enrolled, included large numbers of "birding pieces sent to Barbary in 1653; 3000 birding pieces and 1000 birding piece locks in 1655. A Company minute dated February 7, 1657 stated "All barbary guns to be henceforth made of Barbary bore."⁴³

One transaction began in 1698. In September, word was received in London that 276 English sailors were being held captive in Morocco. Negotiations on a ransom payment for their return included 100 gun locks and 6 Cwt. of gun powder per man, one mohameton (sic) slave for each two men, along with 10,000 pieces of eight were agreed



M275 Fig. 4.46 Barbary locks. This lock may have a Muslim provenance suggested by the unidentified marks and brass inlay on the flash guard, but everything else about it is English of the early 17th century. In the following 50 years, many thousand Barbary locks were exported to north Africa.

upon and return of the sailors was finally completed in 1703.⁴⁴

In design, these locks were mechanically identical to the snaphance locks manufactured in England in the last decades of the 16th century and first decades of the 17th century, but which by the late 1630s were at least obsolescent and had been superseded by a flint-lock with a one-piece pan cover and frizzen. Although it had disappeared in England, the snaphance continued to be used in Morocco and other North African countries until well into the 19th century and even the early 20th century.⁴⁴

The lock illustrated above has all of the characteristics that would be expected on an early 17th century English snaphance, but there are anomalies suggesting a later date and a Barbary lock probability. This would appear to be an unused lock, rather than a detached lock based upon the following observations:

- The pan does not have the decorative guards along the fence usually found on later Islamic-made, locks but not found on any English-made locks.
- The cock is flat which is somewhat like the classic type 1 English lock of the 1640s.
- The “monster head” design found on many English snaphances is not expected on Barbary locks.
- The decorative lines stamped on the tail; the meaningless(?) marks on the cock and steel arm, and the decorative brass inlaid mark on the fence are not typically English, but neither are they expected on Islamic locks.
- Three stock screw holes have been punched where they should be and each has been tapped but the threads are not deep enough to be effective..
- The pan-cover swivel has not been dressed to allow the push-bar to pass over it in order to close the pan: no amount of pressure will make it operate.
- There are no marks in on the steel indicating it had seen any use .

04 Endnotes ~~XXXXXXXXXX~~

1. "Snaphaunce," is more in keeping with the spelling and pronunciation of the word in the Low Countries where it was also popular and is still a preferred spelling for this ignition, but 'snaphance' was, and is, most common in English.
2. Arne Hoff, "The Term Snaphaunce," *Aspects of Dutch Gunmaking*, (H.L. Visser, D.W. Bailey, Ed.) Zwolle: Waanders Pub. 1997. p. 137-144,
3. Ibid.,
4. Blair, Claude. *Pollard's History of Firearms* p. 42, n.18, 19; Meyerson, Åke. *Stockholms bossmakare*. Stockholm: Kungl. Livrustkammaren, 1936, p. 10, n. 21.
5. Conversations, over many years, and personal correspondence, December 15, 2009.
6. Meyerson, Åke and Lena Rangström. *Wrangel's Armoury*. Stockholm: Royal Armoury Press. 1984.
7. Whitelaw, Charles E. *Scottish Arms Makers*, (Sarah Barter, Ed), London: Arms & Armour Press, 1977.
8. Blair, C. & R. Woosnam-Savage. *Scottish Firearms*, (1994), HAS 31, p. 7. The text is quoted in Note 25, p. 48. It was published in 1568, at least 12 years before the earliest reference to its use in England.
9. Quoted by Claude Blair (1983, n. 24, p. 43) from *9th Report of the Historic Mss. Commission*, London, 1883, Appendix, p. 44.
10. Puype, Jan Piet. (1996) "Seventeenth Century terms regarding arms, accessories and related subjects." [Dutch to English translation], *The Arsenal of the World*. pp. 64-69; personal correspondence.
11. Diverse of our English Captains and Gentlemen that have served in the Tumultuarie Warres of the Lowe Contries, or peradventure some time in the civill warres of France, do praise and magnifie the shot of Carabins, or Argolettiers (as they terme them) and of Reisters, which are Pistollotiers. Composed by Sir John Smythe, Knight 1589
12. Meyrick, Samuel Rush. *A Critical Inquiry into Ancient Armour, as it existed in Europe, but particularly in England, from the Norman Conquest to the Reign of King Charles II*, Vol. III, p. 101
13. Fosbroke, Thomas Dudley. *Encyclopaedia of Antiquities and Elements of Archaeology, Classical and Mediaeval*. 2 vols., London, 1825. This incorrect date was introduced by Fosbroke; Meyrick did not suggest a date until 1827 when he read his paper at the February 22nd meeting of the Society of Antiquaries.
14. Meyrick, Samuel Rush/Joseph Skelton. *Engraved Illustrations of Antient Armour from the Collection of Goodrich Court, Herefordshire*. London, G. Schulze for J. Skelton, Oxford 1830. Reprinted by Henry C. Bohn—London, in 1854. This is usually recorded with Skelton as the author, but the text was prepared by Meyrick.
15. Pitt Rivers Museum, Oxford, No. xxx See fig. 4.5 and 4.18, 4.20.
16. Whitney, William Dwight *Language and the Study of Language: twelve lectures on the principles of linguistic science*. 1867
17. "[Gunmakers]...in the Minories and East Smithfield, near the Tower of London. Some were descendants of craftsmen from Holland, German and Italy, encouraged to settle in London by Henry VIII, and it may be noted in passing that this tradition was maintained throughout the seventeenth century." Howard L. Blackmore, *British Military Firearms*, London: Herbert Jenkins, 1961, p. 22
18. Recorded by Claude Blair, (1983) p. 43, n. 24 from *9th Report of the Historic Mss. Commission*, London, 1883, p. 44.
19. National Archives (P.R.O. Kew). SP12/66 No. 51. I am grateful to Brian Godwin for bringing this reference to my attention.
20. See Chapter 6, Fig. 6.9
- 21.. By the years leading up to the English Civil Wars (1642-46, 1649, 1649-51) the snaphance ignition was at least obsolescent, if not already obsolete. None were recorded in the survey of the last surviving Civil Wars Popham Armoury at Littlecote House in Wiltshire although G. Rimer and D. Blackmore found muskets that had been converted to the then current flint-lock which we now call the English Lock.
22. This list has been compiled from Godwin, Brian C. John S. Cooper and Michael G. Spencer. *The English Flintlock; its Origins and Development*. 2003. pp. 49-90. with later additions.
23. Registry of King Gustav 1552, p. 65. Quoted by Nils Drejholt in "Swedish Snaphance Locks," *A Farewell to arms*, Delft: Leger Museum, 2004, pp. 68-81.
24. Drejholt, Nils. *Firearms of the Royal Armouries I*, Stockholm: Livrustkammaren, 1997, p21 (GIIA 8).
25. Thierbach, M. *Die geschichtliche entwicklung der handfeuerwaffen*, Graz: Acad. druck u. verlagsanstalt, 1886/1965.
26. I am grateful to Robert E. Brooker for bringing this lock to my attention.

27. First published as *The Gun Collectors Letter* in Oct. 1946; became *The Gun Collector* with No. 18 in December, 1947; ceased publication with issue No. 48, about 1958.
28. Geibig, Alfred. *Gefährlich und Schön*, Veste Coburg: Germany: Kunstsammlungen der Veste Coburg, 1996.
29. Blackmore, Howard L. *Guns and Rifles of the World*, London: B.T. Batsford, 1965, Fig. 147.
30. Blair Claude (1988). "Simon and Jacques Robert and some early snaphance locks," *Armi Antiche*, 1988/89 pp. 33-88, henceforth referenced as Blair, 1988. All references to the text which follows will be found in this comprehensive article by Claude Blair.
31. The spelling of their names is found with both French and Italian usage: Simon or Simone, Jacques or Giacomi, Robert or Roberto. Even though Jacques' name appears in the records some seven years before Simon's, he listed as Simon's son in a list of wages and they both came from the Franche-Comté which at that time belonged to the Spanish House of Hapsburg. It was bordered on the south by Savoy and the Alps. (Blair, 1988, p. 42).
32. Angelucci, Angelo. *Ricordi a documenti di uomini e di trovati italiani per servire all storia militare*, Torino, 1866; and *Catalogo della Armeria Reale*, Torino, 1890. In 1957, Clement Bosson collected the data, with an introductory text, in "Contribution à l'étude de la platine à Silex," *Armes Anciennes*, Vol. 1, No. 2, (1954), pp. 31-40.
33. Blair, Claude (1988), p. 52.
34. Blair, (1988), *Ibid.*, pp. 44-45.
35. Blair, Claude (1994) and Robert Woosnam-Savage, *Scottish Firearms and a Register of Scottish Long-Guns*. Bloomfield, Museum Restoration Service, 1994, 1999. p. 8.
36. Arne Hoff, *Dutch Firearms*, Sotheby Parke Bernet Publications, London: 1978 pp. 72-3.
37. Gooding, S. James. "John Jones & Son of Birmingham and their Improved Percussion Ignition." *Arms & Armour, Journal of the Royal Armouries*, Vol. 4, No. 1 (2007), pp. 45-51.
38. Gordieff, N.V. *Russkoye Ognestrelnoye Orujie, Mastera-Orujeiniki Orujeinoi Palati Semnatatogo Veka*. (Russian firearms and master weapon craftsmen [of the] seventeenth century [in the] weapon depository). Moscow: 1954. I am grateful to Nickolai Krijanovsky for his translations of this work.
39. FNa The notes on the Italian snaphance which follow are in large part based upon 'The Six Phases of Italian Gunmaking, 1600-1830' an unpublished manuscript by Robert Held and an early draft of the English text of *Le Arti degli schioppi Italiani alla Fiorentina 1630-1830*.
40. Wilson, Guy M. "Some Important Snap Matchlock Guns." *CJAC*, Vol. 26, No. 1 (May, 1988) p. 3-10. The matchlocks recovered from Henry VIII's *Mary Rose* which floundered in 1545 were produced in the Venetian Republic.
41. I am grateful to Robert Held for permission to quote from his draft manuscript in preparation for an English edition of *Le arti degli schoppi Italiani alla Fiorentina 1630-1830*, (The Arts of the Italian Snaphance 1580-1830).
42. Di Carpegnia, Nolfo di, "A Summary of Notes on Central-Italian Firearms of the Eighteenth Century," *Art, Arms and Armor; An International Anthology*. Vol. I: 1979-80. (R. Held, Editor), Chiasso, Acquafresca, 1979, pp. 332-335
43. Back., David H.L. *English Guns for Morocco and the Ransom of British Sailors*. *CJAC* Vol. 38, No. 4 (Nov. 2000), pp. 111-116. Under date of 11 June, 1700. An agreement reached with the Emperor of Morocco "A list of 276 captives [English sailors] has been supplied and the agreed price for each English captive is to be 100 gunlocks according to the pattern given by the emperor, 6 quintals or hundredweight of powder for each, a Mohametan slave for every two English slaves, 10,000 pieces of 8 to be used in England in what the emperor likes most." That exchange totaled 27,000 locks
44. Blackmore, Howard L. in *A Dictionary of London Gunsmiths*, records that in 1653, Thomas Graves made 3,000 birding pieces and 1,000 locks for export to Barbary; almost 75 years later, in 1721, Francis Smart (who also supplied the Hudson's Bay Company), exported 2,500 Barbary locks to Morocco.
45. Delhomme, Capt. "Les Armes dans le sous Occidental," *Les Archives Berbères*, Vol. 2, Paris, 1917. pp. 123-131.

Chapter 5

The English Lock

A Descendent of the Snaphance

When the turning of the wheel of the wheel-lock was replaced in the early 16th century by the falling of the cock striking against the face of the steel, a name for it had to be created. That name in England was “Snaphance.” Sometime during the third decade of the 17th century, gunmakers in England created a flint-lock which joined the steel and pan cover of the snaphance as one, but retained the horizontal sear. Modern collectors have given them the name English Lock which is probably how they would have been identified on the Continent in the 17th century.

In 1867, Professor W. D. Whitney wrote: “When the thing is perceived, the idea conceived, [men] find in the existing resources of speech the means of its expression—a name which formerly belonged to something else in some way akin to it; a combination of words &c.”¹ That is exactly how the word ‘snaphance’ was transferred to identify the English Lock.

Messrs. Godwin, Cooper, and Spencer, in their thorough analysis of the survivors and literature relating to flint-lock development in England, sorted them by type, and provided a description of this unique lock form:

An English Lock has a number of basic characteristics It is a snapping gunlock on the flint and steel principle having a combined pan-cover and steel, an internal mainspring and a sear, or sears, that pivot in a horizontal plane. A half-cock position is found on many locks often supplemented by a dog-catch. Many 17th century European flint-locks with combined pan-cover and steel and horizontal sears were constructed, but it is only those which confirm to the precise characteristic described ... The lock that was generally known as the “English Lock” will be called the Type 1 English Lock and the lock that was generally known as the “English Dog Lock will be called the Type 2 English Lock The labels “English Lock” and English Dog Lock are imprecise terms and have led to some confusion. The designation English Lock should apply to the whole genre of these peculiarly English 17th century flintlocks.²

They also note that “the designation *English lock* should apply to the whole genre of these peculiarly English 17th century locks.” But it must be emphasized, the English lock was known in England by the military, the trade, and the sporting public, by the name “snaphance.” It is not known when ‘snaphance’ disappeared from the vocabulary but it was still in use in 1694 to distinguish between the ‘snaphance’ (i.e. The English lock) and the French [flint] lock, as shown by the price list for repairs negotiated in January of that year between the Board of Ordnance and the London Gunmakers’ Company in March, 1683/4 (Fig.)

When the first of the English Civil Wars began in August, 1642, The Parliamentarians seized control of the main Government arsenal at the Tower of London but it contained only 1,367 muskets. The armies of both sides were under armed and if the few weapons that they had were with snaphance ignition they would quickly have been converted by the most expedient system. Additional arms were purchased by both sides

[illegible]

A231 Fig. 5.1 The illustrated pages record costs for “Repairing Small Arms According to Agreement made with the [London] Gunmakers [Company] in March 168¾ Viz.” It is from a bound record, in which an early page records that the prices quoted were “the Prices in the Rt Honoble my Lord Dartmouths Time.” Lord Dartmouth was Master General of the Ordnance 1689-1690. The post was vacant from 1690-1693. It is significant that this document records both “snaphance” guns and muskets with “French Locks.” See also Fig. 6.9.

in England and on the Continent

In their survey of the Popham armoury which survived at Littlecote House in Wiltshire, Graeme Rimer and David Blackmore of the Royal Armouries staff identified five variations of guns and locks,³ including some which had been converted from matchlock and snaphance ignition. Their Types 1-3 fall into the English Lock Type 1 and their Types 4-5 are English Lock Type 2, category. All of the arms of the Parliamentary period from the armoury are now in the Royal Armouries Museum at Leeds.

Muskets with Type 2 (and perhaps Type 1) English locks were probably still included in Military Stores in the early years of the 18th century. They may not have been withdrawn until the same time the matchlocks were removed which occurred sometime during the reign of Queen Anne. (1702-1714).⁴

The English Lock, Type 1.

The most obvious change introduced with the English lock was the joining of the steel and pan cover to become the frizzen, but the most significant change was the incorporation of a safety device into the sear mechanism. No reference earlier than 1640 suggesting a date when this happened has been found⁵ although it was undoubtedly a contributing factor to the speed with which the English lock was accepted and it



A685, A684, A689

must have been early — perhaps even in the mid 1620s. **A pistol with the Type 1 flint-lock dated 1630 in the W. Keith Neal collection is illustrated in *Great British Gunmakers*.**⁶

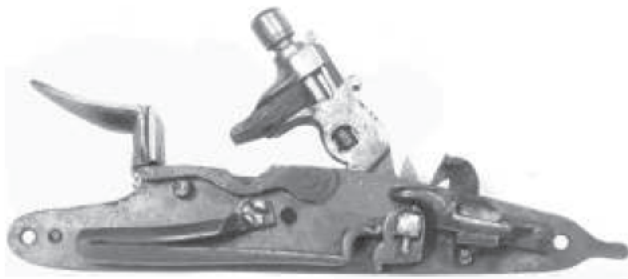
That portion of the snaphance mechanism consisting of the horizontal, or lateral acting, sear working through the lock plate on the tail of the cock, was retained although it was now of one piece with the trigger bar attached and a second sear nose constructed on it to act on the newly designed tumbler. Along the lower edge of the tumbler was added a wedge-shaped projection, the point of which was engaged by a notch of the altered bar when at half-cock. This in effect gave the sear two noses — one which engaged the tail of the cock at full bent, the other acting on the tumbler at half cock. When the cock was drawn to the half cock position the sear nose slid down the wedge and the knife edge jumped into the notch in the sear bar. As the sear moved horizontally, it was impossible to disengage the sear nose from the half cock wedge on the tumbler, except by drawing the cock to full bent position.

When the gun was to be fired and the trigger pulled, the nose of the sear was moved sideways (which automatically cleared the new half-cock position) to retract the sear block holding the cock and to allow the cock to fall.

Externally, lockplates continued the shape of the snaphance but the “hump” along the top of the lockplate which was required on the snaphance to accommodate the push-bar to the pan-cover, was retained although reduced somewhat in size; a dog acting on the tail of the cock is often present as an auxiliary safety and the fall of the cock is usually restrained from traveling too far by the presence of a buffer **although this is occasionally supported by, or replaced by, a shoulder on the cock to be stopped on the lock plate**; the cock, dog, and buffer, are usually flat with square edges, and the frizzen to spring bridle was retained. Unfortunately, dating is difficult as no locks of this type are known with a date or the maker’s signature.

The English Lock Type 2

The significant change that created the Type 2 English Lock, which probably emerged



A028 Fig. RAM Murdon English lock

A028



A451 *Herbert J. Jackson
collection. Royal Ontario Museum,
No. 925.27.*



less than a decade after the Type 1, was mechanical; the tumbler was altered to provide both a half cock and full cock position, with all of the mechanism inside the lockplate. The tumbler was forged with a rectangular lug on the top edge, which was slightly undercut on the front side, and a tapered ramp was located on the rear in the lower quarter. The sear and trigger bar were combined as a single bar with a step-like shape. The end of the top step was shaped to wrap around the lug in the half-cock position while the other, the horizontal step, was flat and served as the rest for the sear when at full cock. This arrangement made the external dog-catch redundant but it was retained by a number of gunmakers; it is estimated that over 80% of Type 2 examples have a dog catch. When the gun was fired, the sear moved off the step and the half cock hook being clear of the block, allowed the cock to fall.

Many of the changes which evolved from the earliest Type 2, were cosmetic and it was about this time that the distinctive, flat, throat-hole cock with rather flat, rounded



A235 James D. Forman collection. CJAC 10-2

A235 joined



A277

A277 Eng Dog x Silk --Michael
Tashman collection



A455 Herbert J. Jackson collection
Royal Ontario Museum, No. 925.27.



jaws appeared. Signed lock plates, although not common, first appeared during the 1640s but most dating is still dependent upon the barrel maker's mark.

Type 2 — The English Dog Lock

Many of the Type 1 English locks could be classed as “dog-locks, but the Type 2 version frequently described as the classic “English dog lock,” is best known by one made by the London gunmaker Henry Crips (Fig. 5.xxx, sometimes spelled Crispe). It was first illustrated in 1923 by H. J. Jackson in his *European Firearms of the 16th, 17th & 18th Centuries* and has been frequently illustrated photographically or in line. The cock is engraved with the shield of an unidentified owner, and a date which Jackson misinterpreted to read 1647. It has in fact been so over-cleaned that it is almost impossible to read the date. But Henry Crips did not become free of the London Gunmakers' Company until 1676, confirming Jackson's error.⁷

Type 2 — The Round Lock

The Type 2 mechanism is also found on locks with the external appearance of the French Lock. The “round lock” as it was described by the trade, that is one with the rounded surface which began to appear in France in the late 1650s, was accepted quite quickly by some of the more progressive English gunmakers produced it with the vertical sear of the French Lock. Only three examples with the Type 2 mechanism, that illustrated and one other by John Upton and one other by John Towson, all dating to the 1660s. are known with the Type 2 English Lock mechanism.

Notes, Chapter 5, English Lock

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A254 Type 2 English with round lock plate, lateral acting sear and dog-catch on the cock by William Upton of Oxford, c.1660-1670. *Craig F. Ross collection.*



Chapter 6 The Flintlock

The French lock, fusil, firelock, etc.

The French Lock (a.k.a. the Flintlock): *platine à pierre (French), das französische schloß (German), acciarino alla francese (Italian), zamek fransuski (Polish), llave a la francesa (Spanish), flintlås, vanlinag a flintlåset, franska låset, (Swedish)*

In this publication, “flintlock” or “French Lock” will be used to identify the flint mechanism with a joined hammer and pan cover (frizzen), an internal mainspring, and a vertical acting sear working on a notched tumbler. All other flint-using locks will be recognized as flint-locks with a modifier for more precise identification.

The ignition system that we now call “flintlock” had its origin at Lisieux in Normandy, France in the second or third decade of the 17th century and was developed in Paris where Marin Le Bourgeois was provided with lodging and shop space at the Louvre by the King. His invention had a one-piece steel and pancover and an internal mainspring. But most significantly, it had a vertical acting sear and a tumbler with full and half-cock notches. This lock quickly became known (except in France), as “The French Lock” (in German as *französische schloss* or in Swedish as *franzoische flinte*) and it is by this name that it was known for more than 200 years throughout most of Europe, including England, but excluding France where it was a *fusil*.

The design spread rapidly and became the system of choice throughout most of Europe because of its efficient mechanism and economical construction. In England, the first military order yet located was given to William Evetts, the London gunmaker, in 1661 for “Carbynes extraord[inary] with French locks at 23s/-.”¹ This is the first time the name, “French lock” has been found in English but it was probably in common use at the time. It continued to be applied by many gun users to the flintlock until well into the 20th century, although over the years it was also known by other names.

The flintlock is the first ignition design that can be identified with the place of origin. The 1930s research undertaken by the late Dr. Torsten Lenk (1890-1957) traced a number of early flintlock arms by members of the Le Bourgeois family, the brothers, Marin (1565-1634?), Jean (d.1633), and Pierre (d.1627), working at Lisieux. Marin was a man of many talents and was recorded variously as *horloger, armurier, serrurier, arquebusier, pientre* and *sculpteur*, and is usually given the credit.

Since then, at least 13 firearms by one or other of the brothers have been located, all of which were recorded in the catalogues of the collection of Louis XIII of France (1610-1643). Among the survivors are one matchlock, seven wheel-locks (including two pair of pistols), and five flintlocks. Three other guns, probably flintlocks, are known to have existed at one time but they have not been located.²

² Tarassuk Met museum



A239 Fig. 6.1 French lock by Pierre Le Bourgeois, brother of Marin of Lisieux, c. 1620. Metropolitan Museum of Art, Rogers and Harris Brisbane Dick Funds, Acc. No. 1972.223.

In the early 1930s, Torsten Lenk (1890-1957), later Director of Livrustkammaren, the Swedish Royal Armoury Museum, was a student studying arms history. In 1939, his doctoral thesis *Flintlåset dess uppkomst och utveckling* (*The Flintlock: its Origin and Development* but now simply referenced as “*Flintlaset*”) was published in Swedish with a lengthy abstract in French.

Lenk’s initial identification of one of the Le Bourgeois family as the inventor of the French flintlock, has never been seriously in doubt but when the lock was introduced has been the subject of considerable discussion. Dates as late as the third decade of the 17th century have been suggested but research undertaken by Leonid Tarasuk during



his many years in the Arms and Armour Department at the Hermitage at St. Petersburg and later in the same Department at the Metropolitan Museum of Art in New York City where there are two more, provides evidence of production in the early third decade and to confidently suggest a possible date between 1610 and 1620, but probably closer to the latter. The earliest dated member of the flintlock family is a gun in the Royal Collection at Windsor Castle that is engraved *FAICT• A• TURENE• M•D•L•* and the date *1630*. Turenne is a small village south west of Tulle where there was already established a master gunmaker with barrel production facilities and where by the end of that century a large factory had been established. “M.D.L.” is not recorded in the currently available listings of French gunmakers if that is what the letters were intended to indicate.

It is surprising that it took gunmakers so long to take the ‘nut’ of the crossbow, add an extra notch to the perimeter, and turn it into the tumbler of the flintlock. Marin Le Bourgeois signed guns with his name but it is probably more than coincidence that the maker’s mark of both Jean and Pierre Le Bourgeois is a crossbow between their initials.

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In the 1980s, Jan Piet Puype, Head Curator (now Emeritus), of The Army Museum at Delft in the Netherlands, was invited to study the large collection of gun parts found on the former sites of Seneca Indian villages now in the Rochester Museum and Science Center at Rochester, New York. His report was published for the 1984 Trade Gun Conference in June at that Institution.



A233 Fig. 6.2 A French lock engraved with a huntsman and his dogs chasing a stag and a chiselled dog head at the tail of the plate, from a 42 bore gun. The plate is also engraved *Faict a Turene M.D.L.* and is dated 1630. *Courtesy the Royal Collection, Windsor.*

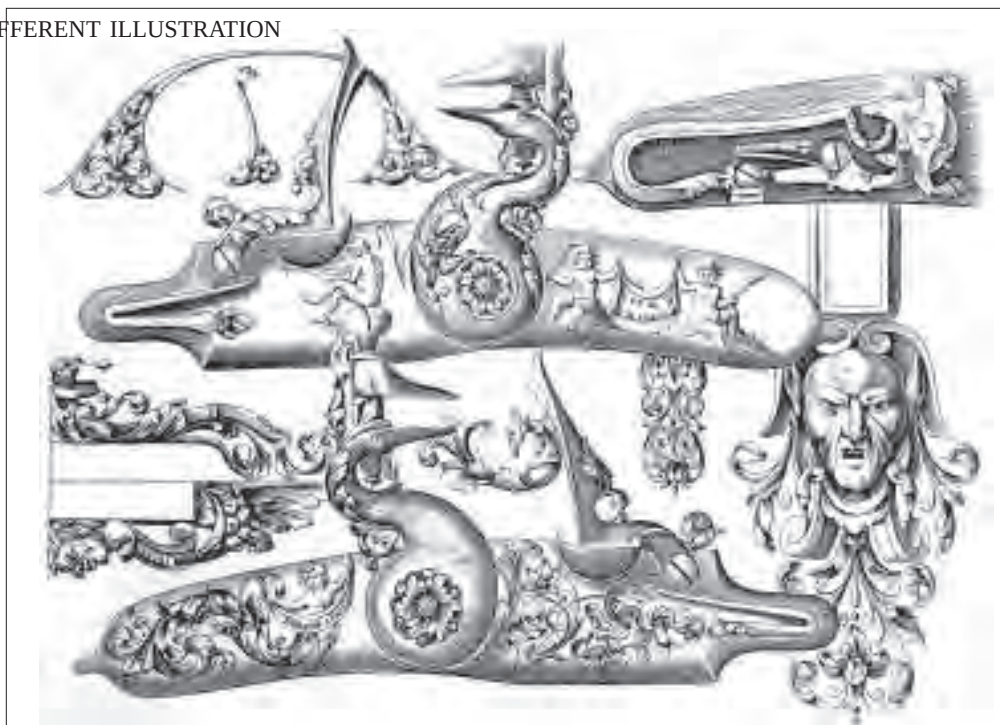
In 1687, under direct orders from the king, Louis XIV, the Marquis de Denonville with more than 800 of the Regiment Carignan-Salières, 930 Canadian settlers and 800 “Christian Indians,” destroyed the four main Seneca villages. The natives were either killed, or dispersed and built new settlements, thus providing a terminal dates for a large collection. This does not create a terminal date for an individual lock but it is a factor to be considered in any calculations.

Additional data was provided from at least nine village sites with approximate dates which they were occupied during the years 1610-35, 1630-40, 1630-50, 1635-55, 1650-70, 1670-87 (three villages), 1675-87, and one occupied for only a few months in 1687. These dates are based on archival records of the Jesuit Order.³

The sites provided 213 relatively complete locks, all but six of which were flintlocks, and a very large accumulation of disassembled components which were made during the first half-century in the history of the flintlock. Most of them have been dated more precisely based on their provenance. Mr. Puype compiled the accompanying chart illustrating the evolution of the lockplate based upon dated or dateable examples from major museums in Europe.

In France, the new ignition was given the name ‘*fusil*’ to distinguish it from ‘*mousquet*,’ the name which already existed for matchlock guns. In most other languages it acquired, in translation, some form of ‘French lock,’ That name continued to be used by many, but not all, in England until some time in the 19th century.

In England, the term ‘fire-lock,’ which formerly had been used to distinguish the wheel-lock from the matchlock and snaphance, disappeared, or at least became obsolescent, in the 1650s when the wheel-lock ceased to be a military arm, but not too much later it reappeared (if it had ever really disappeared), in official documents. It was the term of choice for the flint-lock in *The English Military Discipline* of 1886 and when Nicholas Boon published his *Military Discipline* at Boston in 1701,⁴ his use of the word firelock on the title-page confirms that it was in common use, but rather than making reference to just an ignition, it also referred to the entire musket. Firelock continued to be used by the British military until the introduction of the rifled musket in the mid 19th



A259 Fig. 6.4 This illustration from the Pattern Book was published by C. Jacquinet in 1660 but an earlier, undated edition is known. The illustrations are attributed to the Parisian gunmakers Thuraime and Le Hollandois, royal gunsmiths to Louis XIV. It includes an early form of tumbler bridge indicating that improvement had been introduced by at least 1660. French pattern books were intended to provide guidance to Gunmakers and were a great influence throughout Europe. *Steven V. Grancsay Collection, Metropolitan Museum of Art.*

the invention to these people: ... In the history of the Brunswick regiments, it is stated that the soldiers of that duchy first obtained, in 1687, flint-locks instead of match-locks.⁶

To return to flintlock and the role played in its identification by Dr. Torsten Lenk. *Flintlåset* was published in 1939 with a French summary prepared by Harald Bohr and reviewed prior to publication by O. de Prat, neither of whom has been otherwise identified. The foreword is dated May 1, suggesting that pre-war sales would have been limited and overseas distribution even more so. Nevertheless, Sweden was a neutral country and copies would have been received by some in England and America during the next six years.

The function of the spoken word – and by extension the written word, is to provide a mental image of the intended meaning. Lenk, in Chapter one, page one, and paragraph one of *Flintlåset*, described the image of a flint-lock as follows.

Med flintlås menas I det följande en antändningsmekanism för eldhandvapen med mot ett eldstål slående flinta, eldstål och fängpannlock gjorda i ett stycke (batteri), samt med i vertical led rörlig stång, vars tand griper i urtagningar i en nöt, bildande halve- och helspann. Beträffande de här brukade termerna hänvisas til (fig.1 och 2).



[154] Fig. 6.5 Flintlock of Puype's Type 4, c.1660. Engraved lockplate and cock with floral decoration, a standing dog(?) on the back of the cock, and the signature *Mayer á Lyon*, a maker who was active 1640-1660. The vertical acting sear is of the two-piece form, a variation of that described by Godwin (*CJAC*, Vol. 34, No. 1). [M154]

Mr. Urquhart's translation which will be discussed later, reads:

The term *flintlock* is used in this work to mean a mechanism for igniting firearms by striking a steel or battery (frizzen) with a flint. The steel and pan-cover are made in one piece, with a sear moving vertically. The tooth of the sear engages in notches cut in a tumbler to set the weapon at half and full-cock. For guidance as to the term used here: Figs. 1 and 2 (see Fig 6,6)

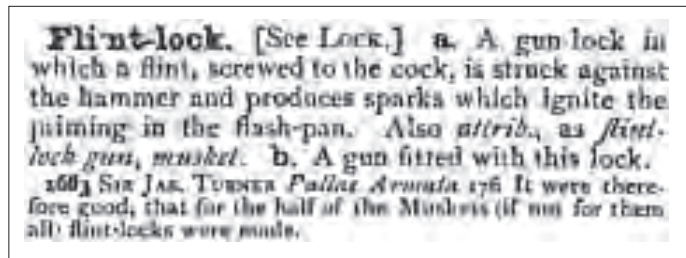
By 1946, gun collecting and the serious study of early European firearm development had arrived in North America. *Flintlåset* played a large part in some circles. It was probably not read by many in Swedish but the French abstract would have made it more readily available and it is often quoted. Swedish is not a difficult written language to understand. Most historians with an interest (the present writer included) could learn enough Swedish to recognize what needed a full translation. The words relating to the lock types are clear and Dr. Lenk apparently chose them carefully. He was quite explicit. Dr. Arne Hoff, Dr. Lenk's friend and counterpart in Copenhagen, wrote: "I can tell you that Lenk was always very eager to have clear and fixed definitions for the different words used in discussing firearms locks." [23]

<i>Snapplås</i>	<i>snapplåset</i>	<i>Flintlåset</i>	<i>Flintlås</i>	<i>snapphanelåsen</i>
snaplock	the snaplock	the flintlock	flintlock	snaphance lock

For the next 20 years, the arms fraternity, though not large, accepted the definition Lenk provided in Page 1, Chapter 1.

This led to the acceptance by collectors that 'flintlock' was *the* word to be used to describe the lock with a vertical sear, one piece frizzen and pan cover, etc. that had been developed in France early in the 17th century, while 'flint-lock' continued to refer to others of the entire flint-using family. It is interesting to note that nowhere in his thesis,

A229 Fig. 6.7. Above: The flint-lock entry from the *Oxford Illustrated Dictionary*. Oxford: The Clarendon Press, 1962.



Mr. Nils Drejholt, Senior Curator (emeritus) at Livruskammaren, the Swedish Royal Armoury, has compared portions of the original Swedish text and the Urquhart translation. It is Dr. Drejholt's opinion that the translations used for the various ignition types seem to have been selected at random and inconsistently.⁸ In a recent letter, he wrote:

I have compared the Swedish and English versions and agree that the English one uses snaplock, snaphance lock and snaphance randomly. On page 18 – starting “It is commonly asserted” ... the Swedish version uses snapplås – snaphance in English and later on Spanish snaplock but Netherlands snaphance lock – snapplås for both in Swedish. On p. 21 they use snaphance – Scottish snaphances for snapplåsvapen i.e. Scottish snaplock weapons. In the next sentence – “manufacture of snaphances at Norwich” the Swedish text is [Skotska?] snapplås — Scottish snaplocks etc.[24]

In the decades following World War Two, an enormous increase in the number of American collectors of European antique firearms produced a small cadre of serious English speaking arms historians: Howard L. Blackmore, Claude Blair, Ian Eaves, G. Charter Harrison, John F. Hayward, Arne Hoff, and Harold L. Peterson, to name a few who joined the small group of existing American students: Steven V. Grancsay, Thomas T. Hoopes, Wm. G. Renwick, and a few others, who studied early firearms history.

They all studied the evolution of early firearms, with emphasis on the French lock, producing published works in an attempt to rationalize inconsistencies between the vocabulary of the day, the research as they found it, and Lenk's definition which created a number of problems. The usual process was to include a paragraph accepting Lenk's description as “the true flintlock,” whatever that means, (a examination of *Flintlaset* did not find Lenk's use of the term) and record that all other types would be called ‘snaplock,’ or ‘snaphance’ locks to add more confusion to the story. For example:

Blair, 1983 — The [Lenk] definition has some historical justification in that this construction had virtually supplanted all other forms of snaphance at the time when the word ‘flintlock’ came into use and I have therefore adopted it here. All other forms of flint snaplock mechanism will be classified as snaphances irrespective of the construction of the pan-over and steel. In addition, the modern term ‘snaplock’ will be used as a general one to cover both types of lock.[25]

Eaves, 1970 — The “fucili” to which Petrini referred was probably the snaphance. ... unless Petrini considered it to be identical to the Italian snaplock. However, the snaplock and the so-called “romanlock” were not, it seems produced in “large quantities” in Italy at that time. (Antonio Petrini, *L'arte fabrile ovvero armeria universale*, 1643).[26]

Hayward, 1962 — The term ‘snaphaunce’ here applies to those locks on which the steel and the pan-cover are separated, while the term snap-lock is confined to those in which the steel and pan-cover are combined. The term ‘flint-lock’ is used only to



A017 Fig. 6.8. “Dessain d’une platine des Six cent qu’on a demandé, a la cour pour monter les 600 gros mousquets qui Sont dans let magazine en fusil. A Brest.” Dated 20 October, 1693 and signed Descloureaux. The design for a lock to convert the 600 large matchlock muskets in the magazine into flintlocks. [See M017], M Descloureaux. *Paris, Archives Nationales, Marine*, G5, Vol. 203

describe what the late Director of the Swedish Royal Armoury, Dr. Lenk, has defined as the true flint-lock, that is the French type with vertically operating sear.[27]

Hoff, 1978 — The term snaphaunce (sic) in this book designates a lock in which the cock when released by a horizontal sear will snap forward allowing the flint to strike a steel which is separate from the pancover. This action produces the ignition. Locks in which the steel and pancover are united in an L-shaped battery, but which also have a horizontal sear, are called snaplocks.[28]

For more than a century, the *Oxford English Dictionary* (henceforth *OED*) has been the arbiter for the use and spelling of words in the English language.

In addition to spelling and variations of spelling, the *OED* provides an historical record of the use of each word. The boxed entry for ‘flint-lock’ which appears above from the 1933 edition, was repeated in the 1988 edition.

The reference that *Palas Armata* by Sir James Turner was published in 1683 is correct but according to the title page, the book was written in the years 1670 and 1671. To quote the entire reference:—

It is impossible to hide burning matches so well in the night-time, especially if there is any wind, (although there be covers made of white Iron, like extinguishers purposely for that end), but that some of them will be seen by a vigilant enemy, and thereby many secret enterprises are lost. It were therefore good, that for the half of the Muskets (if not for them all) flint-locks were made and kept carefully by the Captain of Arms of each Company, that upon any such occasion or party, the half or more of the other locks might be immediately taken off, and the flint-ones Clapt on by the gunsmiths of the Company and then there would be no danger of seeing burning Matches, the sight



A450 Fig. 6.9. A Dutch flintlock, c.1660, with dog-catch and a lockplate of wheel profile, excavated at an Iroquois Indian village site near Rochester, New York which was destroyed by the French in 1677. *Charles F. Wray collection.*

wherof hath ruin'd many good designs.⁹

The *OED* records this as the first use of the word “flint-lock” but at the time, the primary flint-using gun in British service was what was still being called “snaphance,” although it is now recognized that it was what is now identified as the English lock, a flint-lock with a different configuration that was the flint-lock that would have replaced the matchlocks.

That *OED* reference has often been incorrectly quoted by writers on firearms as the earliest use of ‘flintlock’ in English, and therein lies the problem. It is the mainly from that source that a number of writers have used 1683 as authority for the first use of ‘flintlock’ in English. But that was not Turner’s intention. Turner used the word flint-lock to distinguish between a flint-using mechanism and a match-lock mechanism. When he wrote the above — it does not matter if it was in 1670 or ’71, or when his book was published in 1683, English gunmakers, sportsmen, collectors, and the Board of Ordnance identified the flintlock as “French lock” and all the other contemporary flint-lock types which we now identify as English locks, were then known as ‘Snaphance’^{fnxxx}

On the Continent, most flint-lock arms (except for the French lock/flintlock), continued to be identified by the name ‘snaphance,’ ‘*snapplås*,’ *schnapphahnschloß*, etc., with local spelling variations, for a long time and in some areas until well into the 20th century. In England, ‘snaphance’ disappeared slowly and by 1700 it had been replaced by a new name — firelock.

Spelling in everyday use does not always follow the style of the *OED*. The arms users and historians up to the middle of the 19th century often referred to the ignition by its earlier name, firelock; Peter Hawker always used flint-lock, usually with the hyphen, and later writers, including Greener, and later historians, Blackmore, Blair, Hayward, Peterson, Pollard, Wilkinson, etc. usually included the hyphen but sometimes used the



A260copy Fig. 6.10. d'Embser, *Dessigni d'ogni sorta de cannoni, et mortari con tutte le pezze, stromenti, et utigli appartenenti all' artiglieria come anco le piante, alzate, et profile di tutte le machine, edifiziy et ordegni necessary*. A manuscript, three copies of which were produced at Torino in 1732.

single word flintlock. Pollard, whose research has not really been appreciated, used it both ways in the same text.⁹ In most instances the spelling might have been dictated by the publisher's copy-editor: if the publisher was in England, the *OED* would have been followed, while in America, 'flintlock,' the version recorded in Webster's dictionary, would be accepted.

So much new material has been recorded in the last four or five decades that it is now possible to provide a meaningful name and description for every ignition system. Dating might be difficult but that is the next stage for researchers who will, at least, be working with the same descriptive data.

It is for these reasons I have gone to flint-lock as the word to identify, when necessary, any of the other flint-using firearms and if necessary, also including enough adjectives to provide clarity.

.....

The French flint lock evolved over more than 200 years. Master gunmakers and gunlock makers in England, the Continent, Asia and America contributed to that evolution and the variations produced are countless. The most obvious changes occurred in the lock plate and the cock, but the frizzen design should not be overlooked; initially, it was rather short and stubby but very quickly it was lengthened, presumably to give the flint a longer path.

Externally, the buffer that stopped the fall of the cock on the snaphance before it went too far was replaced by a shoulder on the back of the cock which had the same function when it landed on the bolster; the shape and positioning of the tumbler notches in the French lock became more refined, frizzen springs were moved from the outside to the inside of the lockplate and back to the outside again. By 1640, the lockplate had become slimmer and had developed a stepped tail; soon after, the plate became round in cross section only to return to flat a few years later.

By 1670, the flintlock had evolved mechanically into a pretty standard form: flat lockplates and cocks were still being produced and continued into the next century on

French military arms but the ‘round lockplate’ — that is one with an oval surface — which is first illustrated in the pattern book containing designs by Jean Berain published in 1659, had become popular with many wealthy gun buyers; engraving and chiselled decoration was also common on the more expensive arms but this was a carry-over from the contemporary wheel-locks

Internally, a bridle on the tumbler turns up in designs engraved by C. Jacquinet based upon locks made by Thuraïne & Le Hollandois, royal gunsmiths to Louis XIV. This is found in a pattern book dated 1660 but an earlier, undated edition, is known. One point which will be discussed in Chapter 13 is that individual lockmakers and gunmakers used different moulds and filing guides to shape tumbler bridles; and other lock components, in time it may be possible to identify their work from this feature alone.

The external bridle from the pan for the frizzen did not appear in 17th century pattern books even though there was a bridle from the frizzen spring to the frizzen on many earlier English locks and snaphance locks. Without a bridle, the constant movement backward and forward of the frizzen tended to back-out the pin, resulting in the loss of the frizzen or, equally serious, the impact of the flint striking the face of the frizzen put stress on the pin, causing it to bend. Although sporting arms with 17th century dates assigned to them have been illustrated, the feature does not appear in a 1695 pattern book and no dateable evidence has been found to confirm the pan to frizzen bridle earlier than the first or second decade of the 18th century.

In France, the Pattern 1717 military musket was introduced with the spring-to-frizzen bridle of the previous century. There is also a variation [M112] of the Pattern 1717 produced at the arsenal at Turin with a square head on the frizzen screw and corresponding hole on the spring/frizzen to prevent this movement. The same bridle is illustrated by d’Embser’s monumental 1732 manuscript on all manner of warlike stores.¹⁰ But the pan/frizzen configuration did not appear in France until the 1728 Pattern musket. And it was not included on the English arms until the introduction of the Pattern 1738 Land Service pistol. Nor was it incorporated into a Prussian musket for at least another decade.

A detent on the tumbler to prevent the sear catching in the half-cock position has been found on a rifle by Gerrit Penterman of Leuwarden, Netherlands, dated 1683. This is a feature frequently found on flint and percussion rifles of the late 18th century and later.

Numerous attempts to speed the action of the flint were introduced during the 18th and 19th century including; a swivel between the tumbler and the mainspring smoothing that part of the action; providing an adjustable spring on either the mainspring or the frizzen spring, or both. [M187]; wheels or rollers on the toe of the frizzen or the tip of the frizzen spring; relieving the surface of the tumbler, leaving only a ledge around the axle

and around the circumference. All of these modifications reduced friction in each of those moving parts.

A sliding safety that engaged internally with the tumbler was added to locks beginning in the last half of the 18th century. It apparently was not patented although numerous patents to do the same job were granted in the early 19th century, including — Dodd, 1805; Richards, 1808; Jos. Manton, 1812; D. Egg, 1812; Wyatt, 1818; Sartoris, 1819. Each acquired patents which claimed to prevent the lock from accidentally discharging.¹¹

Contamination of the priming by moisture was a frequent problem for sportsmen and numerous attempts to provide a better seal between the frizzen and the pan were made. Some were patented (i.e. Nock, Jover & Green, 1775; Wilson, 1792; Prosser, 1800; Egg, 1803; Jos. Manton, 1803; Matthey, 1806; Noon, 1809; Jos. Manton, 1812; Smith, 1812; Pretymann, 1813 [M188]; John Manton, 1815; Richardson, 1816; Sam. Nock, 1816; Jos. Manton, 1817) but many other ideas apparently did not warrant the cost of a patent.

A reservoir to provide automatic priming of the pan when closing the frizzen was patented by Joseph Hall (1802), John Peckham (1803), and Emanuel Heaton (1814). The same ‘improvement’ was produced by other gunmakers who did not feel the necessity of having a patent.

It is safe to say that none of the above improvements, with the exception of rollers on the springs, achieved anywhere near universal acceptance, but their presence on a lock is of interest and are indicative of lock quality. They might be useful in dating but since all would have had an effect on cost, it is difficult to say when in a gunmaker’s lifetime they were actually produced.

Notes and recommended reading.

1. H.L. Blackmore. *British Military Firearms*. London: Herbert Jenkins, 1961. p. 29.
2. Tarasuk, Leonid. “The Cabinet d’Arms of Louis XIII: Some Firearms and Related Problems.” *Metro-politan Museum Journal*, No. 21, (1986) pp. 65-122. See especially pp.96-102; 88-93.
3. Thaïtes, Ruben Gold.(Editor) *Jesuite Relations and Allied Documents*. Cleveland: Burrows Bros. Co. 1898, Vol. 1-72.
4. Nicholas Boon.. *Military Discipline, the Complete Souldier, or Expert Artillery-man: Containing the Several Postures and Excercises of the Musket & Fire-Lock...* Boston: Printed for and sold by Nichols Boon, 1701. See: Joseph R. Riling, *The Art and Science of War in America: A Bibliography of American Military Imprints,1690-1800*. Bloomfield: Museum Restoration Service, 1990.
5. Hawker, Peter. *Instructions of Young Sportsmen*. This important title went through 12 editions between 1814 and 1859.
6. Dionysius Lardner, The Rev., LLD, FRS, L&E, MRIA, FRAS, FLS, FZS, Hon. FCPS, &c. &c. *A Treatise on the progressive improvement and present state of the Manufactures in Metal* (Vol. II, Iron & Steel) London: Longman, Rees, Orme, Brown, Green, & Longman, and John Taylor. 1833. p. 89.
7. About 30 years ago I called upon Gerard Chatelet, a Swiss-born colleague who had taken his university training in the 1930s, to provide me with a translation of sections of Thierbach’s *Die geschichtliche entwicklung der handfeuerwaffen*. When asked why Lenk had not used ‘French lock,’ the internationally recognized name for the flintlock, he suggested *sprachreinigung*; “the cleaning up of the German language.”
8. Turner, Sir James, Knight. *Palas Armata, Military Essays of the Ancient Grecian, Roman, and Modern Art of War, Written in the years 1670 and 1671*. London, Printed by M.W. for Richard Chiswell at the Rose and Crown in St. Paul’s Church Yard. 1683. p. 176.
9. Pollard, H.B.C. *A History of Firearms*. Boston: Houghton, Mifflin, 1926.

10. d'Embser, *Dessigni d'ogni sorta de cannoni, et mortari con tutte le pezze, stromenti, et utigli appartenenti all' artiglieria come anco le piante, alzate, et profile di tutte le machine, edifizy et ordegni necessary*. A manuscript, three copies of which were produced at Torino in 1732.
11. Great Britain. *Abridgements of Patent Specifications relating to Firearms ... 1588-1858*. London: HMSO/Holland Press, 1960. Patents relating to a waterproof frizzen/hammer design:— Nock, Jover & Green, No. 1095, 1775; James Wilson, No. 1897, 1792; John Prosser, No. 2654, 1800; Durs Egg, No. 2692, 1803; Jos. Manton, No. 2722, 1803; J.F. Matthey, No. 2991, 1806; Thomas Noon, No. 3233, 1809; Jos. Manton, No. 3558, 1812; William Smith, No. 3588, 1812; Robert Pretymen, No. 3722, 1813 [M188]; John Manton, No. 3942, 1815; Francis Richardson, No. 4031, 1816; Sam. Nock, No. 4054, 1816; Jos. Manton, No. 4166, 1817; primer reservoirs to provide automatic priming of the pan when closing the frizzen — Joseph Hall, No. 3573, 1802; J.R. Peckham, No. 2709, 1803; Emanuel Heaton, No. 3794, 1814). Patents relating to lock safety, included — George Dodd, No. 2825, 1805; George Richards, No. 3155, 1808; Jos. Manton, No. 3558, 1812; Durs. Egg, No. 3599, 1812; M.C. Wyatt, No. 4218, 1818; Urbanus Sartoris, No. 4336, 1819.

Recommended Reading

- Bailey, De Witt. *Pattern Dates for British Ordnance Small Arms, 1718-1783*. Gettysburg: Thomas Publications, 1997.
- .Tarasuk, Leonid. "The Cabinet d' Arms of Louis XIII: Some Firearms and Related Problems." *Metropolitan Museum Journal*, No. 21, (1986) pp. 65-122. See especially pp. 88-93, 96-102.
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- Gusler, Wallace B. & Lavin, James D. *Decorated Firearms 1540-1870 From the Collection of Clay P. Bedford..* Williamsburg: Colonial Williamsburg Foundation, 1977. See especially pp. 1-6.
- Hayward, J.F. *The Art of the Gunmaker, 1500-1660* (1962), p. etc; Hoff, A./Stryker, W.A. *Dutch Firearms*. (1978); Blair, C. *Pollard's History of Firearms*.(1983).
- Hayward, John F. "Further Notes on the Invention of the Flintlock". *Art, Arms and Armour* Vol. I. Chiasso: Acquafresca, 1979
- Puype, Jan Piet. *Dutch & Other Flintlocks from 17th Century Iroquois Sites*. Rochester Museum & Science Center, Research Records No. 18, Part 1, 1985
- Puype, Jan Piet.and Marco van der Hoeven (Ed.). *The Arsenal of the World: The Dutch arms trade in the seventeenth century*. Amsterdam: Batavian Lion, 1996.
- Puype, Jan Piet. "Notes on an Early 17th Century Flintlock Target Gun." *Waffen- und Kostümkunde*, Vol. 22 (1980), pp. 27-38.

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PHOTO INDEX — FLINTLOCK



A252 English flintlock by John Tarles, Free of gunmakers' Company 1670, active 1702. *Craig F. Ross collection.*



A255 English flintlock by James Willmore, active St. Martins-in-the-Fields, 1716; Leicester Fields, 1729, Gunmaker in Ordinary to George II, 1740, last recorded 1764. *Craig F. Ross collection.*



A252 English flintlock by John Tarles, Free of gunmakers' Company 1670, active 1702. *Craig F. Ross collection.*



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MORE ILLUSTRATIONS TO BE ADDED

The Miquelet Lock

Patilla, Llave Española, Romanlock, Mediterranean lock

Miquelet: miqueletslot; patillaslot (Danish); (Dutch); a la romano (Italian); llave a la española; llave de miquelet; llave de patilla; patilla (Spanish); spanska snapplåset (Swedish)



A035 Fig. 7.1. “A Catalan mountaineer, known as a Miquelet” from *L’Ecole de Mars, ou memoires instructifs* by M. de Guignard, Paris, 1725. He is well armed with dagger, musket, and two pistols carried on his *pagal* or hunting bag.

Miquelet is the name given by arms historians to identify a family of flint-locks, the primary characteristics of which are an external mainspring, a horizontal sear, and a one-piece frizzen and pan cover.

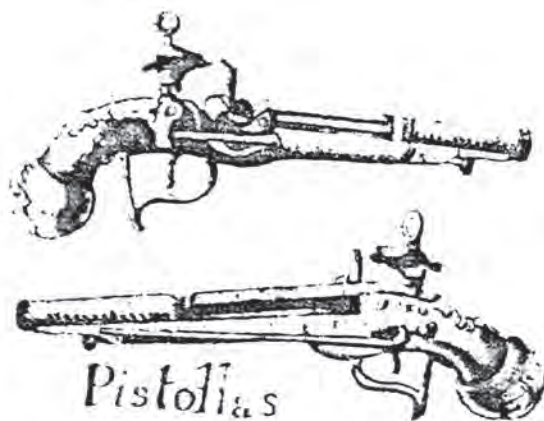
The first with those characteristics probably originated in Spain during the last quarter of the 16th or first quarter of the 17th century, and which in a number of physical variations was produced over the successive decades throughout much of the Mediterranean area. About the same time, a mechanical variation having the same distinctive features was produced in northern Italy. Jointly they are frequently described as Mediterranean locks.

Both were popular over a wide geographical area and differences will be found indicating production in Portugal, Turkey, the Balkans, the Caucasus, much of the Muslim world to the south and east, and briefly, as far north as Sweden and apparently, in England.

Typically, the word “miquelet,” when it is used to refer to the class of flint-lock ig-

tion which we now call by the name, has not been found in Spain or in any of the countries where the lock type was common.

According to the Oxford English Dictionary, “miquelete” originally referred to a 17th century band of Catalonian banditti who infested the Pyrenees. This may be true but it almost certainly had an earlier and perhaps more respectable origin. As early as 1674, France had formed Companies known as Miqueletes. They were located in the south of France and since Henry IV had become monarch of Navarre in 1589, it is probably logical to assume that the new regiment’s names were based upon some his-



A744 Fig. 7.2. Illustrations from an unsigned but dated 1751 manuscript in the Bibliothèque du ministère de la guerre., Paris. The two sides of a typical Ripol-made miquelet pistol illustrating the “belt-hook” which held them on the flap of his *pagal* (bullet bag) as shown in Fig. 7.1 The musket illustrated was also a miquelet with a stock of Catalan form. (Appendix IV, No. 36).

toric precedence. Almost all use of the word in this respect is relatively modern but one or two direct links with the distant past have been found.¹

George Cameron Stone in his *Glossary* published in 1934 included the word as “one of the earliest forms of flintlock” and a year later, Steven V. Grancsay wrote on “A Gun from the Caucasus” in the Metropolitan Museum of Art Bulletin No. 30 which he described as “a flintlock of the miquelet type.” This suggests, because both were knowledgeable members of the Armor and Arms Club of New York, that ‘miquelet’ had been recognized by many. Five years later it was used by Charles Edward Chapel in the first edition of his *Gun Collector’s Handbook of Values*, the seven editions of which probably did more to encourage gun collecting in America than any other publication.

A thorough search for use of the word in English has not been made but S.B.J. Skertchly, in his study on the manufacture of gunflints published 1879, quoted James Wyatt who published on the same subject in 1870. Both were aware of the ignition:

“In France, the Miquelet gun-lock, a Spanish invention was first introduced in 1630 but the stone, if flint was used at that time, had not, at all event, been subjected to any manufacturing process.²

Their date was speculative and incorrect, but their use of ‘miquelet’ indicates that it was a word accepted word in England, and probably had been for some time. The earliest I have seen it used by an arms historian is 1917 when H.B.C. Pollard included it in *The Book of the Pistol and Revolver*. He wrote:

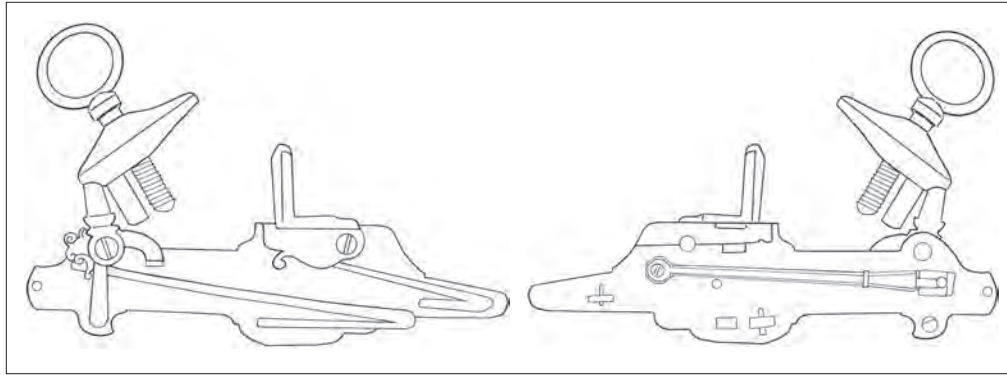
There are two existing accounts of the origin of the flint-lock. One claims that it was invented by the Spanish or Portuguese irregulars, or “Miguelitos”— hence the French name, Lock à Miquelet”³

By 1926, his opinion had apparently been solidified and in his *History of Firearms* he stated:

The lock à miquelet, or miquelet, is the familiar Spanish type of lock where a heavy external mainspring acts on the heel of a massive external hammer pivoted in a bridle screwed to the outside of the lock plate.⁴

Pollard is recognized as one of the leading early and thorough students of firearms development and he is unlikely to have used the term without some justification. We do

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A318 Fig. 7.3. The mechanism of a Spanish patilla lock by Simon Marquart the Younger, made during the first quarter of the 17th century. The half-cock stop was added shortly after this lock was made.

not know what first suggested the name and the lock to him but there was likely to have been some basis to his thought.

There is one contemporary reference might have been his source. In 1697, the first edition of Pierre Surirey de St. Remy’s two-volume *Memoirés d’Artillerie* was published at Paris. In the chapter recording *Armes de guere de toutes forces* he provided the names for 50 types of arm to distinguish between those used by the French from those used by the Miquelets and other foreign troops of the region. He illustrated the standard and fine arms in various branches in the service of France and for the illustration “that represent a Pistol,” (it was a flintlock, not a miquelet), he wrote:

Les pistolets fins & communs sont de 14 pouces de canon, les uns enrichis, & le autres tout simples.

On ne parle point icy des gispes, pistolets, poignards, & autres armes, qui ne sont usitées que parmi les Miquelets, les Barbets, les Houssards, & autres troupes étrangères, ou séparées des autres corps, m’attachant à l’usage le plus général.⁵

Fine pistols and common pistols are 14 pouces in barrel length, the fine pistols are embellished and the others are quite plain.

Here we don’t talk about *gispes*, pistolets, poignards, and other arms which are used only by Miquelets, Berbers, Hussars and the foreign troops distinct from the regular troops but those in regular service.

St. Remy gave us the words and illustrated some of the standard and fine flintlock arms used by various branches in the service of France, but Fig. 7.2 is the earliest illustration yet located of the firearms “de fusiliers de montagne” are included in An unsigned French manuscript dated 1751.⁶

A direct link between the 17th and 18th century use of “miquelet” by contemporary writers and the 20th century use by arms historians, has not yet been found, but “a la miquelet” or “alla Miquelet” or “of Miquelet form” will undoubtedly turn up eventually. In the meantime it will continue to be a useful term.

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Gunmakers in Spain, and Catalonia, and to a certain extent Portugal, were primary contributors to the development of the Spanish miquelet. All three are part of the Iberian Peninsula which is demarcated by the Pyrenees mountains on the north, the Atlantic



A331 Fig. 7.4. Spain xxx xxx xxx xxx xxx xxx etc.

Although Portugal and Catalonia were influenced by Spanish designs, they each created unique differences. Ripoll was an important design and production center until destroyed in 1839 by Carlist invaders.

Portugal, extending along most of the Atlantic coast of the Iberian Peninsula was, until 1588 a major trading nation. In that year it was conquered by Spain. Miquelet locked guns were manufactured there along with a number of distinctive ignitions which will be covered in Chapter Nine

A313 Fig. 7.5. Sardinia is the larger of two islands located between Spain and Italy in the Tyrrhenian Sea. There was a small but active gunmaking center at Tempio at the northern end of the island where guns with pierced-iron stocks and distinctive locks were made. Corsica, the island to the north has been a part of France since 1770 but no evidence of gun manufacture has been found..

A748abcd Fig. 7.6. The relative positions of the Iberian Peninsula, Sardinia, and Italy.

Ocean on the west and the Mediterranean Sea on the east. Portugal extends along almost the entire west coast, the Kingdom of Castile & Leon in the center, and the Kingdom of Aragon in the west. In 1469, Ferdinand of Aragon (heir to the throne of Aragon) and Isabella of Castile (heir to the throne of Castile), were married, bringing much of the area under a single ruling family.

In the early years of the 8th century, much of Spain was invaded by the Moors, an army of Muslim Arabs and Berbers from North West Africa. Christian armies from the north stopped the invasion but it was not until 1492 that the Moors were expelled from their last holdings in the peninsula.

In the years that followed, Spanish metalwork reached a high level of development and gunmaking centers were established, notably around Toledo, Ripoll near Barcelona, and at Madrid and Lisbon. Coincidental with this, trade routes were established between Spain, Italy, and the Middle East, which would explain the transfer of technology and designs to the Muslim world.

As it relates to this study, on the death of Ferdinand in 1516, his grandson became Charles I, King of Spain (later Charles V, Holy Roman Emperor), ruler of the Spanish possessions in Spain, southern Italy, Africa, north and south America, and in 1519 he inherited the Netherlands and Burgundy. Spanish influence is evident in the work of gunmakers throughout his empire.

Two large Islands, Corsica and Sardinia, are located in the Mediterranean Sea between Spain and Italy. The former has no special relationship with this study by a distinctive form of miquelet lock combined with an equally distinctive pierced metal stock made in Sardinia will be discussed later.

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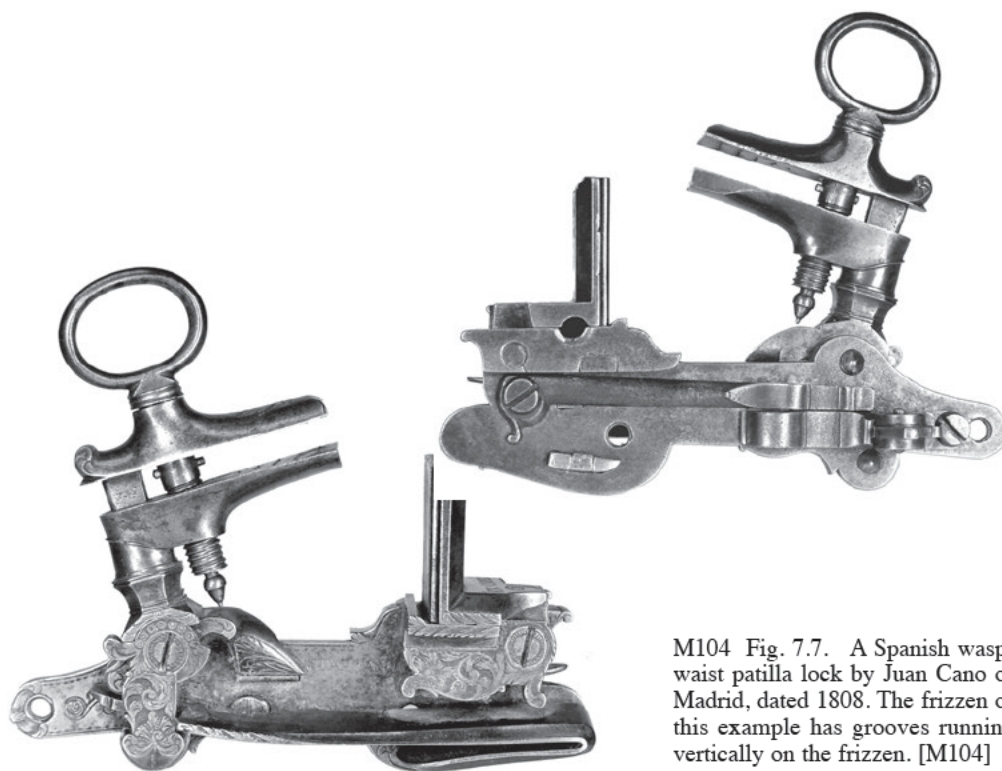
Recognizing members of the miquelet family is not difficult, based on the obvious features noted above. But putting a name to them based on the descriptions provided by

Italy

A315 Fig. 7.6. Italy: on this map, the *Regioni* (regions) are bold type in Italian and the cities, towns, or villages are in English: *Trentino* is known as The Trentino and until 1923 was part of Austria; *Veneto* as The Veneto, or Venetia; *Toscana*, that is Tuscany; *Marche*, The Marches; *Lazio* as Latium, but also Lazio; *Abruzzi* is known as The Abruzzi and *Puglia* as Apulia. Gun related centers in this study include:

- Anghiari — Some thirty gunsmiths active there 1740-1820 specialized in romanlocks. You can't tell an Anghiari piece of 1740 from one of 1820, though many are dated. But! — the leading Guardiani gunmaking family numbered their locks, and the serial-numbers between 1740 and 1820 can be mistaken for dates.
- Bargi — Small village some 30 km West of Bologna, home of the famed Cecchi family of gunmakers who signed their guns "Acquafresca," "Acqua Fresca," or "Afresca."
- Brento — A small village some 25 km south of Bologna, home of the great Negroni clan, founders of the very best of the Tosco-Emilian school of locks and ornamentation that is often, but wrongly, attributed to Brescia.
- Brescia — The best-known Italian gunmaking center, especially during the 17th and early 18th century.
- Bologna — Much good shotgun-making, well into the 1960's.
- Celalba — A hamlet near Perugia, 1740-1820. Outstanding clan name: Matassi.
- Florence (*Firenze*), — the cultural center of Tuscany, was not a major gun-making center but it gave its name to the snaphance — *alla fiorentina*. It was the city where Michele Lorenzoni, who gave his name to a well-known breech-loading system maintained his business.
- Gardone — actually *Gardone Val Trompia*, was part of the Venetian Republic from 1427 to 1796 and by Venetian law, only gun barrels could be made there. The assembly of complete guns was strictly reserved to Brescia.
- Lugo — A small hamlet about 30 km east of Bologna; some fine gun-making, 1730-80, all snaphances; home town of the Zanotti clan which later moved to Bologna.
- Naples (*Napoli*) — Between 1770-1820 the Royal Factories there produced weapons of Boutet-LePage quality and much very good non-royal, private, small-shop gun-making, often up to London standards.
- Rome (*Roma*) — Some fine gun-making in the mid-18th century. Pope Benedict XIV was an impassioned hunter and gun collector. . Background data courtesy Robert Held.





M104 Fig. 7.7. A Spanish wasp-waist patilla lock by Juan Cano of Madrid, dated 1808. The frizzen of this example has grooves running vertically on the frizzen. [M104]

the Spanish gunmaker Espinar (1644) or the Portuguese author Fiosconi (1718), is less precise.

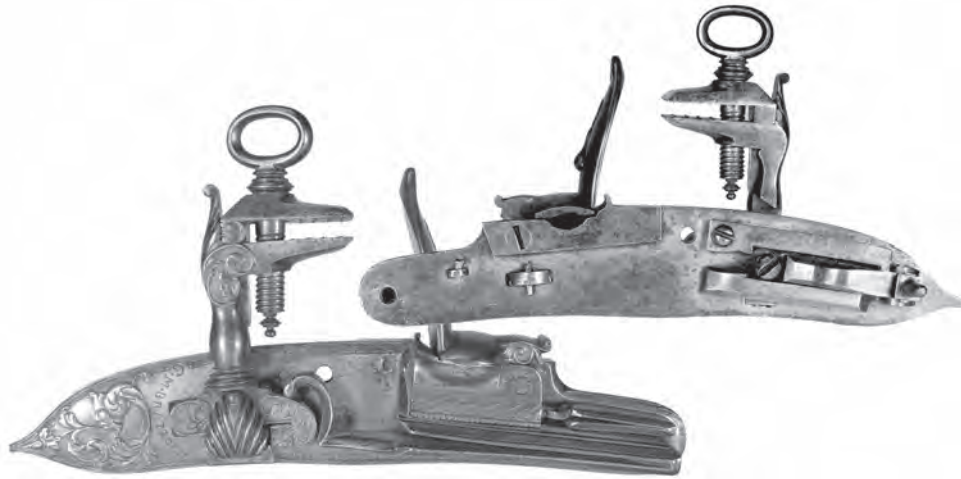
Alonso Martinez de Espinar (c.1594-1682), has been described first as a Page to the king, and later the *Ballestero*, (gun bearer), to Felip III and Felipe IV. Still later he was Keeper of the Wardrobe to Prince Baltasar Carlos, heir to the throne, as well as “*Ballestero mayor* in which capacity he was often the sole hunting companion of the king.”⁷ In 1644 he published *Arte de ballesteria y monteria*, a treatise on hunting that contains considerable on the use of guns and the history of gunmaking in Spain, significant portions of which have been translated by Dr. Lavin

Espinare records only the Spanish names, without a description: *patilla*, *agujeta*, *invencion*, and *calço* (which Lavin considers an editorial error and should be *calço atras*). Espinar wrote:

... the best are the Patilla locks, for they have fewer parts, and run less risk of breaking and are less prone to fire accidentally, being better regulated. Those of agujeta are composed of more parts, and small springs, which operate the sear: they easily get out of order. Those of invencion have this same defect, for the sears are of the same type but they are very easily dismounted and for this reason some use them. The locks with calço atrás [rear sear], are the worst, for they are unsure when cocked; if they have much sear, one cannot fire them: if little, they are unsafe, for at any instant the aforesaid may occur.⁸

The other contemporary publication dealing with this subject is *Espingarda Perfeyta*⁹ which was compiled by three brothers; José Francisco, Joaõ Rodrigues and Manoel Antonio, all of them master gunmakers working in Lisbon was published in 1718. They

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Most, but not all Spanish locks will have a distinctive “wasp-waist” lock plate.



M090 Fig. 7.8. A early 18th century romanlock engraved G.M Brazzolo who worked in Milan during the last years of the 17th century and early years of the 18th century

wrote under the “pen name” César Fiosconi and Jordam Guserio, and it is these names by which the book is known. Henceforth it will be referenced only as “Fiosconi.”

Fiosconi identified a number of Portuguese lock styles by name, but these will be covered in chapter nine, but most of his descriptive texts refer mainly to their quality. Nevertheless, he does make a contribution in a series of paragraphs “Concerning the variety of foreign Locks which are used in Guns”

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In the 1950s and early 1960s, Dr. James Lavin, Professor of Cultural History of Spain at William and Mary University, Williamsburg, Virginia, traveled extensively, searching the museums and archives of Spain for information on firearms development. In his *History of Spanish Firearms*, he identified the patilla lock (pronounced *paa-teal-yah*) as the early word for what we now recognize as the Spanish miquelet. It is given that name in the early documents on the basis of the *patilla*, that is, the foot that acts on the half- and full-cock stop that pass through the lockplate, on which the foot rests. He notes that *patilla*, in this instance, is a diminutive of *pata*, which the *Velázquez Spanish – English Dictionary* identifies as the foot or leg of an animal.¹⁰ In the 1740s, the use of the designation *llave espanola* (Spanish lock) became more common and *patilla* disappeared.

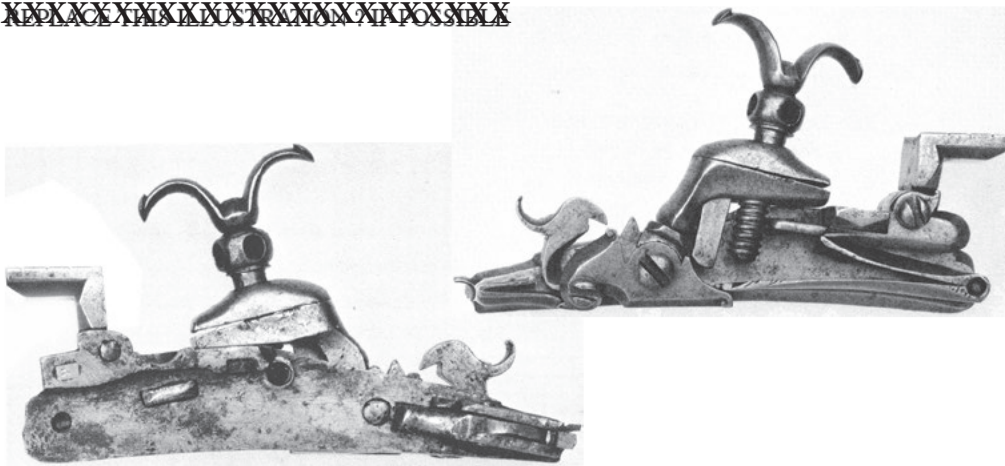
In recent years, based upon Dr. Lavin’s work, arms historians have revived *patilla* to identify miquelet locks with the system of half- and full-cock security in which a leg emerging from the breast of the cock, comes to rest upon lugs protruding through the lockplate, to be activated by a horizontally acting sear.

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The Patilla lock

There are two major branches in the miquelet family — the patilla or Spanish lock, which originated in Spain but was produced throughout much of the lands bordering on the Mediterranean, and the “romanlock” which originated in northern Italy. Both locks will be immediately identified by the external mainspring, the horizontally acting sear,

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A237 Fig. 7.9. Spanish *aguejta* lock from a combination sword-revolver, second quarter of the 17th century. Metropolitan Museum of Art, Rogers Fund, 04.3.122.

and a one-piece steel and pan-cover. While almost all flint-locks with these features will be miquelets, most will have a regional or local name which will have precedence — for example the Sardinian miquelet or the Neapolitan miquelet. These will be mentioned at the appropriate location.

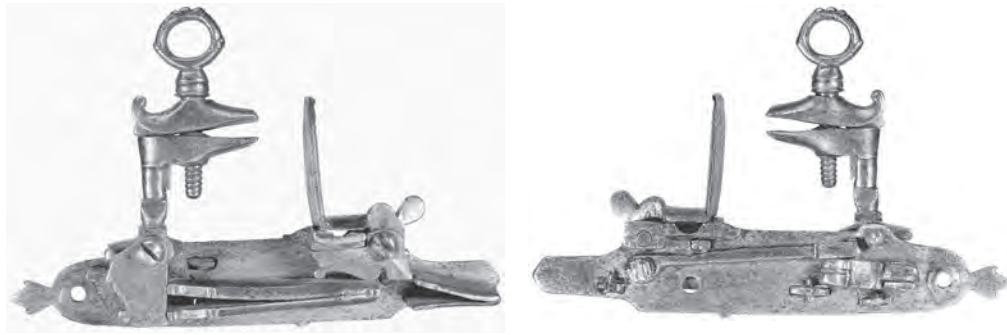
On the patilla lock, the mainspring pushes up on the tail of the cock to be held in the half-cock position by a leg on the breast of the cock resting on a block protruding through the lockplate to catch its foot which stops the cock from falling, and a similar block (almost always round) which serves as the full cock position. The main- and frizzen springs are locked in position by round pins or flat keys passing through a tenon penetrating the lockplate.

The long arm of the mainspring on the patilla lock slips under a bridle fixed on the lower edge of the lockplate with the other end serving as the base for the pin on which the cock pivots. Internally, a one-piece horizontal sear made with a round lug pivoted on the end, passes through the lockplate for the half cock or safe position and a long flat spring with a small flat lug passes through the plate to provide a ledge for full cock. The 'foot' located on the breast of the cock rests on these lugs for the half and full cock positions. For firing, the half cock block that pivots on the trigger bar, is retracted, and the long flat spring with the full-cock rest, slides up a ramp on the trigger bar, to allow the cock to fall.

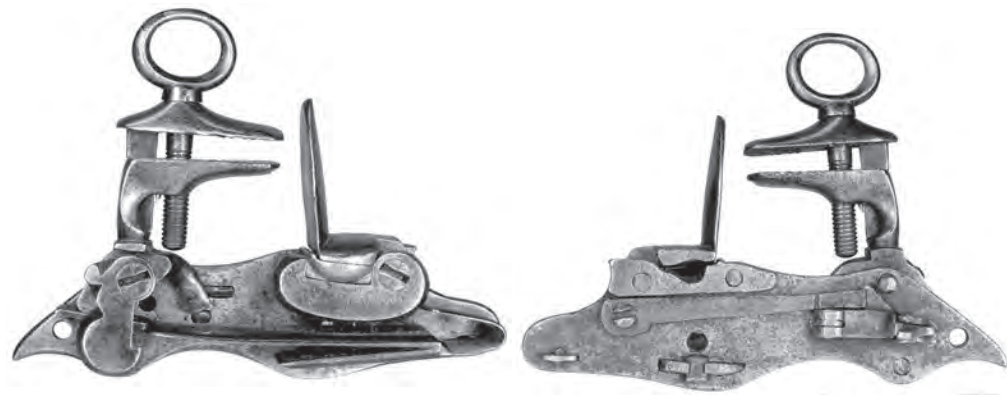
In his chapter on locks, Fiosconi records a lock which he identifies as *fecho a Castillhane* — a Castilian lock, indicating a Madrid variation of the patilla lock, on which the half-cock stop is placed under the knee of the cock. He calls it *de invencion* and considers it to be among the best of the Spanish locks.¹¹

The Romanlock

Italy was the other major contributor to miquelet lock design, creating what is known as the romanlock — *a la romana*. Lock shapes were usually with a quite different appearance from those of Spain, but the main distinction is a mainspring producing downward pressure on the toe of the cock, a square block passing through the lockplate



M103 Fig. 7.10. A Sardinian patilla lock with traces of engraved decoration and the maker's name "Barbuti," probably Antonio Barbuti of Tempio, a gunmaker who was active c.1740-1780, engraved on the lower edge of the plate. [M103]



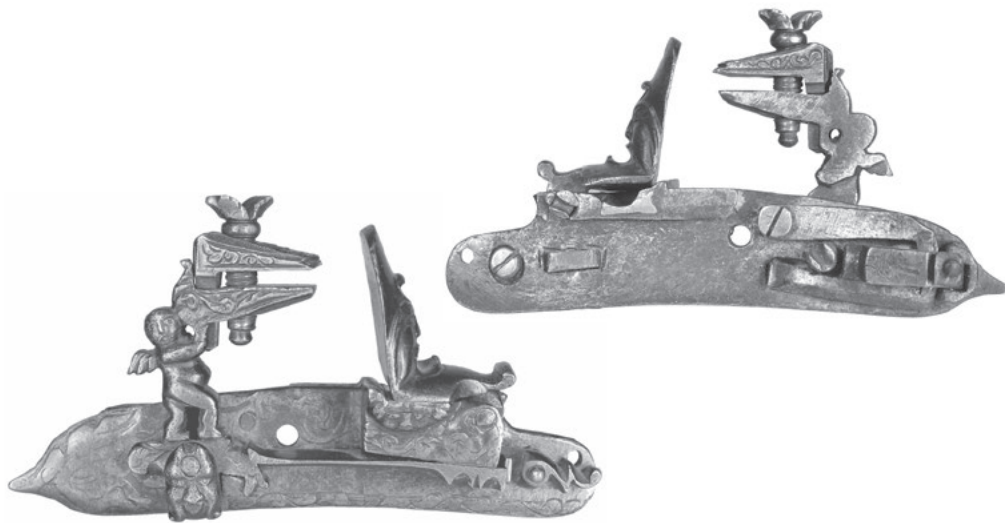
M207 Fig. 7.11. A Neapolitan patilla of the form popular in Southern Italy, particularly Naples, in the 18th century. There is an undecipherable maker's mark or town mark on the frizzen. The leaf-like lockplate is typical. [M207]

for the safe position, and a horizontal sear passing through the lock plate contacting with a full-cock position on the rear of the cock.

The 'romanlock' (*a la romana*) has the same three primary miquelet characteristics: the external mainspring, the horizontally acting sear, and a one-piece steel and pan-cover but after that there is little similarity. The design evolved in northern Italy and was known historically as *à la romana*.

The romanlock's most obvious difference includes a mainspring producing a downward pressure on the toe of the cock and a horizontal acting two piece sear with a square lug working through the lockplate to prevent cock movement in the half-cock position and a depression in the rear of the cock which accepts the sear for the full cock position. In Spain, this is a characteristic which has been ascribed to the *calço atrás* lock and in Portugal it was known as an *Anselmo* lock.

Lockplates are more conventional with parallel top and bottom edges and a pointed tail. The springs, as on the patilla, are fastened by pins or keys and the frizzen spring is placed above the mainspring where it is partially hidden under a skirt over the pan. The frizzen is usually of an outline similar to that on the contemporary French lock and the face is flat and smooth.



M106 Fig. 7.12. A Marchesan romanlock “a tutto tondo” (in the round) with a single leaf mainspring; the frizzen spring is hidden under the pan bridle and the pan is brass lined. The cock is pinned from the inside to a cock bridle and the cock body is chiselled in the form of an angel; the majority of this type date between c.1720 and 1780 [M106]

The Aguejeda Lock

Catalonia is an industrial area in North-East Spain which historically extended into France, with important gunmaking centers located at Barcelona, the capital city on the coast, and Ripoll in the mountains to the north. A distinctive miquelet lock known as the *agujeta* lock (pronounced *agwah-hay-ta*), is found mainly on short- and long-barrel pistols (*pedrenyal*), with characteristics common to Ripoll.

Contemporary writers have recorded existence of the type as early as 1611¹² and Espinar (1644) described it “as “composed of more parts, and small springs, which operate the sear: they easily get out of order”¹³ Examples are scarce, dated examples have not been found, and most survivors are dated to the “first third of the 17th century.”

Mechanically, the *agujeta* is recognized by the external mainspring pressing down on the toe of the cock and the presence of a dog catch working on the rear of the cock. The full cock position is hidden on the back of the cock as found on the romanlock. The head of the flint screw will be found with horns, or the ring-like *anillo* found on the patilla. The steel and pan cover (frizzen) are combined and pivot on a pin, rather than a threaded bolt; the face of the steel is grooved and there is invariably a lip on the top right edge of the steel to make it easier to open.

The lockplate is thick with beveled edges for surface mounting; it usually, but not always, drops to a distinctive lozenge-like point along the lower edge and it is held in the stock by three screws

A much enlarged version of the *agujeta*, known as the Kayble lock, was adopted in Algeria. It will be discussed in Chapter 10.

Sardinian Miquelet

Sardinia (*Sardegna*) is a large island in the Tyrrhenian Sea between Spain and Italy which was influenced by Spanish domination; initially under the rulers of Aragon and



Fig. 7.13.
Fig. 7.14.

925.27.24 Top
925.27.14 Bottom.

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listed in the inv

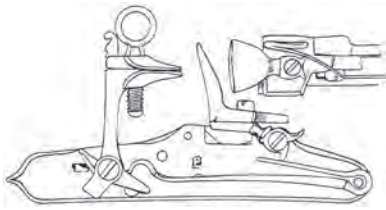
later by the Spanish Habsburgs. In 1702, it was awarded to Duke Victor Amadeus II, the house of Savoy, with his capital at Turin where the royal residence and arsenal were located. It became a part of Piedmont and the Kingdom of Sardinia. Many of the locks identified as Sardinian were made by gunmakers at Tempio, on the island, with a large percentage of them produced by one of the Barbuti family [M103] in the mid 18th century. The locks are of patilla design, members of the miquelet family identified by the mainspring providing upward pressure on the tail of the cock in the Spanish manner, half- and full-cock stops acted upon by the foot of the cock, a flat lock plate with a trefoil decoration on the tail, and a frizzen spring in front of, and in line with, the mainspring.

The Neapolitan Lock

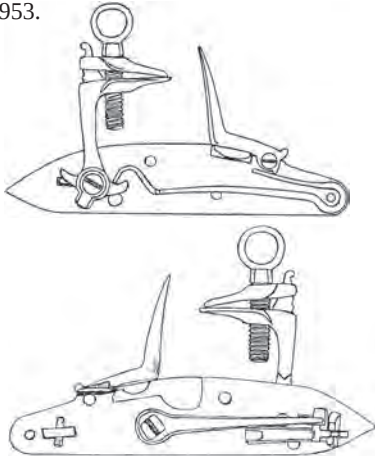
The Neapolitan Lock, sometimes known as *alla borbona* or bourbon lock, was used almost exclusively in southern Italy from Naples down to Sicily. It is a member of the Patilla family with the mainspring applying pressure upwards on the tail of the cock and the half-cock and full-cock stops protruding through the lockplate to hold the foot of the cock. The top jaw is usually formed with a tenon, mortised into the cock body but will also be found with the top-jaw wrapped around the spur of the cock. The Neapolitan lock is a close relative to the Sardinian lock and may have influenced it, or been influenced by it.

Marchasian lock [M106]

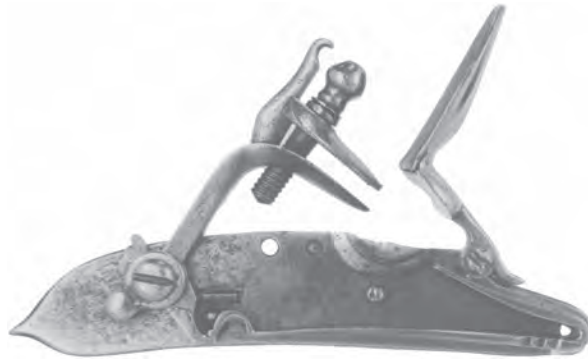
In the 18th century, romanlocks with elements modeled *a tutto tondo*, (in the round), with elements heavily chiseled in anthropomorphic and zoomorphic forms, often includ-



A321 Fig. 7.15. A Swedish *Spanskt snapphanelås* m/1673. Safety was acquired by turning the frizzen face away from the pan cover. After Joseph Alm, 1953.



A322 Fig. 7.16. Swedish miquelet (*Svenskt snapplås*) model 1688 which is also listed in the inventory of stores as *spanska flintmusköter*. After Joseph Alm, 1933.



A272 Fig. 7.17. Miquelet *a la romano* from a Swedish Pattern 1683 Navy pistol. Joseph Alm (1933-fig. 64, 93; 1952-fig. 59) describes this lock as a Spanish design and associates it with patterns of 1673, 1674 or 1688. Robert E. Brooker collection.

ing angels and cherubs, were produced in The Marches, located east of the mountains and on the Adriatic coast of Italy.

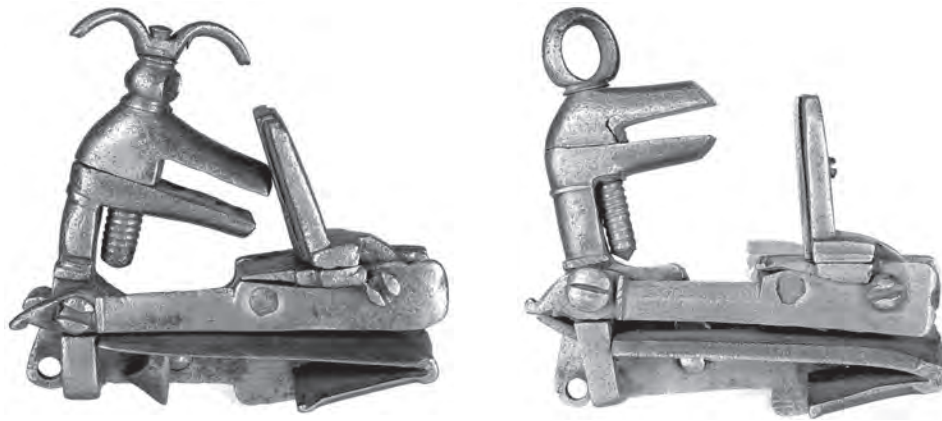
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Italian ornately chiseled locks

A most distinctive, heavily chiseled, patilla lock is readily recognized because many exist and they are so unusual, but Claude Blair has pointed out in 1974 but no evidence has been found since then which will provide either a location for their manufacture or a date of manufacture.¹⁴ The locks illustrated in Fig. 7.13 and 7.14 from the Herbert J. Jackson collection are typical but apparently, no two are identical. Although a few recorded in museum collections and private collections are mounted in guns, probably as many are known only as detached locks.

The chiseled decoration is usually a complicated combination of vines, scrolls, human figures and monster heads. The frizzen springs are sometimes hidden under the pan as on the Spanish patilla, and sometimes above the mainspring as on the Neapolitan patilla.

It has been suggested that this form had its popularity in the third quarter of the 17th century but very few are signed and none of the signatures have been identified. The decoration of some appears similar to that on the Marchasian miquelets [M106], but



M204 M060 Fig. 7. Typical Ottoman patilla locks with wasp-waist plates, which differ from the Spanish patilla only by the presence of a bridle between the cock screw and the flint screw. Most will also have a flint screw with horns although the *anillo* is found. Variations made within the Islamic world had regional characteristics which will be discussed in Chapter 10.

they are usually of romanlock construction and the chiseling is not close enough to give this attribution. It is invariably of much higher quality.

Swedish Miquelet

Although they do not look much like the Spanish miquelet, at least two variations of a miquelet were made for the Swedish army in the last quarter of the 17th century. They are illustrated in *Eldhandvåpen* published in 1933 and *Arméns eldhandvåpen för och nu* published in 1953; both by Joseph Alm, and published by the Kungl Armémuseum, Stockholm. They are described as model 1673, model 1674 and model 1688 *Spansk halvspännarelås*. Each has an external mainspring acting on the toe of the cock and a horizontally acting sear working through the lockplate on the tail of the cock. Safety on the m/1673 is provided by a frizzen which turns to the right. On the m/1688, it is a half-cock post passing through the lockplate as on the romanlock.

English Miquelet

The title on this paragraph may be a misnomer but it will have to do until more evidence is forthcoming. Howard Blackmore first recorded that the Ordnance stores listed Spanish locks in 1639-1640. His source may have been the 1640 order recorded earlier providing prices for “half bent muskets” submitted to Commonwealth agents which also included prices for “Spanish lock Carbines” at [£]00.18.¹⁵ About the same time, an independent group of London gunmakers “offered to supply 600 musket a month at 16s apiece, with similar reductions in the prices of firelock and snaphance pistols, firelock, Spanish lock and snaphance carbines.”¹⁶

No evidence that these guns were ever produced and no survivors have been identified but if they are anything like the *Spansk halvspännarelås* mentioned above, they would technically fall into the Miquelet family of ignitions

The Islamic Miquelet

Most, perhaps all, miquelets of Islamic provenance are of traditional patilla construction. These same basic designs were used in the Islamic world but there was also

a number regional styles which look very different. These will be more appropriately included in the chapter on Islamic arms.

Notes and Recommended Reading

1. Guignard, M. de. *l'Ecole de Mars, ou Memoires Instructifs* Paris: Cimart, 1725, pp. 712 ff; Sepin-Liguières, Armand. *Les Troupes Legeres de l'Ancien Regime*. St.-Julien-du-Sault: 1979, pp.120 ff. See also note 5 below.
2. S.B.J, Skertchly. *The Manufacture of Gunflints*. Bloomfield: Museum Restoration Service. 1879/1984. p. 3; quoting "Manufacture of Gunflints" by James Wyatt in Edward Thomas Stevens. *Flint Chips: A Guide to Pre-Historic Archaeology* 1870, p. 579.
3. H.B.C. Pollard, H.B.C. *The Book of the Pistol and Revolver*, New York: McBride, Nast & Co. Ltd. 1917 (and Robert M. McBride & Co., 1918). p. 21.
4. Pollard, H.B.C. *History of Firearms*. London: Houghton-Mifflin 1926, 1936, p. 34.
5. Pierre Surirey de St. Remy in *Memoires de Artillerie*, Vol. 1, p. 286, facing Pl. 92. Two volumes appeared in editions published in 1702, 1707, 1741, and three volumes in 1745. In the latter, the same text appeared in Vol. 2, pp. 84-94).
6. Anonimus, *Memoire sur l'origine des fusiliers de montagne, leurs etat actuel et ce lui que lon proposeroit de leurs donner avec le tat de leur habillement, armament et equipement et de la revue dinspection qui en a été fait le 1751*. Until the early 1980s, this manuscript was housed in the *Bibliothèque du ministère de la guerre*. When that library was closed, the collections were transferred to the National Archives and the Musée de l'Armée. I am grateful to René Chartrand for bringing this reference to my attention.
7. Lavin, James D. (1965), *A History of Spanish Firearms*, New York, Arco Publishing, p. 22.
8. Espinar, Aलो Martinez de. *Arte de ballesteria y monteria*, Madrid: 1644. pp. 169-170. Translated by James D. Lavin (1965), pp. 169-170.
9. Fiosconi, Cesar and Jordam Guserio. *Espingarda Perfeyta and rules for its use*, Lisbon: 1718. Translated as *The Pefect Gun* by Rainer Daehnhardt and W. Keith Neal. London: Sotheby Parke Bernet, 1974, p. 257 ff.
- 10 Ibid .Lavin p. 165
- 11 Fiasconi, (1718), Op cit p. 261.
12. Covarrubias, Sebastián de, *Tesoro de la lengua castelanna o española*, Madrid, 1611, fol. 22v. Recorded by Lavin, 1965, p. 170-172
13. Lavin op cit p. 170
14. Blair, Claude. *The James A. de Rothschild Collection at Waddeston Manor*. (Armour and Base-Metal-work). London: National Trust, 1974, pp. 299-302.
15. Blackmore, Howard L. *Gunmakers of London Supplement*, Bloomfield: Museum Restoration Service, 1999, p. 17; See also Chapter 5, note 3.
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MIQUELET LOCKS — PHOTO INDEX

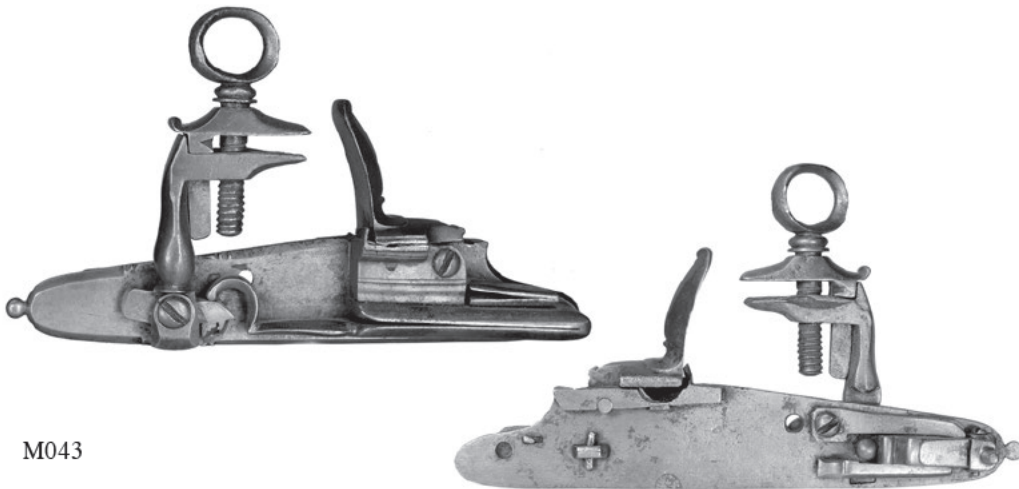


A572 Fig. A mid 18th century, unsigned Austrian miquelet of patilla configuration, with upward pressure on the tail of the cock, and the foot resting on the half cock stop. The square tail on the lockplate is typical, the filed decoration is superb. The barrel is stamped *Lazarino Cominazzo*, the famous Italian barrel making family. *Paul Murray collection*

A726ab



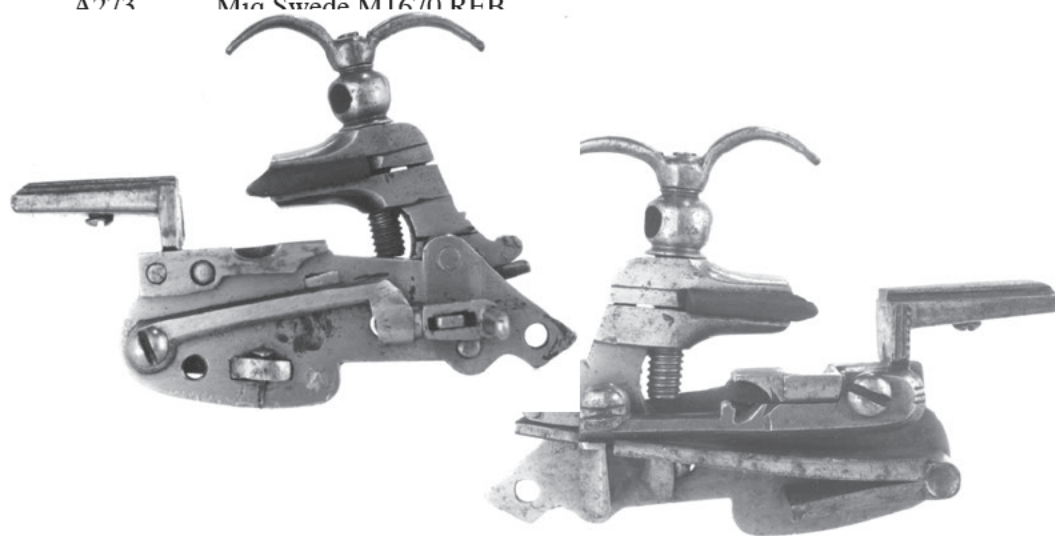
A726 . *Robert E. Brooker collection.*



M043

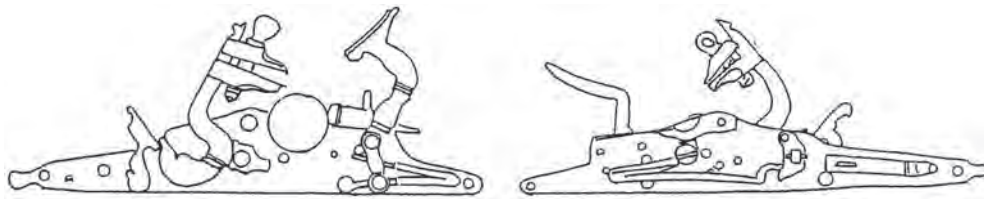
Δ273

Mia Sweda M1670 PER



FN Graells, Eudald, *Les armes de foc de Ripoll*: Ripoll, 1974

A safety feature common to many



A734 Fig. 8.1. A few snaphance locks are found which were fitted with dogs as an extra safety, but all snaphance which were converted with the addition of the one-piece steel and pan cover would have required the addition of a safety. It was invariably a form of dog catch. The left lock is in original snaphance form; the right has been converted to flint-lock.

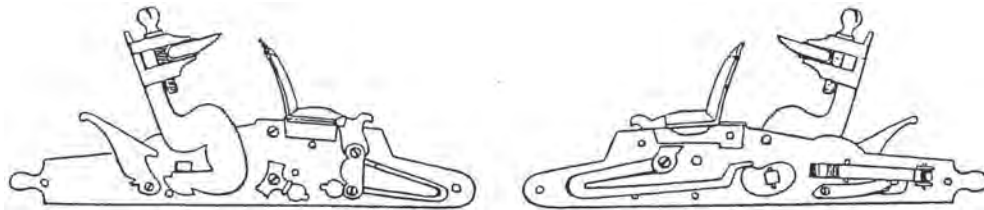


Fig. 8.2. An evolutionary lock with back catch. The sear bar was made with a horizontal block working through the lock plate and acting on the tail of the cock and externally there was a buffer fastened to the plate in front of the cock to prevent it from moving too far.

which is used by historians and I find no difficulty in accepting that thesis.⁷ It is a good and honorable term although it will require some modification if the catch or dog is activated on the underside or breast of the cock rather than on the back. I suspect that historians and technologists will be able to justify that situation. But it must be remembered that Cruso was describing the safety bar that was pivoted behind the cock to stop the movement of the sear found on the snaphance, and not the dog catch found on the later flint-locks.⁸

The term ‘dog’ is not in error and the fact that it has not been found in the contemporary arms literature may mean simply that we are not looking in the right place. Hans Kurath, editor of the *Middle English Dictionary* records a 14th century use of the word “dog” to describe “a heavy metal clamp or brace of some kind” which precisely describes the back catch of a flint-lock.⁹

Some writers, have used the term ‘the true doglock’ just as some writers have described the ‘true’ flintlock. I do not know what a “true” flintlock would be but a true dog-lock would have to be without a half-cock position and have a dog- or back-catch as the only form of safety.

If we were to look for ‘the classic dog-lock’ it would be the one having a vertical acting sear working on a tumbler with only a full-cock notch, combined with a full fledged dog-catch acting on the rear of the cock although a catch working on the underside or the breast of the cock would not be contradictory.

As noted above it has been suggested that “doglock” has no place in the current vocabulary because it is a word of modern vintage invented by collectors. This is not the case although agreement would have to depend upon the detractor’s interpretation of “modern” and the use of the word should be examined.

Viscount Dillon, then president of the Royal Archaeological Institute and Curator

N.B. The line illustrations in this chapter were used in *Encyclopedia of Firearms* (H.L. Peterson, Ed. 1964) where they were identified as “Types.” The figure numbers used here are the same as the type numbers used in 1964.

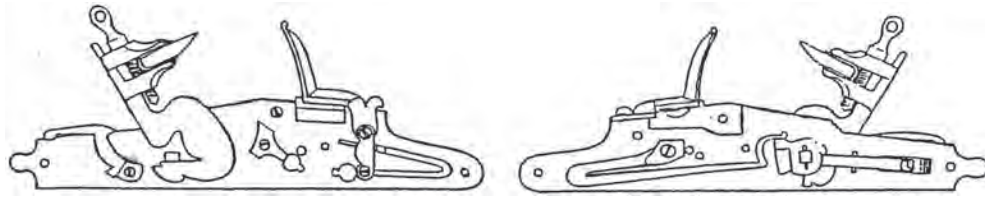


Fig. 8.3. English Lock Type 1. Sometime in the second quarter of the seventeenth century, a development now known as the English lock began to add safety features to the tumbler. It had a one-piece horizontally acting sear working through the plate on the tail of the cock for full bent, and an extension on the sear bar which bore against a ramp or wedge on the tumbler. The earliest reference to a 'half-bent' gun found and reported by Godwin *et al*, is dated 1640.

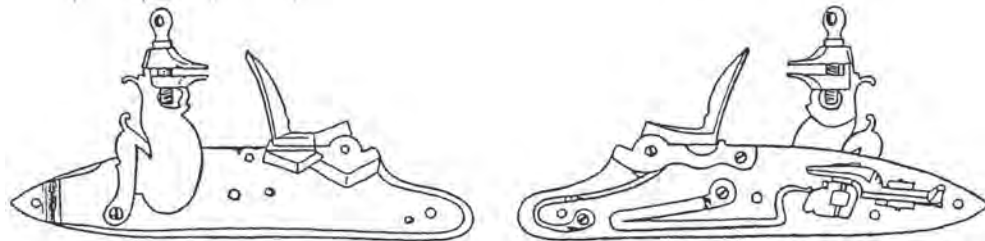


Fig. 8.4. An early English Lock Type 2 with half cock notch on the tumbler but retaining the horizontally acting sear working through the lock plate and catching in a notch cut into the back of the cock.

of the Tower of London Armouries, wrote more than a century ago,

In the James II [1685-1688] lock is found an improvement in the shape of a catch to hold back the hammer [cock] until it was about to be used. This dog-lock, as it was called, continued to be a part of the lock for some years.¹⁰

A 1753 note on the Tower collections recorded of some arms taken at Bath in the year 1715: "They are distinguished from all others in the Tower, by having what they call dog-locks, which kind of lock have a ketch to secure them from going off at thal-cock."¹¹

I have been unable to locate an earlier arms historian's reference which is so specific but there is good justification for Viscount Dillon's certainty.

The "dog" is a familiar term in engineering works and C. Tomlinson writing in Dr. Ure's *Dictionary of the Arts* published in 1853 notes: "there is a dog or lever ... which catches into the top of the bolt, and thereby serves as an additional security against its being forced back."¹²

The term "Ketch Lock" was used by the Board of Ordnance during the early years of the 18th century and the dog appeared on a pattern musket dated 1704 prepared by Richard Wooldridge, later Master Furbisher of the Small Gun Office, for the Ordnance.¹³

Dr. R. A. Kea quoting from a 1682-83 report of the Royal Africa Company Committee of Goods, provides a list of guns proposed for the West African market:

- 1 Flintlock musket, black (tarred) barrel, black stock and English lock at 12s.8d.;
- 2 Birding gun (also called fowling pieces) – 4 or 4½ feet long, walnut stock, large bord (sic), Dog lock.¹⁴

These dog-locks were probably the same as what were called "English locks" in an earlier R.A.C. report.¹⁵

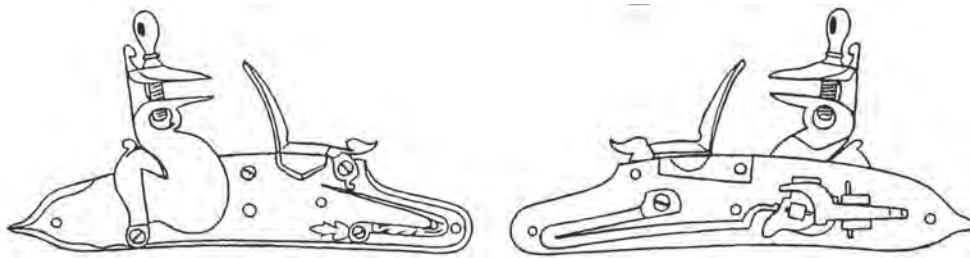


Fig. 8.5. The English lock, Type 2 was the last of the flint locks in England to use a horizontally acting one-piece sear and a half and full cock position on the tumbler. The half cock was held by a heavy hook on the sear bar which slipped over a lug on the tumbler. As the cock was drawn back to full bent position, the sear nose moved into position at the top of a ramp cut into the tumbler where it rested until the trigger was pulled. This illustration is based on the Henry Crips lock from the Jackson collection and was probably the origin by early collectors for “The English Dog Lock.” But it might also be form of lock described in the 17th century by the African trading companies as “dog locks.”

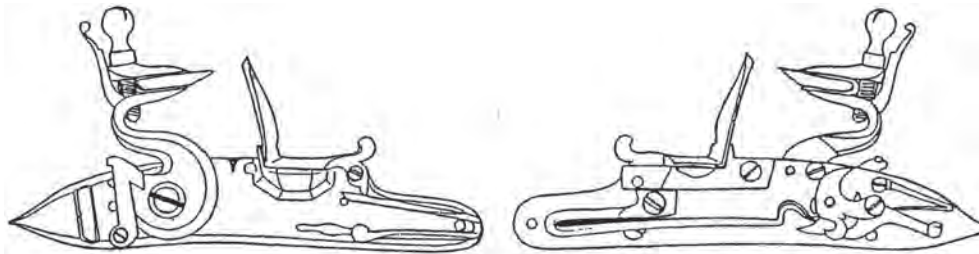


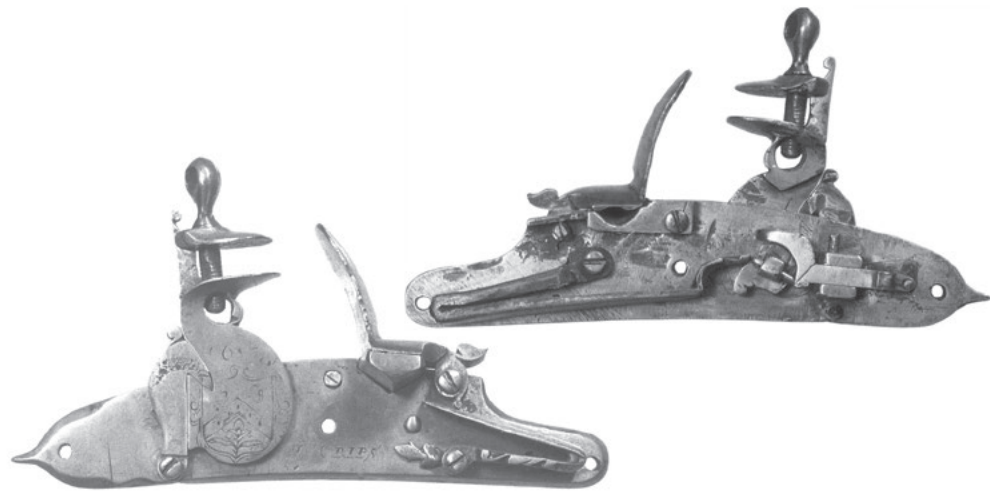
Fig. 8.6. By the third quarter of the seventeenth century, the French lock with a vertical acting sear to engage a full and half-cock notch had displaced almost all others, but some gunmakers, or their customers, continued to consider the dog as a necessary feature.

I am not able to say when the back-action, or dog-catch was first applied to a gun lock but they appear in the early 17th century and continue, in one form or another, into the 19th century. It was, theoretically, not essential as a “safety” on the snaphance which existed in 1570, as setting the steel or hammer back from the pan acted as a safety – at least the gun could not be discharged. Nevertheless, the dog catch does exist on the snaphance. In the collection formed by Clay P. Bedford at Scottsdale, Arizona, there was a snaphance of c.1610 with a dog operating on the under side of the cock.¹⁶ This would of course have served as a safety to prevent accidental discharge although I doubt that safety would have been a concern to the cavalier of the period. He would though have been very disturbed if the cock was accidentally released for it would automatically open the pan with the resultant loss of his priming.

Its function as a safety was achieved in the French-lock by the half-cock notch on the tumbler. But the French-lock was not immediately accepted throughout much of Northern Europe or England and the catch, in conjunction with the horizontally acting sear, remained popular for much of the 17th century.

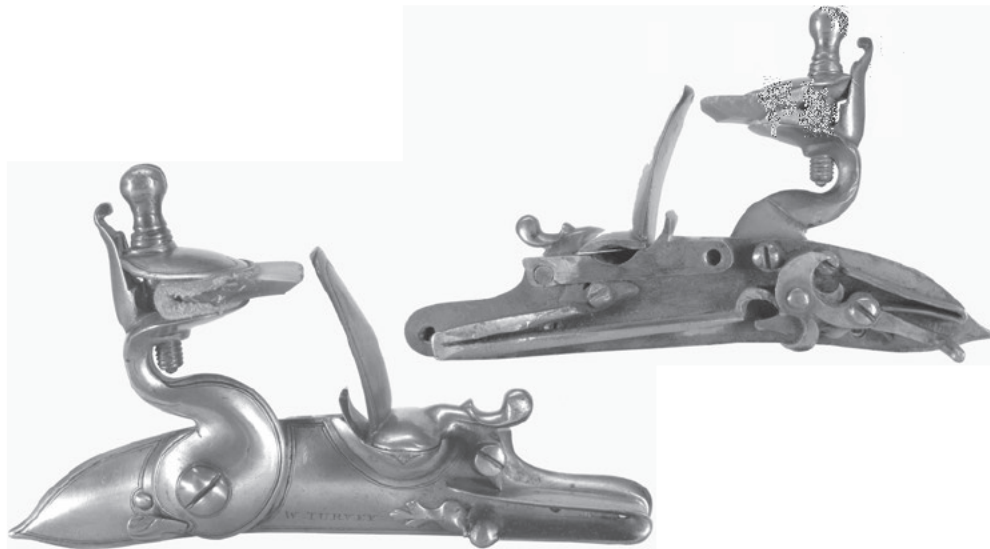
As noted above there were other forms of dog catch. Those working from the underside of the cock body or perhaps on the breast of the cock body were less popular but they continued in limited use throughout much of the muzzle-loading period. In fact Joseph Manton’s patent No. 3558 of 1812 for his gravitating locks is an extension of the design.¹⁷

The catch on the rear of the cock had a distinct disadvantage because a free-swinging catch could accidentally stop the fall of the cock if it had not been swung

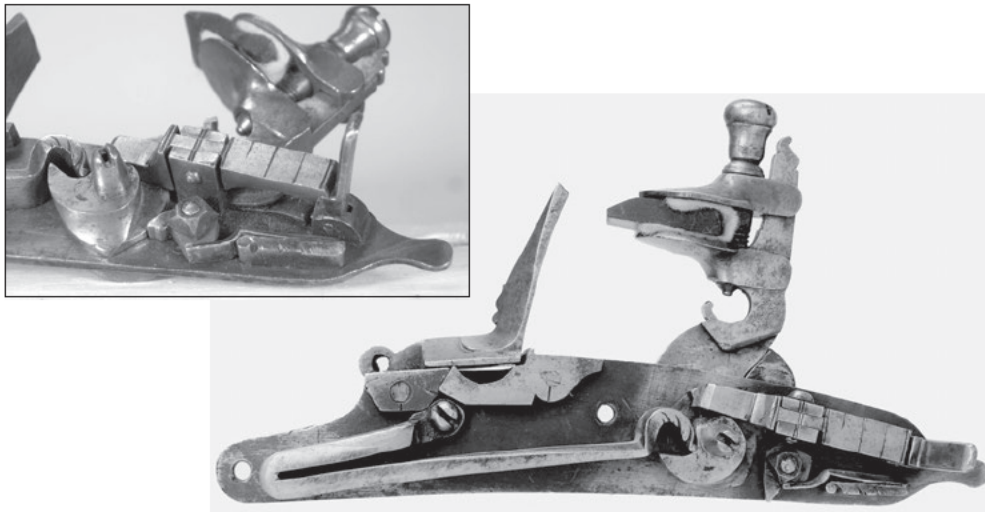


A455 Fig. 8.7 *Herbert J. Jackson collection. Royal Ontario Museum, No. 925.27.25*

Fig. 8.8 Catch on the breast of the cock.



A707 Fig. 8.10 A flintlock with dog catch on lower edge of the cock by William Turvey, London, c.xxxx *David S. Weaver collection.*



A625 Fig. 8.11 A Continental doglock with automatic safety; when the cock is drawn to half-bent, the dog snaps into its place on the back of the cock. On being drawn to full-cock, the dog snaps clear of the locked position. [see also M 072]

completely clear of the notch.

A solution to that problem was found by locating an eccentric nut in conjunction with a flat spring which worked on the catch as shown in Fig. 8.11. This supplemental attachment controlled the dog: when the cock was returned from the fired position to what would be the safe position, the catch was kept in contact with it until the two became engaged. When the cock was drawn to the full cock position, the eccentric, at a certain point, caused the catch to release completely and remove itself from the cock notch. The operation on the specimen illustrated is very smooth and very efficient. The earliest documentation of this feature which I can find is in Thierbach's *Die Geschichtliche Entwicklung der Handfeuerwaffen* where he illustrates the type.¹⁸

Since some term is needed to identify the type of lock with a back catch or an undercatch, and since the term doglock is historic and in almost universal usage, I see no reason to change it if the qualifiers outlined in 1964 are observed.

Dog lock is the name applied to any lock which incorporates a catch that hooks onto the rear of the cock to act as a primary or secondary safety device. Since this feature is found as a variation on most types of lock developed over a period of 250 years, it must be qualified, when used, with a further description of the ignition.

Since the above was written, a few new variations have been recognized and in addition to the Continental locks recorded with the above listing should be added those of Spanish and Algerian manufacture.

The identification, the cataloging, and the description of any artifact usually begins with the most prominent feature. Since most locks will show signs of a national origin, this would probably be the major identifier followed by, in descending order, features of significance. There will perhaps be variations in the order depending upon the user's priorities, but the objective, "make the description understood," must always be the guide.

Notes and Recommended reading

1. "Trade Guns of the HBC," *The Beaver Outfit* 282, (1951) , The provenance of the gun has since

proven to be doubtful.

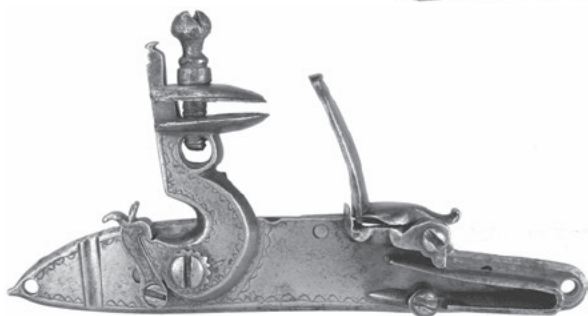
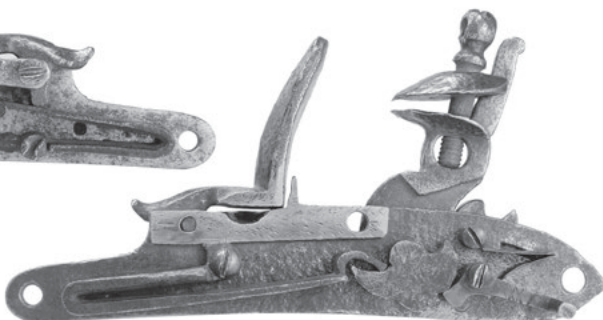
2. See: *Herman P. Dean Firearms Collection at the Huntington Galleries*. Huntington. W. Va. 1980.
3. "Some Notes on the Doglock." *Arms Folio* No. 2 (Ontario Arms Collectors Association) (1956), pp. 16-22.
4. Harold L. Peterson, *Encyclopedia of Firearms*, E.P. Dutton, New York, 1964. "Dog Lock." pp. 117-120.
5. Jan Piet Puype, *Dutch and other Flintlocks from Seventeenth Century Iroquois Sites*. Research Records No. 18, Rochester Museum & Science Center, Rochester, NY, 1985, p. 8.
6. Gordon T. Howard, "Some Observations on the Dog Lock and on One in Particular." *Arms Collecting*, Vol. 22, No. 3 (Aug. 1984) pp. 93-97; H.B.C. Pollard, *A History of Firearms*. Geoffrey Bles, London, 1926; Robert Held. *The Age of Firearms*. Harper & Bros., New York, 1957. p. 95
7. C. Blair, Ed., *Pollard's History of Firearms*. Country Life Books, Feltham, 1983. p. 89.
8. John Cruso. *Military Instructions for the Cavall'rie*, Cambridge, 1632. Reprinted in facsimile, Kineton: The Roundwood Press, 1972. For a detailed examination of this subject see: Dr. Michael G. Spencer, "The English Flintlock and the English Civil War," *Journal of the Arms and Armour Society*, Vol. XIV, No. 2. pp. 89 ff.
9. Hans Kurath, Editor. *Middle English Dictionary*. University of Michigan, 1959, p. 1205.
10. Viscount Dillon. "On the Development of Gunlocks, from Examples in the Tower." *Archaeological Journal*, Vol. L, June 1893, p. 130.
11. *An Historicl Description of the Tower of London and its Curioristies* by J. Newbury, London, 1753. I am grateful to Dr. Michael Spencer for bringing this reference to my attention.
12. Andrew Ure. *Dictionary of Arts, Manufactures, and Mines*. Longman, Brown, Green and Longmans. London, 1853.
13. Howard L. Blackmore, *British Military Firearms, 1650-1850*. Herbert Jenkins, London, 1961. pp. 29, 42.
14. R.A. Kea, "Firearms and Warfare on the Gold and Slave Coasts from the 16th to the 19th centuries." *Journal of African History*, Vol. XII, No. 3 (1971), pp. 197-8.
15. I am grateful to Dr. Kea for providing me with a transcript of some of his notes on this point.
16. Clay P. Bedford and S.V. Grancsay. *Early Firearms of Great Britain and Ireland from the Collection of Clay P. Bedford*. Metropolitan Museum of Art, New York, 1971. p. 106.
17. W. Keith Neal and David Back. *The Mantons: Gunmakers*. Walker & Co., New York, 1966. Fig. 11.
18. M. Thierbach, *Die Geschichtliche Entwicklung der Handfeuerwaffen*. Dresden, 1886-1899. Reprinted, Akademische Druck u Verlagsanstalt, Graz, 1965; See also H. Prummel, "Vuursteengeweer van Valentin Sontag," *Yearbook of the Dutch Arms & Armour Society*, 1985, pp. 38-40.

Although all of the illustrations which follow can technically be classed as dog locks, each will require a more accurate identification.

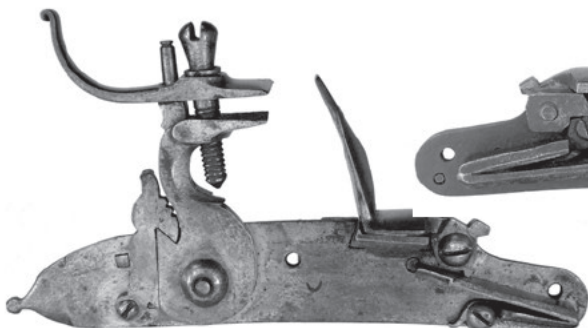
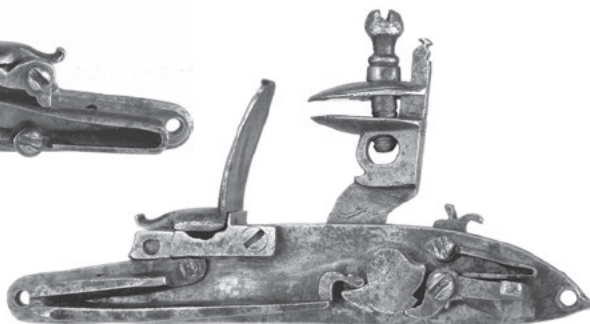
DOGLOCKS — PHOTO INDEX



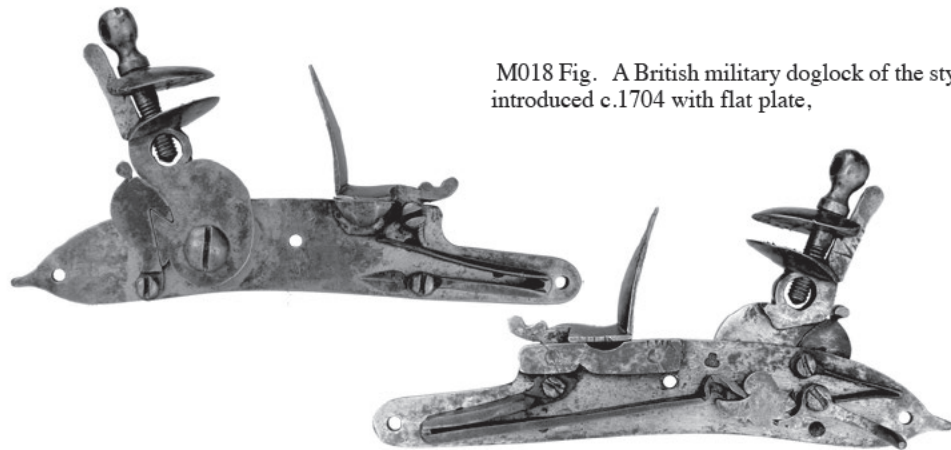
M171 Fig. Typical dog lock with vertical sear, signed *I Cookson*.



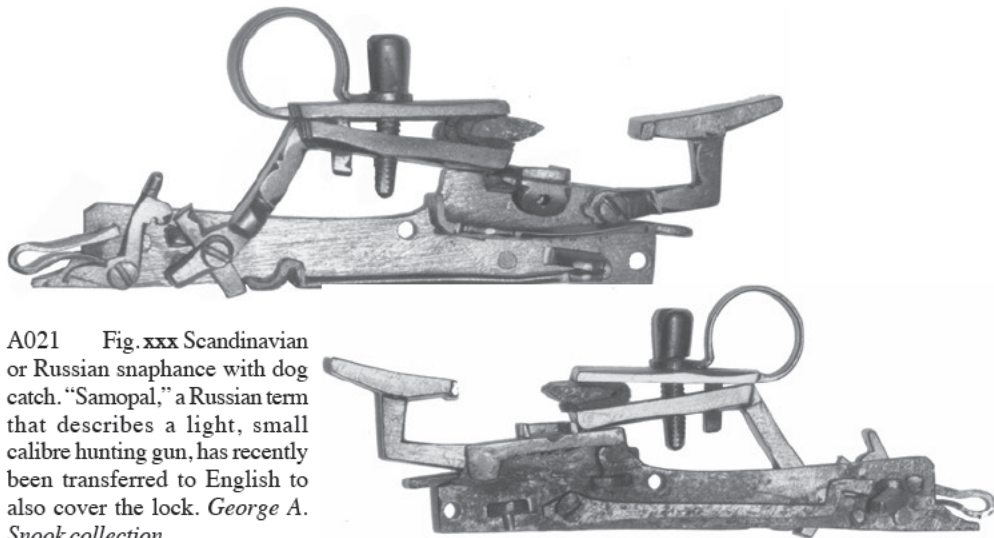
M102 Fig. A doglock, probably of Liege manufacture for the export trade with bridled frizzen but unbridled tumbler;



M175 Fig. Dutch doglock, c. 1660 with vertical sear having half and full cock notches,



M018 Fig. A British military doglock of the style introduced c.1704 with flat plate,



A021 Fig. xxx Scandinavian or Russian snaphance with dog catch. "Samopal," a Russian term that describes a light, small calibre hunting gun, has recently been transferred to English to also cover the lock. *George A. Snook collection.*



A450 A Dutch flintlock, c.1660, with dog-catch and a lockplate of wheel profile; excavated near Rochester, New York. at an Iroquois (Seneca) Indian village site destroyed by the French in 1677, *Charles F. Wray collection.*

A456



A456 925-27.18 An unsigned lock of slight bannana shape with back ketch or dog and no half cock position on the tumbler. An indistinct mark under the mainspring may be the 'hen' mark of a Suhl gunmaker. This is the prototype of Fig. 8.6. *H.J. Jackson Collection, Royal Ontario Museum, Toronto.*



M072 Fig. Unmarked doglock with horizontal acting sear and another small tumbler which activates the dog catch. See Fig. 8.7.



M034 Fig. The Kabyle lock, an Algerian miquelet with brass overlays and engraved dog catch. Dated 1273 A.H. (A.D. 1856) on the lower edge of the lockplate.



SILK - NO H COCK



Non-Traditional Flint-locks

Madrid locks	Vinciennes locks
upside down locks	Eggs Miquelet
Portuguese molinhas	Marsailles locks
Regional variations	

Although the French-lock was the first choice for most gunmakers over more than two centuries, there were some who produced non-standard or experimental locks which may have had some regional popularity, while others can only be considered “novelties.” In this category are also some which were made at the request of government agencies or in anticipation of government interest.

Using the criteria described in the previous chapter to distinguish between flintlocks and flint-locks, it will be necessary that the internal mechanism be visible. On some locks, the placement of the screws will be visible to help identify the flintlocks. If the mechanism cannot be identified, it might be prudent to describe the lock simple as a “flint ignition.”

The main characteristic in this group is that externally they are a flint-using mechanism which looks somewhat like a French lock but mechanically they do not have the expected tumbler with notches, and vertical sear. Each are properly called flint-locks (with the hyphen) but in addition they must have a modifier that identifies the country or district of origin, and the class and sub class.

Most of those which fit into this class will have regional ties such as the Madrelina locks which were popular in Spain and especially of Madrid and the molinhas of Portugal, or of an individual gunmaker such as Joseph Egg whose external mainspring was copied by very few others in England.

Replacement locks

In 1923, Herbert Jackson, a London collector/historian produced *European Fire-arms of the 16th, 17th & 18th Centuries*,¹ a very early book on firearm ignitions illustrated with his collection of detached locks and complete arms. Later that year, part of the collection was sold by Sotheby, Wilkinson & Hodge, the London auctioneers and in 1925, the detached locks were acquired by the Royal Ontario Museum, Toronto from Fenton & Sons, the London antique arms dealers.

Much of Jackson’s material has been superseded by subsequent research but he was the first to suggest the production of a flint-lock replacement for existing wheel-lock guns.

Very interesting specimens of what may be called locks of the transition period are occasionally met with. These have lock plates resembling those of the wheel-lock, and were evidently made before the ordinary form of flint-lock had been firmly established.²

His suggestion that they were developed before the ordinary form of flintlock had been firmly established is incorrect but his identification of a distinct style of flint-lock



A142 Fig. Herbert J. Jackson collection. Royal Ontario Museum, No. 925.27.20

must be recognized. It is possible that the design remained popular long after all of the wheel-locks that were going to be converted, had been done. He undoubtedly based his thesis of an early on the lock engraved Kathlen Dasch in Gratz illustrated as his Fig. 45 and 46 (see Fig. 12.xxx), which its primitive internal mechanism would have suggested.

Notes and Recommended reading

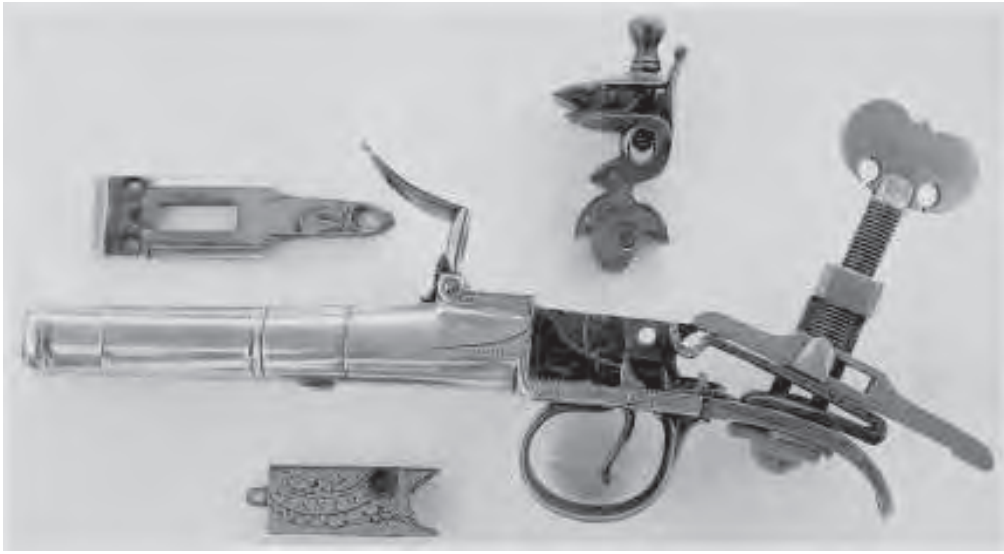
1. Jackson, Herbert J. *European Firearms of the 16th, 17th & 18th Centuries*, London: Philip Lee Warner, 1923. It was reprinted 1959 by Holland Press and again in an undated edition in New York by Bramhall House. All printings were bound with another book of considerably more lasting importance, *A Treatise on Scottish Firearms of the XVIth, XVIIth & XVIIIth Centuries* by Charles E. Whitelaw, but the title quoted above is usually all that is included in bibliographies.
2. *Ibid.*, p. 14.



A141 Fig. Herbert J. Jackson collection. Royal Ontario Museum, No. 925.27.56



A566 Fig. An unsigned, late 18th century flint-lock. This might be classed as a flintlock as there is a tumbler but the sear rests on the front of a ledge at the top of the tumbler and the action of the trigger pushed the trigger bar forward, lifting the sear nose up. *Paul Murray collection*



A696 Fig. A boxlock flint pistol by Stanton (17xx-17xx) of London

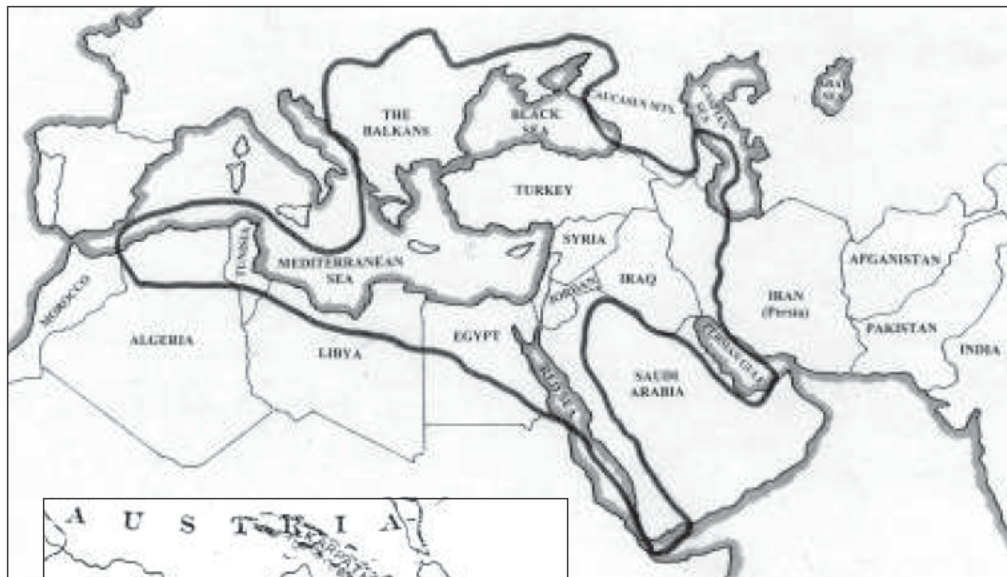


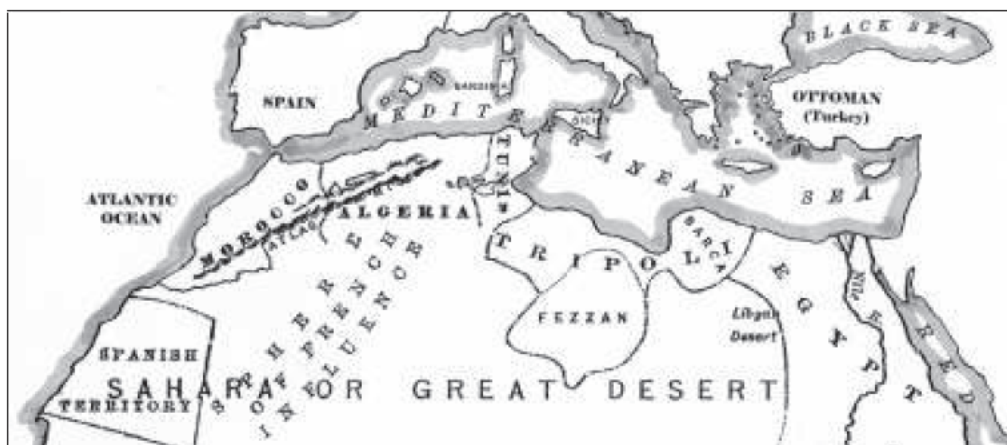
Fig. 10.1-3. The detail maps reproduced here are a composite from a number of 19th century charts.

Fig. 10.1. The Ottoman Empire, c. 1680. Beginning in the early 18th century, Ottoman borders were being pushed back and by the last half of the 19th century it had little influence in the Balkans. After WW2, the Empire disappeared.

Fig. 10.2. The Balkans, c. 1860.

Fig. 10.3. North Africa

~~EXPAND AND CORRECT~~
~~EXPAND AND CORRECT~~



In the 7th century these nomads establish a great empire extending from the Atlantic to the borders of China...with the disintegration of the Arab Empire in the 10th century, the word reverted to its meaning of “nomads,” the peoples of the empire resuming their previous designations of Egyptians, Syrian, Persians, etc. ...Only since the Second World War have Egypt and North Africa been included in the list of “Arab countries.”¹

There were of course other tribal and linguistic groups which played a part in the story of arms design: Moroccans, Algerians, Syrians, Iraqis, Egyptian, and others in the mainstream of the Islamic world; Kurds, Mamluke, Kabyle, Shluk, Armenian, and others, in the geographic fringes — Caucasians to the east, and in the Balkans there were Romanians, Albanians, Greeks, Montenegrans, and Bulgarians.

In 711-712, Moors, an amalgam of Arabs and North African Berbers ² under the leadership of Tarik ibn Zayyad, invaded the Iberian peninsula. They successfully conquered to the Pyrenes and in the following 600 years developed culture, art — especially metalwork, their religion, and good government. Beginning in the early 13th century, military pressure from the Catholic north began to drive the Muslims south out of Spain.

Those Moors who remained, did so as converts to the Catholic religion but their persecution continued. Nevertheless, “they proved so industrious that their labors were soon enriching the districts where they settled.” Nevertheless, they too were successfully expelled, beginning in 1609, and took with them to the homeland of their forefathers many generations removed, their skills as craftsmen and the designs for firearms which they may in fact have been instrumental in developing.

In the early years of our period, from about 1500 when matchlock firearms were



Fig. 10.4. Morocco — *al Maghreb al Aqsa*

just being introduced throughout the Middle East, there were three major kingdoms or empires in the Islamic world: Mughal at the eastern end encompassing much of what is now northern India, Pakistan, and Persia, (which in 1935 adopted the name Iran), in the centre, and the Ottoman Empire stretching from Persia in the east to the Atlantic in the west.

To treat with the great diversity found in the flint-locks of the muslim world, it is best

to work from west to east along the northern shores of Africa. In Arabic, *maghreb* means “West,” and throughout Islam, *al Maghreb* included Morocco, Algeria, Tunisia, and sometimes Spain. With the exception of Spain, this is an area recognized in the English speaking world by the old name for that part of North Africa which was known as the Barbary coast or “The Shores of Tripoli.” *Al-Maghreb al-Aqsa*, that is, the farthest west — Morocco is a country ruled by a succession of sultans under the Saadian dynasty which lasted from 1549 until 1912, (some textbooks say 1910), when Morocco became a French protectorate.¹ It is a relatively isolated country bordered on the west by the Atlantic Ocean, on the East by the Atlas Mountains, and on the south by the Sahara desert.



Fig. 10.5. The *bou shfer*, a flint-lock, invariably with a snaphance lock, is translated as “the father of flint” Top to bottom: The different shapes of the butt stock identify and distinguish muskets from three regions. *Altit* from the Little Atlas Mountains, *Taouzilt* from the high valley of the Sous river, and *Afedali* from Taroudant and the valley of the Sous river.

Fig. 10.6. The Barbary lock found on these 18th or 19th century Moroccan muskets is physically and mechanically identical to the English snaphance of the early 17th century. Very few Moroccan arms are dated and they were still in use in the 20th century. *The Gordon T. Howard collection, The Stewart Museum, Montreal.*



The North African Snaphance

Edward W. Bovill⁴⁷ describes how, in 1578, when the King of Morocco died following the battle of Alcazar el Kebir (also known as the battle of the three kings), his throne was taken on by a prince who adopted the title El-Mansur (The Victorious). He had not earned the title but he set about building his defences against potential invasion by Portuguese or Ottoman forces.

At the time, Queen Elizabeth was concerned about the supply of gunpowder and is said she once remarked “it is better to pay for it than pray for it in time of need,” or words to that effect. England at that time needed saltpeter and she was the only



Fig. 10.7. A snaphance lock with flat plate and rounded cock and battery arm. The buffer and battery spring finial are of flattened tear drop shape. The notch on the tip of the steel is necessary on some locks to accommodate the length of the flint screw: it is not necessary on English snaphance. Although of North African manufacture (probably Moroccan), it is based upon 16th century English snaphance locks of the design, the originals of which were known to the London gun trade as Barbary locks.



Fig. 10.8-10. A decorative characteristic usually found on Moroccan-made snaphance locks is found on the guide for the pan-cover. The top illustration includes a groove which helps to hold the cover in place when it is closed.



Christian monarch prepared to ignore a papal ban on trafficking in war materiel with Muslims. Saltpeter was available in commercial quantities in Morocco so English raw materials and manufactured goods, including small arms and artillery were supplied to Morocco.

In October, 1590, El-Mansur undertook a bold plan on a seemingly impossible campaign to capture the Songhai nation on the other side of the Sahara desert, almost 1500 miles to the south. His force, under the command of a young Spaniard raised in the royal palace at Marrakech, consisted of “2000 infantry armed with the arquebus, half of them Andalusians (Spanish Moors who had migrated to Morocco)...500 mounted arquebusiers, 1500 light cavalry and 70 Christian musketeers.” Artillery was described as “two large cannon and several quite small pieces.” Their small arms were not described other than as above and it is just assumed they were all matchlock muskets. Mr. Bovill records,

The primary source for information about the desert army and its equipment is a Spaniard who was then living in Marrakech, and who was probably one of



M273 Fig. 10.11. Barbery locks. This lock may have a Muslim provenance suggested by the unidentified marks and brass inlay on the flash guard, but everything else about it is English c.1610-30. Before the end of that century and into the next, many thousand Barbery locks were exported to north Africa. (Chapt. 4, Fig. 4.46).



M101 Fig. A late 18th to at least the mid 19th century, snaphance with flat surface profile and fragments of a silver inlay. This lock is otherwise undecorated but of better workmanship than most.

Philip's agents at the Shereefian court. From what he tells us, it is evident that great pains were taken to ensure that the force was the best, in both men and equipment, that the country could provide.

I do not know how the arms of El-Mansur's army were described by the original reporter but the translator distinguished between arquebusiers and musketeers. There were only three alternatives at the time: matchlock muskets, wheel-lock muskets, and snaphance muskets. Wheel-locks would probably have been considered too complicated a weapon but the snaphance had been used in England since at least 1570.^[FN] It is logical to think that El-Mansur's agents in London would have selected it for his expedition,



M281

perhaps purchasing them from the Barbary Trading Co. which was established in London in 1588 or perhaps through his own agents. This would, in part, explain why the snaphance was the flint-lock weapon used almost exclusively in Morocco for the next 300 years while not too many years later, the rest of the Muslim world would choose the miquelet or the flintlock. ^{<D>3}

There is considerable evidence that from at least the early 17th century, firearms were exported in large quantities, either as finished guns or components to be set up by Arab craftsmen. ^{<D>4} These guns were long barrelled, light weight, small caliber, flint-locks which in the Gunmakers' Company records were often referred to as "birding gns." * The locks on surviving Moroccan guns are identical in design to those manufactured in England in the last decades of the 16th century and first decades of the 17th century.

They were called "Barbary guns," a name assigned in England (and perhaps elsewhere) to guns of the pattern sold to Arab gunsmiths. Logic would suggest that the snaphance was introduced by the Barbary Trading Co. which was established in London in 1588 but this has not been substantiated: nothing has yet been found to indicate a 16th century date when they were first exported. The earliest identifiable reference does not appear until more than 60 years later. Howard L. Blackmore notes that in 1652, some London gunsmiths were allowed to export "Small Birding peeces called Barbary Guns" to the Barbary Coast. Authorization to export was given on the grounds that the guns were "soe smale boared as we conceive them to be noe way usefull for ye service of the state.[5]

A style variation of the Moroccan snaphance is frequently encountered. It is often quite large with a flat, square lockplate and cock but mechanically it is not different from the earlier locks. It is usually mounted in a *Taouzilt*-like fish-tail stock, (Appendix IV-43) but that combination of lock and stock has not been reported from Morocco. It does though, appear in photographs with identified as being taken in Egypt.

Snaphance guns continued to be made in, and exported to, North Africa, for more than 300 years: in the Leger Museum at Delft there is a fine example which was made by the Rotterdam firm of I. Tomson & Son about 1800; ^{<D>6} there is in the Metropolitan



M034 Fig. cc. A Kayble lock or Algerian miquelet with dog catch dated 1273AH (1856). The lockplate is overlaid with an undecorated brass sheet and the steel components have a single line border..

Museum of Art in New York, a specimen dated 1876, and W. W. Greener illustrated an example made in his shops in 1885.^{<|>⁷}

In 1912, the French government established an infrastructure designed to maintain law, order, and French security, in Morocco. One Captain Delhomme who was appointed Chief of the Office of Intelligence in Agadir collected information on the arms in his area of jurisdiction and in 1916 published a report “Les Armes dans le Sous Occidental,”^{<|>⁸} has provided a key to identification of some of the snaphance usually identified simply as “Moroccan.”

Delhomme’s descriptions were not presented in great detail but they were adequate to build upon, and they were accompanied by an illustration to confirm that which would otherwise have been vague.

He recorded three styles of musket, all of which used the snaphance ignition. The quality of his illustration was not adequate to reproduce here but the three long-guns he illustrated have been duplicated in Fig. 2 from the late Gordon T. Howard collection. Although Delhomme’s article covers an area outside the subject of this note, it is of interest and so his complete published report follows. Notes in his original text have been included where they appear, either added as a blocked paragraph or within round (<|>) brackets; notes added at this time have been included either in square brackets, or end notes, as appropriate.

Algeria

Immediately to the east of Morocco lies Algeria, a large country with settlements on the coast of the Mediterranean Sea to the north and the Sahara desert in the south.

The Ottoman Empire

The Ottoman Empire had its origin in the last years of the 13th century in Anatolia, in what is now northern Turkey, under Osman I. It reached its highest point towards the end of the 17th century, about the same time that firearms in this Mémoire begins, and ended not too long after they ceased to be produced.

By 1680, the Empire had been extended “to the Gates of Vienna” before being

stopped, then eastward to the north of Roumania and then circling the Black Sea to the north and the Caspian Sea to the south. By 1790, Iraq and much of Persia had been added; by 1800, the northern border ran along the Danube River, north of Servia (Serbia), along the Karpathian Mountains to the northern border of Roumania and south to the Black Sea.

By 1900 the northern border of Turkey within the Balkans, was limited to part of what is now ~~xxxx~~ ~~xxxxx~~, and in 1923 became the Republic of Turkey proper.

Spain, which occupies most of the Iberian peninsula is demarcated in the north by the Pyrenees Mountains and had a history which played a significant part in the arms development throughout most of the Mediterranean area. In the early years of the 8th century, much of Spain was invaded by the Moors, an army of Muslim Arabs and Berbers of North West Africa. Christian armies from the north stopped the invasion but it was not until 1492 that the Moors were expelled from their last holdings in the peninsula.

During those years, Spanish metalwork reached a high level of development and gunmaking centers were established, notably around Ripoll near the French border, Barcelona and at Madrid. Coincidental with this, trade routes were established between Spain and the Middle East which would explain the movement of technology and design.

The Balkan Peninsula is primarily occupied by Yugoslavia, Romania, Bulgaria, Albania, Montenegro, and Greece. The Turks overran the area in the 14th century and retained control until the 19th century when they were slowly pushed back to their present holdings.

Albania, the country on the Balkan peninsula is located on the east shore of the Adriatic sea, about ... miles due east of the heel of the boot of Italy. It is a mountainous region which, because of its inaccessibility, has traditionally been isolated from outside contact but it is most frequently used as the identifier for Balkan arms.

Islamic Firearms

Although Islamic firearms can be easily identified by the lock mechanism, the primary feature used for identification is stock design and separating those of central European manufacture from those of the Muslim world is not a problem. But dating them is another matter; change did not take place quickly in Islam. The Barbary locks which had been introduced in North Africa early in the early 17th century were almost identical to some of those made in, or for, the area two centuries later.

The introduction of the miquelet and flintlock ignitions did not arrive quite that early but the result was the same; style or design in the Muslim world did not require change and it did not happen. The dating of Islamic arms based upon stylistic features alone is most unsatisfactory; the conservative traditions of Islam rejected change so that miquelet muskets made in the 17th century, like the snaphance, are little different from many made in the 19th century.

Nevertheless, there are times when it is not as difficult because dated Islamic firearms from the 18th and 19th century are encountered more frequently than those of European origin. The Arab language, and more particularly the script is difficult for anyone raised with Roman text. But, when it comes to numbers, and therefore to dates, it is relatively simple.

The Islamic Miquelet

The typical Islamic Miquelet is patterned after the Spanish patilla lock with a wasp-

waist, flat plate with an external mainspring which applies upward pressure on the tail of the cock that is held in position by two stock screws. The mainspring is much wider than one would expect on a contemporary flintlock. It is secured to the lock-plate by two square lugs on the lower bar passing through corresponding holes in the plate and fastened by a single key through one of the lugs. The long bar of the spring is shaped to allow for the foot of the cock to pass.

There is a bridle or decorative bar running between the cock pivot screw and the frizzen screw (supported at that end by a post pinned through the lock-plate), and a smooth, streamlined, top-jaw which gives the appearance of thickness to the whole. The top-jaw screw may be a round ring or it may be “with horns” that pivot on the screw head. If the latter, there will always be a hole through the head to tighten the screw.

The frizzen face is a separate steel plate dovetailed and held in position by a single screw into a frizzen which is perpendicular to a narrow-pan cover. The top jaw is often much wider than would be encountered on an English flintlock suggesting possible the need for a wider stone to compensate for stone quality. This is emphasized as original flints, found in place between the jaws, are often considerably wider than the jaws. They are sometimes as much as half as wide again. The top jaw is invariably held in position by a pin on the rear edge fitting into a corresponding hole in the rear of the lower jaw.

Internally, the mechanism is identical to that on the Spanish miquelet; in the half-cock position, the foot of the cock rests on a round pin protruding through the lower portion of the plate and full cock through a flat pin above it.

This was the lock of choice in most of Turkey, and much of the surrounding area.

The Kayble Miquelet [M028, M039, M169].

The classic Kayble lock is a miquelet unlike any others which was popular in the Magreb areas of Tunis and Algeria until well into the 19th century when French domination forbade private ownership of any modern firearms.

It is invariably of large size with an average lock-plate of about seven inches long having decorative finials at each end, and many of the characteristics of the Spanish aguejeta lock: long, pincher-like flint jaws, a top jaw screw with long horns supported by a decorative shaft, and a dog catch as the only form of safety. The long frizzen-bridle of the typical Islamic miquelet was shortened and supported by a flat post behind the and the usual support in front of the pan. A cock-bridle provided the support for the back catch. The lock-plate, bridles, and decorative panels of the cock jaws are usually covered with a thin plate of silver or brass, and pink coral will frequently be worked into the decoration.

The internal mechanism is a simple full-cock post passing through the lock-plate acting on a hole in the cock and a back catch acting on the notch in the rear of the cock as the only safe position.

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The North African Snaphance

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In October, 1590, El-Mansur undertook a bold plan on a seemingly impossible campaign to capture the Songhai nation on the other side of the Sahara desert, almost 1500 miles to the south. His force, under the command of a young Spaniard raised in the royal palace at Marrakech, consisted of “2000 infantry armed with the arquebus, half of them Andalusians (Spanish Moors who had migrated to Morocco)...500 mounted arquebusiers, 1500 light cavalry and 70 Christian musketeers.” Artillery was described as “two large cannon and several quite small pieces.” Their small arms were not described other than as above and it is just assumed they were all matchlock muskets. Mr. Bovill records,

The primary source for information about the desert army and its equipment is a Spaniard who was then living in Marrakech, and who was probably one of Philip’s agents at the Shereefian court. From what he tells us, it is evident that great pains were taken to ensure that the force was the best, in both men and equipment, that the country could provide:

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Two forms of snaphance are found in the Muslim world but it must be noted that the information recorded about them is based on surviving examples which are likely to have been produced in the early 19th century:

—Mechanically they were the same, differing only in appearance. The earliest is of the pattern which was common in England during the last years of the 16th century and the first quarter or so of the 17th century, with one or two very minor improvements, as has been discussed in Chapter Four. The Moroccan version was invariably somewhat larger in size, over eight inches (250mm) comparable with those made in England.

The lockplate is of trapezoidal form with an internal mainspring acting upon a tumbler restrained by a two-piece sear the nose of which passes through the plate to secure the tail of the cock and a secondary sear which is restrained by the trigger bar. The expected buffer to restrict the fall of the cock and a bridle between the steel-arm and frizzen spring, are usually with decorative shaping left to the whim of the gunmaker. The cock has the typical, flat, lower portion with a rounded or shaped body, characteristics that did not appear until the early 17th century. A step on the spur of the cock prevents

the jaws from completely closing, a feature that turned the replacement of the flint from requiring both hands—one to separate the jaws and one to place the flint, to a one hand operation by simply slipping the flint between the open jaws. This is also a feature that appeared in the early 17th century.

A feature found on the Moroccan snaphance which is not found on the English versions relates to the pan cover. On the Moroccan lock, the movement of the pan's travel from the open to the closed position is controlled by passing through a groove with a serrated, or otherwise decorated part of the flash guard which keeps the cover in close contact with the pan and when closed, is contained in position by a lip fitting into a groove in the bolster. This feature has been found on all Barbary locks seen by the writer.

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A later snaphance form, probably first made for the African trade in the mid to late 18th century, has no European counterpart. It had square lines, was much heavier in construction, usually of better finish. The uniformity and quality of their construction suggest that they were probably an export lock produced in the Netherlands or Liège for North Africa. A “deluxe” example signed *I. Tomson & Zoon Rotterdam* dating from about 1805 is in the Legermuseum, Delft in the Netherlands, and W.W. Greener illustrated an example in *The Gun and its Development* which he described as “Flint-lock made by Moorish Gunsmiths at the Author's Factory in 1885.” Most, including the I. Tomson lock, are found mounted in stocks with fishtail butts (Appendix IV, No. 911) and barrels as long as 58-60 inches.

This style of snaphance was not illustrated in a report published in 1916 for the French government on firearms in Morocco but it does appear in stereo views with pyramids in the background suggesting they might have been a style more popular in the countries to the East.[FN

Collectors usually identify Barbary guns first by looking for poor quality but this is often based on condition and is not a reliable criteria. Guns that have been knocking around in a tent, carried from place to place in a camel saddle, left on the ground every night, cleaned only irregularly—if ever, cannot be expected to reach a collector in fine condition. Looking past condition it will often be found that the quality of workmanship is at least as good as any other early 17th century snaphance.

There is no way to date them, but most surviving North African snaphance muskets are probably of late 18th or 19th century manufacture. The only feature distinguishing the Barbary lock from the typical 16th or 17th century English snaphance is found in the construction of the sliding pan cover. That component on all English-made snaphance locks is very plain and it may someday be possible to state when that feature became standard.

There were design changes over the years, which cannot be dated, and the type of lock continued to be made and exported to North Africa, especially Morocco, for more than 300 years. In the Leger Museum at Delft there is a fine example which was made by the Rotterdam firm of I. Tomson & Son about 1800;⁴⁵ there is, in the Metropolitan Museum of Art in New York, a specimen dated 1876, and W. W. Greener illustrated an example made in his shops in 1885.⁴⁶

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The Balkans

The peninsula protruding into the Mediterranean Sea at the eastern end is a sparsely populated area with countries and settlements bordered by mountains. It was also an area where there was constant need for armed protection to be provided by local resources.

The traditional Islamic ignitions were produced by Balkan gunmakers, even though many of them were not Muslim, but some non-traditional designs emerged. They included: Shishané and Boyiliya from Bulgaria in the east, to provide their local names, and the long-necked “red deer” locks from Albania, Montenegro and Greece in the south and west. This last named by Daskalov, K.V./Kovacheva, V

Bring in G-making centers and Elgood.

The Shishané

The Shishané is a miquelet with the same mechanical details as the traditional Islamic lock and they acquired the name assigned to a gun with very specific characteristics. The form was a heavy barreled rifle, often with the pentagonal stock popular in Turkey (Appendix IV, No. 942), and for that reason is frequently identified as Turkish. Dr. Elgood (1995) records that they were made in Gabrovo, a major gunmaking center in north-eastern Bulgaria. The locks, like the barrels, were larger in bulk than the typical, with square lines, a wide back and an equally wide frizzen, which give the impression that they are larger than they actually are. The traditional decoration includes brass or gold inlay on the top-jaw and back of the frizzen and an overlay of the same material on the cock/frizzen bar, often without engraving. [074, 076]

The Boyliya

This Gabrovo-made lock takes the name of a light-weight smooth-bore barrel usually mounted in a traditional pentagonal stock that is frequently decorated with inlaid mother-of-pearl plaques. Mechanically, the lock is the classic Islamic miquelet with the external mainspring pressing up on the tail of the cock but that is where the similarity ends. The cock takes the form of a half-circle, tapered at the rear and widening to accommodate the flint screw, the jaws are narrow and thin but flared at the end. The grooved face of the frizzen is wide at the top tapering to almost nothing at the pan. All the visible face surfaces are overlaid with thin silver plates that are often lightly engraved. [035, 096]

Roumillia

The Caucasian

This is not to mean that firearms were not imported from gunmakers all through the middle east,

Notes

- ### Recommended Reading

~~XXX~~ Within the Empire, there are ~~XXXX~~ areas from which specific firearms designs can be readily identified by the form or design of the ignition. Moving out of the Empire but remaining in Western Asia, ~~XX~~ addition locks may be added.

1. It is on this date that the establishment of the Muslim calendar has been based — the introduction of the Mohammedan era, but it is now believed that the actual date was nearly a month earlier.

- 14 Chapter 10 — Islam

Daskalov and Kovacheva advice tells us:
never accept conclusions on the basis of only one or two considerations. In each case, we should bear in mind absolutely very detail, even the most insignificant and fortuitous at first glance, or any deviation from the rules. (p. 39)

The flint-lock which is now known in a number of forms as the miquelet, probably originated in northern Spain, perhaps in the 16th century, and which from at least c.1650 was known as the Spanish lock.

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Chapter 11a

The Percussion Locks

Powder – as Pellets, Tubes, and Caps

Percussion lock: • (Danish); • (Dutch); • (French); platine *f.* à percussion, platine des armes à percussion • (German); das Percussionsschloss, Schlagschloss, Compressionsschloss • (Italian); cane a percussione, acciarino a percussione • (Portuguese); • (Sp) llave de percusion *f.* (Swedish) .

There was probably more innovation in arms technology that took place between 1807 and 1870 than had happened in the previous four hundred years. Fortunately, those few decades also provided documentation to make a great deal of research material available. The first 20 or 30 of those years were dedicated to improving the priming composition and primer design to produce the desired results. There was also a great deal of effort directed to gunlock design.

The explosive characteristics of a number of chemicals had been known for centuries before Reverend Alexander John Forsyth, Minister at the Church of Scotland in Belhelvie, some eight or nine miles north of Aberdeen, began his experiments in the late 1790s. He was an avid sportsman and his goal was to use one of those chemicals in the discharge of a gun. By 1805 he had developed a recipe to the point where he was invited to show the results to a committee by Lord Moira, the Master General of the Ordnance (later the Marquis of Hastings), in 1806. He was asked to continue his experimentation in quarters provided by and at the expense of, the Board of Ordnance, first at the Tower and later, for security reasons, in London proper. In April 1807, the Earl of Chatham, the new Master General did not approve of the project and ordered him move out. The next day, Forsyth made application to patent his invention. Patent No. 3,032 was granted to him under the date of April 11, 1807. This gave him protection for 14 years which would not expire until April 10 1821. He established The Forsyth Patent Gun Company, located at No. 10 Piccadilly, London, which in 1809 became Forsyth & Company Patent Gun Manufacturer to produce and market his invention.

His patent covered only the principle of the discharge of a firearm by percussion and thereby thwarted any improvement in England for 14 years unless produced with his approval. The text was well crafted, allegedly because he obtained the assistance of James Watt the famous engineer, and his cousin who was a highly placed London barrister and Member of Parliament. The illustrations which he included with his submission were rather simplistic and described five or six methods whereby the percussion powder could be applied to cannons and sporting arms, but they were not part of his patent.

The composition Forsyth apparently settled on was three parts Potassium Chlorate, one half part Sulphur and one half part Charcoal.¹ The three were reduced separately to a very fine powder and sifted. The resulting powder was then mixed, sifted again, and as much water added as was required to make a thick paste. The paste was then forced through a brass screen to produce, when dry, a dark-brown grain about the size of



A539 Fig. 11.1 The Ordnance workshops and proof house at the Tower of London wharf on the banks of the Thames River in 1804. It was in one of these buildings that Alexander Forsyth undertook his early experiments for the Board of Ordnance in 1806-1807. *Howard L. Blackmore collection.*

coarse table salt. In his patent he provided the design for a lock which, after some improvements became the roller lock mentioned earlier that bears his name.

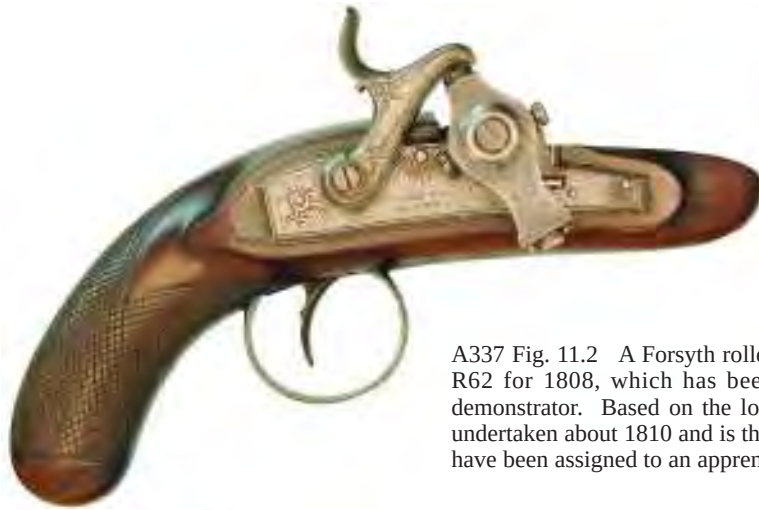
The all-embracing coverage of his patent did not prevent others from trying to perfect a more perfect ignition, nor did it prevent anyone from obtaining another patent for the same end result. But, each would be prevented from marketing it in England without Forsyth's permission. That did not happen until early 1819 when he sold Joseph Egg what was apparently the first a number of licences. On 24 June, 1819, Forsyth wrote to his partner, James Brougham, "I am clearly of opinion that if the patent can now be sold, it should be done ..." By November, he had "empowered Vizzard [his lawyer] to sell licences to all who applied to him. ... If all those who have licences to make and sell locks make them like some of Egg's that I have seen, they will not interfere much next year with our trade."²

Over the next three or four decades in England, on the Continent, and in America, there were countless new designs intended to improve the process. Most centered around the shape or form of the priming material and a new design for a lock to make it work. The primers may be divided into three recognisable categories: Pellets, Tubes, or Caps.

Pellets: whether in powder, combustible pellet, pill, or disk, shaped or contained in a capsule, tape, or other ribbon-like material

Tubes: either plain, patented, round, flat, or continuous tubes containing a detonating compound.

Caps: common or top hat caps, by design differences but not by maker or marking unless technically, physically, or historically different, and with that difference being a visible characteristic.



A337 Fig. 11.2 A Forsyth roller, or scent bottle lock s/n R62 for 1808, which has been stocked to serve as a demonstrator. Based on the lock style, this project was undertaken about 1810 and is the type of work that would have been assigned to an apprentice in training. [M089].

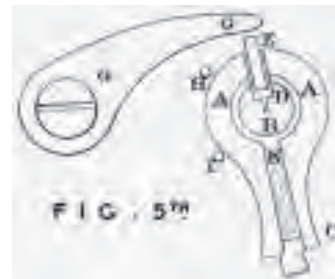
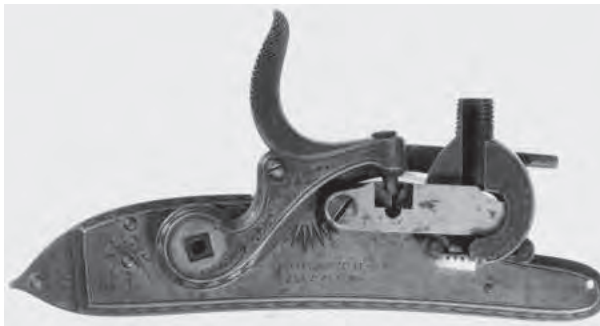


Fig. 11.3 Illustration from Patent No. 3032 dated April 11, 1807.



A365 Fig. 11.4 Forsyth roller lock cutaway to show the plug with touch-hole leading to the barrel on which the magazine (scent bottle) rotates, the powder reservoir and the firing pin, all in position for the hammer to have fired the charge. *Buffalo Bill Historical Center, Cody, Wyoming.*

A366 Fig. 11.5 First variation of Forsyth's slider lock cutaway to show the mechanism. *Buffalo Bill Historical Center, Cody, Wyoming.*

The lock Forsyth & Co. initially produced was what he called his “roller primer” but which is now usually identified as his “scent bottle” primer. Based on serial numbers collected by Messrs. Neal and Back, it is believed this design continued in production until about 1825. Before 1812 he introduced his slider lock which was last produced about 1828. A number of minor mechanical improvements were made to each during their lifetime.

On the lock with the roller primer, a reservoir shaped somewhat like a scent bottle, was attached to the breech so it could rotate on a rod or axel of steel with a depression to accept a few grains of priming on top and a touch hole leading to the barrel. The reservoir was loaded through a door in the bottom and closed by a small cork. When the



A068 Fig. 11.6 Forsyth's slider lock introduced prior to 1812. *Musée d'Arms collection, Liège*



A374 Fig. 11.7 This percussion slider lock, probably the basis for Forsyth's Third Model slider lock, is engraved "Rumford Patent" although no patent in England or on the Continent has been found for it. It was probably commissioned by Count von Rumford prior to moving from England to a recently acquired estate in France in 1809. [224]

scent bottle was turned to the "upside down" position, a charge of the loose powder was deposited in the depression and when it was returned, it located the firing pin, or piston as it was called, in position to be driven into the depression when struck by the hammer, thus detonating the charge.

On the slider lock, a reservoir was mounted on a sliding bar activated by an arm attached to the hammer. When the hammer was cocked, the reservoir was pulled back over the touch hole where it deposited a charge. When the trigger was pulled and the hammer fell, the reservoir was pushed forward to clear the touch hole and a nose on the hammer detonated the priming charge.

For the first seven or eight years, Forsyth's exclusive right to manufacture guns on the percussion system in England, there was no real competition except for injunctions he entered in June 1811 against William Beckwith, Joseph Vicars, and Jackson Mortimer which were granted in November and which confirmed his patent.

There were many individual gunmakers who produced percussion guns experimentally but apparently none were of sufficient consequence to come to Forsyth's attention. That all ended in 1816 when Joseph Manton obtained a patent for a percussion lock using a small pellet placed in a removable nose on the hammer. There was no reason why Manton, or anyone else, could not apply for a patent as an improvement to Forsyth's patent but he could not legally manufacture firearms using the system without Forsyth's authorization.

From almost the beginning, the situation on the Continent where Forsyth's patent carried no protection, was quite different and Forsyth could do nothing about it. An efficient Patent Office had been in existence there since 1791 and patents for detonating locks were granted in April 1810 to François Prélat;³ in June to Jean Lepage; and in September to Prosper de L'Etang. Joseph François Prélat, a Parisian gunmaker, also obtained a *brevete d'importation* — a licence on the importation — using an illustration of the lock and roller magazine being produced by Forsyth. In 1818 he obtained another patent which included pellet priming, and a *certificate d'addition* in 1820 which covered the tubes (patented by Joseph Manton in 1818) and the percussion cap (introduced by Joseph Egg in 1818). At least 18 percussion related patents were granted in France before Forsyth's patent expired in 1821.

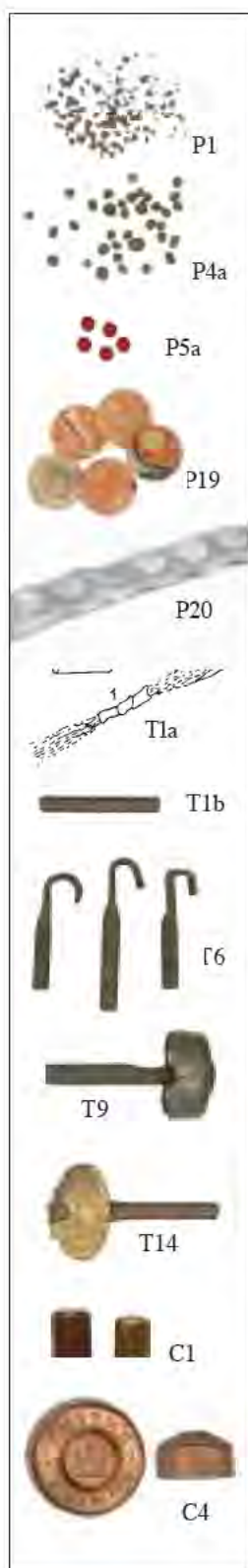


Fig. 11.8 Primer variations (see Appendix IX): P1–Forsyth powder; P4a–Guthrie's pellets; P5a–Billinghamurst pills; P19–Hall's patches; P20–Laidley's metal tape; T1a–Manton tube; T1b–Manton's tube; T6–Patstone's tube; T9–Lancaster's umbrella tube; Clayton's saucer-plug tube; C1–Common ribbed cap; C4 Smith's Imperial cap. The first three primers are illustrated at 1:1 scale.

In America, the evolution of percussion was somewhat later than in England, almost as if sportsman were waiting for a better system, although judging from the fact that the pill lock survived for so long it must have been highly successful. Joshua Shaw, whose claim to have invented the percussion cap in 1814 can be dismissed although he patented a wafer primer made of cardboard in 1822 along with a primer of copper which may also have been a wafer or it may have been a form of cap.⁴

While the percussion cap had a relatively large following in England before 1825, and use of the powders of Forsyth and pellets of others were on the decline, the acceptance of pellets, pills, and balls by sportsmen in the U.S. was strong and they were popular long after they were obsolescent in England.

During the 1820s and 1830s there were a number of American patents granted for firearms but unfortunately, the United States Patent Office fire in December 1836 has prevented identification of most. It is known though that many of them used a pellet or pill for ignition. For example, William Hart, 1827; Samuel L. Faries, 1828 and 1829; Ephriam Gilbert, 1829; Henry Rogers, 1829 and James Miller, 1836, have been identified from the pre-1837 patents. In 1836 a numerical record system was introduced and in the next decade or so there were numerous patents requiring pellet ignition in one form or another. Most well known are the revolving rifles made by James Miller and later his son, William Billinghamurst, Benjamine Bigelow, Joseph Medberg, and other eastern gunmakers who were working well into the 1850s.

For the first decade, Forsyth fought to defend his patent but the antagonists were able to develop the locks and primers which led to popular acceptance of the system. None were especially popular and it must be noted that as primitive as his system was, the sales of it were probably better than the sales of all of his English competitors put together.

If improvement had been left exclusively to Forsyth & Co., it would not have happened. Charles Bagley Uther, who in 1809 had been hired as manager and who became a partner with the formation of the new company in 1809, did not change the lock design. Perhaps he did not have the authority to do so and the roller lock continued to be manufacture until 1825 and the slider lock until 1829; almost a decade after the invention of the copper percussion cap [C1].



A336 Fig. 11.9 An early pill or powder lock by John Jones of Birmingham which would have been made prior to 1815. He produced a number of them and sold some but in 1815 he moved to Russia to take over as superintendent of the government arsenal at Tulla. Some of those that he did not sell have been installed in existing gun and engraved with a popular gunmaker's name [073].^{FN}

During those years, other English gunmakers created locks to be discharged by primers of different shapes including pills by John Jones (c.1813), pellets by Joseph Manton (1816), patches by Collinson Hall (1817), tubes by Joseph Manton (1818), and the copper cap by Joseph Egg (1818). All had been developed before Forsyth's patent expired in 1821. Their designs have been used to identify more than 200 primer types into Pellets (85 variations), tubes (34 variations) and caps (92 variations).

John Jones & Son's Lock

Very little is known about the production of a small group of locks, one of which, formerly in the W. Keith Neal collection, considered to be the original, is signed "John Jones & Co." a Birmingham gunmmaker. There are at least nine other surviving locks with slight variations known.⁵ Some were sold to gunmakers but most are in the white and unsigned. Others are signed with the name of well-known contemporary gunmakers, suggesting someone, probably in the 20th century, acquired a stock and fitted up good guns with fake marks.

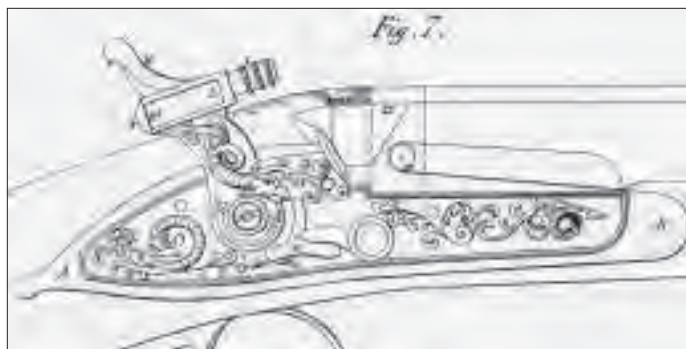
Three variations are known on all of which the detonator was held in a "pan" by a frizzen-like cover which was pushed out of the way by the action of the falling hammer. One of those examined may have used a single ball or pellet primer while the others are magazine fed and would have used powder of the type produced for Forsyth's guns.

His locks would probably date from about 1815 and there is no evidence that Forsyth was aware of his work. In September 1817, John Jones and his son John moved to Russia where John Sr. took over the management of the government arsenal at Tulla. He died there in 1835, age 68 with the military rank of Colonel, after successfully bringing the arsenal close to interchangeable-parts mode.

Joseph Manton's Pellets⁶

On February 29, 1816, Joseph Manton, one of Britain's leading London gunmakers, obtained English Patent No. 3,985 for the first serious attack on Forsyth's patent. His lock included a newly designed hammer with a removable nose designed to contain a percussion pellet and a pin to detonate it. When the trigger was pulled and the hammer fell, the pin was activated by striking over a touch-hole on the breech and the flame of the detonation then had to work its way past the pin and through that hole to ignite the powder. Although the process worked, the corrosive characteristics of the composition created real problems and it is suggested by Neal & Back that less than 275 guns were made before production ceased, sometime in 1818.

On July 12 1816, an application for an injunction was brought before the Court of Chancery to determine if Manton's lock was in infringement of Forsyth's patent but it



A106 Fig.11.10 The hammer of Joseph Manton's 1816 patent No. 3985 had a removable nose into which a small pellet [P31] was placed, followed by a small "firing pin." It was not well-received by the sporting public and very few were produced. [M202]



A152 Fig. 11.11 Collinson Hall's Patch Lock was announced to the public in the 1817 report of the Royal Society of the Arts. He described the "cylindrical plug" screwed into the barrel and the "pin or nipple" protruding from it at right angles thus creating new words for arms historians.

took more than two years for a verdict, by which time his pellet lock was obsolete and he was producing his tube lock.

Collinson Hall's Patch Lock

In 1817, Collinson Hall, a gunmaker whose business was in Mary-le-bone High Street, London, invented a percussion system which altered the hammer on Forsyth's slider lock by removing the long nose and creating a round depression in its place designed to accept, with a force fit, a round paper patch primer. He had to design a nipple to direct the fire into the barrel so he can also be credited with that important addition to the evolution of percussion.

Hall did not patent his design but fortunately for history, The Royal Society for the Encouragement of the Arts Manufactures, and Commerce considered his design significant enough to award him the Society's Silver Medal for 1818, and to print a detailed description of the design in their *Proceedings*.⁷ At the same time he described his method of pellet manufacture. "The detonating powder which is used for the priming is made in the form of a pellet, and is fixed in the centre of a small round piece of paper covered with wax. In this state it is applied to a cavity countersunk in the head of the hammer to which it adheres by means of the wax, and is thus preserved from the effect of wet." The process to produce the patches was described in the Society Proceedings.

The paste is made of the several ingredients in the following proportions, viz

	Grains
Oximuriate of potash	196
Flour of Sulphur	68



A019 Fig. 11.12 “Noses for Hall’s patches.” credit for improving Hall’s hammer is given to Thomas Cartmell of Doncaster by W.H. Wallaston, supplier of platinum to the gun trade. *Keith R Dill collection.*

Fine powdered charcoal	34
Gum Arabic	12

Dissolve the gum in as little water as possible: then grind the oximuriate of potash fine, in a Wedgewood’s mortar, by itself, and also the flour of sulphur and charcoal together, with a pestle of the same material. The mixture of all with the gum must be effected, either in a wooden mortar with a wooden pestle, or, at any rate, in a Wedgewood mortar with a wooden pestle, taking care to keep it moist during that operation, lest it should explode.

The paste, being of the consistence of soft clay, is then to be formed into pellets, by means of a mould, made of a plate of brass or copper, one-sixteenth of an inch thick, and filled with holes of one-eighth of an inch in diameter: this plate being placed upon a table, or other flat surface, over which a sheet of paper is first to be laid, the paste is to be spread evenly over its surface, and then pressed into the holes, either by passing roller over it, or by beating upon it with a wooden mallet: the paste is then to be removed from the upper face of the mould, with a thin spatula or palette knife; and the mould is next to be slid, for the length of an inch, along the paper, to separate the paste from it; and it may then be lifted up, and the pellets carefully driven out of the holes in it, by striking upon it with a soft brush; they are then to be dried. The round paper patch being cut by a proper punch are covered on one side with bees wax mixed with little tallow, and coloured red to distinguish the adhesive side from the other: the pellet then gently pressed on the centre of the waxed side of the patch, to which it adheres, and the priming patch is thus completed.

Unfortunately for Hall, the fame this produced also brought the design to Forsyth’s attention and on August 19, 1819 he was served with an injunction designed to obtain compensation and to prevent further manufacture. The Chancellor refused to grant the injunction at that time, but ordered Hall to record what he made and when the case came before the Court of King’s Bench on December 13, the verdict was made for Forsyth; Hall was required to pay £300 based on the number of percussion locks he had sold.

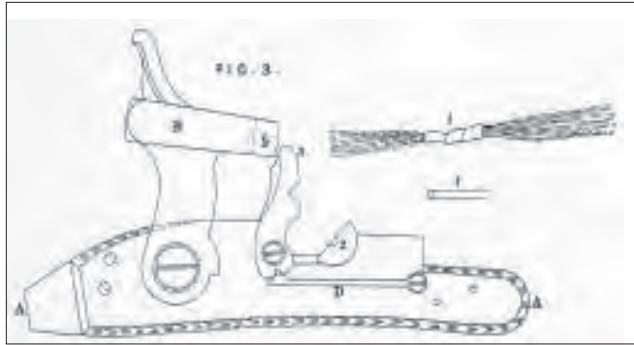
Cartmell’s hammers with noses

Hall’s patch lock design was quickly improved by adopting Manton’s replaceable hammer-nose altered to hold the patch. It is not known who actually introduced this improvement but in 1821, William Hyde Wollaston, a sportsman closely associated with the gunmakers as the only supplier of platinum to the gun trade for touch-hole bushings, wrote a letter to Sir Thomas Frankland. In it, he credits Thomas Cartmell, a gunmaker in Doncaster, who had a “method of preparing a set of pegs at home with patches ready for the field [which] is neat and effectual.”⁸ Judging from the number of surviving boxes of “pegs” and loose pegs, the system was very popular.”

Joseph Manton’s Tube Lock

On August 3, 1818, Joseph Manton obtained English Patent No. 4,285 for a lock using a “thin metal” tube primer. His patent illustrated a coiled and a solid tube version but all of those found in cased guns are of the solid copper variety measuring .090 inch diameter and approximately one inch long.

The judgement in Forsyth’s suit brought against Manton’s pellet lock in 1816 did not



A363 Fig. 11.13 Joseph Manton's patent No. 4,285 dated August 3, 1818 was the first to be granted for a tube lock primer and mechanism. It became the second most popular primer (after the percussion cap) and continued to have sportsmen support into the 1880s.

reach the Court of King's Bench until December 1818 and the verdict was in Forsyth's favour. It would also have covered his tube ignition but he and Manton reached an agreement which allowed him to continue its manufacture but Forsyth had difficulty collecting from him.

The tube lock enjoyed considerable popularity and although the primer was altered by many, it was still being used by some serious sportsmen in the 1880s.

Isaac Riviere

On May 1, 1819, Isaac Riviere (incorrectly spelled Levier in the initial court record), was served an injunction which went to the Court of King's Bench on June 4. Messrs Neal & Back have identified a scent bottle of virtually the same design as Forsyth's made by Riviere and this might be the subject of the suit although it was not patented until 1821, after the expiration of Forsyth's patent although it could have been in production as early as 1819.

Riviere also made a magazine which contained pellets as part of the hammer which is more likely to have been the justification for the injunction. A number of examples of it have survived and the *Times Law Report* summary of the trial reports "as the locks differed materially in the manner of going off, one having a fixed pellet, and the other a moveable one," the hammer magazine must also be considered as a reason for the application. In any event, the court found for Forsyth.⁹

Joseph Egg's Percussion Cap¹⁰

By at least mid-year 1818, Forsyth would have been thinking about the day when his patent would expire and undoubtedly looking back at the more than six years of almost constant, troublesome, litigation which began in 1811 when he obtained an injunction against William Beckwith, Joseph Vicars, and Jackson Mortimer.

About the same time, mid- to late-1818, Joseph Egg created the percussion ignition which was later claimed by many. What is probably significant is that it appeared at a time when any other claimants could challenge him and no evidence that they ever did has been located in the sporting journals of the period.

His work must have come to Forsyth's attention well before the end of the year because he had his lawyers prepare the injunction dated January 14, 1819 that is preserved in the Public Record Office at Kew.¹¹ No record of any action on the injunction has been located and Messrs Neal & Back suggest that they came to an agreement which allowed Egg to produce firearms under his patent. There was undoubtedly a monetary component but more importantly from the historian's point of view, and probably from Forsyth's, he agreed to record on his guns that they were made with his



A340 Fig. 11.14 What may be the first, certainly one of the first, pistols fired by percussion cap is that illustrated here. It was made by Joseph Egg and is engraved *Joseph Egg / By permission of Forsyth the Patentee* on the lockplate. It is little different from locks of the period and internally is identical to the flintlock. Externally, the obvious changes included the replacement of the flint cock with an early form of hammer with a flat nose, and of the pan and frizzen by a drum and nipple to receive the percussion cap. *South Somerset Museum, Yeovil, England.*

A355 Fig. 11.15 Joseph Egg's *Amorce* (percussion caps) [C1] from the research collection of *Societe Francaise de Munitions (SFM)*, which could trace its origins back to primer manufacture by Marin Gevelot in France as early as 1820, and perhaps to 1817

authority. This was the first of Forsyth's efforts to licence his invention. Later, in a letter to James Brougham, his business partner, he wrote "if all those who have licences to make and sell locks make them like some of Egg's that I have seen, they will not interfere much next year with our trade."¹²

After Forsyth began licensing in 1819 there were few incentives for him to undertake litigation, especially because he had sold the business and the patent to Charles Bagley Uther who had been his Manager, and a Partner since 1810. His patent expired on April 11, 1821 which removed all restrictions and innovation by others came quickly with new designs, most of which were based internally on the flintlock mechanism and externally with a different form for the primer.

The Caplock

The transition between flintlock and percussion lock design is hardly noticeable; internally there was no need to change and externally it was only a matter of changing the cock for a hammer and the frizzen for a drum, both of which were described in 1817 by Collinson Hall, or other means of getting the flame from the nipple to the powder in the barrel. All other visible changes were purely aesthetic

Egg's design for his new percussion hammer used a slight variation of the crescent form of the flintlock cock which had evolved about ten years earlier. He did not anticipate the potential difficulty of fragmenting metal caps, providing only a flat hammer-like surface.

In this period, as in all percussion ignition guns, the nipple which holds the percussion cap becomes part of the lock and ignition system, even though there is no direct physical connection. The nipple, to use the word used by Hall, was threaded into a round plug leading the ignition into the breech.



A339 Fig. 11.16 One of a cased pair of pistols signed S. Evans, a gunmaker located in Cambridge, on the locks. There is an unidentified crest on the escutcheons and the same crest with E.B. Knight and the date 1821 on the brass case handle. This form of bar action lock indicates it is early introduction although the date may be commemorative.

The best evidence for Egg's claim and the timing of it is found on a pistol in the South Somerset Museum, Yeovil, England¹³ but it is also found on other arms engraved "By Permission of Forsyth the Patentee," or words to that effect. The dating of those arms can be accurately placed to after January 14, 1819 and before 11 April, 1821. When the Forsyth patent expired, there would have been no need for it.

The nipple, a prerequisite for the percussion cap was a minor redesign of that introduced by Collinson Hall. Although Joseph Egg introduced the percussion cap in 1818, there is no record of a commercial production for about five years, notwithstanding the fact that both Richard Walker and Thomas Starkey advertised that they were established in 1820. It is not yet known who first supplied percussion caps to the sporting fraternity but in 1823, Frederick Joyce, recorded as an operating chemist at the same location formerly used in Soho by Accum and Garden, who had been employed by Forsyth, is a good possibility. Sarah and Richard Walker are a less likely possible supplier. The first record located on them is in 1829 but their advertising states that the firm was established in 1820. In any event, it was probably a while before standard cap sizes and standard size nipples evolved.

It is generally considered that the "threaded" cone on a nipple is an early feature designed to compensate for loose fitting caps. In many ways it does and the threads were designed for that problem. Many of the earliest nipples, (assuming their originality can be determined), were ribbed. But the smooth nipple quickly (there is no way to determine how quickly) replaced them, nevertheless, at least into the 1880s, long after the obsolescence of the percussion cap, the gunmakers' supply catalogues were still listing the threaded nipple.

• • • • •

Illustrations in this chapter thus far have included locks which predate the expiration of Forsyth's patent. They demonstrate the work and ideas of just a few of the major arms makers in England – mainly those who came to the attention of Dr. Forsyth or those who published. But Hall's description of how to make percussion pellets illustrates how simple it was to manufacture percussion primers, and gunmakers being what they are, were great experimenters.



A594 Fig. 11.17 The British military nipple. The dotted line represents the shape of the original vent hole, c.1840; the solid line is that in use in the 1860s. The terminology is that of the Board of Ordnance (to 1855) and thereafter, of the War Department.

A590 Fig. 11.18 Percussion nipples (a.k.a. cones or pegs) : (back row) — Nipple for a common cap, of standard form with copper-washer seat, grooved cone to aide gripping (although this is usually considered an early feature, it was still included in trade catalogues into the 1890s), the square (on this example is actually six-sided; A U.S. military nipple of 1863 pattern; a long-cone nipple, probably for a market or punt gun. (front row) a cup nipple, probably for a percussion patch but suitable with a slightly different shape cup for a pill; a smith's Imperial cap; William Smith's Imperial cap [C4] of 1831 which required as special wrench with a pin to enter the hole visible on the bed; Westley Richards' tube primer [T4] patent of 1831 which allowed the escaping gas to be deflected. They are marked 'R' or 'L' as appropriate for the right or left barrel.

William Davy of Norwich had a printed notice of an address change produced which included the statement that he would percussion guns. It can be dated to 1818 as on the back there is an invoice for gun work dated in December of that year. Unfortunately he provided no descriptions. Most made before 1821 will likely be unsigned in order to avoid a problem with Rev. Forsyth.

The Percussion Lock Patterns

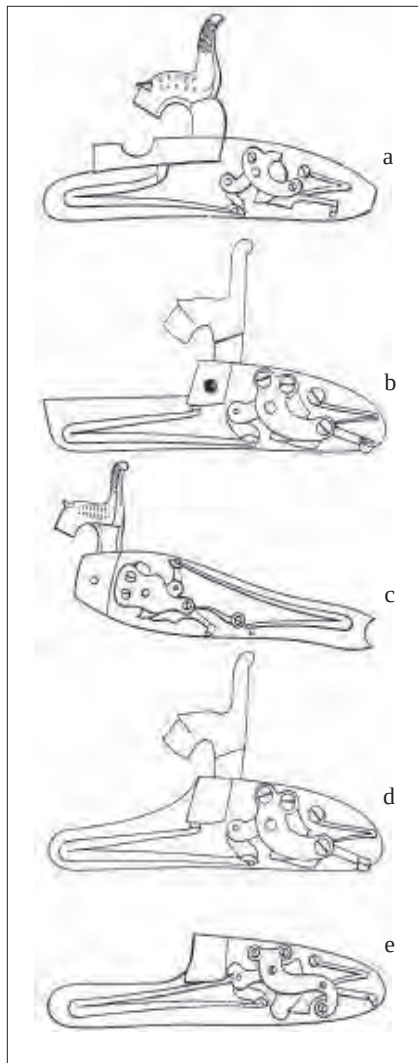
It is unlikely that it will be possible to accurately date the chronological evolution of the three basic percussion lock forms: bar locks, front or forward action locks, and back action locks, because they appear to have all arrived on the scene about the same time.. There were countless minor and some major internal variations in each but they are most readily recognized by the characteristics as stated

Front or Foreword Action Lock

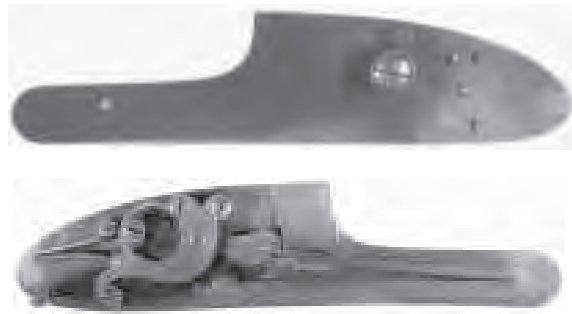
The name for this lock is provided in the gunmakers' supply catalogues produced in the 19th century and was the natural adaptation of the flintlock to percussion. It was illustrated in Hall's 1817 patchlock where it was described as cut for a cylindrical plug, a name it retained in the trade, screwed into the side of the barrel, and having a pin or nipple projecting from it on the radius.

Bar Action Lock

The bar action lock is a front action lock in which the spring is locked in front of the hammer, that is neatly fitted to a bar on the breech of the barrel, which gives it the name. It provided secure contact between the two, and allows the grasp of the hand to tighten naturally in the act of raising the gun to the shoulder. The Joseph Egg rifle illustrated as Plate 105 in *Forsyth & Co.* by Neal and Back has this pattern lock and it has the necessary Forsyth acknowledgment on the barrel which would date it to pre 1821.



A354 Fig. 11.19 The five basic English, lock designs, from top to bottom: a. Front action lock cut for the cylindrical plug into which a percussion nipple was fitted. b. Bar action with straight upper lip which was fitted to the bar, a part of the barrel for additional strength. c. The Back Action lock had a number of virtues but it was not considered as aesthetically pleasing. d. Bar in Wood indicates that the wood surrounded the lock plate to provide additional protection from moisture. e. Rebounding locks: the first rebounding lock was patented in 1866 and was quickly followed by variations. On this typical design, the mainspring provides pressure both to activate the hammer and to return the hammer to a position which removes pressure on the firing pin.



M209 Fig. 11.20 This lock demonstrates the state a gunmaker would receive a lock from the lock makers or suppliers. They were finished but not hardened, the hammer screw was in place but the hammer wanting, to be supplied and fitted by the gunmaker. It is a rebounder lock marked on the inside *Stanton & Co. Joint Patents, No. B55461*. {M209}

Bar in Wood Lock

John B. Johnson writing in 1851 records that this lock was introduced to the trade as Westley Richards' plan. He wrote, "it differs from the bar-lock, inasmuch as the fore-end of the lock-plate does not fit up to the barrel, though the mainspring works in the fore-end of the stock. The lock-plate is fitted so that it is completely surrounded by the wood of the stock."¹⁴ The "Trade Only" catalog dated July, 1881 produced by Edward K. Tryon of Philadelphia, one of the leading arms dealers in America, listed this lock as the "Wesley Bar Lock."

Back Action Lock

The back action lock (which was also known by the trade as a "backwork" lock), had its origin in the late 17th century but it was produced only occasionally until the introduction of the percussion system. It is recognized by having the mechanism behind the hammer and the lockplate taking the form of the straight grip or pistol grip.

It was considered to provide more strength to the stock at that point, to gain by the greater length of the mainspring, and most important, to prevent moisture getting into the mechanism because it was surrounded by wood.

To paraphrase Peter Hawker (1833, but not in the 1830 edition) "back-action locks are getting somewhat in vogue (to keep the action of the lock clean from foulness and rust which is



A588 Fig. 11.21 It is believed that the U.S. patent granted to Fordyce Ruggles in 1826 but lost in the Patent Office fire in December 1836, covered the underhammer ignition illustrated here. *Nicholas L. Chandler collection*

always occasioned by the oxygen gas. Joe [Manton] says he discarded them long ago ... but Mr Bishop [William, known as the Bishop of Bond Street and Westley Richards' agent] has shown me some new locks of Westley Richards that are equally well protected and far neater in appearance." This is somewhat ambiguous but it suggests W. Richards was the originator of a back action percussion lock, and this is confirmed by Johnson in 1851.¹⁵

Under Hammer Lock

The underhammer lock was covered in U.S. Patent date November 24, 1826 granted to Fordyce Ruggles and variations on it had considerable popularity in the New England States. "The Ruggles is very simple. It consists of a single block of iron, threaded at one end to serve as the breech plug. Directly behind this threaded breech plug is a channel, cut or forged to house the hammer and trigger. A trigger, hammer, mainspring, and trigger spring make up the entire mechanism."¹⁶

Pill Lock, Punch Lock

The only difference between a pill-lock and a caplock can be found in the shape of the nipple. On the latter, the shape of the nipple is designed to accept a percussion cap while on the former the nipple is made with a depression to accept a pill or small pellet. As mentioned above, the use of detonating pills or pellets was popular, especially in the rural areas of the north-eastern United States where hard money was usually in short supply, and many local entrepreneurs manufactured detonating pills for local consumption.¹⁷ Most early percussion cap production was restricted to Connecticut but at least five percussion pellet makers operating in New England, Ohio, and northern New York have been identified by their product and a few submissions to the U.S. Patent Office, both before and after the fire included primers of a shaped composition. Revolving rifles were especially adapted to pill ignition. In one article on James and John Miller, the Rochester gunmakers, which illustrated 19 revolving rifles and one revolving pistol, four were made for percussion caps, the others for pill ignition.¹⁸ On the latter, a simple depression in the cylinder held the pills in place with bees-wax.

Side Hammer and Mule Ear Lock

This form of lock with a horizontal, or side acting hammer had considerable popularity in the North East United States, is most invariably identified as a 'mule ear' or side striker. The design was patented by Ephriam Gilbert of Rochester, N.Y. on April 3, 1829 (in the name and date series) and like all others in that period was lost in the Patent Office fire in December, 1836. The main virtue of this design in its original form was it required few parts of simple design: hammer, trigger bar, swivel, and two springs. The



A329 Fig. 11.22 A superimposed, percussion “mule-ear” rifle by John J. Walker, active 1851-1886 at Simcoe, Ontario, Canada.

mainspring was fastened with a screw and all others were held by pins passing vertically through the lockplate. Surviving examples are known with copper cap or pill ignition and it must be noted that some later versions became much more complex. [M220, M135].

Patented, and Unpatented

The 19th century was a period of considerable development in all areas of scientific and mechanical progress, a situation that was encouraged by the establishment of Patent



A601 Fig. 11.23 The mark of the British Registered Design Act in use between 1842 and 1883 as found on a powder flask cover by James Dixon & Sons, Sheffield.

1	Class 1,	Metals
L	Year of mfg.	1856
E	Month	May
6	Day of Month	6
2	Parcel number	2

Offices and inventor protection throughout much of Europe. Royal licenses giving protection to inventors, both mechanical and literary, had long existed in most kingdoms; in England it was formalized in 1582 and records were retained in the Great Seal Patent Office in London. The first English patent relating to firearms – actually to gunpowder – was issued in 1588.

In England, Non-Ornamental or Useful Design Acts were passed in 1787, 1789, and 1794 which provided protection for designs of some textile goods. In 1839 the Design Copyright Act expanded on these to give 12 months protection on the ornamentation, shape, or configuration of most other manufactured articles. An exception was that those of metal received three years protection. This protection was subject to registration by the deposit of copies of the design under the proprietor’s name with the Registrar of Designs. This was a much less costly process and in many cases probably just as effective as a patent. The late Howard L. Blackmore’s record of arms related entries includes locks by Joseph Aston, George and John Dean, Charles Lancaster, John Gedge and primer designs by Westley Richards, Edward Brookes, to name a few.¹⁹

In 1842, The Designs Act created 13 classes of ornamental designs based upon the material of their construction, which included all manufactured goods and at the same time created a “register mark” indicating the class and date of the registration. Articles made wholly or chiefly of metal became “Class 1” This and the following are now generally identified as the Non-Ornamental and Useful Designs Acts.



A604-5 Fig. 12.24 A hammer to carry seven pellets [P70] and a spare magazine in a bone case by Isaac Riviere of London, and a similar one by Thomas (?) Sykes of Sheffield to hold six pellets. Both are engraved with the maker's name and "Patent" but no patent has been found to cover them.

The Designs Act 1843 extended protection to useful, as distinct from ornamental manufactured goods, which gave three years protection and the Designs Act 1850 provided the opportunity to register for one year with the right to its later application to a full patent. It was in this category that Robert Adams' bullet with the base-tang was registered, and later being granted Patent No. 1/1852.

Coincidental with registration under the 1843 Act there was the right to incorporate either an inscription recording the registration date or a variation of the symbol illustrated in Figure 1. This recorded the Class, Year, month and date of Registration, and the bundle under which registration was obtained. Two forms of the registration mark were used; one during the years 1843 to 1868 and one from 1868 to 1883.

The most readily available sources for information on our area of study are the patent records found in England, in America (established 1790), and in France (established 1791). Each had active departments in the significant time period. In central Europe, as it relates to this chapter, they were not established until the machine age had firmly taken hold: Germany in 1877, Switzerland in 1888, and Austria in 1899.

Unpatented

The word "Patent" does not necessarily mean that any part of the object was covered by a patent; it was frequently used as what might be termed a "trade mark" that had no legal status and it was apparently not illegal to do so.

In 1814, Thomas Sykes of Sheffield, in the County of York, [England], Gunsmith and Manufacturer of Powder Flasks, Shot Belts, and other Articles," obtained a patent for a powder flask which he produced and marked "Sykes Patent."

The Patent was later "held to be invalid, on account of a defect in the specification," but nevertheless he continued to mark his flasks "Sykes Patent." Another man with the same surname also marked flasks "Sykes Patent," arguing before the court that he had as much right to mark his goods with that name and patent. The court found for Thomas on the basis that "the defendant had no right so to mark his goods *as and for* goods manufactured by the plaintiff..." There was no question about the marking.[FN

Another possibility is that the patent has been lost in the recording system used to locate a patent related to this study. Searching for a patent is usually done from lists compiled from hand written records made in previous centuries. The records of interest to arms historians (and others) were set in type and published by subject in the mid 19th



A327 Fig. 11.25, 26 Primer magazine on the hammer of a pistol by Joseph Contriner & Son of Vienna, Austria, active 1798-1848. *Courtesy Hermann Historica*

and early 20th century but if the name of an inventor was miss-spelled or the subject was incorrectly assigned, the patent would be virtually impossible to find. The scribe who prepared the documents for François Prélat's 1818 French patent used flourishes and scrolls when writing Prélat's name. This was later interpreted as "Prelaz" and that is the way his first patent was recorded in the subsequent records. Fortunately it ended up in the correct subject index.

The presence of "Patent" associated with a maker's name and a number is usually an indication that the lock was made under a licence granted by the inventor to the maker. These are usually engraved, as found in the flintlock by Theophilus Richards [M188], or if the product of a lock maker's factory they would logically be stamped, as on the rebounding locks illustrated by John Stanton [M209].

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Some of the illustrations which follow have been acquired from the original patents, but most are from the printed copies compiled during the last half of the 19th century in England, France and the United States of America by Patent Office officials. Others have been collected from the works of contemporary authors, and a few from surviving examples of a gunmaker's work.

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Notes and Recommended Reading

1. This formula was found by Maj. David Back when researching the Brougham papers. It was not signed or dated. Neal & Back, *Forsyth & Co.: Patent Gunmakers*. London: G. Bell & Sons, 1969, p. 101. Potassium Chlorate was also known as chlorate of potash, oxymuriate of potash, oxy-muriate of potash, oxygenated muriate of potash, and hyper oxygenated muriate of potash. See also: "Remarks by the Editor" *Journal of the Franklin Institute*, Vol. 10, (1830), pp. 109-110. "The quality of the chemical is not indicated by the name, but rather by the skills of the manufacturer.
2. Neal, W. Keith & David H. L. Back. *Forsyth & Co.: Patent Gunmakers*. London: G. Bell, 1969. Henceforth, Neal & Back, (1969), pp. 192, 200-201.
3. The scribe who prepared the documents for Prélat used flourishes and scrolls when writing Prélat's name. This was later interpreted as "Prelaz" and that is the way his first patent was recorded in the subsequent records.
4. Gooding, S. James. "I am Sorry Senator Buchanan, Joshua Shaw did not Invent the Percussion Cap." *Black Powder*, Autumn, 2005. pp. 33-39. This concludes that Joshua Shaw, whose claim to have invented them in 1814, can be shown invalid:

5. Gooding, S. James. "John Jones & Son of Birmingham and their Improved Percussion Ignition." *Arms & Armour, Journal of the Royal Armouries*, Vol. 4, No. 1 (2007), pp. 45-51.
6. Gooding, S. James. "Joseph Manton's First Percussion Lock Patent." *Arms Collecting*, Vol. 39, No. 2 (May 2001), pp. 39-43.
7. The complete text of the article with the illustrations was reprinted in *Arms Collecting*, Vol. 32 No. 1 (Feb. 1994) pp. 3-8.
8. I am grateful to Maj. D.H.L. Back for bringing this letter to my attention.
9. Neal & Back, (1969), pp. 189-191
10. Gooding, S. James. "Joseph Egg, Inventor of the Percussion Cap..." *Arms Collecting*, Vol. 36, No. 3, (Aug. 1998), pp. 75-79. An early examination of the claims of Pr  lat, Deboubert, and Shaw and the contemporary documentation. Supported by two identified specimen caps from the SFM collection and the suggested date of 1818 for its invention.
11. P.R.O., C13 729/15.
12. October 6, 1819: Neal & Back (1969), p. 200.
13. I am grateful to Peter Scott-Edeson for bringing this pistol to my attention and to Bernard Dickens for a photographic record of it.
14. Johnson, John B. *The Gun and How to Use It*. London: Piper Bros. 1851, p. 13
15. *Ibid.*, p. 11-12.
16. Chandler, Nicholas L. "Early New England Underhammers in the style of the Ruggles Patent of 1826." *American Society of Arms Collectors Bulletin* No. 96 (2007). pp. 39-51.
17. Only five names recorded as percussion pill or pellet makers has been found but the process was so simple that many chemist or chemistry oriented individuals were probably suppliers to the local needs. The recorded names include: Ackley, C. Waterville, N.Y., U.S.A. Specimen: Percussion powder, "Made and warranted by"; Bisbee & Wilson, Garrottville Co., Ohio, U.S.A., Specimen: A box of black percussion pellets; Billingham, Wm, Rochester, N.Y., U.S.A. Specimen: Manufacturer of Dr. Guthrie's Percussion Pills. A gunmaker active between 1827 and c.1880; Catlin, R.T. Winfield, N.Y. U.S.A. Specimen, container only. "Improved Anti-Corrosive Waterproof. Pellets; Guthrie, Dr. Samuel. Sacketts Harbor, N.Y., U.S.A. c.1826 — d.1848. Manufacturer of patented percussion pills from c.1826. His agent in New York was Van Buren, Wardwell & Co.
18. Smith, James B. "J. & J. Miller, Makers of Fine Revolving Firearms, Rochester, N.Y." *The Canadian Journal of Arms Collecting*, Vol. 9, No. 3 (Aug. 1971), pp. 75-91.
19. "The British Designs Acts — 1839-1883." *Arms Collecting*, Vol. 36, No 2 (May 1998), pp. 49-54.
20. Patent No. 3,828 dated August 4, 1814. The trial proceedings was recorded in *Barnewall and Cresswell's Reports*, Vol. 3, p. 541.

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Gerhardt, Robert E. "The Gedney Automatic Percussion Prming System." *Man at Arms*, Vol. 32, No. 2 (April, 2010), pp. 31-34.
 Hoff, Arne. "Danske perkussionsb  sser En forel  big unders  gelse," *Vaabenhistoriske Aarb  ger VIIIb-c*, (1956), pp. 150-165. (with summary in French).

Chapter 11b

The English Patent Office (1582)

The British Patent Office (1852)

From the late 16th century until September 1852, there was the English Patent Office located in London and later, the Scottish Patent Office located in Edinburgh, each granting patents numbered in the order of granting.

The last firearm patent recorded exclusively in London was patent No. 14,289 granted to Stephen Taylor on September 10, 1852 for “Improvements in the construction of fire-arms and in cartridges for charging the same.”

In 1852 the two Patent offices were amalgamated to become the British Patent Office and a new, numerical, numbering system within each year was instituted. It is just coincidence, but the first patent recorded under the new system was granted to Robert Adams on October 1, 1852 for “Improvements in ball cartridges,” Patent No. 1/1852.

Notes and Recommended Reading

Great Britain *Abridgements of Patent Specifications Relating to Firearms ... 1588-1858*. London : HMSO/ Holland Press, 1960. Unillustrated, but a vast source of information. A number of editions recording then current information were published with similar titles. The Holland Press edition is the most readily available.

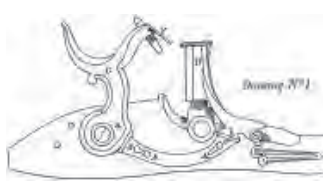
Grancsay, S.V./Lindsay, M.K. *Illustrated British firearms patents, 1714-1853*, New York : Winchester Press, 1969. A comprehensive introduction and index of patents precedes a collection of approximately 50 significant English patents granted between 1718 and 1853. The full text and illustrations of each is included in the bound volume and a portfolio of large plates accompanies the publication

Hoyem, George A. *Cumulative Alphabetical Index to patents for Inventions, Class 119, Small Arms*. Oceanside: Armory, 1993. An index to the illustrated collection of patents on Small Arms covering the years 1855 to 1930, published by Her Majesty’s Stationary Office between 1905 and 1934. It records the name of the patentee, the year of the patent, and the patent number.

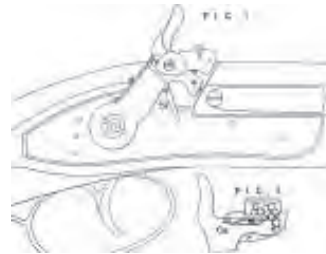
Patents for Inventions. Abridgement of Spec. Class 119, 1855-1866. HMSO, 1906; 1867-1876, HMSO, 1904; 1877-1888. HMSO, 1904; **1889-1901** HMSO, 1911; **1901-1908**. HMSO, 1911; **1900-1915**. HMSO, 1922; **1916-1930**. HMSO, 1934. (seven volumes) reprinted by Oceanside Armory, 1993. See entry under Hoyem, George A.



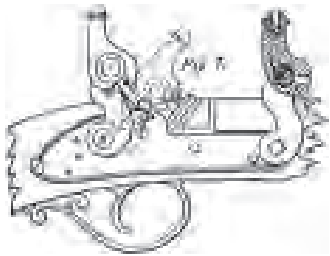
A595 Fig. 11.27 Joseph Manton’s Patent No. 4,285 dated July 22, 1818 was the first serious competition to Forsyth’s patent. It covered the primer and a clamping arrangement to hold a tube primer “placed in a grooved pan at right angles to the touch-hole,” perpendicular to the barrel with one end entering the vent. It continued to be popular among some sportsmen until into the 1880s.



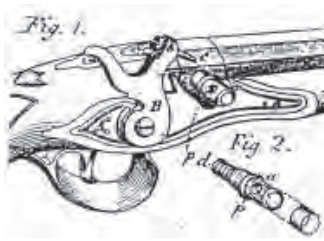
A389 Fig. 11.28 Wm. Westley Richards’ patent No 4,611 granted November 10, 1821 for a self acting primer magazine.



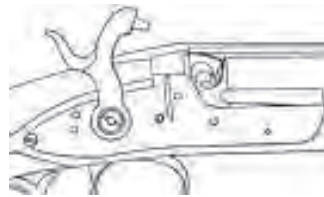
A385 Fig. 11.29 Thomas Cartmell of Doncaster invented an “improved cock, to be applied to the locks of guns, pistol, firearms or ordnance,” Patent No. 5,033 dated November 6, 1824 He illustrated three styles of magazine placed on the top of the hammer which “allowed one pill to enter the nose, preparatory to discharge on the nipple of normal design.”



A381 Fig. 11.30 John Jackson of Nottingham was granted patent No. 4,823 dated July 29, 1823 with a magazine containing the detonating powder attached to the hammer. A single charge enters a recess in the hammer and the reserve is cut off as the hammer falls



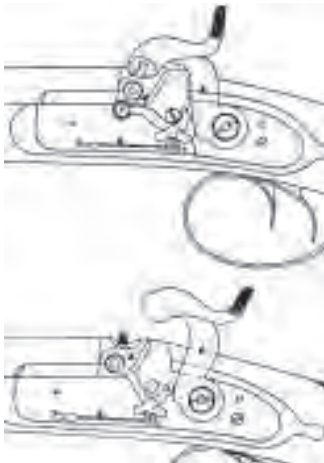
A153 Fig. 11.33 Dr. Francis Fox of Derby was granted English patent No. 4,427, January 15, 1820. The cylindrical plug which Fox calls a 'priming tube' and a 'case of varnished paper' to secure the priming and protect it from moisture.



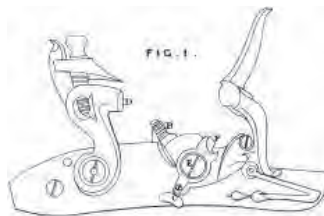
A386 Fig. 11.11. Joseph Egg's patent No. 4,727 dated November 26, 1822 covered a magazine "attached to the outside of the barrel" filled with short tubes containing detonating composition to fall into the priming chamber and the pan as the hammer is raised. The priming is protected when the piece is discharged. See also A382



A380 Fig. 11.31 Joseph Manton's patent No. 5,106 dated February 26, 1825 illustrates '12 globular pellets contained in a self-acting magazine' attached to the hammer called a 'revolving pellet carrier.' One pellet is deposited in the nose of the hammer when the 'carrier' is manually rotated



A383 Fig. 11. George Henry Manton's patent No. 5,838 dated September 2, 1829 covered "lessening the recoil" by "giving a greater vent of the gaseous matters" with the movement of a cover activated by levers attached to the lockplate.



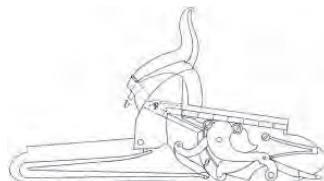
A357 Fig. Samson Davis patent No. 4,648 dated February 12, 1822 recorded that "the lock is a compound one, and may be used as a flint lock or ... to act on the detonating principle. The nipple is made to turn on a hollow axis ... or by turning it around to expose the pan, and the flint may be struck against a hammer [frizzen] in the usually way. This patent was assigned to George John Lacy at 67 Threadneedle St., London.



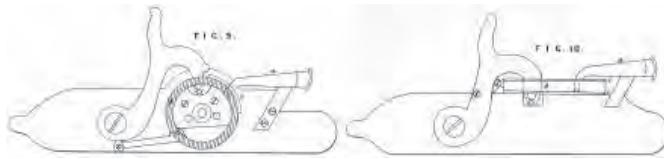
A600 Fig. 11.31 Patent No. 4,590 granted November 14 1821 to William Webster was an improvement to Forsyth's roller primer which allowed the primer to be secured by a bolt-catch for easy removal. Although not patented until 1821, similar primers were made by Webster, probably as early as 1808.



A391 Fig. 11. William Beckwith's slider lock as illustrated on the trade card used in his cased guns and pistols which provided evidence for Forsyth's injunction entered in June 1811

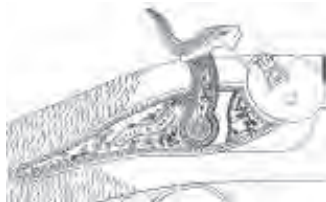


A500 Fig. 11. British patent No. 9,801 granted to William Needham June 24, 1843 for a cap magazine embedded in the stock and carried to the lock for automatic capping. Used primer C10.



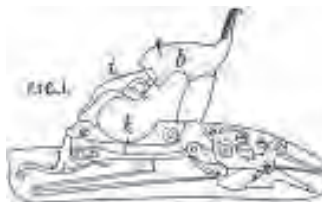
A610 Fig. Above: The two percussion lock designs submitted with English patent No. 6675 by Henry Shrapnell, the inventor of the exploding shell which bears his name, on September 6, 1834. The magazine *a* to contain detonating balls deposits a ball on plate *b* which is connected to the hammer to deposit a primer in the touch hole. "The only difference between Fig. 9 and Fig. 10, is, that one of the locks is made with a straight plate, the other a circular plate."

A150 Fig. 12.xxx Right: Three views of a design for a primer magazine found in the papers of Henry Shrapnell in the National Archives, Ottawa. A surviving gun made to this pattern by James Purdey in 1836 was formerly in the W. Keith Neal collection.



A384 William Westley Richards' patent No. 6,071 dated February 11, 1831, was intended to eliminate the "pieces of the cap in bursting" from being dangerous by replacing it with a primer with a shield. The primer [T4] is the basic feature of the patent.

A414 Fig. John Stanton, British Patent No. 49, Jan. 8, 1867; Gun Lock. The first Stanton the first rebounding lock patents



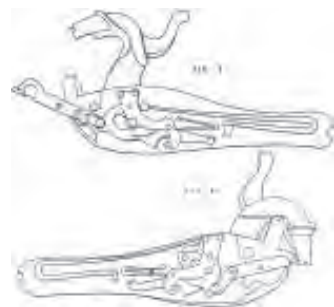
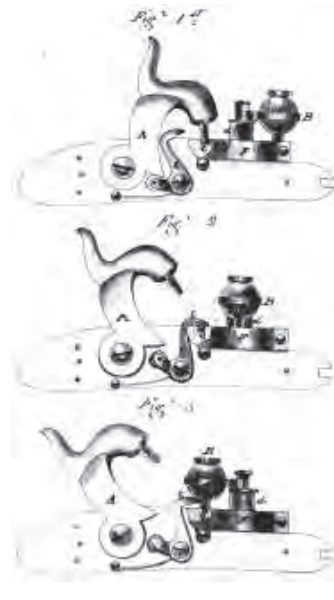
A160 Fig English patent No. 1,319 issued May 3 1862 to S. Merolla for a rain protector. As the hammer is drawn, the pivoted nipple cover is moved by a link connected to the tumbler



A415 Fig. Wm. P. Bardell & Wm. Powell, British Patent No. 2,287, Sept. 6, 1866; Gun & Pistol Locks. The first rebounding lock patent.



A416 Fig. Edward Thomas Hughes (Agents for W.F. Parker), British Patent No. 180, Jan. 19, 1872; Locks for Fire-Arms



A382 Fig. Joseph Egg's patent No. 6,829 dated May 6, 1835 covers a magazine on the barrel with a mechanism on the hammer to supply a single charge as the hammer falls. The primers may be powder or tube form. See also OA 386



A387Fig.11. The pill lock on a six-barrel “volley gun” by John Thompson of London who was active in 1826. *Ross Egles collection.*



A341 Fig. 5. In 1832, the gunsmith Thomas Hayward of Winchester submitted a percussion magazine which Blackmore records “was considered by Lovell to be the best of the magazine locks.” It is believed that this is the prototype constructed on an India Pattern lock shown to Lovell at that time. [M174]



A342 Fig. 6. One of six Thomas Hayward muskets included in the 1834-1835 British trials. The tubular magazine held round percussion pellets. When the hammer was cocked, one pellet was picked up in a cavity in a turning drum and put into position to be struck as the hammer fell. It is constructed on the India Pattern lock. *Royal Armouries Museum—Leeds.* FN



A015 Fig. W. & J. Rigby, Dublin, percussion cap lock with unusually long swivel. *Michael McNall collection.*



A348Fig.11. William Moore’s percussion tube-lock held a round tube in place by a U-shaped spring-clamp. No patent for this design has been found although it was widely used. This lock was submitted for the Ordnance percussion trials of 1834-1835.^{FN} *Royal Armouries Museum – Leeds.*



A335Fig.11. Joseph Manton’s 1818 tube lock of a later form by William Moore. [M067]



A374Fig.11. This percussion slider lock, probably the basis for Forsyth’s Third Model slider lock, is engraved “Rumford Patent” although no patent in England or on the Continent has been found for it.. [224]





A392 vFig.11. A flintlock pistol by Joseph Manton dated by serial number to 1808, that was converted to patchlock about 1825. *Keith R. Dill collection.*



A403 Fig.11. Joseph Manton flintlock converted by replacing frizzen with a combination nipple/pan cover. This plan was used frequently by Manton. *Paul Murray collection*



A159 Fig. From William Webster's patent No. 4590 dated September 14, 1821 which also covered an improvement to Forsyth's roller patent. Webster had worked for Forsyth from 1808 to 1818. *Photos courtesy D.H.L. Back.*



A157 Fig. George John Lacy and Sampson Davis, patent No. 6,046 dated December 6, 1830 claiming "the mainspring outside the lock and making a head fixed upon it act as a striker." It is marked "Davis" on the outside and S. Davis on the inside of the lock. It also bears an inspector-like mark; '6' over a 'crown' over 'SD' over 'Patent.' *Robert E. Brooker collection*



A158 Fig. This left lock from a flint double gun is engraved "à Liege" below the frizzen spring but the right lock is of a different shape and unmarked, even though the percussion mechanisms are well matched. Both locks have an inlaid panel (gold?) marked "patent" and "percussion" on the sliding reservoir carrier. The spelling of both words and the style of engraving suggest that the alterations were done in England. *Photos courtesy D.H.L. Back.*



A147 Fig. TWO VARIATIONS OF ELZECKEL DAKER'S STRIKING PAN for combination flint and percussion ignition introduced in 1821. The left with pill, *ex W. K. Neal collection* [M216], the right with percussion cap. *ex Herbert J. Jackson collection*.



A129 Fig. An "Improved Percussion" lock on a pair of pistolward Patrick of Liverpool. *Edwin Pugsley Collection, Cody Museum No. P-1264*.



A410 Fig.11. The lock from a single barrel pistol by William Green, Manchester Square, London. One of many marked "Patent" but no patent located. *Roger F. Phillips collection*.

The United States Patent Office (1790)

The United States patent act of 1790 established a procedure to provide rights to owners of inventions on submission of an application and a patent model supporting the invention. Revisions were passed in 1793 but it was not until 1836 that the Patent Office was officially established. Patents were identified only by the name of the patentee and the date of granting the patent. They are commonly know as “Name and Date” patents.

It was not until the establishment of the Patent Office in July 1836 was a new recording system was introduced based on the number issued to the patent on acceptance. All patents after the date of the establishment were numbered as a new series beginning with Patent No. 1.

Early in the morning of December 15 of that year, a tragic fire in the building housing the patent office destroyed all of the patent records along with the patent models which accompanied the application.

Congress immediately moved to restore the lost patents by offering to all who resubmitted copies, to replace them a no cost to the patentee. Only 2,845 of the Name and Date Patents were resubmitted and these were given numbers preceded by ‘X’ and are now identified as the X-Series. A small number of the new 1836 series patents had been destroyed in the fire but they were quickly recovered from their owners’ records.

The only official record of the patents issued before the fire is found in American State Papers, *Documents, Legislative and Executive of the Congress of the United States*, from which the following list with its brief description has been compiled. A partial record of new patents, sometimes with supporting documentation but very rarely with an illustration was published in the *Journal of the Franklin Institute*.

As has been noted, most of the patents granted prior to the fire have been lost and post 1836, the muzzle loading gun with a side-lock was being replaced by mechanical improvements. The result was that many of the patents were for pepper box pistols and, by 1840, the new revolver took precedence.

In the late 1850s, the United States Army was apparently looking for a way to increase fire power. Documentation on the program has not yet been found but there is a relatively large number of surviving designs proposed to speed repriming based on the Model 1842 martial pistol. In each case, a priming magazine was incorporated into the hammer. Some were patented but most probably were not. A number of them are illustrated here (Fig. 11.x-xx), but none were able to overtake the speed, convenience and acceptance of the Maynard tape primer patented in 1845 and the Sharps primer patented in 1852.¹

1. Gun report articles



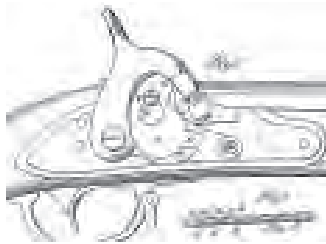
A390 Fig. Illustration from the *Journal of the Franklin Institute* for the patent granted Samuel L. Faries of Middletown Ohio, August 29, 1828. This is one of the few pre-1836 patents that is documented.



M220 Fig. Mule-ear pill or punch lock by Ephriam Gilbert covered under the Name & Date Patent April 3, 1829. Stamped (partially under hammer) *E. Gilbert Patent Rochester. [NY]* and inside the plate with the number 876. [M220]

Name and Date Patents

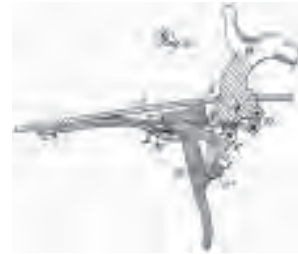
Patentee	Date	Description
West, Edward	1802/07/06	Pat. on gunlock
Sloat, Jonathan D.	1818/10/19	priming magazine
Colville, Alexander A.	1820/04/28	Pat. on gunlock
Shaw, Joshua	1822/06/19	Percussion gun
Medbury, J. & Kellogg, S.	1826/06/16	Rifle lock
Cromwell, Simon	1827/02/03	Pat. on gunlock
Hart, William A.	1827/02/20	Percussion punch lock
Davis, Marvel	1827/02/20	Pat. on percussion gunlock
Lowery, James B.	1827/09/10	Percussion gunlock mag.
Shattuck, Joseph	1827/11/10	Pat. a percussion gunlock
Moses, Oren	1828/05/03	Pat. percussion gunlock
Caswell, Jedediah	1828/05/08	Pat. on percussion gunlock
Lawrence, Joseph	1828/05/24	A percussion gunlock
Faries, Samuel L.	1828/05/29	Selfprime/waterproof perc. lock
Shaw, Joshua	1828/06/24	Improved percussion arms
Gilbert, Ephriam	1829/04/03	Gun Lock
Eastman, Robert	1829/12/07	Pat. pillbox Mechanism
Judson, Able	1831/06/13	Pat. a gunlock
Strong, Elisha	1831/08/02	Pat. on percussion sidelock
Richardson, Israel P.	1832/02/17	Percussion gun lock
Shaw, joshua	1832/10/24	Cannon lock
Shaw, Joshua	1832/12/03	Cannon lock
Gray, J.B.	1834/10/07	A gunlock
Daplyn, Thomas	1835/02/20	Pat. on percussion gunlock
Morrison, Samuel	1836/01/10	Pat. on gunlocks
Marsh, Johnson	1836/07/01	Gun & pistol locks
Chaplin, Ethan S.	1837/07/17	Pat. Improved gunlock



A460 Fig. 11. E d w a r d Maynard, Washington, DC. No. 4,508, Sept. 22, 1845.



A465 Fig. 11. Jesse S. Butterfield, Philadelphia, PA, No. 12,124, Jan. 2, 185.



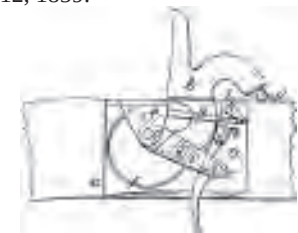
A469 Fig. 11. M i c h a e l Tromlay, Mount Vernon, IL. July 12, 1859.



A461 Fig. 11. William W. Marston, New York, NY. No. 6,514, June 5, 1849.



A466 Fig. 11. Edwin P. Monroe, Charlestown, MA No. 14,513, Mar. 25, 1856.



A470 Fig. 11. Anson P. Stevens, Brooklyn, NY. No. 38,249, Apr. 21, 1863.



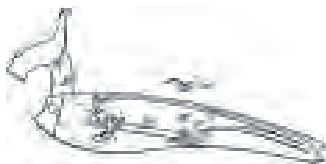
A462 Fig. 11. Christian Sharps, Hartford, CT. No. 9,308, Oct. 5, 1862.



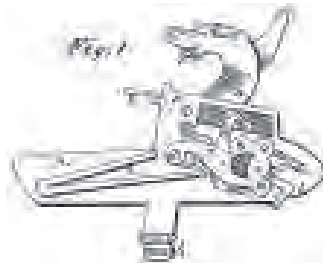
A467 Fig. 11. M i c h a e l Tromly, Mount Vernon IL. No. 18418, Oct. 18, 1857.



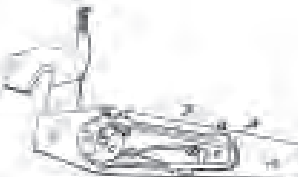
A473 Fig. 11. Cornelius W. Scott, Constantia, OH. No. 44,827, Oct. 25, 1864.



A463 Fig. 11. P. F. Charpie, Mount Vernon, OH. No. 9,934, Aug. 16, 1853.



A468 Fig. 11. Jesse S. Butterfield and Simeon Marshall, Philadelphia, PA. No. 24,372



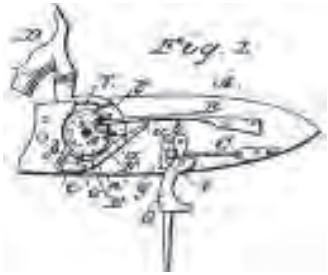
A474 Fig. 11. W i l l i a m Rudolph and August Braun, San Francisco, CA No. 54,021, Apr. 17, 1866.



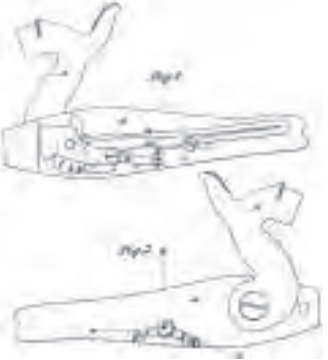
A464 Fig. 11. James Hulst, Alum Creek, OH. No. 10,927, May 16, 1854.



A475 v Fig. 11. James E. McBeth, New Orleans, LA. 58,443, Oct. 2, 1866.



A476 Fig.11. S a l m o n Belden and John Franklin Crabtree, Visalia, CA. 76,587, April 14, 1868.



A477 Fig.11. Alfred Young, Philadelphia, PA. No. 104,394, June 14, 1870.



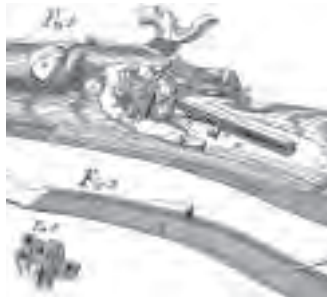
A479 Fig.11. John Sidney Heath, London, England. No. 138,887, May 13, 1873.



A480 Fig.11. D a n i e l Moore, Brooklyn, NY. No. 145,118, Dec. 2, 1873.



A481 Fig.11. James M. Grisham, Towash, TX. No. 152,990, July 14, 1874.



A478 Fig.11. Dillon H. Mapother, Louisville, KY. No. 135,233, Jan. 28, 1873.



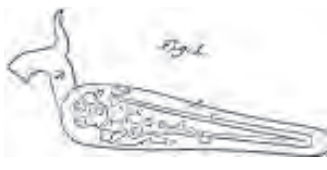
A482 Fig.11. S o l o m o n Rush, Reynoldsburg, OH. No. 153,848, Aug. 4, 1874.



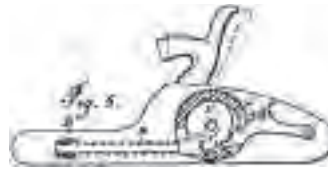
A484 Fig.11. Charles E. Best, Jordan, NY. No. 216,370, June 10, 1879. Assigned to Charles T. Phillips.



A425 Fig. Harry Comstock, U.S. Patent No. 414,796, Nov. 12, 1889; Gun Lock Assigned to Hunter & Comstock Arms Co., Fulton, N.Y.



A426 Fig. John Frick, U.S. Patent No. 426,004, April 22, 1890; Gun Lock.



A427 Fig. Henry Pieper of Liège, U.S. Patent No. 591,291, Oct. 5, 1897; Lock Mechanism for Firearms.



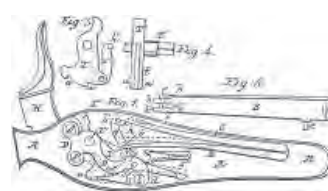
A428 Fig. Frank Snyder, U.S. Patent No. 695,242, March 11, 1902; Gun Lock Assigned to Hunter Arms Co, Fulton, N.Y.



A429 Fig. Charles E. Sneider, U.S. Patent No. 149,353, April 7, 1874; Rebounding-Locks, Assigned to himself & Duncan C. Clark of Baltimore.



A432 Fig. Albert J. Aubrey, U.S. Patent No. 902,639, Nov. 3, 1908; Gun Lock.



A417 Fig. John Stokes, U.S. Patent No. 84,314, Nov. 24, 1868, Gun Lock. Assigned to Wesson Firearms Co., Springfield.



A418 Fig. Joseph C. Dane, U.S. Patent No. 124,939, March 26, 1872; Improvements in Gun Locks, Assigned to Charles Parker of Meriden, Conn.



A423 Fig. Everett L. Lake, U.S. Patent No. 289,423, Dec. 4, 1883; Lock for Fire-Arms



A419 Fig. Lewis L. Hepburn, U.S. Patent No. 162,473, April 27, 18, Gun-Lock.



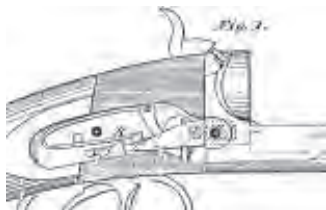
A424 Fig. Charles A. King, U.S. Patent No. 412,340, Oct. 8, 1889; Rebounding mechanism for breech-loading guns.



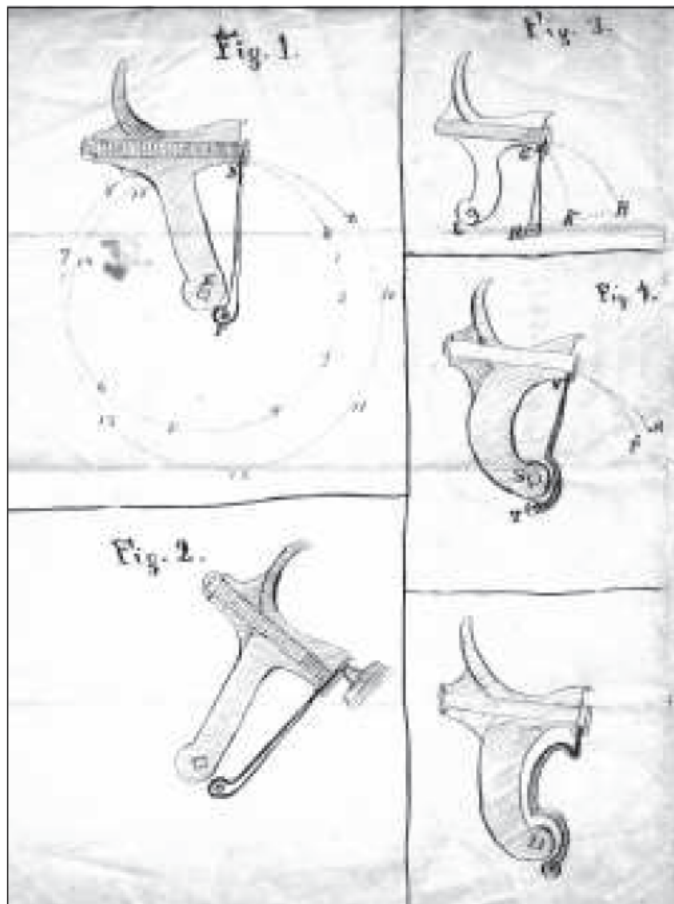
A420 Fig. David Kirkwood & Henry Mortimer, U.S. Patent No. 169,710, Nov. 9, 1875; Locks for Fire-Arms.



A421 Fig. John A. Nichols & Joseph W. Livingston, U.S. Patent No. 198,669, Dec. 25, 1877; Gun Locks.



A422 Fig. William H. Baker, U.S. Patent No. 199,773, Jan. 29, 1878; Locks for Fire-Arms.



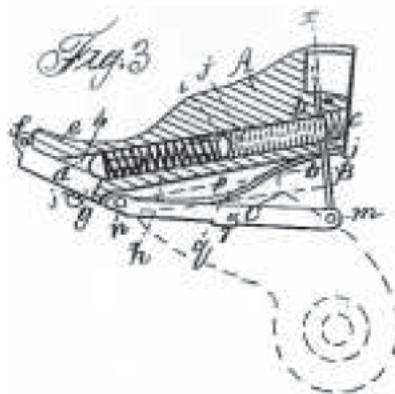
A488 Fig. 11. Roswell Harvey Phelps. A manuscript sketch of five variations for hammer magazines, c.1860. *ex John Hoveness Hintlian collection.*



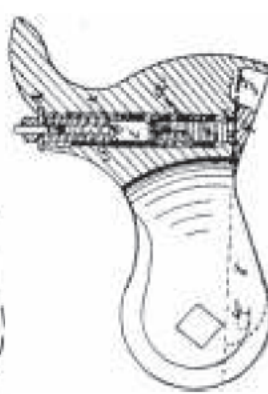
A485 Fig. 11. John H.B. Latrobe, Baltimore, MD. U.S. Patent No. 14,319, Feb. 26, 1856



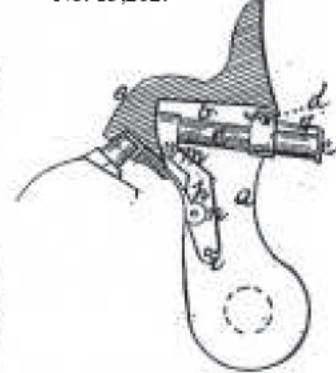
A489 Fig. 11. James N. Ward, U.S. Army, U.S. Patent No. 15,262.



A471 Fig. 11. Arthur F. Tait, Morrisania, NY. U.S. Patent No. 38,770, June 2, 1863



A486 Fig. 11. William H. Bell, Washington, DC. U.S. Patent No. 22618, Jan. 18, 1859.



A487 Fig. 11. George W.B. Gedney, New York, NY. U.S. Patent No. 23,241, Mar. 15, 1869. A stick primer (P17, P18?)



M118 Fig. William Jenks of Columbia, South Carolina obtained U.S. Patent No. 747 in 1838 for a side-hammer lock for a breech loading firearm. This, from a carbine of 1847 with a Maynard primer is stamped 'Remington' over 'Herkimer' over N.Y. on the plate and '587' on the hinge of the magazine cover. [M118. see also M163]



M117 Fig. Sharps' New Model 1859 with the Lawrence primer marked on the plate, C. SHARPS' PAT. / OCT. 5th 1852 and R.S. LAWRENCE PAT. / APRIL 12th 1859 near the primer mechanism,.



M116 Fig. Pattern 1855 U.S. Springfield musket with Maynard's tape primer, dated 1858.



M162 Fig.11. James Durrell Greene's U.S. Patent No. 10,391 dated January 3, 1854 and Patent No. 11,157 dated June 27, 1854 were incorporated into 2,000 carbines fitted with Maynard's patent tape primer were made for the British War Office and delivered in 1858. They were not issued in quantity at any time and large numbers of the locks were sold in the 1940s and again in the 1960s.



A112 Fig. American military experimental lock fitted with Butterfield's priming system. Stamped in front of the hammer *Butterfield's Patent Dec 11 1856 Philada and Harpers Ferry* and the date 1859, only the last digit of which is clear. *U.S. Military Academy Museum.*

Chapter 11d

The French Patent Office (1791)

The Patent Office established at Paris in 1791 provided a vehicle for French gunmakers and others to create and record improvements to Forsyth's system. Some 19th century French historians even suggest there was a French origin for the percussion system before Forsyth's patent in 1807 but 1810 is the earliest date found for French percussion patents issued to Lepage in June, Prélat in October, and de L'Etang in September.

François Prélat, the Parisian gunmaker's patent, was a *brevete d'importation* — a licence on the importation — used an illustration of the lock and roller magazine being produced by Forsyth but there is no evidence that he did so with Forsyth's permission. In 1818 he obtained another patent which included pellet priming, and a *certificate d'addition* in 1820 which covered the tubes (patented by Joseph Manton in 1818) and the percussion cap (introduced by Joseph Egg in 1818).

The illustrated record in which most of the following can be found, is in a series of publications produced in the early decades of the 19th century. *Description des machines et procédés consignés dans les brevets d'Invention, de perfectionnement et d'Importation* is a series covering the years 1791-1844, starting with Vol. 1 published in 1811 to Vol. 91 published in 1860.

The *brevets* (patents) contained in the volumes appear in a numerical order which does not appear to be the order in which they were granted and are not associated with a patent number. Other sources provide different patent numbers for the same date. For this reason, patent numbers have not been included here.

The word *brevet* can cover either a patent or a licence; *Brevet d'Importation* (Cd'I) covers an exclusive right to import, while a *Certificat d'Addition* (Cd'A) covers an addition or alteration (sometimes with quite radical changes), to the original patent.

I am grateful to Amand Leveau for his frequent and important contributions to this chapter. His coloured photographs of the original Prélat *addition* in 1820 confirms the accuracy of entries that have frequently been used incorrectly, to give Prélat credit for invention of the percussion cap.

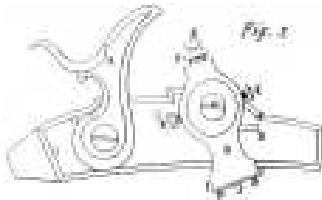


Fig. 046 François Prélat. Arquebusier du Comte d'Artois, later, Arquebusier de S.A.R. (Son Altesse Royal) Monsieur Frère du Roi, Paris. Brevet d'Importation dated April 17, 1810.

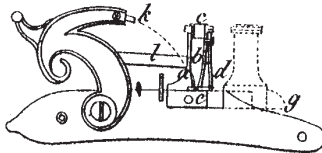


Fig. 052 Charles Joseph Bruneel, arquebusier at 16 rue St. Dominique, Lyon. Patent dated August 26, 1819. Cd'A March 20, 1820.

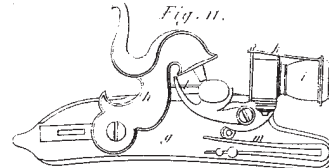


Fig. 054 Clement Pottet. Paris Patent dated October 24, 1820. Cd'A November 24, 1820.

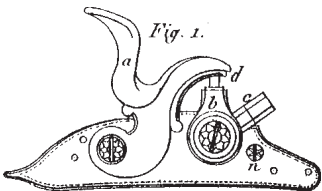


Fig. 048 Prosper de L'Etang, armurier at 28 rue de L'orangerie, Versailles. Patent dated September 26, 1810.

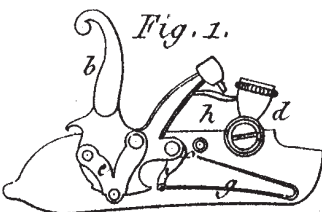


Fig. 051 Clément Pottet, armurier & arquebusier. Paris. Patent dated August 28, 1818, Cd'A November 16, 1819.



Fig. 049 Jean Baptiste Cessier, Arquebusier St. Etienne. Patent dated June 3, 1816. Cd'A January 30, 1821.

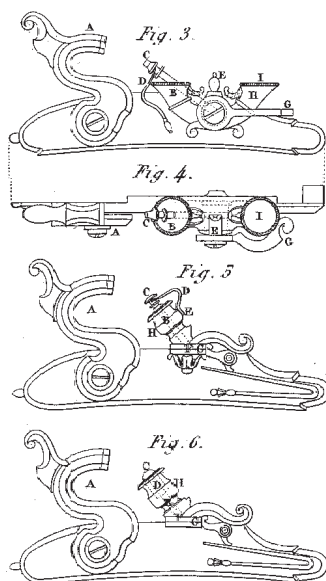


Fig. 047 Jean Lepage (1746-1834), Arquebusier de l'Empereur and Arquebusier du Roi, Paris. Patent dated June 23, 1810.

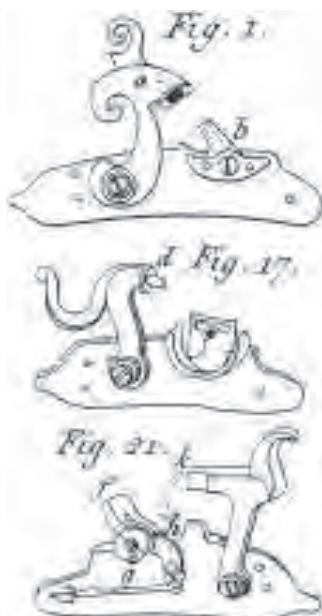


Fig. 050 Joseph-François Prelat. Arquebusier du Comte d'Artois, Paris. Patent dated July 29, 1818. Cd'A February 26, 1821

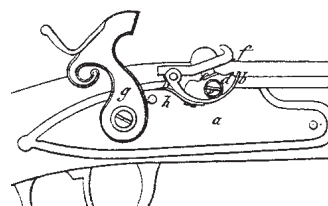


Fig. 057 Eugène Pichereau, arquebusier, Paris. Patent dated February 5, 1821.

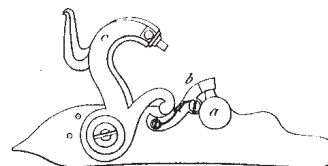


Fig. 063 Jean-Baptiste Nicolas, armurier, Verdun. Patent dated December 28, 1821.



A626 Fig. 12. Philippe Guillemain-Lambert Patent September 11, 1835, Cd'A No. 6,932 French Patent 6,507. CdA No.6932, August 19, 1836.

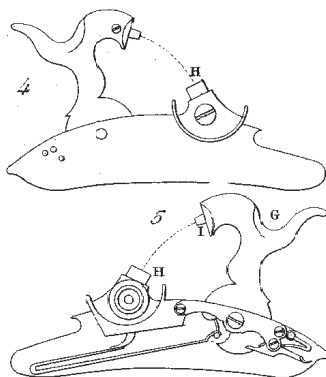


Fig. 053 Albert-Henri-Marie Renette, arquebusier, canonier & Fabricant d'armes du Roi, Patent dated March 16, 1820. Cd'A September 22, 1820

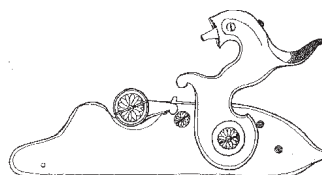


Fig. 43. Jean Jacques Blanchard. 36 rue de Clery, Paris. Patent dated January 16, 1821, Cd'A April 19, 1821.

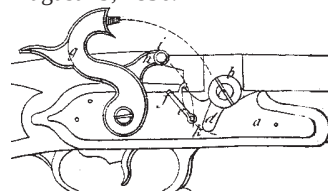


Fig. 066 Charles Mahiet Fils, arquebusier at Chinon. Patent dated March 6, 1823.

Replace illustration

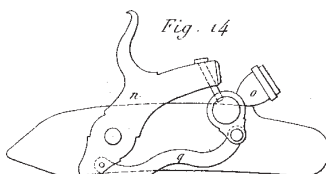


Fig. 055 Clement Pottet patent dated October 24, 1820. Cd'A to 1818.

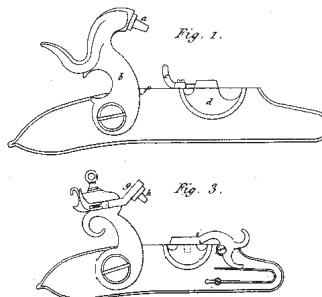


Fig. 060 Jacques Aimable Puiforcat, arquebusier, and fourbisseur, Paris. Patent dated June 6, 1821.

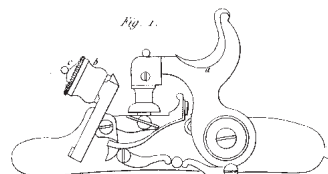
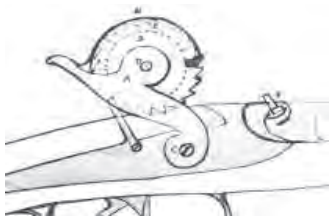
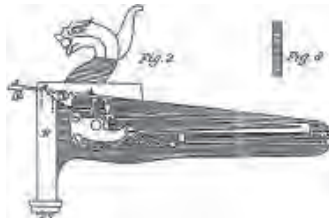


Fig. 067 Pierre Alexis Lefaure, armurier at Presles. Patent dated August 21, 1823.

Fig. 055 Clement Pottet patent dated October 24, 1820. Undated Cd'A,
I do not understand this.
Under a publication dated 24 October, 1820,
1st addition, 2nd lock
???



A437 Fig.11. Magloire Docile
Henriet French patent No. 1,275
dated April 16, 1845 for an
automatic cap carrier on the
percussion hammer.



A444. Fig.11. Left: French patent 38,195, September 28, 1858 granted
to Joseph L. Chester of Philadelphia, Pennsylvania who was represented
by 'Tolhausen,' an agent in Paris. This is the French patent protecting
Butterfield's American Patent. The right illustration is from a Francis
Bannerman catalogue dated January 1945, a usually accurate source for
illustrations, where it is recorded as "from a European museum."

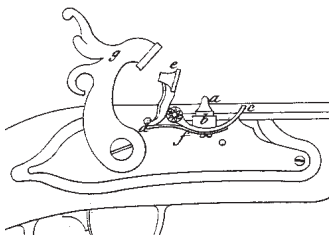
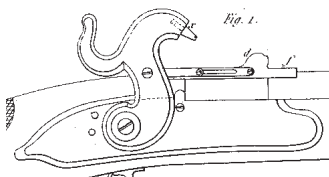


Fig.058 Alexis Moreau,
Arquebusier, 50 rue Montorgueil,
Paris. Patent dated February 9,
1821.



A065 Fig. Philippe Guillemin-
Lambert, armurier. Patent dated
September 27, 1822.

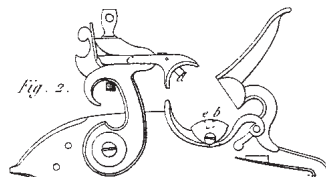


Fig.059 Jean Lepage. arque-
busier, Paris. Patent dated March
12, 1821.



Fig. 062 Fig.11. Etienne Dabat, arquebusier, 66
rue du Faubourg Saint-Honoré, Paris. Patent dated
December 28, 1821. This ignition has all of the
characteristics of Joseph Mantons 1816
unsuccessful pellet lock.



Fig. A441 Philippe Guillemin-Lambert, armurier,
Autun. Patent dated September 27, 1822. (C d'A
August 21, 1823, March 31, 1825).



A438 Fig.11. Photograph of one illustration
from the Jean Lepage patent dated June 23, 1810.
See Fig. A047



A442 Fig.11. François-Marie-Agathe Des Maurel &
Pierre-Paul-Firmin Bessieres, patent No. 10,496
dated May 25, 1840 for a "system with automatic
priming." C d'A February 15 1841 and July 18, 1843.



M158 vPercussion pill lock made to Jean Lepage's French patent of June 23, 1810. It is a single shot and does not have a primer magazine suggesting that it is only a slight variation of the ignitions covered in that patent. [M158, M207]

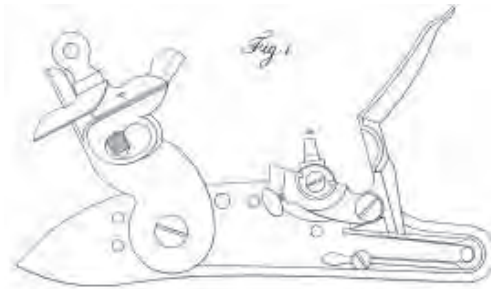


M159 vFig.11.Tube lock of unusual construction. The centrally hung hammer is of parrot shape, identical to that illustrated in French patent No 1110 granted to Louis Marin Gosset dated 11 July, 1820. The tube is apparently prevented from ejection by a heavy, hinged stop. It is unmarked. [M159]

Chapter ~~XX~~ 11e Central Europe, Unpatented

In most of Europe during the years when early small-arms evolution was underway there was no overall administrative patent authority. Although some patents were granted in some states there was apparently a common agreement by kings, princes, dukes and government leaders to keep the numbers low and to accept only the most important presentations.

Prior to the defeat of Napoleon, central Europe was governed as a complex grouping of states but in 1814-1815, the Congress of Vienna put together a large group of German states, including Austria, into a German Confederation. The Hohenzollerns of Prussia and the Hapsburgs of Austria were in almost continual conflict that produced a military confrontation in 1866 in which the Prussians were victorious, consolidating their control over a new North German Confederation with an independent Austria to the south. Five years later, France went to war with Prussia, was soon defeated, lost Alsace and part of Lorraine, and in 1871 a new German empire, the first unified Germany was formed with the king of Prussia as its Kaiser.



A309 Fig. An experimental military conversion with a sliding pan cover containing a percussion nipple, held in place by a thumb-screw, and a reversible combination top jaw and hammer, held by the flint screw, illustrated in *Ubhandlung Feuer- und Seitengewehre* by Beroaldo Bianchini, Vienna, 1829. Photograph courtesy Musée d'Arms, Liège.



A310a,b. Fig. Joseph Contriner's percussion design with a primer magazine activated by the action of the hammer Plate XXII from *Ubhandlung Feuer- und Seitengewehre* by Beroaldo Bianchini, published at Vienna 1829. Photograph courtesy G. Charter Harrison.



M211 Tube Console (pre Augustine), Caesar R^a. Mfg. Brescia

Description : A flintlock converted to Console's system of tube ignition, retaining the original flint cock. The lockplate of flat configuration with beveled edges, is engraved *Caesar R^a Manf. / Brescia* [1797-1802]. Most parts are numbered "XVI" (316?) which Robert Held describes as a contractor's number. The pan has been replaced by a receptacle with a triangular opening for the tube; the frizzen has been replaced by a tube cover with a blade-like tube-striker. It is stamped in the interior: "450" under the tube opening. See M115



M115 Fig. 11. This percussion lock which is dated 1828 on the lockplate began life as a flintlock. It was converted to tube lock percussion as the Austrian Model 1841. Known as the invention of Giuseppe Consol as improved by Gen. Vincien Augustin, this tube lock is probably one of those sold to the U.S. Government during the Civil War and later sold by Francis Bannerman of New York. See also M211.



M272



M266



A162



A right hand percussion lock with horizontal sear. In principle, the action of this lock is identical to that of the English Lock of c.1620. In the half cock position a branch on the lower half of the sear rests in an inclined shelf on the tumbler. At full cock, a hook on the horizontal sear wraps around a spur on the upper portion of the tumbler. Pressing the sear backwards with the trigger, lifts both out of the way to allow the hammer to fall.



M218 Perc Danish, internal hammer, in the white

Description : A percussion version in pistol size of the flintlock designed by Christian Wilcken Kyhl which became the Danish Pattern 1807. It is unmarked, of robust, simple construction, with internal hammer and round-surfaced plate.



M251 Perc. Right percussion with enclosed hammer

Description : The right lock of a pair of Continental enclosed hammer percussion locks with flat plates and single stock screws. The plates are of pointed flint lock form and are shaped for a pan-shaped bolster but there is no evidence that they have been converted from flint. Associated with No. 252.



A765 Fig. English percussion lock of George Lovell's first back-action design introduced in 1838. *Harold R. Jonah collection*



A785a Grey Edward Paekert Ted Girodet

Breech Loading Firearms

Pin-fire, Center-fire; Rebounding & Hammerless



The desire for greater firepower was always present in the mind of the military or sport shooter and quicker loading was always the most logical route to achieve it. Early wrought iron perriers made at the forge and accompanied by a combination chamber and breech box were adequate for the military but escaping gas was too much for sportsmen to accept.

There were early attempts to solve the problem, one of the most well know being a wheel-lock rifle made for Henry VIII in the Tower of London, designed with a breech block hinged at the side that would secure a cartridge pushed into a chamber in the barrel.

Similar cartridge arrangements were produced in wheel-lock ignition and more commonly in flintlock during the 17th and 18th centuries but there was little chance of success until the invention of a self contained cartridge which would seal the breech to prevent the escape of gas in that direction. That meant powder, ball, and a primer, in a single unit, a combination which was used by a few gunmakers for special customers by combining a cartridge with a pan and frizzen. But again,

considerable fouling at the breech and escaping gas was still a deterrent to its production in any great quantities. The solution to that problem was not created until the second quarter of the 19th century.

In 1812, Samuel Pauly (1766-1821), a Parisian gunmaker, obtained French patent No. 843, the first for a breech loading gun and a self-contained cartridge. The cartridge had a removable turned brass base into which a pill or pellet primer was placed, and the whole was threaded into a paper or metal cartridge. In the years that followed, there were other similar patents but none achieved obturation, the sealing of the breech to prevent the escape of gas on discharge.

The first commercially viable breech-loading sporting gun with drop down barrels was introduced in 1833, to begin a relatively short period — less than 50 years — of continual shotgun development. During that half century, much of the innovation

A406 Fig. 12.1 A breech-loading cannon (powder box missing.) recovered from Lac de Deux Montagnes, Quebec, at the west end of Montreal Island, dating from between the establishment of Fort Senneville in 1671 and May 7, 1691 when it was destroyed by the Iroquois. Illustration from *The Dominion Illustrated News*, Oct. 25, 1890, p. 286. *Stewart Museum collection*, Montreal.



A408 Fig. 12.2 The Lefaucheux breech-loading gun patented in 1833 as illustrated by W. W. Greener in *The Gun and its Development* in 1888.

A407 Fig. 12.3 The illustration which accompanied the fourth addition to Casimir Lefaucheux's patent for the pin-fire cartridge submitted to the French Patent office in 1835.



A409 Fig. 12.4 George H. Daw's patent breech-loader with a detail of the cartridge and his primer. The primer components are: A. Cap on anvil, showing the end that rests on the powder; B. percussion cap; C. The Anvil; D. End view of ditto."



A Fig. 12.5

that was directed more from the ignition to the mechanism of the action, was recorded by John Henry Walsh (1810-1888) who frequently wrote under the pen-name “Stonehenge.” As a physician with the Royal College of Surgeons by age 22, he published his first book in 1852 and his *Rural Sports* in 1856. The same year, he joined the *The Field*, a magazine for rural life and sports established in 1853 and in 1857 he became Editor. Over the next 30 years, *The Field* conducted fact-finding trails in many areas of gun performance which he reported and whenever gunsmiths had a new product, he reviewed it. William S. Curtis [FN1 records how the Trials brought him into contact with guns and gunmakers to an unusual degree giving him a greater opportunity than any person outside the Trade of seeing varieties of system and workmanship. In 1882 he published the first and in 1884 the second volume of *The Modern Sportsman’s Gun and Rifle* which brought together the text and illustrations of literally hundreds of new gun mechanisms, thereby providing a comprehensive record of sporting gun development in those first 50 years.

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Returning now to the evolution of sporting gun ignition as seen through the eyes of John Henry Walsh. In 1833, the Parisian gunmaker Casimir Lefauchaux obtained French patent No. 5,138 for “A New Gun Loaded Through the Breech.” With it was associated a cartridge which, like Pauly’s, had a self contained but composite cartridge ignited in the traditional way with a percussion cap and nipple. It did not survive for long with that cartridge.

On March 31, 1835, he was granted his fourth *Certificate de Additione* to No. 5,138 covering what became known as the ‘pinfire’ cartridge which when incorporated into his breech-loading gun on the original patent, immediately became successful. The cartridge as originally designed was of paper and thin metal construction, closed at the rear. Inside, at the base, was placed a common percussion cap where he inserted, through the wall of the case and perpendicular to the case was positioned an iron ‘firing pin’ positioned to strike the percussion cap inside the cartridge. The breech of the drop-down barrels had a small slot to accept the pin and the hammer was designed to land squarely on the pin to detonate the cartridge. The pin was used for manually extracting the cartridge after firing. W.W. Greener later wrote about the drop-down barrels: “This is the most convenient and handy arrangement for double-barrel breech-loaders.”

Walsh records that Lefauchaux’s gun was introduced to English sportsmen by Mr. Lang, (Joseph Lang & 22 Cockspur St., Charring Cross) about 1857.[FN2]

William Wellington Greener, in *The Gun and its Development* published in 1888, glowingly wrote:

It is now some years since the breech-loading system firmly established itself in this country as a sporting or military weapon. Although the English are unable to claim the invention of this system, it is through their energy and untiring industry that it has achieved such magnificent results, and been brought to its present state of perfection.

The invention when first introduced was in a very crude form. We give in [Fig. 12.2] an illustration of the original Lefauchaux Breech-loader, which may be termed the first successful breech-loader on the drop-down system; although so to speak, a practically useful weapon when first introduced, the action was weak and the imperfectly developed, but the great achievement was the introduction of a shell or cartridge case which should fit the breech of the gun. The shell or case, by expanding at the moment of discharge, effectually closed the breech-joint, and prevents the escape of gas. ... The pin cartridge case has been greatly improved upon

M177



M177 Fig. 12.6 The breech of B.L. double gun with a side lever which, when pressed, lifts the hammers to half cock to allow the firing pins to retract. This design would have appeared after the center fire cartridge became popular about 1862 and before it was superseded by the rebounding lock first patented in 1866. It is marked *Beacham's Patent* and engraved *Perry & Yeld*. [M177]

by the rim-fire and central-fire principles, but these are only modifications of Lefauchux's plan [FN3]

By the 9th edition published in 1910 Greener was not quite so complimentary

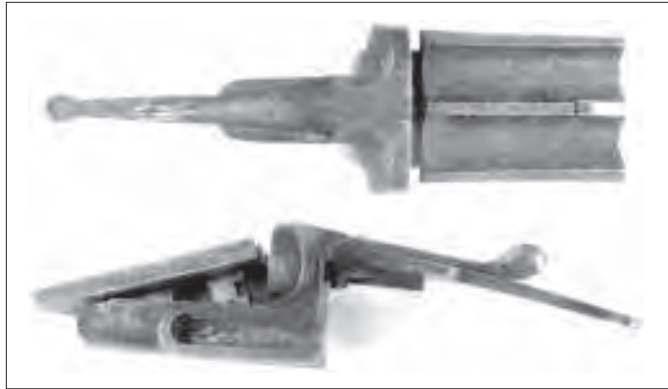
The pin-fire cartridge and the modern breech-loader, even in this form, were not the outcome of any one great invention, but resulted from one improvement after another, each later for differing but slightly from the one which immediately preceded it. By the modification and combination of details a principle of breech-loading was gradually evolved, and although that principle has never since been departed from with success, the breech-loading gun, in all its minor details, has been radically changed. The chief alterations have been in the breech-action and the lock mechanism, and it is by tracing these changes that the best idea of the development of the modern gun is to be obtained, and it is by describing them that the history of the gun will be unfolded. [FN4.]

The breech action of the Lefauchaux gun is a crude mechanism. The first cartridges were without rims, and the gun had no extractor, the fired cases being withdrawn by the striking-pin. The great fault of the gun is the weakness of the breech action and the clumsy and inefficient method of securing the barrels thereto; defects which English gun-makers were quick to observe and remedy. [FN5]

In 1861, George H. Daw, Gunmaker, at 57 Threadneedle St., London, introduced a new breech-loading gun and at the 1862 International Exhibition in London he was awarded a prize medal for a "Central-Fire Breech-Loader." It was built with drop-down barrels and, his center-fire cartridge, was a considerable improvement over the Lefauchaux invented in 1835 and won immediate approval. He described it:

The patent central-fire cartridge presents a similar appearance to the one just alluded to [the pin-fire] with this great and important exception, *there is no brass pin*. The reader, on examining the woodcut will see that the detonating cap is in the center of the cartridge, and slightly below the surface. By this depression, the base can be struck with any amount of force without the cap itself being touched. Here is a great element of safety; the cap must be actually struck by something resembling the piston before any explosion can take place.

The construction of this part of the cartridge is as follows:—In the centre of the base is a metallic cup, with a touch-hole drilled through the top. This cup is so attached that it forms part of the base itself, the part with the touch-hole projecting forward, inside, so as to be embedded in the powder. Then a small four-grooved "anvil," with a point like a Jacob's rifle-shell, fits loosely into the cup, and upon the "anvil" is placed the percussion cap.



A083 Fig. 12.7 A commercially available conversion breech to transform a double barrel muzzle loading gun into a breech loading gun, probably dating from the 1870s. J. M. Davis Gun Museum, Claremore, Oklahoma.

It will thus be seen that when the hammer strikes, the cap explodes *within the breech*, and the flame darting down the grooves of the anvil,” having only a tenth-of-an inch to go to the centre of the charge, instantaneous ignition is always the result. There is no escape of gas nor flash of the cap in the eye to glare upon it, or impair its accuracy for the next fire; no danger of a piece of the copper flying off against the face.

Another quality of this cartridge is, that it can be kept anywhere and sent anywhere, and carried about with the greatest confidence.[FN Daw p16-17

• • • • •

Under the trigger guard is the opening lever, ... Holding the gun in the ordinary way for charging, this lever is thrown downwards by the thumb of the right hand; its function is to press back, or unlock a powerful steel bolt that works from the centre of the false breech-pieces into the locking socket, between the breech ends of the barrels.

What looks like the usual nipples are so in reality, but there is an addition which completely alters their principal of action. Placed inside of what is the ordinary touch-hole of the nipple is a stout steel piston, held in its proper position by a simple spring bent against a shoulder on its centre, and this position is, that the top of it shall project about the eighth-of-an-inch above the top of the nipple itself, by means of the spring pressing it upwards. The nipple may be said to form a very small cylinder, bored right through the false breech-piece as will presently be understood.

Let the gun be charged and locked for firing. Then the hammer strikes the top of the piston, sends it down the nipple cylinder, the lower end coming through the small bore in the false breech-piece, as already mentioned, striking in its turn the percussion cap in the centre of the cartridge—which latter will be explained here-after—and exploding charge. When the hammer is raised, the spring at the same instant returns the piston to its place, standing above the nipple ready for another discharge.

It will now be seen on reference to the drawing, that the nipple is placed at such an angle in the false breech-piece, that when the breech-pieces are locked tight for the purpose of discharge the breech-end of the piston must strike the cartridge right in the centre where the cap is fixed and no other place: hence the distinctive name of “Patent Central-Fire.”[FN6 p.12

The secret to perfection of the breech-loading sporting gun’s success lay in the cartridge. There was considerable controversy over the ownership of patent rights and a clear picture from primary sources will always be tainted by the writer. Stonehenge seems to have stood above the conflicts and I present his comments.

At the time of the introduction of the Lefauchaux gun into England the pin cartridge case was the only one used ... Soon afterwards, however, the Pottet central-fire, as constructed by Eley, Joyce, and of late Kynoch, in this country, came into general use, and supplanted the pin. [FN7

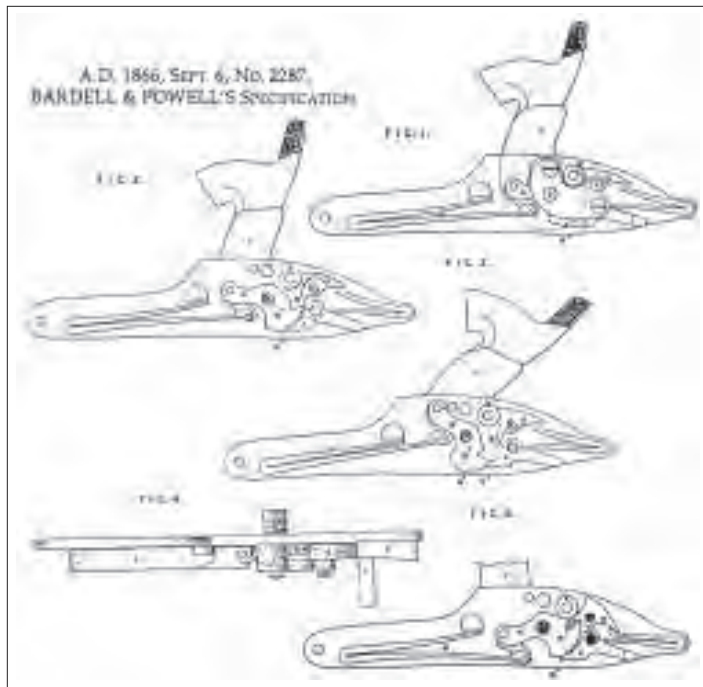


Fig. 12.8 William Powell, Gun Finisher and William Powell Gun Lock Maker, both of Aston in Warwick County near Birmingham, were granted the first patent for a rebounding lock in 1866. No record has been found for Powell which probably means that he rented bench space from another lock maker. It may have been William Powell at Hasluck's Building in Baggott Street, Aston.

The final improvement the cartridge case, which has stood with slight alterations to the present time, was effected some eight or nine years afterwards (i.e. after Lancaster's design of 1852, that is, about 1860-61.) by M. Pottet, who patented it in Paris and London. This plan, with a slight change effected by M. Schneider, was introduced into England soon afterwards by Mr. Daw, gunmaker, of Threadneedle-street, London, and shown by him at the exhibition of 1861 [actually 1862], with a modification of Lancaster's striker, driven ...[FN8 p146-7]

The center-fire cartridge worked quite efficiently but it was not entirely without difficulties. The problem this combination created was that the firing-pin which detonated the cartridge got hung-up when the barrels were dropped or raised. A few attempts were made to resolve the problem with a lever to retract the hammer [M177] but the solution was a new lock design – the rebounding lock – which, with a relatively minor but very significant alternation, removed the pressure on the hammer allowing the problem to be eliminated.

Rebounding Sidehammer Locks

The first English rebounding side-hammer lock patent, the first of many throughout the world, was covered under patent No. 2,287 granted on September 6, 1866 to W. P. Bardell and William Powell, gunmakers, both of Ashton near Birmingham. It was quickly followed on January 8, 1867 by Patent No. 49 granted to John Stanton of Wolverhampton, a gunlock maker. This too was quickly followed by patents granted to Thomas Rigby of Bradmore near Wolverhampton on February 6 and another to John Stanton on February 9, 1867. The Rigby patent was not illustrated but the text seems to describe Stanton's action:

When by the action of the trigger the hammer is allowed to fall the nose of the hammer strikes upon the needle or pin or striker in the usual way, but the prolonged or projecting part of the crane of the tumbler strikes upon the upper end of the mainspring just before the hammer



A435 Fig. 12.9 George Daw's double hammerless gun introduced about 1862 had the lock mechanism fixed on the trigger plate and firing pins parallel with the barrels. (Greener 18881, Fig. 214-5)

reaches the lowest point in its descent; the said upper arm of the mainspring is thereby depressed, and it immediately reacts on the upper part of the crane, lifting the said projecting part and with it the tumbler and hammer; the hammer is brought to half-cock or to such a height that a bent in the tumbler engages with the sear and maintains the hammer in the position it has been brought to by its rebound. [FN9]

That pattern lock quickly became standard on almost all English falling-barrel guns. It is not known if, or what, legal negotiations took place between Stanton and Rigby, but a great number of rebounding locks are stamped on the inside: *Joint Patents* over *J. Stanton & Co.* over a serial number – usually in a five-figure number preceded by a letter.

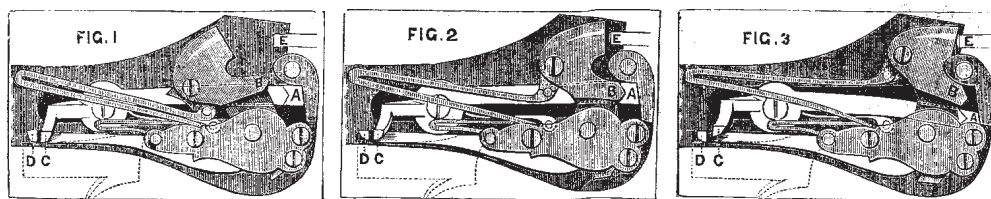
The Hammerless Lock

The lock which gave the hammerless gun its name arrived on the scene after the intended scope of this *Aide Mémoire* ends. It nevertheless should be given at least brief consideration.

It was not long before the hammerless lock, that is, one with no visible external hammer, was developed, with improvements coming in rapid succession. Mr. Walsh wrote, “To Mr. Daw, of Threadneedle-street, London, is due the credit, if credit there be, of devising the first gun without hammers, using his improvement on the Pottet cartridge with its detonating cap, instead of the friction cap used by Mr. Needham. It was patented in 1862 [No. 1,594], but was a clumsy piece of mechanism, and never attained any degree of popularity.”¹FN10 p.176-7

Thomas Murcott, gunmaker at 68 Haymarket, London, was the first to patent a practical hammerless action granted April 15, 1871, No. 1,003. The patent illustrated two versions and described them as applicable to drop-down or those in which “the barrel or barrels move to the front or move laterally in or on the stock, and other breech-loading arms.”

W. & C. Scott, the Birmingham gunmakers established in 1840 were joined by William's son William Middleditch Scott, in the 1850s. The son's talent was productive of numerous patents, all of which were successful, but one of which received great international acclaim. His patent No. 761 dated February 23, 1878 granted to him and to Thomas Baker, a gun-action maker with the firm was describe by both W.W. Greener and J.H. Walsh [FN11 at great length as the most ingenious and safest available to the trade. It was licensed to gunmakers throughout Europe and America. Holland and Hol-



A096 Fig. 12.12. This illustration of W. & C. Scott's "Patent Safety Lock," patent No. 761 of 1878 is from the 1881 catalogue of Joseph C. Grubb Co., gunsmiths, at 712 Market Street, Philadelphia. It was also used by W.W. Greener (1881) and J. Walsh (1882).

land marketed it as the 'Climax Safety Hammerless' and advertised it as "Absolute security, not only when the locks are bolted, but even when placed at full cock ready for discharge."

Prior to the introduction of hammerless locks in England, many of the gunmakers in America were supplied by the gunlock makers working in the towns of Staffordshire that surrounded the gunmaking center of Birmingham. But by the 1870s, factories in New England and New York had started mass production of rebounding and hammerless locks for the trade. The major establishments, D.M. Lefever and Sons in Syracuse, W.H. Baker and The Baker Gun Company in Syracuse, and the Ithica Gun Co. at Ithica, all in New York State.

Notes and Recommended Reading

1. Walsh, J. H. (Stonehenge). *The Modern Sportsman's Gun and Rifle*. London: Horace Cox, 2 Vols. 1882. 1884. Reprinted by William S. Curtis Publishers, 1988. (Henceforth recorded as "Walsh" plus 1882 and page number).
2. Walsh, 1882, p. 143.
3. Greener, W.W. *The Gun and its Development with Notes on Shooting*. London: Cassell & Co. 1881 (2nd edition) 1888 (4th edition), 1910 (9th edition) p. 228. (Henceforth recorded as "Greener" plus date and page number).
4. Greener, 1910, p. 132.
5. Greener, 1910, p. 134.
6. Daw, George H. *Daw's Gun Patents. Comprising a descriptive account of the patent central-fire breech-loader and its cartridge...* London: the author, 1864. Reprinted, Kingsmead Reprints, 1973 with the cover title "Gun Patents 1864." Cartridge. p. 6; action p. 12.
7. "As usual in all valuable inventions, the lawyers were called in to settle various contending claims." (Walsh, p. 264))
8. Walsh, 1882, p. 146-7.
9. Cherepy, Louis S. Sr. *A Rebounding Lock for the Side-Hammer Gun 1866-1910*. Bloomfield: Museum Restoration Service, 1994. p. 33.
10. Walsh, p. 176-7. In 1860s, Joseph Needham obtained a number of patents with an action similar to the Prussian needle gun having a moveable breech-block, some of which had no visible hammer but in this study, 'hammerless' refers to hammerless sporting fowling pieces. See also the flintlock [M157] with no visible cock.
11. Greener (1888) , p. 406 and Walsh, 1882, pp. 195-200.
12. Cherepy, Louis S. Sr. *A Rebounding Lock for the Side-Hammer Gun 1866-1910*. Bloomfield: Museum Restoration Service, 1994.

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Daw, George H. *Daw's Gun Patents. Comprising a descriptive account of the patent central-fire breech-loader and its cartridge...* London: the author, 1864. Reprinted, Kingsmead Reprints, 1973 with the cover title "Gun Patents 1864."

Greener, W.W. *The Gun and its Development with Notes on Shooting*. London: Cassell & Co. 1888 (4th

edition), p. 228.

Leveau, Amand. "The First French Pinfire Cartridges." *International Ammunition Association Journal*. No. 467, May/June 2009, pp 34-36.

Smith, Gene P. & Chris C. Curtis. *The Pinfire System*. San Francisco: Bushman-Bradshaw Publishing, 1983.

The Patent Records, Rebounding Locks.

"In Great Britain, patents relating to Small Arms fall into Class 119 in the English Patent Office system. No record was taken of the number of patents issued there for variations of locks but there were only nine which could be located that related to rebounding locks. There is documentation of an interchange of information between America and England, although there is no specific documentation on this subject with the exception of the Dane/Hughes/Baker connection.

In the United States Patent Office records, the subject matter of this study falls under Classification 42, Subclass 69. The record of patents which might relate to rebounding locks was searched in detail.

It is interesting to note that in the U.S. from 1866 to 1910, 127 lock patents were granted which embodied some form of mechanical or functional feature. It was found that of these, 17 dealt exclusively with the rebounding hammer principal. It should be noted though that the majority of the rebounding lock patents were issued in the 20 years leading up to the mid 1880s. During the same period in England, the nine patents relating to rebounders were all issued between 1866 and 1877." — Louis S. Cherepy, Sr. (1993).¹²



M129 Fig. 12.13 American style rebounding lock with the mechanism behind the hammer is under constant pressure. No patent for this lock has been found but it is from a W.H. Baker & Co. first model front trigger break model double or 3-barrel gun, c. 1875. [M129].



M132 Fig. 12.15. An unsigned, back action, rebounding lock. [M132]



M238 Fig. 12.14 One of a pair of rebounding locks marked A.M. Arms Co. Boston (American Arms Co. Boston, 1870-1901). [M238]



M130 Fig. 12.16. Frank Snyder of Fulton Co., New York obtained U.S. patent number 695,242 dated March 11, 1902 for this lock. It bears serial number 129,168 and is marked L. C. Smith, the gunmaking firm located at Ithica, N.Y. [M130]



Fig. 12.17. A bar action rebounding locks scroll engraved and "Newark" on the bar of each. They bear the "Stanton Patent Joint Patents" stamp on the inside of the plate and the registration "No. C 12297" on the right and "No. C 12298" on the left. [M223]



M243 Fig. 12.18. Rebounding lock, in the white, by Charles E. Sneider of Baltimore based on U.S. Patent No. 149,353 dated April 7, 1874. Stamped on exterior and interior, *Sneider over Baltimore* [M243]



Fig. 12.19 A rebounding lock of inferior finish inside, stamped "Richard." It incorporates Stanton's lengthend mainspring designed to bear against the tumbler to produce the action required to force the hammer to return to the half-cock position. [M263]



Fig. 12.20. A hammerless lock marked *American Gun Co.*, a trade name of H.&D. Folsom & Co., New York. [M260]



Fig. 12.21. A hammerless lock marked Claborough & Bros, (1870-1883), St. Louis, Missouri and San Francisco, California. [M261]



Fig. 12.22. A high quality seven pin bar action side lock with intercepting (double) sear, 'in the white' as made ready for sale to the gunmaker. The lump on the internal hammer (tumbler) is for the cocking rod to push on when the gun is opened, thus cocking the action. [M250]



Fig. 12.23. A right lock or side plate from a "one-half side lock" hammerless gun. From serial number 12,000 to 25,000, Lefever Arms Co. of Syracuse N.Y. made their guns with one sear located on the side plate and the other on the frame. This plate, which includes the early side-cocker and cocking rod is stamped Lefever Arms Co. on the outside and serial number 12,914 on the inside. [M249]



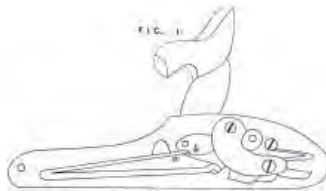
Fig. 12.24. An unusual lock for a late percussion or early breechloading side hammer gun. The plate is stamped with a decorative border and "N.R. Davis & Sons," active at Assonet, Mass. from 1853 and became N.R. Davis & Sons in 1884. There is evidence that a hammer was never fitted. [M253] *Ron Serbin collection.*



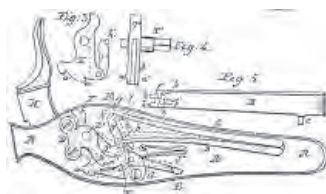
A415 Fig. 12.25. Wm. P. Bardell & Wm. Powell, British Patent No. 2,287, Sept. 6, 1866; Gun & Pistol Locks



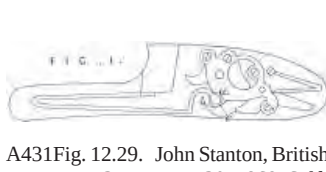
A414 Fig. 12.26. John Stanton, British Patent No. 49, Jan. 8, 1867; Gun Lock



A430 Fig. 12.27 John Stanton, British Patent No. 367, Feb. 9, 1867, Gun Lock



A417 Fig. 12.28. Stokes, U.S. Patent No. 84,314, Nov. 24, 1868, Gun Lock



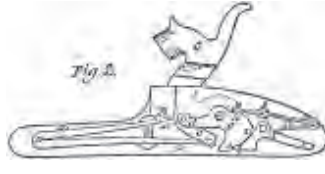
A431 Fig. 12.29. John Stanton, British Patent No. 3,774, Dec. 30, 1869; Self-Acting Safety Gun Lock.



A416 Fig. 12.30. Edward Thomas Hughes (Agents for W.F. Parker), British Patent No. 180, Jan. 19, 1872; Locks for Fire-Arms



A418 Fig. 12.31. Dane, British, Patent No. 124,939, March 26, 1872; Improvements in Gun Locks, Assigned to Charles Parker of Meriden, Conn.



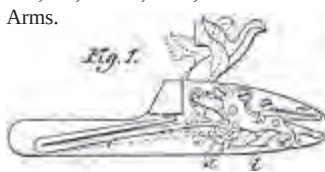
A429 Fig. 12.31. Charles E. Sneider, U.S. Patent No. 149,353, April 7, 1874. [M243]



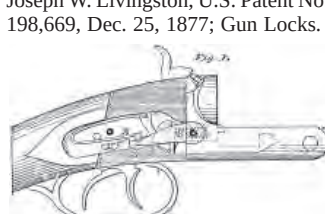
A419 Fig. 12.32. Lewis L. Hepburn, U.S. Patent No. 162,473, April 27, 1874, Gun-Lock.



A420 Fig. 12.33. David Kirkwood & Henry Mortimer, U.S. Patent No. 169,710, Nov. 9, 1875; Locks for Fire-Arms.



A421 Fig. 12.34. John A. Nichols & Joseph W. Livingston, U.S. Patent No. 198,669, Dec. 25, 1877; Gun Locks.



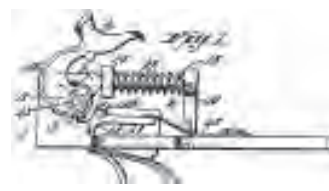
A422 Fig. 12.35. William H. Baker, U.S. Patent No. 199,773, Jan. 29, 1878; Locks for Fire-Arms.



A423 Fig. 13.36. Everett L. Lake, U.S. Patent No. 289,423, Dec. 4, 1883.



A424 Fig. 12.37. Charles A. King, U.S. Patent No. 412,340, Oct. 8, 1889; Rebounding mechanism.



A425 Fig. 12.38. Harry Comstock, U.S. Patent No. 414,796, Nov. 12, 1889; Gun Lock Assigned to Hunter & Comstock Arms Co., Fulton, N.Y.



A426 Fig. 12.39. John Frick, U.S. Patent No. 426,004, April 22, 1890.



A427 Fig. 12.40. Henry Pieper of Liège, U.S. Patent No. 591,291, Oct. 5, 1897. [M253]



A428 Fig. 12.41. Frank Snyder, U.S. Patent No. 695,242, March 11, 1902; Gun Loc Assigned to Hunter Arms Co, Fulton, N.Y.



A432 Fig. 12.42. Albert J. Aubrey, U.S. Patent No. 902,639, Nov. 3, 1908.

Chapter 13

On the Manufacture of Gun Locks

Apprentices, wrought iron, and the skill of the craftsman

Comparing gun locks made at the end of the 16th century, the 17th century and the 18th century or anywhere in between, it is possible to see the gradual but tremendous increase in the levels of skill of gunlock makers. Although much of what is included in the following paragraphs is based on the gun trade in England, similar information could probably be found throughout much of Europe.

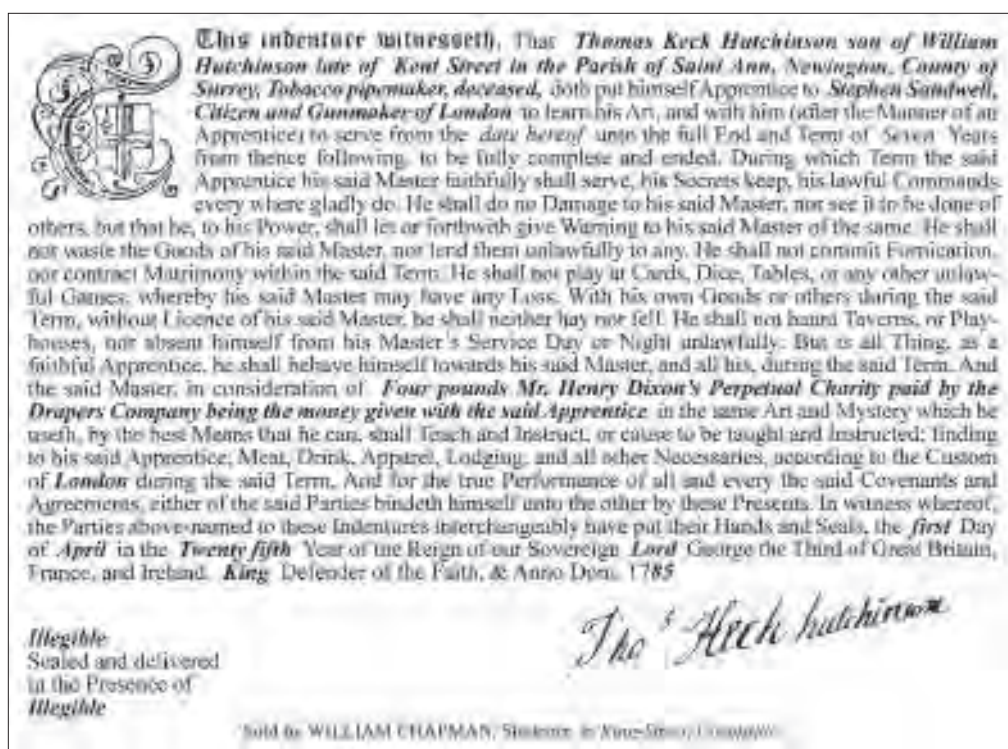
Whenever a number of related trades settled in a community they tended to form an Association, Guild, Society, or Company, etc. to support and advance their interests. In England, the Guild of St. George of the Armourers was established by an ordinance of the City of London, and granted a Royal Charter in 1453. It was later joined by the Braziers Company and is now recognized as the Armourers and Braziers' Company. The London Gunmakers' Company was granted a Charter in 1637 but opposition, from the Armourers and Braziers' restricted their activities until the Charter was not enrolled until 1656.

Similar associations were established in major arms producing centers on the Continent but for many reasons, less documentation has survived and more dependence has been made on surviving hard evidence. Much of that evidence has been supplied by Johan F. Støckel who was appointed Curator of the army's historical collection in 1906. It was renamed the *Tøhusmuseet* in 1928.

Capt. Støckel soon began collecting castings of the barrel and other marks on arms from his museum and many others with the assistance of curators across the continent. His large scale drawings of them resulted in Volume One of *Haandskydevaaabens Bedømmelse* (The Evaluation of Hand-Firearms) published in 1938 containing more than 5,000 gunmakers and and more than 1,200 marks. A second volume devoted to a study of town and proof mark variations appeared in 1942,¹ and it is this volume that is of particular interest to this introduction because Støckel was able to determine, in some cases, the difference between proof, town, and acceptance marks. Many contributions to his study have been published since 1942 and many marks; Nürnberg, Augsburg, Suhl, Amsterdam, etc., are now as well recognized at those of the English Proof Houses. Some of these will be found in Appendix II.

In North America, documentation has survived recording the names of five members of *La Corporation des Armuriers a Montreal* who celebrated the feast of St. Eloy or St. Eloi, the patron saint of their trade on December 1, 1676 which was to be paid for by each member contributing a gun or pistol. The day began with a high mass followed by a dinner with considerable wine and ending with an altercation which found its way into Court records. It is possible that the *Corporation* existed as early as 1645 but nothing has been found to suggest it continued after February, 1681.²

One of the common concerns of each association was protecting the recognition of the quality of its members products, which lead to the adoption of an identifying mark or marks, which are now frequently considered to be proof or acceptance marks but in



A095 Fig. 13.1 Thomas K. Hutchinson began his apprenticeship with Stephen Sandwell in 1785 and was turned over to Matthew Limbery in 1790. He was free of the Gunmakers Company in 1792. His masters were obviously well chosen. In 1798 he took James Purdey as an apprentice and Purdey became one of London's most important gunmakers. Courtesy Stan Cook.

many cases are simply “town marks” recognizing the place of origin. In time, proofing of barrel strength became part of the Guild’s responsibility and old or additional new marks were adopted.

It is obvious that the apprentice who had been taught by a gunmaker with many years of experience, who in turn had been taught by a gunmaker with many years of experience, and so on for two or three hundred years, would possess higher and higher levels of skill. The evidence of that cumulative degree of knowledge played a significant role in the development of gun makers who became as skilled as any craftsmen in the world by the end of the 16th century. Howard Blackmore wrote:

The gunmakers ... were now congregating in the districts of East Smithfield, the Minories and Tower Hill ... The Parish records of the last quarter of the sixteenth century reveal a gathering of specialist craftsmen working together in the production of guns. There were barrel-smiths, locksmiths, gun stockers, gun inlayers, bone engravers and iron damaskers. Families of gunmakers were growing up together, intermarrying and training new generations.³

By the end of the 17th century, the emergence of the specialized trades had refined gun production and divided the process into a number of subtrades. D. M. Smith in his study of the Birmingham gun quarter records that in 1829 there were 14 and 32 in 1865, some of which would have been undertaken in the same shop. A few lists were published over the years, but probably the most informative early list is one that came up at



A759 Fog/ 13.2 ditto
Gunmakers shop Steven V.
Grancsay

a trial at the Court of Kings Bench in 1747. John Hirst, a gunmaker, was sued “By and at the Expense of the Worshipful Company of Gun-Makers of London ... for using the Art, Mystery and manual Occupation of a Gun-Maker; he was not a member of the Gunmakers’ Company.”⁴ Hirst testified that he had served an apprenticeship for seven years under Mr. Jonathan Heron, a gunsmith and whitesmith in Yorkshire, was a journeyman with him and afterwards was a Journeyman with “Mr. Clarke, who forged Gun-Barrels for the Tower,” he listed other qualifications and that in 1747 he set up business as a Gun-Maker at Tower Hill and he produced a gun which he had made. He pointed out that there were 21 different branches in the gunmaker business and “that the Master Gun-Makers in London after they received the several Parts of the Gun from the respective Makers, only screw those Parts together.” The Court found for the Defence, “The Plaintiff not being able to make any Case fit to be left to the Jury, suffered a Non-suit.” The 21 Branches looked upon as so many distinct Trades were recorded:

Barrel-Forgers,	Lock-Polisher,	Tip and Pipe Maker,
Breech-Forgers,	Lock-Hardener,	Side-Piece and Thumb-Piece
Barrel-Filer,	Trigger and Nail-Forgers,	Repairer and Polisher,
Barrel-Polisher,	Trigger and Nail Filer,	Engraver,
Barrel-Loopmaker,	Stock-Maker,	Bluer,
Lock Forger,	Furniture-Forgers or Founders,	Flint-Maker and
Lock Filer,	Furniture-Filer and Cutter,	Mounter or Screwer together

Hirst also included a “Stick-maker” and he could also have added Spring Makers. In the next century he would have had to include Percussioners, those who were specialists in the fitting of percussion hammers and nipples. These are all skills which could only be acquired by experience gained under the watchful eye of a good teacher and such a large group of craftsmen could only be maintained with a comprehensive training program.

Apprenticeship

There were many reasons for the existence of the Guilds, including creating business, solving problems affecting the members, religious, social, and fraternal events.



A087 Fig. 13.3 “Old smithy and open forge in Digbeth. Taken down early in the Nineteenth Century” from an unidentified publication. *Birmingham Gun Barrel Proof House collection*

Also, but perhaps more important, was the training of future gunmakers and the administration of apprenticeship contracts and records. In London, organization of apprenticeship training was undertaken by the Armourers’ Guild and the London Gunmakers’ Company. There are apprenticeship records for the Armourers’ Company dating from 1535 and the London Gunmakers’ Company from 1656, the year when their charter was enrolled.⁵

The London Gunmakers’ Company arranged apprenticeships, assumed responsibility for the training, and assigned the candidate to a master. If the master died or ceased business, during the term of the apprenticeship, the Company would “turn over” the apprentice to another master for completion of his term. In communities too small for that relationship or too far from London, apprenticeship could have been arranged as a contractual agreement between a local gunsmith and the father or guardian.

An apprenticeship usually began about the age of 14 with the signing of a contract and the payment of a fee to the Master. It could have been earlier, and officially ran for seven years or might have been longer if the apprentice had not yet reached the age of 14. The Master agreed to teach him “his art” and the apprentice agreed to faithfully serve, keep his secrets, etc., etc. for the full term of the contract. During those seven years, in most cases, the apprentice would live in quarters supplied by the master; his work schedule would normally consist of a ten, or more, hour day and a six day week.

His work day would depend somewhat on the number of skilled works in the shop. Not many staffing figures are available but when Alexander Forsyth established his business in June, 1808, in addition to two clerks, he had Joseph Vicars, Chief Mechanic; James Purdey, Stocker and Lock Filer; William Webster, Mechanic and Lock Filer; J. McLachlan, Lock Filer; and Henry J. Bales who was probably an apprentice.⁶ The apprentice would have gained experience from each of them and as his experience increased he would make a decision about specializing in one branch of the business. On the successful completion of his seven years, he was required to serve two years as a Journeyman, working for an established gunsmith. He could work more but the two years was a minimum requirement. During that time he could produce a proof piece and when all these qualifications had been met, he could become a Freeman of the Gunmakers’ Company, set up his own business, take apprentices, and hold office in the Gunmakers’ Company.

For example, the James Purdey mentioned above, began his apprenticeship with Thomas Keck Hutchinson on 21 August 1798 and completed it in 1805. He served as a Journeyman with Joseph Manton between 1805 and 1808 when he joined Forsyth & Company. During that time he would have built a proof piece for presentation to complete the requirement for admission to the Gunmakers’ Company. In 1812 he was admit-



Fig. 792

Fig. 13.4 The lock making centers in Staffordshire; Wolverhampton, Willenhall, Walsall, Bilston, Darlestone, and West Bromwich. Birmingham in Warwick County. From Thomas Moule's *The County Maps of Old England* published in 1830.

ted Freeman to the Gunmakers' Company and in 1816 he established his own business at No. 4 Princess Street, Liecester Fields. He quickly gained a reputation as London's finest gunmaker.

Of the 21 branches of the gunmakers' trade listed earlier in this chapter, only four of them are devoted to lock manufacture — gunlock-forger, gunlock-filer, gunlock-polisher, and gunlock-hardener. In many cases these would have been carried on by the same person or within the same shop with the gunlock-filer in the senior position.

Any gunmaker who went through a seven year apprenticeship under a competent gunmaker would have been sufficiently skilled to make gun locks of quality, perhaps even equal to the best. But economies of production made it practical for many gunmakers to turn the majority of the production over to those who specialized in the area. There is little documentation, but it does exist, that even the top line gunmakers used lock makers outside of their own factory to produce their locks, leaving only hardening as required and decoration to complement their skill.

Living and working at the trade

Very little information has been found on how the men and women worked at the trade. The London Gunmakers' Company had the power to control the trade in the City and within three miles of the city borders, but apparently that power did not extend to the suppliers of components who not only remained relatively free of restrictions, but it also did not preserve most of the records that would have been helpful to historians.

During most of the 17th century the London lockmakers were able to supply all of the requirements of the gunmakers and this was probably the case in most of the arms centres — suppliers appeared to fill the gunmakers' needs.

REPLACE THIS MAP



A778 Fig. 13.6 London, 1776 from “An Actual Survey of the Great Post-Roads between London and Edinburgh.” by Mostyn John Armstrong. A large number of gunmakers and related trades settled in the Minories, Soho, and East Smithfield
 Craig Ross.collection

In 1700 the Gunmakers’ Company, prime contractor to the government, gave the contract for “30,000 Barbary locks” jointly to Henry Banks and Edward Nicholson. They were unable to supply that large quantity in the time required from the London trade and had to seek permission to go outside the city, to Birmingham and other centers in Staffordshire.⁷

Between 1753 and 1755, Reinhold Rücker Angerstein, a Swede with family connections to the foundry business in Sweden, traveled the length and breadth of England recording the industries, techniques, equipment, costs, sources of supply, etc. of the country trades. He made reference to gunsmiths and gunlock manufacture in a number of locations.⁸

Wolverhampton — Gunlocks are made here and sold for five, eight and up to 16 shillings each. The most inferior ones are sold to America for 1 shilling and 6 pence. Two miles east of Wednesbury I viewed an iron-works comprising melting furnace and hammer for iron filings, rolling mill, gun factory and saw-blade factory.

... Iron filings and small pieces of iron cut off during the gun-making process were put into crucibles that were placed in a reverberatory furnace in order to fuse the contents together. The resulting lump of iron was removed from the pot and forged. ...

Wednesbury — Gun-lock smiths living in the neighbourhood sold the simplest locks at 1s.6p. a piece, but the reasonably passable ones for 5 shillings. If you order them of good quality you can have them for 8 shillings to 15 shillings, according to the smiths. The simple locks are mainly exported to the colonies.

Stourbridge — Stocklocks or gun locks are also made by some masters in Stourbridge and sell for between 4s and 30s per dozen. Those 9 inches long are the cheapest, namely 4s; 10 inches long 6s; 12 inches long, 12s; 13 inches long, 16s; and 15 inches long, 30s. Gunlocks double bridle sell for 5s to 7s and 12s; ‘water pan and bolt’ for 14s; three-quarter bridle, 2s.6d; single bridle 3s.6d; common trading 1s; trading fine, 1s.3d; half bridle, 1s.10d.

... In every village, house and farm on the road between Wolverhampton and Wednesbury, one found a smith’s workshop making buckles, rings, locks and nails. ...

... In a village on the other side of the coal field called Darlaston there were very many nailers and also workmen specializing in other products such as buckles, fire-irons and gunlocks, etc.

... On the road between Stafford and Wolverhampton there are many locksmiths, who live in miserable hovels and deliver their products to Wolverhampton every Wednesday, which is market day. These would include stock locks for doors and chests.

... Bilston: Gunlocks, common ‘Traidel’ (sic, probably trade) 15d each. Lock in ‘rest,’ 6½d to 7d. Wages for filing of above-mentioned locks, 6d to 7d.



A800 Fig. London in the 1750s. East Smithfield, a community just east of the Tower of London, and The Minories (rhymes with winner), the street, and the community, running north from The Tower, were close to the offices of the Board of Ordnance and the London Proof House. Beginning in the late 16th century, East Smithfield, and later The Minories, attracted a large number of gunmakers and related trades.

The Proof House of
The London Gunmakers' Company.

The Minories

East Smithfield

The Tower of London,
(The Board of Ordnance)

The Government Proof House
on Tower Wharf.

Wednesbury: Mr. Burchard charges for musket locks, 14d. Small 'corst,' (sic) 12½d. Trading, bought a sample of it, 14d. Double three-quarters, 3s.9d. Double 'Credlock', 5s. Ditto 4½, 6s to 7s each. Ditto gunlocks at another gunsmith. Small 'colst' (sic) 12d. Musket ditto 14d. 'Trading fans,' (sic) 4d. Best ditto, 20d. Half bridle 24d; three-quarters ditto 2s.2d 'Solid pans' three-quarters bridle, 2s.6. Ditto 3s. Waterpans, 6s.6d. Waterpans ditto, 8s. Bolt double bridle, 6s.6d. Ditto 8s. Ditto 9s. Waterpan and bolt, 10s.6d. Waterpan and bolt, ditto 12s.6d.

London

Most gunmakers, at least when starting business, had their living quarters and their shop in the same building. Henry Nock was a witness when on May 15, 1786, Ezekiel Baker married Mary Negus. Until 1789, Mary and Ezekiel resided on No. 8, Castle Street which is recorded as No. 9 Castle Lane, adjacent to one of Henry Nock's factory buildings. In testimony given at a trial in the Old Bailey in 1817, Baker, stated "I live at 24, Whitechapel-road, in the parish of St. Mary, Whitechapel, on the north side of the road, about one hundred yards beyond the church; I have a work-shop at the back of the shop; my counting-house is between the front and back shops and communicates with the dwelling-house; it is under the same roof, it is separated from the shop by glass sashes." His 20 year old daughter Jane slept in the room over the counting-house. Prior to his acquisition of that property, he worked for Henry Nock and lived at No. 8, Castle Street adjacent to one of Nock's factory buildings which is recorded as No. 9 Castle Lane.⁹

Although Henry Nock was working within the area covered by the Gunmakers' Company jurisdiction, he made tools for the Company and supplied locks to the Ordnance, he was apparently not considered to be a gunmaker and therefore not forced to become a member of the Company. He remedied that in 1784 when he became free by



A801-3 Fig. 13.7, 8, 9. (Left) The Birmingham Gun Quarter based on the Ordnance Survey of the 1890s. The Birmingham Gun Barrel Proof House was located at the end of Banbury Street, just off the lower right corner of the map. The Ordnance Department Proof House (1798-1818, 1839-1841) on the Birmingham & Frazeeley Canal is located in the upper right corner. The detail from the center of the large map (lower right) illustrates the density of workshops in the late 1890s. The W.W. Greener factory is located on the east end of Saint Mary's Row. The road map (upper right) locates gun related trades in the late 1940s based upon the research of D.M. Smith (1964-5). Almost the entire area covered by the details were demolished for highway construction during the mid 1960s, leaving almost the only survivors in the center of the Quarter being the New Buildings on Price Street.

redemption. By that time he was firmly established, having moved from what was probably a relatively small operation in central London to a complex group of buildings in Whitechapel, about a mile from the Proof House, while maintaining his store-front location at No. 10 Ludgate Street.

Birmingham

G. C. Allen provided a description of the gun quarter written in 1860 that paints a vivid picture which can have changed little from the previous century:

A passage from a main street communicates with court-yard, from which two blocks of two-storied buildings rise, facing one another; and at intervals staircases lead up from the courtyard to the workshops, of which the buildings are entirely composed. Each shop consists of one or two small rooms, in which the various operations in connection with the setting-up of the guns are performed. In one shop, two men will be found engaged in barrel-browning; in another a single workman is shaping the gun-stocks from a pile of roughly cut wooden blocks, delivered to him by the master gunmaker. Elsewhere a lock filer is working with one assistant and in another shop, leading from the same staircase, an engraver and his sons carry on their trade. Farther down the street, a narrow alley communicates with an ill-lighted room, where two barrel filers, whose work is known throughout Europe are engaged; and nearby in



A761 Fig. 13.7 A water-powered hammer (lower right corner) being used to shape the beat the slag from wrought iron illustrated by Georgius Agricola in *De Re Metallica*, 1556.

A763 Fig. 13.8 This water powered tilt hammer appears to have a head weighing not less than about 200 pounds. It has been claimed that a skilled operator could produce squares, rounds, octagons, etc. with great accuracy although the weight of the hammer might vary. Illustration from Diderot's *Encyclopédie*, Vol. 4, Section 4, Plate VII, Paris, 1763.

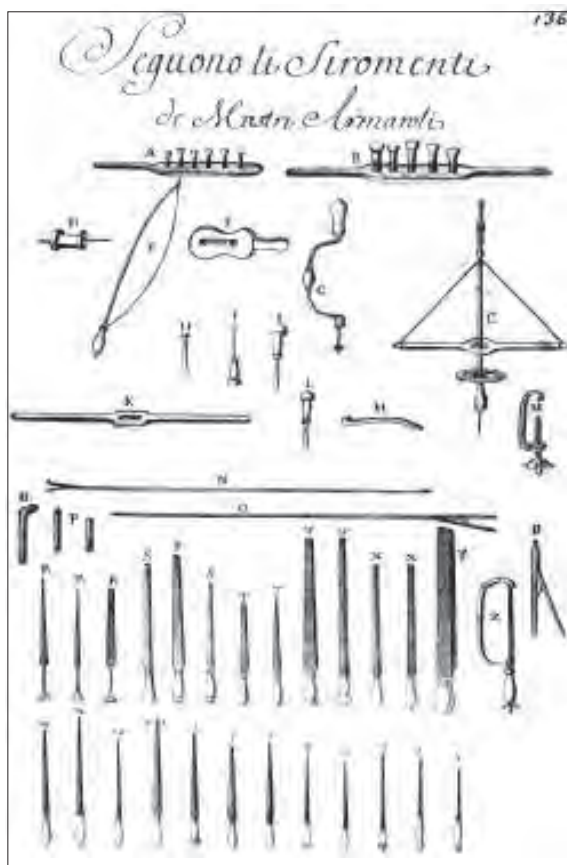
a tiny workshop, with the names of the proprietor chalked on the door, which forms the establishment of one of the most famous hardeners in the trade. Each craftsman works for one or several gunmakers, and receives the material from them; but hires his own workshop and pays his own assistants.¹⁰

Charles E. Greener (1868-1950), in a paper read before the Newcomen Society in 1925, expanded upon the Birmingham workers, and the customs of the late 19th century, which would have been little different that those of the century earlier or perhaps two centuries earlier.

Each workman, or each group of master, journeyman, and apprentices, occupied usually his or their own private workshop, renting the same, with or without power, by the week. Into the workshop it was not etiquette to enter without first knocking at the door, -even by the master gunmaker in the factory of which he was also landlord. Each little shop might have the door fastened on the inside, or if, as in many cases, the only ingress was by a trap through the floor, a dog lay near. The methods actually followed in these shops were known only to the men working therein. Some of these craftsmen had ways of their own of getting particular results. If the work done passed "the view," questions were never asked as to how the end had been achieved. In most cases, of course, it was the individual skill of the worker, or by making the best use of the tools he had been taught to use to advantage. There were plenty of "mysteries;" recipes for welding fluxes, such as Stourbridge sand, etc.; browning and staining mixtures, for polishing wood and metal; methods of colour hardening; processes of hardening and tempering were as well and jealously kept as the concoction of the contents of the cooling trough in a forge, or of the hardening water used by the maker of hand-cut files.¹¹

Peter Hawker on Joseph Brazier

Col. Peter Hawker (1786-1853), lived at Longparish House, between Andover and Whitechurch, Hants. He is best-known as the author of *Instructions to Young Sportsmen* which he took through ten editions between 1814 and 1844, with two more edited



A702b Fig. 13.9 Two 18th century publications have provided identified illustrations of a number of gunmakers' tools. The earlier, dated 1732 is a manuscript volume titled *Dissegni d'ogni sorta de cannoni, et mortari con tutte le pezze, stromenti et utigli appartenenti all'artiglieria come anco le pianate, alzate, et profile di utte le machine, edifizy et ordegni necessary per la medema* produced at Torino, Italy by Giovanni Battista d'Embser. It was printed by Edizioni EDA in 1981 with the title *Il Regio Arsenale di Torino nel '700*. Appropriate illustrations will be referenced "d'Embser."

This illustration, d'Embser, page 136, provides details of a number of lockmakers' small tools including taps, dies, drills and files.

by his son and published posthumously in 1854 and 1859. Each new printing was updated providing a running history of sporting gun development in England including the designs of Forsyth, Lancaster, Clayton, Edge and the corrosion-proof powder of Frederick Joyce. Hawker also created a number of improvements to sporting and military arms, including the primer illustrated as T12 in Appendix IX, details of which he recorded in his Diary:

Nov. 12th 1849.—Went to Clive's barrel factory with my models of patent ignition for my new stanchion gun, preparation for the forging &c. Called on Mr. Parker, who makes the crested handles for my primers, and was interestingly amused by his showing me all the departments of his button and army accoutrement factory.

Nov. 16th 1849.—Up early, and off to Wolverhampton to see Mr. Brazier, the great lock maker of Britain, about the lock for my new stanchion. I had a terrible job to find the right man, the name of 'Brazier' here was like Smith, too universal to be distinguished. After an hour's tramp in mud and filthy streets, I got on the right scent, and found him at his little country seat, called 'The Ashes,' and ascertained that 'Joseph Brazier, Esq.' was the precise direction to catch him. I had to carry my models on my back to show the while concern, and luckily it was that I did, as Wilkinson had directed him all wrong about the lock, which luckily he had not yet begun. I left the models by his particular request.

Nov. 27th 1849—Busy directing Mr. Aston's men at the lock and screws of the big gun. Then at Clive's afterwards with Mr. Shardlow at the proof house, where I saw the barrel proved...

Nov. 28th—Stood over Aston's man to direct him. Then at Clives's and on to Greener's, after seeing Evans about my stock, &c. He sent me to Messrs. Hollis and Sheath, the large wholesale gun



A072a Fig. 13.10 The second, titled *Handwerke und Künste in Tabellen* by P. N. Sprengel, was published in Berlin in 1771. Essay Seven, Parts Five and Six on “The Gunmaker and the Gunstocker,” was reprinted with facing page translations by Maria von Nocolai and John Bivins. It was published in Volume III (1988) of *The Journal of Historical Armsmaking Technology*. Aided by the text, the translators were able to isolate a number of specific tools.

manufacturers in St. Mary’s Square, [Birmingham] to see a large gun they were doing with my new plan for ignition.

...Aston make locks for him, and the cost of a common cheaplock is 11d.; 4d. the iron, 6d. the work, and a penny profit from Mr. Aston.¹²

.....

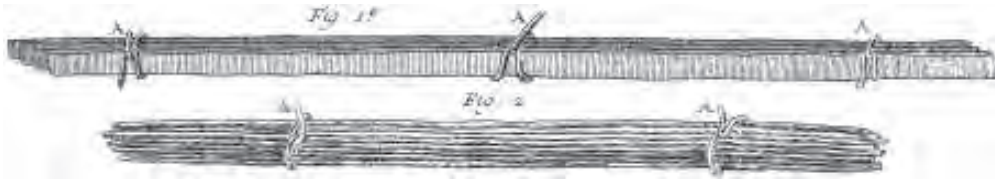
Wrought Iron and Steel – The raw materials

Before beginning the study of gunlock manufacture, it is desirable to look at the raw materials available to the gunmaker. The introduction of iron smelting and forging, which had developed to a high level, began more than 2,000 years before the invention of gunpowder.

The iron ores required to be converted to a useable iron, magnetite, hematite (red and brown) and carbonate to name a few, are available in nature and were both plentiful and accessible during the early years of the 16th century when this study begins. Smelting is the process of converting the ore to produce a ball of iron (with impurities) of low carbon content but it was not possible to create enough heat to completely melt the iron. By the 15th century, changes in fuel and furnace design, made cast iron available. The quality of ore varied from place to place resulting in iron production tending to be located in clusters throughout each country where the best ore was available.¹³

Cast Iron: In the last quarter of the 15th century, about the time the skills of the gunsmith were emerging as a separate craft within the armourers trade, a foundryman at Liège in what is now Belgium, created a furnace capable of generating the temperature, about 1500°C (2,800°F), necessary to melt iron from the smelter. In 1494, the first of many blast furnaces was built in England at Newbridge in Sussex providing the capacity to produce large quantities of cast iron.

After several hours melting the ore over a charcoal fire, the furnace was tapped, that is, the molten iron was allowed to flow into an open mould formed in sand on the floor of the foundry. A channel with branches running from the “sprue” having the



A779 Fig. 13.11 By the end of the 16th century, iron bars of round and square shape were readily available. This 1760 illustration is almost a duplicate of that provided by d'Embser in 1732.

appearance of piglets feeding at a sow, provided the mould to create iron ingots approximately four to six inches in width and three to four feet in length (approximately 12cm wide by one meter long), hence the name “pig iron.”

Wrought Iron: Although cast iron had no value to the blacksmith because of its high carbon content it could not be worked, but pig iron could be economically converted to wrought iron. It was heated in a charcoal fire in a ‘finery’ and subjected to a blast of air to burn out the carbon. The end product in the above process was a ball of iron or ‘bloom,’ which, in order to be useful had to be flattened and remove some of the slag by heating and hammering. Initially, a small bloom could be handled with hammers at the forge but later, trip-hammers or tilt-hammers operated by water power and still later by steam power, were developed with a hammer of 300 to 400 pounds that were capable of more than 140 blows per minute.

This tended to eliminate some of the impurities and it changed the physical structure by reducing the impurities to lengthy fibers, thus strengthening the texture of the iron. But there was a limitation to the work of the tilt hammer; it could not draw out bars of much less than one inch square because they were too flexible when hot and they cooled too rapidly.

It was iron at this stage which was the principal iron component of firearms until well into the 19th century. Wrought iron was relatively soft but after being worked to shape, could be hardened by the process known as case hardening which would impart a thin layer of steel to the surface.

Steel: Steel is any iron-carbon alloy with a carbon content between 0.1 and about 1.8 percent. Increasing the amount of carbon in wrought iron by cementation would produce that state.¹⁴ There are numerous ways cementation could be accomplished but all were time consuming and expensive. The forests were being depleted, and charcoal was getting in short supply. Small improvements were introduced: in the first decade of the 18th century, Abraham Darby at Coalbrookdale found a way to replace charcoal with coke; Benjamin Huntsman of Doncaster invented a process in the 1740s for making cast steel of uniform carbon content that was free of slag; Henry Cort of London obtained an important patent in 1783 to put pig iron heated in a reverberatory furnace burning ordinary pit coal with the heat being reflected onto the iron from the roof of the furnace, and by providing access for the operator to stir the charge so that the oxygen in the air could decarbonise the contents to produce malleable iron; and Henry Bessemer, (later Sir Henry), invented a process for steel production in large quantities that was apparently included in his patent No. 2325 dated October 17, 1855 for “Improvements in the manufacture of ordnance and in the projectiles to be used therewith.”

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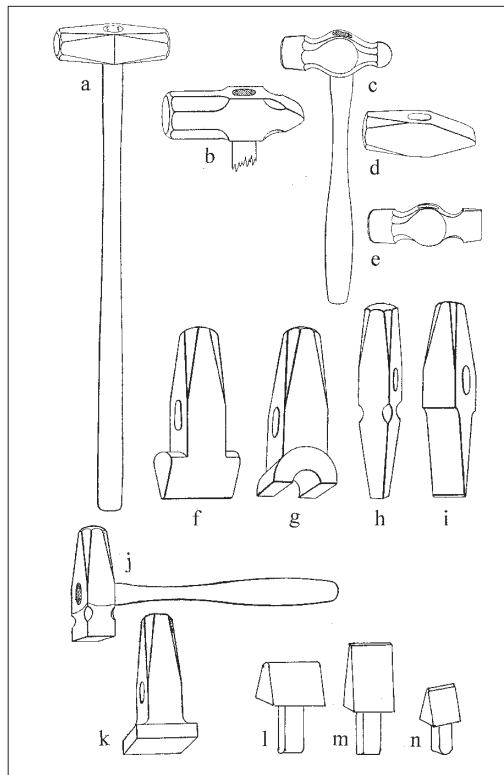


Fig. 13.12. Forge hammers typical of those in use at the beginning of the 20th century but only little changed from 200 years earlier. They are classed according to the weight of the head. The swing sledge (a) would weigh at least eight and as much as 20 pounds with a handle about 36 inches long. The helper would grasp it with both hands near the end of the handle and strike a full-arm-swing blow; a hand sledge (b) would weight five to eight pounds with a 26 to 34 inch handle. It was the tool of the helper who would hold it in both hands to strike a blow from shoulder height; a typical hand hammer (c) would not weigh more than 2½ pounds but a 1-pound hammer is more likely for small work.

Hand hammers, hand sledges, and swing sledges are classified according to the form of the head into ball-peen, (c), cross-peen (d) and straight-peen (e). The ball-peen is used for rounding and shaping; the long-peen or cross-peen to stretch the metal rod lengthwise and the straight-peen to stretch the metal sideways.

Set hammers (j) and flatters (k), both of which have a larger face, are used to flatten a surface in finishing. Both are struck with a hand hammer wielded by an assistant. Fullers (f) are used in spreading the iron by concentrating the force of the sledge blow on a small surface to force the spreading of the metal. The effect is as achieved with the long peen hammer.

Swages (g) are often used in pairs, with the lower half, called the bottom swage placed on the anvil with its square shank in the hardie hole, a multi purpose, square, hole, in a corner of the anvil designed to hold various shaped tools. Swaging will be discussed later in greater depth.

Punches (h, i) of square or round shape as required, small at the point and tapering towards the handle. The hole is made by driving the punch through from both sides and stretched by driving it through to the desired size

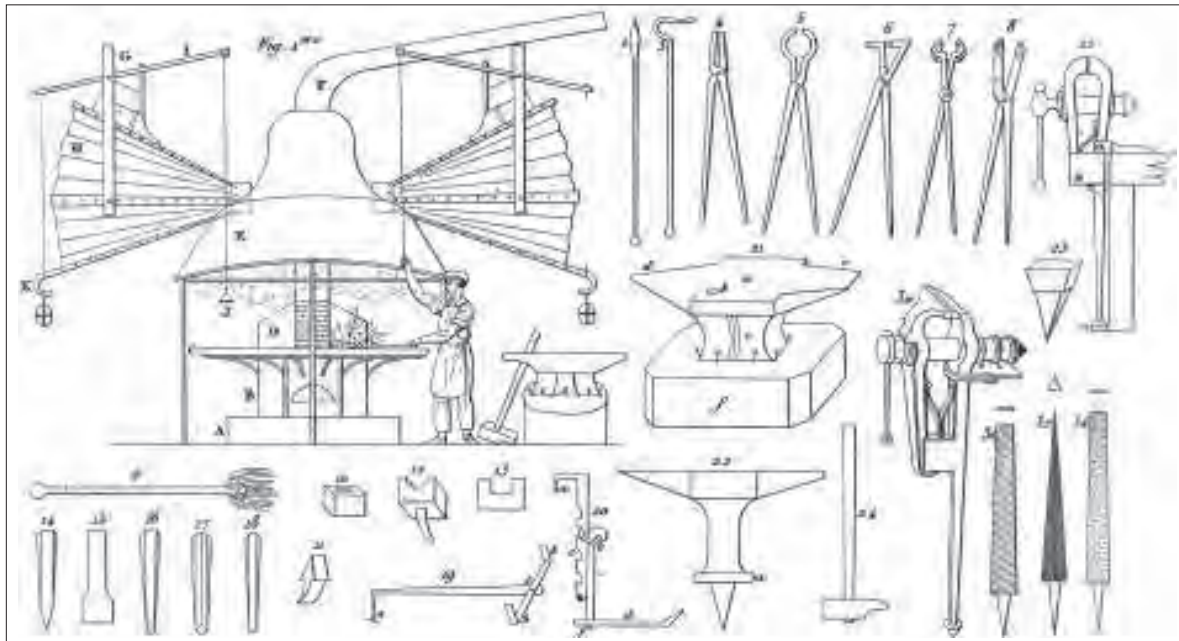
Bars of Iron

By the time the skills of the gunsmith were emerging as a separate craft within the armourers trade, wrought iron in convenient shapes had become available. The first rolling mill to produce uniformly thick plates was built during the first quarter of the 16th century in Germany and the first slitting mill in England was built at Dartford, in Kent, in 1590.¹⁵ The bloom would be trip-hammer flattened to a manageable thickness, passed through rollers to the desired thickness, and then cut into bars by passing through the wheels of the slitting mill.¹⁶

At the same time developments were taking place in the production of iron, improvements were also taking place in processing. By the end of the next century, a rolling mill which made it possible to go from a somewhat flattened ball of iron to a sheet of iron of pre-determined thickness, and a slitting machine which could cut it into strips of a uniform size to reduce costs, provided the raw material for gun barrel makers, gun lock makers, and all of the other metal working trades and would allow the craftsman to devote time and expertise to refining their product.

Gun Lock Manufacture

From the introduction of a mechanism to aid the ignition of hand-held firearms in the last years of the 14th century or first years of the 15th century, the manufacturing



A104 Fig. 13.13 Plate 1 from *Nouveau manuel complet de l'Armurier du Fourbisseur et de l'Arquebusier* by M.A.O. Paulin-Desormeaux, 1852. Many tools were common to different trades and some had different names in each. (see also introduction to Appendix I) In this illustration, the following are readily identified: Fig. 1, A large forge with double bellows which is much more elaborate than would be used by most lock makers; 2-8, Forge tools; 28, Slanting clams or Bevelling vice; 30, The common leg vice; 35-41, Cold chisels; 42-46, Files of various sizes; 47-48, Specialty saws; 72-76, Riffler files; 67, 69, Bow drill.

process was a three stage operation — first at the forge, and then at the bench with chisel and file.

Vannoccio Biringuccio, writing in the first half of the 16th century devoted a chapter of Book Nine “Concerning the Art of the Smith who Works in Iron” to what he called “secrets,” used by forge smiths. Two paragraphs are worth recording:

In short, even limiting the use of hammers to the working of iron alone, it seems to me that beyond comparison it has more uses and that it has more secrets and perhaps more ingenious secrets than the art of any other metal. Thus, if it were not an activity so laborious and without any delicacy, I would say that it is one greatly to be lauded, for when I consider that the masters make their works without moulds or pattern, letting only the eye and good judgment suffice for it, and that they make it exact and of good shape by hammering alone, it seems to me a great thing. And what shall we say of those who make crossbows that must support the force given them and must bend their two horns exactly the same amount? For it is necessary not only that such a master fashion it exactly but also he must temper it. Then look at how many kinds of works an iron smith must necessarily put his hand to.

Thus in conclusion, it seems to me an art comprising great knowledge, for I know of no art or activity whatever, excluding the sciences and painting, that does not need this as its principal member. Therefore, in my opinion, if it were not for the nobility of the material, I would say that the smith working in iron should justly take precedence over the goldsmith because of the great benefit that he brings.¹⁷

By the end of the 17th century, the emergence of specialized trades had refined gun

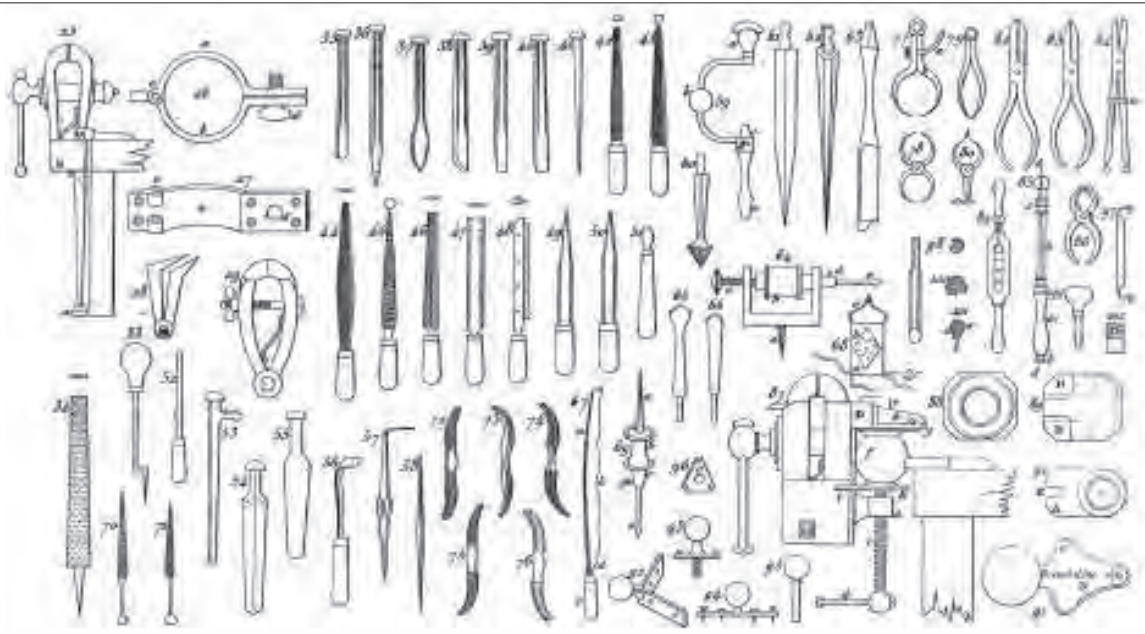


Fig. 13.14 In 1732, Giovanni Battista d'Embser at Turino in what is now northern Italy, compiled a monumental volume on the activities undertaken at the government arsenal there. This is his illustration of the armorer's workshop

lock production and divided the process into a number of sub-trades but the same three stages were still required and all work began at the forge where the component parts were roughly hammered to the required shape and size. This was in effect, a form of sculpture in red-hot metal with a hammer and anvil as the modelling tools. It was skilfully accomplished "by eye" after seven or more years of apprentice training from a master and an untold number of years in the trade. One 19th century writer noted that five minutes at the forge could reduce filing times by an hour or more.

The craft of the gunlock maker began at the forge and it is safe to assume that every gunmaker would have a forge and many would have more than one. Forging a barrel needed at least two, but ideally three men, working on the hammers, while some stages of lock forging was a one man operation. Hand in hand with the forge two or three anvils of simple construction but different size and shape, and a group of hammers of varying size and configuration, each with a special purpose.



Fig. 13.15 Sweden, 1720



Fig. 13.16 France, c.1760



Fig. 13.17 England, c.1860

Fig. 13.15 Tools of the armorer, Sweden, 1720, by J. Möllerheim, *Arme Museum, Stockholm*.

Fig. 13.16 Tools of the Serrurier from Diderot's *Encyclopaedia*, Plate LIV, c. 1860.

Fig. 13.17 "Smiths' tools" from an English Ordnance Department publication c.1850. Note the iron brace with square and round rimers (reamers), the bow drill with stock and two forms of box associated with a flat drill.



A783abc Fig. 13.12 To quote Charles E. Greener, “A cock of dainty form and proportions would take shape from the forging as if by magic.” This cock was found under one of the work benches at the time the Greener plant on St. Mary’s Row, Birmingham, was closed to provide the space required for a traffic pattern in the mid 1960s. This shape of cock first appeared in the 1780s and continued to be popular until the flintlock period ended. It may have been forged by someone who later became a Greener employee.

Special notice should be taken of Biringuccio’s statement that the forger worked by eye, without patterns, depending only upon his skill gained by years of experience. Charles E. Greener described these same skills almost four centuries later:

A cock of dainty form and proportions would take shape from the forging as if by magic, and what was more difficult its pair was produced – a right and left hand – and practically without a measurement being necessary, the work requiring the smooth file only to finish.¹⁸

Work at the Forge

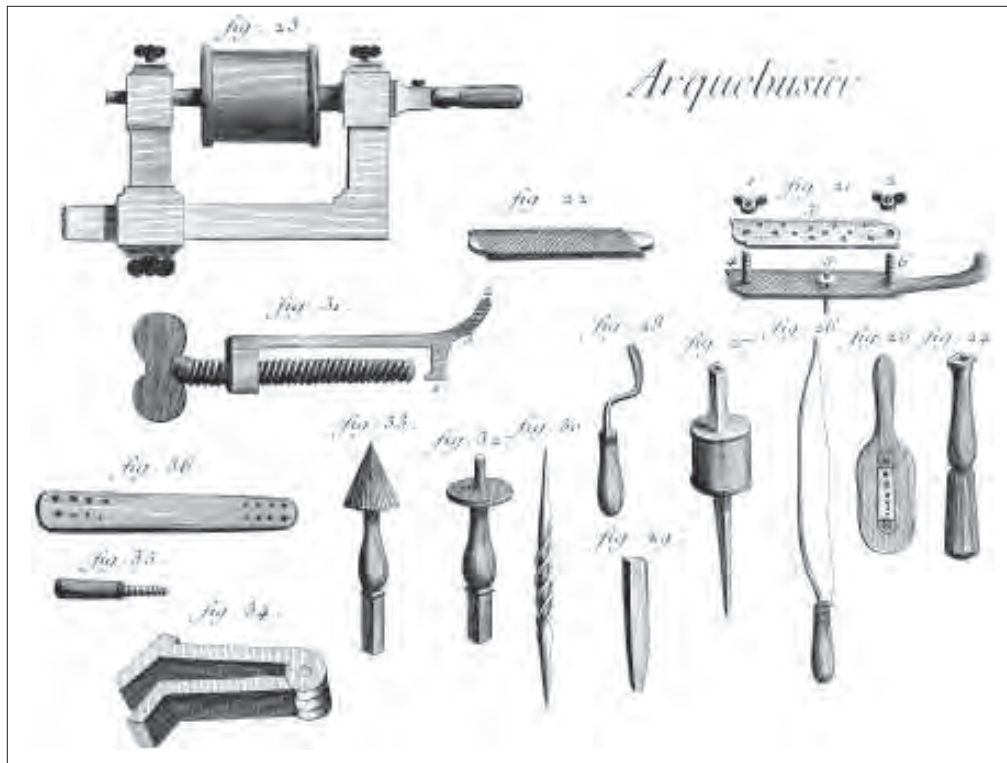
In the mid 17th century, when styles in England moved from flat lock plates with separate applied pans to the round forms popular in Paris, lock makers began to hammer weld pans into position on the lock plates. Forging techniques for lockplates went from rolled stock to square stock requiring flattening and shaping the desired thickness and size by skilled hammermen.

The first stage in the production of a gunlock calls upon the skills of a master smith working at the forge to rough out the required shapes by heating the metal to a certain temperature, usually identified as the colour to which the metal turns for the job required, and shaping it with a hammer to create the desired shape.

Many of the tools used in the process had been designed centuries earlier and are still used today by skilled masters at the forge. *Commendatore d’Embser* illustrated the basic tools in plate 135 of his 1732 manuscript in the chapter “Requirements for the Master Armourer Relating to [Fire]Arms.”¹⁹ It is significant that the tools he illustrated (Fig. 13.14) are identical, to those illustrated 130 years later by A.O. Paulin-Desormeaux (Fig. 13.13) in *Nouveau Manuel Complet de l’Armurier du Fourbisseur et de l’Arquebusier*, a two volume work published in the Manuels-Rouret Series, Paris, 1852.²⁰

The main elements of the workshop as illustrated by d’Embser (Fig. 13.14) are the forge (A), with its bellows (B), the adjacent anvil (E), and the hammers (F, G, H, I).

The forge illustrated by Paulin has a double firebox and bellows of improved design (for two smiths), but with only a few other exceptions, all of the 18th century tools illustrated by d’Emser are included in the Paulin list; the only exceptions are the two lighting devices (O, P) not illustrated in the later publication. Paulin included four hammers and four pair of tongs to suggest that there was variety but he might well have increased that number; both classes were frequently designed for a specific purpose and made as the need arose.

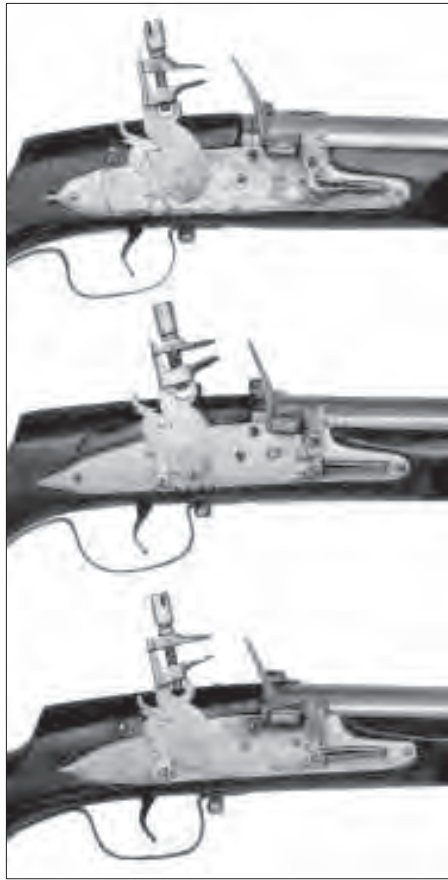


A070 Fig. 19 The *Encyclopedie ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers* by Denis Diderot and J-Le Rond d’Lambert, the first volume of which appeared in 1751, contained illustrations of many trades using tools which would also have been appropriate in the hands of a gunlock maker. The two most appropriate would be the Serrurier (locks maker) and fourbusseur (a decorator of metal work). This plate of the tools of the *arquebusier* (gunmaker) illustrates: No. 21—two-part templates; 22—?calibre simple; 23—reamer to shape the pan; 24—tap or drill socket; 25—pressure plate for bow-drill; 26-7—bow-drill and bow; 28—riffler [file]; 29—square punch; 30—scriber; 31—spring vice; 32-3—rotary mills; 34—bevel clamps; 35-6—tap and die.

The variety of basic tools used by the forgesmith were few. Mainly, in addition to the forge, they were a variety of hammers, tongs, and punches. Tongs, the tools used to handle hot iron, would have been made in the shop and most would have been made to serve a purpose in the mind of the smith. A representative grouping will be seen as tools number 4-8 in Fig. 13.13. Punches of various size, were used to punch holes at the forge.

The drill required to produce the holes necessary was a relatively simple, straight rod fitted with a sharpened leaf shaped point or a flat point sharpened like a cutting mill powered by a bow drill, or a breast drill, depending upon the size of the hole and the thickness of the metal. In almost every case, a preliminary hole would have been punched at the forge. By the late 18th century or early 19th century, a vertical equivalent of the drill press appeared but it was not until 1864 that the twist drill as we know it today was available to actually cut a hole through a plate of iron.²¹

It had been invented and manufactured since 1861 by Stephen A. Morse in East Bridgewater Mass. and in 1863, U.S. Patent No. 8119 dated April 7, 1863 granted to Morse who established a factory in New Bedford, Mass. in 1864.



A215 Fig. 13.20 Three cavalry carbines with Type 2 English locks purchased in the 1640s which formed part of the last surviving Civil War Armoury. The differences created by individual craftsmen prior to the introduction of moulds to provide uniformity are obvious. *The Royal Armouries Museum, Leeds*

Anvil tools, (l, m, n) are made to fit into the hardie hole. A bottom fuller (l) is intended to spread or stretch the iron; the hot hardie (m) being sharp is suitable for making a sharp, clean cut; the cold hardie (n), is thicker is more blunt so that it may have sufficient strength to cut cold iron or steel

A New Requirement

The nobility, aristocracy and wealthy land owners who maintained an army would have demanded uniformity in their arms, at least as it relates to bore diameter. Lock appearance would also have been considered but since gunlock forgers work was based on experience, minor variations in shape and size would have been accepted.

Some evidence, but few examples, of this can be seen. in the English lock carbines (c.1645) from the Littlecote armoury at the Royal Armouries in Leeds, Fig. 13.20) the de-

tached English lock in the Royal Ontario Museum (Fig. 8.7) and the musket by Henry Crips dated 1679, formerly in the J.C.L. Knaption collection with the unidentified arms engraved on the cock,²² and perhaps two late 17th or early 18th century detached flintlocks (one in the Anthony Gibbs-Murray collection, the other (Fig. M111) illustrated in Chapter 14 bearing the hen [chicken] town mark of Henneburg and the engraved arms of an unidentified aristocrat.

Swaging

Creating locks more accurately than by eye could only be accomplished by a technique known as swaging, a process known to craftsmen since Roman times which made possible the shaping of hot metal by forcing it into a mould. It was used by those who provided coins of a uniform size, shape, and design for the rulers of the old world in silver, gold, or copper.

It is not known when the process was first used to shape iron but a very simple application of the technique was described by Biringuccio in 1540:

Iron balls for muskets and arquebuses are also made with the hammer by forming a cube of the desired size from a rod. This is done at an ordinary forge. Then, on a little anvil the hollow of a hemisphere is made and iron is heated well and struck between the anvil and the chisel, turning it often inside so that it becomes perfectly round. Then it is cut off and the point where it had



A782 Fig. 13.21 Preliminary forging beginning from a .625 inch (16mm) bar. *Left*: the bar split for the lower jaw and the body widened with the hand sledge. *Center*: the stage for swaging or further forging. Time required: less than ten minutes by Lloyd Johnston, Woodville, Ontario.

been attached is depressed with the same chisel. I have seen some worked very well in this way; they are smooth and much better than those made by casting in moulds, and, furthermore, they are not brittle because they are made of good soft iron without the corruption of anything malignant to its nature.²³

It is also not known when the technique of swaging was introduced by the gun trade but it may have been as late as the last years of the 17th century. In 1676, René Fezeret of *la corporation des armuriers à Montreal* boasted that he could make *un chien* (a cock), more perfect when taking it from the forge than Simon Guillory was able to do after he had worked on it with a file, suggesting that swaging was not practiced at the time.²⁴

The earliest indication yet found of the technique being used in England is a document reported by Howard Blackmore stating that in 1716, Richard Wooldridge, who a year earlier had been put in charge of the Ordnance Small Gun Office in London, was sent to Birmingham to show the workers “ye way to fitt locks to the mould.”²⁵

Filing to the “mould,” which in time became known (perhaps locally) as the ‘jigger,’ was not the same as swaging the lock plate in a mould but it is a step that could not have been done if the locks had not first been forged to a common shape and size. The only way for that to be possible is if the lockplate had been swaged to a pattern. This was the first step to the creation of interchangeable parts, a goal that took more than another century to achieve.

There is solid evidence that swaging moulds was fully developed by the early years of the 18th century. It includes illustrations in an Italian manuscript in the Royal Armouries, Leeds, dated 1732²⁶ and the indent of tools and stores requested by the Hudson’s Bay Company gunmaker in Fort Nelson on Hudson Bay in 1739 included “Moulds for Guncocks, Gunjaws, and Gunpans.”²⁷ In 1740, Count Augustin Ehrensvärd, who had recently returned from a trip to England where he compared the art of gunmaking in England, (but mainly in London), with that in Sweden, and read a paper on the subject at the quarterly meeting of the Royal Academy of Sciences, in 1740. The record of that meeting is now in the Royal Library, Stockholm. In it, he mentioned the benefits of the use of moulds and noted that most master gunmakers in London had tools in three sizes, one for musket locks, one for common gun locks and one for pistols. By that time moulds were obviously well developed and had probably been in use for many decades prior to his travel.²⁸

Forging and Interchangeable Components

Although forging to a mold was the first step, no detailed description of the tech-

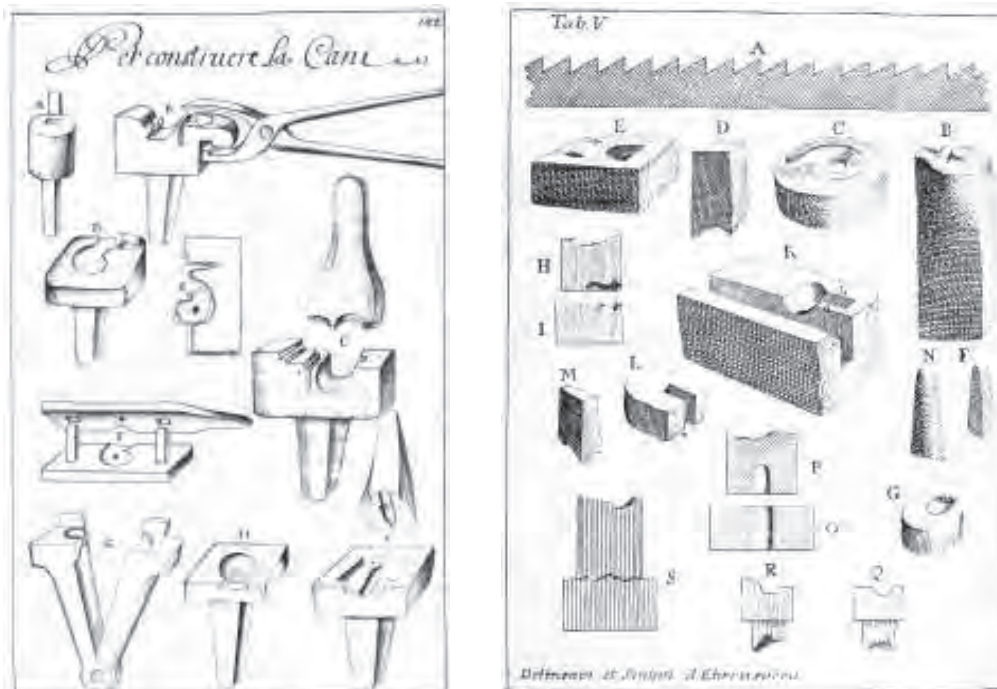


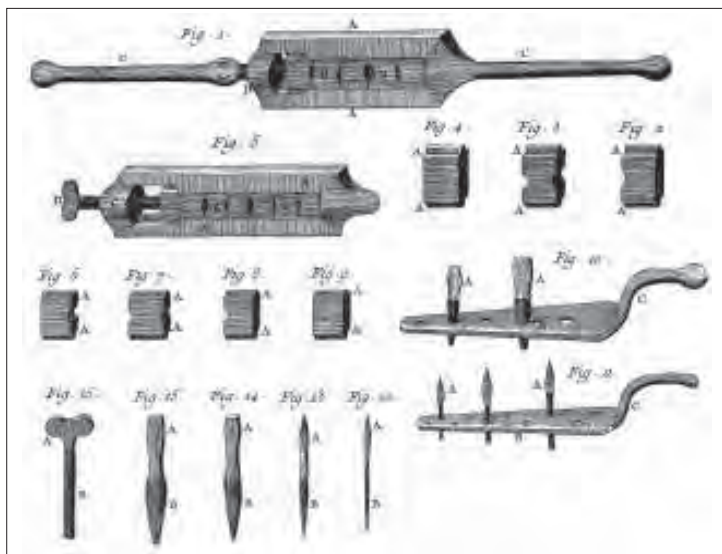
Fig. 13.22. Fig. 13.23 Moulds for swedging flint lock components including the cock, pan, and screws. The central piece in the right illustration appears to be a jig designed to hold the pan while welding it to the lockplate. Left: from d'Embser's treatise, 1732; Right from a lecture by Count Augustin Ehrensvärd of Sweden on gunmaking in England to the Royal Academy of Sciences, Stockholm, in 1740.

nique has been found prior to 1852 although Honoré Blanc (1791) did mention the use of the drop hammer for the task but he gives no other details, Cotty (1806) states "The workman forges the parts by ordinary means; but he does not finish them with the hammer with the same care" and Joseph Gamel (1826) simply recorded "a heated iron rod is clamped in a vice and its upper part, where the lip on the jaw would exist, is stretched by several blows from the hammer." The use of the drop hammer will be discussed later but to forge in a mold by hand and eye, it is necessary to look to an article published in 1852, that is, about the time "interchangeable" was being considered by the Board of Ordnance.

According to the late Ray L.J. Riling,²⁹ Rev. Jacob Abbott first published his description of a tour of the Springfield Arsenal in 1843 in a series titled "Marco Paul's Adventures in Pursuit of Knowledge." He published a brief article on the same subject in the July, 1852 issue of *Harper's New Monthly Magazine* but provided only a minor contribution:

Swedging (sic), as it is called, is the forming of irregular shapes in iron by means of dies of a certain kind, called wedges, one of which is inserted in the anvil, in a cavity made of the purpose and the other is placed above it. Cavities are cut in the faces of the swedges, so that when they are brought together, with the end of the iron rod out of which the article is to be formed between them, the iron is made to assume the form of the cavities by means of blows of the hammer upon the upper swedge.³⁰

In 1853 he published a new version under the title "Marco Paul at the Springfield



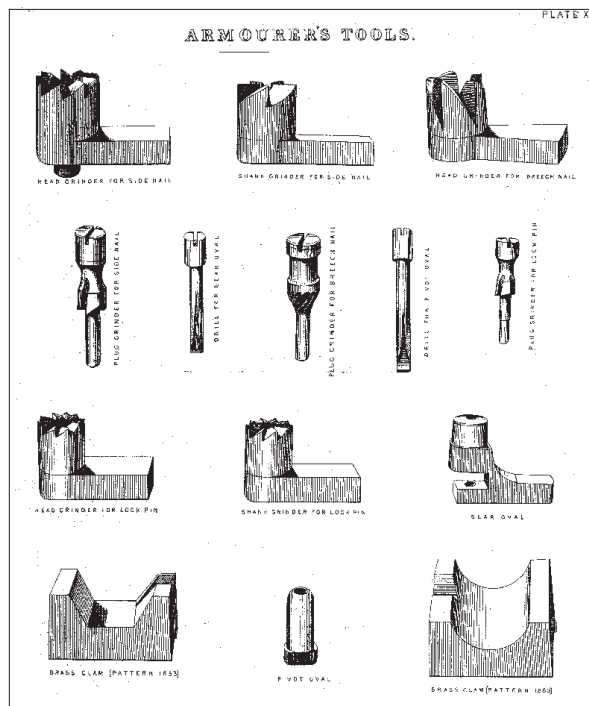
A786-3 Fig. 13.24 Screw-plates, taps and die holders. Plate 55 of Diderot's "Serrurerie" c.1760.

Armory" which, although the text was revised, the process descriptions he provided were probably not changed:

The first building to which Forester conducted Marco, at this part of the works, was near the north-west corner of the square. On entering it, they found a very long, spacious apartment, with a double row of forges extending through the middle of it. The floor was paved with flat stones. The walls and ceiling were neatly whitewashed. Over each forge was a pair of blacksmiths bellows. There were men working at several of the forges, and Forester and Marco advanced to see what they were doing.

Instead of the simple anvil and hammer, used by blacksmiths for common work, they found that much more complicated apparatus was used here. There was at each forge a large anvil, but the surface, instead of being flat and level, as usual with anvils, had upon it a variety of depressions and perforations; and there were also by the side of each, what Marco was disposed to call little anvils, but which the workmen told him were called stakes. These stakes had excavations and depressions sunk in them, of various irregular forms, the use of which Marco did not at first understand.

At the first forge to which Marco approached, a workman was heating the end of a long iron rod. When it was heated, he put it over one of these stakes, in such a manner that the hot iron would lie in one of the depressions. There was another piece of steel placed over the stake, and supported in a peculiar manner, which could be struck with a hammer from above, and driven down upon the stake. This was called a jumper; for it would jump up in a curious way after it was driven down. Now there was a depression in the under side of the jumper, corresponding to the one on the upper side of the stake, in such a manner that when the two were brought together, a cavity was left between them, of such a form as that the piece which they were going to forge would exactly fit into. By this contrivance, it was easy to forge the most irregular parts of the gun-lock. They had only to heat the end of the iron rod, and insert it while hot, between the stake and the jumper. Then by



A069 Fig. 13.25 Armourers tools from a series of Ordnance plates illustrating the tools used in the manufacture of the Pattern 1853 Enfield musket. "In making screw-pins, "grinders" were used. The pins, etc. were hand-forged, knocked out by an "oliver," or treadle hammer, and some were taper. The forgings were ground down by forcing them with a breast-brace through a "grinder": another grinder usually being required for the head, whatever its shape. Then the taper was put on by holding the screw in a hand vice and filing it whilst turning it on a steadier. A good smith was so adept at this that roundness was invariably secured, as also a uniform taper and the required dimension. The thread was then cut in a screw plate. In some instances, a gunsmith would cut any screw thread, any pitch or dept desired, simply by the eye, using the hand vice and file alone to effect the screwing. The smith made his own taps, often "slave," "first," and "full" cuts, from his own screw plate; he also hardened and tempered them." *C.E. Greener, 1925.*

testimony that he knew of no example in England of the application of machinery to the making of muskets, except for Braziers for lock making and those which had only recently been installed at Government arsenals in Enfield. at Birmingham. He did note "the copying machines now at Enfield have been imported direct from America. They are principally employed in fashioning gun-stocks."³²

A report for the Committee was prepared by John Anderson, Inspector of Machinery at the Woolwich Arsenal. The paragraphs which follow were published somewhat later but were undoubtedly based on the report and have added considerable data to this phase of lock manufacture. The only real difference between the processes undertaken at Woolwich Arsenal and those used by English gunmakers at that time would probably be one of scale. Inspector Anderson wrote:

striking repeated blows upon the jumper with the hammer, the hot metal would be forced into the cavity between them, in such a manner as to take its exact form.

In some cases it was necessary to perform more than one operation upon the same piece. One part would be formed between one stake and jumper, and then it would be heated again, and the other part fashioned by another. The stakes, and jumpers, and other similar apparatus, were of course, all different at the different forges; each forge being designed for some particular part of the lock.³¹

Lock Making at Woolwich.

In 1854, a Committee of Parliament in England was formed to look into the state of the British gun trade relative to a decision to establish a new machinery-equipped Government arms factory to produce a rifle of the quality of the Springfield rifles using the machinery exhibited by Robbins & Lawrence of Windsor Vermont at "The Great Exhibition at the Crystal Palace" in 1851.

Sir Thomas Hastings, Surveyor of the Ordnance provided



Fig. 13.26 Fourbeseur Pl. X



Fig. 13.27 Fourbeseur Pl. VIII

The threshold of the manufacturing process is the smithery, where the foreman presides to deliver out the raw material and receive in return the work done. To each smith is issued the particular size of bar iron or steel required for the article he works upon. Opening out of this shop is the smithery itself, with its fifty-five forges, together with steam hammers, hoppers, rider hammers, and other contrivances by which out modern Vulcan economises labour. In this department all the iron and steel work of the lock and stock are moulded, for the ordinary method of forging conveys a very inadequate idea of the manner in which the material is here manipulated. Every sportsman knows that the lock of a gun is made up of any small pieces of irregular form. To forge these with the hammer alone would be far too expensive a process, as it would require highly-skilled labour, nor even then would it be possible to produce the different pieces of exactly the same size, so that any one may fit into any other with perfect accuracy when the gun is ultimately put together. To accomplish this end, the essential principle of the manufacture, each smith with his helper takes in hand a particular piece of work. One man, for instance, makes hammers, or cocks, as sportsmen call them. The irregular form of this part of the lock would seem to preclude the possibility of its being made by the hundred thousand, each one being the counterpart of its brother to the thousandth of an inch. Yet this is done, and with an ease that appears astonishing to the beholder. Let us watch the brawny smith before us. he draws a rod from the fire at white heat, lays it upon an indented part of his anvil, and, together with his mate, deals alternate blows in half a dozen different directions, and produces in a few seconds an irregular mass, which we see bears a resemblance to the indentation in the anvil, which, on closer inspection, we find to be a rude matrix of a gun cock. This is the first process, called swaging. These blows, though sometimes delivered through a swinging circle of eight or ten feet, fall upon exactly the same spot, for practice so nicely co-ordinates the muscles as to produce a motion as exact as that which draws



A305 Fig. 13.28 A view of the interior of the workshop of a *Ciseleur et Damasqu shoreur* (engraver and [gold] damascener) from the Diderot *Encyclopédie* c.1760. On the left, an engraver working on a gun barrel with a group of barrels and two sporting guns resting in the corner.

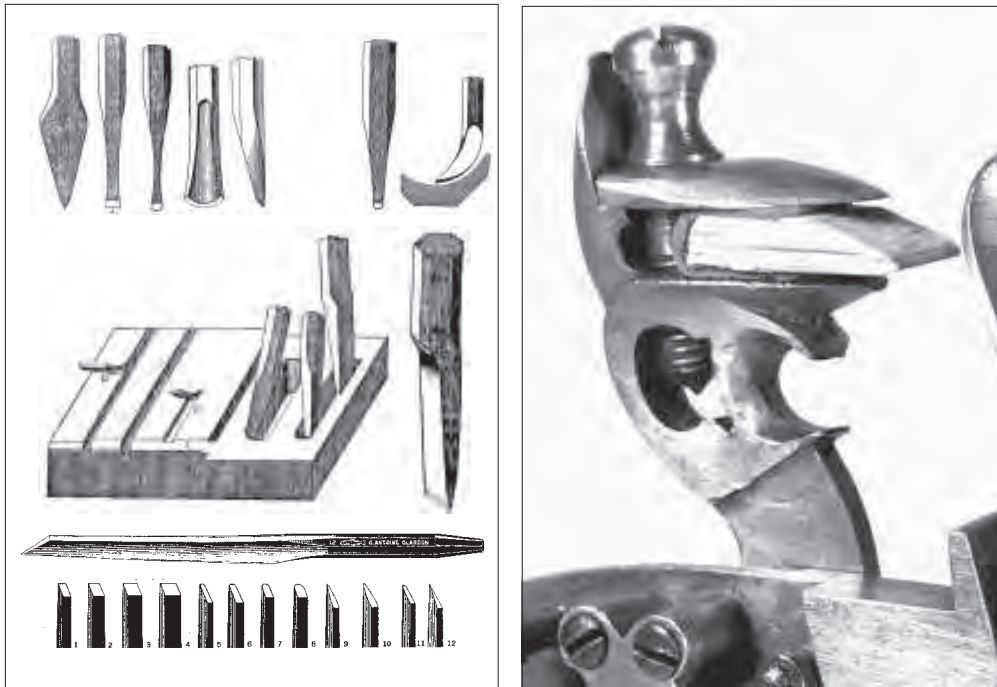
from the bow of a Paganini the same delicate note for any number of times in succession. The cock thus swaged, the smith stamps his initials upon it, and transfers it to another smith, who works with a steam-hammer, on which is a steel die of the exact form it is required to take. A single blow of this instrument gives it its final form, leaving the superfluous metal in the shape of a thin film, where it has been squeezed into the opening between the dies, which is cut off by a subsequent stamping process. By this method of swaging and stamping, the lock-plate, bridle, cock, sear, trigger, sight leaf, breech-screw, and swivel are formed so perfectly, that the tool is scarcely required to touch them afterwards. Those parts of the lock made of steel, such as the mainspring, searspring, and tumbler are simply swaged, the stamping process being omitted on account of the sudden blow tending to break the grain and thus destroy the elasticity of the metal.

The diversity of cutting-tools in these different machines strikes the observer with astonishment; the oddest shapes, the most unlikely-looking forms, proving admirably adapted for the purposes they are intended to accomplish. Many of these work automatically that is, they engage and disengage themselves; setting to work only when they are fed with material, and, when their rodent-like teeth have gnawed away as much metal as is requisite, they stop of their own accord. The effect of this is so extraordinary, that it almost seems as if those bright limbs of iron, which stop and move on without human agency, must be directed by some sort of metallic brain.

The most common form of tool employed is what is termed the circular cutter or milling-tool, which is constructed to fit every class of work. These cutters will continue serviceable for months without requiring to be sharpened, in consequence of each being to its own limited sphere.³³

With chisels at the bench ...

John Wohler, (Johann Heinrich Wöhler) the father of a colleague of long standing, was born June 26, 1904 and on April 12, 1920 he began his apprenticeship in Germany with Fredrich Krupp Germaniawerft at the age of 16. In 1923 when he was released to join the navy, his letter of recommendation noted that his training was in the area of "Mechanic Apprentice, Fitter Apprentice, and Lockmaker Apprentice." His accomplishments and conduct during the time he was with Krupp was very good according to the letter of recommendation given to him when he left. This would have been long after



A097 A787 Fig. 13.30 Top row: a few basic chisel types from the large selection held by almost every locksmith from *Practical Blacksmithing* by M.T. Richardson, 1889; the basic principles for the removal of metal with a chisel. Many of the files sold by gunsmiths' supply houses in America in the late 19th, early 20th century, were supplied by the Grobet factory in Vallorbe, Switzerland. The company was established in the early 19th century and in the last years of the century was the amalgamation of business competitors operating under the names of F.L. Grobet and G.A. Glardon. In the tool supplier catalogues, the same illustrations are described variously as "die sinkers" chisels and "Engravers Chisels."

0A098 Fig.13.31 The flint cock illustrated in Fig. xxx is a superb example of the lock-filers' art. It is an early 19th century example of a flintlock with stepped tail, an almost exaggerated rain-proof pan, and a decorative, reinforced cock. Internally it is rather plain but well formed and overall is nicely polished and ready for the gun makers' engraver. The complexity of the construction indicates that although it would have received some of its form at the forge or perhaps in a mould, there would have to be considerable chisel and file work required to reach this stage. What is most interesting to the writer is that one small area on the inside of the cock – the small curve from the lower jaw to the little decorative bump at the throat on the breast, has not been finished, showing the marks of the lock finisher's small, curved chisel. It is almost as smooth as the polished curve on the outside of the cock but the small, scraping marks of the chisel following the arc have not been removed with the file [M025].

lock making, as is covered here had ended, but the techniques and training would have been similar. In one of our conversations he opened an entirely new field of interest to me— learning about the cold-chisel. As a woodworker, my knowledge of what could be done was adequate, but he told me of one of his early assignments: with a chisel, remove about one inch from the top of a 6x6 inch block of steel (iron?), and make it square with the block.³⁴

On March 4, 1925, Charles E. Greener, who had served "his time on the bench" at W.W. Greener & Co. of Birmingham, recorded:

Of cold chisels the gunsmith had a round dozen forms and as many sizes. There were many corners which, inaccessible to the file, were dealt with in a masterly manner.

A cock of dainty form and proportions would take shape from the forging as if by



Fig. 13.32 Chisels, files, a brace with drill or reamer and support brackets ? (*chaffe-pommeaux*) from Plate. IX from Diderot on the tools of the *Fourbisseur*, usually considered a decorator of metals but is accompanied by swords and sword guards.



Fig. 13.33 Hand punches square, round, etc., forge tools and rack, a leg vice of a type in use by armourers from at least the early 17th century, a row of files and rasps and a row of fine German needle files from Plate LIII of Diderot's *Serrurierie*.

magic, and what was more difficult its pair was produced – a right and left hand – and practically without a measurement being necessary, the work requiring the smooth file only to finish. On the breeches and fences, too, the cold chisel gives the form, the scraper often adding the finishing touches. Clean cutting was the characteristic of gun-fitting – even in engraving the attempt was to cut, never to scrape, rub, or scratch. The gun-workers differed from the engineers and fitters chiefly in starting work late in the day, and in working their movements were much quicker, particularly in filing, hammering, and the like.³⁵

The significance of the chisel in the blacksmith's tool box is evidenced by a series of articles published in *The Blacksmith and Wheel Wright* between 1889 and 1891 which were collected by the Editor, M.T. Richardson, and republished under the title *Practical Blacksmithing*. Thirty-three pages were devoted to the manufacture, sharpening, and use of the cold chisel.

Much of the background information on early tools is derived from tool makers' catalogues but it seems that most of those who would require these tools would also be competent to make their own. Therefore, I assume, they were not readily available commercially. Greener mentions that a gunsmith would have had twelve different forms and as many as twelve sizes of each. The only catalogue I have seen listing them includes illustrations of exactly twelve. This probably provides a good indication of how



A044 Fig. 13.34 “Old gun lock filers’ tools.+ 1, 2. Spring Cramps; 3. Swivel Plates; 4. Stocks with Die; 5. Peg Grinder; 6. Wheeler; 7. Pivot Brush; 8 Levellers; 9. Oval. Illustrations from *Gun-making Handicrafts* by Charles O. Greener, 1925.

Greener’s dozen were shaped, keeping in mind that if something different was required, it could easily be made by any gun lock-maker.³⁶

With the File

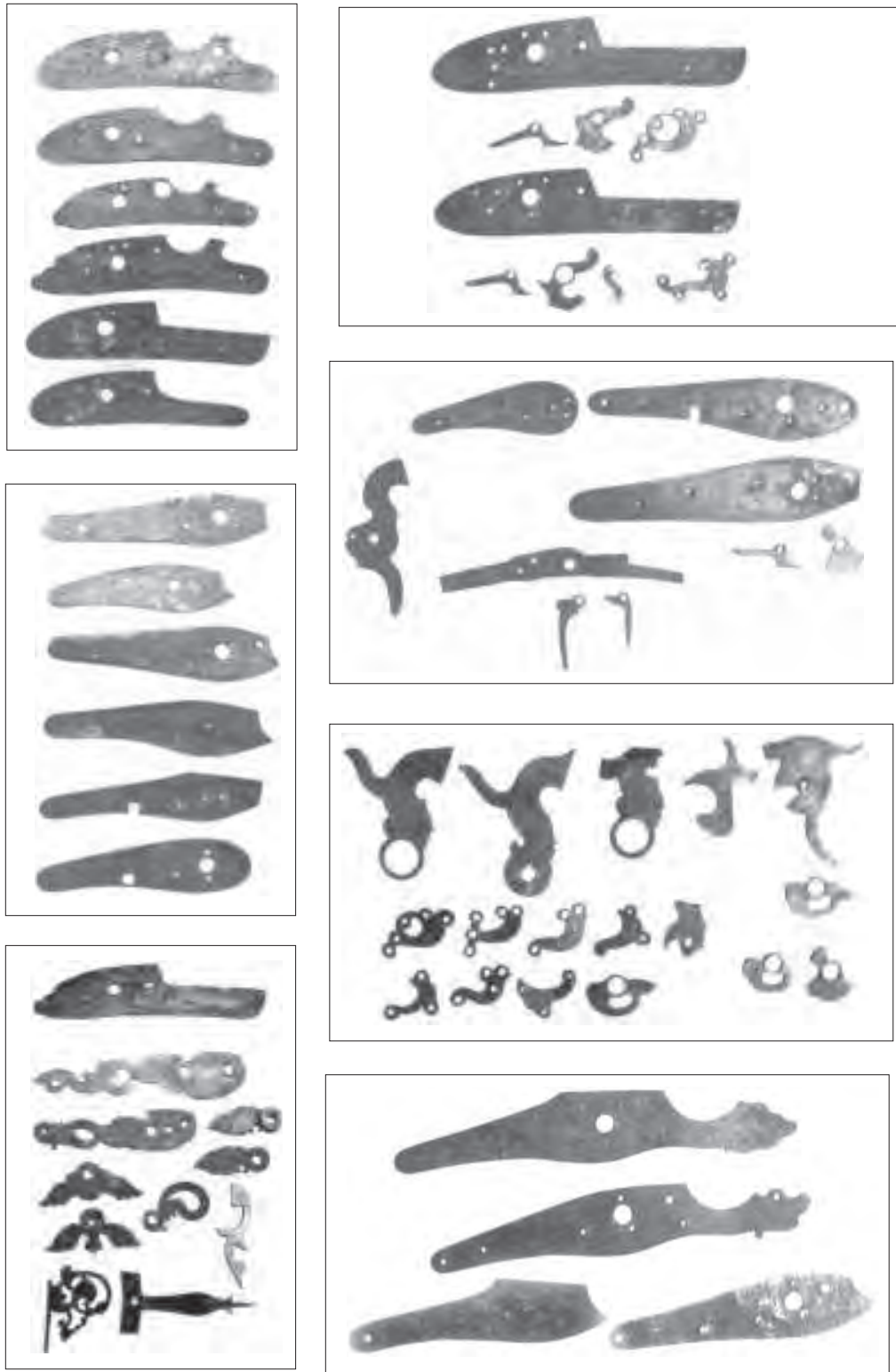
It was the gunlock filer who took all of the forged lock components and put them together in a finished gun lock. Although it might not be correct to say that this was the most important link in the chain it is nevertheless true, that much of a great gunmaker’s reputation was determined by the smoothness and speed of the action.

Although the training of a gunmaker’s apprentice was extensive, the making of files was not likely to be a part of it and files would have been purchased from local suppliers, or from traveling salesmen if the gunmaker operated outside of a major centre.

File making was a branch of the Cutlers’ Trade and file-makers existed in most of the iron making centres of England including Manchester, Newburn (nr. Newcastle), Birmingham, Wolverhampton, Warrington, and Sheffield. Like gunmaking, a file-maker served a seven year apprenticeship followed by two years as a journeyman and traditionally would have specialized in a branch of the file maker’s trade; forgers, strikers, cutters, hardeners or grinders.³⁷ In 1881 it is recorded that more than 400 different styles, cuts, and sizes of file were available for use at Springfield Armory.³⁸

In *The Gun and its Development* published in 1888, W.W. Greener described the method used to make a percussion lock. The technique would have changed little since the days of the flintlock.

The various parts of a gun lock are forged by experienced hands from the best iron and steel, and handed to the lock fileer, who first squared the lock-plates, and drills the



A786 Fig. 13.35 Lock and Inlay patterns made by Edward Paekert, 1857-1894. See also Fig. 11.A785a



A379abc Fig. 13.36 The 'Musket Lock Jigg' or 'jigger,' produced by Ezekiel Baker for the East India 'Fusil & Carbine Pattern Lock Approved July 1818' It is stamped with 'EB,' the supplier's initials and 'J.L.' These are probably the initials of Joseph Longmore, who in 1817 was a gunlock filer at the Royal Manufactory in Lewisham. *David F. Harding collection.*

holes from a pattern laid on the plate. The tumbler shank and pivot are turned or ground between two cutters, which makes the pivot and shank central with each other, and at perfect right angles to the body of the tumbler. The bridle is the filed up and fixed, the scear placed on and shaped, and the swivel fitted to the tumbler. The main-spring and scear spring have then to be shaped, filed to the requisite thickness and strength, fitted upon the lock-plate, hardened and tempered. The bents are then cut in the tumbler with a small saw, and finished with files and smoothers until the scear works with as little friction and rubbing as possible. A very old smooth file, worn almost to a burnisher, is used to finish the bents and bearings of the lock.³⁹

Almost 40 years later, William Greener's son Charles provided some background to expand upon the use of files:

Skilled hand work showed to greatest advantage in the lock mechanisms. These were of great variety, some simple, some intricate, and the best ornate. Every lock-filer had his own sets of templates, his jigs for "gaiting" the lock and for drilling the tumbler, the bridle and other pin holes, and for fashioning the parts. In all, a lock-filer's kit included over a score of special tools, of which the "grinders," "wheelers," "freers," and "shells" are probably almost unique. A filer could dispense with a lathe, and workmen have claimed that with a full kit of tools and patterns for the job no time was saved by resorting to the lathe. The forger of small-work for the lock-filer has disappeared, whilst lock-filing has all but vanished. However, we have still all details pertaining to the art of lock-filing, and although full information has never been published, it is on record for use when needed. The fame of such lock-filers as Joseph Brazier, of Four Ashes, is as great as that of any of the gunsmiths of his day, and probably of any other age, whilst the workmanship of the locksmiths generally stands first amongst the handicrafts connected with iron and steel. The locksmith made and case-hardened his own patterns; made, hardened, and tempered the springs; he used only Huntsman's cast-steel, and charcoal iron, obtaining it from Sweden when British supplies failed. A tool-kit in the Author's possession comprised about 60 instruments, including "ovals," levellers, routers, saws, and special implements, but excluding a few dozen files of over a dozen sectional shapes, and sundry "vent" cutters for gaiting the lock mechanism. A "dead smooth" file, worn until almost a burnisher but still with "cut," is much prized even after 50 years of wear.

The lock-filer not infrequently was his own forge-smith. Hence comes the old witticism of the much stressed locksmith who, at 9 p.m., announced he “would knock off work now, and do a bit of forging” – that is, prepare the rough material for another day’s work by labour actually harder than that of lock filing and fitting. Amongst the arts and crafts lost to the industry, that of the locksmith may soon be reckoned; practically gone already are furniture forgers and filers, cock forgers, nipple makers, ramrod smiths and turners, and most of the implement makers.⁴⁰

• • • • •

Interchangeable components, Part 1

During the last decades of the 18th and first few decades of the 19th century, serious efforts were being made to create interchangeable components. This was not of great concern to gunmakers serving the sporting trade although they too were looking at components made by specialist gunlock makers using equipment that would reduce costs.

The military had a different list of requirements. Uniformity of pattern had been achieved in England and most of Europe almost a century earlier as evidenced by surviving arms, but truly interchangeable parts was not achieved until well into the 19th century.

Honoré Blanc was a gunmaker in Avignon, France until 1759 when he was appointed an inspector of lock manufacture in the government factory in Charleville. He received promotions until 1777 and when the work at three arsenals, Charleville, Maubeuge, and St. Etienne were brought under central control, he was appointed *contrôleur principal* of the three with responsibility to develop *platines à l’identique*.⁴¹ He is recognized by some as the gunmaker who perfected the first stage of interchangeable components.

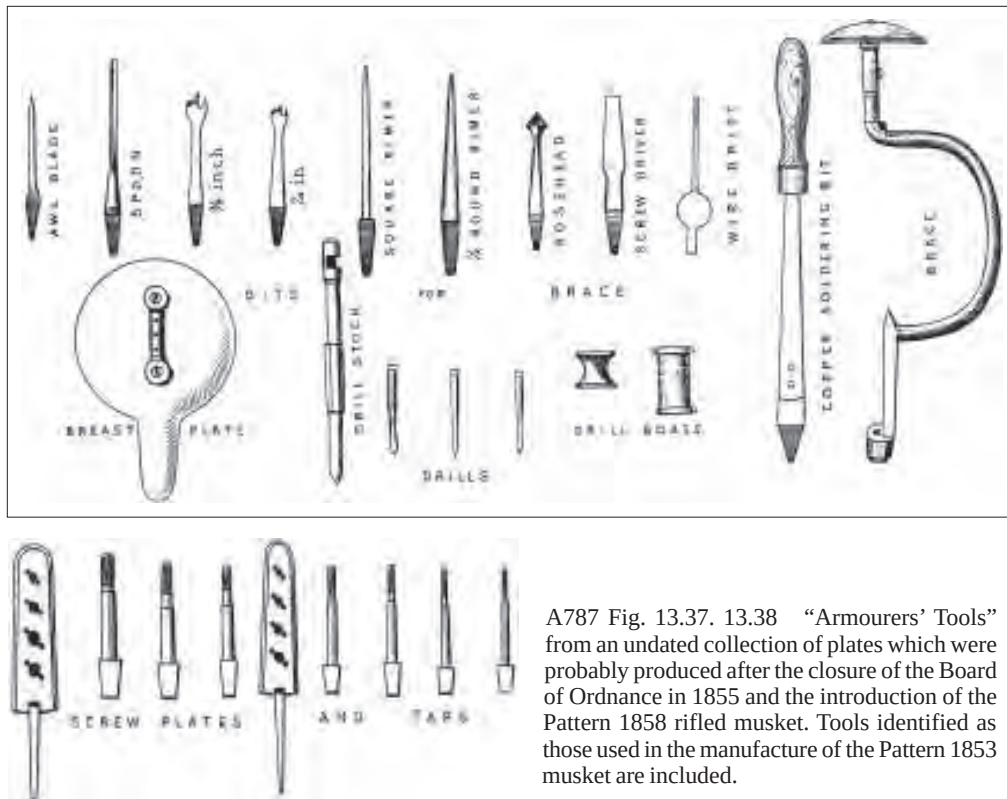
The acceptance of Mr. Blanc’s claim to have successfully achieved interchangeability is largely based on a memorandum he prepared for the French Minister of War and the report on it made for the Minister by a committee of the Royal Academy of Sciences. It is supported by a letter dated August 30, 1785 from Benjamin Franklin to John Jay, United States Secretary of Foreign Affairs, in which he describes the system. Jay said he had assembled several locks himself from parts picked at random from a tray.⁴²

The actual report prepared for the Minister was quite explicit and was signed by the Secretary appointed by the Minister. In conclusion, it read:

It is essential to add to all this, that the parts contained in each of the boxes, at *les Invalides*, were so numerous, that one could, assembling them all, make a thousand gunlocks. One thus sees, as we have said, that the Author’s project is not only doable, but done, & with a success which leaves nothing to be desired.

We conclude, therefore, that the means of production employed by M. Blanc to make firearms, so that their gunlocks all be made of *perfectly identical parts* in all their kinds, & thus *proper to be substituted one for the others*, are very well conceived and devised; that their object is assured by experience, & that it is strongly to be desired that we make all our arms by these methods; finally that they merit the praise and approbation of the Society.

Signed, *Condorcet*,
Permanent Secretary.⁴³



A787 Fig. 13.37. 13.38 "Armourers' Tools" from an undated collection of plates which were probably produced after the closure of the Board of Ordnance in 1855 and the introduction of the Pattern 1858 rifled musket. Tools identified as those used in the manufacture of the Pattern 1853 musket are included.

The accomplishment of interchangeability has not been supported by other evidence. Gaspard-Herman Cotty began his military career in the French army in 1794 and died in 1839 as a retired Field Marshal. As a captain in 1802, he was assigned to the arms factory at Versailles and his *Mémoire sur la fabrication des armes portatives de guerre*, was published in 1806 he provided a comprehensive account of the manufacturing processes involved in the production of small arms and edged weapons with, at the end, the conclusion:

5th. As to the perfect interchangeability on which Roanne [the arsenal where the experimental work was done] established the particular merit of its gunlocks, it is a myth. In effect, one cannot refuse to convince oneself that the *templates*, *punches*, etc., might be changeable internally and externally from the violent pressure which they bear; so that the hundredth piece, for example, which comes from a die, will surely be different from the first, and the filer not using *try-gauges*, at this manufactory, might, instead of remedying the faults, increase the errors. If, then, as practiced at Roanne, one sees gunlocks reassembled with parts taken at random from among those made from the first to the thousandth, it is clear that they will transgress at least on harmony, an essential quality without which one cannot expect good service.

Experience unhappily agrees with this assertion; because of this defective fitting, generally recognized, one must particularly attribute complaints from the regiments against the large number of lock parts from this manufactory that break during drill.

According to these facts, and all weighed with impartiality, I do not fear to say that ordinary processes for making gunlocks must be preferred to the mechanical ones currently in use; and that even though these latter would give more advantageous results, because of care and their perfectability (an abstraction made nevertheless of

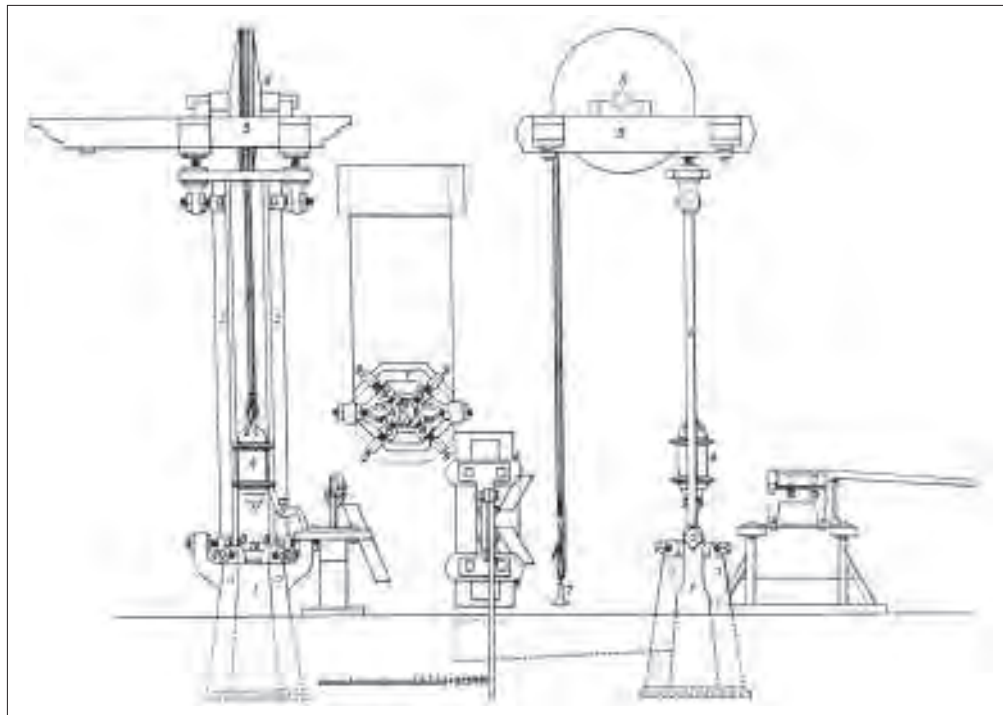


Fig. 13.39 The Drop-Hammer designed by Mr. Jones. A cast iron base whose weight is one hundred and thirty poods [4,680lb], is mounted on the ground on a solid foundation. ... A cast iron mass or hammer whose weight ranges from two to four poods [75-150lb], is situated between these uprights. The hammer is raised by a rope moving over a large pulley...the lower half of the die of the forged article is fixed by means of screws on the cast iron anvil between the cast iron stocks. The upper half of the die is fixed by screws in the moving hammer.

interchangeability), it would still be necessary to always keep a certain number of workmen of the previous method.

Heaven forefend, besides, that in reading this article, one might think that my intention had been to injure anyone, or to impugn the opinion of several of my comrades, who have declared themselves partisans of M. Blanc's fabrication process; because I have only had the public good in view, before which they know, as I do, that any other consideration must be silent.⁴⁴

.....

Interchangeable components, Tula Arsenal, Russia

The pre-swaging steps described above by Coty, Barrett, and Anderson, in the mid 19th century would have also been required a century and a half earlier by the lock forgers described by Eherensvard and d'Embesser.⁴⁵ Towards the end of the 18th century the pre-shaping would still have been required even though the swaging was to be done mechanically rather than by men and hammers.

John Jones (1767-1835) of Birmingham, first comes to our attention in 1806 when he was described as a "tool maker and die sinker" in his application for English patent No. 2911. In 1809 he described himself as a "gun lock maker and barrel maker" (Patent No. 3267), and in 1811 he was granted a third patent (No. 3469) with one Henry James; neither of whom were further identified. Each of these patents covered the forging of gun barrels and the last included a practical lathe capable of turning and tapering the barrel.

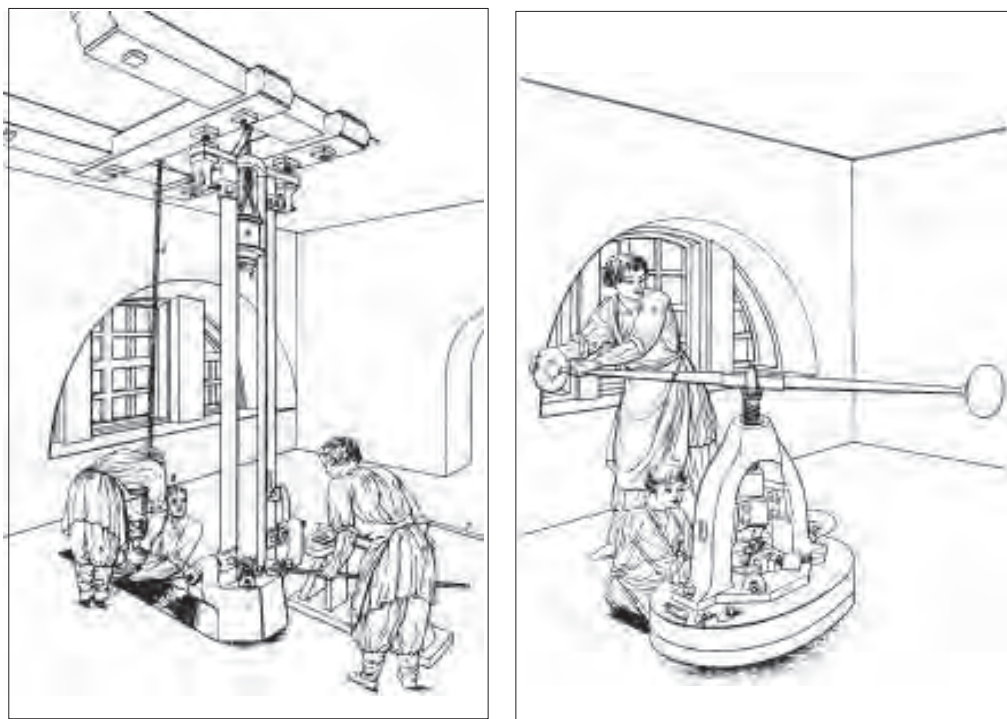
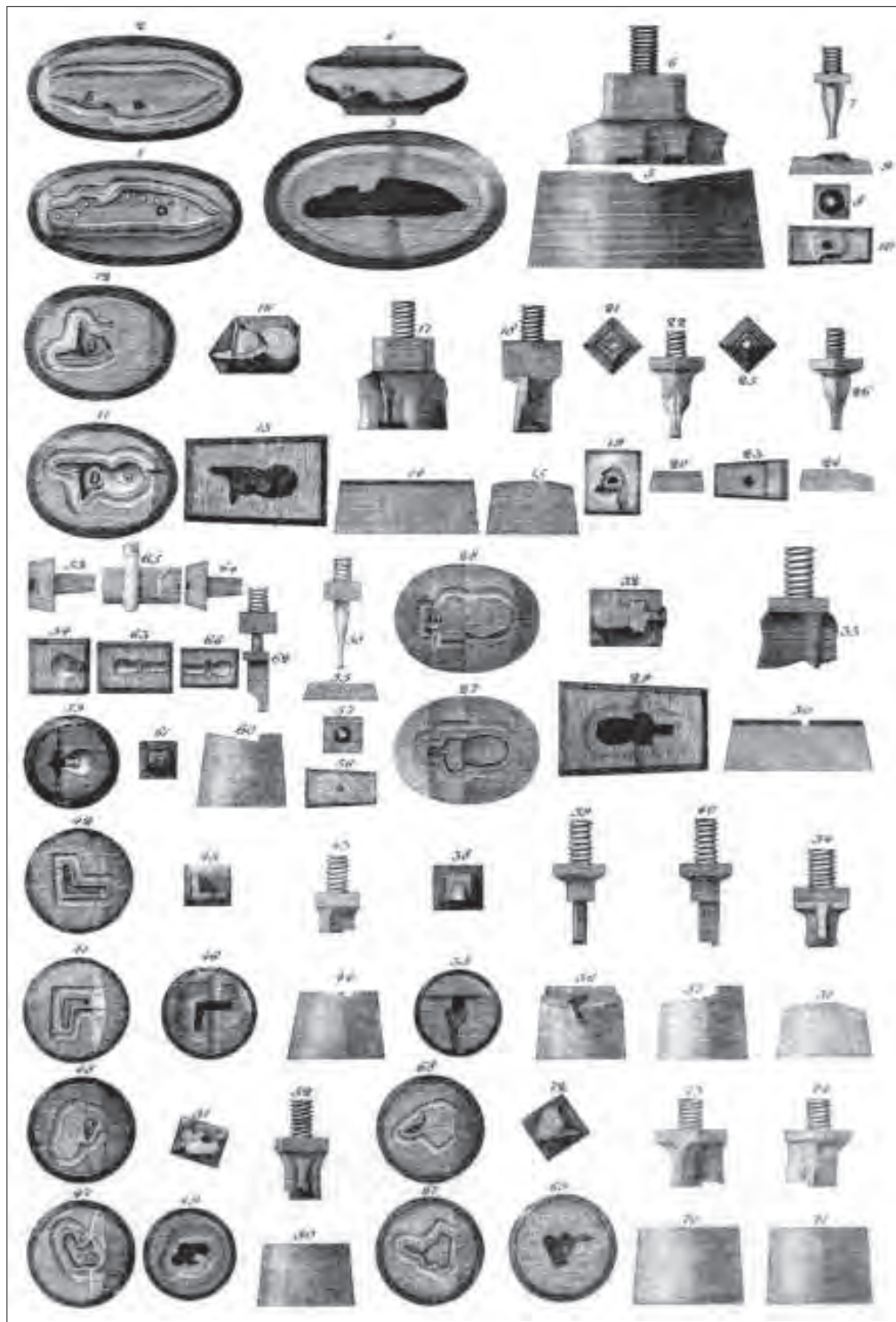


Fig. 12.40 Operation of the Drop-Hammer (XVII) Heating the end of a small bar of strip steel, the smith prepares it on the vice or anvil by striking it several times by the hammerman, so that it goes easily into the die. Heating it for the second time, he puts it (1) on the half-die (2) fixed on the base and lubricated with the hempseed-oil. Meanwhile, the operator (3), by means of a rope (4), raises the hammer (5) with the half-die (6) fixed in it and releases it suddenly. This process is repeated once or twice. By two or three blows the heated iron, filling the die, takes its internal form. The articles forged by this method are cut from the bar by large shears (7) situated near the drop hammer.

Fig 12.41 On a fly-press, an iron arm, provided on each of its ends with a cast iron ball for balance, is horizontally fixed to the upper end of the screw. Below the hole in the traverse of the frame, the steel die is fixed to the lower cross beam. The construction of the die depends on the type of the forged article. In the center of the screw, the steel tool or punch belonging to the previously mentioned die is screwed

In 1815, Jones (and his son John) moved to Tula in Russia where he had been appointed to what would now be called “Plant Superintendent” of the government arsenal. He immediately set to work to create a mechanized factory, beginning with lock production using his die sinker skills to train workers how to produce the moulds and other special tools, and dies to create the lock components. In 1826, an illustrated “*Opisanie Tul’skogo...Tekhnicheskomo Otnoshenii*” (trans: *Description of the Tula Weapons factory in Regard to Historical and Technical Aspects*) by Iosif Gamel was published at the August Semen Press, Moscow.⁴⁶

In Chapter VIII with the title “A Detailed Description of All the Works,” Mr. Gamel dealt in great detail with the manufacture of the military flintlock then in production. His “*Description*” included 42 full-page line illustrations, 15 of which are plates on the manufacture of the lock and its related screws and including illustrations of the drop-hammer and the fly-press used for trimming the flash extruded from the dies. Figure number in brackets are those from the original Russian edition. The translated captions are from the 1988 printing with some revisions.⁴⁷



A177 Fig. 13.42 The hammer dies and anvil dies required for forging/swaging the various components for the lock and other iron parts from Iosif Gamel's 1826 *Description of the Tula Weapon Factory*.

Fig. 13.43 Translated text from *Description of the Tula Weapons Factory*, Moscow, 1826

12. Forging the cock

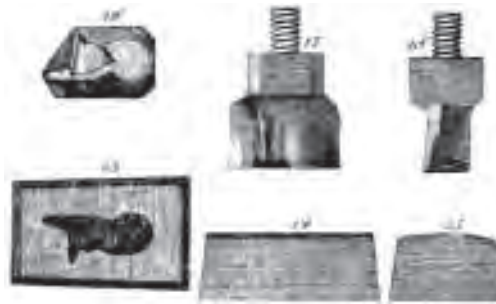
For forming the cock, a heated iron rod is clamped in a vice and its upper part, where the lip on the jaw would exist, is stretched by several blows from the hammer. On the base of the drop hammer, a half-die (11) is set and the second half-die (12) is screwed to the weight. The hammer (or the weight) in this drop hammer weighs three poods [108lb]. Two men raise and drop the hammer on the lower half-die.

On this drop hammer one hundred and fifty cocks are forged every day.



13. Punching the square hole in the cock

The square hole in the cock, by which it is mounted on the tumbler, is first punched on one of the small presses by means of the punch (25 and 26) going through the hole of the lower die (23 and 24). The edge of the cock is not trimmed so that it can be easily held in the lower die.



14. Trimming the cock

For trimming the cock, the die (13, 14 and 15) is set below on the press, and the other die (16, 17 and 18) is fixed above. The press used for this purpose is the same size as that used for trimming the lock plate.

15. Straightening and cleaning the cock

The trimmed cock is heated and laid individually by the tongs in the forging die. Each cock is then straightened by beating it twice with the weight carrying the upper die. Afterwards, the cocks are cleaned of scales in the faceted barrel, exactly like the lock plates.

16. Punching the heart-shaped hole in the cock

For punching the heart-shaped hole in the throat of the cock, for which two grooves have already been formed on both sides during the die-forging process, a die (19 and 20) is laid on the base of the press. The hole is subsequently punched by the punch (21 and 22).

The press utilized for this purpose is smaller than that used for trimming the plate, cock and the frizzen. Its height is about fourteen vershoks [25in].

17. Punching and threading the hole in the cock for the top jaw screw

For punching a hole in the cock for the top jaw screw, the hammer is fastened by a screw (1) to a die (2) fixed on a machine similar to that used in drilling small holes in the plate (Figure XXXII). This hole is threaded by a hand tap.

21. Forging the top jaw screw

The top jaw screw is forged by means of the die (63 and 64), in which one half of the screw is longitudinally cut. In this die, the end of the strip of the iron bar is first forged and then heated. On it, a movable anvil (65 and 66), which is fixed to the wooden lever with the other half of the screw cut in it is mounted. The operator strikes by a hammer on the movable anvil, whereas the master rotates the iron rod in the nest. Consequently, the top jaw screw is made perfectly round, as if it was turned.

The master, assisted by the hammersmith, forges one hundred and seventy top jaw screws every day. The through-hole in the head of that screw is manually punched after its heating.

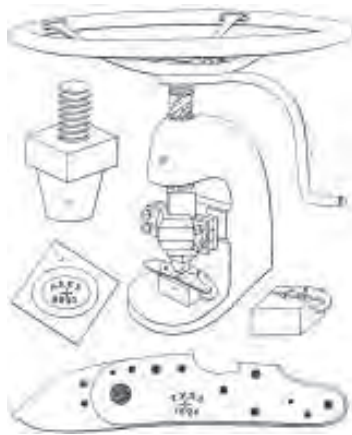


Fig. 13.44 Formerly, a tool was used to engrave the word Tula and the year of manufacture of the lock on the plate. But in 1823, Mr. Jones established a press on which all these inscriptions were immediately stamped. Consequently, not only much time was saved but also the money paid to the engravers. In addition, the inscriptions themselves were much better executed and were identical on all the plates. The lock plate (1) is laid in the recess (2) especially made for it in the supporting piece (3). The handle (4) is moved forward and, as a result, the screw (5) travels downward. Accordingly, the inscription made on the lower surface of the stamp (6) is imprinted on the lock plate.

Gamel's introduction to that section records details not previously considered which will put the entire process in perspective"

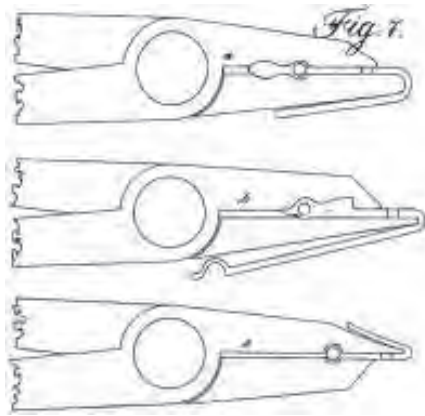
For the manufacture of the lock, the following raw materials are required: four pounds and twelve zolotniks of strip iron, [3lb.11 oz.], eighty-one zolotniks [12 oz.] of steel and twenty-four zolotinks [3½ oz.] of brass for the seat [pan].

Before 1819, the forging of the different parts of the gun locks was conducted by the masters in their houses, using conventional manually operated smith instruments. The obtained products were not accurately forged and had only a very little resemblance with the required parts, with respect to their form. Therefore they were given their necessary sizes by the fitters by means of tedious filing. Certain machines have been established by Mr. Jones in 1819 for the manufacture of the different parts of the lock in a special workshop in the factory.⁴⁸

According to the method introduced by Mr. Jones, the entire parts of lock, except the tumbler, the springs and the pan, are forged by means of dies. The products obtained by these dies need only a very small effort to be converted to perfectly finished interchangeable parts. The effort of the fitter for cleaning the rough external layer of these articles by files and polishing is reduced. It could be easily seen that by the use of this method, the metal as well as the coal are highly economized. According to the old method, it was necessary to heat repeatedly the parts to be forged, since such small articles are quickly cooled when heated in the fire and put on the cold anvil. In addition, the articles themselves, as a result of their form, require long periods for forging. Moreover, with such frequently repeated heating, a large amount of coal as well as iron are burned. At the present time, all these amounts have been economized.

With the arrival of Mr. Jones in Tula, many experiments have been made for forging the different parts of the lock, especially the cock, by means of dies. The aim of these experiments was to avoid the difficulties encountered in their forging. Twenty years ago [c.1806], the gunsmith Vasilij Antonove Pastuhov developed a press whose fly lever weighed more than hundred and twenty poods [4,320 lbs]. It is probable that the design of this press was adopted from presses used for stamping money and medals.

In the Sestroecik factory, a press was also constructed for the same purpose. On this press, the forged articles were perfectly finish-forged under pressure. Such forging by presses is incomparable to the die forging introduced by Mr. Jones, where an iron rod is nearly directly processed into a finished article.



A311 Fig. 13.43 One of his Master's secrets: special purpose pliers designed to assist in the manufacture of 'V' springs from Plate XVII, *Uebhandlung Feuer- und Seitengewehre* by Beroaldo Bianchini, Vienna, 1829.

The Master's Secrets

Returning once again to Biringuccio, Charles Greener, and the Apprentice Contract: The secrets mentioned in each refer to special techniques or formulae passed from master to apprentice to do a particular project or create a particular effect. They were not written down and many of them probably could not have been: how do you record the time required to create case hardening on lock parts immersed in bone dust in a metal box of varying size, covered in a fire of varying intensity?

Ralph Hodkinson, curator of crafts in Old Sturbridge Village at Sturbridge Massachusetts, published a series of articles titled "The Sixth Sense of the Craftsman" in *The Chronicle of the Early American Industries Association* which pointed out just how much of fine craftsmanship was accomplished by instinct based upon experience. About the forger in iron he wrote:

"Remember, please, that he had no pyrometer with which to measure high temperatures, no furnace with accurate temperature control. Yet the whole character of iron (and even more so of steel) changes critically with temperature. Here he used eyes like yours and mine, but wonderfully sensitive to the whole range of red color. There was one, and only one shade of red which was just right for each operation. He knew that shade. There was only one instant at which the irons in his forge were just right for welding. Another few seconds in the fire, a pull or two extra on the bellows and those fleeting semi-liquid surfaces for good welding would be burned into uselessness. Not only did he recognise this brief instant of weldability, he "struck while the iron was hot" at exactly the right time, in precisely the right place and direction to unite the two or more pieces of iron, which he had swiftly positioned on his anvil, into a single unit of the shape he desired."⁴⁹

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- 34 Mr. Wohler completed his apprenticeship on April 5, 1924, and arrived in Canada in 1928. After forty years, Imperial measurements were more natural to him than metric.
35. Greener, *Op. Cit.* p. 10.
- 36 The majority of chisels and files sold by gunsmiths' supply houses in America in the early/mid 20th century were supplied by the Grobet factory in Vallorbe, Switzerland. The company was established in the early 19th century and in the last years of the century was the amalgamation of business competitors operating under the names of F.L. Grobet and G.A. Glardon. In the tool supplier catalogues, the same illustrations are described variously as "die sinkers" chisels and "Engravers Chisels."
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38. Lyle, Lieut. D. A. (U.S. Ordnance Dept) and Samuel W. Porter (Master Armorer, National Armory). "Files and Rasps." *Ordnance Notes*, No. 164. Sept. 14, 1881, pp. 1-62, Plates I-XXIX. This is a most comprehensive paper on the manufacture and forms of rasps and files, with a listing of at least 440 different styles, cuts, and sizes used at Springfield Armory in 1881.
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47. *Ibid.*, I am grateful to Elena Yablonskaya, Curator of Arms at the Kremlin Armoury for a quality scan from the original printing of this illustration. The Cairo translation of some of the technical terms, not surprisingly, required a second opinion. A number of words change their meaning, dependent upon their use, while others have two words for the same part. My revisions follow:
- | | |
|--|-------------------------------|
| board | lockplate |
| lock hammer | cock |
| foot piece of cock | shoulder |
| lip | jaw (both?) |
| lip (of mainspring) | hook on mainspring |
| steady pin | tenon, pin |
| long slit | mortise |
| head screw | top jaw screw |
| ridge of the hammer | spur of the cock |
| lip for the ridge..the step on the cock spur ? | |
| lip on the jaw.. lower jaw ?? lower flint jaw | |
| firing piece | frizzen |
| set firing piece | frizzen |
| under firing piece | frizzen spring |
| underfiring piece | ??? |
| loop (of frizzen) | finial ?? |
| loop (of frizzen spring) | screw hole, eye |
| support (of frizzen) | bridle on pan??? |
| firing piece strap | bridle on pan |
| trunnion | tumbler |
| shaft of trunnion | shaft of the tumbler |
| trunnion shoe | bridle |
| small trunnion | axle of tumbler |
| support (of firing piece) | foot of frizzen |
| heel | which stops travel of frizzen |
| seat | pan |
| pocket | pan |
| trigger | sear |
| trigger bit | sear spring |
| steady pin . lug, pin, tennon, etc. on spring | |
| screwstock | lock, stock screw |
| set screw | lock, stock screw |
| stem | body (of a screw) |
| handguard | trigger guard ??? |
| handguard nipple | ??? |
| emery paper | |
| trims | flash, flashing |
| tumbler turning device | tumbler mill |
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A work in progress!

Chapter 14

A Reference Collection

Matchlocks, Wheel-locks, Flint-locks, & Percussion

What follows began as a catalogue to record items in the writer's collection and in museological terms was an accession record: each item was entered in numerical order as it was received. That is the order they will appear in this chapter.

That worked very well until the number reached a couple of hundred and then the location problem was solved by the basic index which begins on the next page.

There will undoubtedly be criticism because the illustrations are not in chronological order, or a classification by ignition, or by country of origin, or by military or sporting, or whatever. But it is the writer's belief that it would serve no useful purpose. There are countless books to do a much more thorough job and it is the purpose of this book to provide a guide to such additional information.

Prior to the late 1940s, most museums used a catalogue number that included a letter to indicate the type or class of artifact. The letter 'M' was used by the Victoria & Albert Museum in London and the Musée de l'Armée in Paris, to indicate items in their arms and armour collections. When the Royal Ontario Museum of Archaeology was established at Toronto in 1914, the V&A influence was considerable and the prefix 'M' was selected to identify material in the Department of Arms & Armour in the new institution.

A new cataloguing system based on the date of acquisition was introduced in 1948. When this study was taking shape, the prefix 'M' (standing for 'Mechanism') was added to the Accession Record for clarity in the computer without inconvenience, when compiling Chapter 14.

did not allow this.

It was hoped that text could be closely associated with the illustration but the economies of space made this not possible. Identification of illustrations in this chapter will retain the original accession number in order and missing numbers will indicate items removed owing to exchange, update, or because of type duplication. Future bibliographic references should be able to work with this arrangement.

The abbreviations used in the captions, which may also be used for the description titles, are, in the main, obvious but to avoid any question, they follow:

Air	Airgun	Hless	Hammerless		
BL	Breech loader	Miq	Miquelet	Rbdr	Rebounding lock
Cap	Cap lock	ML	Matchlock	Snap	Snaphance
Ctg.	Cartridge	Pellet	Pellet (percussion)	Tape	Tape-lock
Dog	Doglock	Perc	Percussion (other than caplock)	Tube	Tube lock
FL	Flintlocks			WL	Wheel-lock
F-L	Flint-locks	Pill	Pill-lock		

?

INDEX BY TYPE

This "Subject Index" designed to aid locating major types continues the order of chapters as follows and will guide the reader to individual locks by the accession number.

Indexed Categories	Flintlocks. English	Miquelet. Other
Matchlock	Flintlocks. Continental	Percussion powder
Wheel-lock	Dog-locks	Percussion pills
Snaphance - English	Military flintlocks - English	Percussion pellets
Snaphance Italian	Military flintlocks - Other	Percussion tubes
Snaphance Islamic	Flintlocks. other	Percussion caps
Snaphance Other	Miquelet. Spanish	Percussion "Improved"
English Locks	Miquelet. Italian	Percussion, other
Flintlocks. French	Miquelet. Islamic	Breech-loading/rebounding

Matchlock

M099	ML	Stamped with the initials "IZ"	189	FL
M143	ML	English military	197	FL
M195	ML	Snap-matchlock mark CB	198	FL
			234	FL

Wheellock

M083.	WL	Engraved. German
M085.	WL	Portuguese colonies? (fake?)
M245	WL	Continental, round belly

Snaphance English

M087.	Snap	English

Snaphance Italian

M044.	Snap	Italian "C.O."
M050.	Snap	C.Z. 1768
M077.	Snap	Italian marked "brento"
M110	Snap.	Italian by E. Bramansio
M172	Snap	Tuscan w/eng. bldg.

Snaphance Islamic

M023.	Snap	Moroccan
M059.	Snap	N.African (round profile)
M101	Snap.	Moroccan, flat plate

Snaphance Other

M 069.	Snap	Russian
M	Snap	
M		North African local manufacture

English lock

M042.	Dog	English lock, c.1660.Dog
M020.	F-I.	English, c.1630

French Flintlock

M002.	FL	Plate only, NY archaeological
M017.	FL	French by Chaleier for ML conv
M030*	FL	French, FL, left, unused
M061.	FL	Duroix à Angoulene
M112	FL	French, M.1717 variant by "Perrin"
M154	FL	French c.1640 by Mayer à Lisle
182	FL	French, M. 1717, P. Girard; 1

Flintlock English

025.	FL	Left hand, rainproof pan, unused. English
070.	FL	Coiled mainspring, (Groves patent)
071.	FL	Brookes w/automatic pan cover
133	FL	Wm. Smith Pat., No. 4065
152	FL	Unmounted English lock
173	FL	Miniature flintlock
186	FL	W. Turvey, swing-frizzen safety
187	FL	H.W. Mortimer & Co., Adjust-able frizzen
188	FL	Prettyman's pat. by Theo. Richards, 1813
217	FL	Aston's "invention". In the white

Flintlock Continental

109	FL	Early 17th cent. flintlock, ring top jaw screw)
111	FL	w/ crest & ponçon, banana shape
136	FL	Austrian, Vienna, M.1775
210	FL	Italian, by L. Zugno w/ brass overlays
215	FL	Rgt. Military with full and fired stops on cock.
222	FL	Central European sporting flintlock of c.1740

Flintlock British Military

003.	FL	H. Nock, screwless, rifle size
018.	Dog	Pattern 1704, Brit Military
032.	FL	Manton carbinc. 1836
M038.	FL	British Rampart gun by Brander

Margins: Top/bottom 1.43; sides 1.69 inch.

00A0 TEXT-MASTER 4 Trials

DO NOT MAKE ADDITIONS TO THIS FILE
ADD NEW ENTRIES TO THIS FILE in red
pen, THEN COPY TO 00A0 LOCKS
MASTERS

M001. WL, Brescian

A 17th century Brescian wheel-lock marked on the inside of the plate with the initials FG and lily which according to the late count Nolfo di Carpegna, may be the mark of Francesco Garatto of Brescia. Although he has since revised this opinion and considers it unidentified. It is one of the seven locks by this maker recorded by di Carpegna (1997) pp. 59-60. Plate length: 165mm. References: Letter, Nolfo di Carpegna, 14 January, 1972. Homer S. Robinson was Commander of the Occupational Forces at Brescia towards the end of WWII and was given this lock by the Mayor of that city when he left that post.

M002. FL, Dutch, lockplate only, NY

This archaeological flintlock plate with the rounded baseline profile of a French wheel-lock was a surface find at the Boughton Hill Site, an Iroquois (Seneca) village in New York State, destroyed by the French under the Marquis de Denonville on July 14, 1687. It was deaccessioned (if it was ever accessioned) by the director of the Museum of the Fur Trade, Chadron, Neb. 1971. Plate length: 103mm. References: letter, Charles E. Hanson, 18 August, 1971; J.R. Mayer. *Flintlocks of the Iroquois*, Rochester: 1943, p. 22

M003. FL H. Nock, screwless, rifle size

Nock's screwless lock for the No. 3 or No. 5 (trial designations) 1796 Nock Pattern Carbine for light and heavy cavalry. It is engraved with the crown over GR on the flash guard, H. NOCK and a crowned broad arrow below the pan and a small S over a larger TP on the tail, inside of the lockplate. (see also M003, M041, M114, M219, M237). Plate length: References: Blackmore, 1956, pp. 108-9; S.J. Gooding, "A Note on Screwless Flintlocks for the Ordnance, 1780-1790: Jonathan Henneff, Henry Nock, and a Prussian Design." *JAAS*, XIX, No. 3.

M004. Perc Left, bar action, case hard color

English percussion bar action lock with round hammer and simple engraved border design and considerable casehardening color. Marked on the inside 'J I' (?) over 'C' in a shield and over stamped '1'. Plate length: 116mm.

M005. Tape Greene carbine V.R. Plate

In 1858, 2,000 Greene carbines were ordered by the British Board of Ordnance. The locks are marked on the tail *Mass. Arms Co /Chicopee Falls / U.S.A. 1856* and the Victorian Crown over VxR behind the hammer. The cover for the tape dispenser is stamped *Maynard's Patent*

at the top of a circle and Sep. 22 1845 at the bottom. Inside the lockplate is the Ordnance inspectors' mark, a Crown over A over 3. Ammunition problems caused them to be relegated to "Hold in Stores" status where they remained until 1946 when some carbines and loose locks were sold to Harold Young a New Jersey antique gun dealer and W.W. Greener in Birmingham. Greener's stock was subsequently sold at auction in the 1960s. It is said that the carbines and locks were sold with either a target or a small sheet of instructions in the patch box and a roll of primers tied with a short fine wire in the primer magazine. All were in almost unused condition. See also M162 for added text. Plate length: 140mm. References: B.R. Lewis, "The Greene Carbines," *CJAC*, Vol. 6, No. 1 (Feb. 1968) pp. 17-20; H.L. Blackmore, *British Military Firearms*, p. 282; C.H. Roads, *The British Soldiers Firearms, 1850-1864*. London: Herbert Jenkins, 1964, p. 283.

M006. Perc H.B.C. bar action

Left hand percussion bar action lock stamped *Hudson's Bay Company over Made in England* and engraved with scroll decoration. See also M033 and M142. The inside of M006 is plain, M033 is stamped II, and M142 is stamped "36." These locks were a regular item of trade to be sold as replacements for the Imperial line of single and double barrel shotguns. Plate length: 114mm. References: S.J. Gooding, *Trade Guns of the Hudson's Bay Company 1670-1970*, 2003.

M007. Perc, Danish military converted from FL

A right percussion Danish lock with a rounded plate, converted from flint. There are no marks on the outside of the plate but the inside bears the initials "x", "L?" and "JH" in a square. There is a hammer safety of the same design as used on arsenal production models dated 1848. Plate length: 157 mm. References: Bjørn Nielsen, "Visererne til Tapriffel M.1848. *Vaabenhistorisk Aarbøger*, Vol. XXVII (1981). pp. 7-35.a

M008. Rbdr. Pair, engraved R.R. Train, 008

A pair of percussion rebounding locks with the features covered in Thomas Rigby's provisional English patent 332 of February 6, 1867. Rigby, of Bradmore Penn, near Wolverhampton, England,

apparently.

an ?
a rounded ?

Ital

is recorded variously as a gunlock maker or an action maker from 1867 until at least 1880. The right lock is stamped with the design of a railway engine of the period but both are stamped with the initials TF in a square on the inside. *Plate length: 110mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. pp. 32-3, Fig. 19.*

M009. Perc Whitman's improvement

A percussion bar action lock with scroll engraved plate and hammer, and "Whiteman's Improved Percussion." The removeable hammer nose is drilled very deep suggesting percussion cap, but it could also be for patch ignition or an as yet unidentified primer. Mainspring missing. *Plate length: 121mm. References: Bailey & Nie record a William E. Whiteman, Patent gunmaker and philosophical instrument maker on Market Place, Malton, Yorkshire, 1821-1828; Blackmore (1986) records a Stephen Whiteman at Chamber St. White's Yard in 1819 and 1822.*

M010. Perc, Lancaster's improvement

A back action lock engraved with pheasants and "C. Lancasters Improvement" but with no evidence of what that improvement might be. It is stamped 'JB' on the inside, one of the marks of Joseph Brazier who was described by Peter Hawker as "the great lock maker of Britain." Mainspring missing, but no evidence of other losses. *Plate length: 153mm. References: A surviving, cased, tubelock gun by Chas. Lancaster is accompanied by a bag of tubes described as his "Improved percussion primers." (Appendix IX, T25).*

M011. Perc Forsyth & Co. conv. to cap

A Forsyth & Co. roller primer lock converted to percussion cap. The serial number 2930 indicates manufacture in 1821. Sear spring missing. *Plate length: 119mm. References: DHL Back, Forsyth & Co. 1995, p. 44.*

M012. Perc. Back action w/ pierced cock

An unsigned, Continental, back action percussion lock with engraved plate and hammer, and pierced decoration along the back of the hammer. *Plate length: 112mm.*

M013. Air, Uncocked air gun action

Air gun action of round form for a muzzle loading single shot pneumatic air cane gun. Unmarked except for the serial No. JT-12887 of James Townsend who made air canes and guns at 11 Sand Street, Birmingham between 1845 and 1869. *Plate length: 150mm (124mm o/a).*

M014. Miq Spanish military

The second version of the Spanish Model 1789 carbine lock. *Plate length: 13.8mm. References:*

Calvo, Juan Louis. *Armamento reglamentario y auxiliar del ejercito Espanol*. Book 1. Barcelona, 1975.

M015. Miq Astiazaram

Spanish miquelet by Astiazaram located at Ribes. Stamped with the Astiazaram mark behind the pan and engraved *PRO MIG* under the mainspring. Top jaw and screw replaced. *Plate length: 136mm. References: Juan Louis Calvo. Armamento reglamentario y auxiliar del ejercito Espanol. 1975.*

M017. FL French, by "Chaleier" ML conv.

A flintlock of large proportions with reinforced and decorated cock. The lock is engraved in front of the cock with a crown over crossed anchors over "L". Stamped on the inside of the plate "I. CHALEIER" a St. Etienne gunmaker active in 1700. This mark (with the christian name initial M) is *Neue Stockel* No. 1235. This lock is of the same pattern as 600 made in 1693 "to convert 600 large [matchlock] muskets to [flintlock] fusils which are in the magazine [at Brest]" illustrated in a 1693 dated report in the National Archives, Paris. Descloureaux, who signed the document may have been an officer or gunsmith in service at the arsenal of the Royal Marine. *Plate length: 179mm. References: Archives Nationales, Marine, Paris. G5, Vol. 203. Jarlier, V.1, col. 52; E. Heer, Der neue Stockel, 1978, p. 202. See also M268.*

M018. Dog Pattern 1704, Brit Military

A British military doglock of the style introduced c.1704 with flat plate, cock, and dog. Stamped on the inside *M* over *RX* in a three-lobed punch mark. *Plate length: 187mm. References: Blackmore, 1961, p. 41; "Dutch Muskets for Ireland," Arms Collecting, Vol. 32, No. 3, (Aug. 1994), pp.75-84; H.L. Blackmore, British Military Firearms, pl. 53.*

M020. FL English lock, c.1630

An early example of a Type 1 English lock with a flat profile cock body. A notch on the curved extension of the sear engages in a projection on the lower edge of the tumbler, providing an efficient half cock position. *Plate length: 192mm. References: Rimer, Graeme. The Typology of 17th century Flint-locks in the Popham Armoury at Littlecote House. Arms Collecting, Vol. 25, No. 4 (Nov. 1987), pp. 111-124; Brian Godwin, Et al. "The English Flintlock, Its Origins and Development." Park Lane Arms Fair 20th Anniversary Volume, 2003, pp. 49-91.*

M021. FL Cannon, Hidden/Phila. Plate

Brass cannon lock engraved with the number "1" on the right side plate and inside, under the mainspring, "E. Hidden Phila" *Plate length:*

See Fig

125mm. *References* : Gaede, F.C. "Enoch Hidden and his Cannon Locks." *Arms Collecting*, Vol. 36, No. 4 (Nov. 1999), pp. 111-120

M022. Miq Italian, marked Celalba

A percussion miquelet lock converted from flint, engraved on the inside *celalba*, a village in northern Umbria. *Plate length*: 139mm.

M023. Snap Moorish

A snaphance lock with flat plate, ridged cock body and decorated battery arm. The bar between the buffer and the battery spring is joined in the center with a decorative ring. The circular fence has a decorative lip on the inside which overhangs the pan. *Plate length*: 214mm.

M024. Miq Ottoman, plain, with horns

An Ottoman/Turkish miquelet of the 18th/19th century. The cock has horns, rather than the more common ring, the frizzen to cock bar is decorated. See M204. *Plate length*: 85mm.

M025. FL, English left

A late English flintlock in the white, for the left side with rainproof pan. Sear spring missing. This lock is fully filed and polished except for the inside of the curve from the lower jaw to the breast of the cock which still has the marks left by the chisel which shaped it. *Plate length*: 113mm.

M026. Miq Portuguese trade lock

A simple, right, flint-lock of typical Portuguese "fecho de no" construction intended for the African trade in the late 19th, early 20th century with the initials "DP" behind the pan. ~~See also M079.~~ *Plate length*: 129mm

M027. Miq. Neapolitan.

A Neapolitan miquelet of the form popular in Southern Italy, particularly Naples, in the 18th century. There is an undecipherable maker's mark or town mark on the frizzen. *Plate length*: 139mm.

M028. Miq, Algerian, brass covered lock

Algerian Kayble lock with dog catch, embossed and engraved brass overlay and a coral bead inlet into the dog. *Plate length*: 178mm.

M029. FL Converted from perc. African trade

A back-action percussion military lock converted to flintlock for the African trade in the late 19th century. A new casting consisting of a brass pan and a steel frizzen is stamped "GI" on the inside. The lockplate is stamped "HH." The screw hole for fastening the lock to the stock (located in the new part) has not been drilled. *Plate length*: 194mm.

M030. FL French, flintlock, unused

A French, left hand flintlock with semi rainproof pan, in the white. Stamped on the inside with

"M" and "&(?)." Lightly pitted overall. *Plate length*: 124mm.

M032, FL Pattern 1833 carbine dated 1836

A Manton Pattern carbine lock engraved with "W" [crown] "R" over *TOWER* and dated 1836, 1006 of which were made by Joseph Brazier of Wolverhampton. On 12 November 1834, 1000 Pattern 1833 carbines designed by Charles Manton, Master Fourbisher, were authorized: half to be made at Enfield and half by 10 London gunmakers. Although the dates 1835 & 1836 appear on the locks, they were not completed until 28 June 1837 when the final batch were reported ready. Deliveries were 297 in Feb. 1836; 292 in Mar. 1837; and 411 on 28 June, 1837. *Plate length*: 139mm. *References*: Blackmore, *British Military Firearms*, pp. 144, Pl. 54; S.J. Gooding. "Manton's Pattern 1833 Carbine," *The Gun Report*, Feb. 2006, pp.26-31

M033. Perc H.B.C. Bar action

Left hand percussion bar action lock stamped *HUDSON'S BAY COMPANY* and *Made IN ENGLAND* and engraved with scroll decoration. See also M006 and M142. The inside of M006 is plain, M033 is stamped II, and M142 is stamped "36." These locks were a regular item of trade to be sold as replacements for the Imperial line of single and double barrel shotguns. *Plate length*: 114mm.

M034. Miq Algerian, brass dated 1273AH

An Algerian miquelet lock with brass overlay on the plate dated 1273 (1856). *Plate length*: 175mm.

M035. Miq Boylia, silver overlay dated 1226

An Ottoman (Balkans) Miquelet, Boylia with lightly engraved border on a silver overlay on all major parts, small lacuna on top jaw. A brass overlay on the frizzen is dated 1226 [1811]. *Plate length*: 112mm. *References*: Nikola Daskalov, *Weaponry of the Past*, 1989.

M037. Tape Maynard/Remington

Remington Model 1855 rifle lock with Maynard tape primer ignition. This lock has been through a fire. *Plate length*: 170 mm.

M038. FL, British Rampart or Wall Gun

A British flintlock rampart or wall gun lock, engraved on the flat style lockplate: *BRANDER & POTTS LONDON*. The lockplate and cock are engraved with a double line border. *Plate length*: 238 mm.

M039. FL, Fire at the Tower of London, 1841

The Grand Storehouse at the Tower of London was completely destroyed by fire on October 30, 1841 with the loss of 90,000 stand of arms. This accretion consisting of an iron pistol lock, fused brass trigger guards and other parts, is one of the

souvenirs of the fire sold in the weeks that followed. Mounted on a Victorian base of lapis lazuli and gilt brass. (see also M134). *Plate length*: Lock 135 mm. *References*: Guy Wilson. "The Great Awful Conflagration of 1841." *Strange Stories from the Tower of London*. 1976, pp. 34-39.

M040. FL, Nock's Volley gun

A back action flintlock made for a first model Nock's Volley Gun, the design of which was presented to the Board of Ordnance by James Wilson in July, 1779. Two patterns of lock were produced: this, the earlier of the two in which the internal springs were behind the cock and the frizzen spring behind the pan in the manner of the Queen Ann pistol, was first manufactured in 1780. Engraved with a crown over GR and Tower; no internal markings. Blackmore records his manufacture of 655 Voley guns between 1780 and 1788. *References*: In F. Bannerman's 1929 catalog (p. 96) they had one only at \$6.50. H.L. Blackmore, "The Seven-Barrel Guns." *JAAS* Vol. 1, No. 10, (June, 1955); *British Military Firearms*, p. 91

M041. FL, Nock's screwless, pistol size

Nock's screwless lock for pistol and rifle. Engraved with the crown over G.R. behind the pan and the initials IF or TF on the backplate. (see also M003, M114, M219, M237). *Plate length*: 121mm. *References*: Howard L. Blackmore, 1956, plate XXI, p. 90; 1961, p. 124, pl. 32 (bottom). *Plate*

M042. Dog, English lock, c.1670. Dog

A classic English doglock/Type 2 English lock, with horizontal acting sear, of the last half of the 17th century. *Plate length*: 141mm. *References*: G.T. Howard, "Some Notes on the Dog-Lock and on one in Particular." *Arms Collecting*, Vol. 22, No. 3 (Aug. 1984), pp. 93-97. *Plate*

M043. Miq, Roman lock

Plate length: 164mm. *References*:

M044. Snap, Italian

An Italian snaphance c.1660, marked "C.O" on the interior, the mark of an unidentified Tuscan maker. *Plate length*: 115mm. *References*: Nolfo di Carpegna "A Summary of Notes ..." in Held, *Art, Arms & Armour*, p. 320, and note 11.

M046. Perc, Mule ear lock

Small, American percussion Mule Ear lock, unsigned but with lightly engraved floral and scroll design. Lacking the flat mainspring. *Plate length*: 114mm.

M047. Perc, Mule ear double, over/under

Percussion Mule Ear lock with two hammers to fire a double barrel, over/under gun. The plate is signed "H. [Henry] W. Eldredge" who was active

at Angelica, New York c.1850. *Plate length*: 116mm (151mm o/a). *References*: George F. Harding Museum, Sotheby NYC sale, Nov. 25, 1986, Lot No. 578.:

M048. BL, Lever bolt/W. Richards, Liverpool

The unsuccessful "Lever-Bolt" breech loading action designed for .22 caliber target shooting by W. Richards of Liverpool, probably in the 1930s. The "Lever-Bolt" provides a "straight-pull" bolt for a lever activated, Martini-like lever. This action, which is operational but incomplete, is blued and polished. It was developed by Mr. J.L. Brown, manager of W. Richards (Liverpool) Ltd. (It must not be confused with the Lever Bolt Gun Co. of Hartford, Conn. which produced a catalogue in the very early 1930s). *Overall length*: 120mm.

M049. BL Greek Mannlicher Model 1898

Action from a 6.5mm Greek Mannlicher with rotary magazine, loaded with six blank cartridges and mounted on a standing walnut base for use as a book-end. Marked on the left side of the action, Steyer 1914 and on the receiver with the Greek coat of arms over Y:1903/14 and the serial number 3472F. The rotary magazine is filled with six dummy cartridges which were deactivated by removing the powder and killing the primer about 1971 by Edward J. Anderson of the Ontario Attorney Generals Office, Forensic Branch. *Plate length*: 220mm o/a. *References*: D.B. Webster, *Military Bolt Action Rifles*. Bloomfield: 1993, p. 56.

M050. Snap Italian snaphance by C.Z. 1768

An Italian snaphance engraved CZ and dated 1768 on the inside of the plate, under the mainspring. Cassiano Zanotti of Lugo, Emilia and Bologna, was born 1706, son of Pietro, and d. 1786. *Plate length*: 136mm.

M051. Perc Brit Back action, rampart? dated 1855

A back action, right hand, military lock engraved with a crown over VR over ENFIELD 1855 and an extremely long (46mm) sear, incorrect bridge. The gun for which this was intended has not been identified. *Plate length*: 141mm.

M052. Perc w/ unusual hammer

Back Action with hammer providing a very long reach. Mainspring and sear spring missing. The same lock has been found on mid-19th century sporting guns, unsigned, but engraved Gardhiane which Terenzi (1972, p. 107) describes as "reminiscent of Tusco Emelian" manufacture. *Plate length*: 122mm.

M053. Miq Neapolitan

A south Italian Neapolitan Miquelet. *Plate length*: 152mm.

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Removes

M054. Perc, Ethan Allen & Co. Makers

Right, bar action percussion lock with scroll engraved plate stamped *E. ALLEN & CO MAKERS*. Internally, it has a straight mainspring and bears No. 59 on most parts. *Plate length*: 123mm.

M055. FL, Austrian percussion-to-FL, African trade

Lock from an Austrian Model 1854 Lorenz percussion musket which has been converted to flintlock using castings which have been only partially finished. It bears the typical three-digit form of date -855 (for 1855), and Austrian eagle. Altered for the African trade. *Plate length*: 141mm.

M056. FL, "African-made" flintlock

A very crude flintlock probably hand-made by one of the central African "native gunmakers." *Plate length*: 129mm.

References: P. M. Anderson, "Black Powder/Black Magic" *Black Powder*, Vol. 41, 1994, pp. 21-23 describes and illustrates the manufacture of these locks.

M059. Snap, N. African (round profile)

A snaphance lock with flat plate and rounded cock and battery arm. The buffer and battery spring finial of flattened tear drop shape. Although of North African manufacture (perhaps Moroccan), it is based upon 16th century English snaphance locks of the design known as Barbary locks which were exported by the thousands by the Barbary Trading Company during the 18th century. *Plate length*: 210mm.

M060. Miq, Islamic military with ring-top flint screw

An Ottoman/Turkish military miquelet of the 18th or 19th century. The frizzen to cock bar has a round mark which probably held a gold (or brass) Tugra government mark. *Plate length*:

M061. FL, Duroux à Angoulême,

A right flintlock with a brass lock plate, of the style called the "Marsailles" lock. Engraved "Duroux à Angoulême" in front of the cock. Duroux was active 17-- to 1810 and worked at the Naval School at Angoulême during the First empire. This lock is from a brass barrelled blunderbus which burst before the T.V. cameras about 1960, resulting in the loss of the user's arm. *Plate length*: 135mm. *References*: Gaier, Claude. *Five Centuries of Liège Gunmaking*. Alléur, Belgium: p. 116.

M064. Perc, flat tube, In the white

A lock with a spring clamp for an as yet unidentified flat tube. Although this method of securing the tube is often identified with William Moore and/or George Fuller, no patent has been

found for either. But Moore submitted the design to the Ordnance in 1839 (it was rejected) and it is unlikely that he would have submitted a design other than his own. The tube submitted for the trials was a round tube. *Plate length*: 126mm. *References*: N. Corry collection, 31 Jan. 1989. W&W sale No. 336, Lot 1116. H.L. Blackmore, *British Military Firearms*, Plate 56; *Dictionary of London Gunmakers*, Wm. (3), p. 145;

M065. Patch, Left lock, Chas Piper-Cambridge

A left bar action patch lock marked *Charles Piper, Cambridge* and all over scroll engraved. The removable nose has been replaced. *Plate length*: 118mm. *References*: N. Corry collection, 31 Jan. 1989. W&W sale No.: 336, lot 1116. Blackmore (1986) records a Charles Piper in 1833-1830 at 97 Peascod St. Windsor, where he was armourer to George IV's personal collection. Bailey & Nie, and Boothroyd, record him in Cambridge 1849-1855. *Plate*

M066. Patch, Right lock, Chas. Piper-Cambridge

A right bar action patch lock marked *Charles Piper, Cambridge* and all over scroll engraved. The removable nose has been replaced. See also M065. *Plate length*: 120mm. *References*: Blackmore (1986) records a Charles Piper in 1833-1830 at 97 Peascod St. Windsor, where he was armourer to George IV's personal collection. Bailey & Nie, and Boothroyd, record him in Cambridge 1849-1855.

M067. Tube, Wm. Moore

A right hand tubelock by William Moore, Appointed Gunmaker-in-ordinary to William IV in 1836, serial number 521. This is "the other lock" from the gun that provided the left lock in the H.J. Jackson collection (Plate LXIII, fig. 111), now in the Royal Ontario Museum, Toronto. *Plate length*: 122mm. *References*: H.J. Jackson & Chas. E. Whitlaw. *European Firearms ...* pl. LVIII, Fig. 111; K. Corey Keeble. "The Science and Beauty of Antique Gunlocks." *Rotunda*, Vol. 28, No. 2, (Fall 1995), pp. 10-17.

M068. Perc, W&J Rigby back action

Percussion, back-action classic Irish style pistol lock by *Wm. & J. Rigby*, Serial No.: 6234. This number is listed by DHL Back in *Messrs Rigby* as a "Best double gun with cases" and a pair of "Best duelling pistols" sold in 1827 to one J. Forde for £38.4.6. Deeply engraved in Rigby's style. *Plate length*: 120mm.

M069. Snap, Russian, snaphance.

A classic 17th century Russian snaphance, unmarked except for three punch marks under the frizzen spring and over the sear. *Plate length*:

196mm. *References*: N. Corry collection, 31 Jan. 1989. W&W sale No.: 336, lot 1142

M070, FL Coiled mainspring, (Groves patent)

A flintlock constructed under Jonathan Groves's English patent No. 2072 of 22 Oct. 1795 with a coiled spring. It is unmarked, "in the white," not drilled for fitting to a stock, has a goose neck cock, roller on the frizzen and an internal flat frizzen spring. *Plate length*: 145mm. *References*: Maj. Noel Corry; "Some Interesting British Flintlocks." *Man at Arms*, Vol. 11, No. 6, (Nov/Dec. 1989) pp. 23-41 contains a description and patent drawings; H.L.B. *Guns & Rifles of the World*, plate 299, where it is identified in the Tower records as invented by Ezekiel Baker. The Tower specimen has a reinforced cock and traditional frizzen spring.

M071, FL, Brookes w/automatic pan cover

A very high quality English flintlock with a rotating waterproof pan cover activated when the frizzen is struck. Engraved *Brooks* in front of the cock. *Plate length*: 123mm. *References*: Illustrated: *The Gun Report*, March 1986, p. 51.

M072, F-L with horizontal sear and coiled snake sock screw

Unmarked doglock with horizontal acting sear and another small tumbler which activates the dog catch. The cock screw is in the shape of a coiled snake and is fastened from the inside of the plate. A similar screw is found on a pistol at Kelvingrove, Glasgow. *Plate length*: 159mm. *References*: William Reid, "Tortoise-Shell Veneered Pistols in the Scott Collection" *Scottish Art Review Special Number*, (Vol. 6, No.1, 1956) pp. 30-40.

M073, Perc, Pill lock, "Jones Patent"

Pill lock, in the white, identical to one marked "Jno. Jones & Co. Improved Percussion" in the W. Keith Neal collection. Another of the same construction and one with a minor variation, both unmarked, is in the Birmingham Museum of Science and Industry collection. John Jones & Co. was active in Birmingham 1810+

Plate length: 121mm. *References*: Neal & Back, *Forsyth & Co.* p. 198-99; pl. 110, 111, 112.

M074, Miq, Shishané with Flat profile, brass overlay

A Bulgarian Shishané with gold (?brass) inlay and brass overlay. *Plate length*: 94mm. *References*: Nikola Daskalov. *Weaponry of the Past*, p. 57.

M075, Miq, Silver inlay (twisted wire)

Twisted silver wire and german silver overlay. Maker's mark (?) on the cock/frizzen bar. Top jaw and screw were replaced by A.C. Carpenter. *Plate length*: 99mm.

References:

M076, Miq, Square lines, brass overlay & inlay

A Shishané with decorative gold (brass) inlays on the top jaw and overlay on the frizzen/cock bar which retain traces of engraving. *Plate length*: 91mm. *References*: Nikola Daskalov. *Weaponry of the Past*, p. 57.

M077, Snap, Italian, marked "brento"

A finely chiselled snaphance, c.1730-40, engraved "brento" a village on the road between Florence and Bologna on the inside of the right plate. This is attributed by di Carpegna and Boccia to Francisco Negróni whose name would have been found on the left lockplate. *Plate length*: 149mm. *References*: Nolfo di Carpegna, "A Summary of Notes ..." in *Art, Arms & Armour...*, Held, p. 326 and fn 26. L. Boccia, *Museo Stibbert Collection Catalog*, (1975) pl. 564b. *Plate*

M078, FL, Inventor's (?) model, w/ ext. spring

An American, or perhaps English experimental/prototype flintlock with an exterior mainspring and unusual trigger guard-like sear spring. The frizzen has been resteeled. Although the stepped lockplate appears to be of professional manufacture, the fitting of the new springs are not of the same quality, suggesting the work of a less skilled workman. *Plate length*: 121mm.

M079, FL, Portuguese Trade lock

A right-hand, simple, flint-lock of typical Portuguese construction intended for the African trade in the late 19th, early 20th century. This Portuguese *Fecho de No* is stamped 283 on the back of the plate. The cock and plate are filed smooth (more or less) and there is simple "engraving" under the frizzen spring and on the rear of the plate. Otherwise, identical to No. 026. Although all are of inferior quality, this has some decorative engraving. *Plate length*: 129mm.

M080, Miq, Persian

A miquelet lock with extremely curved cock. Decorated with typical brass/black rondelles inlaid (perhaps overlaid) along the frizzen support bar. Considered to be of Roumelian origin but originally associated with a blunderbuss pistol of Turkish or Kurdish origin. *Plate length*: 76mm. *References*: George Cameron Stoner, *A Glossary of the Const...of arms & Armor*, 1934. Fig. 648/2.

M081, Miq, Italian by Mig. Zegarra

Miquelet lock bearing the gold impressed mark *Migl. Zegarra* and engraved *En Madrid*. It has the half cock which passes through the plate and catches behind the knee of the cock. Miguel Zegarra (Lavin spells it Segarra) was a disciple

Long

check spelling

of Gabriel de Algora in Madrid. He received honorary appointment as gunsmith to Carlos III on 11 April 1768. On July 11, 1771, he was sworn as regular, replacing the deceased Agustin Ortiz. Died, 22 Jan. 1783. *Plate length*: 145mm.

M083. WL, Engraved, Bohemia, early 18th century

An early 18th century Bohemian, perhaps Prague in Czech Republic or Eger in Hungary, wheel-lock. The plate is deeply etched and engraved with a company of armored cavalry led by a captain with drawn sword and pistol in saddle holster. The dog head is engraved with a warrior in Roman armor seated in front of a panoply of flags and in front of the pan is a hunter in a boat with a punt gun. *Plate length*: 199mm (275mm o/a)

M085. WL, Portuguese colonies? (fake?),

A wheel-lock of unusual form, engraved with a standing lion fronted by a shield with arms. *Plate length*: 102mm (151mm o/a).

M086. FL, Experimental Prussian screwless

A right-hand, screwless flintlock with flash-guard on the pan. The lock is unmarked except for a stamp inside with a 4-pointed star joined over a crescent or an "O", the assembly mark XXII and a 0. It is the standard Prussian Jäger-Korps rifled carbine lock fitted with a flashguard and a screwless mechanism. This may be the pattern of the Prussian muskets, seven of which were made by Henry Nock in 1786 (see also M 237). The stock screws have been broken off. *Plate length*: 160mm. *References*: Wallis & Wallis Sale No. 354, Lot No. 1171, Feb/91. It is one of six detached locks in sale No. 354 and the catalogue records "The following six detached gun locks (lots 1166-1171) are stated to be part of war booty brought from the Arsenal, the Central Depot, and the Museum of Artillery in Paris, captured in 1815." All were "non standard" flintlocks. See also locks M086, M136, M215; Arnold Wirtgen. *Die Preussische Handfeuerwaffen, Modelle und Manufakturen 1700-1806*, (Osnabrück, 1976) pp. 117-122, fig. 270-273; Howard L. Blackmore, "The Experimental Firearms of Henry Nock." *JAAAS*, Vol. II, No. 4 (Dec. 1956), pp. 71ff. Plate XXII; S. J. Gooding, "Notes on the Screwless Flintlocks for the Ordnance, 1780-1790" *JAAAS*, XIX, No. 3, pp. 135-147.

M087. Snap English Snaphance

A classic English snaphance of the first quarter of the 17th century with flat lock. The lower portion of the cock is flat; the upper rounded. The finial of the buffer and battery spring are in the shape of

acorns. The frizzen has been refaced. *Plate length*: 188mm. *References*:

M088. Miq Persian miquelet, damascened

A gold damascened miquelet described by Maj. Noel Corry: "Our Afghan friend Mohammad Zakir presented me with two locks...when we visited his shop in Kabul many years ago." This was one of them. *Plate length*: 79mm. *References*: N. Corry in "Guns & Pistols of Kurdistan and the Caucasus," *The Gun Digest*, No. 42 (1988), p. 95, Plate VII.

M089. Perc, Forsyth roller primer on a demonstrator model.

A 1st model roller primer stamped with the "F" over "Patent" marking and bearing serial number R62 on the back of the scent bottle. This salesman's promotional piece is fitted to a pistol-like walnut stock but not designed to be fitted for, or with, a barrel. On most Forsyth guns, the scent bottle is threaded into the barrel and not attached to the lock plate. The lock on this specimen, a separate plate is made to accept the scent bottle and is therefore similar to those used on guns provided with an interchangeable flint and percussion lock. By serial number, the scent bottle would date 1808. The square ends of the lock plate and the engraved *Forsyth & Co. Patent* inscription, suggest that the piece was assembled c.1810. *Plate length*: 104mm (o/a 208mm). *References*: Ex. J.N. George collection, Wallis & Wallis February 18, 1948, Lot No. 107. Illustrated in *English Pistols and Revolvers*, Onslow Co. NC, 1938. plate XV; Ex. Clay P. Bedford collection. Illustrated *Early Firearms of Great Britain & Ireland*. Metropolitan Museum of Art, 1970, plate 170; Neil & Back. p. 31; Back, 1995, p. 35; *Arms Collecting*, Vol 32, No.: 1 (Feb. 1994), p. 4.

M090. Miq, A Romanlock by G.M.Brazzolo

A Roman lock engraved G.M. Brazzolo on the plate. *Plate length*: 158mm. *References*: *Der Neue Stöckel* records a Giachino Brazzolo at Milan 1692-98 and a Giovanni Maria Brazzolo at Milan 1698. The source for this was probably Giabi, 1978.

M093. Miq, Spanish

A Spanish military *Patilla* miquelet, Pattern 1789/1792. An undecipherable makers' mark is on the plate behind the pan. *Plate length*: 123mm. *References*: J.L. Calvó, *Armamentos de Municion en las Fuerzas Españoles*, 2004, p.24.

M094. Miq, Albanian/Balkan

A Miquelet with the typical Balkan long, straight cock. Plain but with a drilled and serrated decorative border along the top of the plate. *Plate length*: 87mm.

M095. FL, Pat. 1833 carbine lock dated 1835

A Manton Pattern carbine lock dated 1835. On 12 November 1834, 1,000 Pattern 1833 carbines designed by Charles Manton, Master Fourbisher, were authorized. Although the dates 1835 & 1836 appear on the locks, they were not completed until June 1837 when the final batch were reported ready. Deliveries were 297 in Feb. 1836; 292 in Mar. 1837; and 411 on 28 June, 1837. See also M032, M190. *Plate length*: 139mm. *References*: Howard L. Blackmore, *British Military Firearms*, pp. 143-4, Pl. 54; S.J. Gooding, "Manton's Pattern 1833 Carbine," *The Gun Report*, Feb. 2006, pp.26-31

M096. Miq, Bulgarian Miquelet with silver overlay

A Bulgarian boyliya lock with silver overlay, floral and scroll engraved. *Plate length*: 125mm. *References*: Daskalov, K.V, *Weaponry of the Past*, 1989.

M097. Perc. Manton Pat. 1816

This left hand Joseph Manton 1816 Patent pellet lock hammer, has been fitted to an almost contemporary (but not original to the hammer) John Manton lock. The lockplate probably dates to c.1825. This hammer and four Manton tube lock hammers were acquired by Louis Cherepy at an Fort Lee Arms Collectors meeting in New Jersey in the early 1960s. It is probable that the complete lock (M202) was acquired by Warren Moore at the same meeting. See also M202. *Plate length*: 121mm. *References*: Neal & Back, Manton, Vol. II, p. 152. "About 275 locks were made with this ignition system and only four have been traced which still exist in their original form."

M098. Rbdr. Colt Pat. F.A. Co.

This constant-tension left hand rebounding lock was used on the double guns and rifles manufactured by Colt's Patent Firearms Manufacturing Co. of Hartford, a class of long gun introduced by Colt's in 1878 and continued in the line until 1891 when they were discontinued. Andrew E. Whitmore is recorded in the Springfield, Mass. directories as a contractor working for Smith & Wesson (1879-80), and a gunmaker (1880-1889). He obtained at least four patents, two of them for rebounding locks, and all of them assigned to Colt's. Nevertheless, no Patent has been located for the lock used by Colt on their double guns, even though the one illustrated is the most simple of all of the rebounding locks encountered. By merely altering the shape of the pin on the swivel from a round to an inverted comma shape, the act of rebounding the hammer was achieved. After the hammer fell,

the bifurcated hook of the mainspring that engaged the swivel climbed up the inclined plane of the inverted comma. After all forward movement was arrested the mainspring slipped down the inverted plane of the swivel and returned the tumbler to the halfcock position.

Plate length: 110mm. *References*: The right hand mate of this lock is illustrated in Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*, pp. 91, Fig. 51. *Plate*

M099. ML, Stamped with the initials "IZ"

A 16th century German sear matchlock with square lockplate bearing the initials "IZ" on the interior. The head of the serpentine has an ingenious three-cog wheel to feed the burning match. *Plate length*: 192mm (310mm o/a)

M101. Snap. Moroccan, square form

A late 18th to mid 19th century Moroccan snaphance with flat surface profile. This lock is undecorated but of better workmanship than most. *Plate length*: 221mm. *References*: W.W. Greener,

M102. Doglock Belgian Export lock

A doglock, probably of Liège manufacture for the export trade with bridled frizzen but unbridled tumbler; two screw attachment at tail and in front of frizzen spring; pan not integral with the plate. The lock plate is grooved to simulate a stepped plate and engraved border. The cock screw has a decorative washer attached. *Plate length*: 171mm.

M103. Miq. Sardinian by "Barbuti"

A Sardinian miquelet with traces of engraved decoration and the maker's name "Barbuti," probably Antonio Barbuti of Tempio, who was active 1740-1780, engraved on the lower edge of the plate. *Plate length*: 151mm. *References*: A. Gaibi, "Il fucile sardo," *Armi Antichi*, 1967, p. 45; E. Heer, *Der neue Stockel*, 1978, Vol. 1, p. 54.

M104. Miq. Spanish by Juan Cano of Cadiz

A fine Spanish miquelet of classic type. Engraved Juan Cano on the plate in front of the cock, En Cadiz on the pan cover, and the date A^o 1808 on the plate under the mainspring. Gold line pan. The surface of the lockplate is scroll engraved and the mainspring has a beaded edge and the underside is decorated with a deep chiselled shell. *Plate length*: 112 mm.

M105. Miq. Portuguese "fecho de no."

Portuguese fecho de no with engraved floral and leaf decoration. *Plate length*: 113mm. *References*:

M106. Miq. Italian, "a tutto tondo"

A Marchesian miquelet lock with a single leaf mainspring; the frizzen spring is hidden under the pan bridle and the pan is brass lined. The cock is pinned from the inside to a cock bridle and the

cock body is chiselled in the round (*a tutto tondo*), in the form of an angel; the majority of the type date between c.1720 and 1780. This form of decoration was produced exclusively in the Marches, a large region in Italy between Umbria and the Adriatic. *Plate length*: 106mm. *References*: Nolfo di Carpegna. "A Summary of Notes on Central Italian Firearms of the 18th Century," *Art, Arms & Armour*. (Robert Held, editor). Chiasso, Switzerland: Aqua Fresca Editrice, SA. 1979. p. 340

M107, FL Spanish military, M.1801

A Spanish, Model 1801 cavalry pistol lock with brass pan and the makers mark *Arano* and the letter "A" on the outside of the plate and no interior markings. *Plate length*: 127 mm. *References*: Juan Louis Calvo, *Armamento Reglamentario y Auxiliar del ejercit Espanol*. Barcelona, 1975. Plate 11.

M108, Perc. Back action, unusual sear/tumbler
An unmarked back action lock of Continental manufacture with a lateral acting sear which acts at full cock on the rear of the hammer and at rest, in a depression on the lower beast of the hammer. The ramp-like surface of the hammer is purely decorative. *Plate length*: 97mm.

M109, FL Early 17th cent. flintlock

Early 17th century flintlock with wide flat jaws, ring to top jaw screw, square tumbler pin and vertical sear. Two screw lock attachment. There is no bridle on either the frizzen or the tumbler. *Plate length*: 150mm.

M110, Snap. Italian, by E. Bramanti

An Italian snaphance by E. Bramanti of Celalba in northern Umbria, c.1740-1750. The plate, cock, and frizzen are scroll engraved and the maker's name is found under the mainspring. *Plate length*: 146mm.

M111, FL Crest, maker's mark, banana shape

A large, late 17th century flintlock with round banana plate and cock marked under the frizzen spring with a stamp bearing the hen of Henneburg surmounted by the initials "WG," the acceptance mark of the city of Henneburg and the initials of an unidentified lock maker. It is engraved on the tail of the lockplate with the arms of an unidentified aristocrat. *Plate length*: 178mm.

M112, FL Italian (Piemonte) Military signed "Perrin"

A Piemonte (Italy) Model of 1735 cavalry and marine carbine lock. The feather spring bridle is designed to prevent the screw working loose by use and was incorporated into a number of patterns from about 1730. It was used on the sear of one pattern pistol and continued to be used into the 1780s. It is stamped 'Perrin' on the inside of

the plate. *Plate length*: 170mm. *References*: Francesco Sterrantino, *Le Armi da fuoco del Vecchio Piemonte, l'armamento portatile 1683-1799*, 2002.

M113, FL E. Baker flintlock

A flintlock with the same configuration as the East India Company Pattern 1802 Baker rifle. Engraved on the plate, *E. Baker*, with holes through the plate to remove tension from the mainspring and the frizzen spring by the use of a pin. Fitted with Baker's high frizzen and a detent on the tumbler. Stamped with a Crown over 3. *Plate length*: 147mm. *References*: Harding, Vol. 1, Fig. 11.1

M114, FL Nock screwless

A Nock production model of his screwless lock without flash guard. The plate is engraved only *H. NOCK* behind the pan, on the reverse a crown over 6 inspector's mark, stamped S on the tail. (see also M003, M041, M114, M219, M237). *Plate length*: 142mm. *References*: Howard L. Blackmore, 1956, p. 89, Plate XXe. Plate

M115, Tube Austrian tube lock dated 1828

This percussion lock which is dated 1828 on the lockplate began life as a flintlock. It was converted to tube lock percussion as the Austrian Model 1841. Known as the invention of Giuseppe Consol as improved by Gen. Vincien Augustin, this tube lock is probably one of those sold to the U.S. Government during the Civil War and later sold by Francis Bannerman of New York. See also M211. *Plate length*: 146mm. *References*: Edwards, William B. *Civil War Guns* Harrisburg: Stackpole Co. pp. 260-62. Marchi, Bruno. "Il Fucile Austriaco Systema Augustin: *Diana-Armi*, Year IV, No. 5 (Sept. 1970) pp. 21-24; Marchi, Bruno. "Systema Augustin: *Diana-Armi*, Year IV, No. 6 (Nov. 1970) pp. 105-109.

M116, Perc. Springfield, M.1855

Pattern 1855 U.S. musket with Maynard tape primer, dated 1858. *Plate length*: 138mm.

M117, Pellet Sharps/Lawrence primer

Sharps' New Model 1859 marked on the plate, C. SHARPS' PAT. / OCT. 5th 1852 and near the primer mechanism, R.S. LAWRENCE PAT. / APRIL 12th 1859. *Plate length*: 127mm.

M118 Tape Jenks/Remington tape primer

William Jenks of Columbia, SC obtained U.S. Patent No. 747 in 1838 for a side-hammer lock for a breech loading firearm. This, from a carbine of 1847 with a Maynard primer is stamped 'Remington' over 'Herkimer' over N.Y. on the plate and '587' on the hinge of the magazine cover.

Plate length: 167mm. *References*:

M119, Rbdr. by Wm. Moore

so as to permit removal

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the surplus military goods dealer

breast?

A right-hand rebounding lock engraved William Moore & Son which was probably made by Charles Moore and his son William, 43 Old Bond St. London although they are recorded by Blackmore (1986) only as Charles Moore or William Moore and Co. between 1854 and 1872.

Plate The lock was constructed on Joseph Stanton's English patent No.: 367 of 1867 on which the upper leaf of the mainspring and the tumbler were lengthened to bear against each other. The spring, on firing, was slightly depressed by the tumbler extension to cause the hammer to rebound. *Plate length: 115mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 87, Fig. 47.*

M120, Rbdr. W. Richards

Back action rebounding lock engraved W. Richards constructed upon the United States patent issued to John Stokes of Springfield, Mass. in November, 1868. The same principle, applied to a bar action lock, was patented in England in February, 1867 by John Stanton. There is no record of a relationship between Stanton and Stokes but that possibility does exist. *Plate length: 116mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 86, Fig. 46.*

M121 Rbdr. Parker Bros. Plate

Joseph C. Dane, on March 26, 1872, obtained U.S. Patent No.: 124,939 for the rebounding lock which had been patented two months earlier in England by E. T. Hughes, a patent agent acting for W. F. Parker of the Parker Gun Co. at Ithica, New York. It is a free floating lock working directly off the tumbler. All of those examined bear the U.S. patent date on the inside of the plate. Parker's considered the rebounding hammer to be such an important part of their shotguns that they give it extensive coverage in their catalogs. *Plate length: 122mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 88, Fig. 48.*

M123 Rbdr. Remington Arms Co. Plate

Lewis Lobell Hepburn of Ilion, N.Y. a sometimes employee of the Remington Arms Co. obtained U.S. Patent No. 162,473 for the rebounding lock used by Remington in 1875. In it, a tumbler from which a stirrup is pivoted in two places in open-topped pin holes. This example of his patent bears serial number 550 and is stamped Remington Arms Co. By 1879, rebounding locks were universal and Remington advertised they were on all of their double guns. *Plate length: 117mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 89, Fig. 49.*

M124, Rbdr. N.R. Davies

This free floating rebounding lock has not been dated but it would appear, because of its simple and inexpensive construction, to be of post 1900 production. It is marked only *N. R. Davis and Son: Nathan R. Davis was active at Assonet, Mass. from 1853. In 1884 the name of the firm was changed to N.R. Davis & Sons with the addition of W.A. and N.W. Davis to the company. Plate length: 107mm. References: Eugene L. Lyon, The N.R. David Firearms Co." The Gun Report, May 1984, pp. 58-60; Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 100, Fig. 62.*

M125, Rbdr. Unsigned,

The sear and sear spring for this unmarked mechanism would have been built into either the frame or the trigger plate. The pattern has not been identified but the principle of Comstock's patent have been used. *Plate length: References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 96, Fig. 57.*

M126, Rbdr. Hopkins & Allen

Hopkins & Allen Arms Company, Norwich, Conn. U.S.A. is stamped on the plate of this free floating lock. The company was in business from 1868 until 1917 and manufactured a full range of firearms. On this, the single leaf mainspring first applies downward pressure on the tumbler to activate the hammer. The hammer continues on through inertia to strike the firing pin but the mainspring comes into contact with the now elevated corner of the tumbler to reverse the action and force the hammer to rebound. *Plate length: References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 94, Fig. 55.*

M127, Rbdr. A. J. Aubrey

A. J. Aubrey was the Vice President and Superintendent of the Meriden Firearms Co. which was owned by Sears Roebuck & Co. He obtained patent No.: 902,630 dated Nov. 3, 1908 to provide a lock "of extremely simple construction composed of comparatively few parts." On it, he gave the mainspring an upward acting energy, working on a tumbler that moved counter-clockwise, which in turn activated another tumbler that incorporated a rebounding ramp. *Plate length: References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 99, Fig. 61.*

M128, Rbdr. Folsom Arms

Rebounding lock by the Folsom Arms Co. at 314 Broadway, New York which used a coiled spring as patented by Harry Comstock, an employee of L.C. Smith. *Plate length: 115mm. References:*

to new

Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 95, Fig. 56.

M129, Rbdr. W.H. Baker & Co. Plate

A fine American style rebounding lock with the mechanism behind the hammer. The hammer is under constant pressure. No patent for this lock has been found but it is from a W.H. Baker & Co. first model front trigger break model double or 3-barrel gun, c. 1875. *Plate length*: 85mm. *References*: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 92, Fig. 52; Daryl Hallquist, "The Guns of the Baker Brothers," *The Double Gun Journal*, Vol. 3, No. 3, (Autumn 1992), pp. 62-67 and Vol. 3, No. 4 (Winter 1992), pp. 139-148. *Plate* —

M130, Rbdr. L.C. Smith

Frank Snyder of Fulton Co. New York obtained U.S. patent number 695,242 dated March 11, 1902 for this lock. It bears serial number 129,168 and is marked L. C. Smith, the gunmaking firm located at Ithica, N.Y. *Plate* In outward appearance this free floating lock is a bar action lock but internally, all of the mechanism is behind the hammer. *Plate length*: 130mm. *References*: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 98, Fig. 60.

M131, Rbdr. Baker Gun Co. Plate

W. H. Baker & Co. was established at Batavia, New York in 1877. The principals of the Company were William H. Baker, an experienced gunsmith, L.C. Smith (Lyman Cornelius Smith) and his brother Leroy Smith. This lock, number 35945, is engraved *Baker Gun Co.* but it was not made under Baker's 1878 patent. *Plate length*: *References*: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 90, Fig. 50.

M132, Rbdr. Lock, Unsigned, back action

An unsigned, American-made back action rebounding lock with the mechanism behind the hammer and a free floating hammer. *Plate length*: 132mm. *References*: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 92, Fig. 53.

M133, FL Wm. Smith Patent 1812.

A right-hand flintlock engraved *Saml & C. Smith, Princess St., London*, and number 4065, made to the fourth and final design variant of the original patent 3588 granted to William Smith in 1812. The lock, S/N 4065, has a detented tumbler and was made for use on a rifle. The steel has been re-faced. It is marked *Patent 3398* on both the lock plate and the back of the steel. On the death of Samuel and Charles, the widows could not agree to continue the business or to sell. Court action

required a detailed inventory and the list of "Double and Single Second Hand Flint Guns" dated 31 December, 1859 included "1 Single Stock and Lock, No. 4065." It was on a rifle, converted to percussion with a new lock and inlet at the time into a profiled walnut block for display. The gun from which this lock came, still survived in the 1980s. *Plate length*: 123mm (138mm o/a).

M134, FL Tower of London Fire, 1841. The Grand Storehouse at the Tower of London was completely destroyed by fire on October 30, 1841. This accretion consisting of a French musket lock, barrel, and other parts, is one of the souvenirs of the fire sold in the weeks that followed. Mounted, with a brass plaque, on an oak base. (see also M039). *Length*: 140mm o/a. *References*: Guy Wilson. "The Great Awful Conflagration of 1841." *Strange Stories from the Tower of London*, 1976. pp. 34-39 Gift of Howard L. Blackmore, September, 1994. Signed and dated on the oak base.

M135, Perc. Mule-ear lock by A. Ault,

A finely made but terribly complicated mule ear lock mechanism inlaid "A. A. Ault" in gold on the hammer. The signature has been seen on a percussion half-stock rifle with American lines. *Plate length*: 164mm.

M136, Austrian military 1775.

A flint-lock with horizontal sear and external mainspring working on the rear of the cock. The sear, working through the plate, catches on the breast of the cock. The inside of the plate is stamped with the initials ER in a square punch (with a broken corner) and a crowned "T" in an oval. *Plate length*: 169mm. *References*: Thierbach, (1886, p. 53, Pl. 7, Fig. 133), "from a musket in the Pattern Room of the Vienna Arsenal," identified as Austrian Infantry, 1775. Also illustrated by Dollecze (1995 pl. 16, p.837) who identifies it as *Das Schnapphahnschloss vom Jahre 1775 — ein Project de Obersten v. Pracht*. *Plate* See also Musée Militaire Vaudois Exposition. *Piedmont XVIII-XIX — Armes et technologie militaire Royaumes de Sardaigne et d'Italie*. Torino: Academia di San Marignano, 1994. pp. 34-40. Wallis & Wallis Sale No. 354, Lot 1170 (Feb. 1991) and Sale 384, (June 1994). No. 354 stated: "The following six detached gun locks (lots 1166-1171) are stated to be part of war booty brought from the Arsenal, the Central Depot, and the Museum of Artillery in Paris, captured in 1815." All were "non standard" flint locks. See also No. 086, 215. Wallis & Wallis Sale No. 384, Lot 1164.

M138, FL African trade/Brit. Mil. pistol

? the f-1 is on a block?

sear?

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This flintlock from a British military pistol was converted to percussion, and then back to flintlock for the African trade in the last quarter of the 19th century. The plate is engraved with a crown over "GR" and was originally engraved "Tower" on the tail. This was ground off and replaced by a single stamp: The initials PR over C in a heart surmounted by a cross and a "Tower" stamp now appears on the tail of the plate. The cock is missing. *Plate length: 132mm.*

M139, F-L Madrid lock by Jos. Deop

A Madrid or *madreliña* flint-lock which had considerable popularity in Spain during the 18th century. It is signed around the pan by Joseph Deop, a Ripoll lockmaker of the last quarter of the 18th century. It has a flat lock and cock, deeply chiselled with background pebbled and overlaid with gold. Although it has the lines of a flintlock, there is a lateral acting sear, the half cock of which is a pin passing through the plate to catch a hook on the breast of the cock, and a full cock position on the rear of the cock. *Plate length: 141mm. References:*

M140, Flint Cannon lock

A small cannon lock for the Lgt 3-Pdr cannon, with brass frame engraved *R^d Manufactory* over ENFIELD and stamped with a Crown over W.R. (1830-1837) on the left side. *Plate length: 93mm. References:* Blackmore, Howard L.. "Some Notes on the Introduction of Cannon Locks in the Royal Navy." *Arms Collecting*, Vol. 30, No. 4, (1992) pp. 111-124.

M141, Miq. Spanish Miquelet by Bustindui, c.1800

Spanish miquelet bearing the gold stamp of Juan Esteban Bustindui of Valencia, and with a gold lined pan. In 1791 he was described as an outstanding gunsmith. *Plate length: 104mm. References:* Lavin, James D. *History of Spanish Firearms*, 1965.

M142, Perc. H.B.C. lock

A percussion bar action lock stamped *Hudson's Bay Company* and *Made in England*. Engraved with scroll decoration. See also M006 and M133. The inside of M006 is plain, M033 is stamped II, and M142 is stamped "36." These locks were a regular item of trade to be sold as replacements for the Imperial line of single and double barrel shotguns. *Plate length: 114mm. Reference:* S.J. Gooding, *Trade Guns of the Hudson's Bay Company 1670-1970*, 2003.

M143, English military Matchlock

A military match trigger lock of the last quarter of the 17th century with a lockplate similar to the contemporary English flintlock with rounded plate. The pan is attached to the plate; there is a

hand-operated pan cover and a shield at the rear of the pan. *Plate length: 178mm (200mm o/a).*

References:

M144, Perc. Forsyth & Co. No. 913

A right-hand Roller Primer lock (serial number 913 of 1814) marked *FORSYTH & CO.* over *PATENT*. The un-numbered scent bottle is a contemporary replacement. *Plate length: 122mm. References:* Recorded in Neal & Back, p. 42.

M145, Perc. Forsyth & Co. No. 1331R

A detached right-hand lock with the lower ½ inch of the magazine of silver bearing the Forsyth trade mark "F" over "Patent" on the front and the London silver hallmarks (Lion Passant and King's Head) with the number R 1331 on the rear. It also has a silver top-screw. The serial number 1331 would date it to 1817. At the Forsyth vs Manton trial, which reached the Court of Kings Bench on 12 December 1818, Lord Yarmouth testified about a Forsyth magazine which had exploded and a silver addition he had designed, with a silver screw, to remedy the problem. This information, recorded by D.H.L. Back (Forsyth, 1995, p. 193-5), is based upon the London Times of December 14, 1818 report of the trial. It would explain the silver addition on the right lock primer (No. 1331) and the replacement magazine (No. 3126) dating to 1824, on the left lock. (see No. M146). *Plate length: 113mm. References:* Neal & Back, 1969, p.185, 1995 p. 40; Illustrated Bradley, R.J. "Forsyth's Scent Bottle: The Canny Scot who led all from flint to percussion." *Guns Review*, Vol. 1, No. 1 (July/Aug 1960), p. 16. Plate.

M146, Perc. Forsyth & Co. No. 1332L

A detached left-hand lock with serial number 1332 fitted with roller primer number 3126. The roller is of unconventional shape but is stamped with the Forsyth "F" and "Patent." At the Forsyth vs Manton trial, which reached the Court of Kings Bench on 12 December 1818, Lord Yarmouth testified about a Forsyth magazine which had exploded and a silver addition he had designed, with a silver screw, to remedy the problem. This information, recorded by D.H.L. Back (Forsyth II, p. 193-5), is based upon a contemporary newspaper report of the trial. This would explain the silver addition on the right lock primer (No. 1331) and the replacement magazine (No. 3126) dating to 1824, on the left lock. (see No. M145). *Plate length: 113mm. References:* D.H.L. Back, *Forsyth & Co.*, 1995, p. 193.

M147, FL 18th Century Arabic flintlock

An 18th century Islamic flintlock with chiselled decoration. A small, right hand, flintlock chiselled in the Brescian manner with a

*British
English*

*Duplicated
info
from M14*

meaningless (?) "signature" (IPONM) on the exterior of the plate and an Arabic punch-mark on the interior of one "Ali" with what appear to be a couple of other small characters in the cartouche that I cannot make out" (Oliver Pinchot). The plate, cock, top jaw and frizzen are deeply chiselled with scrolls, flowers, and decorative borders. *Plate length: 90 mm.*

M148 Perc P.F. Charpie patent, 1853.

Left-hand percussion lock, not previously mounted based upon P.F. Charpie's U.S. patent No. 9934 of 16 August, 1853. Marked *PATENTED AUGUST 1853* in front of the hammer. This patent covered a mechanism which internally consists of only four parts: the mainspring, one screw, a combination activator/sear, and a swivel. *Plate length: 119mm. References: Louis S. Cherepy, Sr. A Rebounding Lock for the Side Hammer Gun, 1866-1910. p. 110.*

M149, Perc Left-hand miquelet

Left-hand percussion miquelet lock of simple construction. The lockplate is engraved with a superficial decorative border but is otherwise unmarked. The construction suggests that this lock may have been made in Portugal. *Plate length: 106mm.*

M150, Pill Unfinished gunmaker's prototype

An unfinished gunmaker's prototype or patent model for a system of conversion from flint to percussion which retains the flint parts. The front half of the lockplate is finished with frizzen and frizzen spring; the rear half has an unfinished tang which was probably designed either for gripping in the vice or for a future mounting. No interior parts have been fitted. The cock is of crescent pattern with the top jaw replaced by a custom constructed hammer-head, dovetailed to slide over the lower jaw and held in place by the top jaw screw. The nose of the hammer has a hollow dimple to strike a nipple or pellet. The cock/hammer has an integral pin for a tumbler attachment. *Plate length: 153mm*

M151, Miq. Small Spanish miquelet

A small right-hand Spanish patilla/miquelet lock, plain and unmarked. *Plate length: 76mm.*

M152, FL Unused English flintlock

A previously unmounted English flintlock with rainproof pan, in the white. Engraved lockplate. *Plate length: 121mm.*

M153, FL Belgian export lock

A late, right-hand flintlock of musket proportions, classed as an "Export" lock for the African or South American trade, with gooseneck cock. Stamped in front of the cock with a bee in a circle and the initials *GL* on the wings, the trade mark registered in 1881 by Georges Laloux of Liège.

There are no marks on the frizzen to indicate use. The mainspring screw and frizzen spring screw are probably replacements. *Plate length: 155 mm.*

M154, FL Early French flintlock

A right flintlock of Puype's type xxx c.1660. Engraved lockplate and cock with floral decoration, a standing dog(?) on the back of the cock, and the signature *Mayer à Lyon*, a maker who was active 1640-1660. The vertical acting sear is of the two-piece form, a variation of that described by Godwin (*CJAC*, Vol. 34, No. 1). The mainspring repaired. *Plate length: 129 mm. References: Godwin + Jalier (1)*

M157, FL Enclosed flintlock

A flintlock centrally mounted and concealed within side plates. The cover of the opening is fitted with an internal frizzen which when the flint strikes it, opens the cover to allow the escape of the smoke. The mechanics are fitted to a sideplate (on the right) which is stamped with the maker's mark "ILD": the left plate is unmarked. *Plate length: 93mm. References:*

M158, Perc. LePage percussion c. 1810,

Right percussion pill lock by Jean LePage, Paris. This lock, which is in the white and unmarked, has not before been on a gun. It has a number of the characteristics shown in LePage's French patent of 10 May 1810. It is a single shot and does not have a primer magazine suggesting that it is a slight variation of the ignition covered in LePage's May 10, 1810 patent. See M207. *Plate length: 119mm. References: Antoine Ader/Hotel Drouot, Lot No. 148, May 29, 1996.*

M159, Tube European tube lock

A left tube lock of Continental, probably French, manufacture and unusual construction. The centrally hung hammer is of parrot shape, identical to that illustrated in French patent No 1110 granted to Louis Marin Gosset dated 11 July, 1820. The tube is apparently prevented from ejection by a heavy, hinged stop. It is unmarked. *Plate length: 122mm. References: Antoine Ader/Hotel Drouot, Lot No. 149, May 29, 1996.*

M160, Miq. Roman Lock

A classic, unsigned, Roman lock with lightly engraved plate, cock, and frizzen. Some pitting around the pan. *Plate length: 133mm.*

M161, FL Manton carbine, dated 1835

A Manton Pattern carbine lock engraved with "W" [crown] "R" over *TOWER* and dated 1836, 1,006 of which were made by Joseph Brazier of Wolverhampton. As the last official flintlock arm, they saw very little use, were withdrawn from service, to be held in stores for a number of years and finally sold as surplus. Francis Bannerman, the New York military surplus dealer included a

(where does quote open?)

note in his 1907 catalogue offered 700 of them for sale and continued to advertise them until into the 1930s. *Plate length*: 139mm. *References*: Blackmore, *British Military Firearms*, pp. 144, Pl. 54; S.J. Gooding, "Manton's Pattern 1833 Carbine," *The Gun Report*, Feb. 2006, pp. 26-31. See also M032, 095, 161, 190, 236.

M162, Tape Green Carbine

In 1858, 2,000 Green carbines were delivered to the British Government. They were held in store at Weeden until 1919 when they were sold to Greener's of Birmingham at 2/6. From 1946 on, they were sold in parcels, first to Harold G. Young of the House of Guns, 34 Alpine Place, Kearny, New Jersey. Most locks were in excellent condition. When removed from their stocks, the lock crews were simply broken off, flush with the plate. Lots were later sold by Sotheby's after they had been cleaned by David Winks who by the time I met him had retired as the foreman of the back-shop of Holland & Holland's where the work was done. The surviving carbines were sold at the same time with a target in the patch box and a roll of primers tied with a wire in the primer magazine. All were in unused condition. See also M005. *Plate length*: 139mm. *References*: Lewis, B.R. "The Green Carbines," *CJAC*, Vol. 6, No. 1, (Feb. 1968), pp. 17-20;; Roads, C.H. *British Soldiers Firearms*, 1850-1864. pp. 282-3; H.L. Blackmore, *British Military Firearms*, p. 282.

M163, Perc. Jenks carbine

A side hammer lock on the 1838 design of William Jenks who held the original U.S. Government contract for Naval carbines. The hammer is curved to cover over the sliding breech there by locking it in place. The same mechanism with a tape primer magazine was also made. See also M118. *Plate length*: 162mm. *References*: William B. Edwards. *Civil War Guns*, 1962, p. 184; Butler, David F. *United States Firearms, The First Century 1776-1875*, 1971, p. 141.

M164, Ctg. Springfield, 3-bent tumbler

When the Model 1873 Springfield rifle was introduced it was fitted with a two bent tumbler.. After about 20 to 30 thousand were produced it was decided that the half cock required adjustment and the three-bent tumbler was introduced on the carbine but was not adopted for the rifle until somewhere in the 45 to 50 thousand range. *Plate length*: 138mm. *References*: Richard Dougherty, personal communication.

M165, Ctg. Springfield, 2-bent tumbler

When the Model 1873 Springfield rifle was introduced it was fitted with a two bent tumbler.. After about 20 to 30 thousand were produced it was decided that the half cock required

adjustment and the three-bent tumbler was introduced on the carbine but was not adopted for the rifle until somewhere in the 45 to 50 thousand range. *Plate length*: 138mm. *References*: Richard Dougherty, personal communication.

M166, perc. back action, gold inlay

A Continental back action lock with swivel safety in front of the hammer. It is engraved with scrolls and vines and ~~flaid~~ ^{inlaid} with a wolf or fox in gold in a wooded setting. It is stamped '6' under the mainspring. *Plate length*: 129mm

M167, Cap Lock with gravitating safety

An unsigned caplock with a gravitating dog working on the breast of the hammer and coarse scroll engraving on the plate and hammer. The dog appears to be a replacement. *Plate length*: 120mm.

M169, Miq. Algerian, silver overlay.

Algerian miquelet with silver overlay dated 1190 (AD 1776) on the lower edge of the lockplate. The inside of the lockplate is covered with a thin brass plate; the outside with embossed or chiselled silver panels on all visible parts. The panel on the inside of the lower jaw is missing. The dog catch a replacement. *Plate length*: 179mm

M170, W. Richards boxlock

A Westley Richards "drop lock" for right barrel with intercepting sears, jewelled steel components, stamped on the right side "Westley Richards Patent 177587 / 10667 / 07" in oval and on the left with engraved flowers on the pivots and hammer spur. *Plate length*: 75mm, 128mm overall. *References*:

M171, Dog I. Cookson

Typical dog lock with vertical sear, signed I Cookson. *Plate length*: 170mm.

M172, Snap Tuscan w/ engraved bldg.

Plate length: 159mm

References:

M173, FL Miniature

An unfinished miniature flintlock with reinforced cock and a bridle on the tumbler and frizzen. The mainspring, frizzen spring, top jaw and top jaw screw are missing. *Plate length*: 69.5mm

M174, Pellet Hayward's pellet magazine

Blackmore notes, "after an India Pattern musket had been successfully converted in 1832, thirty-two of the muskets were ordered for trial in October, 1833" This would be the lock submitted in 1832 by T.H. Hayward, a Winchester gunmaker. Lovell made a few suggestions and the improved muskets made on New Land Pattern locks were delivered for trials in 1834. This lock is the prototype converted from the India Pattern lock. The tubular magazine held round percussion

each.

trial

pellets. When the hammer was cocked, one was picked up in a cavity in a turning drum and put into position to be struck as the hammer fell. *Plate length: 174mm (189mm o/a). References: H.L. Blackmore, British Military Firearms, pp168, 178; J.A. Chalmer, W. Furneaux, and F.L. Edridge. "The British Percussion 'Musquet' Trials of 1834-1835" Arms Collecting, Vol. 40, No. 1 (Feb. 2002) pp. 12-18.*

M175, Dog Dutch c.1660

Dutch doglock, c. 1660 with vertical acting sear having half and full cock notches, a flat cock with a long spur extension to the top jaw, a flat lock plate with a slightly rounded tail, and three screw attachment. Plain, but with what might be a maker's mark in the form of a crescent in front of the cock. *Plate length: 155mm. References: J.P. Puype. Arms of the Netherlands in the Collection of H.L. Visser. Vol. 1, Part 1, p. 132.*

M176, FL English Rampart gun, Farmer, 1746
The lock of a large rampart or wall gun by James Farmer dated 1746. Although usually described as wall guns, these "large scale Brown Bess muskets" with a bore diameter of one inch or more, were also carried as side arms on the carriage or limber of the light 3-Pdr. cannon and used in conjunction with a defensive mantlet. *Plate length: 232mm. References: Adrian B. Caruana. Grasshoppers and Butterflies, the Light 3 Pounders of Pattison and Townshend. 1979, 1999.*

M177, Ctg. Patent hammer lifter, c.1866

A finely engraved breech of B.L. double gun with lock engraved *Perry & Yeld*. The water table bears the London View marks and a round, silver inlaid stamp embossed *Meacham's Patent London* surrounding the stamped number 947. No patent has been located. A side lever, when pressed, lifts the hammers to half cock to allow the firing pins to retract. This design would have appeared after the center fire cartridge became popular about 1862 and before it was superseded by the rebounding lock first patented in 1866. William Perry, gunmaker, is recorded in 1866 and 1867 at Great May's Bldgs. St. Martins Lane, London. Neither Yeld nor Meacham have been located. *Plate length: 166mm. References: Crudginton & Baker, The British Shotgun, 1979, Vol. 1, p. 138; At some point in time, Frederick Joyce & Co. the cartridge manufacturers, needed a pair of barrels for some ammunition testing. They were removed from this action.*

M178 Miq. Balkan, gold & silver decoration

Balkan miquelet with twisted silver and gold wire inlay on the plate and cock and overlays of gold in various colors on the frizzen back and cock

cover. *Plate length: 96mm. References: Daskalove & Kovacheva, Weaponry of the Past, Sofia: Sofia Press, 1989, pp. 66-73.*

M179, Perc. Right angle pistol lock, Type 1

This form of lock is often found on late 19th century target pistols manufactured in Belgium and France. The sear mechanism is described as 'the up-sear.' *Plate length: 94mm.*

M180, Perc. Right angle pistol lock, Type 2

This form of lock is often found on late 19th century target pistols manufactured in Belgium and France. The sear mechanism is described as 'the down-sear.' *Plate length: 100mm.*

M181, FL East India Co., dated 1816

East India Co. pistol lock with long frizzen. Dated 1816 on the tail; stamped with a lion rampant holding an orb, and a crown over "2" in front of the cock. Stamped on the inside of the plate, "5" and "27" *Plate length: 136mm. References: David F. Harding, Small Arms of the East India Company, 1600-1856, 1997.*

M182, FL French, "1717" (P. Girard/I. Perrin)

A French Pattern 1717 flintlock musket or rampart gun lock stamped on the outside with the "S (fleur de lis) E" mark of St. Etienne and P. Girard who was described as *entrepreneur des armes pour le roy*. Inside, the lock is stamped I. Perrin the lockmaker. *Plate length: 182mm. References: Jarlier, Pierre. Répertoire d'arquebusiers et de fourbisseurs français, 1974.*

M183, Rbdr Bar action engraved S. Mortimer

A rebounding lock engraved with the name "S. Mortimer" perhaps to capitalize in the Mortimer reputation. *Plate length: 112mm. References: H. Lee Munson, The Mortimer Gunmakers, 1753-1923, 1992.*

M185, Miq. Neapolitan marked Manetta

Neapolitan miquelet, floral engraved overall, signed "Maletta" or "Manetta." *Plate length: 152mm.*

M186, FL W. Turvey with swinging frizzen safety

A flintlock by William Turvey with a frizzen which can be rotated side ways while the pan cover remained in position. When returned for firing, the frizzen locked with the pan cover and acted in the usual manner. *Plate length: 136mm.*

References: This lock is illustrated as Plate 413 from the W. Keith Neal collection in his Great British Gunmakers 1740-1790, at which time it was attached to "A Coach Carbine."

M187, FL H.W. Mortimer & Co. adjustable spring

Flintlock with crescent cock and rainproof pan, engraved with border and decoration, and H.W. Mortimer & Co. in front of the cock. This lock

roy
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spring?

has an adjustable screw-like device attaching the feather spring to the lock and what appears to be an adjustment screw to the spring and a roller on the spring. It is the same device found on the musket ~~musket~~ made for H.W. Mortimer Jr. in 1803 while a member of The Law Association Volunteers. *Plate length: 117mm. References: H. Lee Munson, The Mortimer Gunmakers, 1753-1923, 1992, pp. 84-5.*

M188 FL Pretymen patent, 1813

Engraved T. Richards over Patent 225 on the plate in front of the cock; Richards Patent on the back of the frizzen and stamped R225 over Patent on the rear of the plate. It is the work of Theophilus Richards (1799-1833) of Birmingham. This construction is covered under Robert Pretymen's English patent No. 2722 of July 12, 1813 for "An improvement in the pan touch-hole and pan cover of a gun-lock." The patent covered a touchhole covered with a plate, a shaped leather "washer," screw-fastened to the top of the pan cover, and "channels cut around the pan to run off wet." *Plate length: 111mm. References: Robert W. Band, "An India Pattern Musket with Robert Pretymen's Rainproof Lock," CJAC, Vol. 39, No. 2, pp. 47-48*

M189 FL Underlever cocking device. Plate

An unusual flintlock with a long, narrow plate, limited deep engraved and relief chiselled decoration, and an under lever to cock the piece. *Plate* The lever in three stages, moves the cock to (1) half-bent; (2) three-quarter bent, (3) full bent. At the same time, the arm on the right side of the lock closes the frizzen. The same lock(s) is found on a double gun by Nicolas Bouilliet (recorded 1774) in the Royal Armouries, Leeds. On it, the locks have a waterproof box over the mechanisms. Hence, the underlever for cocking. This would explain why the lever does not work to move the cock to the first "half-cock" notch but does to the next two. *Plate length: 133mm. References: Royal Armouries accession records, (XII.1755); Jarlier, 2nd supplement, col. 32, 32.*

M190, FL Manton Carbine, Lockmaker's sample

Charles Manton's Pattern 1833; a toolroom sample dated 1835. This lock is inlet into a shaped walnut block on which the left side has been opened to permit a view of the action of the lock. The "Stock" is stamped in three lines, *Patt 1833 Manton* and is pierced for a thong. The stock where the trigger pin passes has been reinforced with a hide glue/sawdust mix which would have been part of the original manufacture, in anticipation of the pressure put upon it. The same material has been used in holes in the

"grip." See also No. M032, M095, M161 and M236.

Plate length: 139mm (213mm o/a). References: Howard L. Blackmore, British Military Firearms, pp. 143-4, Pl. 54; S.J. Gooding, "Manton's Pattern 1833 Carbine," The Gun Report. Feb. 2006, pp. 26-31

M191, Miq. Turkish Miquelet dated 1220 (1805)

Turkish miquelet with gold, silver and coral decoration. This elaborately decorated lock is in the Turkish style but according to Robert Elgood, the inlays are representative of a number of areas, suggesting a gunmaker who travelled extensively. The inlays on the right side of the cock are in gold and continued around to the left side in silver. The date 1220 A.H. (1805) is in gold, bordered in silver; the top jaw is covered with silver beads and bands. The cock-to-frizzen bar is of silver with engraved floral decoration. The underside of the frizzen spring is inlaid with silver "flowers." Three round, coral beads are mounted on pins between the cock and the pan. A forth pin is vacant and of a longer size suggesting it was of greater importance, perhaps gold. A similar arrangement (with vacant pin) is found on a lock photo in the Noel Corry collection in the Royal Armouries Museum, Leeds. *Plate length: 85mm. References: Robert Elgood, private conversation*

M194, Ctg. Zimmerstutzen lock.

A side lock for a Zimmerstutzen "salon" rifle of German manufacture. The earliest used a percussion cap, the later ones were chambered for the 4.5mm rimmed case. All have a characteristic arm pivoted to the hammer and linked to the long striker (about 18 inches), which runs through the false barrel to the chamber approximately nine inches from the muzzle. See also M235. *Plate length: 128mm. References: Airgun Review, No. 2, p. 39. Plate*

M195, Snap matchlock

Snap matchlock with flat plate and gracefully arched dog; round pan and manually opened cover. The pointed and stepped tail first appeared about 1640, probably in the Netherlands. The maker's mark, an oval with a beaded border enclosing the initials "GB" or "CB" has not been identified but it is a style popular in Italy during the 17th/early 18th century. A similar lock is mounted on a restocked rifle in the Museum of Artillery, Turin. *Plate length: 28mm. References: Boccia, 1967, p. 122.*

M196 Miq. Unsigned Miquelet (of patilla form)

lever?

This lock has anomalies which suggest southern Europe: the square tail to the lock-plate and the bridle to the cock-screw. The bridle serving as the support for the cock-screw, which usually covers the cock, has been recessed into the body of the cock, providing a stop for the cock at both full cock and in the fired position. The light engraving on the pan cover and the cock bridle is suggestive of the subtle shading of the Italian *bulino* technique. A lock with similar configuration was used to replace the wheel-lock of a rifle dated 1683 and made in Vienna, now in the Musée Royal de l'Armée, Brussels. *Plate length: 122mm.*

M197 FL French left ; with crescent cock

Left lock for a double gun with classic French crescent cock, rainproof pan; case hardened in color; unfired frizzen. *Plate length: 122mm. References:*

M198 FL Unmarked right flintlock in the white

Right lock for a double flintlock gun; roller on frizzen spring; unfired frizzen; all in the white. *Plate length: 135mm.*

M199 Perc. Pair of unmarked bar action locks

A pair of unused percussion bar action locks engraved with scrolls, a lion, and flying pheasants but without maker's name. Case hardened in color and retaining much of their original protective varnish coating. *Plate length: 115mm*

M200, Perc. Bar action lock by Peterman

An extremely well-made percussion bar-action lock by "Peterman." The plate is scroll engraved with rope border; the hammer scroll engraved with elaborate engraved serpent head. Sellers (1983, p. 236) lists three "Peterman" gunsmiths: a Peter and an Abraham at Philadelphia in 1847 directories, and a George in Betetour County, Virginia in the 1850 census. *Plate length: 123mm.*

M201, FL Spanish military, M. 1801

Spanish, Model 1801 military musket with brass pan and grooved frizzen. The lock is stamped *ARI* on the body of the plate and has another stamp in a square depression, behind the cock. See also M107. *Plate length: 170mm. References:* Calvó, J.L. *Armamentos de Munición en las Feurzas Armadas Españolas... 1700-1873* 2004.

M202, Pill Manton 1816 Patent

This lock (S/N 830-), is one of four known examples of Joseph Manton's pellet lock based on his patent No. 3985 dated February 29 1816. Neal & Back (1966, 1978) estimate that only 275 guns were made. It was his first recorded excursion into percussion. They record 20 surviving examples, all of which were shotguns

and all of which had been later converted to caplock or tubelock. One pair of flint pistols altered with replacement pellet locks (probably promotion pieces), also survive, and two detached locks from the converted guns, were the only original locks reported. This is one of them. See also M097. *Plate length: 120mm. References:* S.J. Gooding, "Joseph Manton's First Percussion Patent, Feb. 29, 1816, No. 3985" *Arms Collecting*, Vol. 39, No. 2 (May, 2001), pp. 39-43. **M203, Pill John Jones pattern, by M. Knight**

This lock is heavily engraved, bearing the name "M(?) Knight," an unidentified gunmaker and stamped on the inside with the lockmaker's initials MN or MM. It can only accept a single pellet which must be manually inserted in the "pan." Other variations of the "Jones/Knight lock" are known: one like No. 073 above with a pellet magazine; and a one with a magazine variation in the Birmingham Museum of Science and Industry. No Patent granted to Jones for a gun lock is recorded. The basic characteristic is identical in principal to LePage's French patent of 1810 which suggests they *may* be contemporary. *Plate length: 124mm. References:* Winant, 1959..p. 62; Neal & Back, 1969, plate 110-113; S.J. Gooding, "John Jones & Son of Birmingham and their improved percussion ignition," *JRAM*, Vol. 4, No. 1, pp. 45-51.

M204, Miq, Turkish Military, with horns

A Turkish munition grade Miquelet with horns. The round *tugra* is blank. See also M024. *Plate length: 118mm.*

M205, Perc, H.B.C. with fine engraving

A Hudson's Bay Company marked lock from a very high grade single- or double-barrel shotgun which would have been acquired as a special order by either a senior employee or wealthy customer. It would have been considered a *fusil fine* because of the quality over and above the standard trade guns. It is unmarked, except for the Company name engraved on the forward bar. See also M006, M033 and M142. *References:* S.J. Gooding. *Trade Guns of the Hudson's Bay Company 1670-1970*, 2003.

M206, FL New Land, pistol, W.R royal cypher

New Land pattern flintlock pistol or carbine of flat profile with sliding safety acting on the tumbler, stamped with crowned *W.R.* (1830-1837) in front of cock and on the inside of the plate, "IH" or "JH", "A", a crowned "3" and *Wheeler*. Robert Wheeler and Son had Ordnance pistol contracts 1835-1837. *Plate length: 131mm. References:* Bailey, De Witt. *British Board of*

S.J.

(C)

Ordnance Small Arms Contractors 1689-1840. 2000.

M207, Pill, Lepage patent 1810 pill lock

On June 23, 1810, less than three years after Alexander Forsyth was granted his English patent for the discharge of firearms by a detonator, Jean Lepage was granted a French patent which covered a number of forms of primer application. Most were designs to use a single pill primers as with the vase form here or the nipple form on lock No. M158. *Plate length*: 134mm. *References*: See Chapter 11.

M208, Perc/CF?, N.R. Davis & Sons

An unusual lock for a late percussion or early breechloading side hammer gun. The plate is matching stamped with a decorative border and "N.R. Davis & Sons" and marked "30" under the mainspring. It was one of a pair in the Serbin collection. N.R. Davis was active at Assonet, Mass. from 1853 and became N.R. Davis & Sons in 1884. Although drilled for lock nails, there is evidence that a hammer was never fitted. The "tumbler" with half and full cock notches and a ledge for the mainspring, is circular, fitting into a hollow "drum" integral with the plate. It is held in place by the pressure of the mainspring and a "washer" fitting, (but not very tightly) into the drum. There is nothing to hold the washer in position. See M253 for the left lock. *Plate length*: 108mm. *References*: Eugene L. Lyon, *The N.R. Davis Firearms Co.* *The Gun Report*, May 1984, pp. 58-60;

M209, Rbdr. Stanton & Co., Wolverhampton

John Stanton, (1841-1871) Lockmaker at No. 13 Clifton St., Wolverhampton, was one of the earliest English patentees to submit a rebounding lock and was granted a number of patents, the first being Patent No. 49 dated January 8, 1867 followed by No. 367-February 9, 1867, and No. 3774-December 30, 1869. His locks are stamped *Joint Patents / Stanton & Co.* and a registry number, in this case *B55461*. This lock demonstrates the state a gunmaker would receive a lock from the lock makers; finished but not hardened, the hammer screw in place but the hammer wanting, to be supplied and fitted by the gunmaker. *Plate length*: 120mm. *References*: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*, pp. 30-31, 34-35, 38-39

M210, FL, Italian lock with brass inlays by L. Zugno

Small Italian flintlock engraved *L. Zugno* along the lower edge. Three engraved brass plaques — two on the plate and one on the cock. Bridle on tumbler but not on frizzen. *Plate length*: 95mm.

References: , Carpegna, p. 223-224. Luca Zugno, Gardone, 1761. Appendix 12, p. 438.

M211, Tube, Console (pre Augustine), Caesar R^a Mfg. Brescia

A flintlock converted to Console's system of tube ignition, retaining the original flint cock. The lockplate of flat configuration with beveled edges, is engraved *Cesar R^a Manf. / Brescia* [1797-1802]. Most parts are numbered "XVI" (316?) which Robert Held describes as a contractor's number. The pan has been replaced by a receptacle with a triangular opening for the tube; the frizzen has been replaced by a tube cover with a blade-like tube-striker. It is stamped in the interior: "450" under the tube opening. See M115. *Plate length*: 153mm. *References*: W&W sale No. 354, (Feb. 1991) Lot 1165 along with M086, M136, M215. Marchi, Bruno. "Il Fucile Austriaco Systema Augustin," *Diana-Armi*, Year IV, No. 5 (Sept. 1970) pp. 21-24; Marchi, Bruno. "Systema Augustin," *Diana-Armi*, Year IV, No. 6 (Nov. 1970) pp. 105-109.

M212, Miq. Roman Lock

A classic roman lock with slightly rounded plate, engraved with acanthus leaf and scroll on the tail and cock. Sculpted frizzen. Unsigned lockplate. *Plate length*: 134mm.

M213 Rbdr. Right Bar in wood by J. P. Claborough & Bros.

A right rebounding lock with scroll engraved plate in classic pattern on the tail and J.P. Claborough & Bros. in a ribbon on the front. Stamped inside, *Joint Patents/Stanton & Co.* and the control number B74182. English gunmaker, established outlet in California 1867. *Plate length*: 116mm. *References*: D. Tate, *Birmingham Gunmakers*, Long Beach: Safari Press, 1997, p. 42 ff.

M214 Rbdr. Left Bar in wood by J. P. Claborough & Bros.

A rebounding left lock, pair with above, with scroll engraved plate in classic pattern on the tail and J.P. Claborough & Bros. in a ribbon on the front. Stamped inside, *Joint Patents/Stanton & Co.* and control number B74183. English gunmaker, established outlet in California 1867. *Plate length*: 114mm. *References*: D. Tate, *Birmingham Gunmakers*, 1997, p. 42 ff.

M215, FL, Austrian infantry musket M.1784

A large military lock with flat plate and flash shield. The rear of the cock is made with a stop for full cock and fired position. The plate is not marked but the interior is stamped with a long arrow. *Plate length*: 178mm. *References*: Peter Krenn, *Hand feuerwaffen des Osterreichischen soldaten*. Graz: Landesmuseum, 1985, Fig. 24;

Wallis & Wallis Sale No. 354, (Feb. 1991) stated: "The following six detached gun locks (lots 1166-1171) are stated to be part of war booty brought from the Arsenal, the Central Depot, and the Museum of Artillery in Paris, captured in 1815." All were "non standard" flintlocks. See also M086, M136.

M216, FL/Perc, Baker's percussion/flint design of 1821

A combination flint and pellet lock, in the white, with features in a design Ezekiel Baker submitted to the Royal Society of Arts in 1822 and on a percussion cap gun dated 1821 formerly in the H.J. Jackson collection. This lock is also fitted with the "Regulating Screw Pin" design to adjust the mainspring pressure for which he received a silver medal from the Society in 1822. *Plate length: 123mm. References: Christies W. K. Neal sale, July 18, 2002; Jackson & Whitelaw (1923), fig. 110; Winant (1959) pp. 105-106; S. J. Gooding, "Ezekiel Baker and his Improvements to Flintlock Firearms." The 78th London Arms Fair Guide, Spring 2007, pp. 37-46; Reprinted, Black Powder, Summer, 2008, pp. 28-35.*

M217, FL, Aston's invention

A flintlock in the white with Aston's method of mounting the flint. Although completely unmarked, a detached cock formerly in the Neal collection, is engraved on the top jaw *Aston Inventor*. It is not known which of the Astons in the lock making trade was the maker. There were at least 30 of the name working in England but it was probably Thomas Aston (active 1810-1822) at 10 John Street, Birmingham. A screw at the back of the cock presses against an arm attached to the top jaw to apply pressure on the flint to hold it in place. *Plate length: 121mm. References: Christies W.K. Neal sale, July 18, 2002.*

M218, Perc, Danish, internal hammer, in the white

A percussion version in pistol size of the flintlock designed by Christian Wilcken Kyhl which became the Danish Pattern 1807. It is unmarked, of robust, simple construction, with internal hammer and round-surfaced plate. *Plate length: 117mm*

M219, FL, Nock screwless lock in the white.

This typical Nock screwless lock, in the white, retaining its "setting-up" screws. A 5½ inch lock reduced in length to 5 inches, with a hole drilled for two-screw attachment. (see also M003, M041, M114, M237). *Plate length: 136mm. References: Howard L. Blackmore, 1956, p. 75, plate XXI; S.J. Gooding, "A Note on Screwless Flintlocks for the Ordnance, 1780-1790: Jonathan Hennem,*

Henry Nock, and a Prussian Design." JAAS, XIX, No. 3, pp. 135-147.

M220, Pill, Mule-ear, Ephriam Gilbert Patent, 1829

A mule-ear, pill or punch lock by Ephriam Gilbert, Name & Date Patent April 3, 1829. Round tail lockplate engraved with 3-line border with cross bars, scallop on tail and basket with flower and other decoration, engraved hammer. Stamped (partially under hammer) *E. Gilbert Patent Rochester*. [NY]. Stamped inside the plate with the number 876. *Plate length: 109mm*

M221, FL, U.S. Pattern 1817 Common Rifle by H. Deringer.

A lock with a flat profile at the front of the plate and slightly rounded at the rear; with a slanted brass pan. Signed in front of the cock, "U.S over Deringer over Phila and dated 1826 on the tail. *Plate length: 137mm. References:*

M222, FL, Prussian sporting flintlock of c.1740.

Unsigned Central European sporting flintlock of the first half of the 18th century with flat, stepped lockplate with chiselled border; unbridled, fluted, faceted pan; cock with chiseled border, faceted top jaw and decorative cock screw; shield shaped frizzen with bevelled pie crust border. This lock, although threaded for lock screws, has never been on a gun and the frizzen is unmarked. *Plate length: 145mm*

M223, Rbdr, Bar action pair by Stanton engraved Newark

A pair of bar action rebounding locks profusely scroll engraved and engraved "Newark" on the bar of each. They bear the "Stanton Patent Joint Patents" stamp on the inside of the plate and the registration "No. C 12297" on the right and "No. C 12298" on the left. Mounted on a walnut block with a turned brass pillar support. John Welch (1829-1868) is the only gunmaker, listed in Bailey and Nie who was working in Newark after 1866, the date of Stanton's patent. *Plate length: 119/120mm.*

M224, Pdr, Rumford patent percussion sliding lock

A sliding percussion ignition left lock engraved "Rumford Patent" on the magazine bar and engraved with a sunburst around the lock screw and on the stepped tail. Mounted on a walnut block with a turned brass pillar support. No patent issued to Rumford has been found in England, France, or America. Benjamin Thompson was born of English parents in 1753 in America. He moved to England after the American Revolution, was knighted by the King in 1784 entered into the service of the elector of

Bavaria (1784) residing in Munich, and returned to England with the title Count von Rumford in 1795. In 1809 he settled on an estate at Auteuil near Paris where he died in 1814. Rumford's interests in science, technology, and gunpowder, combined with his presence in England prior to 1809, suggest that this lock might be the prototype for Forsyth's slider lock introduced about 1810. It appears to have been made by the same lockmaker as a Forsyth demonstration lock made in October, 1809: the same engraved sunburst around the lock screw, the same wheat-head design around the border, the same pointed and stepped tail on the plate, the same decorative shape to the sear, and the same size and design of the tumbler bridge. The right lock of the same description, formerly in the Charles D. Cook collection (Serven, 1952, lot 990), is in the collection of the Winchester Arms Museum in Cody, Wyoming. *Plate length: 116mm*

References: Herbert G. Houze, "The 1861 Inventory of the Arms and Miscellaneous Material in the Office of Colonel Samuel Colt" and, Appendix, "Further Notes on the Forsyth Material in the Arms collection of Colonel Colt," *Armax* Vol. 1, No. 1 (1987), Plates A3, A5. *Classic Arms & Militaria*, Vol. XII, No. 3. Formerly in the collection of Joseph H. Gest (1950+/- 1960); Herbert J. O'Connell (c.1960-1966); Paul Murray (1966-2003).

M225. Miq. Persian Miquelet with gold inlay

A small late 18th/early 19th century North West Persian miquelet with heavy gold overlay of scrolls and vines. *Plate length: 75.8mm*, *References:* Elgood, Robert. *Firearms of the Islamic World in the Tareq Rajab Museum*, 1995, Fig. 85, p. 202

M226. FL, Miniature flintlock

A rather clumsy-made lock with throat hole cock and a bridled tumbler but unbridled frizzen and mainspring missing. This lock may have originated from the same group of African gunmakers as No. 056. *Plate length: 90.4mm*. *References:* P. M. Anderson, "Black Powder/Black Magic" *Black Powder*, Vol. 41, 1994, pp. 21-23 describes and illustrates the manufacture of these locks.

M227. FL, Decorative "Export" lock

A flintlock with flat profile and imitation step filed in the tail, throat hole cock with square jaws, bridge on tumbler and frizzen. Nicely engraved heart and scrolls on plate, cock, top jaw, and frizzen. Line engraved border. Initials "GB" stamped on inside. *Plate length: 140mm*.

M228 Perc. Experimental, with horizontal sear.

A right hand percussion lock with horizontal sear. In principle, the action of this lock is identical to that of the English Lock of c.1640. In the half cock position a branch on the lower half of the sear rests in an inclined shelf on the tumbler. At full cock, a hook on the horizontal sear wraps around a spur on the upper portion of the tumbler. Pressing the sear backwards with the trigger, lifts both out of the way to allow the hammer to fall. *Plate length: 131mm*.

M229 Perc. British Military, P.1839.

Standard British military Pattern 1839 musket lock stamped *Tower* on the tail and *crowned VR* in front of the hammer. Stamped on the inside with the Crown over 3 and another over 13. Stamped also with the initials "WF" and in another location, the name "Davis." *Plate length: 165mm*. *References:* HLB, *British Military Firearms*, p. 179

M230 Miq. Spanish perc. w/arched hammer

A coarsely-made right percussion Miquelet/*patilla* lock with a long, arched hammer leading to a depression for a round bolster. Others of this style have been described as conversions from flint, but on this, there is no evidence that it is so. The plate, bridge, and hammer are engraved. The hammer spur is quite broad and engraved.

One of a type made at Ripolle in North-eastern Spain. *Plate length: 123mm*. *References:* Graells, E. *Les armes de foc de Ripoll*, 1974.

M231, Perc. Bar in wood by Alex. Henry

A right percussion lock with overall scroll engraving, Alex. Henry in a ribbon, and stamped "Joseph Brazier Ashes" on the inside. The four pin bridge is of "cheese cutter" form. *Plate length: 118mm*.

M232, Perc. Continental with cap guard, pointed tail

An percussion lock of Central European origin with a cap guard protector. Although threaded for lock screws, it is unmarked and would be considered "in the white." The plate is pointed at the tail, hammer is of flat profile, and the cap guard is square. The plate is cut for a round drum of 2cm diameter. There is single screw attachment with a hook at the front of the plate. Light overall pitting. *Plate length: 140mm*

M233, Perc. Continental with cap guard, round tail

An percussion lock of Central European origin with a cap guard protector. Although threaded for lock screws, it is unmarked and would be considered "in the white." The plate is round at the tail, hammer is of flat profile and the cap guard is round with a long spur on the tail. The

clumsy

2

plate is cut for a separate pan. There is two screw attachment. *Plate length: 133mm.*

M234, FL Rgt. flintlock by Vegnuil á Marseille. Flintlock with flat plate, two screw attachment, engraved border with light scroll flourishes, pointed tail and flat, engraved throat hole cock. The body engraved "Vegnuil á Marseille" and stamped with a small crown over "BL" behind the pan. Stamped on the inside with "T.M (the left branch of the T missing) beside three punch marks," "DR" and "9." *Plate length: 165mm*

M235, Ctg. Zimmerstutzen by C.G. Harston & Co.

A left lock, scroll engraved and marked C.G. Harston & Co. from a BL rook rifle firing a needle rifle cartridge which had the primer at the rear of the powder and the "needle" had to enter the case to strike it. Eley ceased manufacture of the ammunition in 1906. Charles Greville Harston was an officer in the Canadian Militia in Toronto who obtained Canadian patents for alterations to the military Martini action in the 1880s. In 1874 C.G. Harston & Co. was located in Birmingham, England, at 95 Bath St (1872-1875) and London at 24 Cullum St. and in 1875 at 12 Victoria Street. London. In 1872-1875 a Greville-Harston & Co. was recorded at 95 Bath St. Birmingham.

Plate length: 118mm.

M236, Perc, Manton carbine converted to perc.

A Manton carbine, Pattern 1833, converted to percussion 1844-1847, with safety at half cock. The usual engraving: WR crown over Tower, and the date 1835.

Length: 139mm. References: H. L. Blackmore, British Military Firearms, p. 214; S.J. Gooding, "Manton's Pattern 1833 Carbine," The Gun Report, Feb. 2006, pp.26-31.

M237, FL, Nock Screwless, first version 1786

The first order for screwless lock muskets given by the Duke of Richmond to Henry Nock were completed in May 1786. Of the 39 ordered, as many as seven may have been copied from a Prussian model (see M086?), the balance were probably of this experimental pattern. All of the mechanism is covered with a brass casing stamped HN, over which is a thin steel plate engraved with the crown over GR, with the flash-guard attached. Although no screws are required to dismantle the lock, there are two square headed bolts used to secure the cock and the sear. It is possible to get at the mechanism without tools. This lock design in a larger (5½ inches as opposed to 5 inches) size, with the royal cypher

engraved on the flash-guard was used in a number of trial arms. These two differences suggest this may have been an early production. (see also M003, M041, M114, M219). *Plate length: 140mm. References: Howard L. Blackmore, "The Experimental Firearms of Henry Nock," JAAS, Vol. II, No. 4 (Dec. 1956), pp. 71ff. Plate XXII; S.J. Gooding, "A Note on Screwless Flintlocks for the Ordnance, 1780-1790: Jonathan Hennem, Henry Nock, and a Prussian Design," JAAS, XIX, No. 3, pp. 135-147.*

M238, Rbdr, A pair of rebounding locks marked A.M. Arms Co. Boston.

A pair of rebounding locks marked A.M. Arms Co. Boston (American Arms Co. Boston, 1870-1901). *Plate length: 116mm. References: Sellers, F.M. American Gunsmiths, 1983.*

M239, Perc, Demondion underhammer 1831

Augustus Demondion, English patent No. 6,139, July 13, 1831. This design was used for a breech loading musket firing a cartridge with a horizontal tube protruding from the base. The mechanism is from an underhammer military musket on which the hammer is formed on the mainspring and the sear on the trigger which are incorporated into the trigger plate and brass trigger guard. The hammer is cocked on opening the breech which is hinged at the front and the breech block acts as an anvil on which to strike the tube. The TG is designed to deflect gas down in front of the soldier's hand. The only mark is "6" on the trigger plate. This patent is identical with the French patent No. 4,677 dated April 27, 1831 granted to Jean-Antoine Robert. *Plate length: 35.7cm overall. References: W.W. Greener, The Gun and Its Development, 9th edition, p. 125; Pierallini, Livio, "Il sistema del dottor Robert" Diana Armi 1994 No. 3, pp. 96-98.*

M240, Perc, Pr. of Perc. in the white; Brazier - the Ashes.

A right and left pair of bar action percussion locks stamped inside "Joseph Brazier" over "Ashes" in very small letters. They are in the white and undrilled for side screws. They are fitted with a 4-pin bridle and a paneled hammer. The left hammer screw is a poor replacement. *Plate length: 119mm.*

M241, Pellet, Sharps New Model 1859

Sharps' New Model 1859 marked on the plate, C. SHARPS' PAT. / OCT. 5th 1852 and near the primer mechanism, R.S. LAWRENCE PAT. / APRIL 12th 1859. *Plate length: 127mm.*

M242, Perc. Whaling gun lock c. 1840.

leading #

The box-lock from a percussion harpoon or whaling gun with a two-nipple priming system. The central hung hammer has a nose wide enough to strike two side-by-side nipples (on $\frac{3}{8}$ inch centers). This lock's working life in a salt water environment has produced considerable pitting. It is unmarked. Payne-Gallwey (1882, p. 413) illustrates a "double-cap side plug" for swivel-guns designed to have an extra charge of powder in the plug to xxx xxx xxx xxx

Plate length: 187mm

M243, Rbdr, Sneider Patent 1874

A rebounding lock, in the white, by Charles E. Sneider of Baltimore based on U.S. Patent No. 149,353 dated April 7, 1875 assigned to "himself and Duncan C. Clark," his partner. Stamped on exterior and interior, *Sneider over Baltimore*. The patent incorporates a coupling or link with the mainspring to prevent the latter from expanding beyond the limit and a projecting arm on the sear-spring bearing on the tumbler for returning the hammer after it has struck the firing pin. The tumbler pin/hammer is hexagonal; the sear spring screw has a broken head. Plate length: 113mm. Reference: Louis S. Cherepy, Sr. *A Rebounding Lock for the Side Hammer Gun, 1866-1910*. p. 109.

M244, Snap, North African local manufacture

African, a roughly forged, snapchance of primitive construction with a straight back cock, vertical sear, no provision for a pan cover. The tumbler is peined to retain the cock and decorative file marks have been cut into the frizzen spring. Probably made for the tourist trade. Plate length: 193mm.

M245, Wheel, Continental Wheel-lock of wheel profile.

A classic, unmarked, Continental wheel-lock of wheel profile with an external wheel, hexagonal and turned dog arm, round bellied lock conforming to the shape of the wheel, chamfered lockplate terminating with an oval step. Perhaps Swedish. Plate length: 175mm.

M246, Perc, Percussion underhammer rifle mechanism

Typical underhammer lock consisting of the tang with breech plug mounted with the mainspring and feather spring, hammer, and trigger. A heavily pitted, surface find, allegedly found in the Carleton Place area of Eastern Ontario. Plate length: 151mm.

M247, Flint, Baker's Pattern 1818 East India Co. Musket

Between 1819 and 1820, Ezekiel Baker redesigned East India Co. small arms beginning with this lock approved in July, 1818. It is a lock

of rounded form marked with the United East India Company crest introduced in 1809, a crown over "8" inspectors' mark just behind the pan, and the rear stock screw moved to behind the tumbler and bridle. He included his "high" frizzen and a cock with a flat facet below the jaws which was fastened to the tumbler with a slotted bun-nut. Plate length: 147mm. References: Harding, David F. *Small Arms of the East India Company, 1600-1856*, 1997, Vol. I, pp. 204-208.

M248, Flint, Contemporary "Fantasy" lock

A right flintlock cut from the solid with a slightly round plate with a roller on the frizzen spring and a safety on the cock. There are curls on the cock spur, frizzen top, and frizzen spring. It is engraved *D. Leingang*, below the frizzen spring. The face of the frizzen is engraved with serrations, a winged dragon is lightly engraved on the exaggerated back of the frizzen, there is a decorative border on the frizzen and pan where they join, around the screws, and on the neck of the cock. This lock was made by Donald Leingang of Ottawa, Ohio, a retired tool maker with an interest in firearms. Mr. Leingang told me that he based the lock on a Boutet photograph but he had additional sources for some details. Plate length: 140mm.

M249, BL, Lefever Arms Co. Hammerless Shotgun

A right lock or side plate from a "one-half side lock" hammerless gun. From serial number 12,000 to 25,000, Lefever Arms Co. of Syracuse N.Y. made their guns with one sear located on the side plate and the other on the frame. This plate, which includes the early side-cocker and cocking rod is stamped *Lefever Arms Co.* on the outside and serial number 12,914 on the inside. It has the type G engraving (the cheapest), a simple engraved double line border introduced in 1892. Plate length: 114mm. References: Elliott, Robert W. and Jim Cobb. *Lefever: Guns of Lasting Fame*, 1986, pp. 129-30.

M250, BL, Intercepting sear sidelock, in the white. A high quality seven pin bar action side lock with intercepting (double) sear, 'in the white' as made ready for sale to the gunmaker. The lump on the internal hammer (tumbler) is for the cocking rod to push on when the gun is opened, thus cocking the action. Plate length: 125mm.

M251, Perc. Right percussion with enclosed hammer

The right lock of a pair of Continental enclosed hammer percussion locks with flat plates and single stock screws. The plates are of pointed flint lock form and are shaped for a pan-shaped bolster but there is no evidence that they have been

converted from flint. Associated with No. 252.
Plate length: 124mm.

M252, Perc. Left percussion with enclosed hammer

The left lock of a pair of Continental enclosed hammer percussion locks with flat plates and single stock screws. The plates are of pointed flint lock form and are shaped for a pan-shaped bolster but there is no evidence that they have been converted from flint. Associated with No. 251.
Plate length: 124mm.

M253, Perc/CF?, N.R. Davis & Sons

An unusual lock for a late percussion or early breechloading side hammer gun. The plate is stamped with a decorative border and "N.R. Davis & Sons" and marked "30" under the mainspring. It was one of a pair in the Serbin collection. N.R. Davis was active at Assonet, Mass. from 1853 and became N.R. Davis & Sons in 1884. Although drilled for lock nails, there is evidence that a hammer was never fitted. The "tumbler" with half and full cock notches and a ledge for the mainspring, is circular, fitting into a hollow "drum" integral with the plate. It is held in place by the pressure of the mainspring and a "washer" fitting, (but not very tightly) into the drum. There is nothing to hold the washer in position. See also M208 for left lock. *Plate length: 108mm. References: Eugene L. Lyon, The N.R. David Firearms Co. The Gun Report, May 1984, pp. 58-60;*

M254, Flint, Portuguese flint with vertical sear
Portuguese flintlock with deeply curved lock plate, damascened in gold floral and scroll design, typical square cock with safety, and grooved frizzen. Internally, fitted with a bridled tumbler having half and full cock notches. The sear bar has been bent forward. *Plate length: 166mm.*

M255, Flint, Fraudulent "HBC" trade gun, c.1850. A contemporary surplus India Pattern FL plate that was never drilled for a bridge on the tumbler, stamped with a fake HBC tombstone fox over what was probably intended as EB, although the E is poorly cut. The crowned GR has been removed, which would not be a difficult job on most India Patterns – if it had ever been there – but the Tower on the tail seems to be original. The maker's stamp, *S.A. & J. GODDARD* over *WARRANTED* is stamped below the tombstone. Bailey & Nie list an S.A. [Samuel Aspinall] Goddard & Co. as "American Merchants and Gun Manufacturers" at 50 Newhall St. Birmingham, in 1853. This is the period when competitive fur trading companies were ordering flintlock trade guns in England and

Liège that were to be "marked exactly like those of the Hudson's Bay Company," or words to that effect. *Plate length: 164mm.*

M256, Cap, English export lock by R. Ashmore & Son

A medium grade percussion lock of the quality usually sent to America by one of the Ashmore family active as lockmakers in Darlaston in Staffordshire between about 1827 and the mid 1850s. The hammer is the percussion version of the simple crescent flint cock popular in the 1830s and the hammer screw appears to be original but is smaller than expected and may be a replacement. It is engraved with vines, *en suite* with the plate. The lock plate is cut to accommodate a small, round, percussion bolster and is stamped *R. Ashmore & Son*. *Plate length: 119mm.*

M257, SHbl, Wm. Moore & Co. Right

Plate length: 257mm

M258, SHbl, Wm. Moore & Co. back action Left

Plate length: 122mm

M259, Perc, J. Goulcher, large, left

Plate length: 139mm

M260, Hless, American Gun Co. Right

Plate length: 114mm

M261, Hless, Claborough & Bros, Left

Plate length: 113mm

M262, Perc, Scroll engraved Back Action

Plate length: 118mm

M263, Rbdr, Rickard hammerless. Plate

Plate length: 108mm

M264, Hless, Neumann Bros

Plate length: 119mm

Source:

M265, FL, Queen Anne pistol lock by S. Powell, 1706.

A flint, military pistol lock of round, banana form. It is of three screw attachment, engraved with the royal crown over *AR* behind the pan and a crown over broad arrow Ordnance acceptance mark below the pan. The tail is engraved 'S. Powell' over the figure '6' representing the date 1706. The number '3' is stamped on the inside of the plate. The top arm of the mainspring has been filed to fit against the barrel of a different gun. *Plate length: 139mm.*

M266, Perc, Small, Continental

A small, unsigned, forward action lock engraved with simple scrolls and shading. Stamped 'M' on the inside behind the stock screw, 'L' under the mainspring, and 'PD' below the mainspring. *Plate length: 86mm*

M267, Perc, British, Pattern 1853 Enfield, dated 1857

The Pattern 1853 Enfield was the first to be produced entirely by machinery in the newly equipped factory at Enfield. The same lock was used on the Pattern '58 and the Snider Enfield introduced in 1866. *Plate length: 137mm*

M268, FL, French Royal Marines c. 1700

French, military flintlock with flat, banana-shaped lock plate and throat-hole cock, scroll engraved decoration and crossed anchors with crown over and "L" in lower quarter. (See also M017). *Plate length: 179mm*

M269, Perc, Small back action marked J. Deringer, Philadelphia

A very small back action lock, in the white, with scroll engraving and engraved border, panelled hammer, stamped *J. Deringer over Philadelphia*. The name is that of a tailor employed by Henry Slotterbeck, the actual maker (Slotter & Co.). (1863-1870). This would have been for what is known as the "Peanut Deringer." *Plate length: 69mm. References: R.L. Wilson and L.D. Eberhart. "The 'Deringers' of Slotter & Company." Man at Arms, Vol. 6, No. 1 (Jan/Feb. 1984), pp. 31-34;*

M270, Perc, Unusual hammer, plate engraved "Hinks",

An early 19th century percussion lock with an unusual notch in the hammer nose which appears to be intended to direct gas and copper sideways from the nipple. The lockplate is of late flintlock design dating from the first or second decade of the 19th century but there is no evidence that it has been converted. The front clip to catch the front of the plate has been removed and the hole filled. The stepped tail is border engraved, there is an engraved sunburst at the stock screw hole, the hammer has floral engraving and the body of the plate is engraved "Hinks." Bailey & Nie record a Charles Hinks at Liverpool in 1827. *Plate length: 120mm.*

M271, FL, Tulle pistol lock by "Amat Fille"

A small pistol lock engraved *Amat Fille over Tulle*. Dizzain Amat, established in Tulle c.1680, was the first of a long line of *armurier/arquebusier*. This lock was made after the death of one of them, probably Jacques Amat who was married in 1727, and the business taken over by his daughter. *Plate length: 114mm.*

M272, Pill, Back striker lock by "KS"

A back striking percussion lock of square profile decorated with a steel overlay with a heart shaped cut-out, rope engraved edges and the initials "KS." A 16mm space is provided for a round bolster and the hammer has a nose designed for pill-lock ignition. The hammer screw has been replaced. *Plate length: 190mm.*

M273, Snap, Snaphance of English configuration, perhaps late 17th century.

A snaphance lock with English, 17th century characteristics but with anomalies suggesting a later date and a Barbary lock possibility. Through much of the 17th century, (and perhaps in the late 16th century), London gunlock makers were called upon to produce countless locks for the trade to Morocco and Algeria. In the late 17th century there was a requirement on one order for some 27,000 locks to ransom a number of sailors — 276 sailors at 100 locks per man — captured in 1698 — and a contract was given to the London Gunmakers' Company to produce 30,000 locks. The return of the sailors was not concluded until 1705. This would appear to be an unused Barbary lock, rather than a detached North African lock: —

- Three stock screw holes have been punched where they should be and each has been shallowly tapped.
- The pan-cover swivel has not been dressed to allow the push-bar to pass over it in order to close the pan: no amount of pressure will make it operate.
- There are no marks on the steel indicating use.
- The pan does not have the decorative guards along the fence usually found on later, probably Islamic-made, locks but not found on any English-made locks.
- The cock is flat which is somewhat like the classic type 1 English lock.
- The decorative lines stamped on the tail; the meaningless(?) marks on the cock and steel arm, and the decorative brass inlaid mark on the fence are not normal English, but neither are they normal on Islamic locks.

Plate length: 168mm. Reference: Back, David H.L. "English Guns for Morocco and the Ransom of British Sailors." CJAC. Vol. 38, No. 4 (Nov. 2000), pp. 111-116.

M274 Miq. Small unmarked romanlock

A small, unmarked romanlock of high quality. *Plate length: 85mm.*

M275, FL, French, Vincennes 1759 Lock

A French back action flintlock from a Pattern 1759 Vincennes breech-loading musket or carbine. Marked on the face of the lock in front of the cock with a *fleur-de-lis* over 'V' [Vincennes] and stamped "*I Cizeron*," [Jean-Baptiste?] of Saint-Etienne on the inside of the lock below the bolster. Two forms with a distinctive back-action lock are illustrated in the Diderot *Encyclopedia*. Both have a "thumb spur" from the comb of the cock. This is a third version with the same basic lock design but lacking the thumb spur. *Plate length: 148mm.*

M276, Pill, Bedford County style, long plate

In the Eastern United States during the last half of the 18th and first half of the 19th centuries, regional designs of gun stocks and flint- or percussion lock shapes, evolved. These are now identified as "Schools." This lock, stamped under the mainspring "W.G. Suttter," is the work of a late gunsmith (c.1930) of Ruffsedale, Pennsylvania, who made locks in the style of the Bedford County School. The long, narrow, lockplate, only 20mm wide, is scroll engraved with an oval panel engraved with a sitting ground hog. The hammer is of hard bronze and the nose is cupped for a pill or perhaps a small patch primer. *Plate length: 129mm.*

M277 Tape Sharps M1855 with Maynard Tape Primer

Lock for a Sharps Model 1855 carbine or rifle with Maynard tape primer mechanism. Marked *Patent*, over 1845 on the exterior of the plate and *Edward Maynard over Patentee 1845* on the primer cover. The numbers "66" appears on the inside of the plate, inside the primer cover, and on the rear of the hammer. A large quantity (6,000) of these were purchased by the British War Office in 1856-57. *Plate length: 147mm. References: Coates, Earl J. & McAulay, John D. Civil War Sharps Carbines and Rifles, 1996; Hopkins, R.E. Military Sharps Rifles and Carbines, 1967; Sellers, F.M. Sharps Firearms, 1978*

M278 Patch Patchlock by Samuel Nock.

Collinson Hall's invention of the patchlock and nipple in 1817 was considered an infringement of Forsyth's patent but after 1821 when the patent expired, all restrictions were removed. Samuel Nock, nephew of Henry was apprenticed to his uncle in 1791 and became free of the Gunmakers' Co., 1800. This patchlock, serial number 6382, was probably made after 1821 but before 1823 or 1824. *Plate length:*

M279 FL New Land Pattern musket

The New Land Pattern musket was introduced by the Board of Ordnance in the early years of the 19th century with production starting in late 1802 or early 1803. The locks were made with a flat plate 6½ inches long, with a flat ring-neck cock, "some of which had an accentuated front curve giving them a pot-bellied look." The mainspring on many locks was secured to the plate by a tenon on the fixed end of the spring engaged with a notch in the bolster. Earlier versions were engraved with the royal cipher; on the one, the cipher was impressed. In 1838, 800 muskets were converted to percussion for cold weather trials in Canada. *Plate length: 180mm.*

HLB Brit. Mil FAs. p. 136ff.

BIBLIO

Musée Militaire Vaudois Exposition. *Piedmont XVIII-XIX — Armes et technologie militaire Royaumes de Sardaigne et d'Italie*. Torino: Academia di San Marciano, 1994. pp. 34-40. *Plate*

BIBLIO

Journal Abreviations:

CJAC *Canadian Journal of Arms Collecting: later, Arms Collecting.*

JAAS *Journal of the Arms & Armour Society*

JRAM *Journal of the Royal Armouries*

DA *Diana Armi (Italy)*

DWJ *Deutsches Waffen Journal (Germany)*

ASAC *American Society of Arms Collectors*

AI *Armi Antiche (Italy)*

Musée Militaire Vaudois Exposition. *Piedmont XVIII-XIX — Armes et technologie militaire Royaumes de Sardaigne et d'Italie*. Torino: Academia di San Marciano, 1994. pp. 34-40.

Sellers

Carpegna

M063, Pill, Forsyth Scent bottle No. 284

A detached Forsyth First Model roller primer fitted with side screws on each side for adjusting the pads. The surface is scroll engraved and marked with the "F Patent" trade mark. Serial 284, dated to 1810. *Plate length: 55mm*

Acquired: N. Cory collection, 31 Jan. 1989.

Wallis & Wallis sale No. 536, Lot 1108

References: Neal & Back, 1969. p. 35. Plate

M184 Perc Unidentified "prototype"

A Neapolitan Miquelet, floral engraved overall, signed "Maletta" or "Manetta." *Plate length: 152mm.*

*Insert Biblio
or perhaps
Master biblio?
Compare w/ intro reference?*

038.	FL	British Rampart gun by Brander & Potts
040.	FL	Nock's Volley gun
041.	FL	Nock's screwless, pistol size
095.	FL	Chas Manton carbine Lock, 1835
113	FL	E. Baker flintlock
114	FL	Nock screwless
161*	FL	Manton carbine, dated 1835
176	FL	British Rampart, Farmer, 1746
181	FL	E.I. Co., 1816. Holland & Holland
190	FL	Manton carbine, 1835, Shop sample.
206	FL	New Land, pistol/ crowned WR
219	FL	Nock screwless lock in the white.
237	FL	Nock Screwless, First version, P1786
251	237	FL Nock First version, P.1786
265	FL	Queen Anne military pistol

Flintlock Dog lock

018	Dog	Pattern 1704, Brit Military
072.	Dog	Danish? unmarked4
171	Dog	I. Cookson
175	Dog	Dutch, c.1650

Flintlock Other

078	FL	Inventors(?) model, external springs
086.	FL	Unsigned, screwless
140	FL	Cannon
147	FL	Arabic in Brescian manner
157	FL	Enclosed lock by J.L.D.
221	FL	U.S. Pattern 1817 Common Rifle by H. Deringer.
247	FL	Baker's Pattern 1818 East India Co. Musket
248	FL	Contemporary Fantasy lock by D. Leingang

Miquelet Spanish *Pakella*

141	Miq.	Bustindui
014.	Miq	Spanish military
015.	Miq	Astiazaram at Ribes
022.	Miq	Miquelet/Cap. marked Celalba
027.	Miq	Spanish, marked on frizzen
035.	Miq	Turkish, (boyliya) silver overlay dated 1811
081.	Miq	Miguel Zegarra
093.	Miq	Spanish M.1792?
104	Miq.	Juan Cano, en Cadiz A-1808
107	FL/Miq	Spanish mil. M1802 Pistol
139	FL/Miq	Madrid, by Jos. Deop
151	Miq.	Small Spanish Miquelet
196	Miq.	Spanish? miquelet
201	FL/Miq	Spanish, M. 1801, Musket

Miquelet Italian

043.	Miq	Romanlock
053.	Miq	Neapolitan
090.	Miq	G.M.Brazzolo - Roman lock
106	Miq.	Italian, a tutto tondo
160	Miq.	Classic Roman lock
185	Miq	Neapolitan, "Manetta"
212	Miq.	Roman lock, unsigned.

Miquelet Islamic

024.	Miq	Arabic, plain
028.	Miq	Kayble, brass covered
034.	Miq	Kayble, brass dated 1854
060.	Miq	Arabic
074.	Miq	Square lines, (Shishané) brass overlay
075.	Miq	Silver inlay (twisted wire)
076.	Miq	Square lines, (Shishané) brass overlay & inlay
080.	Miq	Unusual cock
088.	Miq	Gold inlay, Caucasian
094.	Miq	Balkan
096.	Miq	Turkish, silver overlay, (Boyliya)
169	Miq.	Algerian, silver inlays
178	Miq	Albanian "Gazel" w/ gold/silver
191	Miq	Turkish, with gold/silver overlay
204	Miq	Turkish Military, with horns round mark, blank.
225	Miq	Turkish miquelet with gold vines
230	Cap	Islamic, rgt. lock with arched hammer

Miquelet other

103	Miq.	Sardinian miquelet by "Barbuty"
105	Miq.	Portuguese fecho de no.
	Percussion	Percussion Powder
2167*	Pellet	Punch lock, no number.
011.	Cap	Forsyth & Co. conv. to caplock
089.	Pdr.	Forsyth & Co. promotion piece
144	Pdr.	Forsyth & Co. No. 913
145	Pdr.	Forsyth & Co. No. 1331R
146	Pdr.	Forsyth & Co. No. 1332L
203	Pill	N. Knight, "Jones" design
207	Pill	LePage patent, 1810.
216	FL/pill	Baker's flint/Cap combination of 1821. In the white
224	Pill	Rumford Patent Percussion sliding lock

Percussion Pills

073.	Pill	In the white, Jones Patent(?)
158	Pill	LePage patent 1810 pill lock

Percussion Pellets

065.	Patch	Left lock. Chas Piper-Cam bridge
066.	Patch	Right lock, Chas Piper-Cam bridge
117	Pellet	Sharps/Lawrence primer
005.	Tape	Green carbine V.R.
037.	Tape	Maynard/Remington-Fire damage
116	Tape	Springfield, M. 1855
118	Tape	Jenks/Remington tape primer
162*	Tape	Green Carbine
174	Pellet	Hayward's patent, 1831.
202	Pellet	Manton 1816
097	Pellet.	Manton's 1816 Pat. (composite)
220	Pellet	Mule-ear punch. Ephriam Gilbert Pat. 1829.
241	Pellet	Sharps, New Model 1859 with color.

Percussion Tubes

064.	Tube	Cap flat tube. In the white
067.	Tube	Wm Moore
115	Tube	Augustin tube lock dated 1828
159	Tube	Unsigned, continental
211	Tube	Console (Pre Augustine), Caesar R. Mfg.
239	Tube	Demondion military type

Percussion Caps

004.	Cap	Plain, bar action, case harden color
006.	Cap	H.B.C. bar action
007.	Cap	Danish converted from FL
012.	Cap	Back action w/ pierced cock
046.	Cap	Mule ear, single bbl.
047.	Cap	Mule ear over/under double
051.	Cap	Brit Military Back Action/ram part? dated
052.	Cap	Back action, incomplete, odd hammer
068.	Cap	W&J Rigby back action
163*	Cap.	Jenks carbine (No. 030)79
166*	Cap.	back action, gold inlay
179	Cap	Rt. angle pistol lock, type 1 (up sear)
180	Cap	Rt. angle pistol lock, type 2 (down sear)
199	Cap.	Bar action w/ lion (a pair)
200	Cap.	Bar action lock by Peterman.
218	Cap	Enclosed hammer, round plate, In the white
229	Cap	British military, Cap. Pattern 1839
231	Cap	Rgt. Bar in Wood by Alex. Henry

232	Cap.	Continental, in white, with cap guard—pointed tail
233	Cap	Continental, in white, with cap guard—round tail
235	Cap	Zimmerstutzen by C.G. Harston
236	Cap	Manton carbine lock converted 1844-1847.
240	Cap	Pair of Cap. locks in the white by Jos. Brazier—the Ashes
242	Cap	Percussion harpoon or whaling gun lock c. 1840
262	Cap	Scroll engraved Back Action
251	Cap	Caplock, unsigned, right, with internal hammer
252	Cap	Caplock, unsigned, left, with internal hammer
253	Cap	N.R. Davis & Sons, left lock
256	Cap	English export lock by R. Ashmore & Son.
259	Cap	J. Goulcher, large, left
262	Cap	Scroll engraved Back Action

Percussion Improved

009.	Cap	Whitmore's improvement
010.	Cap	Lancaster's improvement
054.	Cap	Ethan Allen & Co. Makers

Percussion Other

108	Cap.	Back action, unusual sear/tumbler.
135	Cap.	A. Ault, Mule ear
148	Cap	Left-hand, P.F. Charpie patent, 1853.
149	Cap	Left-hand miquelet
150	Pdr.	Unfinished gunmaker's prototype
228	Cap	Experimental Cap. rgt lock with horizontal sear
246	Cap	Underhammer Jeff Paine,

Breech loading Rebounding locks

008.	Rbdr.	Pair, bar action w/ R.R. engine
098	Rbdr.	Colt Pat. F.A. Co.
119	Rbdr.	Wm. Moore
120	Rbdr.	W. Richards
121	Rbdr.	Parker Bros.
122	Rbdr.	Meteor, back action
123	Rbdr.	Remington Arms Co.
124	Rbdr.	N.R. Davies
125	Rbdr.	Unsigned.
126	Rbdr.	Hopkins & Allen
127	Rbdr.	A. J. Aubrey
128	Rbdr.	Folsom Arms
129	Rbdr.	unsigned back action
130	Rbdr.	L.C. Smith
131	Rbdr.	Baker Gun Co.
132	Rbdr.	Unsigned, back action
177	Rbdr	Needham's Perry & Yeld, Lever

183	Rbdr	Lifter.	194	Ctg.	Zimmerstutzen, salon gun.
208	Cap	Rebounder. S. Mortimer	242	Cap	Percussion harpoon
209	Rbdr	N.R. Davis & Sons,			
213	Rbdr	Stanton, Bar in wood, In the white as sold, B55461.			
214	Rbdr	Rgt. J. P. Claborough, Stanton B74183			
223	Rbdr	Left. J. P. Claborough, Stanton B74182			
223	Rbdr	Bar action rebounding locks by Stanton. eng. "Newark."			
238	Rbdr	Pair of rebounder lock by A.M. Arms Co. Boston			
243	Rbdr	Sneider Pat. 149,353 1874			

Breech loading Other

048.	Bl.	Lever bolt/W. Richards. Liverpool
049.	Bl.	Greek Mauser 6.5mm
164*	Ctg.	Springfield. 3-bent tumbler
165*	Ctg.	Springfield. 2-bent tumbler
170	CF	W. Richards boxlock
249	Bl.	Lefevre Hammerless Sidelock
257	SHbl	Wm. Moore & Co. Right
258	SHbl	Wm. Moore & Co. back action Left
249	Hless	Lefevre Hammerless Sidelock
250	Hless	Hammerless lock with double sear, in the white
260	Hless	American Gun Co.
261	Hless	Claborough & Bros.
264	Hless	Neumann Bros

Trade gun & Export Locks

026.	Miq	Portuguese trade lock
029.	Fl.	Brunswick/Cap. conv/African trade
033.	Cap	H.B.C. Bar action
055.	FL	Austrian Cap to fl for African trade
056.	FL?	"African gunsmith"/blacksmith
079.	Fl.	Portuguese Trade lock
102	Dog.	African trade(?)
138	FL	African trade/Brit. Mil. pistol
142	Cap.	H.B.C., right
153	FL	Belgian Export by G. Laloux
205	Cap	H.B.C. with fine engraving
226	Fl.	Miniature. Pimitively made, possibly African gunsmith
227	Fl.	Decorative "Export" lock

Miscellaneous

013.	Air	Uncocked action
021.	Fl.	Cannon, Hidden/Phila.
039.	Fl.	B.O. Fire of 1841
134	FL	B.O. Fire of 1841
184	Cap	Prototype?

Appendix I Nomenclature

Frizzen, Steel, Hammer, Battery, Frizzel, Etc.

Since this book is also intended as a guide for the many historians with limited experience in arms technology, a vocabulary has been used with explanations when required, of a word's meaning. But it has not always been possible to clarify other words of significance to the study. It is hoped this Appendix will assist.

Much of the terminology being used today by arms historians is based upon manuscript references produced by contemporary writers who were familiar with firearms.

When living in Toronto in the 1950s, and beginning to buy printing, it was necessary to learn the vocabulary of the typesetters' trade — line width was measured in picas with six pica to the inch, type height was measured in points with 72 points to the inch, and leading, the spacing between the lines, was also measured in points. On moving less than 300 miles to Ottawa in the early 1960s, the vocabulary was quite different. The most significant change was that picas became 'Ems' which technically is a variable measurement based on the width of the letter M in whatever font and size is being used. If that difference existed in such a short distance in the 20th century, it is not surprising that the words used to identify a gun's ignition over a two or three hundred year span, and a few thousand miles or kilometers, did not remain constant and is often confusing.

In the late 1940s, C. Meade Patterson collected terminology from United States Ordnance Department records of the 1820s, and published "U.S. Military Flintlock Parts" in *Muzzle Blasts*, the magazine of the National Muzzle Loading Rifle Association. The vocabulary at that time coincided almost completely with that used in England and much of that terminology remains there today. His observations have been incorporated below. But in North America and among collectors generally, a new vocabulary has developed which can sometimes be confusing. The descriptions which follow when combined with the illustrations of lock components may serve as a guide.

Where practical, the terminology of those who made or used guns in former times have been used. Peter Hawker, whose *Instructions to Young Sportsmen in all that relates to Guns and Shooting* went through 10 editions spanning the last years of the flintlock and early years of percussion, is our best source in this respect but even his vocabulary was not consistent.

The terms which follow are intended to supplement the vocabulary used in the main portion of this aide mémoire. It does not mean that they are the only words the reader will encounter but hopefully, it is a start.

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Fig. A1.1. Illustrations of the detent, from the top: the cock at rest showing the detent hidden under the unusual bridle and the mainspring hooked on the swivel of a Samuel and Charles Smith flintlock from a rifle (S/N 4065); the cock at half bent with the sear resting in front of the 'hump on the detent and pushing it to the rear; the cock at full cock position with the detent pushed forward to a position where the sear will be forced to slip over the 'hump' to clear the half-cock bent as the cock falls. [M.133]

Anillo (Anneal-yoe) : Spanish for the ring-like head of the top jaw screw of Spanish, Italian, and Islamic flint-locks, but also found on some 17th century Continental locks.

Apron : The carved, raised area, of the stock surrounding the tang.

Back pin : "Screws, by taking out which you are enabled to work at, and countersink, the inside of the touchhole." (Hawker, 1844).

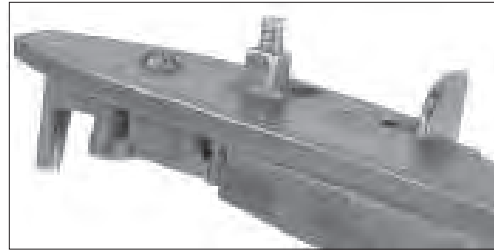


Fig. A1.2. Ezekiel Baker called this his 'solid shank' to give greater strength to the square of the tumbler and secured the cock with a 'washer-screw,' also known as a tumbler button, bunn nut or burr.

Barrel bands : The word usually used to identify the bands used to fasten the barrel into the stock of a military musket. See capucine.

Barrel pins : See stock.

Bent, half, Full bent : See tumbler.

Bolster : The thick part on the top edge of the lockplate, of which the pan forms a part, making it possible to provide additional threads to the lock screw. If the pan is a separate piece, the bolster becomes the *front bolster* and the *rear bolster*. It also serves as the stop for the shoulder of the cock.

Bolts : See stock.

Bolt safety : a sliding flat bolt usually set into the lockplate behind the cock which pushes forward to lock the cock at half cock. Early examples, in the form of a stud-like projection, can be found dating on firearms from the 1660s. During the 18th century more elaborate versions appear on English sporting guns

Bore of the pan : the pan proper which contains the priming powder.

Box lock : A box-like addition to the breech end of the barrel of a muzzle loading pistol, or occasionally a long gun, in which the mechanism is fitted and the cock or hammer is in line with the centre of the barrel. Externally, it may be of square or rounded shape. This may be what gunmakers' called "a hollow lock" in the early 19th century.

Break-off : See standing breech.

Bridles : There are two possible bridles; one covering the tumbler and one serving the frizzen, thus creating "the two bridle lock." The tumbler bridle is usually identified by the number of screws. The Smith bridle (Fig. A1.1) would be a

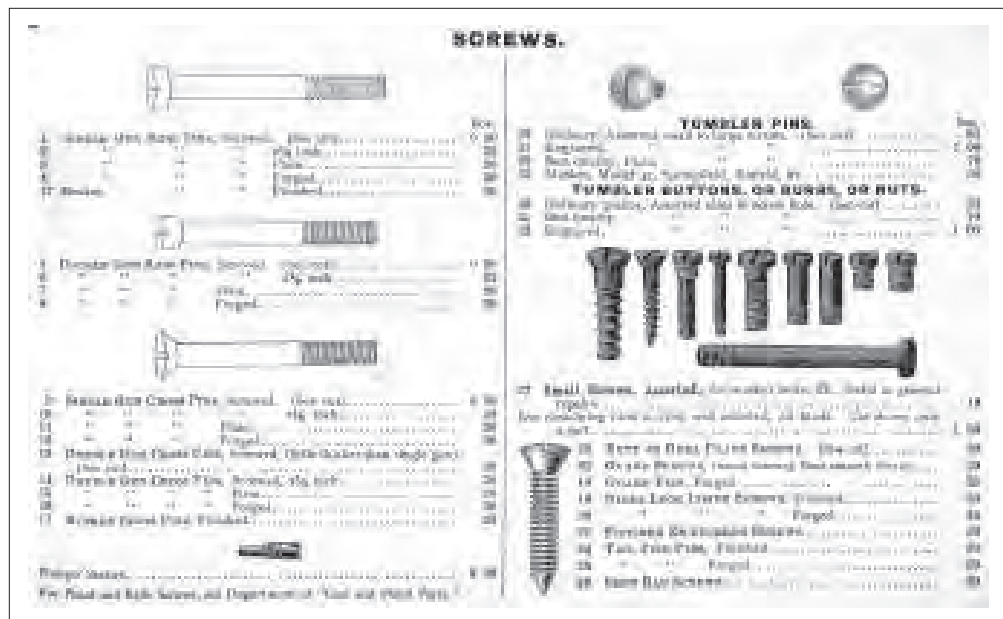


Fig. A1.3. Pins, Screws and Wire were the gunmakers' choice for fasteners. Screws were, as they are today, intended for fastening in wood while wire was used to secured barrels, ramrod pipes, trigger guards etc. Pins were almost the only fastener used by locksmiths. In the early 19th century, all pins, with or without an enlarged head, were slotted at one end and threaded at the other, but the threaded portion was known as *the screw of the pin*. All threaded holes in metal parts, were called "pin holes" placed to accept the pin for the springs, bridle, etc. stock, etc. Any unthreaded, round hole of the lock plate, or of the bridle, (except the *tumbler axle hole*), is intended for a pivot. These were referred to as the bridle pivot hole, main-spring pivot hole, tumbler pivot hole, side pin hole, etc. Illustration from the 1885 *Ammunition, Gun Material and Gunsmith's Supplies* catalogue of John P. Moore's Sons, 302 Broadway, New York City.

3-pin bridle.

Cap guard : When the copper cap was first introduced and cap sizes had not been standardized, a guard to prevent loss of the cap was built into locks by a few gunmakers.

Capucine (cap-you-scene). The sheet metal bands intended to hold the barrel and the stock together. Originally a French term but now working its way into the English vocabulary. The same function on military muskets is done by *barrel bands*.

Cock screw : The screw which fastens the cock and the tumbler. See also tumbler pin.

Cone : See nipple.

Detent : A swivel, inlet into the tumbler, to prevent the sear nose from catching in the half-cock bent on firing. The use of the detent has been noted on a pistol engraved Gerrit Pentermann, Leuwarden, dated 1683.

Faceted, Chamfer. Beveled edges usually

found on the pan, top jaw frizzen, etc. Chamfer is normally an even bevel, taking the same amount from both edges; faceted is when a long slope, sometimes reaching to a small flat top is found.

False-breech : "Part where the end into which the breechings hook, before the barrels can be laid in the stock" [of a single or double barrel gun or pistol]. (Hawker, 1833).

Feather spring : See frizzen spring.

Flash guard, fence : The raised "lip" at the rear of the pan of a flint-lock or behind the nipple on an early percussion lock, intended to deflect the flame on discharge. Also, "part between cock and pan, on which is received the solid cock." (Hawker, 1844).

Frizzen spring, feather spring : The spring which provides pressure on the frizzen. Hawker used the term feather spring for that part of the lock, but he also, on at least one occasion, calls it the *hammer spring*. I tend to use both, re-

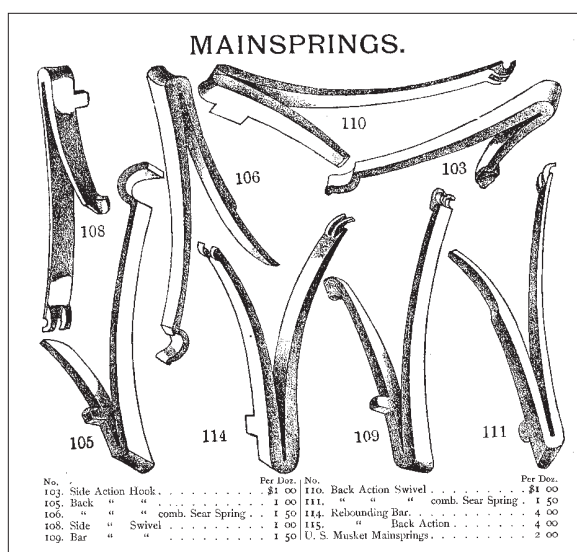


Fig. A1.4. The mainspring, like all other 'V' springs consists of a sort arm held stationary by a round or flat lug to provide leverage and a long arm to release the energy obtained by the compression produced by the tumbler, an eye for the mainspring pin or a lip to fit up into a slot in the underside of the lockplate bolster, and a hook to engage the tumbler or swivel. The illustration is from the July 1, 1887 *Material Catalogue* of Kennedy & Curtis, Philadelphia. It provides names to eight forms of mainspring: 103–Side action hook; 105–Back action hook; 106–Back action hook combination sear spring; 108–Side action swivel; 109–Bar action swivel; 110–Back action swivel; 111–Back action swivel combination sear spring; 114–Rebounding bar.

serving frizzen spring for heavy military musket springs and feather spring for the light spring of sporting guns and pistols.

Frizzen, Steel, Hammer, Battery, Frizel : The slightly curved lock component struck by the flint on a snaphance will be called the steel as it serves no other function, but when combined to form the 'L' shaped pan cover it will be called the *frizzen*, a name which has a contemporary history. Under date of May 16, 1810, William Parker of Holborn invoiced the Thames Police Office for "hardening frizzens,"² During much of the 18th and 19th century that part was usually referred to as the hammer, although the term "battery" or "steel" was occasionally used.

Frizzle is a term used for the frizzen by the Ordnance (Blackmore, 1980).

Furniture : The metal parts, other than the lock and barrel, either functional or decorative, incorporated into the stock including the ramrod pipes, trigger guard, butt-plate, side plate, escutcheon, etc. But not including inlays or decorative wire work.

Fusil/Musket : In French, the *fusil* is a flintlock while a *musket* is a matchlock. In England, a musket is the regulation soldiers' firearm and a fusil is a light-weight and slightly smaller musket.

Grooves : See lands.

Grotesque mask : A decorative butt plate in the form of a face, usually silver, most frequently found on Queen Anne pistols.

Hair trigger : A gun or pistol with a very light trigger pull. Not necessarily a Set trigger. A set trigger can, by mechanical means, adjust the pull heavier, or lighter.

Hall marks : The punch marks applied to silver furniture by the assay office to indicate quality of the silver, and the maker. (Dixon, 1971). In England, they normally consist of four marks : the maker's mark, usually his initials; The standard mark showing the quality of the metal; the town mark indicating where the assay office was located; and the date letter.

Hammer spring : See frizzen spring.

Heel of the stock : See stock.

Hollow lock : See sidelock.

Horns: The horns-like head of the top jaw screw of many Islamic flint-locks, but also found on some 17th century Continental locks.

Hut : "At first the breech-end was closed with a 'hut,' and then with a plug having a tail-piece; then the 'tail-pin' (as it was named) took the same external diameter as the barrel to which it was fitted—that is, it not only fitted the bore, but closed the barrel, being so fashioned as to be a continuation of the exterior of the barrel for about one inch, and was called a breech-plug." (Greener, 1925).

Ketch lock, Catch lock : An alternative name for the dog-lock used by the East India Company in the mid 17th century and the Royal Africa Company in the 1st quarter of the 18th

TECHNOLOGICAL DICTIONARY English-German-French Professor Dr. Franke, 1855	
Flint-firelock, Flint-lock, s. (of the French system), <i>Luok</i> ♦ <i>Das französische Schloss</i> ♦ <i>Platine f.</i> & <i>pierre</i>. The principal parts of it are: The cock (with the upper and lower jaw) ♦ <i>Der Hahn</i> (<i>mit dem Maule, oder den beiden Hahnlippen</i>) ♦ <i>Chien, m.</i> (<i>avec les mâchoires</i>). The pan, touch-pan ♦ <i>Die Pfanne, Zündpfanne</i> ♦ <i>Bassiné, m.</i> The pan-bore ♦ <i>Der Troy, Pfannentroy</i> ♦ <i>Fraisure, f.</i> The touch-hole ♦ <i>Das Zündloch</i> ♦ <i>Lumière, f.</i> The fence of the pan ♦ <i>Der Ansatz der Pfanne</i> ♦ <i>Rempart m.</i> du bassiné. The hammer ♦ <i>Die Batterie, der Deckel, Pfannendeckel</i> ♦ <i>Batterie, f.</i> The face of the hammer ♦ <i>Die Stahlbahn, Schlagfläche</i> ♦ <i>Face, f.</i> The hammer nail-hole ♦ <i>Das Deckelschraubenloch</i> ♦ <i>Trou m.</i> de la vis de batterie. The hammer-spring ♦ <i>Die Batteriefeder, Deckelfeder</i> ♦ <i>Ressort m.</i> du batterie. The hammer-spring pin ♦ <i>Die Batteriefeder-Schraube</i> ♦ <i>Vis f.</i> du ressort de batterie. The hammer-spring pin-hole, or hammer-spring hole ♦ <i>Das Deckelfeder-Schraubenloch</i> ♦ <i>Trou m.</i> de la vis du ressort de batterie.	The hammer-spring stud-hole ♦ <i>Das Deckelfeder-Stiftloch</i> ♦ <i>Trou m.</i> du pivot du ressort de batterie. The plate, lock-plate ♦ <i>Das Schloßblatt, Schlossblech</i> ♦ <i>Corps m.</i> du platine. The nut or tumbler ♦ <i>Die Nuss</i> ♦ <i>Noix, f.</i> The main-spring hook ♦ <i>Der Krappen, Krappen</i> ♦ <i>Griffe, f.</i> The bents ♦ <i>Die Rasten</i> ♦ <i>Craus, m.</i> pl. The half-bent, the half-cock ♦ <i>Die Ruhrast, Vorderrast, die erste Ruhe</i> ♦ <i>Cran du repos</i>. The whole-bent, top-bent, the full-cock ♦ <i>Die Spannrast, Hinterrast, die zweite Ruhe</i> ♦ <i>Cran du bandé ou du départ</i>. The bridle ♦ <i>Die Studel</i> ♦ <i>Bräde f.</i> de noix. The sear ♦ <i>Die Stange, der Schängel</i> ♦ <i>Gâchette, f.</i> The sear-spring ♦ <i>Die Stangenfeder</i> ♦ <i>Ressort m.</i> de gâchette. The main-spring ♦ <i>Die Schlagfeder, Hauptfeder</i> ♦ <i>Grand ressort</i>. The lead, hint-lead or keeper ♦ <i>Das Steinfutter</i> ♦ <i>Plomb m.</i> pour la pierre, enveloppe <i>f.</i> de la pierre. The lock-cover ♦ <i>Der Regendeckel</i> ♦ <i>Couvre-platine, m.</i> To half-cock the piece ♦ <i>Den Hahn in Ruhe stellen</i> ♦ <i>Faire passer le chien au cran du repos</i>. To cock the piece, to bring to the full-cock ♦ <i>Den Hahn spannen oder aufziehen</i> ♦ <i>Armer ou bander le chien</i>. Flint-musket, s. ♦ <i>Das Steinschloß-Gewehr</i> ♦ <i>Arme f.</i> à silex; <i>fusil m.</i> à silex.

Fig.a1.5. This illustration in English – German – French contains the gun-lock related entries compiled from the *Technological Dictionary Containing the Technical Terms use in Manufactures and Arts, Building, Civil, and Naval Architecture, Military, Civil and Mechanical Engineering, Artillery, Navigation, Mathematics and Natural Philosophy, Chemistry and Mineralogy, Etc.* by Professor Dr. Franke, II^d Director of the Polytechnical School of Hannover. Wiesbaden: Kreidel & Niedner, 1855. The entire firearms related portion from this important, 616 page, multi-language dictionary was reprinted as “A Dictionary of Small Arms Terms: 1855” in *Arms Collecting*, Vol. 30, No. 3 (August, 1992), pp. 75-86.

century.

Keys : See stock.

Lands :On rifle barrels, the raised portion that remains after the grooves have been cut which together are known as the rifling.

Mainspring with a hook and Mainspring with swivel. These are the terms used in the 1885 John P. Moore’s Sons (NYC) Ammunition, Gun Material and Gunsmith’s Supplies catalogue and describe the connection with the tumbler.

Musket : See fusil.

Muzzle ring : The decorative turning around the muzzle.

Nipple : The part which holds the percussion cap to direct the fire to the barrel. The word was introduced by Collinson Hall when he announced his patchlock in 1817, a year before the percussion cap was introduced by Joseph Egg. It was also known as the *pivot* (Hawker 1830) Peg, (Lancaster 1933), or *cone* (U.S. Ord-

nance).

Nipples, Reversed : “These Caps must not be used on what is called a reverse Nipple, that is, one the hole of which is larger at the top than the bottom.” (Notice with a sample package of caps by Charles Clarke Armstrong 23 January 1854).

Pan : The receptacle to hold the priming powder. This was *never* described as the *flashpan* although a “flash in the pan” to describe a misfire, is well known. (See also flash guard). The flat base was known as the *seat*; the *bore of the pan* held the priming powder.

Pan cover : The part intended to prevent loss of the priming came in many forms from the hand removed to the automatic.

Peg : see nipple

Pins and Screws. *Screws* : In former times, were as they are today; designed to hold in wood by cutting the threaded portion into the grain of the wood. *Pins* may pass through wood but are threaded for part of the length to be turned into an appropriately threaded hole in metal. But, having said that, the threaded portion of the pin was known as the screw. All pins have a slotted head and threaded shank but in the 19th century, some gunmakers designed a head requiring a special driver.

Pipes, ramrod pipes : The tubes inlet into the stock or attached to the barrel, to receive the ramrod.

Pivot : See nipple.

Re-steeled hammer : The hardened surface of the frizzen was quickly worn away by the striking flint. It was “refaced” by overlaying with a new layer of steel — that is, it was re-steeled. The joint of the new steel usually appears obvious.

Rib : The iron strip under the barrel which spaces the ramrod, or the strip between the barrels of a double-barrel gun.

Roller-frizzen : a small wheel or roller attached to either the foot of the frizzen or more commonly the upper leaf of the frizzen spring to prevent friction and ensure a smooth and speedy action as the frizzen opens.

Screwed barrel : a 17th century term for a rifled barrel.

Screws : See pins.

Seat : The flat base of the frizzen; the cover of the pan.

Set trigger : A mechanism built into the trigger system which is adjustable to increase or decrease the amount of pull required to release the sear.

Shoulder : Projects on the rear face of the cock to check the fall of the cock. The shoulder, by landing on the bolster, stops it from traveling too far. This term is the most commonly used term, but Acton, writing in 1789, called the bolster, the *cheek*.

Side hammer : Any lock on which the cock or hammer is on the outside of the lockplate. The term is used with both muzzle- and breech-loading arms.

Side lock : A lock fastened to the side of the barrel by pins passing through the stock.

Side Nails. The term used by some Gunmakers and the Ordnance for the lock pins.

Small of the stock : See stock.

Solid cock : A form recommended by Hawker who wrote “I should be inclined to recommend the solid cock which *falls on its end*, instead of being *stopped in the middle* by the lock-plate ... the solid cock is received on a firm support annexed to the pan; while the one on the other construction suddenly catches the lock-plate.”

Solid shank : See tumbler pin.

Solid shank tumbler : See tumbler pin.

Spanish barrel :

Springs : ‘U’ or ‘V’ *spring* of the type usually found on gun locks; *Leaf spring* made of flat stock; Spiral spring with all the coils in one plane, as a clock spring, usually of flat stock; *Helical spring*, coiled on a mandrel, lengthwise of its axis, like a screw thread; *Extension spring*, a helical spring which lengthens in action.

Standing breech : or *Break-off*. “Nearly two centuries ago [i.e. c.1720], for conveniently removing the barrels from the stock, the former were attached by the lugs of the breeches hooking into a break-off or standing breech.” (Greener, 1925).

Steel: The face of the steel is the surface struck by the flint of any flint-lock. When the steel and the pan cover are joined they become the frizzen (*qv*). When the surface became too worn it was re-steeled by brazing on a new piece of steel.

Stock : The lock is inlet into the *lock recess* and held in place by lockpins or *sidenails*; the barrel is inlet into the barrel *bed* and it is held in place by *barrel pins* (if they are round) passed through *lugs* or *loops* brazed to the bottom of the barrel, or *keys*, *slides*, or *bolts*, if they are flat. The area behind the lock (that held by the hand) is the *small of the stock* the butt at the top is the *heel of the stock* and at the bottom it is the *toe of the stock*.

Swivel : The arm pivoted between the tumbler and the mainspring to reduce friction.

Threads : The term used by the Ordnance to describe the double border lines engraved on the lockplate, cock body, etc. (Bailey, 1997)

Throat-hole cock : The term used by the Ordnance to describe the flint cock with the ring joining the lower jaw with the body cock.

Toe of the stock : See stock.

Top Lock : A word used to describe a box-lock (Mann, 1962).

Touch-hole : The hole leading from the pan to the powder chamber to ignite the main charge. See also *vent*.

Tumbler : The tumbler is the lock component which unites the mainspring and the cock. On some of the earliest flint locks it took many shapes. On the flintlock, it is one of the defining characteristics that was introduced on the first French lock. The main characteristics included its round shape with an area on the circumference recessed to accept the spring known as the tumbler hook and two notches on the rear to accept the sear nose, thus providing a half- and full-cock position, or a half-bent and full-bent as it was sometimes called. Many refinements were incorporated over the following centuries. see *detent*, *swivel*, *bridle*

Tumbler burr : See tumbler pin.

Tumbler button : See tumbler pin.

Tumbler nut : See tumbler pin.

Tumbler pin, *Tumbler Button*, *Washer Screw*, *Tumbler burr*, *Tumbler nut* : Ezekiel Baker called it a “washer screw;” (He said : Instead of a pin being screwed into the shank of the tumbler, which weakens it so much as frequently to cause it to break off, I have introduced a *solid shank* with a washer-screw upon it, which gives greater strength to the shank of the tumbler... p.214); the East India Company incorporated it

into the Pattern 1819 flintlocks and called it a “screw nut;” Thomas Bland & Sons (large Birmingham gun component manufacturers), in their Catalogue of “Muzzle and Breech-loading Guns & Rifles,” c.1890, called it a “Gun Lock Tumbler Button.” John P. Moore’s & Sons, NYC, in their 1885 gun material catalogue called them Tumbler buttons, or burrs (also burs), or nuts. See also cock screw.

Turn-off barrel : A feature of some muzzle-loading pocket pistols and rifles so that the barrel may be unscrewed from the breech for loading.

Vent : On all firearms from hand cannon through the flint locks, the hole from the pan leading to the charge in the chamber. On early percussion guns it is the small hole “at the side of the breeching, to let out the gas, and to [theoretically], lessen the recoil.” (Hawker 1844).

Vent-pick : A pointed “needle” used to clear the touch-hole.

Washer screw : See tumbler pin.

Wedding band : a term (not used in England) for the decorative turning between the octagonal part of a barrel and the round portion.

A Record of Sources

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Curtis, Wm. S. A note in *Black Powder* (the National Muzzle Loading Rifle Association of Great Britain), Vol. 32, (1985), p.7 on the invoice; presented by William Parker, gunmakers in Holborn St. to the Thames Post Office dated May 16, 1810, there was included an amount “for hardening frizzens.”

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ADD-ONS

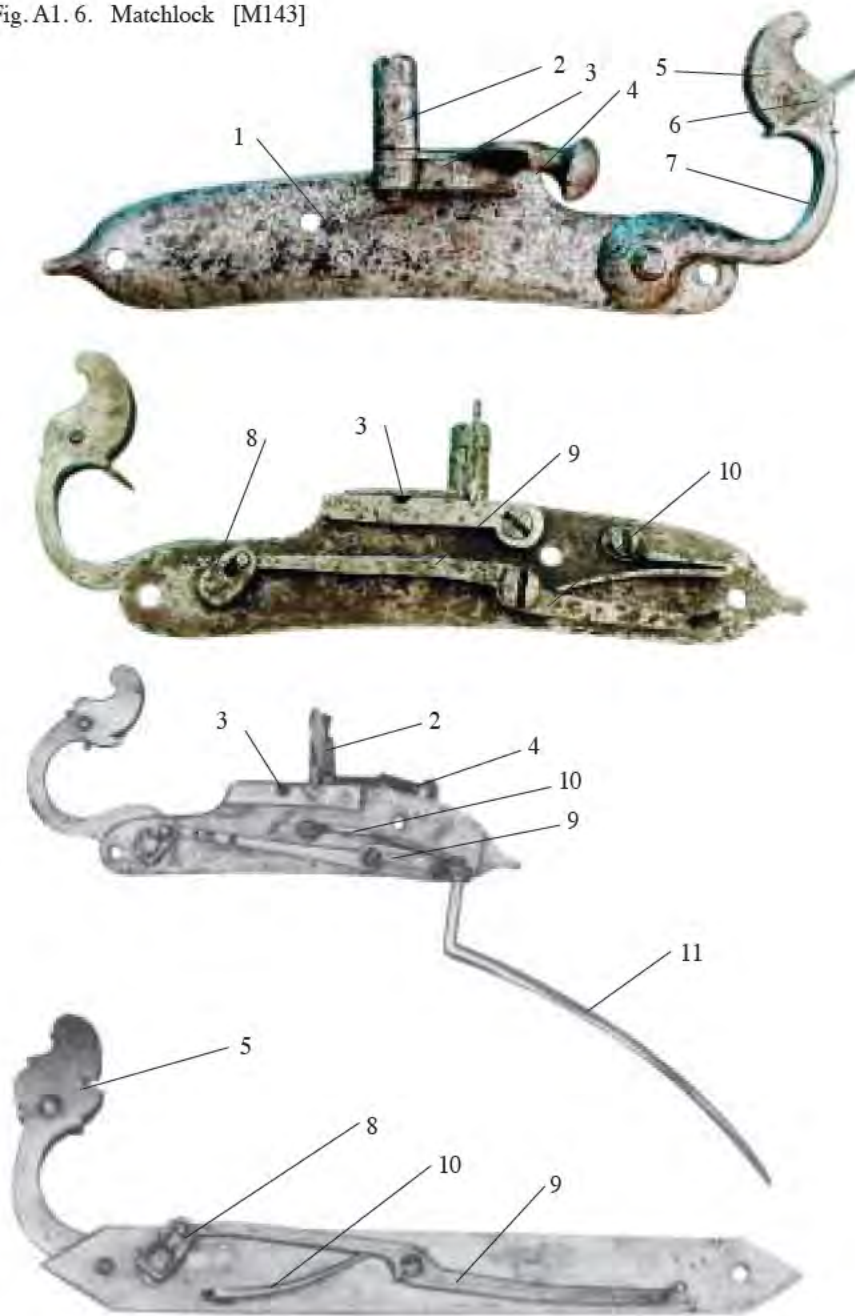
Breech-plug : At first the breech-end was closed with a "hut," then with a plug having a tail-piece; then the "tail-pin" (as it was named) took the same external diameter as the barrel to which it was fitted, - that is, it not only fitted the bore, but closed the barrel, being so fashioned as to be a continuation of the exterior of the barrel for about one inch, and was called a breech-plug. The "patent breech" was the conoidal base formed in the interior of the breech plug, and specially shaped funnels or holes communicating between barrel and "pan," or the "nipple" — C.E. Greener, 1925.

Tail-pin : see breech-plug.

Hut : see breech-plug.

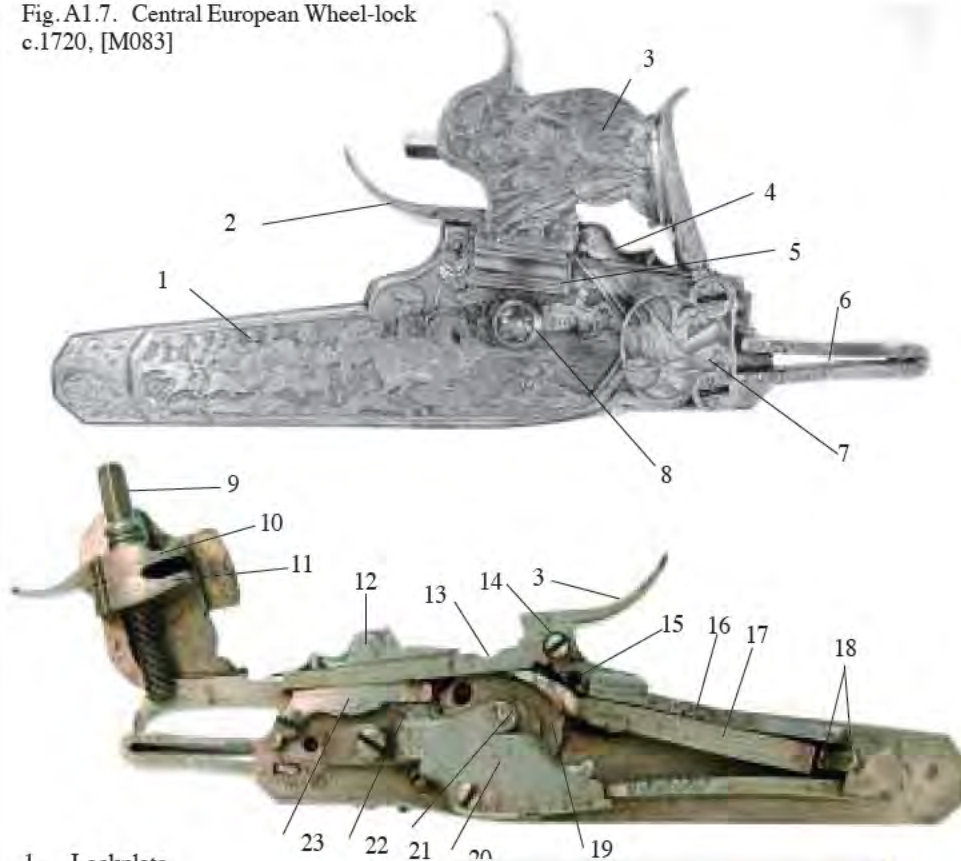
Patent Breech : the conoidal base formed in the interior of the breech plug, and specially shaped funnels or holes communicating between barrel and pan or the "nipple"— C.E. Greener, 1925. First patented by Henry Nock in 1787, "The breech, commonly called the patent breech, is screwed on its outside to fit the inside of the barrel."

Fig.A1.6. Matchlock [M143]



1. Lock plate	5. Match holder	9. Sear
2. Flash guard & pan cover pivot	6. Match screw clamp	10. Sear spring
3. Pan	7. Serpentine	11. Sear bar
4. Pan cover	8. Serpentine link	

Fig. A1.7. Central European Wheel-lock
c.1720, [M083]

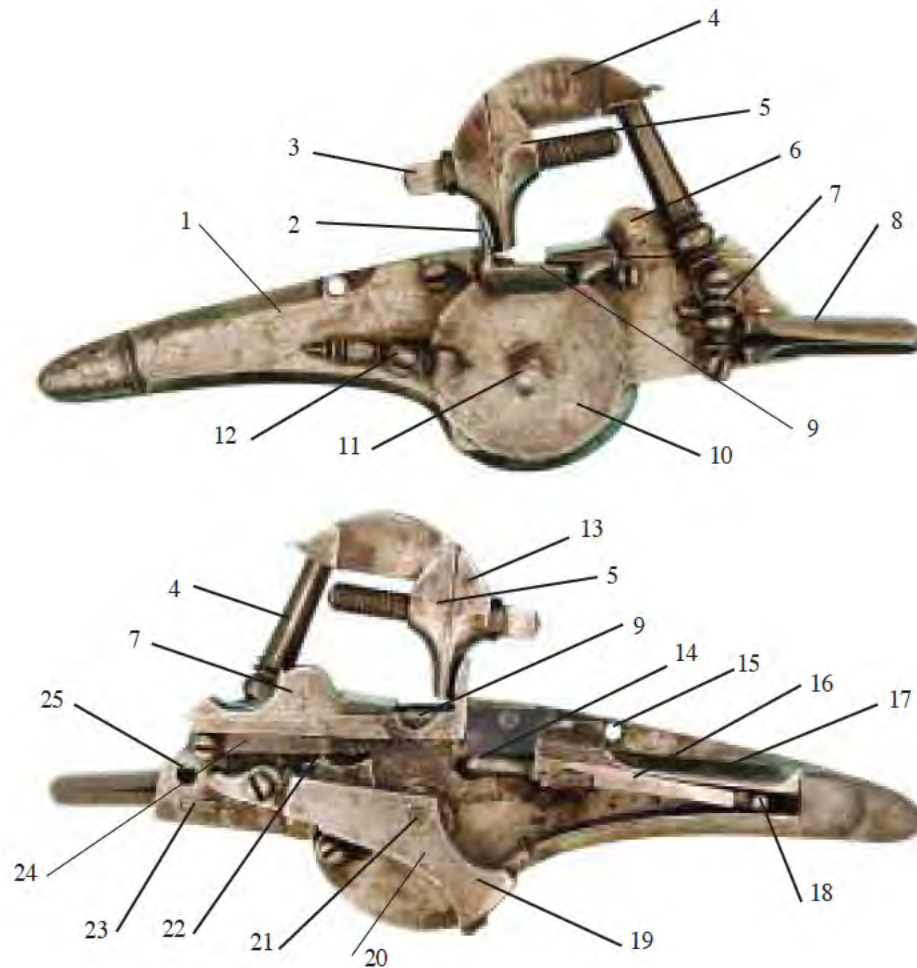


- 1.. Lockplate
2. Flash deflector
3. Dog cover
4. Pan cover
5. Pan
6. Dog spring
7. Dog bridle
8. Square of spindle
9. Dog screw
10. Dog, top jaw
11. Dog, lower moveable jaw
12. Pan cover spring
13. Full cock stop
14. Pan fastener
15. Rear Stock Screw
16. Mainspring
17. Secondary sear and Sear nose
18. Trigger/sear bar
19. Wheel
20. Wheel bridle
21. Wheel axle
22. Pan swivel & wheel retainer
23. Pan cover spring



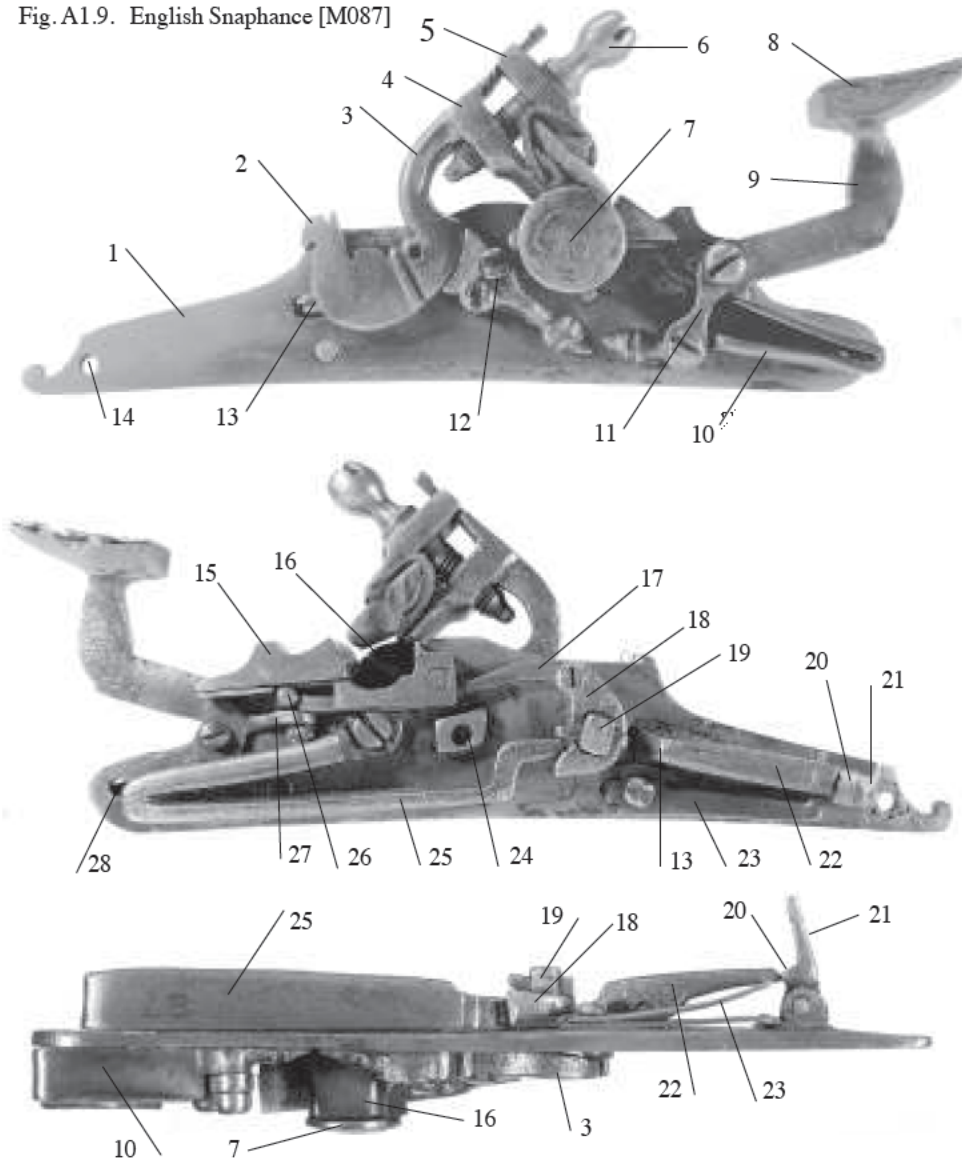
24. Flat link chain and swivel
25. Wheel eccentric
26. Hole for sear nose

Fig. A1.8. Continental wheel-lock with wheel contour [M245]



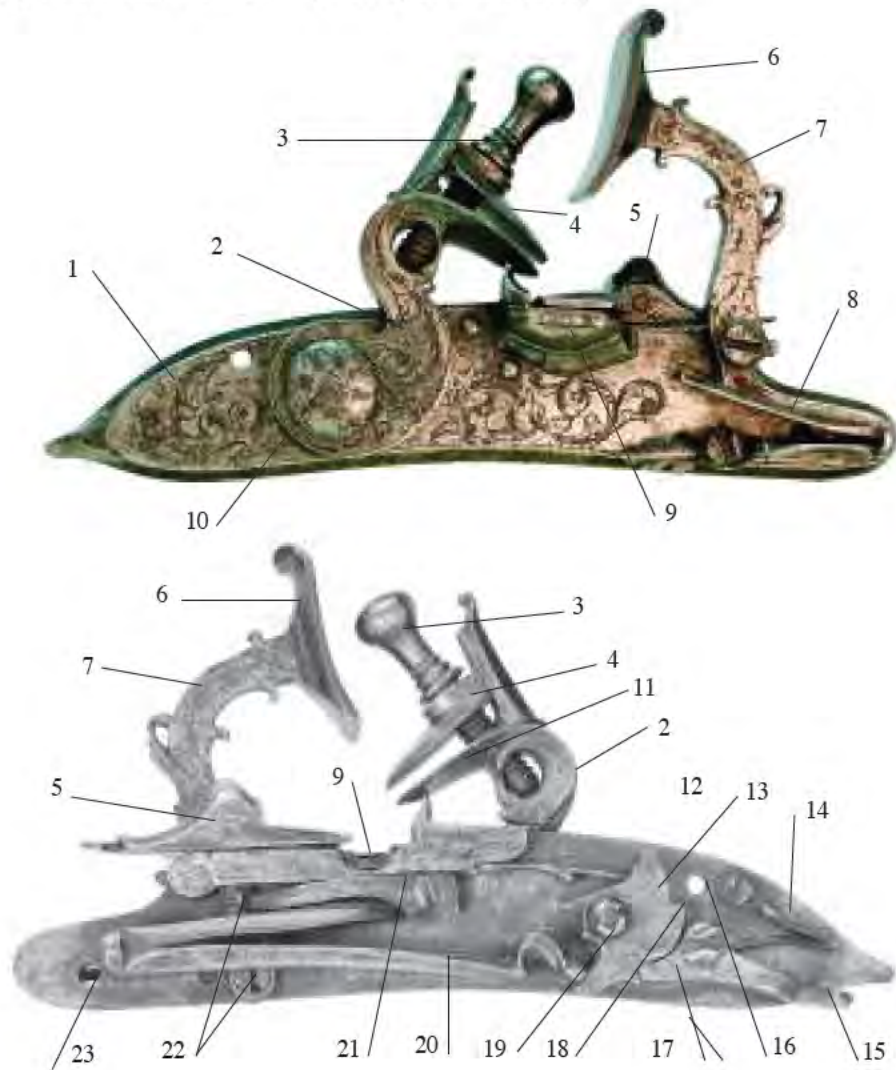
1. Lock plate (of wheel profile)	11. Square of spindle	21. Wheel axle
2. Fence	12. Wheel bridle	22. Pan swivel
3. Jaw screw	13. Dog jaw	23. Dog spring tenon
4. Dog	14. Sear nose and wheel hole	24. Pan cover spring
5. Lower Jaw (moveable)	15. Stock nail	25. Front stock pin
6. Pan Cover	16. Sear	
7. Dog bridle	17. Main spring	
8. Dog spring	18. Trigger bar	
9. Pan	19. Wheel bridle	
10. Wheel	20. Flat link chain (under)	

Fig. A1.9. English Snaphance [M087]



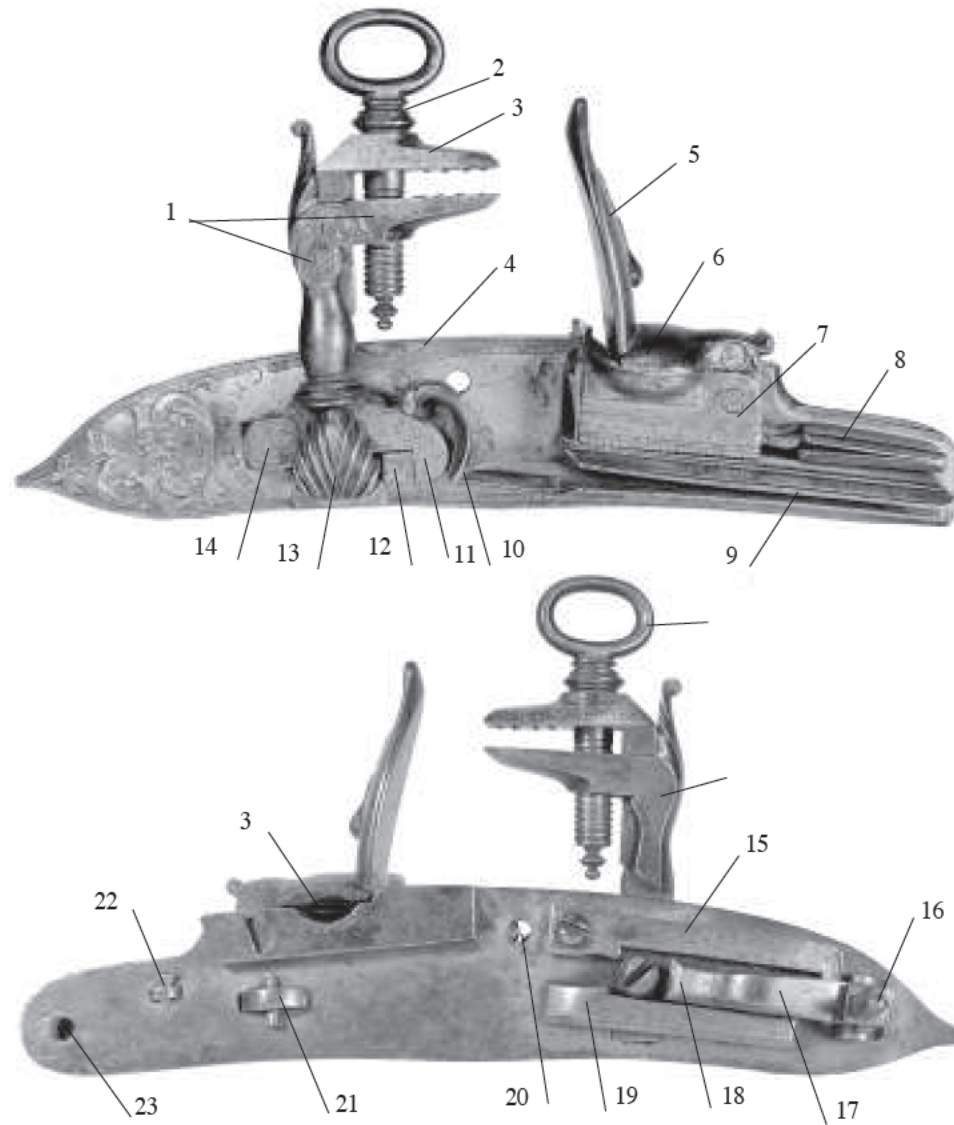
1. Lock plate	11. Bridle	20. Sear
2. Tail of the cock	12. Buffer	21. Trigger bar
3. Cock body	13. Sear nose	22. Secondary sear
4. Lower jaw	14. Rear Lock screw hole and monster head	23. Sear spring
5. Top jaw	15. Pan cover	24. Center lock screw hole
6. Top jaw screw	16. Pan	25. Main spring
7. Flash-guard/fence?	17. Push bar	26. Pan cover swivel
8. Steel (frizzen)	18. Tumbler	27. Pan cover spring
9. Steel arm	19. Cock square	28. Front lock screw hole
10. Steel spring		29. Sear bar

Fig. A1.10. Italian, Tuscan, Snaphance by Bramansi [M110]



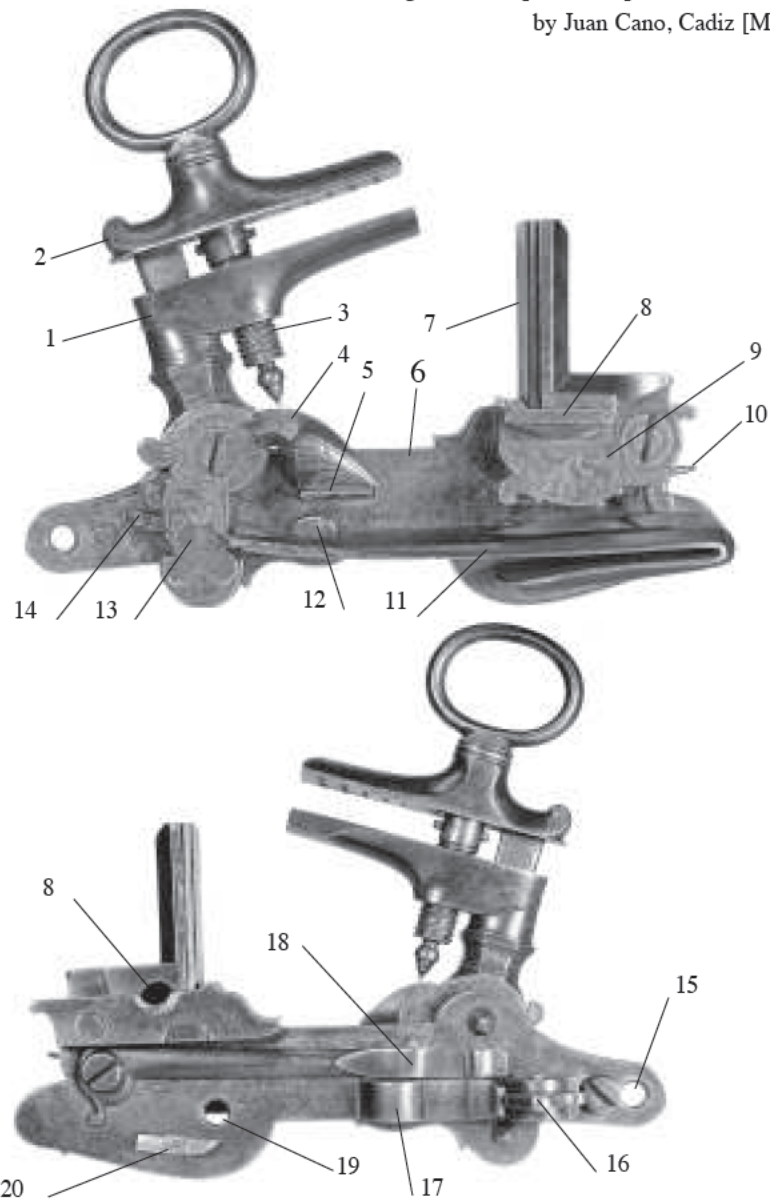
1. Lock plate	9. Pan	17. Sear nose in half cock
2. Cock	10. Cock screw	18. Full cock notch
3. Flint screw	11. Lower jaw	19. Cock screw nut
4. Top jaw	12. Push bar	20. Mainspring
5. Pan cover	13. Tumbler	21. Pan cover spring
6. Steel	14. Sear spring	22. Pan cover swivel
7. Steel arm	15. Trigger bar	23. Front stock screw
8. Steel spring	16. Rear Stock Screw	

Fig. A1.11 Italian, Romanlock, by G.M. Brazzolo, Milan [M090]



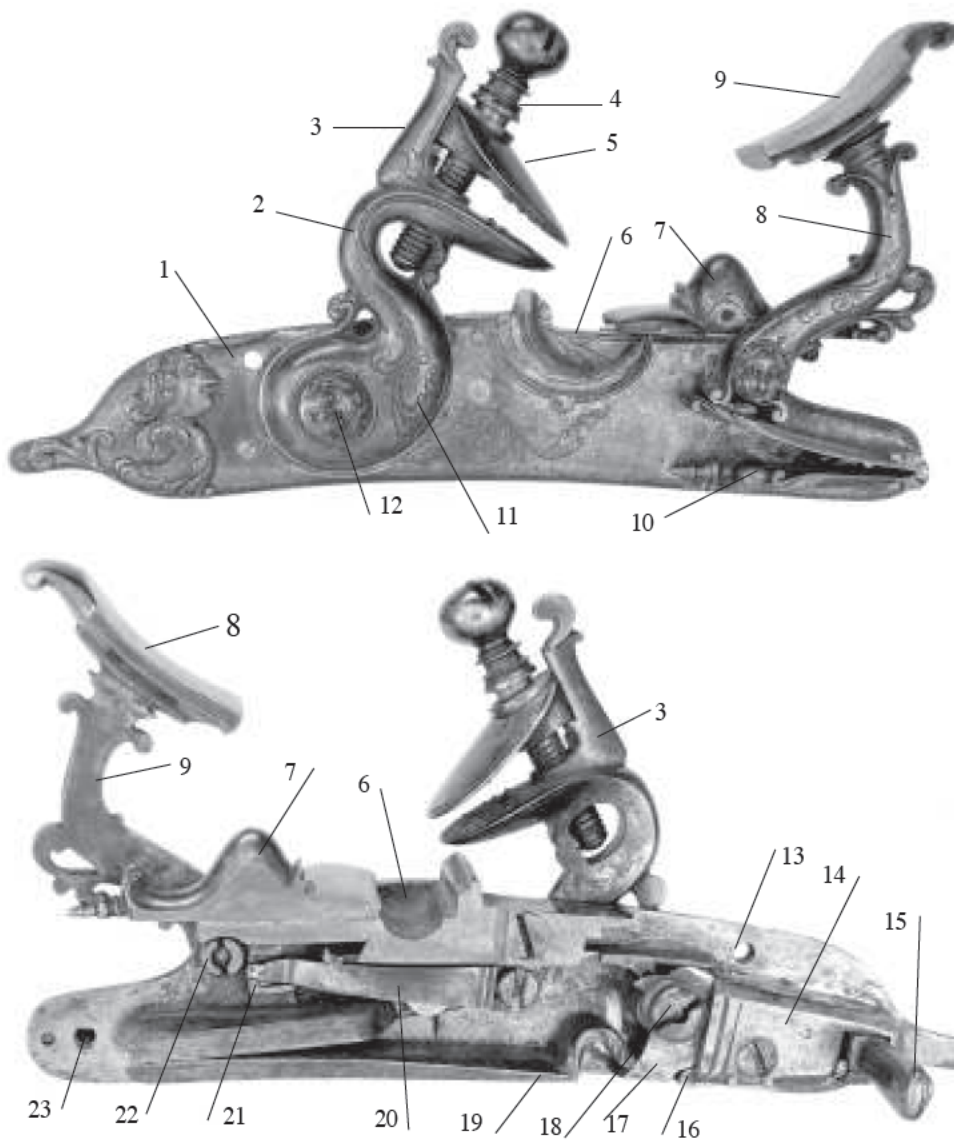
1.. Cock/lower jaw	10. Mainspring (pressure down)	18. Sear nose
2. Flint screw	11. Toe of the cock	19. Half cock bar
3. Top jaw	12. Half cock rest	20. Center stock screw
4. Lock plate	13. Cock bridle	21. Mainspring stud and pin
5. frizzen	14. Heel of the cock (sear under)	22. Front stock pin
6. Pan cover	15. Sear spring	23. Front stock screw
7. Pan bridle plate	16. Trigger bar	
8. Frizzen spring	17. Sear bar	
9. Mainspring		

Fig. A1.12. Spanish Miquelet (Patilla) Lock
by Juan Cano, Cadiz [M104]



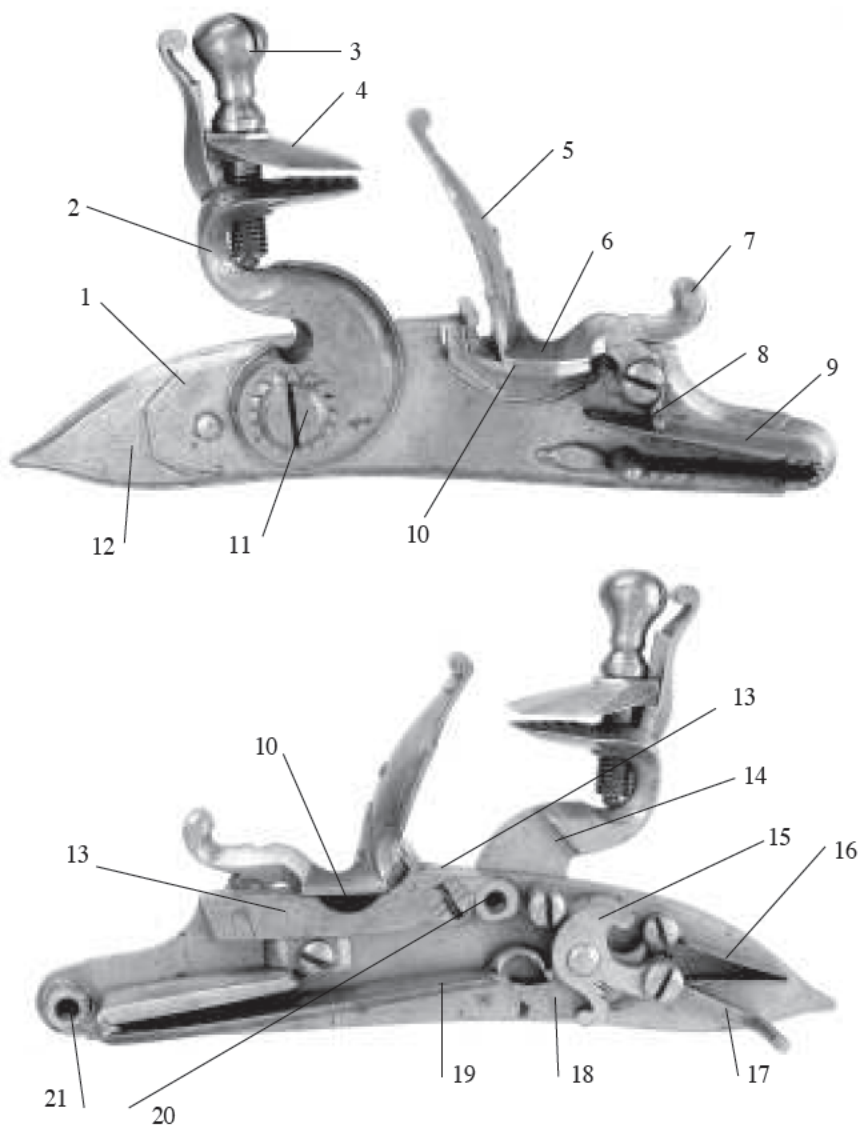
1. Cock and lower jaw	8. Pan	(pressure up)
2. Top jaw	9. Pan bridle	15. Rear stock screw
3. Flint screw	10. Frizzen spring	16. Trigger bar
4. Leg (of the cock)	11. Mainspring	17. Half cock block
5. Full cock stop	12. Half cock stop	18. Full cock stop
6. Lockplate	13. Cock bridle	19. Front stock screw
7. Frizzen	14. Mainspring	20. Mainspring stud and key

Fig. A1.13. Italian Snaphance — Brento [M077]



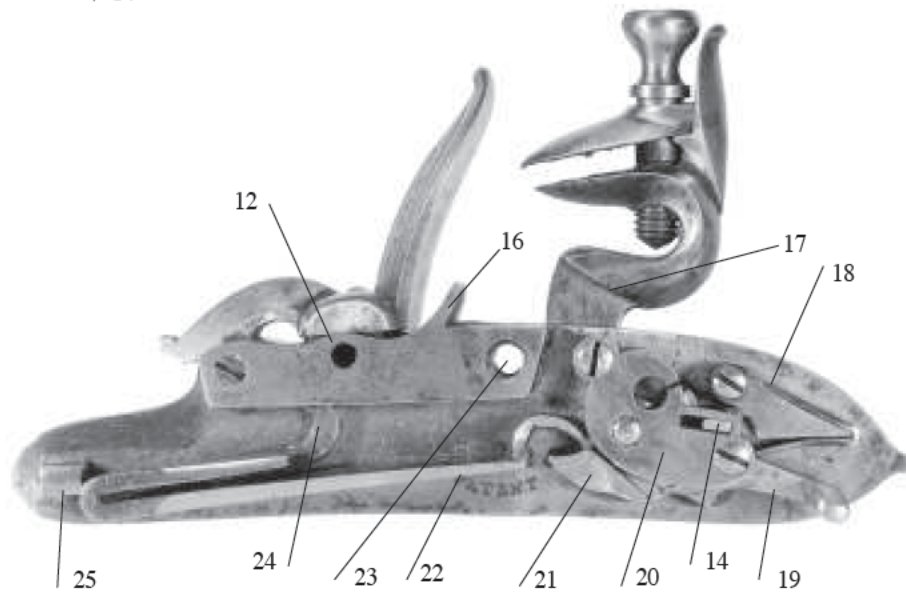
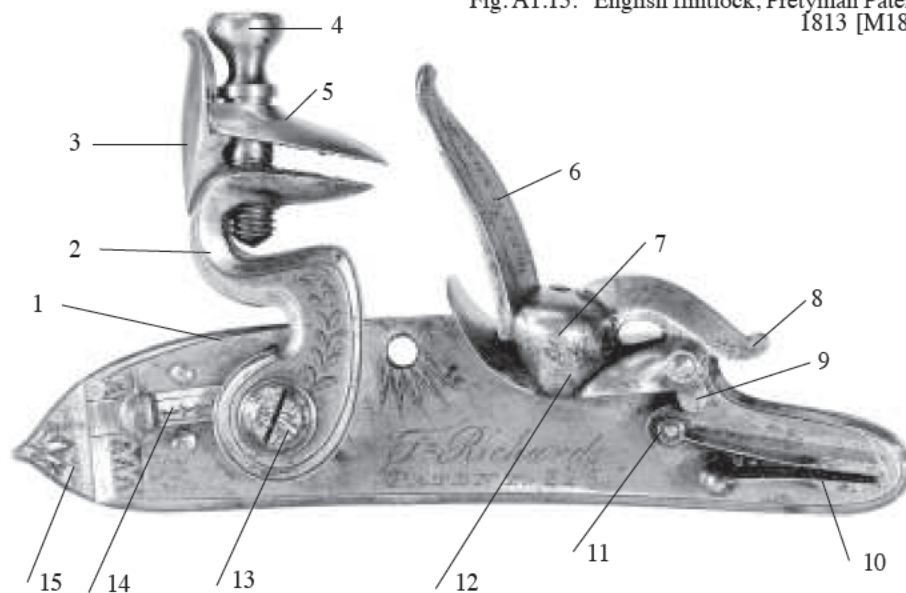
1.. Lock Plate.	9. Steel arm	17. Tumbler
2. Neck of the cock	10. Steel spring.	18. Tumbler nut
3. Comb of the cock	11. Body of the cock	19. Mainspring
4. Top jaw screw	12. Cock screw	20. Pan cover spring
5. Top jaw	13. Rear stock screw	21. Pan cover swivel
6. Pan	14. Sear cover box	22. Steel arm screw
7. Pan cover	15. Trigger bar	23. Front stock screw
8. Steel	16. Sear nose.	

Fig. A1.14. Continental Flintlock, [M222]



1. Lockplate	8. Heal of frizzen	15. Tumbler bridge
2. Cock	9. Frizzen spring	16. Sear spring
3. Top jaw screw	10. Pan	17. Trigger bar and sear
4. Top jaw	11. Cock screw	18. Tumbler
5. Frizzen	12. Stepped tail	19. Mainspring
6. Pan cover	13. Bolster	20. Center stock screw
7. Toe of frizzen	14. Cock shoulder	21. Front stock screw

Fig. A1.15. English flintlock, Pretzman Patent,
1813 [M188]



1. Lockplate	10. Feather spring	19. Trigger bar and sear
2. Cock	11. Feather spring roller	20. Tumbler bridge
3. Comb	12. Patented pan	21. Tumbler
4. Top jaw screw	13. Cock screw	22. Mainspring
5. Top jaw	14. Safety	23. Center stock screw
6. Frizzen	15. Stepped tail	24. Spring catch
7. Pan cover	16. Fence	25. Stock clip
8. Toe of frizzen	17. Cock shoulder	
9. Heal of frizzen	18. Sear spring	

Gunmaker, Guild, Proof Marks, etc. and the Marks of London Gunmakers to 1850



Fig. XXX. The provisional proof made when the barrels are simple tubes. When the tubes withstand proof they recoil straight into the bank; those that burst fly about in all directions. Illustration from *The Science of Gunnery* by William Greener, London, 1841.

Even before the introduction of gunpowder, armourers in the major centres identified their product with a mark indicating their guild or town of origin. In the gunmaking trade, proof marks were an indication that a barrel was safe to be loaded and fired and although there was a law that “all guns must be surveyed by persons appointed by the Master of Ordnance during the reign of Queen Elizabeth, it was not enforced.

Many of the marks which are often called “Proof Marks” may more correctly fall into one of six categories: guild marks, town

marks, government acceptance marks, control marks, gunmakers’ marks, or proof marks.

Guild Marks: Throughout history, craftsmen in a common trade banded together for business and social reasons. Guilds, or Associations were organized for mutual support and a guild mark was often created.

Town Marks: Municipal arms storehouses were maintained for when the need might arise, and arms acquired for that purpose were invariably marked with a form of the town crest or symbol

Government Ownership: As distinctive from municipal ownership, some national governments developed a system of marking which can be used for dating. See particularly the marks of Denmark which follow. These marks would normally be applied when the arms were accepted into the government stores.

Control Marks: As component parts went through the various manufacturing stages (mainly in government arsenals), they would be stamped with marks indicating the approval of the qualified inspector.

Proof Marks: The traditional proving of weapons arose out of the need for protection on the part of the user against unreliable weapons; it was the guarantee of a weapons quality which originated centuries before gunpowder was invented. It was also a means of protecting the gunmaker against competition from cheap imported arms. Although originally conceived by the gunmakers and their guilds to stop foreign competition, the system of proof in nearly every major arms-producing area was eventually taken over by the municipality or the state which imposed penalties on those who sold arms not bearing the prescribed marks.

Gunmakers' Marks: The creation of gunmakers' marks would have been the direct result of the establishment of a communal proof house which necessitated some method of identifying the unfinished barrels. The obvious solution was a mark for each individual barrel maker which would not be damaged in the testing. But makers' marks existed earlier than the establishment of the municipal proof house, suggesting at least some form of proofing in batches in a private house.

In London, the Gunmakers Company was created by Royal Charter in 1638 but had little authority until it was enrolled by the Lord Mayor and Aldermen but that did not take place until 5 June 1656. Only then could they take on all of the functions desired, including the establishment of a Proof House although they had been proving guns from shortly after date of the Charter, and enforcement of the regulations,

Initially, proof was a two-stage process. When the barrel had been welded, bored, and breeched, it was "Viewed." That is, it was proof fired to identify any bad barrels before work began at the next stage. The final, or "Proof" stage took place when all of the finishing work had been completed. The View mark consisting of a crown over V and the Proof mark, a crown over the initials GP of the Gunmakers Company Proof had been described in the Charter approved in 1638 a quarter century earlier.

Parliament approved new regulations from time to time and in 1813 an Act was passed to establish the a second Proof House to be administered by "The Guardians, Trustees and Wardens of the Gun Barrel Proof House of the Town of Birmingham."^{FN1} Construction began almost immediately and the corner stone for the proof house was laid on 6 October 1813.

The proof marks of the London Company remained unchanged and new Birmingham proof marks illustrated in the 1813 Act consisted of crossed sceptres under a crown, with the initials B and C (the legal name was abbreviated to 'the Birmingham Company') on the left and right, over P for "Proof" and V for "View." The next *Gun Barrel Proof Act 1855* introduced a "Provisional Proof for "a barrel liable in any subsequent Stage of Manufacture to be reduced in Strength before it forms Part of a Small Arm in a finished State." The printed version of the Act provided illustrations of the new marks and this was the beginning of artistic renderings on the printed page. The mark on the barrel continued to be small, and much less artistic.

The introduction of smokeless powder in the 1880s with much higher pressures than the traditional black powder necessitated new proof requirements for special needs which produced new marks. This was also about the time that governments took over the commercial proof houses and created legislation governing proof: Liege, ; etc.

Johan F. Støckel

Johan F. Støckel is a name familiar to almost all arms historians but his major work, published only in Danish, is not widely read. Captain Stockel began his study of the gun marks usually called proof and makers' marks found on early firearms, in 1906 when he was appointed curator of Denmark's National Collection of Historic Weapons (now known world-wide as the Tøhusmuseum),. In 1938, his first volume of *Haandskydevaabens Bedømmelse*, a listing in Danish of European and a few American arms makers whose marks could be identified, was published.

Volume II was not a continuation of Volume I, although the pagination and num-

bering of mark illustrations began numbering where Volume I ended. It was a separate and stand-alone study illustrating 5,245 marks, mainly barrel marks but including lock marks, based upon his records of some ten thousand marks, along with a critical evaluation of their identification and function. Although Capt. Støckel's work was published more than a half-century ago, it has stood the test of time very well with little contradiction and relatively few additions. There has never, before or since, been such a comprehensive analysis made of the subject.

References:

1. The most complete list of identified London marks is illustrated in Blackmore, H. L. *Gunmakers of London Supplement, 1350-1850*. Bloomfield: Museum Restoration Service, 1999, pp.121-126.
2. The marks of the major arms-making centers has been covered in a series of histories in *The Gun Digest* by A. Baron Engelhart and others between No. xxx (19xx) and No. xx (19xx).

CAPTION

Fig. XXX. The provisional proof made when the barrels are simple tubes. When the tubes withstand proof they recoil straight into the bank; those that burst fly about in all directions. Illustration from *The Science of Gunnery* by William Greener, London, 1841.

Between 1906 when he was appointed AS WHAT ... until 1938, Captain J. F. Stockel studied the marks usually called proof marks found on early firearms. The result was the publication in 1938 of Vol. 1 and in 1943 of Vol. 2 of *Haandskydevaabens Bedømmelse*^{FNtranslation}. Vol. I contained a record of countless arms makers with illustrations of 1,260 of their marks or signatures. Vol. 2 contained his evaluation of an additional , illustrates of 5245 towns, guilds, and gunmakers' marks and their variations. There has never, before or since, been such a comprehensive analysis made of the subject.

Johan F. Støckel is a name familiar to almost all arms historians but his work, published in Danish is not widely read. The first volume of his two-volume work published in 1938 included a life-long study of gun marking with 1260 marks illustrated and evaluated, with biographical information on thousands of European gunmakers. His second volume published in 1943 examined and recorded an additional 5245 marks, based upon his records of, perhaps, ten thousand marks, with a critical evaluation of their identification and function.²

The figures in round brackets following a description indicate the mark number in Støckel, 1942.

Stöckel described Guild, town and proof marks as either white, or black, in indication of whether the image (in the center of the mark) was raised (i.e. white) or impressed (i.e. black). It is unlikely that the difference had any significance but it is a useful tool to describe the difference.

1. Translation.

²In 1978-1982, a three volume publication titled *Der neue Stockel* containing an expanded record of arms markers by Eugene Heer, was published in German by Journal-Verlag Schwend. The text was expanded with new gunmaker names but many of the illustrated marks from Vol. 2 were not included.

References:

1. The most complete list of identified London gunmaker's marks is illustrated in Blackmore, H. L. *Gunmakers of London Supplement, 1350-1850*. Bloomfield: Museum Restoration Service, 1999, pp.121-126.
2. The marks of the major arms-making centers has been covered in a series of histories in *The Gun Digest* by A. Baron Engelhart and others between No. xxx (19xx) and No. xx (19xx).

CAPTION

Fig. **XXX**. The provisional proof made when the barrels are simple tubes. When the tubes withstand proof they recoil straight into the bank; those that burst fly about in all directions. Illustration from *The Science of Gunnery* by William Greener, London, 1841.

LONDON GUNMAKER'S BARREL MARKS

001	Bawdeson, Allen	047	Brazier, Robert	092	Fullerd, William
002	Assomes, Richard ?	048	Brooke, Robert	093	Guillon ?
003	Addis, Thomas ?	049	Buckmaster, Robert	093	Gunmakers' Co. ?
004	Annely, Thomas	050	Blanckley, Samuel ?	094	Gardner, Charles
005	Archer, Thomas	050	Bidet, S. ?	095	Goff, Daniel
006	Archer, Thomas ?	051	Bannister, Thomas 1	096	Griffin, Joseph
007	Austin, Thomas	052	Barnett, Thomas	097	Gregory, Nathan
008	Brooke, Benjamin	053	Brinnd, Thomas 1	098	Gandon, Peter 1
006	Baker, Ezekiel	054	Brueton, Thomas ?	099	Gandon, Peter 2
009	Bate, Edward	055	Bailes, William	100	Garrood, Robert
010	Bate, Edward	056	Bates, William 1	101	Giles, Richard
011	Bond, Edward	057	Benge, Walter	102	Gibson, Thomas
012	Burchett, Edward	058	Birkell, William	103	Green, Thomas 1
013	Burrows, Edward	059	Brander, William 2	104	Gregory, Thomas 1
014	Baker, George	060	Brazier, William	105	Gardner, William 1
015	Blake, George	061	Buckmaster, William	106	Guy, William
016	Blyth, Henry	062	Burton, William	107	Huff, Francis
017	Bowers, Henry	063	Coombs, Edward	108	Halfhide, George
018	Burrows, Henry	064	Cornforth, F.	109	Hall, John 3
019	Baker, John 2	065	Chersley, Henry	110	Hall, John 4
020	Barber, James 1	066	Cox, Henry	111	Harman, John
021	Barker, James	067	Crips, Henry	112	Harrison, John 2
022	Barnes, John 1	068	Clark, John 5	113	Hartwell, John 1
023	Bennett, John 2	069	Clarkson, Joseph	114	Hawkins, John 2
024	Bleiberg, Isaac	070	Cotterell, John	115	Heylin, Joseph
025	Brazier, James 2	071	Chalkley, Stephen	116	Henshaw, John
026	Brooke, John 1 ?	072	Cole, Thomas 1	117	Horton, John
027	Brush, John	073	Dolep, Andrew	118	Hosey, John
028	Buckmaster, Joseph	074	Dolep, George	119	Hirst, Nathaniel
029	Bumford, John 2	075	Drew, George 1	120	Harvey, Robert
030	Bundy, John 1	076	Delllany, Henry	121	Holder, Roger
031	Bunker, John	077	Dafte, John	122	Hadley, Thomas
032	Bunney, Joseph	078	Drew, John 3	123	Hardwell, Thomas
033	Bailey, James	079	Dunn, Jeffrey	124	Hawley, Thomas 1
034	Barber, Lewis 1	080	Dyer, Richard 1	125	Henshaw, Thomas
035	Byllyard, Lewis	081	Davis, Thomas 4	126	Hudson, Thomas 1
036	Brander, Martin ?	082	Denton, William	127	Hartwell, William
037	Byrne, Michael	083	Egg, Durs	128	Heasler, William
038	Bolton, Peter	084	Eales, John	129	Henshaw, William 3
039	Bond, Philip	085	Emerton, John	130	Hunt, William ?
040	Barnett, Robert 1	086	Fisher, George	131	Jones, George 2
041	Barnett, Robert 2	087	Fowell, John	132	Nock, Jover & Green
042	Barras, Ralph	088	Freeman, James Paul	133	Johnson, Hugo ?
043	Beaver, Robert	089	Ferguson, Patrick	134	Johnson, John
044	Bennett, Robert	090	Fell, Stephen	135	Jones, John 3
045	Berrow, Richard ?	091	Fell, William	136	Joyner, John 2
046	Bower, Richard				



				204	Rowland, Robert
				205	Rew, Adrian
				206	Russell, Charles
				207	Rea, John 2
				208	Richards, John 1
				209	Rimes, John
				210	Richards, Jos. & Wm
				211	Richardson, Michael
				212	Richards, Thomas
				213	Richards, Thomas ?
				214	Rood, Thomas
				215	Sale, Edward 2
				216	Smart, Francis
				217	Smithett, George 2
				218	Segalas, Israel 2
				219	Shaw, John 2
				220	Sherwood, Joseph
137	Jones, Richard 1	171	Memory, Michael	221	Shorey, Joseph
138	Jeffries, Thomas	172	Murden, Robert	222	Sibley, John 1
139	Jones, Thomas 3	173	Mead, Thomas 1	223	Sibley, John 2
140	Jover, William	174	Mortimer, Thos. E	224	Silk, John 4 ?
141	Kolbe, John	175	Mortimer, T. Jackson	225	Smart, John 2
142	Kipling, Charles	176	Nicholson, Edward 1	226	Spencer, James
143	Kirby, Henry 1	177	North, Edward 1	227	Stace, Joseph
144	Knight, Miles	178	Nock, Henry	228	Stanton, Jonathan
145	King, Richard	179	Needham, William	229	Sanderson, Lawrence
146	Kelly, William	180	Nutt, William	230	Sibthorpe, Robert
147	Ketland, William	181	Osmond, Daniel	231	Silk, Robert 1 ?
148	Leveridge, Benjamin 2	182	Oakes, Samuel 1 ?	231	Stedman, Robert ?
149	Lancaster, Charles	183	Pickfatt, Charles	232	Sinclare, Richard 1
150	Lloyd, Evan	184	Pickfatt, Charles	233	Sinclare, Richard 2
151	Lanphere, Richard	185	Place, David 2	234	Stringer, Ralph
152	Loder, Richard 1	186	Press, Edward 1	235	Sandwell, Stephen 1
153	Looker, Robert	187	Piddington, Ferdinand	236	Saunders, Thomas 1
154	Loy, Robert	?		237	Southwick, Thomas
155	Lugg, Rupert	188	Petty, Godfrey	238	Southwick, Thomas ?
156	Lugg, Rupert ?	189	Pickfatt, Humphrey	239	Staples, William ?
157	Love, Samuel ?	190	Peddell, James 1	240	Staples, Wiliam
158	Love, Samuel	191	Pindar, John	241	Tyer, Andrew
159	Lane, Thomas	192	Pollard, James	242	Turvey, Edward 1
160	Laverock, Thomas 1	193	Pope, John	243	Thurland, Edward
161	Monlong, Peter	194	Powell, John 3	244	Tailor, Godfrey
162	Maskall, Richard (2)	195	Pratt, Isaac	245	Trulock, George 1
163	Chaumette, Isaac dela	196	Price, John 1	246	Tarles, John 1
164	Moore, Charles 2	197	Probin, John	247	Tow, John
165	Moore, Daniel 2	198	Parkin, Thomas 1	248	Twigg, John Fox
166	Markby, George	199	Powell, Thomas 2	249	Trevey, Nathaniel
167	Mortimer, Harvey (1)	200	Palmer, William 1	250	Thomas, Samuel
168	Mortimer,Harvey (2)	201	Parkett, William 1	251	Towle, Thomas 1 ?
169	Marsh, John	202	Pin, Warner ?	252	Townson, William 1
170	Mayo, John 2	203	Predden, William	253	Trulock, William 1

254	Turvey, William 1
255	Turvey, William 2
256	Utting, John
257	Vandebaize, Philip 1
258	Venn, Ralph
259	Windus, Edward
260	Warner, John
261	Whitehead, H.
262	Wadland, Oliver ?
263	Ware, William
264	Wilkinson, James 1
265	Warren, Charles
266	Wynn, David
267	Wright, Edward
268	Wilkinson, Henry
269	Walker, John 1
270	Watson, John 1
271	White, John 3
272	Willows, John
273	Wallis, Marmaduke
274	Welford, Richard 1
275	Willson, Richard 1
276	Willllson, Robert 1
277	Wogdon, Robert
278	Wallis, Thomas
279	Williams, Thomas 2
280	Wallis, William
281	Watson, William 1
282	Yeomans, Edward
283	Yates, James
284	Bailes, William 1
285	Barker, Edward
286	Byanvas, Glode
287	Byllyard, William ?
288	Carter, Richard
289	Deverre, Pierre
290	Griffin, Benjamin
291	Gyssard, Nicholas ?
292	Hartwell, William ?
293	Layton, Thomas ?
294	Unknown
295	Norcott, John
296	Showen, Roger

Appendix III

Caliber, Gauge, and Bore

Powder, ball and shot

“Caliber,” “gauge,” and “bore,” are three words to identify the same thing—the diameter of the hole in the barrel which is known also as the bore. Caliber (spelled calibre in England), is usually reserved for rifle barrels; gauge is usually reserved in America for shotgun barrels, and bore was used in England for both although with the introduction of cartridges (both paper and metallic) in America, bore diameter is more frequently given in decimal parts of an inch.

From earliest times, the bore of a gun or rifle was measured by the number of round balls of pure lead made to fit the bore which could be made from one pound of lead. Prior to the mid 18th century the specific gravity of lead was considered to produce a round ball of 1.69 inch diameter. When scientists recalculated that figure a new base was introduced which undoubtedly took a number of years to become universal and would have had little effect on vocabulary: the diameter of a 12 bore gun would have changed from .738 inch to .729 inch, a difference of .009 ($\frac{9}{1000}$) inch. The comparative figures are set out in the tables which follow.

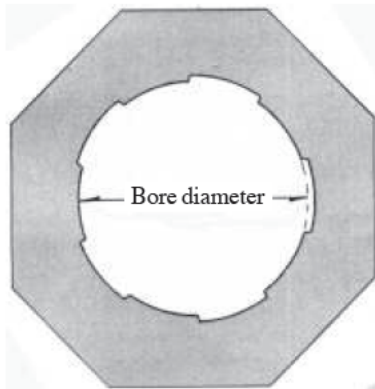
In the military, bore diameter was the first feature to be standardized for the obvious reason — interchangeable ammunition. In England, it was in 1752, the calibres which had been used for almost a century: Musket bore $\frac{76}{100}$ inch; Carbine bore $\frac{66}{100}$ inch; Wall guns, $\frac{89}{100}$ inch, became official.

The procedures to be followed at proofing in 1824 were recorded and there is no reason to believe the process was much different in 1724.

“The Barrels were viewed before proof to see that they appeared good in every respect and correct as to dimensions, in order that , should any be evidently defective, the time, and also the expence of the powder etc. expended in proving them might be saved—The examination they underwent was as follows: the breech pin was screwed out, and an iron plug, which was attached to the end of an iron rod and of the calibre of the musquet, forced down from one end of the bore to the other—the loops were gauged and together with the sight, tried with a hammer to see whether they were brased on properly—the bayonet socket gauge was put on the muzzle—if they appeared good, they were marked and sent to the proof house for proof—they were then proved and afterwards allowed to lie for forty eight hours, in which time any flaws in the metal would be visible—if found correct in every particular, they had the proof mark affixed to them, and also the viewers mark—The next inspection of barrel was by the finished viewer; to whom they were brought by themselves in a burnished state; but, if the barrel was to be browned it was only in a smooth’d state—if the barrel was found perfect in every respect it was marked by the finished viewer on the breech pin.¹

The measurements provided on the charts which follow are provided for both the Imperial system used in England and the Metric system used in much of Europe. It must be remembered though that, the metric system was introduced first in France in the 1790s and did not receive official recognition until a international treaty signed by 17 states in 1875.

From the 16th century, the period of interest to this study, many of the major



A724 No 9 Fig. XVII.1 The bore of a rifled arm is determined by the measurement in thousandths of an inch or millimeters, measured from the top of the lands to the same level opposite.

industrial states and centers in Europe had their own local systems of weights and measure. They are unlikely to be of concern to readers of this *Aide Mémoire* but many of them will be found in a series of papers compiled and edited by Mr. Rudi Roth, beginning in the *Ordnance Society Newsletter* No. 37 (January 1997) where he converts the local names and figures, into metric.

Rifling, the spiral grooves cut into the bore of a gun to provide rotation to the bullet in its flight, was probably introduced in the last years of the 15th century or the first decades of the 16th century. It is not know where it first appeared but most surviving examples are of German origin and this would be a logical assumption.

The vocabulary that applies to rifling is not extensive. The word for the grooves is too obvious to be mentioned and the raised portion, between the grooves, are known as the lands. The shape and number of the grooves will be found in many forms dictated by the whim of the gunmaker.

The word 'calibre,' or "caliber" is usually reserved to describe the size of the bore in America but in England, and much of Europe, the caliber retained the same 'bore' designation used for the fowling piece. A 12 bore gun and a 12 bore rifle or carbine would have the same size solid ball, if that were the shooter's choice of projectile.

Notes

1. H.L. Blackmore. *British Military Firearms*, p. 269.

Lederer, Paul S. "Two Rifled English Flintlock Pocket Pistols" *Arms Collecting*, Vol. 39, No. 1, pp. 20-21.

Bore Dimensions — c.1740

Bore	inch	mm	Bore	inch	mm
1	1.690	42.9	16	0.670	17.0
2	1.341	34.0	17	0.657	16.6
3	1.171	29.7	18	0.644	16.3
4	1.065	27.0	19	0.633	16.0
5	0.988	25.0	20	0.622	15.7
6	0.930	23.6	21	0.612	15.5
7	0.883	22.4	22	0.602	15.2
8	0.845	21.4	23	0.594	15.0
9	0.812	20.6	24	0.586	14.8
10	0.784	19.9	25	0.574	14.5
11	0.759	19.2	26	0.569	14.4
12	0.738	18.7	27	0.563	14.3
13	0.714	18.1	28	0.556	14.1
14	0.701	17.8	29	0.550	13.9
15	0.685	17.3	30	0.544	13.8

An 18th century table copied from an unidentified artillery student's notebook produced about 1740.

"This Table is Computed upon the supposition that the diameter of one pound is 1.69 inches; and the diameter of any other bullet is found by dividing the diameter of 1.69 by the cube root of the number of bullets in the pound: for instance the diameter of a bullet whereof there are three in the pound is found by dividing 11.69 by the cube root 1.443 of (3) which give 1.72 for that diameter and in the same manner of any other diameter is found." British Museum Library (King MS 261).

A recalculation of the diameter of a one pound ball to 1.671 inch diameter in the mid 18th century made change necessary. British Museum Library (King MS 261).

Gauge: Bore Size

Post mid 18th century from H.B.C. Pollard's *The Book of the Gun and Pistol*, London, 1917. The recalculation of the diameter of a one pound lead ball which took place in the mid 18th century necessitated a slight change in the standard bore diameters.

G.	inch	mm	G.	inch	mm	G.	inch	mm
12	0.729	18.50	25	0.571	14.50	38	0.497	12.60
13	0.710	18.00	26	0.563	14.30	39	0.492	12.40
14	0.693	17.60	27	0.556	14.10	40	0.488	12.30
15	0.677	17.10	28	0.550	13.90	41	0.484	12.20
16	0.662	16.80	29	0.543	13.40	42	0.480	12.10
17	0.649	16.40	30	0.537	13.60	43	0.476	12.09
18	0.637	16.10	31	0.531	13.40	44	0.473	12.07
19	0.626	15.90	32	0.526	13.30	45	0.469	11.90
20	0.615	15.60	33	0.520	13.20	46	0.466	11.83
21	0.605	15.30	34	0.515	13.00	47	0.463	11.76
22	0.596	15.10	35	0.510	12.90	48	0.459	11.65
23	0.587	14.90	36	0.506	12.80	49	0.456	11.58
24	0.579	14.70	37	0.501	12.70	50	0.453	11.50

Bullets to fit these bores should be .02 inch less in diameter.

Small Bore

Bore	Diameter		Bullet	Bore	Diameter.		Bullet
	inch	m.m	dia.		inch	m.m	dia.
51.05	.450	11.43	.430	91.83	.370	9.39	.350
54.61	.440	11.17	.420	99.70	.360	9.14	.340
58.50	.430	10.92	.410	108.49	.350	8.89	.330
62.78	.420	10.66	.400	118.35	.340	8.63	.320
67.49	.410	10.41	.390	129.43	.330	8.38	.310
72.68	.400	10.16	.380	141.95	.320	8.12	.300
78.41	.390	9.90	.370	156.14	.310	7.87	.290
84.77	.380	9.65	.360	172.28	.300	7.62	.280

From H.B.C. Pollard's *The Book of the Gun and Pistol*, London, 1917.

Conversion Figures — Imperial to Metric

The measurements on the tables which follow are provided for both the Imperial system used in England and the Metric system used in much of Europe. It must be remembered though that, the metric system was introduced first in France in the 1790s and did not receive universal recognition until an international treaty was signed by 17 States in 1875.

From the 16th century, the early period of interest to this study, many of the major industrial states and centers in Europe had their own local systems of weights and measure. They are unlikely to be of concern to readers of this *Aide Mémoire* but many of them will be found in a series of papers compiled and edited by Mr. Rudi Roth, beginning in the *Ordnance Society Newsletter* No. 37 (January 1997) where he converts local names and figures, into metric.

Fractional Millimeters	21	53.34	58	147.32
Inches (") 10mm = 1cm	22	55.88	59	149.86
1/16 (.0625") 1.6 (0.16cm)	23	58.42	60 (5 ft.)	152.40
1/8 (.125") 3.2 (0.32cm)	24 (2 ft.)	90.96	61	154.94
3/16 (.1875") 4.8 (0.48cm)	25	63.50	62	157.48
1/4 (.25") 6.4 (0.64cm)			63	160.02
5/16 (.3125") ... 7.9 (0.79cm)	26	66.04	64	162.56
3/8 (.375") 9.5 (0.95cm)	27	68.58	65	165.10
7/16 (.4375") .. 11.1 (1.11cm)	28	71.12	66 (5½ ft.)	167.64
1/2 (.5") 12.7 (1.27cm)	29	73.66	67	170.18
9/16 (.5625") .. 14.3 (1.43cm)	30 (2 ½ ft.)	76.20	68	172.72
5/8 (.625") 15.9 (1.59cm)	31	78.74	69	175.26
11/16 (.6875") 17.5 (1.75cm)	32	81.28	70	177.80
3/4 (.75") 19.1 (1.91cm)	33	83.82	71	180.34
13/16 (.8125") 20.6 (2.06cm)	34	86.36	72 (2 yd.)	182.88
7/8 (.875") 22.1 (2.21cm)	35	88.90	73	185.42
15/16 (.9375") 23.8 (2.38cm)	36 (1 yd.)	91.44	74	187.96
	37	93.98	75	190.50
Inches Centimeters	38	96.52	76	193.04
1	39	99.06	77	195.58
2	40	101.60	78 (6½ ft.)	198.12
3	41	104.14	79	200.66
4	42 (3½ ft.)	106.68	80	203.20
5	43	109.22	81	205.74
6	44	111.76	82	208.28
7	45	114.30	83	210.82
8	46	116.84	84 (7 ft.)	213.36
9	47	119.38	85	215.90
10	48 (4 ft.)	121.92	86	218.44
11	49	124.46	87	220.98
12 (1 ft.)	50	127.00	88	223.52
13	51	129.54	89	226.06
14	52	132.08	90 (7½ ft.)	228.60
15	53	134.62	91	231.14
16	54 (4½ ft.)	137.16	92	233.68
17	55	139.70	93	236.22
18 (1½ ft.)	56	142.24	94	238.76
19	57	144.78	95	241.30
20				
Inches Centimeters	Inches Centimeters			

Inches	Centimeters		
96 (8 ft.)	243.84	109	276.86
97	246.38	110	279.40
98	248.92	111	281.94
99	251.46	112	284.48
100	254.00	113	287.02
101	256.54	114 (9½ ft.)	289.56
102 (8½ ft.)	259.08	115	292.10
103	261.62	116	294.64
104	264.16	117	297.18
105	266.70	118	299.72
106	269.24	119	302.26
107	271.78	120 (10 ft.)	304.80
108 (3 yd.)	274.32		

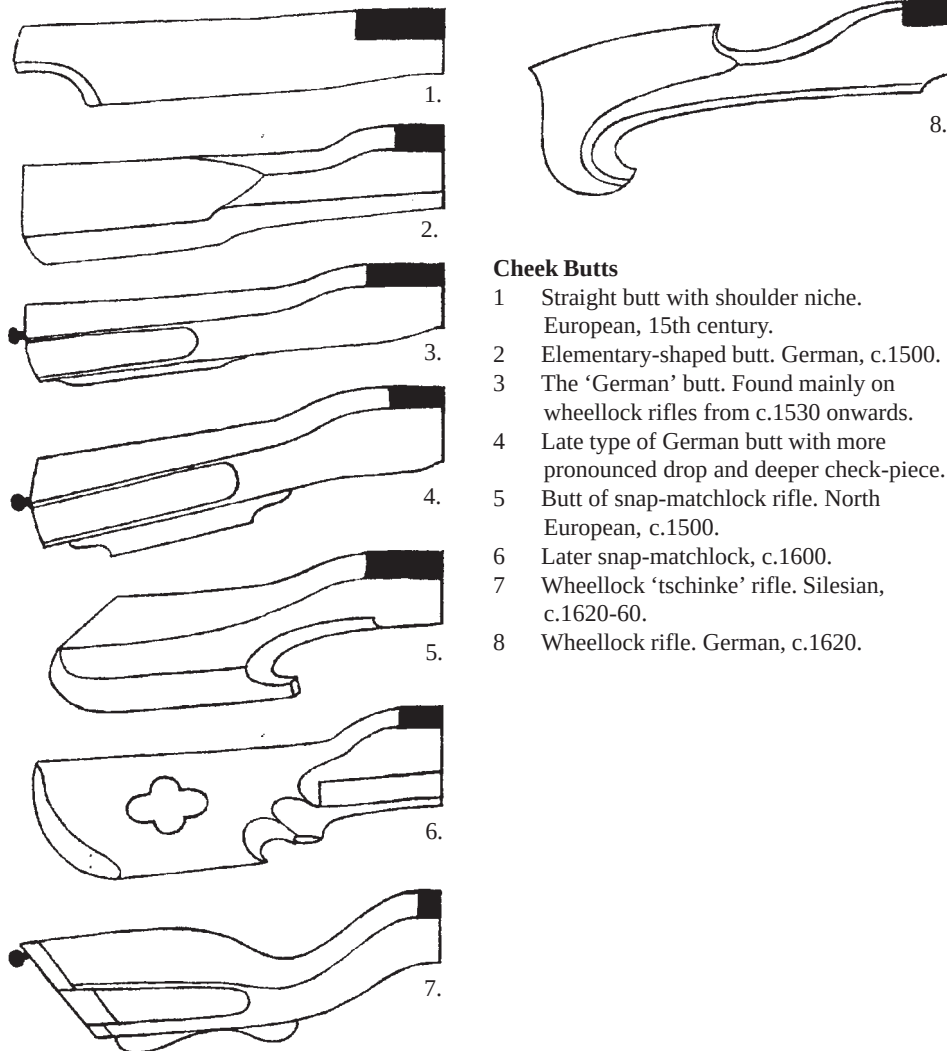
A692-3 An English, iron bore gauge. forged by an unknown smith with the initials 'RS.' It has the fractions in Imperial on one side and Bore sizes on the other.



Appendix IV Gun Butt Design

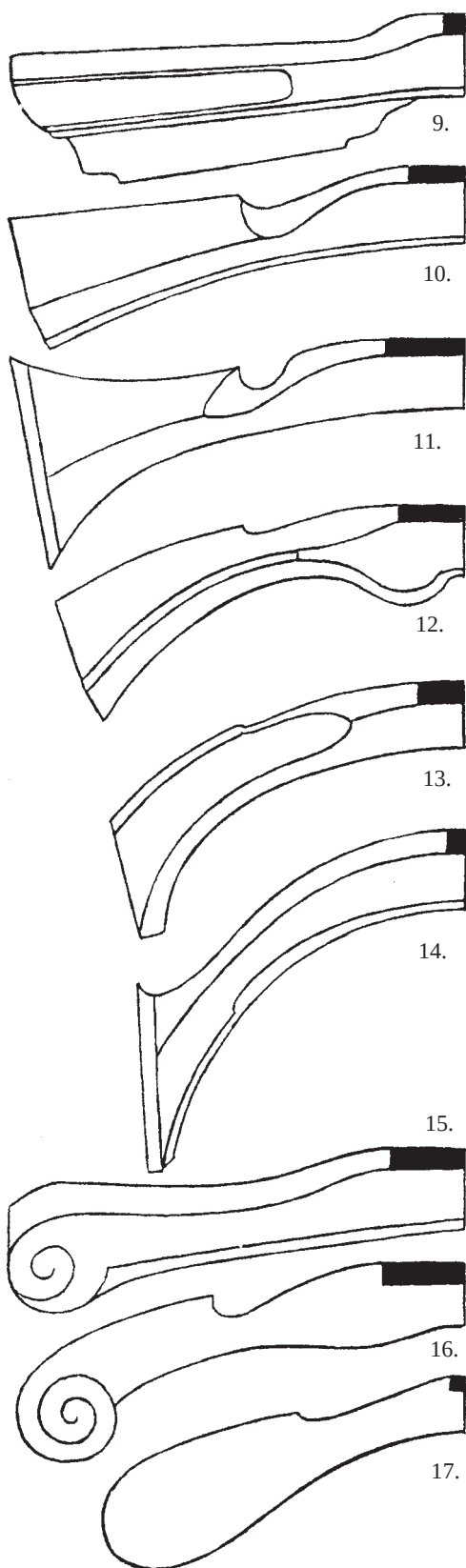
from *Guns and Rifles of the World*
by Howard L. Blackmore

The outline shape of a gun butt is by no means diagnostic. The earliest was a simple, round wooden “tiller” pushed into a hole forged, or cast, into the breech of the barrel. The triangular musket butt of the first half of the seventeenth century, for instance, was in use throughout Europe. Other shapes, e.g. the Cingalese butt, while firmly indicative of the country of origin, cannot be used as an accurate measure of the date of manufacture. Nevertheless the following outlines form a quick guide to identification and also illustrate the amazing way in which soldiers and sportsmen through the years have found it necessary to shape the stocks of their firearms.



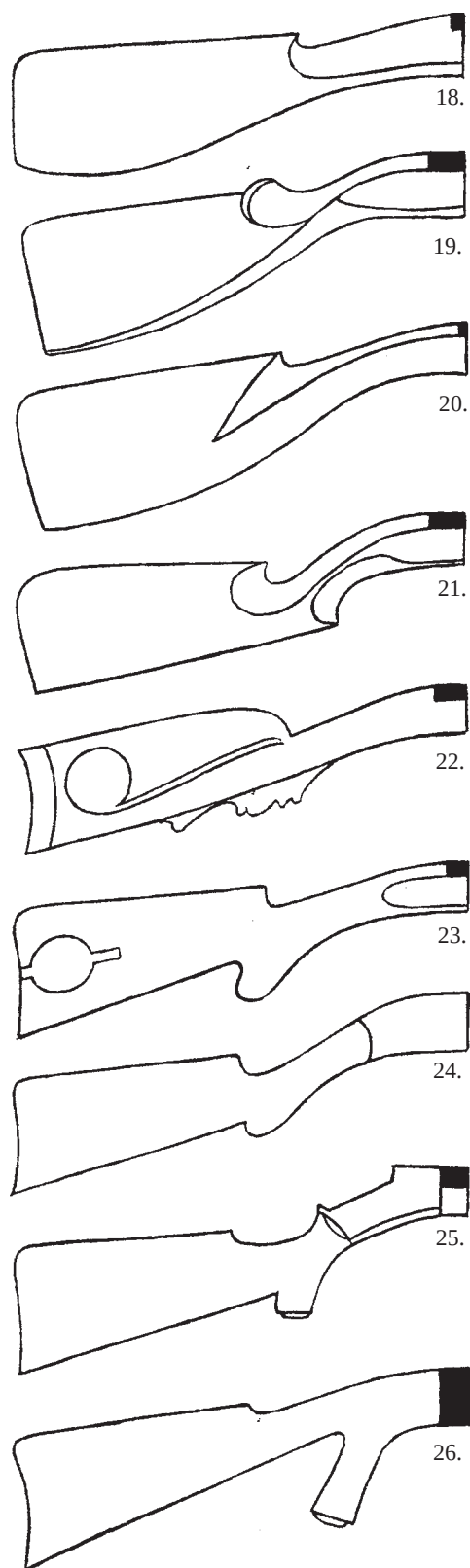
Cheek Butts

- 1 Straight butt with shoulder niche.
European, 15th century.
- 2 Elementary-shaped butt. German, c.1500.
- 3 The 'German' butt. Found mainly on
wheellock rifles from c.1530 onwards.
- 4 Late type of German butt with more
pronounced drop and deeper check-piece.
- 5 Butt of snap-matchlock rifle. North
European, c.1500.
- 6 Later snap-matchlock, c.1600.
- 7 Wheellock 'tschinke' rifle. Silesian,
c.1620-60.
- 8 Wheellock rifle. German, c.1620.



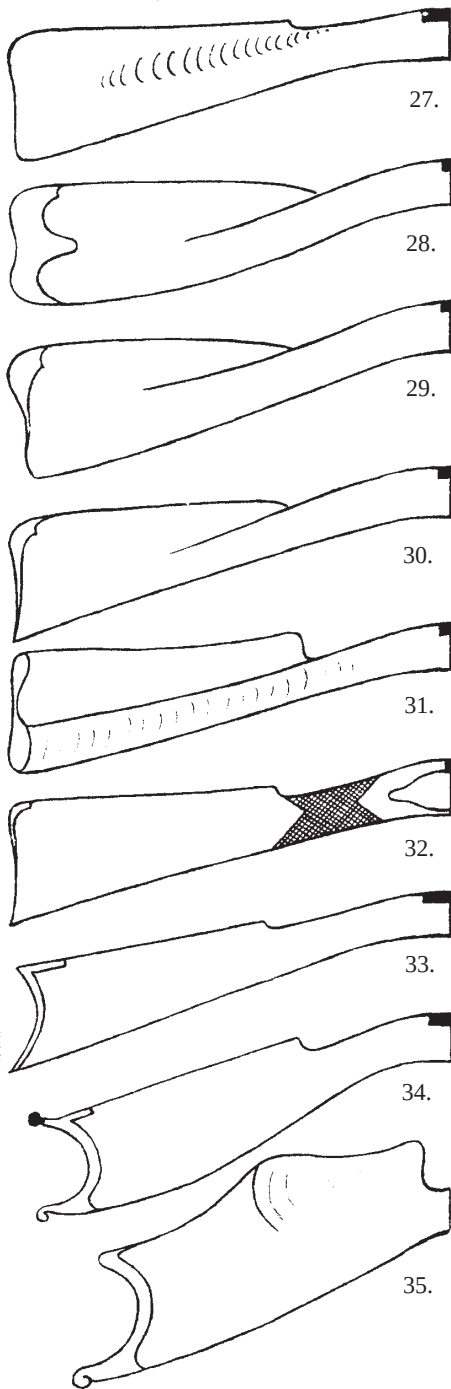
Shoulder and Chest Butts

- 9 German-type butt lengthened to reach shoulder. Russian, 17th century.
- 10 Transitional butt. European, c.1600.
- 11 Triangular musket butt. European, 17th century.
- 12 Petronel. French, c.1590.
- 13 Petronel. Swiss, c.1590.
- 14 Petronel. English, dated 1584.
- 15 Semi-rounded butt. German, c.1540.
- 16 Rounded butt. German, c.1600.
- 17 Paddle-shaped carbine butt. North European, c.1620-60.



Development of the Pistol Grip Butt

- 18 French, c.1640.
- 19 English, c.1650.
- 20 Swiss, c.1650.
- 21 French, c.1675.
- 22 French, c.1800.
- 23 German, c.1850.
- 24 American, c.1880.
- 25 American, c.1880.
- 26 French, c.1850..

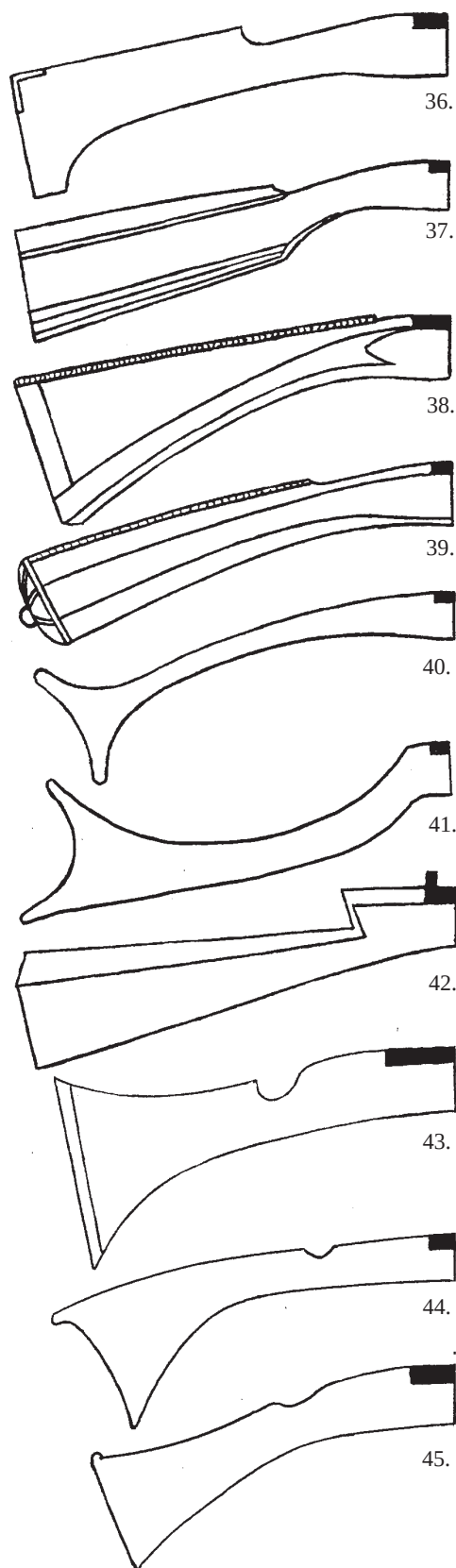


Development of Straight European Butt

- 27 Rounded wrist extending down lower edge of butt. Flat butt-plate, c.1680.
- 28 Pronounced wrist, rounded butt-plate, c.1700.
- 29 Large bulbous 'heel' on butt-plate, c.1690.
- 30 Less pronounced heel, toe of butt is pointed. Still with extended tubular wrist, c.1740-90.
- 31 Tubular wrist extending butt-plate. High comb. Found mainly on French and German muskets, c.1740-80.
- 32 Straight line from pointed toe of butt-plate to lock, c.1780 onwards.

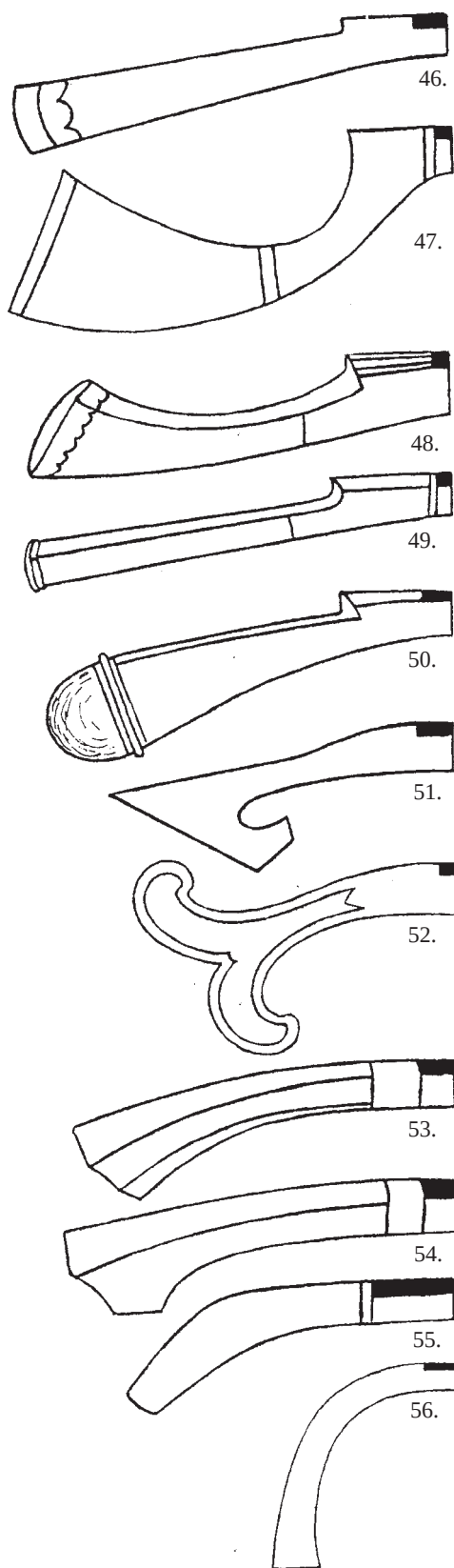
American and Schuetzen Butts

- 33 Heavy, curved butt-plate. Straight narrow butt, flat sides. American, c.1780 onwards.
- 34 Schuetzen butt. Semi-circular butt-plate. Increased drop from line of barrel to allow for standing firing position. American, c.1850 onwards.
- 35 Schuetzen butt of advanced design, with raised cheek rest. German, c.1870.



Mediterranean Butts

- 36 Spanish (Catalan), 18th-19th century.
- 37 Spanish (Madrid), 18th -19th century..
- 38 Sardinian, 17th -18th century.
- 39 Italian, 17th century.
- 40 Albanian, Tanchika, 18th -19th century.
- 41 Albanian, Rasac, 18th-19th century.
- 42 Ottoman pentagonal, 18th-19th century.
- 43 North African, Fish-tail, 18th-19th century; Moroccan c.17th-19th century.
- 44 Moroccan, Altit, 18th-19th century.
Usually with bone or ivory butt.
- 45 Moroccan, Taouzilt 18th-19th century



Oriental Butts

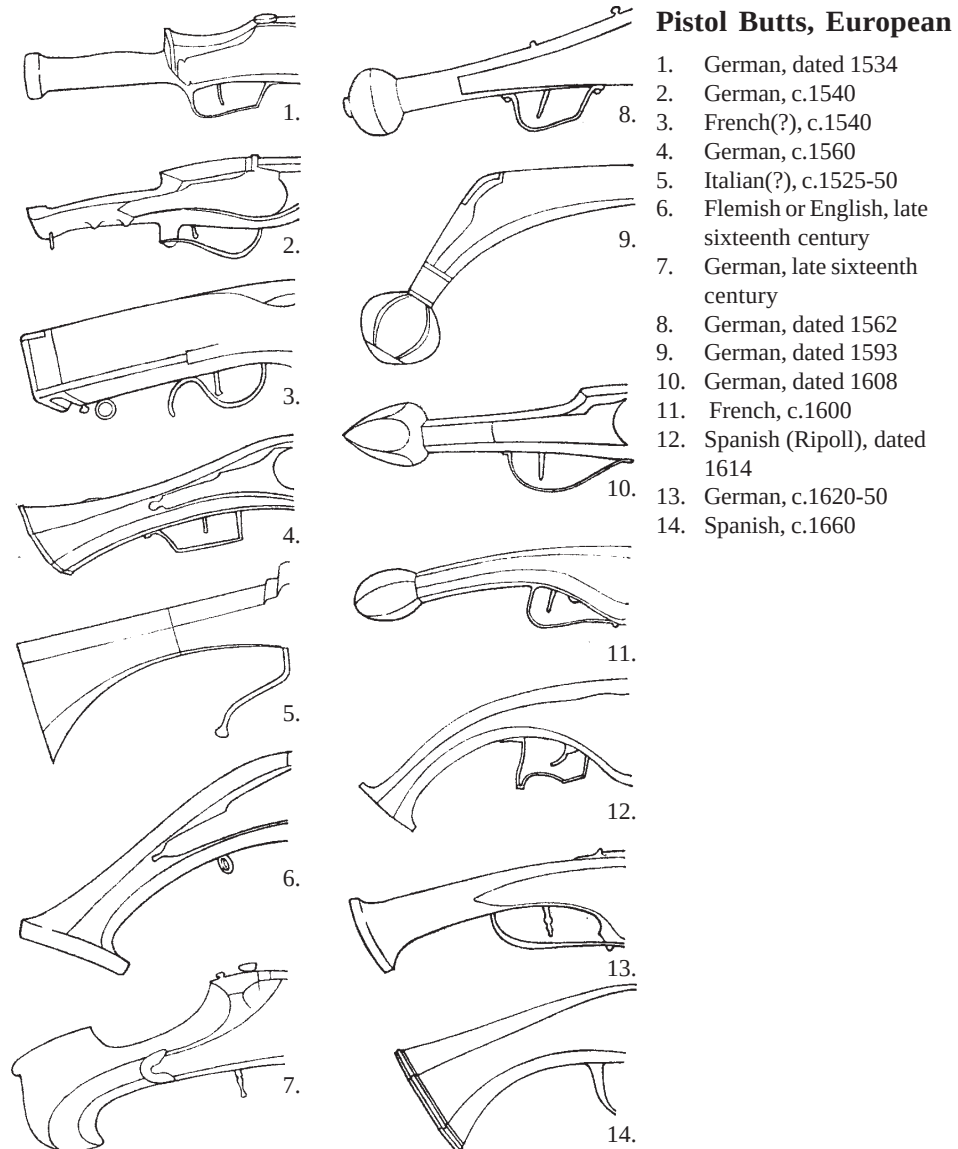
- 46 Circassian, Indo-Persian, 18th-19th century.
- 47 Afghan, 18-19th century.
- 48 Indian, 18th-19th century.
- 49 Indian (Deccan), 18th-19th century.
- 50 South Indian (Coorg), 18th-19th century.
- 51 South Indian (Coorg), 18th-19th century.
- 52 Cingalese, 17th-18th century.
- 53 Indonesian, 18th century.
- 54 Japanese, 18th-19th century.
- 55 Chinese, 18th-19th century.
- 56 Formosan, 18th-19th century.

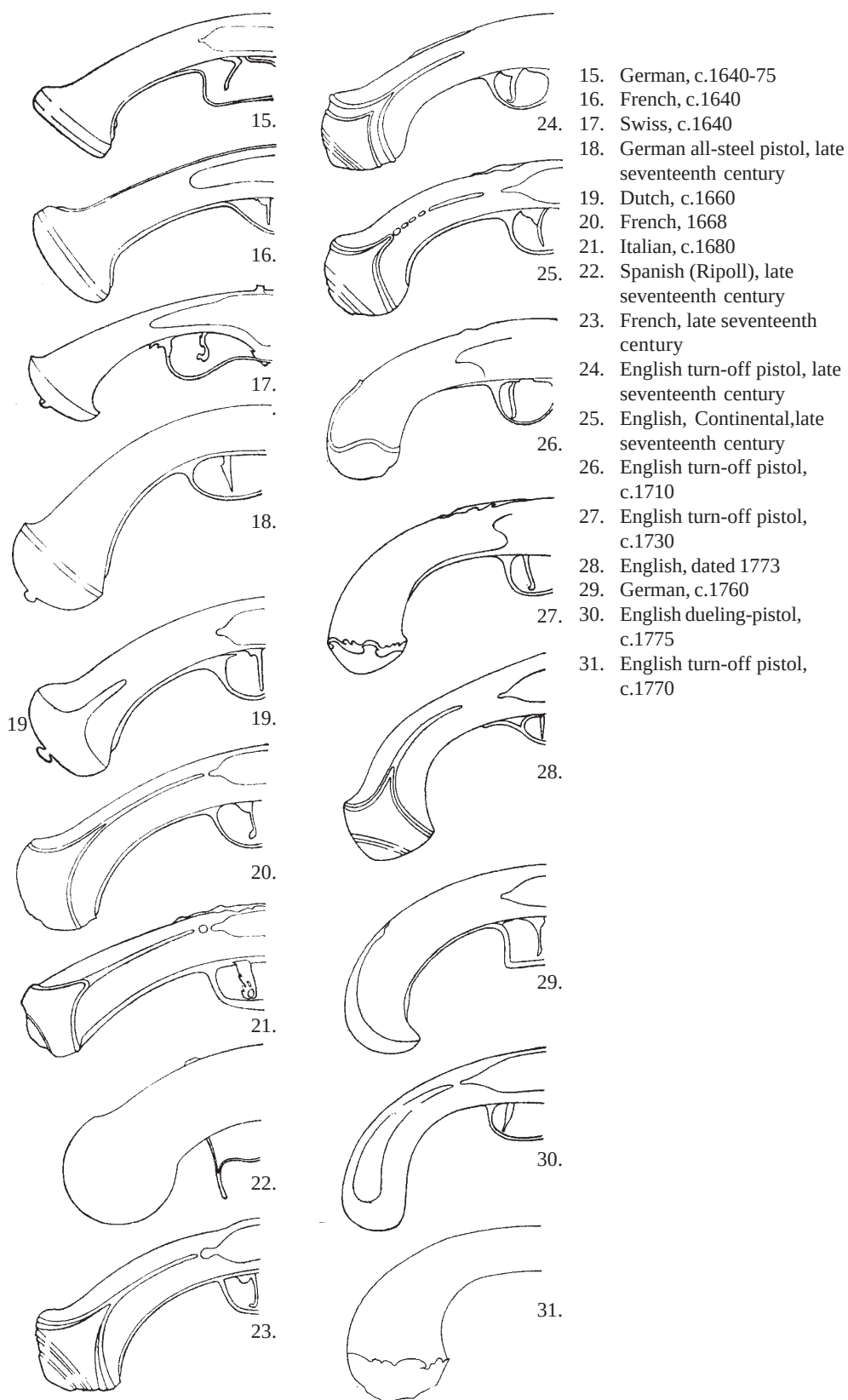
Appendix V

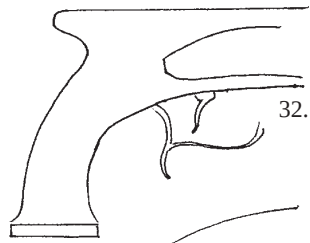
Pistol Butt Design

from *Pistols of the World*
by Claude Blair

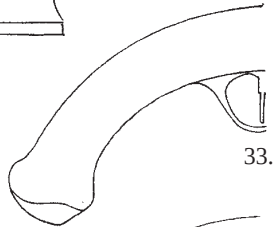
As pointed out by Mr. H.L. Blackmore in his *Guns and Rifles of the World*, the outline shape of the gun butt is by no means diagnostic: the same qualification applies to the pistol butt. The following outlines provide a quick guide to identification and also illustrate more clearly than do the half-tone plates the forms taken by this part of the weapon over the years in different localities.



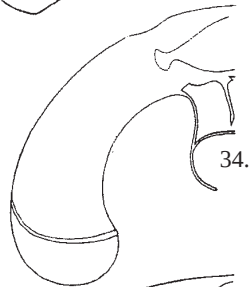




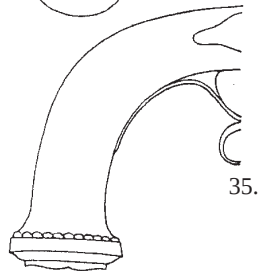
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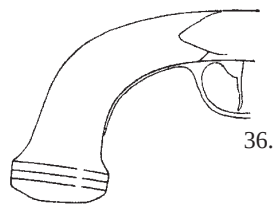
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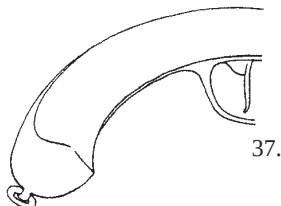
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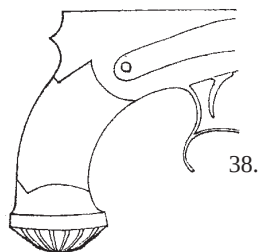
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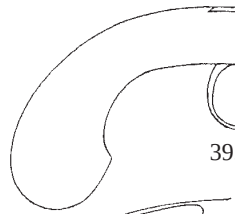
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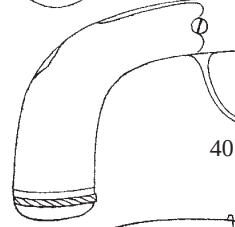
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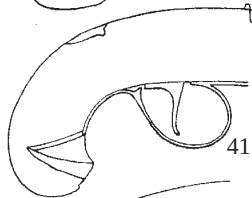
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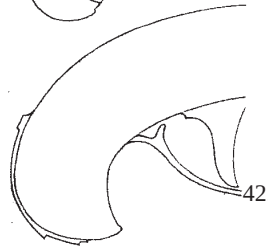
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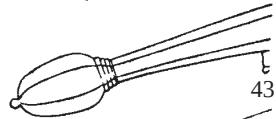
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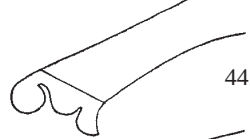
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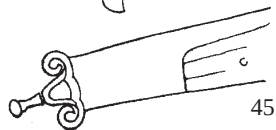
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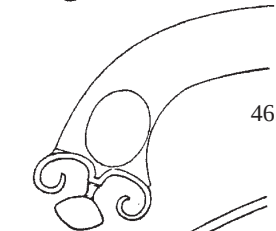
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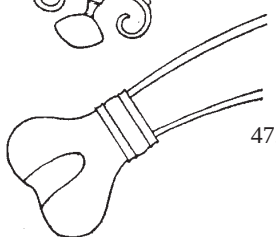
44.



45.



46.



47.

32. English Saw handle, c.1800-1840

33. English dueling-pistol, early nineteenth century

34. American dueling-pistol, c.1815

35. French dueling-pistol, c.1815

36. French, 1816

37. French, 1816

38. English dueling-pistol, c.1840

39. English pocket-pistol, c.1840

40. English pocket-pistol, c.1830-40

41. American derringer, c.1840

42. American derringer, c.1855

Scottish

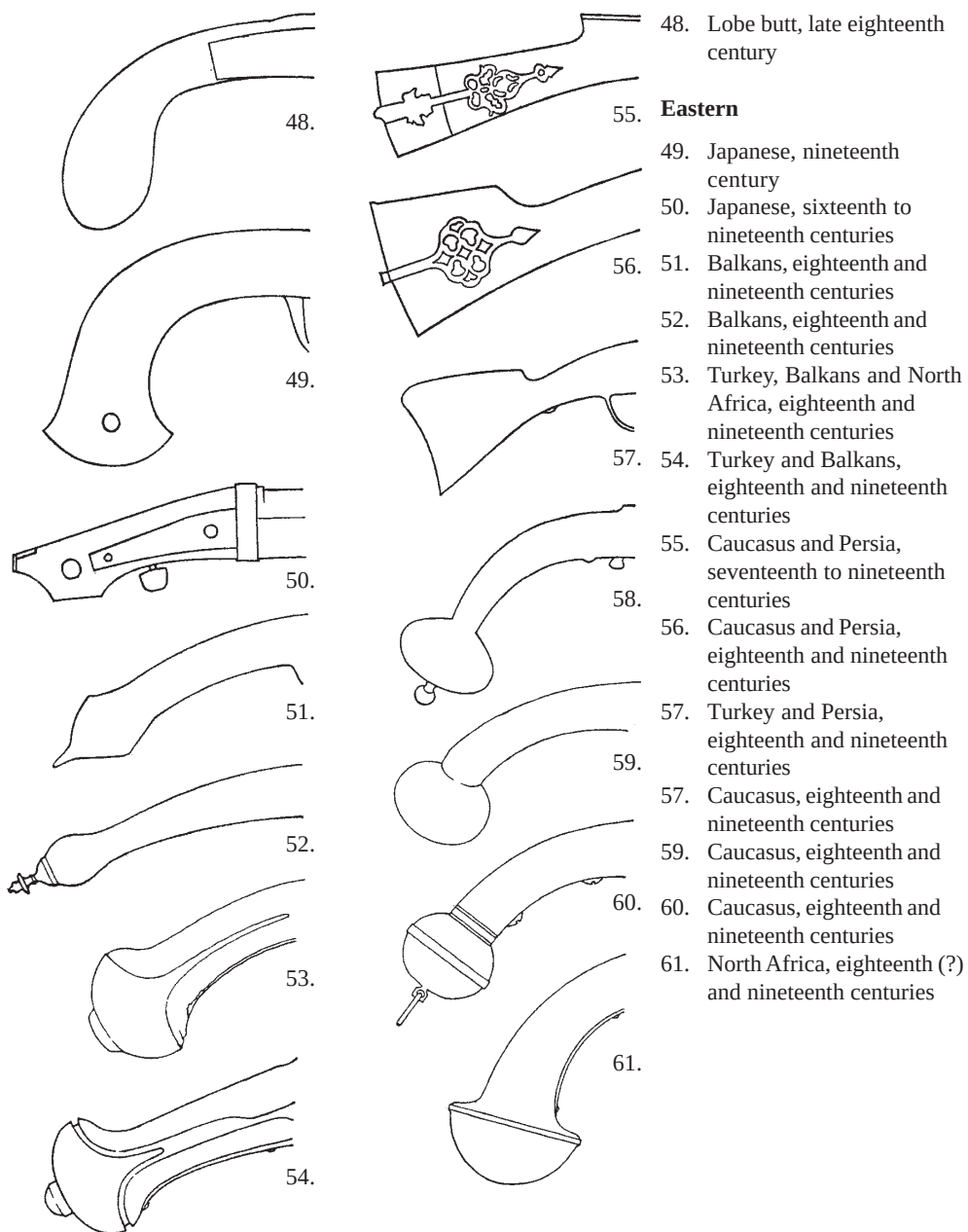
43. Lemon butt, early seventeenth century

44. Fishtail butt, early seventeenth century

45. Early ramshorn or scroll butt, late seventeenth century

46. Developed ramshorn or scroll butt, eighteenth and nineteenth centuries

47. Heart butt, late seventeenth and early eighteenth century



GERMANY*Electors of Brandenburg*

Joachim I	1499-1535
Joachim II	1535-1571
Johann Georg	1571-1598
Joachim Friedrich	1598-1608
Johann Sigismund	1608-1620
Georg Wilhelm	1620-1640
Friedrich Wilhelm	1640-1688
Friedrich III	1688-1701

King of Prussia, House of Hohenzollern

Friedrich I	1701-1713
Friedrich Wilhelm I	1713-1740
Friedrich II (the Great)	1740-1786
Friedrich Wilhelm II	1786-1797
Friedrich Wilhelm III	1797-1840
Friedrich Wilhelm IV	1840-1861
Wilhelm I	1861-1871

Kaiser—German Empire

Wilhelm I	1871-1888
Friedrich (III of Prussia)	1888
Wilhelm II	1888-1918

HOLY ROMAN EMPIRE

Maximilian I	1493-1519
Charles V (I of Spain)	1519-1558
Ferdinand I	1558-1564
Maximilian II	1564-1576
Rudolf II	1576-1612
Matthias	1612-1619
Ferdinand II (of Styria)	1619-1637
Ferdinand III	1637-1658
Leopold I	1658-1705
Joseph I	1705-1711
Charles VI	1711-1740
Charles VII (of Bavaria)	1742-1745
Francis I (III of Lorraine)	1745-1765
Joseph II	1765-1790
Leopold II	1790-1792
Francis II (I of Austria)	1792-1806

ITALY*Duke of Savoy*

Filiberto I	1497-1504
Carlo III	1504-1553
Emanuel-Filiberto	1553-1580
Carlo-Emanuele I	1580-1630
Vittorio-Amedeo I	1630-1637
Francesco-Giacinto	1637-1638
Carlo-Emanuele II	1638-1675
Vittorio Amedeo II	1675-1720

Duke of Savoy & King of Sardinia

Vittorio-Amedeo II	1720-1730
Carlo-Emanuele III	1730-1773
Vittorio-Amedeo III	1773-1796

Carlo-Emanuele IV	1796-1802
Vittorio-Emanuele I	1802-1821
Carlo-Felice	1821-1831
Carlo-Alberto	1831-1849
Vittorio-Emanuele II	1849-1861
<i>Monarch, Kingdom of Italy</i>	
Vittorio-Emanuel II	1861-1878
Umberto I	1878-1900

MOROCCO*Sultan*

Muhammad I ash-Sharif	1631-1635
Muhammad II	1635-1664
ur-Rashid	1664-1672
Ishma il as-Samin	1672-1727
Ahmad Adh-Dhahabi	1727-1729
Abdullah	1729-1735
Ali ibn Isma il	1735-1737
Abdullah	1737-1738
al-Musta'il ibn Isma il	1738-1740
Abdullah	1740-1745
Zain-ul-Abidin	1745
Abdullah	1745-1757
Muhammad III	1757-1790
Yazid	1790-1792
Hisham	1792-1793
Sulayman	1793-1822
Abdul-Rahman	1822-1859
Muhammad IV	1859-1873
Hasan I	1873-1894
Abdul-Aziz	1894-1907

NETHERLANDS

William I	1813-1840
William II	1840-1849
William III	1849-1890
Wilhelmina	1890-1948

NORWAY

<i>As Denmark</i>	1500-1814
<i>As Sweden</i>	1814-1905

PORTUGAL

Manuel I	1495-1521
João III	1521-1557
Sebastião	1557-1578
Henrique	1578-1580
Antonio	1580
<i>Spanish rule</i>	1580-1640
João IV	1640-1656
Afonso VI	1656-1683
Pedro II	1683-1706
João V	1706-1750
José	1750-1777
Maria I (Joint)	1777-1816

Pedro III (John)	1777-1786
João VI	1816-1826
Pedro IV	1826
Maria II	1826-1828
Miguel	1828-1834
Maria	1834-1853
Pedro V	1853-1861
Luis I	1861-1889
Carlos	1889-1908

PRUSSIA

Dukes

Albert	1525-1568
Albert Frederick	1568-1618
John Sigismund	1618-1619
George William	1619-1640
Frederick William	1640-1688
Frederick	1688-1701

Kings of Prussia

Frederick I	1701-1713
Frederick William I	1713-1740
Frederick II	1740-1786
Frederick Wilhelm II	1786-1797
Frederick Wilhelm III	1797-1840
Frederick Wilhelm IV	1840-1861
William I	1861-1888
Frederick III	1888
William II	1888-1918

RUSSIA

Grand Princes of Moscow

Ivan III "the Great"	1472-1505
Vasily III (Vasilii, Basil)	1505-1533
Ivan IV "the Terrible"	1533-1584
Fyodor I (Fedor)	1584-1598
Boris Godunov "Lord Protector"	1598-1605
Fyodor II (Fedor, Theodore)	1605
Dmitry II (Demetrius)	1605-1606
Vasily IV	1606-1610
Wladislav	1610-1613
Mikhail (Romanov)	1613-1645
Alexei I Mikhailovitch	1645-1676
Fyodor III	1676-1682
Peter I (the Great)	1682-1725
Catherine I	1725-1727
Peter II (Petr)	1727-1730
Anna Ivanovna	1730-1740
Ivan VI	1740-1741
Elizabeth Petrovna	1741-1762
Peter III	1762
Catherine II (the Great)	1762-1796
Paul	1796-1801
Alexander I	1801-1825
Nicholas I	1825-1855
Alexander II	1855-1881

Alexander III "Peacemaker"	1881-1894
Nicholas II	1894-1917

SCOTLAND

James IV	1488-1513
James V	1513-1542
Mary (Queen of Scots)	1542-1567
James VI	1567-1625
Charles I	1625-1649
Charles II	1649-1685
James VII	1685-1689
William & Mary	1689-1702
Anne	1702-1714

Act of Union, 1707

SPAIN

Fernando V (of Castile)	1479-1516
Carlos I	1516-1556
Felipe II	1556-1598
Felipe III	1598-1621
Felipe IV	1621-1665
Carlos II	1665-1700
Philippe	1700-1724
Luis	1724
Philippe V	1724-1746
Fernando	1746-1759
Carlos III	1759-1788
Carlos IV	1788-1808
Fernando VII	1808
Jose (Bonaparte)	1808-1814
Fernando VII	1814-1833
Isabella II	1833-1868

First Republic

Antonio Canovas del Castillo	1868-1870
Kingdom of Spain	
Amadeo I	1870-1873
Alfonso XII	1874-1885
Alfonso XIII	1886-1931

SWEDEN

Hans II	1497-1501
Sten Sture (Regent)	1501-1503
Svante Nilsson Sture	1504-1512
Sten Svantesson (Regent)	1512-1520
Christian II	1520-1523
Kingdom of Sweden	
Gustaf I (Vasa, Regent from 1521)	1523-1560
Erik XIV	1560-1568
Johan III	1568-1592
Sigismund III (Vasa)	1592-1599
Carl IX	1599-1611
Gustaf II Adolf	1611-1632
Christina	1632-1654
Carl X Gustaf	1654-1660
Carl XI	1660-1697

Carl XI	1660-1697
Carl XII	1697-1718
Ulrike Eléonore	1719-1720
Frederik I	1720-1751
Adolf Frederik (Adolphus)	1751-1771
Gustaf III	1772-1792
Gustaf IV Adolf	1792-1809
Carl XIII (regent 2-4 months)	1809-1818
Carl XIV	1818-1844
Oscar I	1844-1859
Carl XV	1859-1872
Oscar II	1872-1907

TURKEY, Ottoman Empire

(Both Sultan and Caliph after 1517)

Bayezid II Wali	1481-1512
Selim I	1512-1520
Suleyman I (II) 'Kanuni'	1521-1566
Selim II	1566-1574
Murad III	1574-1595
Mehmed III	1595-1603
Ahmed I	1603-1617
Mustafa I	1617-1618
Osman II	1618-1622
Mustafa I (2nd time)	1622-1623
Murad IV	1623-1640
Ibrahim	1640-1648
Mehmed IV	1648-1687
Suleyman II (III)	1687-1691
Ahmed II	1691-1695
Mustafa II	1695-1703
Ahmed III	1703-1730
Mahmud I	1730-1754
Osman III	1754-1757
Mustafa III	1757-1774
Abdülhamid I	1774-1789
Setim III	1789-1807
Mustafa IV	1807-1808
Mahmud II	1808-1839
Abdülmeçit I	1839-1861
Abdülaziz	1861-1876
Abdülhamid II	1876-1909

MASTERS GENERAL OF THE ORDNANCE

Compiled by Maj. Francis Duncan, M.A.,
D.C.L., LL.D. in *History of the Royal Regiment
of Artillery*, London, 1979.

Sir Thomas, Baron Darcie	1745-.....
Sir Philip Hoby	1348-.....
Ambrose, Earl of Warwick	1554-1589
Commission	1589-1596
Robert, Earl of Essex	1596-1600
Charles, Earl of Devonshire	1603-1606
Lord Carew	1608-1629

Howard, Lord Vere	1630-1634
Montjoy, Earl of Newport	1634-1659
Sir William Compton	1660-1664
Commission	1664-1670
Sir Thomas Chicheley	1670-1679
Commission	1679-1682
George, Lord Dartmouth	1682-1688
Frederick, Duke de Schomberg	1689-1693
Henry, Viscount Sidney	1693-1702
John, Earl of Marlborough	1702-1711
Richard, Earl Rivers	1712-1712
James, Duke of Hamilton	1712-1712
John, Duke of Marlborough	1714-1722
William, Earl of Cadogan	1722-1725
John, Duke of Argyle	1725-1740
John, Duke of Montague	1740-1742
John, Duke of Argyle	1742-1742
John, Duke of Montague	1742-1749
Vacant (Sir J. Ligonier, Lt-Gen.)	1751-1755
Charles, Duke of Marlborough	1755-1758
John, Viscount Ligonier	1759-1763
John, Marquis Granby	1763-1770
George, Viscount Townshend	1772-1782
Charles, Duke of Richmond	1782-1783
George, Viscount Townshend	1783-1783
Charles, Duke of Richmond	1784-1795
Charles, Marquis Cornwallis	1795-1801
John, Earl of Chatham	1801-1806
Lord Moira	1806-1807
John, Earl of Chatham	1807-1810
Henry, Earl Mulgrave	1810-1818
Arthur, Duke of Wellington	1819-1827
Henry, Marquis of Anglesey	1827-1828
Viscount Beresford	1828-1830
Sir James Kempt	1835-1841
R.H., Lord Vivian	1835-1841
Sir G. Murray	1841-1846
Henry, Marquis of Anglesey	1846-1852
Henry, Viscount Hardinge	1852-1852
Vizroy, Lord Raglan	1852-1855

N.B. Where contradictory dates are available,
The Cambridge Biographical Encyclopedia,
Cambridge: University Press, 1994/1998, will
have precedence.

Appendix VII The Islamic Calendar

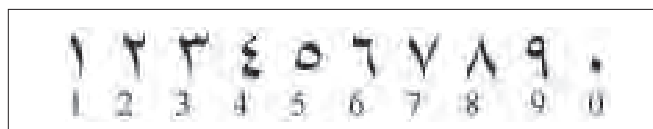
From 1000 After Hejira to Anno Domini 1900

The dating of Islamic arms based upon stylistic features alone is most unsatisfactory; the conservative Muslim traditions rejected change so that arms made in the 17th century are little (if any) different from many made in the 19th century.

Hejira is the Arabic term for the departure from ones country and friends and Day One equates to July 16,* and the flight of Mohammed from Mecca to Medina in A.D. 622 of the Gregorian calendar. The Muslim calendar is based on the lunar year of 354 or 355 days and progresses more rapidly than the Gregorian calendar based on the solar year, so a simple mathematical calculation can convert an Islamic date to one on the Christian calendar.

Multiply 970,224 by the year of the Hejira; mark off six decimal places from the product and add 621.5774. The total (without the decimals) will be the year of the Christian era.

The day when the year of the Hejira began will be found by multiplying the decimal figures by 365. The result may be out by a day as the intercalary days do not occur simultaneously.



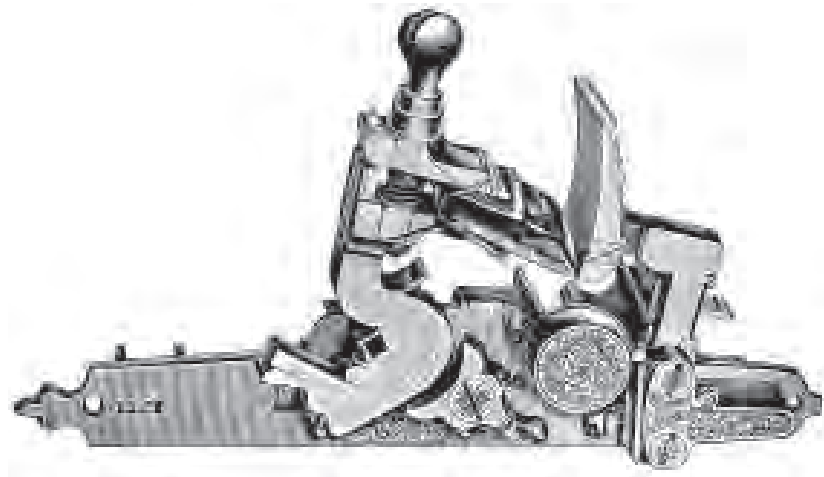
A.H.	A.D. (Gregorian)	1020	16 March 1611	1041	30 July 1631
1000	19 Oct. 1591	1021	4 March 1612	1042	19 July 1632
1001	8 Oct. 1592	1022	21 February 1613	1043	8 July 1633
1002	27 Sept. 1593	1023	11 February 1614	1044	27 June 1634
1003	16 Sept. 1594	1024	31 January 1615	1045	17 June 1635
1004	6 September 1595	1025	20 January 1616	1046	5 June 1636
1005	28 August 1596	1026	9 January 1617	1047	26 May 1637
1006	14 August 1597	1027	29 December 1617	1048	15 May 1638
1007	4 August 1598	1028	19 December 1618	1049	4 May 1639
1008	24 July 1599	1029	8 December 1619	1050	23 April 1640
1009	13 July 1600	1030	26 November 1620	1051	12 April 1641
1010	2 July 1601	1031	16 November 1621	1052	1 April 1642
1011	21 June 1602	1032	5 November 1622	1053	22 March 1643
1012	11 June 1603	1033	25 October 1623	1054	10 March 1644
1013	30 May 1604	1034	14 October 1624	1055	27 February 1645
1014	19 May 1605	1035	3 October 1625	1056	17 February 1646
1015	9 May 1606	1036	22 September 1626	1057	6 February 1647
1016	28 April 1607	1037	12 September 1627	1058	27 January 1648
1017	17 April 1608	1038	31 August 1628	1059	15 January 1649
1018	6 April 1609	1039	21 August 1629	1060	4 January 1650
1019	26 March 1610	1040	10 August 1630	1061	25 December 1650
				1062	14 December 1651
				1063	2 December 1652
				1064	22 November 1653
				1065	11 November 1654
				1066	31 October 1655

*It is now believed that the actual date was nearly a month earlier.



Fig. 6.4. The Arabic character *seneh* signifies the year of the Islamic era which in Arabic is “*after hegira*” and corresponds to “*Anno Domini*.” It sometimes underlines a date, as above left, which translates as the date *seneh* 1195 (1780). That on the right bears the date 1273A.H. for 1856. The Kayble lock illustrated has engraved brass plates on the surface with a coral inset on the dog, is dated 1235 which corresponds to A.D.1819 of the Gregorian calendar.

1067	20 October 1656	1090	12 February 1679	1113	8 June 1701
1068	9 October 1657	1091	2 February 1680	1114	28 May 1702
1069	29 September 1658	1092	21 January 1681	1115	17 May 1703
1070	18 September 1659	1093	10 January 1682	1116	6 May 1704
1071	6 September 1660	1094	31 December 1682	1117	25 April 1705
1072	27 August 1661	1095	20 December 1683	1118	15 April 1706
1073	16 August 1662	1096	8 December 1684	1119	4 April 1707
1074	5 August 1663	1097	28 November 1685	1120	23 March 1708
1075	25 July 1664	1098	17 November 1686	1161	2 January 1748
1076	14 July 1665	1099	7 November 1687	1162	22 December 1748
1077	4 July 1666	1100	26 October 1688	1163	11 December 1749
1078	23 June 1667	1101	15 October 1689	1164	30 November 1750
1079	11 June 1668	1102	5 October 1690	1165	20 November 1751
1080	1 June 1669	1103	24 September 1691	1166	8 November 1752
1081	21 May 1670	1104	12 September 1692	1167	29 October 1753
1082	10 May 1671	1105	2 September 1693	1168	18 October 1754
1083	29 April 1672	1106	22 August 1694	1169	7 October 1755
1084	18 April 1673	1107	12 August 1695	1170	26 September 1756
1085	7 April 1674	1108	31 July 1696	1171	15 September 1757
1086	28 March 1675	1109	20 July 1697	1172	4 September 1758
1087	16 March 1676	1110	10 July 1698	1173	25 August 1759
1088	6 March 1677	1111	29 June 1699	1174	13 August 1760
1089	23 February 1678	1112	18 June 1700	1175	2 August 1761



A825 This illustration of the later Islamic form of snaphance appeared in *The Gun and its Development* by W. W. Greener with the caption “Flint-lock made by Moorish Gunsmiths at the Author’s Factory in 1885.” Greener’s use of the word ‘gunsmiths’ suggests that he may have had more than one lock-maker brought from the Barbary Coast to work in his facactory in Birmingham. It might also suggest tht he was producing locks for the African trade.

1176	23 July 1762	1208	9 August 1793	1240	26 August 1824
1177	12 July 1763	1209	29 July 1794	1241	16 August 1825
1178	1 July 1764	1210	18 July 1795	1242	5 August 1826
1179	29 June 1765	1211	7 July 1796	1243	25 July 1827
1180	9 June 1766	1212	26 July 1797	1244	14 July 1828
1181	10 May 1767	1213	15 June 1798	1245	3 July 1929
1182	30 May 1768	1214	5 Jule 1799	1246	22 June 1830
1183	7 May 1769	1215	25 May 1800	1247	12 June 1831
1184	27 April 1770	1216	14 May 1801	1248	31 May 1832
1185	16 April 1771	1217	4 May 1802	1249	21 May 1833
1186	4 April 1772	1218	23 April 1803	1250	10 May 1834
1187	25 March 1773	1219	12 April 1804	1251	29 April 1835
1188	14 March 1774	1220	1 April 1805	1252	18 April 1836
1189	4 March 1775	1221	21 March 1806	1253	7 April 1837
1190	21 February 1776	1222	11 March 1807	1254	27 March 1838
1191	19 February 1777	1223	28 February 1808	1255	17 March 1839
1192	30 January 1778	1224	16 February 1809	1256	5 March 1840
1193	19 January 1779	1225	6 February 1810	1257	23 February 1841
1194	8 January 1780	1226	26 January 1811	1258	12 February 1842
1195	28 December 1780	1227	16 January 1812	1259	1 February 1843
1196	17 December 1781	1228	4 January 1813	1260	22 January 1844
1197	7 December 1782	1229	24 December 1813	1261	10 January 1845
1198	26 November 1783	1230	14 December 1814	1262	30 December 1845
1199	14 November 1784	1231	3 December 1815	1263	20 December 1846
1200	4 November 1785	1232	21 November 1816	1264	9 December 1847
1201	24 October 1786	1233	11 November 1817	1265	27 November 1848
1202	13 October 1787	1234	31 October 1818	1266	17 November 1849
1203	2 October 1788	1235	20 October 1819	1267	6 November 1850
1204	21 September 1789	1236	9 October 1820	1268	27 October 1851
1205	10 September 1790	1237	28 September 1821	1269	15 October 1852
1206	31 August 1791	1238	18 September 1822	1270	4 October 1853
1207	19 August 1792	1239	7 September 1823	1271	24 September 1854



Fig. A7.4. This Ottoman miquelet decorated with coral beads, gold and silver inlay and brass overlay, is dated 1220 A.H. (1805) on the cock.

1272	13 September 1855	1288	23 March 1871	1304	30 September 1886
1273	1 September 1856	1289	11 March 1872	1305	19 September 1887
1274	22 August 1857	1290	1 March 1873	1306	7 September 1888
1275	11 August 1858	1291	18 February 1874	1307	29 August 1889
1276	31 July 1859	1292	7 February 1875	1308	17 August 1890
1277	20 July 1860	1293	28 January 1876	1309	7 August 1891
1278	9 July 1861	1294	16 January 1877	1310	26 July 1892
1279	29 June 1862	1295	5 January 1878	1311	15 July 1893
1280	18 June 1863	1296	26 December 1878	1312	5 July 1894
1281	6 June 1864	1297	15 December 1879	1313	24 June 1895
1282	27 May 1865	1298	4 December 1880	1314	12 June 1896
1283	16 May 1866	1299	23 November 1881	1315	2 June 1897
1284	5 May 1867	1300	12 November 1882	1316	22 May 1898
1285	24 April 1868	1301	2 November 1883	1317	12 May 1899
1286	13 April 1869	1302	21 October 1884	1318	1 May 1900
1287	3 April 1870	1303	10 October 1885		

Appendix VIII Fire-stones and Gun-Flints

Pyrite, Flintstone, Wedges, Spalls, and Platforms

Although the wheel-lock could not fire without a firestone, nor a snaphance without a flint, there has been almost nothing written about the design or acquisition of these essential items before the last years of the 18th century. A number of bibliographies have been compiled on gun-flints, mainly by archaeologists, but in almost every entry which mentions dates, the earliest provided for their manufacture in England is “about 1680 in Brandon.” This, on both counts – time and place – is incorrect, a point which will be dealt with later.

First, we should look at the “firestone” of the wheel-lock, and then the flint of the snaphance and all other flint-locks. The mineral pyrite, or iron pyrites is an iron sulphide, brass-like or gold in colour, which emits sparks when struck against steel. It is heavier in weight than a comparative flint and formed by crystals of various shapes so that breaking along the cleavage faces may be uniform or irregular. It is also known as a fire stone or fools gold.

Flint, as used in the manufacture of gun-flints, is a form of quartz, or chert, usually found as irregularly shaped nodules in layers of chalk or limestone. Colour can vary from grey to black or light brown to dark brown, although other colours are known, and when fractured it presents a smooth, glass-like surface.

The heat required to ignite the priming powder of a firearm was generated by different means: on the wheel-lock, the spark came from the iron pyrites rubbing against the revolving steel wheel which actually ran through the priming powder in the center of the pan; on the flint using arms, the action of the sharp, hard edge of the stone striking the frizzen will tear small white-hot particles from the steel and direct them into the pan to ignite the priming powder.

Fire-stone for the wheel-lock

Almost nothing has been found relating to the acquisition of pyrite for wheel-locks, but since pyrites occurs naturally and was, compared with the requirement of flints for a large army, not a high-demand item, because wheel-locks were not issued in quantity. It is probable that its acquisition did not create a major logistics problem. Skertchly offers, but does not provide a source, a note which is worthy of recording:—

The date of the final abandonment of pyrites for flint is not known, but in the year 1586, Julius, Duke of Brunswick had pyrites collected for his fire-arms near Seefen, and even worked it into shape himself, “though in so doing he often bruised his fingers and was advised by the physicians not to expose himself to the sulphurous vapour emitted by the substance.”¹

The only study located relating to its use in firearms is one by John Witthoft, Research Associate at the University Museum, University of Pennsylvania, which he included in his *Pennsylvania Archaeologist* article on gunflints.²

In 1962 we acquired a plain Austrian wheel lock military fusil of the late seventeenth



Fig. A8.1. A lead holder for a piece of iron pyrites associated with a German wheel-lock gun dated 1575 but possibly mounted in 1586. The J. A. de Rothschild collection, Waddesdon Manor,

century; a sturdy, unadorned, simple workaday firearm.... We put the gun into good working order, got the mechanical train to function perfectly, and tried to bring the gun into use. Our attempts were sorry failures.

Our first fire-stones were sawn from large single crystals of the purest pyrite we could obtain. They simply shattered against the wheel, producing no sparks. After a few attempts, we had to disassemble and clean the lock because it was becoming choked with pyrite debris. We tried good pure pyrite from other locations and in other mineralogical forms, with no success whatever. We finally hit upon a piece of pyrite that was finely-granular and poorly consolidated, a sort of “sandstone” made up of tiny cuboid crystals. This sparked beautifully, but was rapidly cut down by the wheel, so that the lock mechanism became choked with grit.

When we cleaned the lock, it was found to be choked with unaltered pyrite crystals and cleavages, mixed with small amounts of a sour soluble white dust: iron (ferrous) sulfate. Our fire-stone was examined more carefully, and we found that the weak but original cement between the pyrites crystals was marcasite, a paramorph of pyrite. Marcasite is of the same chemical composition as pyrite, but has a different crystal form, specific gravity, and chemical properties because its molecular structure differs from that of pyrite. We set a slab of marcasite, part of a ball of radiating needle-like crystals, in the vise. It worked perfectly, with slight erosion from the wheel but with spectacular production of fire. Oxidation products which collected in the pan were ferrous sulfate, with sulfuric acid traces. The problem seemed to be solved, but an even more difficult puzzle appeared later.

Marcasite is usually a perishable mineral, surviving only when protected from moist air. Unless they have been protectively coated, many specimens in mineral cabinets vanish in a few years, leaving only a pile of white ferrous sulfate powder. This explains why sulfide slab for wheel lock guns have not survived. Neither can we expect any evidence for sulfide fire-stones to survive in most archaeological sites, since they would have oxidized readily and their oxidation products are soluble. Numerous references in the archaeological literature to earthy limonitic masses discovered in prehistoric graves as being chemically-altered sulfide fire-stones, cannot



Fig. A8.2. Left: A core showing the cavity from which two wedge-flints have been spalled. Right: two views of a French wedge-flint or gunspall recovered from Senneville, a fort and village established in Quebec Province, Canada, 1704-1776.

be correct, since normal pyrites is stable and would still be pyrites and marcasite fire-stones would have disappeared without leaving a trace. Neither could possibly give rise to hydrated iron oxide through weathering except under extreme conditions of heat and pressure, such as could come about only through deep burial within the earth's crust.

Although Witthoft blames the stone, he perhaps should also have considered the wheel in relation to the stone. In the 1950s, the Honourable Jack Hart, a Minister of Parliament for the Channel Island of Guernsey, constructed a wheel-lock based on the da Vinci drawings. As described earlier, it could not be made to work. But when acquired by the present owner, Mr. A. C. Carpenter, he hardened the wheel and it sparked well. In support of this comment, the lock to which I had access in "The Children's Room" at the Royal Ontario Museum, never failed to spark and I do not remember any residue although black powder did not enter the picture.

Mr. Witthoft's note on the permanence of pyrites and the effect of moisture on the marcasite inclusions, might also provide an explanation for why so few wheel-locks are illustrated with a stone in position.

Only two wheel-lock/pyrites related artifacts have come to the writer's attention. The first was a heavy lead wrapper or holder designed to surround a pyrites block. It is described by Claude Blair in his catalogue of the *J.A. de Rothschild Collection at Waddesdon Manor*, and is associated with a German wheel-lock dated 1575 having an external wheel with domed copper-gilt cover. He notes

It is unusual in retaining its original lead pyrites holder. This consists of a piece of lead approximately $\frac{1}{4}$ inch thick shaped in plan to the jaws, which it fills completely, and slotted vertically at the front for the pyrites.³

The other, a similar example, is illustrated by Dr. Arne Hoff in *Feuerwaffen I*. It is on what he describes as an Austrian or Polish wheel-lock dated 1652 in the Livrustkammaren, Stockholm.⁴ It retains its original pyrites which appears to have only a slightly rounded point although this may be normal wear.

Gunflints

There would of course have been a need for gunflints beginning with the introduction of the snaplock and snaphance in the first half of the 16th century, and that need would have been filled by the same artisans who made the flints for strike-a-lights. There is a 100 year gap in the literature but from at least the 1660s (and prob-

Fig. A8.3. Gunspall from Fort Albany (1674-1686). On June 30, 1682, Thomas Killdale, the Hudson's Bay Company "Armourer and Smyth" at Moose Factory, went to Charleton Island with Governor Nixon to build a new rudder for Capt Nehemia Walkers ship *Diligence*. When they returned to the post on the mainland, perhaps in a hurry, he did not take his tool chest and when it was found 291 years later, there was, among numerous other things, this single wedge flint/gunspall.



ably much before that), it can be shown that the Board of Ordnance purchased gunflints from flint-knappers in Lewisham, Purfleet, Greenhithe, Maidstone and Northfleet. Mr. de Lotbiniere writes that a record of the first purpose-made gunflints for the Ordnance which he found is dated 1655. He also convincingly suggests that prior to the first Ordnance orders, flints would have been procured locally or even made by the men who used them. I find it difficult to believe that in 100 years, a commercial source would not have emerged to supply the needs of the many noblemen who maintained an army, and the landowners would have made arrangements for the supply of gunflints. It can be assumed that most of the flints for the sporting public were from the same sources which supplied the military.⁵

Returning to Skertchly, he says, "These strike-a-lights are made from English flakes, and the first gun-flints differed from them being of smaller size; the old gun-flints were, in fact, only modifications of the existing strike-a lights."⁶ He was probably correct; the earliest dateable firearm-associated gunflints are simple flakes struck from a flint nodule with a single, well-directed "*sharp rebounding blow delivered with a definite amount of force to detach a flake.*" Skertchly's italics emphasised that phrase and he added, "If the blow be dead the stone is only bruised; if it be bounding, but too slight, the bruising shows an incipient cone, but no flake is struck; if again the blow be too heavy the stone is shattered. Moreover, the blow must be delivered in a certain direction."⁷

The Old English System

No contemporary description of the procedure to manufacture a wedge flint has been found but the process, requiring considerable skill, would have been relatively quick and simple, and the tools would probably have been similar to those used in the French system. It continued to be used until well into the 19th century, even though, in the last half of the 18th, the French system was available.

The small nodules available would have been split to provide a flat surface for the bottom of the flint and a single blow, at the right place, would have "spalled" a wedge from the surface. The 17th century gunspalls illustrated have had some secondary chipping to round-off the heel, but very little on the sides. This may have been the style at the time but since they are all related to the fur trade in Canada, it may have been considered an unnecessary expense for trade flints.

The resulting flint is now known variously as a "gunspall" by archaeologists in North America and as a "wedge flint" by arms historians in England. The method

Pedigree Gunflints



Fig. A8.4. 1674-1686 Gunspall, Fort Albany.



Fig. A8.5. 1704-1776 Gunspall, Senneville.



Fig. A8.6. 1800 Gunspall, Boundry Falls.



Fig. A8.7. 1805 Wedge-flint, *Earl of Abergavenny*



Fig. A8.8. 1805 Platform flint, *Earl of Abergavenny*

continued to be used in England and in France through most of the 18th century as shown by the excavations at Fort Albany, a Hudson's Bay Company fort on the west coast of James Bay (1674-1686); at Senneville, a French fort and settlement located on the east shore of Lac des Deux Montagnes, on the western approaches to the city of Montreal between 1696 and about 1776; a canoe load of trade goods lost on August 9, 1800 in the rapids at Boundry Falls, Ontario; Canada; and by the large numbers of gunflints collected by divers of the Chelmsford and District Sub Aqua Club from the wreck of the *Earl of Abergavenny*, the East Indiaman which foundered in Weymouth Bay in 1805.

The wedge flint was produced by a single blow on the edge of the flat side of a flint nodule to create a flake rounded on one side, flat on the other, and tapering to the edges. That was then trimmed somewhat on the sides, and rounded on the heel to allow it to sit better in the jaws of the cock. No dateable gunflints of the 16th or early 17th century are known to the writer so it is possible that this trimming may not have been used at such an early date. But this was the typical gunflint from at least the mid 17th century, and probably from the introduction of flint-using firearms. Skeretchly considers this a style of flint to be made by "The English System." It continued to be used occasionally until well into the 19th century, even though most flint knappers had adopted the technique which apparently originated in France.

In 1797 in France, Citizen Dolomieu published a description of a different flint-making technique by first creating a long flake and then cutting it into individual gun flints. He did not record where or when it had originated but there are a number of

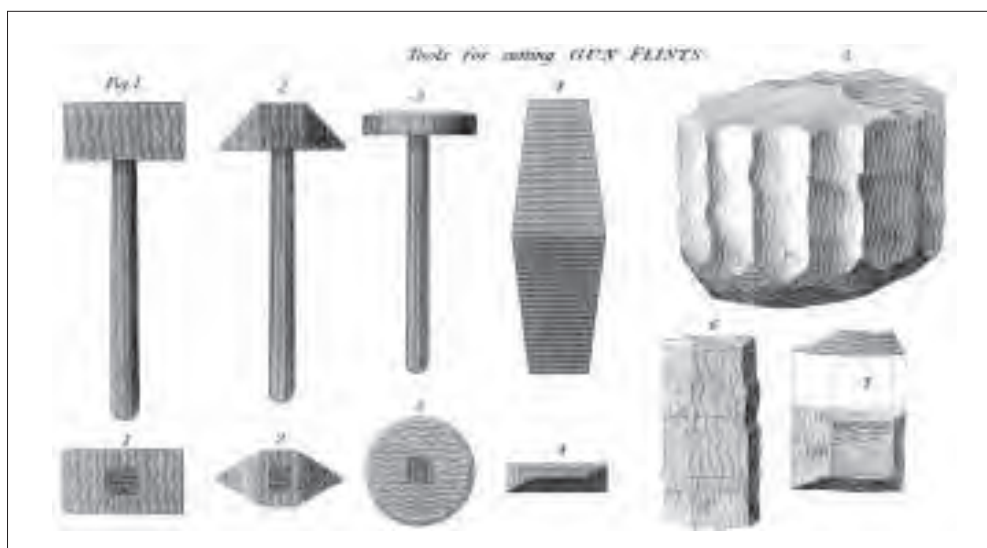


Fig. A8.9. This engraved illustration, “Published as the Act directs, 1819 by Longman, Hurst, Rees, Orme, & Brown, Paternoster Row” in London, is a direct copy of the tools and work illustrated by Deodat de Dolomieu published at Paris in his “Memoire Sur l’art de tailler les pierres à fusil (silex pyromaque)” in the *Journal des Mines*, Vol. 6, in 1797.

legends about how it found its way to the flint knappers in England. These seem to credit a French soldier, or a French sailor captured during the American Revolution, or a French soldier captured during the Napoleonic Wars of the late 18th century. It is suggested he taught the flint knappers at Brandon how to make flints from what are now known as blades.

Another, and more likely source for the knowledge has also been recorded. In 1837, Dr. James Mitchell, Fellow of the Geological Society of England interviewed the knappers in Brandon and wrote “Mr. Jeremia Simmonds has informed me, that the first man who introduced the French mode into England was his own grandfather Mr. James Woodyer, who resided at Kingsdown, between Maidstone and London. He has been dead now more than fifty years.” Those figures would indicate a date not later than 1786 and possibly as early as 1760 or 1770. Dr. Mitchell also suggested “it is probable that the French mode was not introduced at Brandon until some time after it was in use in Kent.”⁸

The new system created what is now known as the “platform” gunflint which by many arms collectors is now considered to be the standard English gunflint. Instead of knapping single flints from small nodules, the new system produced long flakes and those having close to the desired profile were then cut to the desired width.

In July, 1775, William Levet of Northfleet in Kent, who for 15 years, had been “Gunflint Maker to the Board of Ordnance” offered his customer, “best musquet flints of a New Construction” and the Board gave him an immediate order for 200,000. Mr. de Lotbiniere notes that this matches well with Mitchell’s mid 1780s date and provides the probable date for the introduction of the platform flint in England.⁹

Today, and for almost two centuries, the area around Brandon in Suffolk County, England, has been intimately associated with gunflint production; so much so that it is frequently assumed it has been that way since the beginning of gunflint making history. But Seymour de Lotbiniere’s search of Brandon church, marriage, birth, and



Fig. A8.10. A front view of a core showing how it would be cut to produce the flakes with a minimum of wastage.



Fig. A8.11. A flake showing how it would be knapped: HP is horse pistol; C is carbine; D is Double. "An average workman will knap 3,000 flints in a day of 12 hours, but a good one will make 4,000." Skertchly, p. 33,



Fig. A8.12. The Flint-knappers' Tools:
a. Quartering Hammers in two sizes, the First at about six to seven pounds, the Second at about 3½ pounds, of hexagonal shape, iron, with a steel facing.
b. Flaking Hammers weighing just over one pound, of square section tapering to a small square face, with a head of hardened steel.
c. Knapping Hammers made from a 9-inch flat file. These would wear quickly ("in a fortnight") and replaced frequently. They used to be called French hammers, suggesting they may have been introduced from knappers in that country.

Fig. A8.13. The knapping block from the trunk of a large elm tree measures about four feet in diameter and two feet high, and a detail of the knapping stake.

Classification of Gunflints by Size and Pattern

Dimensions in inches on an average of ten flints.

Sketchily recorded that

No gunflint was made by measure, but all by the eye

	Long	Wide	Thick
Wallpiece	2.00	1.50	.50
Large Swan	1.50	1.20	.30
Best Musket	1.30	1.10	.40
2nd Musket	1.30	1.10	.30
Musket, Double Edge	1.30	1.20	.40
Best Carbine	1.20	1.00	.25
Second Carbine	1.20	1.0	.25
Carbine, Double-Edge	1.20	1.10	.25
Horse Pistol Common	1.10	.90	.30
Large Common Gun	1.10	.90	.30
Super Single	1.00	.85	.20
Double Edge Best Single	1.00	1.00	.30
Best Horse Pistol	1.10	.90	.30
Second Horse Pistol	1.00	.85	.20
Small Common Gun	1.00	.80	.20
2nd Double or Rifle	.95	.65	.20
Fine Double	1.00	.65	.23
Super Pocket Pistol	.75	.65	.20
Fine Pocket Pistol	.75	.60	.20

Fig. A8.14. Table compiled from the documentation provided with each of the flints illustrated by Skertchly and illustrations, from top to bottom, of the three major types he identified: Best, top; Double Edged, center; and Common, bottom.

apprenticeship records did not find a single gunflint maker listed as a local tradesman until 1791 when Philip Hayward took up residence. Soon, many others moved there to work the particularly high grade black flint found at about 40 feet. That, combined with the French flaking technique dramatically increased the rate of production and quickly made Brandon the main gunflint making center of the world.

About that time, the Duke of Richmond, Master General of the Ordnance (1782-1795) ordered a trial of gunflints from the Brandon area. It might have helped that the flint was found on the estate of his cousin, Earl Cadogan, but the quality was so superior that from about that time, almost all future supplies for the Ordnance were from that source.¹⁰

The French System

This was a three-stage process — quartering, flaking, and knapping — which in 21 pages, Skertchly described in detail but briefly it was as follows,

Quartering: The flint nodule weighing anywhere from 25 to 200 pounds was split, or “quartered” as it was known, into a manageable size of a few pounds and about six or more inches to the side. All of the contemporary English illustrations¹¹ show a uniform cylinder-like quarter, or core, as was illustrated by Dolomieu in his

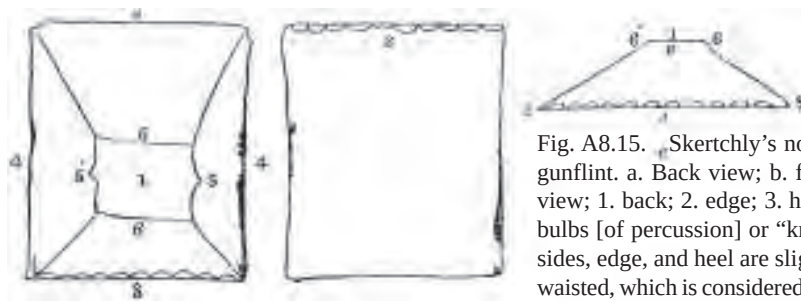


Fig. A8.15. Skertchly's nomenclature for a gunflint. a. Back view; b. face view; c. side view; 1. back; 2. edge; 3. heel; 4, 4, sides; f. bulbs [of percussion] or "knots;" 6 ribs. The sides, edge, and heel are slightly hollowed or waisted, which is considered a point of beauty.



Fig. A8.16. Skertchly's illustrations of, left to right, an Old English gunflint, a French gunflint, and a Cut and polished gunflint. In de Lotbinière's terminology, the first would be an English Wedge-flint.

1797 report. Skertchly and surviving examples provide evidence of a more-or-less conical core.

Flaking: A single blow produced with considerable skill, would split a flake from the core. It would usually be long enough to provide four or five flints depending upon the quality of the stone and the skill of the flaker, but eight inches was not unknown. "An average flaker will make from 7,000 to 8,000 flakes in a day, a good one 10,000 or working long hours, say from 6 a.m. to 10 p.m. 12,000."¹²

Knapping: The flint knapper would automatically calculate how many and of what size, flints could be produced from a given flake. Resting the flake on a stake mounted conveniently in a heavy block of wood and with a light tap of his knapping hammer, he would cut the flake and trim the sides and heel as required, and lightly rasp the firing edge on the stake, a process which could be completed eight or ten times per minute.

Gunflint Identification

Skertchly identified three patterns of gunflint: Fine single, Common, or Doubles and within each they were distinguished as "bests" or "seconds," as identified by the knapper who threw them into the appropriate bucket when finished. He also remarked, "It will be noticed that the distinction between *bests* and *seconds* is arbitrary, and that good seconds may be as well made in every respect as inferior bests. As a rule, however, seconds are thinner than bests, or as thick but of inferior workmanship or material. Commons are single-backed, but may be as well-made as bests. Double-edged flints are longer than single-edged of the same kind, because they have no heels to be cut off."¹³

Identifying a gunflint by its shape and giving a name to the different forms is just a matter comparing the shape with the 33 illustrations provided by Skertchly, from which a representative selection has been included. But, it seems to have been a very arbitrary decision. William Curson & Company founded at Brandon in 1800, "Manufacturers of every description of Gun Flints," offered in their 1865 price list "put up in



Fig. A8.17. A group of thin flints of the type frequently found in the jaws of flint-locks used in the Middle East. The lower flint is of light brown colour, it measures almost 2 inches wide, and was probably made in France for the Islamic trade.

paper parcels of 1,000 free.” Their names and prices follow.

No		s.	d.
1.	Common Single or Rifle Flints	1	9
2.	Large Common Gun Flints	2	0
3.	Musket Flints	3	0
4.	Carbine Flints	3	6
5.	Superior Horse Pistol Flints	2	9
6.	Superior Single or Rifle Flints, spotted	2	0
7.	Superior Double Barrel Flints, spotted	2	0
8.	Superior Pocket Pistol Flints	3	0
9.	Superior Musket Flints	4	0
10.	Superior Double Edge Carbine Flints	4	0
11.	Superior Double Edge Musket Flints	5	0
12.	Best Horse Pistol Flints	4	6
13.	Second Single Rifle or Fusee Flints	4	0
14.	Smaller Size Rifle or Fusee Flints	3	6
15.	Best Musket Flints	5	0
16.	Large Size for Sealing guns	6	0
17.	Extra Superfine Carbine Flints	5	0
18.	Extra Superfine Rifle or Fusee Flints	5	0
19.	Smaller Size Rifle or Fusee flints	4	0 ¹⁴



Fig. A8.20. The flint deposits of Europe after Wolfgang Seel, 1981.

Dating, or country of origin, is another matter. A platform flint, or any other made in England by the flaking process, must be dated post 1775 but gunspalls did not disappear until well into the 19th century as evidenced by the large percentage found with those recovered from the *Earl of Abergavenny* mentioned above, and those recovered from the canoes lost at Boundry Falls in northern Ontario in 1800, one of which is illustrated.

Colour is also used as an identifier but that too is not very precise. Brandon flints are not invariably black; French flints are not always the colour of amber or beeswax; North American flints are not always grey. And flint, or chert, with ingredients that produce a different colour: red, white, or green and a grey/gold, are known.

Mr. de Lotbiniere records that chalk diggings from the Salisbury Plain produced grey flint with a tendency to white spots. He also suggests “Most of the best English gunflints seem to have been made from a black flint, showing a brown translucency when held against the light, most noticeably at the shallow edges.”¹⁵

This would apply to the early flints excavated on the site of the Hudson’s Bay Company post at Fort Albany. Although the Albany flints were intended to be used or sold by a British company, they may be of French manufacture. It is not recorded where the H.B.C. purchased their flints before 1682, but, the Company minutes recorded in 1691 “& particularly to be spareing in your Flints (tho’ it seemes a very small thing) and in your brandy, they being both French Commodities and hard to come by.”

This was followed in the Minutes of December 7, 1692 “Mr. Robert Nicholas [probably a Company director] is desired to agree for 10,000 good flints and to buy them as cheape as posible he can. But, on March 16, 1698/9, Mr. Sibley [a Company gunmaker who supplied trade guns between 1692 and 1714], supplied 10,000 French gunflints.

The 1697 shipment to Hudson Bay included “1 small rundlett contg 5000 French flints and 1 small box Conta 5000 English Flints.”

As late as April 2, 1706, the Committee Minutes record “The Sect is ordered to be speake of Mr. Sibley Two guns of 30 s price Each viz one for Capt Jos Davis and ye

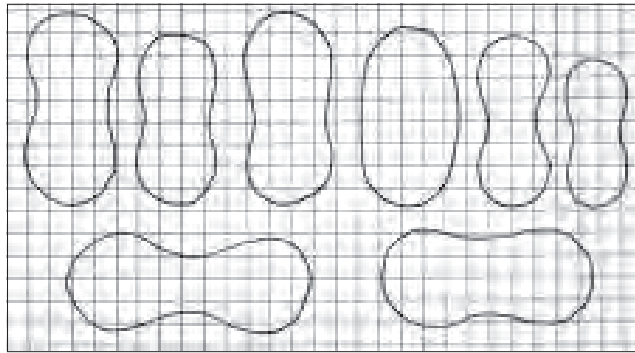


Fig. A8.18. Three red leather flint pads from cased pistols courtesy Maj. D.H.L. Back; a lead flint pad of a form excavated from an 1812 trash pit at Fort Pike, (Sackets Harbor, N.Y.); a flint pad commercially available in the 1950s which may have been based on a contemporary military pattern.

Fig. A8.19. This drawing, on 5mm grid squares, has been made from the group of pad cutters in the late W. Keith Neal collection, seven of which were sold at Christie's King Street on July 18, 2002, Lot No. 62. All the original pads in the collection were made from red leather of varying thickness

other Mr. Henry Kelsey ... Likewise 8 Muskets 4 blunderbuses and 2 pr of pistols for ye use of ye Perry also 6 Cutlasses and 100 french flints." These were supplies for the ships on the voyage to Hudson Bay which would have been departing in May.

Again, on May 8, 1713 it was determined by the Committee to order "10,000 good French flints for Fusees of the largest size," but on May 29 1713 it was agreed to order "six or eight thousand of the best English Flints (No French are to be gott) and to be sent into the House with all Expedition."¹⁶

Gunflint production on the Continent has not been extensively covered but Wolfgang Seel, incorporated considerable background information on European gunflints in "Flint, Flintenstein, Pierre a Fusil" published in *Deutsches Waffen Journal*,¹⁷ and Steven W. White has gathered much of the available information in "The Manufacture of Gunflints." published in *Art, Arms and Armour*.¹⁸

Skertchly illustrates a cut and polished flint "made for experiment 30 years ago (i.e. c.1846) but never in demand. Polished French gun-flints [were] made at the same time." Actually, polished stones were produced in Europe at least as early as the first half of the 17th century and Lionello G. Boccia illustrated a case of 102 polished stone "gunflints" made at that time for a wealthy sportsman.¹⁹

Gunflints frequently found in the jaws of arms with a Mediterranean provenance, if they are contemporary, will have a much different appearance than those just described. They are usually much thinner and what de Lotbiniere would call a wedge shape, but they are not spalled from a flint stone and they will be wider than one would expect to find in the jaws of a comparable northern European gunflint.

Those illustrated in the top two rows of Fig. 17 are from a large supply which found their way to America at least as early as the mid 20th century—and perhaps prior to the mid 19th century. The stone varies considerably in colour, within the lot but the technique of making them is consistent indicating they have a common source.

The lower flint in that illustration appears to be a French-made flake. It is almost two inches wide, obviously twice as wide as almost all flint-lock jaws but this is a characteristic of a small number of flints found in the jaws of Islamic/Ottoman miquelet rifles.

Flint pads

The irregularities of gunflints made some form of padding between the flint and the jaws of the cock almost essential. This was usually of leather or lead wrapped around the flint but archaeological excavations have unearthed many other metals, including a few of brass cut from helmet plates. The jaw-shaped photographic images illustrated here are of lead and are frequently found on War of 1812 sites. Pads found on Revolutionary War sites appear to have also been made by hammering lead balls to do the job. The decorative lead pads were commercially available in the 1950s and may have been based on examples from contemporary ordnance stores. The round-end pads are of red leather. The line illustration is taken from the impression of pad-cutters in the W. Keith Neal collection.

Notes and Recommended reading

1. Sidney B.J. Skertchly, *On the manufacture of gunflints, the methods of excavation for flint, the age of Palaeolithic man and the connexion between Neolithic art and the gun-flint trade*. p. 2. Henceforth referenced as Skertchly.
2. John Witthoft, "A History of Gunflints." pp. 42-43.
3. Claude Blair. *J.A. de Rothschild collection at Waddeston Manor* London: National Trust, 1974. pp. 248-252, Catalogue No. 98..
4. Arn Hoff, *Feuerwaffen I* Braunschweig: Klinkhardt & Biermann, 1969, p. 141-2. Catalogue No. 1269.
5. James Mitchell. "On the Manufacture of Gun-Flints. *Edinburgh New Philosophical Journal*, Vol. 22, Oct. 1936-April 1837. p. 36. Henceforth referenced as Mitchell.
6. Skertchly, pp. 36-37.
7. *Ibid.*, p. 43-44.
8. Mitchell, p.38 note.
9. de Lotbiniere (1982), p. 41.
10. de Lotbiniere (1977), p. 96
11. For example, an unidentified encyclopaedia dated 1819; *The Edinburgh Encyclopedia* (1830, and perhaps earlier); *New Edinburgh Encyclopedia* (American Edition), 1832; *The Saturday Magazine*. March 10, 1838.
12. Skertchly, p. 28
13. Skertchly p. 46.
14. S.B. Haw. "Cursons Gun Flints." *London Arms Fair Guide* Spring, 1983, pp. 30-31
15. de Lotbiniere (1984 2)
16. This information is collected in *Trade Guns of the Hudson's Bay Company, 1670-1970* by S.J. Gooding, Bloomfield: Museum Restoration Service, (www.armscollecting.com), 2003, pp. 115-116, from the archives of the Hudsons' Bay Company A1/15 p. 4, Rich/1957 p. 121, A1/27 p. 5, A1/33/p. 55
17. Wolfgang Seel, "Flint, Flintenstein, Pierre a Fusil" published in *Deutsches Waffen Journal*, October, 1981, pp. 1450-1458.
18. Stephen W. White, "The Manufacture of Gunflints." 1979, pp. 400-417; Donald Baird, "Gunspalls and the Cock-Jaw Basin in British Military Flintlocks. *The Canadian Journal: Arms Collecting*, Vol. 19, No. 3 (Aug. 1981), pp. 80-86 discusses gunflint manufacture in Ireland.
19. Lionello G. Boccia, *Novo Secoli di Armi da Caccia*, Firenze: Editrice Edam. 1967, Fig. 140.

Much of the credit for unravelling the story of the gunflint must be given to the late Seymour de Lotbiniere (1905-1984). He was neither an archaeologist, nor an arms historian; he was a dedicated gunflint historian. He studied and recorded gunflint making, the craft, the business, the history, and the demise. His articles on the subject,

although generally short, have been produced by a thorough student who, as a child, played on the sites of the knappers and who, after a career in London, returned to live in Brandon and expand upon his study.

Mr. de Lotbiniere's last work but one, summed up much of his gunflint research in the Introduction to a reprint of Skertchly's treatise, giving it the appropriate title "Updating Skertchly." He once remarked that it "was done with the benefit of a century of hindsight."

The literature of gunflint production is extensive but little of it deals with the actual technique of manufacture — the shaping of the gunflint. Skertchley (1879, compiled in 1876), is the most extensive but his desire to show an evolution going back some thousands of years coloured his thinking. Nevertheless, he is considered required reading and his illustrations are of considerable importance. Rainbird Clarke (1935) provides what is undoubtedly the most comprehensive study of the history of gunflint making; it should perhaps be read before reading Skertchely. The paper by Sir Francis H. S. Knowles and Alfred S. Barnes (1937), provides the best description of the tools of the trade and how the actual knapping was done.

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- Knowles, Sir Francis H.S. and Barnes, Alfred S. "Manufacture of Gun-Flints" *Antiquity*, June, 1937 pp. 201-207
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Appendix IX Percussion Primers

Percussion Powder, Pellets, Tubes, and Caps

Rev. Alexander John Forsyth began searching for a chemical to ignite his favourite sporting gun in the late 1790s.¹ The detonating compound he supplied when he first introduced his ignition to the public in 1807 was in the form of a fine grained brown crystal about the size of coarse table salt consisting mainly of potassium chlorate. He quite accurately called it percussion powder [P1].

The earliest percussion powder was manufactured for Forsyth in London by John Prosser, who is usually described as a sword and belt maker but who also manufactured guns and locks at No. 9 Charing Cross Road. He was employed in this capacity by Forsyth from at least 1807 and produced some percussion powder, but in 1808 he was replaced by Frederick Garden, (later Accume & Garden), of No. 11 Old Compton St., Soho. In 1823, Garden's business and building was acquired by Frederick Joyce.²

In the years that followed, the shape, form, and formula changed, but the name did not. "Powder," that is the word, was frequently used to describe the primer in pellet, tube, cap, or any other form, for at last the next 50 years.

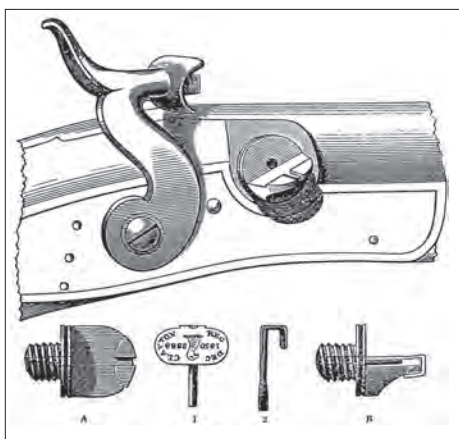
To complicate matters, "primer" frequently referred to the reservoir to hold and feed primers. As late as the early 1850s, Frederick Joyce, by this time the leading London percussion primer manufacturer, described his product as "Anti Corrosive Percussion Gun Powder" and recorded "This Powder as Manufactured by me in the form of Caps, Patches, Balls, & Grain is warranted free from any rusting or corroding quality to be effective in every climate and not to miss fire." At the time, he considered himself to be a Practical Chemist at 57 Upper Thames St., London.

At the same time Forsyth was working with Potassium Chlorate in Scotland, Charles Edward Howard (1774-1816) was in Norfolk working with mercury, so that by March 13, 1800, he was in a position to report his findings before the Royal Society and in the *American Journal of Science*, on the isolation of mercury fulminate, a new process to produce a chemical which could be detonated by percussion.³

Howard did not carry his experiments further (his interest ended with an explosion in which he was severely injured) but in 1823, E. Goode Wright of Hereford, published a lengthy note "On the Substitution of Fulminating Mercury in place of Detonating Compositions into which Chlorate of Potash enter as a Priming for Percussion Guns."⁴ He noted that "It does not create rust so rapidly nor generate dirt from the charcoal after firing; it is not affected by damp."

In the third edition of *Instructions to Young Sportsmen* published in 1824, Peter Hawker wrote:

In August, 1824, I gave the following statement relative to this [percussion] powder: "Since the first part of this work was printed off, a letter has been received from Mr. Joyce, chemist, 11 Old Compton-street, Soho, commenting, as he is fully justified in doing, on the injury done to fire-arms by oxymuriate of potash; and enclosing a specification of a new 'ANTI-Corrosive' percussion powder."⁵



A1.1 Alfred Clayton's 1850 Registered Design of a tube primer [T14] was in improvement to Peter Hawker's 1849 construction [T12]. This illustration from the 1854 edition of Hawkers "Instructions" is copied from the Design Act Application and incorporates his crest on the handle, but all of the surviving primers seen are marked with Clayton's Southampton address

Hawker noted that "Mr. Joyce has had so many obstacles to overcome before he could bring it to perfection that we must, at all events, give him a great deal of credit." World wide, over the 50 or 60 years following the granting of Forsyth's patent, hundreds, perhaps thousands, of designs were created to "improve" the current priming composition and form or to speed up the reloading process. Most of them got no further than the drawing board, few got as far as production of a prototype, and most others, with the exception of copper caps and tubes, were produced in very small quantities.

The ever present anvil

Although it is never mentioned in the literature of the period, an anvil against which the primer could be crushed for detonation was an absolutely essential component and there were only a few substantial variations in anvil design. Forsyth's anvil was the depression in the steel axle where the powder was deposited when the scent bottle was rotated; in Manton's 1816 patent, the pellet located in a chamber or in a removable nose on the hammer, was crushed against the bottom of the chamber by the pin which Manton called the tube; his 1818 patent tube lock was constructed with a platform made as part of the lockplate into which the tube was clamped.

The percussion nipple proposed by Collinson Hall in 1817 was the first, and ultimately the only purpose-designed "anvil" required to detonate the primer. It is not yet known when the cap makers and the nipple makers developed standard sizes but it must have been before 1830 and in the next decades sportsmen were demanding improvements.

In 1849, Peter Hawker who was famous in the sporting world because of his literary efforts, created what he called the "saucer plug and side primer ignition"[T12] which a year later was improved by Alfred Clayton, a gunmaker then at Lymington and after 1855, at Southampton.

Primer Identification

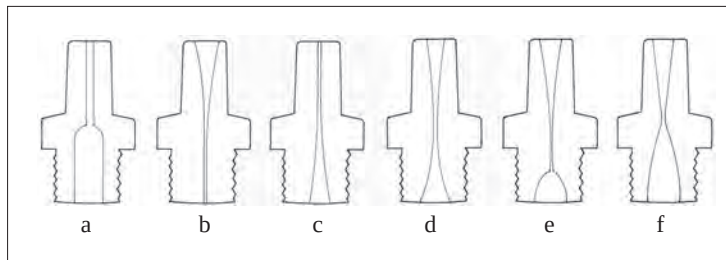
The illustrated record which follows is an attempt to categorize all of the early primers in a readily identifiable, expandable format, and to provide a means of identification.

The early primers can be easily separated into three groupings based upon visible characteristics: pellets, tubes, and caps. It is of extreme importance that identification of these divisions be obvious to all who work in the field. In summary, they include:

2 Appendix IX — Primers



A1.2. A late sample board, probably dating from the last half of the 19th century. The nipples differ in cone length, square shape, vent design and screw thread.



A1.3. The hole, vent, or touch-hole, of some of the nipples produced by James Dixon & Sons at Sheffield. They are identified, as *a*. polished squares and bottom; *b*. 2 sides, reversible hole; *c*. taper hole; *d*. double taper holes; *e*. double taper hole extra best quality; *f*. Westley Richard's pattern double taper hole. They were available in Medium quality, Better quality, Best quality, Extra best quality, copper lined, and platina lined.

Pellets: whether in powder, combustible pellet, pill, or disk, shaped or contained in a capsule, tape, or other ribbon-like material.

Tubes: either plain, patented, single, round, flat, or continuous tubes containing a detonating compound.

Caps: common or top hat caps, by design differences but not by maker or marking, unless technically, physically, or historically different, and with that difference being a visible characteristic.

Primer Identification and Sources

It would not be difficult to identify primers if they all arrived in a nicely labeled container that could be shown to have the original contents, but that is not the way they are usually found. Once a primer is removed from its container it must have some form of permanent identification, otherwise it will quickly lose its identity. The writer's reference collection is housed in 2x2 inch coin holders which can be stapled for security and provide sufficient space for recording data.⁶ These are then stored in page size holders designed for 35mm slides.

The best primary source for identification is the patent office records now housed in the new British Library in London, and the Patent Offices in Paris and Washington.⁷ Patentees usually describe the primer intended to be used and occasionally illustrated them. These of course are most useful but consideration must be given to minor alterations made between the start of the patent process and manufacture of the specimen.

Special, and perhaps unique designs, found in cased sets have been identified with somewhat less convincing accuracy but they do provide a place to start. In this category

MILITARY PERCUSSION CAPS.

As supplied to HER MAJESTY'S WAR DEPARTMENT, the IMPERIAL OTTOMAN,
and other FOREIGN GOVERNMENTS.

			Per 1000.—s.	d.
TW TREBLE WATERPROOF CENTRAL-FIRE, in boxes of 250 each	...	...	3	6
FC FOIL COVERED (Best Quality)	do.	...	3	0
BP BEST PLAIN, for Enfield Rifles,	do.	...	2	9
FM FOIL COVERED,	do.	...	2	6
PM PLAIN,	do.	...	2	0

Kept in Boxes of 100 each at 3d. per 1000 extra.

JOYCE'S SIZES OF PERCUSSION CAPS CORRESPOND WITH THOSE OF OTHER MAKERS as follows:—

JOYCE'S	C.F. Caps.	42	29	23	24	15	25	18	21	12	26	22	16s
ELEY'S	Same Size.	5	7	8	24	10	11	18	12	...	13	14	26
BIRMINGHAM		43	46	48	50	51 52	53 54	55 56	57	...	58	...	...

Where there are two numbers of the Birmingham Sizes corresponding with only one of Joyce's it is in consequence of two numbers being of the same size, varying only in the length of the Caps.

A1.4. The two London capmakers and those located in Birmingham assigned their own numbers to identify cap size. This page from the 1894 F. Joyce & Co. Ltd. catalogue records the numbers used by each.



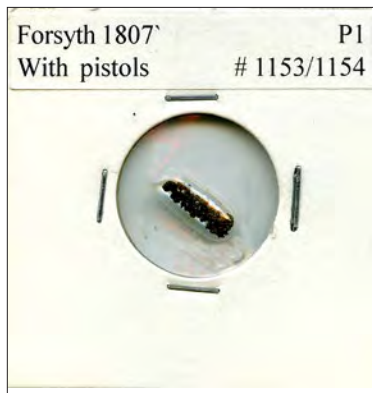
A1.5. A percussion cap gauge engraved "F. Joyce London — Manufacturer of Percussion Caps" on one side of the brass band. The other side engraved with the cap sizes, clockwise, beginning from the musket size at 12.00 o'clock are numbers M, 34, 22, 26, 12, 21, 18, 25, 15, 24, 23, 29, 4, 41, 40, M. The inside diameter of the ring measures Only two examples with this detail have been recorded and both originated with officials in the Joyce company. *W. Keith Neal collection, courtesy David H.L. Back.*



A1.6. A cast brass percussion cap gauge produced for commercial sale by W.&C. Eley using that name between 1841 and 1851. Pegs (not drilled as nipples) have been included for a musket cap and, (right side) caps No. 4, 6, 8, 9, 24; (left side) 13, 12, 18, 11, 10. The overall length is 4.7 inches (119mm) — reproductions have been produced which measure 4.6 inches (116mm).



A1.7. Cap gauge by "W.N. Lowell March 17, 1887" a gunmaker in Danville, New Hampshire. It has pegs for caps of musket, No. 10, 11, 12, 13, and GD size. The latter is not usually recognized as a size; it is usually considered to be a brand or perhaps quality with the initials "GD" embossed on the crown and used by many cap makers.



A1.8. A 2x2 inch coin holder provides space for data, including the source. Powder, in this case, acquired from the late W. Keith Neal, has been contained in a medicinal capsule and additional information recorded on the reverse.

would be the d'Ancion [T15] tube from a cased pair of pistols now in the Roy G. Cole collection in the Royal Ontario Museum at Toronto and the LePage primers [T22] found with the cased revolving pistol in The Royal Armouries at Leeds.

Most gun collectors accumulate all kinds of related “things.” Many of those “things” have been primers which have been handed down from collector to

collector for almost two centuries, carrying with them their identity as primers from the time they were in the hands of the original purchaser.

In the mid 1960s, a Canadian collector purchased a box – a pistol case missing its partitions – half filled with primers accumulated by Tony Foley. Mr. Foley was a long-time London antique arms dealer who, whenever he came across a cased gun, tossed the less common primers into the box because they could not be sent to a buyer by mail.

William Keith Neal (1905-1990) built what has been described as the finest collection of early English guns ever assembled. He was also a great accumulator of gun material and when that portion of his collection was sold in July 2002, there was more than 100 of the typical round “pill” boxes, numerous chamois bags and countless little boxes and envelopes with what he considered to be primers in the sale. Happily, I had the opportunity to spend time with him in his gunroom in Guernsey and acquired a number of identifiable, and unidentifiable early primers from him and later, a few from the sale.⁸ Most of the WKN “things,” some of which are identifiable as primers but a few which are not obvious, but probably are, primers. They are included here because it is assumed that the previous owners knew more about them than I. There were nine previously unknown primers.

The contemporary literature is a reliable source for identification. Peter Hawker, an avid English shooter whose *Instructions for Young Sportsmen* went through eleven editions between 1814 and 1859, covers the early development of the percussion system and many of the editions include illustrations of recently developed primers with a paragraph or more on each. His contributions include identification of those by Daniel Long [T10], Charles Lancaster [T9], Westley Richards [P9, T4], and one of Joseph Manton's designs [T2]. He did not include his own Saucer Plug primer [T12] developed in 1849 but he did include Alfred Clayton's improvement to it [14] registered in 1851.

A Capt. R. Lacy, writing in *The Modern Shooter* published in 1842, described and illustrated J.W. Edge's “Eccentric Capped-Tube primer [T8] and W. W. Greener illustrated a number of primers in most editions of *The Gun and Its Development* [P19, T4, T20]. It must be noted though that Greener was not born until 1834, missing first-hand knowledge of the system, and he did not publish the first edition of *The Gun* until 1881, by which time his data was not as accurate as one would wish.

There were numerous early patents for percussion ignitions in France and the requirement for primers was probably met by local chemists, just as they were in England.⁹ As early as 1817, Marin Gevelot was an *armurier et fourbisseur* (armourer and

arms merchant) in Paris and was probably producing percussion primers in pellet form at that time or very soon after that date. By 1826 or 1827, his son Marie-Joseph had acquired a manufacturing facility for fulminate of mercury and percussion caps at Issey les Moulineaux. The firm continued as a family business until 1884 when it merged with Gaupillat & Co.

In 1835, André François Gaupillat established a cap making business at 74 Richelieu, Paris. In 1837 they opened a plant at Bas Meudon. The business went through a number of different partnerships over the next 50 years but remained mainly a Gaupillat enterprise until December 1884 when it merged with Gevelot.¹⁰ In 1980, the successors of Gevelot & Gaupillat became bankrupt and the individual companies reorganized with the old Issy les Moulineaux plant forming the new *Societe Francaise de Munitions* (SFM). It was because of that bankruptcy that the Joseph Egg caps [C1] illustrated in Fig. 11.14 and the identifying container found their way into the reference collection.

Percussion Primers, and the Accession Record

In the accession record which follows, the prefix “P” “T” or “C” is accompanied by a numerical figure entered from a master list which has been compiled in the order of accession. In the system, the number will *always* make reference to a specific primer, design, or size.

There will undoubtedly be some duplication in this study created in the effort for completeness. For example, P21 and P22 are (almost) certainly the same primer. The specimen P21 which is based upon the 1859 U.S. Patent of Jacob Rupertus, is conclusive. The specimen called P22 conforms, (almost), to the patent description but it is associated with a contemporary, documented, Russian, provenance, in which one Thomas Bishop is described as the inventor. If it is proven that they are the same, one will be removed and the number will be voided.

This study deals only with the “early primers” but the system could be expanded with little difficulty to the primers designed for self contained combustible and metallic cartridges. This though I will leave to others.

Notes and Recommended Reading

1. Reid, Major-General Sir Alexander John Forsyth. *The Reverend Alexander John Forsyth M.A., LL.D. Belhelvie, Aberdeenshire, 1768-1843 and His invention of the percussion lock*. Aberdeen University Press, 1909, Reprinted 1955.
2. Gooding, S. James. “Accum and Garden, 1805-1823: Percussion Powder Makers, and a note on their successor, Frederick Joyce.” *IAA Journal*, 385. (Sept/Oct. 1995), p. 19.
3. Howard, Edward Charles, “On a new fulminating mercury.” *Philosophical Transactions of the Royal Society* 1800, pt. 1, pp. 204-38; Howard, Edward Charles. “On a new fulminating mercury.” *American Journal of Science*. Vol. 90, Series 2, (1800) p. 649;
4. Wright, E. Good “On the Substitution of Fulminating Mercury in place of Detonating Compositions into which Chlorate of Potash enter as a Priming for Percussion Guns.” *The Philosophical Magazine & Journal*. Vol. LXII, 1823, p. 203.
5. Hawker, Peter. *Instructions to Young Sportsmen in all that Relates to Guns and Shooting*. London: various publishers. 1825, p. 76. Hawker’s *Instructions* went through 11 London editions; 1814, 1816, 1824, 1825, 1826, 1830, 1833, 1844, 1854, and a Philadelphia edition in 1846. Each, from 1824, contained information on new developments in the percussion system.
6. The staples should be flattened with a pair of pliers or a very small hammer.
7. Very few records for primer designs created in central Europe relating to this study have been examined.
8. Christies – London, July 18, 2002.
10. Leveau, Amand. “The Gaupillat Family.” *IAA Journal*, No. 451, (Sept/Oct. 2006), pp. 126-128.

6 Appendix IX — Primers

Primer Identification

The collection of information for the Primer Identification Manual which follows began in the mid 1950s and the first significant article on the subject appeared in *The Canadian Journal of Arms Collecting*, Vol. 4, No. 4, in November, 1966. By the 1980s, the record had expanded to the point where a convenient method of identification had to be created.

The alpha/numeric assigned to each primer type will remain constant. In some cases, the identification of the primer will be changed to represent later information and that information has been included in “Errata & Addenda” following the last page of percussion caps.

PELLETS

Powder



Pills



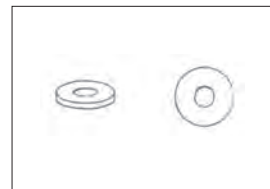
Patches



Tapes

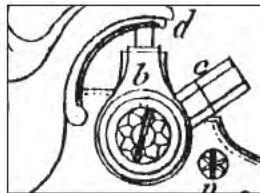


Wafers





P1 1807 — A. Forsyth



P2 1810 — De l'Etang



P3a 1821 — W. Richards



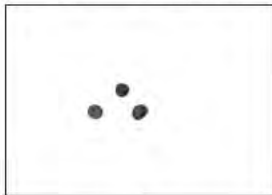
P3b 1821 — W. Richards



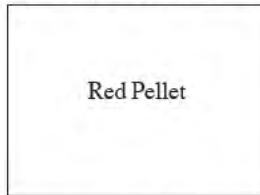
P4a 1826 — S. Guthrie



P4b 1826 — S. Guthrie



P4c 1826 — Guthrie



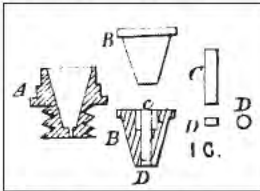
P4d 1826 — Guthrie



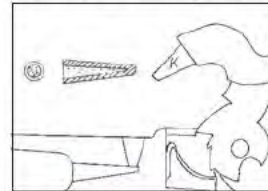
P5a 1830 — Billinghamurst



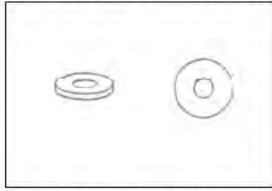
P5b 1830 — W. Billinghamurst



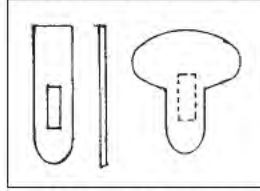
P6 1834 — J.A. Manton



P7 1840 — J.R. Cooper



P8 1839 — H. Wilkinson



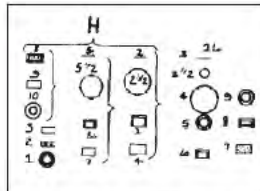
P9 1841 — W. Richards



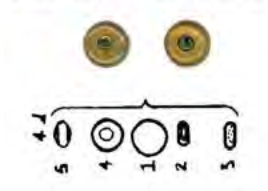
P10a 1845 — E. Maynard



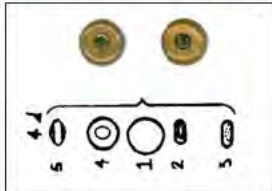
P10bcd 1845 — E. Maynard



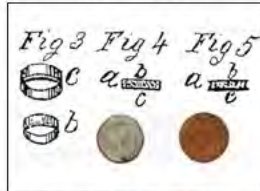
P11a 1845 — C.J. Smith



P11b 1845 — C.J. Smith



P12 1850 — von Gersheim

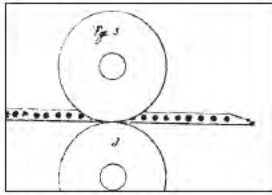


P13ab 1852-53 — C. Sharps

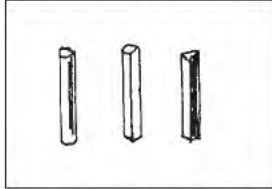


P14 1855 — J. Butterfield

- P1 1807 — Forsyth Percussion powder
English patent No. 3032, 11 April 1807. The basic patent for the percussion system. Specimen: ex W.K. Neal, Slider locks No. 1153, 1154. (Alexander John Forsyth).
- P2 1810 — l'Etang Powder
French patent No. 600, 26 September 1810; *Certificate d'Addition* 8 May 1811; a rotating magazine for detonating powder, (Prosper De l'Etang).
- P3a 1821 — W. Richards Powder/pellets, .339" dia
English patent No. 4,611, 10 November 1821, Composition, Westley Richards
- P3b 1821 — W. Richards .306" dia
Paper patch in brass band, stamped "WR" on band.
- P4a 1826+ — Guthrie .020" black pellet
- P4b 1826+ — Guthrie, No. 1 .10"+ gold pellet
- P4c 1826+ — Guthrie, No. 2 .05"± gold pellet
- P4d 1831+ — Guthrie Red Pellet.
Described in *American Journal of Science & Arts*, 1831-32 and reported by Pauling, Samuel Guthrie. (see also P5a)
- P5a 1838+ — W. Billinghamurst .085" red pellet
Specimen: "Waterproof Percussion Priming Made by W. Billinghamurst, Rochester, N.Y." (see also P4d)
- P5b 1838+ — W. Billinghamurst .100" black pellet
- P6 1834 — J.A. Manton Wooden plug
English patent No. 6,572, 13 March 1834. A conical wood plug through which runs a small iron pin projecting about $\frac{1}{12}$ inch above the wood.
- P7 1840 — J.R. Cooper Conical shape
English patent No. 8,347, 21 January 1840. There are numerous drawings and a magazine using percussion caps is described. Joseph Rock Cooper.
- P8 1839 — H. Wilkinson Card patch, round
English patent No. 8,119, 22 June 1839. Caps or detonating powder fastened upon or between paper or cardboard discs. Henry Wilkinson.
- P9 1841 — W. Richards Card patch, wedge
English patent No. 9,177, 14 December 1841. Hawker mentions this in 1844 as "a flat paste-board primer covered with tin-foil."
- P10a 1845 — E. Maynard Tape, 680"
U.S. Patent No. 4,208; Sept. 22, 1845. Tape primer made of paper. Specimen: First stage in manufacture, erroneously described as experimental. Edward Maynard; English patent No. 1,078; 10 June 1845, George Washington Tyson; French patent No. 1696; 17 August 1845; G. W. Tyson.
- P10b 1845 — E. Maynard Tape, Brown, .198"
- P10c 1845 — E. Maynard Tape, Red, .221"
- P10d 1845 — E. Maynard Tape, Green, .181"
- P11a 1845 — C.J. Smith Various forms
English patent No. 10,667; 14 May 1845 illustrating many variations. Charles J. Smith. (see also C64, P67)
- P11b 1845 — C.J. Smith Brass capsule
Specimen: A 2-piece "donut" with a white metal center, .168 inch dia. .08" deep. (see P67)
- P12 1850 — Von Gersheim Nail shaped
English patent No. 13,935; 29 January 1852. Three formula to be "made into suitably shaped pellets." Jos. von Winiwarter Specimen: package label: *Gersheim's Percussions Zünder*.
- P13a 1852 — Sharps Cu. & foil capsule
"Pellets ... may be shielded or covered in any way that will be effectual." Specimen: Copper cup with a white metal cover .1785"± inch diameter, .035"± inch thick. Discussed in, but not covered in Christian Sharps; U.S. patent No. 9,308, 5 October 1852; French patent No. 15,042, 15 Dec 1852.
- P13b 1853 — Sharps Copper capsule
Detonating compound between two interlocking copper cups .1840 to .1860" dia. x .029" thick. Covered in Sharps; U.S. patent No. 9,820, June 28, 1853.; Christian Sharps.
- P14 1855 — J. Butterfield Cu. & foil capsule
U.S. patent No. 12,124; 2 January 1855 for a back action lock using a percussion cap, but with no mention of a pellet primer. Jesse S. Butterfield. See also P86.
The capsule P13a (.1785"± diameter), is the only one yet identified which might fit the non military Butterfield pistols; French patent No. 38,195, 28 September 1858. Primers in the shape of flattened disks piled in rolls and coated with shellac. Joseph L. Chester. (see also P86)



P15 1856 — J. Chattaway



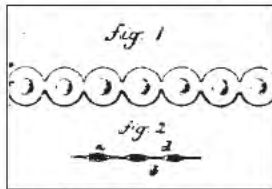
P17 1857 — Bousfield



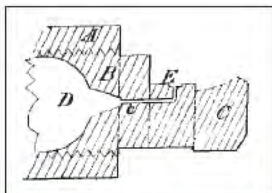
P19 1817 — C. Hall



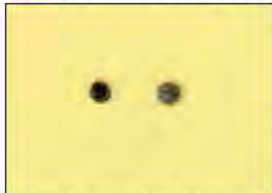
P22 1859 — T. Bishop



P25 1879 — M. Backes



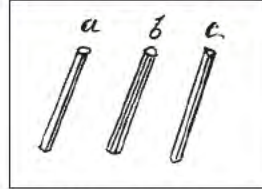
P28 1824 — de Berenger



P31 1816 — Jos. Manton



P16a 1856 — J.D. Greene



P18 1858 — D.G. Rollin



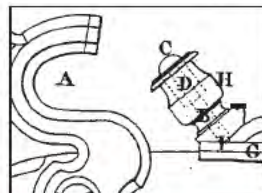
P20 1859 — T.T.S. Laidley



P23 1866 — C. Canouil



P26 1880 — H.F. Megill



P29 1810 — J. Lepage



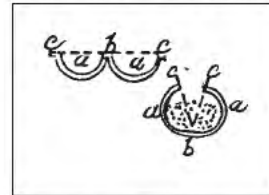
P32 183± — C. Moore



P16b 1856 — J.D. Greene



P18ab 1858 — D.G. Rollin



P21 1859 — J. Rupertus



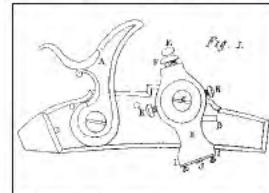
P24 1876 — E. Savorel



P27 xxxx—J. Butterfield(?)



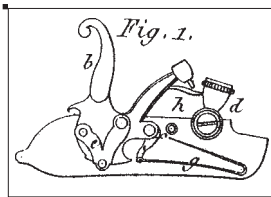
P30 183± — C. Moore



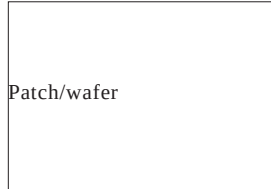
P33 1810 — F. Prélat

10 Appendix IX — Primers

- P15 1856 — J. Chattaway Metal tape
U.S. Patent No. 15,063, June 10, 1856; Water-proof percussion cap/foil cover of cap soldered in place with bismuth, lead, tin alloy. James Chattaway ; U.S. Patent No. 15,370, July 22, 1856. Metallic tape percussion primers made of alloy of bismuth, lead and tin and pressure welded together after fulminate is applied to depressions. James Chattaway.
- P16a 1856 — J. D. Greene Cloth tape, Pat. model
English patent No. 447, 21 February 1856. A strip of paper or linen formed into a roll. Specimen: fabric with patches of , black detonating powder. Patent version, .21 inch wide. James Durell Greene
- P16b 1856 — J. D. Greene Cloth tape
Production, version, .26 inch wide.
- P17 1857 — G. T. Bousfield Combustible sticks
English patent No.2882, 17 November 1857. George Tomlinson Bousfield. French patent, No. 34,673, 7 December 1857. George G. Martin.
- P18a 1858 — D. G. Rollin Stick
U.S. Patent No. 20,129, April 27, 1858. Detonating compound formed into a thin stick shape to be used as a continuous priming stick.. Pat. model, .120" dia.
- P18b 1858 — D.G. Rollin Stick primer
Production model .089" dia.×.5"
- P19a 1817 — C. Hall Paper patch
The Silver Medal of The Royal Society for the Encouragement of the Arts was awarded in 1818 to Collinson Hall for the development of the paper patch and nipple. Most are .150" diameter with white paper on one side and marble paper the other. (See also P79).
- P19b 1817 — C. Hall Paper patch
As above, white paper on each side. The ease of manufacture of this primer would suggest many local manufacturers.
- P20 1859 — T.T.S. Laidley tape, patent model
U.S. Patent No. 22,957, February 15, 1859; Tape of shallow metallic percussion caps held on a paper tape. (This description does not conform with the model submitted to the U.S. Patent Office with the patent application). Theodore T. S. Laidley
- P21 1859 — J. Rupertus Lead covered pellet
U.S. Patent No. 25,142, August 16, 1859; Fulminate enclosed in metallic sphere, in hemispherical form. Jacob Rupertus.
- P22 1859 — Bishop Lead covered pellet, 170"
Specimen submitted "on behalf of the inventor" Thomas Bishop, to British ambassador in Moscow.
- P23 1866 — C. Canouil Paper, suitable shapes
French patent 23 June 1866; No. 72,052; priming powder compressed between two identical and non metallic units. Charles Maurice Paul Canouil.
English patent No. 1,896, 21 July 1866. Pellets between sheets of paper "divided into strips, rounds, squares, or other suitable forms." Specimen: perforated green paper square.
- P24 1876 — E. Savorel Perforated metal strip
U.S. patent No. 174,675, 15 February 1876; .199" wide on .30" centers. Edward Savoral.
- P25 1879 — M. Backes Wafer strips
U.S. patent No. 221,015, 28 October 1879. M. Backes
- P26 1880 — H. F. Megill Paper tape
U.S. patent No. 227,560, 11 May 1880. A blue pellet .25" wide tape. This patent was described as a lamp starter. Henry F. Megill.
- P27 xxxx — Butterfield (?) Red/White wafer
Specimen: Paper wrapped package with identification "Butterfield Primers" in pencil, containing wafers of cardboard, .33 inch. diameter x .040 inch thick, red one side, white the other.
- P28 1824 — de Berenger Pellet
English patent No. 4990, 27 July 1824. The percussion priming may be made up in powder pellets, patches, metallic caps, or other forms. Charles Radom de Berenger.
- P29 1810 — LePage Varnish or rubber coated
French patent No. 585, 23 June 1810. Jean Lepage Pellet dispenser in cased set indicates a ball of less than .06 inch.
- P30 183± — Charles Moore Red pellet
A red pellet .090" dia. found in Charles Moore, London, dispensers.
- P31 1816 — Manton grey/black pellet
English patent No. 3,985, 29 February 1816. Joseph Manton. Specimen: A flat, grey/black pellet, 110" dia., found with cased pistols S/N 8274
- P32 183± — Charles Moore Adaptation of P-31
P31 pellet between paper, cut to .25"± in squares. Cased with C. Moore revolver S/N 861 (see also P30)
- P33 1810 — Prélât, Pills/Powder
French patent (*Brevete d'Importation*) 17 April 1810 for Forsyth's patented roller lock. François Prélât

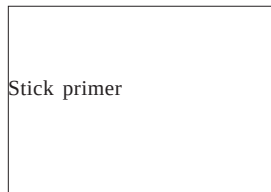


P34 1818 — C. Pottet



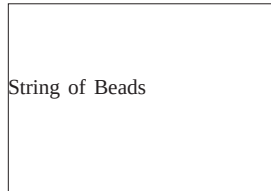
Patch/wafer

P37 1822 — Guillemin



Stick primer

P40 1857 — G.G. Martin



String of Beads

P43 1833 — J. Contriner

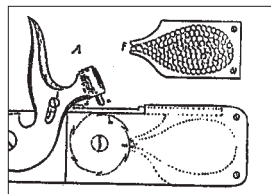


P46 1970 — L.H. Cherepy

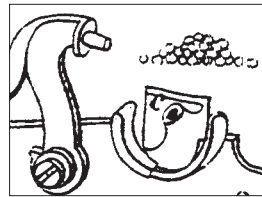


Pill

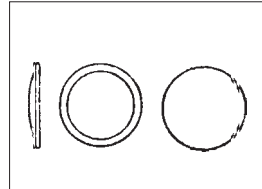
P49 1821 — Lepage



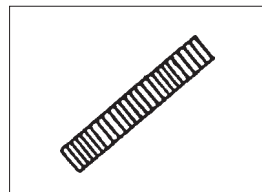
P52a 1837 — L. LeGrain,



P35 1818 — F. Prélate



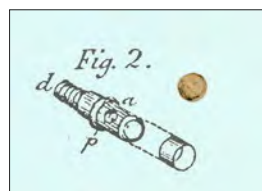
P38 1824 — L.M. Gosset



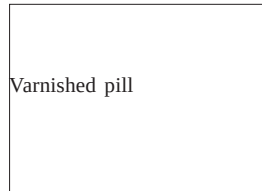
P41 1858 — J.L. Chester



P44 183±—Bisbee & Wilson



P47 1820+ — F. Fox



Varnished pill

P50 1825 — J. Leroy

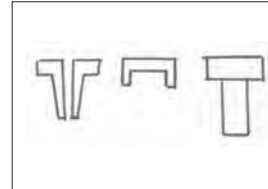


Glass globule

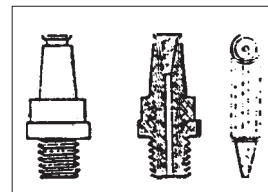
P52b 1837 — L. LeGrain,



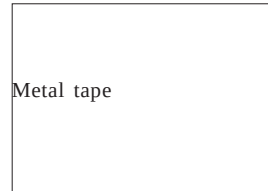
P36 1820 — L.M. Gosset



P39 1825 — J.J. Plomdeur

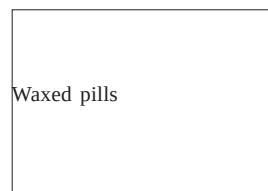


P42 1872 — R. Andreany



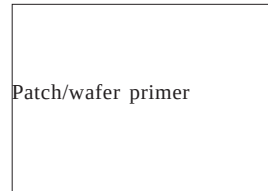
Metal tape

P45 1859—Harmer/Parsons



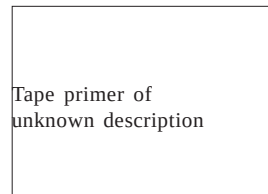
Waxed pills

P48 1821 — Moreau



Patch/wafer primer

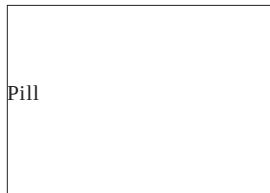
P51 1826 — P. Mahiet



Tape primer of
unknown description

P53 1839 — Martin

- P34 1818 — Pottet Pills/Powder
French patent, 28 August 1818, 2nd *Certificate d'Addition* 11 October 1819, magazine containing 28 pills. Clément Pottet.
- P35 1820 — Prêlât Pills/Powder
French patent 29 July 1818, *Certificate d'Addition* in 1820. The use of pills, size of a pea, waterproof and fireproof. François Prêlât.
- P36 1820 — Gosset Brass/paper, 1cm. dia.
French patent 11 July 1820; cardboard trimmed in the center with fulminate powder and covered with a very thin sheet of copper. Louis Marin Gosset
- P37 1822 — Guillemin-Lambert Patch/Pastille
French patent No. 1,417/2,039; 27 Sept 1822; lead disk of 3 'lignes' (.26 inches) lined with paper or parchment and fulminate in the center, Philippe Guillemin-Lambert.
- P38 1824 — Gosset Patch/Pastille
French patent 20 Dec 1824; No. 2,536; round primer covered with lead or copper metal with priming powder in the center. Louis Marin Gosset,
- P39 1825 — Plomdeur Pellet
French patent No. 2,556; 29 Dec 1825; copper mushroom primer, Jacques Joseph Plomdeur
- P40 1857 — Martin Stick primer
French patent No. 34,673, 7 December 1857. George G. Martin of New York, patentee, Devos, agent.
- P41 1858 — Chester Patch/Pastille
French patent No. 38,195, 28 Sept 1858; primers in the shape of flattened disks pillled up in rollers and coated with shellac. The patent for Butterfield's priming device. Joseph L. Chester
- P42 1872 — Andreany Pellet
French patent No. 96,091, 31 July 1872, Capsule without metal, Rocco Andreani.
- P43 1833—Contriner String of beads
In 1833, the Viennese gunmaker Joseph Contriner offered the Austrian military a conversion with a magazine using a cord imbedded with wax protected pills which looked like a rosary.
- P44 1830± — Bisbee & Wilson Black pills
Specimen: Black pills .07"± dia. labeled manufactured by Bisbee & Wilson, Garrotsville County, Ohio.
- P45 1859 — Harmer/Parsons Metal tape
English patent No. 1,145; 16 June 1859. "Caps" in a metal tape with edges bent and shaped to form a ratchet. John Harmer and William Parsons.
- P46 1970 —Cherepy Paper patch, modern.
Specimen: The alteration of a toy cap to illustrate the action of a patch lock. Louis S. Cherepy Sr
- P47 1825± — Unidentified Pellet, .146" dia.
Specimen ex W.K. Neal, D.H.L. Back. See also P62. Paper covered pellet. Appropriate for use with Francis Fox's English patent of 15 January 1820. (See also P60, P62, P72).
- P48 1821 — Moreau waxed pills
French patent No. 1,156; 8 February 1821, A wax or resin covered pill to be placed in a cavity in the hammer. Moreau.
- P49 1821 — Lepage Pill
French patent No. 1,358; 12 March 1821; Pill covered with resin placed in the cavity of the hammer. Jean Lepage
- P50 1825 — Leroy Varnished pill
French patent No. 1,797; 8 September 1825; the pill is coated with a vanish of specific mixture. Julien Leroy.
- P51 1826 —Mahiet Wafer/patch primer
French patent No. 1,834, 10 February 1826; the priming powder is placed between two sheets of varnished and oiled parchment and placed in a cavity of the hammer, Philippe Mahiet.
- P52a 1837 — Legrain Metal covered pill
- P52b 1837 — Legrain Glass globule
French patent No. 6,076, 12 December 1837; Pill coated with a thin sheet of metal or metallic powder. Glass globule size of a pearl filled up with fulminate powder. Louis Legrain
- P53 1839 — Martin Tape
French patent No. 5,243; 7 July 1839, Improvement in Heurteloup's pat. used a primer tape of unknown description; Martin (see T7, T26)



P54 1845—A.M.D. Guibert



P57 xxxx — Unidentified



P60 xxxx — Unidentified



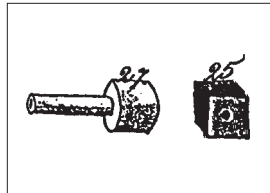
P63 1824-6—Cartmell/Manton



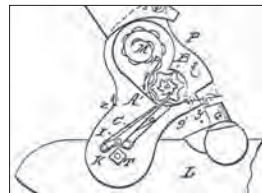
P66 xxxx — Unidentified



P69 xxxx — Unidentified



P72ab 1837 — E. Audent



P55 1856 — J.N. Ward



P58 xxxx — Unidentified



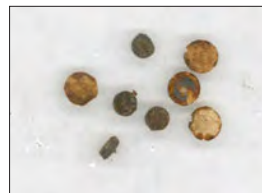
P61 1856 —Andrene/Bolasco



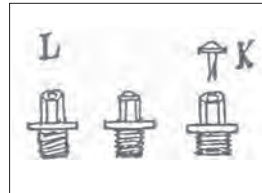
P64 xxxx — Unidentified



P67 xxxx — Unidentified



P70 1817 — I. Riviere



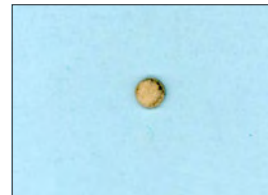
P73 1837 — J.J. Plomdeur



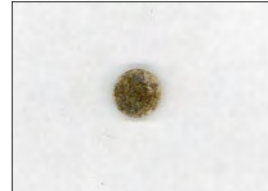
P56 1866—Blanchon/ Canouil



P59 xxxx — Unidentified



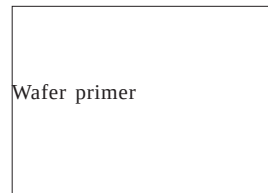
P62 xxxx — Unidentified



P65 xxxx — Unidentified



P68 xxxx — Unidentified



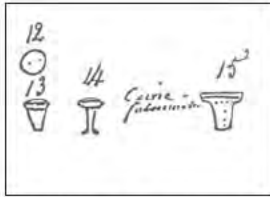
P71 1822 — J. Shaw



P74 xxxx — Unidentified

P54	1845 — Guibert	Pill	
	French patent No. 1,808, 15 July 1845; Guibert, "Pil-amorce" of a particular compound, Auguste Marie Denis Guilbert.		
P55	1856 — Ward	Tape primer	
	U.S. patent No. 15,262, July 1, 1856, hammer magazine; Maynard's tape (P10) might have been used but the diameter of the roll would have to be less than .75 inch diameter. James N. Ward.		
P56	1866 — Canouil & Blanchon	Tape	
	French patent No. 72,213, 9 July 1866; use of tape primers. The tapes made for Maynard's patent arms would perhaps fit.		
P57	xxxx — Unidentified	Tape	
P58	xxxx — Mass. Light Co.	Tape	
	Specimen: 100 Repeating Matches Pat. Nov 7, 1865. .257-.300 wide.		
P59	xxxx — Unidentified	Tape	
	.490 inch wide.		
P60	xxxx — Unidentified	Grey/black wafer,	
	.141x.033" diameter		
P61	1856 — Andreane/Bolasco	Capsule	
	French patent No. 26,513, 20 February 1856, A primer for artillery. Andreane & Bolasco		
P62	xxxx — Unidentified	Pellet	
	Specimen: Paper covered pellet w/ black crystalline core. .1465" dia.×.050 - .058" thick (See P47).		
P63	1824/1825 — Cartmell/Manton	Pellet	
	English patent No. 5,033, 6 November 1824; Thomas Cartmell; English patent No. 5,106, 26 February 1825; Joseph Manton. Specimen: Round, grey ball .040-.060" dia. Ex W. K Neal collection, consistent with patent illustrations.		
P64	xxxx — Unidentified	Orange balls,	
	.090-096 inch diameter		
P65	xxxx — Unidentified	Grey wafer, .	
	Specimen: A grey wafer .2258-.2510"×.0740-.1035" dia. ex W. K. Neal.		
P66	xxxx — Unidentified	pill	
	Specimen: A brown, crystoline pill-like with illegible inscription. From the primer collection of W. Keith Neal.		
P67	xxxx — Unidentified	Copper pellet	
	A copper pellet composed of bands of copper: a multi piece pellet .254 0215×.1095" (see P11). Since identified as a primer for metallic cartridges.		
P68	xxxx — Unidentified	wafer	
	Specimen, .Shiney, brown .294×.069"		
P69	xxxx — Unidentified	Wafer	
	Specimen: A black, metallic colored wafer, .180×.092 inch diameter		
P70	1817 — Riviere	Pellet	
	Specimen: black crystalline appearance, .129-131" dia.×.074". Recovered from magazine No. 678 of Isaac. Riviere's "patent" hammer-magazine where it was covered with white paper disk over the opening.		
P71	1822 — Shaw	Wafer	
	U.S name & date patent 19 June 1822 for a cap (no description but possibly a wafer) made of copper and a wafer. Joshua Shaw. (See C3)		
P72ab	1837—Audent	Ctg. primer	
	French patent 8,066, 22 December 1837. Primer for a cartridge showing the old form (left # 27) and the new form (right # 25). The detonating pellet was placed in a depression in the wooden shape and covered with a paper retainer. Ernest Audent		
P73	1837 — Plomdeur	Mushroom	
	French Patent No. 7,876, 4 October 1837. A copper mushroom shaped primer with the fulminate in the head. Jacques Joseph Plomdeur.		
P74	xxxx — Unidentified	Pellet	
	A paper pellet, orange on one side, white on the other, with small round detonator between. Diameter .182 inch diameter, .027" thick.		

Appendix IX — Primers 15



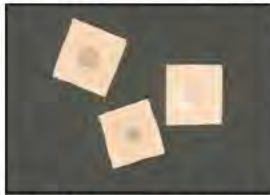
P75 1846 — Du Tillet/Flobert



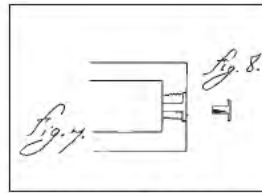
P78 1863—J. Lemaire-Daime



P81 xxxx — Samuel Nock



P84 1866 — Canuil Fils



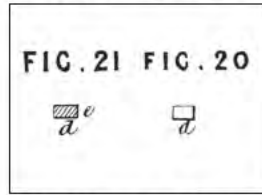
P76 1847 — P.A. Loron



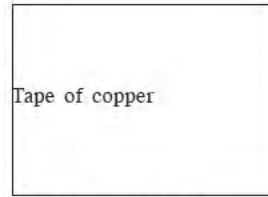
P79 1817 — C. Hall



P82 xxxx—Billinghurst gold



P85 1834 — J.A. Manton



Tape of copper

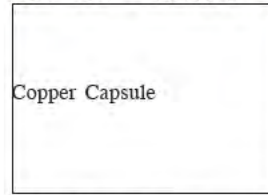
P77 1844—A. La Marmora



P80 183± — Coriander



P83 1837 — Plomdeur



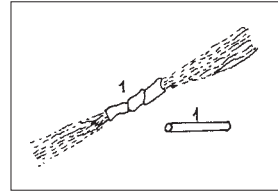
Copper Capsule

P86 1869—Gedney

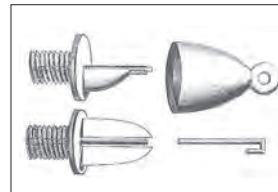
- P75abc 1846 — du Tillet & Flobert Various
French patent No. 3,589, 18 May 1846. Three variations of a “new cone shaped capsule” of copper for muzzle loading or cartridge loading guns. No. 15 is for military muskets. Antoine Paul du Tillet & Louis Nicolas Auguste Flobert.
- P76 1847 — Loron Ctg. primer
French patent No. 4,857, 4 January 1847. A nail shaped primer or percussion cap to fit into a specially constructed cartridge. Pierre Antoine Loron
- P77 1844 — La Marmora Continuous
Italian military trials beginning in 1837 led to the introduction in 1844 of a 4.5mm copper tape in a roll of 39 or 40 pellets on 11mm centers. Up to 1846 when machinery was introduced, the tapes were workman-produced; It was discontinued in 1848. Colonel (later General) Alesandro La Marmora.
- P78 1863 — Lemaire-Daime Parchment+
French patent No. 61,249, 17 Dec 1863; parchment, paper, fibrous or filamentous material for the manufacture of primers “pour armes a feu & jouets d’enfants.” Jacques Louis Lemaire-Daime.
- P79 1817 — Hall Patch .292 in. dia.
Specimen: An early variation of Hall’s patch with dimensions consistent with his description and illustration, covered on both sides with plain paper. In wooden pill box with incomplete label by *G Bott N^o 16 Bridlesmith Gate Nottingham.* (see also P19).
- P80 1825 — Coriander Seed .130-.170 in. dia.
English patent No. 5,242 granted Aug. 15, 1825 to Charles Downing of Devon: “...by use of any of the species of compositions known by the name of percussion powder, which composition or compositions I form into small pellets or grains about the size of coriander seeds, in the way in which medicinal pills are shaped...”
- P81 1823+ — Samuel Nock Wafter primer
A pair of pistols by Samuel Nock of London (at a post 1823 address), with a pan .25 inch diameter and a central depression approximately .1875 inch deep (7mm/5mm). The hammer nose is square at the base but becomes a round shaped peg. It is this peg that lands in the smaller hole.
- P82 xxx—William Billingham Gold Pills.
Pills of irregular shape and inconsistent size, similar to those produced by Samuel Guthrie, Container marked “Made by William Billingham”.
- P83 1837—J.J.Plomdeur Nail shape
French Patent No. 7,876, 4 October 1837. Mushroom/nail shape with fulminate in the head. .215 inch diameter by approximately .3 inch long.
Jacques Joseph Plomdeur.
- P84 1866—P. Canouil Fils Patch
Small, plain paper patch measuring approximately .3 inch square. Specimen box printed P. Canouil Fils, Amorce pour Jouets. See P73.
- P85 1834—John A. Manton Metallic priming
British Patent 1834 No. 6,572, 13 March, 1834. External view of my metallic priming. Fig. 21 exhibits a small cavity, formed in one end of the primer, to contain the detonating powder. See also P6.
- P86 1869—Gedney; Capsule
U.S. Patent 23,241, 15 March, 1869. Specimen not located but Sharp’s-like of less than .125 inch (4 mm) diameter. G.W.B. Gedney. See P14. Similar (identical?) primer for A.F. Bell Pat.38,770, 2 June 1863 and W.H. Bell Pat. 22,618, 18 Jan. 1859.

TUBES

Manton's Tube

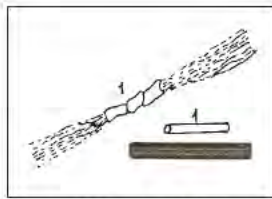


Saucer Plug

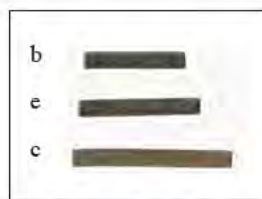


Unpatented





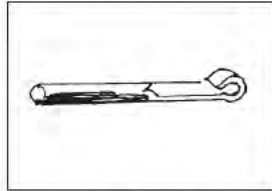
T1ab 1818—Jos..Manton



T1bec 1818—Jos..Manton



T1d 1818—Jos..Manton



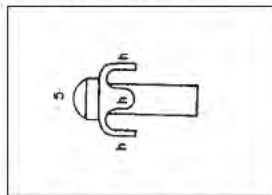
T2a 1818—Jos..Manton



T2b 1818—Jos..Manton



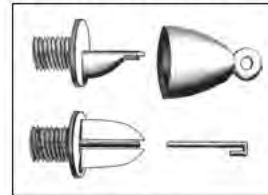
T3 1818—Jos..Manton



T4 1818—Jos..Manton



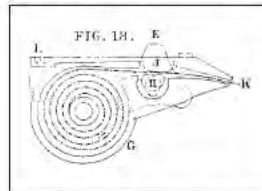
T5 1818—Jos..Manton



T6a 185+—Patstone



T6b 185+—Patstone



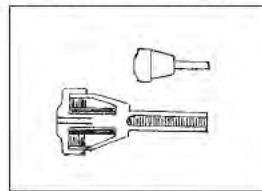
T7 1841—Heurteloupe



T8ab 1842—J.W. Edge



T9 1844—C. Lancaster



T10 1844—D. Long



T11 1844—H. Wilkinson



T12 1849—P. Hawker



T13 1850—C. Lancaster



T14a 1850—A. Clayton



T14b 1850—A. Clayton



T15ab xxxx—D. d'Ancion

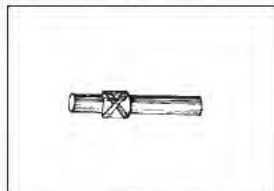


T16 xxxx—Unidentified

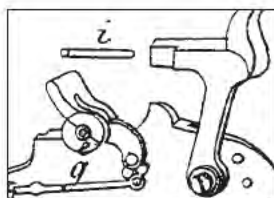
T1a	1818 — Manton Wrapped Tube English patent No. 4,285, 2 February 1818. Joseph Manton. The specimen illustrated as 'b' (.09×.550 inch) may be of the original size but no example has been identified.		ers, which will flatten them ... to assume the form of tapes." Magazine illustrated at T26. Charles Louis Stanislas, Baron Heurteloup. French patent No. 10,235; 21 August 1842; tin alloy gutter filled with priming powder and closed to form a tube. C.L.S. Heurteloup.
T1b	1818 — Joseph Manton straight/plain tube English patent No. 4,285, 2 February 1818. Joseph Manton. Plain tube, .0875 inch diameter, .527 inch long. A French patent granted to François Prelate in 1820 [T23].	T8a	1842 — J.W. Edge Eccentric cap/tube Described by Lacy, <i>Modern Shooter</i> , 1842. Specimen: Crown with raised mark "Edge," .09×.530" long
T1c	1818 — Joseph Manton .092×.675"	T8b	1842 — J.W. Edge Eccentric cap/tube A larger version of Edge's tube with a plain crown. .112×1.07"
T1d	1818 — Joseph Manton .090×1.45"		
T1e	1818 — Joseph Manton .090×1.650"		
T2a	1818 — Joseph Manton Ring end Illustrated by P. Hawker in the 9th edition (1844) of <i>Instructions to Young Sportsmen</i> .	T9	1844 — C. Lancaster Umbrella tube Illustrated by P. Hawker in the 9th edition (1844) of <i>Instructions to Young Sportsmen</i> . Based upon a T3 tube with a galvanized iron "umbrella." .09×.665"
T2b	1818 — Jos. Manton Ring end .080×.990" The end ring has a diameter of .239 inch.		
T3a	1818 — Joseph Manton .090×.685"	T10	1844 — D. Long Cone shape head Illustrated by P. Hawker in the 9th edition (1844) of <i>Instructions to Young Sportsmen</i>
T3b	1818 — Joseph Manton .090×.710" A tube identified (probably erroneously) by W.W. Greener in <i>The Gun and Its Development</i> as being invented by Joseph Manton. It was incorporated into the designs of others. (See T9, T13, T17, T33)	T11	1844 — Wilkinson Mushroom tube, Tentatively attributed to Henry Wilkinson who created an underhammer improvement using a primer somewhat like Westley Richards' (T4) primer. .150×.610"
T4	1831 — W. Richards All steel, .150×.610" English patent No. 6,071, 11 February 1831. Westley Richards. First reported by Hawker in 1833 as the "all steel" primer but all specimen examined have been of brass. Also named, by Hawker, "Westley Richards' Hermetically Sealed Primer." French patent No. 4,735, 6 August 1831; imported pat. for the W. Richard mushroom primer. William Newton	T12	1849 — Hawker Saucer plug Primer The design and manufacture of this tube is described by Hawker in his <i>Diary</i> under 1849. Tube .090×.64". The head is of brass gilt. Peter Hawker.
T5	1835 — J. Egg Short tube, .086×.275" English patent No. 6,829, 9 May 1835. Joseph Egg. Primer magazine using short primers.	T13	1850 — C. Lancaster Leather head English patent No. 13,161, 3 July 1850. A number of head designs are described. The tube is the basic T3 tube .09×.5 inch.
T6a	1882± — Patstone Saucer Plug Sir Ralph Payne-Gallwey illustrated this form of tube for a saucer plug ignition in <i>The Fowler in Ireland</i> published in 1882. They were being made for him by "Patstone of Southampton," and is a minor design change to T14.	T14ab	1850 — A. Clayton Saucer plug Registered under the Non Ornamental and Useful Design Act, No. 2,586, Dec. 2, 1850 by Alfred Clayton of Lymington, where it was described as "an improved tube for Col. Hawker's new ignition,." .09×.91" length. All examined specimen record the Southampton address to which Clayton moved in 1855.
T6b	1850+ — Patstone Saucer plug, .09×.81"	T15a	xxxx—Ancion Tube .07×.530" Specimen: Attributed to D. D Ancion of Liège, based upon a cased pair of pistols in the Royal Ontario Museum, Toronto.
T6c	1850+ — Patstone Saucer plug, .09×.63"	T15b	xxxx — Ancion Tube .09×.64"
T6d	1850+ — Patstone Saucer plug, .088×.642"	T16	xxxx — Unidentified Tube A slightly larger diameter than T1b with a flattened, soldered (lead) tip .10×1.435"
T7	1834 — C.L.S. Heurteloup Continuous English patent No. 9,084, 9 September 1841. 'Soft metal drawn tubes of pewter or other soft metal of about 1/10" in diameter (by approx. 9 inches long) pressed through roll-		



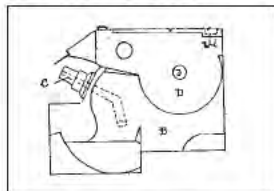
T17 xxxx—Unidentified



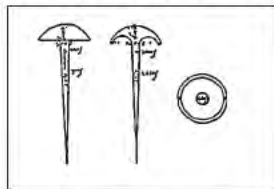
T20 xxxx—Unidentified



T23 1820—F. Prélat



T26 1842—A.P.F. Thibert



T29 1870—J. Barthe



T32a 1835—G. Console



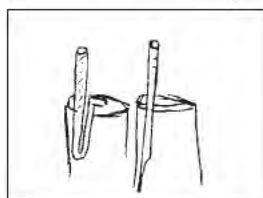
T32d 1835—G. Console



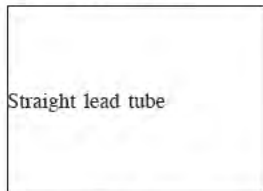
T18 xxxx—Unidentified



T21 1970—D.W. Bailey



T24 1831—Robert



Straight lead tube



T30 1821—L. de Valdahon



T32b 1835—G. Console



T33 xxxx—Unidentified



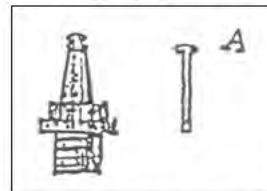
T19 xxxx—Unidentified



T22 1835—Jean Lepage



T25 xxxx—C. Lancaster



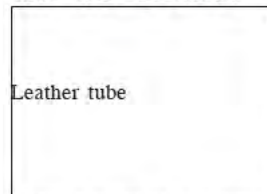
T28 1862—C.T. Eyraud



T31 xxxx—Unidentified



T32c 1835—G. Console



Leather tube

T34 1850—C. Lancaster

22 Appendix IX — Primers

T17	xxxx — Unidentified	Flat clip/tube	28 January 1863, Chrysos Tôme Eyraud,
		An addition to, or alteration of, T3.	1870 — Barthe,
T18	xxxx — Unidentified	Notched block & tube	Stem Primers
T19	xxxx — Unidentified	Square block & tube	French patent No. 91,656, 15 October 1870,
		On some of these primers, it appears as if	Joseph Barthe.
		the T18 block has been soldered with the	T30
		notched side of the block against the tube.	1821 — de Valdahon
			Grass or straw
			French patent No. 1,298; 21 Sept 1821; Specimen: a straight straw or grass tube filled with the priming compound; .83 inch long; .15 inch dia. tapering to .12 inch. Ex H.P. White collection J.C.A.J. LeBoeuf de Valdahon.
T20	xxxx — Unidentified	Wrapped tube	T31
		A tube illustrated by W.W. Greener in <i>The Gun and its Development</i> which he described as “a priming tube, the one end being inserted in the touch-hole and the other struck by the cock.”	xxxx — Unidentified
			Lead Tube
			Specimen: ex H.P. White collection. A lead tube approx. $\frac{1}{8}$ to $\frac{5}{32} \times 1\frac{1}{8}$ " long, bent in the middle, straight (more or less) seam, rounded/folded over at the ends.
T21	1970 — Bailey L.	Shape tube, .09×.64 inch	T32a
		A tube constructed by D.W. Bailey and W.S. Curtis in the 1970s in order to shoot a tube lock gun	1835 — Console
			Shaped brass tube
			A flat tube of brass fastened to a cartridge by a wire was tested by the Austrian army in a lock designed by Console in 1835. Specimen, ex H.P. White collection. Tube of brass w/card wad wired to the end. Wad $\frac{7}{16}$ inch diameter by $\frac{1}{16}$ inch thick; wire twisted, 1 inch long; Tube of thin sheet brass shaped flat on one side over a cardboard or wooden strip, rounded on the other, $\frac{5}{8} \times \frac{7}{32}$ " wide. The illustration conforms with that tube. Guiseppe Console.
T22	1835 — Lepage	.078×.468"	T32b
		A short tube with notches at one end, attributed to Jean Lepage because of its association with a revolving pistol in the Royal Armouries Museum, Leeds.	1836 — Console
			Triangular brass tube
			In January 1836, a triangular brass or copper tube was adopted for the Console lock by the Austrian army and continued in service until 1840
T23	1820 — Prêlat,	Short Tubes	T32c
		French patent 28 July 1818 and <i>certificat d'addition</i> 28 July 1820. A tube of metal containing the fulminate used in the fourth lock type of the patent. François Prêlate.	1840 — Consule
			Coiled brass, .150×.81"
			The Console lock was improved by General Vincenzo Augustin in 1840 and used a round tube. There are a number of slight manufacturer's variations.
T24	1831 — Robert,	Short Tubes	T32d
		French patent No. 4,677, 27 April 1831; ; Robert, copper tube filled up with powder and pushed into the bottom of the paper cartridge.	xxxx — Consule-like
			Copper tube,
			Tube pressed closed at both ends, one end drilled. All of the specimen known to the compiler can be traced to a source in Liège. .100×.830"
			T33
			xxxx — Unidentified
			Cruciform tube
			Four-blade “handle” of galvanized iron, soldered to end of a T3 tube. .089± × .681".
T25	xxxx — Lancaster	Tube .090×.635-.647"	T34
		Specimen: A proprietary brand, marketed by Charles Lancaster, differing only in length from the Manton tube	1850 Lancaster
			Leather tubes
			English patent No. 13,161, 3 July 1850. “Per-cussion tubes are made of softened leather.” Charles William Lancaster
T26	1842 — Thibert,	Continuous	
		French patent No. 13669, 9 Aug 1842; ; A copper tube rolled up containing a particular mixture described as an improvement to the continuous tube of Heurteloup's Koptipteur ignition., Augustin Pierre Félix Thibert.(see T7, P53).	
T27	1834 — Heurteloup	Continuous metal tube	
		English patent No. 6,611, 22 May 1834; English patent No. 7,980, 22 June 1839; A straight, round, soft metal tube fed through the stock or placed in the end of a primitive cartridge. Charles Louis Stanislas, Baron Heurteloup.	
T28	1862 — Eyraud	Chemical pin	
		French patent No. 56,029, 7 Nov 1862; chemical match or pin primer; <i>Certificat d'Addition</i>	

CAPS

Common Caps



Top Hat Caps



Hammer Caps



Patented & Unpatented





C1 1818—Jos. Egg



C2 1820—F. Prélat



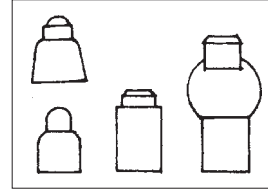
C3 1822—J. Shaw



C4a-d 1830—S. Smith



C5 1833—C. Jones



C6 1836—W. Richards



C7 1839—G.H. Manton



C8 1841—T. Starkey



C9 1843—S. Walker



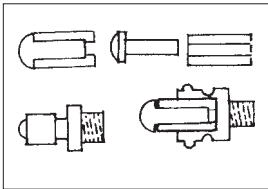
C10 1843—W. Needham



C11a 1849—W. Richards



C11bc 1849—W. Richards



C12 1852—W. Richards



C13 1853—J. Horrocks



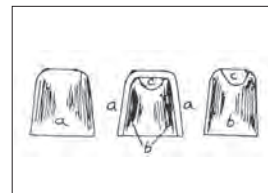
C14 xxxx—W. Tibbal



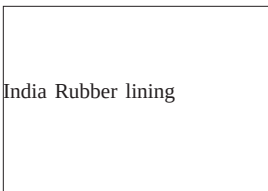
C15 1853 — J. Goldmark



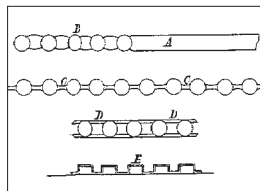
C16 1853—J.D.M. Stirling



C17 1854 — Armstrong



C18 1855—W.T. Eley



C19 1855—F. Pratt



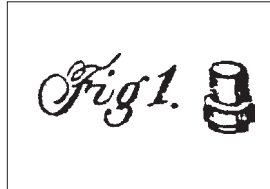
C20 1857—W. Eley

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C1	1818 — Egg	Brass, untrimmed cap	Tubular magazine using outside primed cap.
	Unpatented, but supporting documentation indicates its introduction by Joseph Egg late in 1818.		William Needham
C2	1820 — Prélât	Cap	C11a 1849 — Richards 2-step short
	Certificate de addition in 1820 to French patent 28 July 1818, red copper drawn cap with the shape and size of the nipple. Joseph François Prélât..		English Registered Design Act, 9 March 1849. Westley Richards. Crown marked (C11a) and two lengths plain (C11b, C11c), are known.
C3	1822 — Shaw	Iron	C12 1852 — W. Richards Gutta Percha/cap
	U.S. patent, 19 June 1822: A name and date patent for a cap (no description) made of copper. Specimen: Package labeled as “Joshua Shaw’s Superior Double Loaded Patent Spring Primers.”		English patent No. 14,027, 28 March 1852. A tube of Gutta Percha in which a percussion cap of the ordinary form and construction is inserted.
C4a	1830 — Smith	Flat nipple, coronet	C13 1853 — Horrocks Gutta Percha lining
	English patent No. 5,978, 7 August 1830. There are three sizes measuring (inside diameter); .330, .338, and .364". Each size seems to have a slightly different embossed crown and shape to the raised central “nipple.” Specimen .330" round nipple, coronet		English patent No. 1,404, 8 June 1853. Metal, Lined with an elastic waterproof material, such as gutta percha or other lining. Woven fibrous material may replace the metal. John & James Dunlop Horrocks.
C4b	1830 — S. Smith	.338" flat nipple, Crown	C14 1860±—Tibbal Gutta percha
C4c	1830 — S. Smith	.364" wide flat, Crown	Specimen: A Gutta percha cap-like component found inside a .36 cal. revolver cartridge labeled as “Explosive Tipped.”.274"o/d ×.171" deep. William Tibbals.
C5a	1833 — C. Jones	Hammer cap	C15 1853 — J. Goldmark Waterproofing
	English patent No.6,394, 7 March 1833; English patent No. 6,436, 12 June 1833; Although Charles Jones obtained two patents covering the lock requiring this hammer cap, and described them as patented on packaging, there was no mention of them in either patent. Embossed “J” on the inside.		U.S. patent No. 10,262, 22 November 1853. for a machine to grind the edge of percussion caps. Joseph Goldmark. Some are crown embossed with his name.
C6	1836 — W. Richards	Truncated/enlarged	C16 1853 — J.D.M. Stirling Zinc plated
	English patent No. 7,041 22 March 1836. The cap is placed in an outer casing.		English patent No. 66, 10 January 1853. John Davies Mories Stirling. Caps of tin, zinc or silver, plated.
C7a	1839 — G.H. Manton	Hexagonal	C17 1854 — Armstrong/ Pursall 2-piece cap
	English patent No. 7,965, 11 February 1839. George H. Manton covered a circular magazine and illustrated this primer. The first of this type examined were found in England. Numerous crown marks (TF, G, Fque. G Gevelot) have since been recorded		English patent No.157, 23 January 1854. Charles Clarke Armstrong and William Pursall. An outer case (a) and an inner case (b) with a depression (c). French patent No 20511, 3 Oct 1854;; Amstrong & Pursell, Imported pat.
C8	1841 — T. Starkey	Crown Mk.	C18 1855 — Eley India Rubber Waterproofing
	English patent No. 9,188, 16 December 1841 illustrated a number of variants consisting of an inner and outer case. That illustrated bears the crown mark of Thomas Starkey		English patent No. 1,272, 4 June 1855. A disc of vulcanized India-rubber is placed over the priming. William Eley
C9	1843 — S. Walker	Six-split	C19 1855 — W. Pratt In Chains
	William Greener credited Sarah Walker at 12 Legge St., Birmingham, with invention of the six split cap in his <i>Science of Gunnery</i> published in 1846 (p. 308).		English patent No. 1,677, 24 July 1855. Caps in chains, being connected by single central links or double side links. The English agent acting on behalf of John Henry Johnson of Baltimore.
C10	1843 —Needham	Embossed crown	C20 1857 — Eley xx Reinforcing
	English patent No. 9,801, 24 June 1843.		English patent No. 2,440, 19 September 1857. Provisional protection only. “It is proposed to place round percussion caps, disks or short tubes prevents their bursting or opening when forced on the nipples.” William Thomas Eley.



C21 1858—W. Pursall



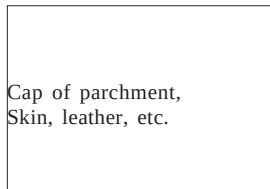
C23 1869—J. Talbott



26 xxxx—Liège ?



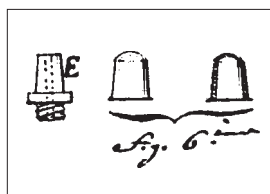
C28a xxxx—Cardinal cap



C29 1868—Newens



C32 xxxx—Unidentified



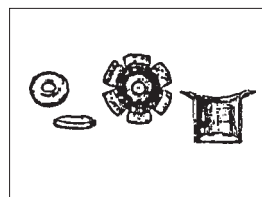
C35 1820—Deboubert



C22a 1859—W&M.A. Walker



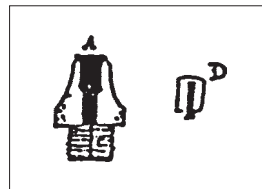
C24ab 1870—B.F. Woodside



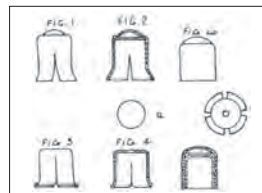
C27a xxxx—Gevelot



C28b xxxx—Cardinal cap



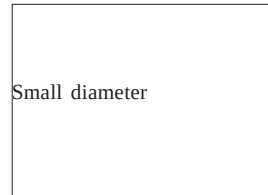
C30 1839—M. Germain



C33 1841—T. Starkey



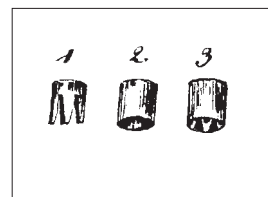
C36 1835—Unidentified



C22b 1859—W&M.A. Walker



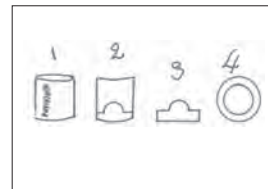
C25 xxxx—Gevelot



C27b xxxx—Gevelot



C28c xxxx—Cardinal cap



C31 1835—M.J. Gevelot

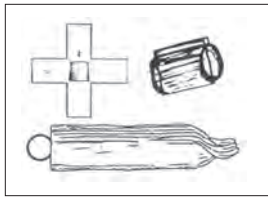


C34 xxxx—F.W. Mills

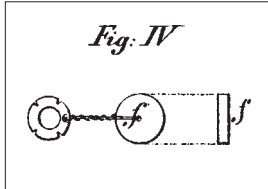


C37 1838—Gevelot

- C21 1858 — W. Pursall Waterproofing
English patent No. 1,982, 1 September 1858.
Provisional protection only. Waterproofing
caps by placing a metallic powder covering
the priming and sealing it by pressure or fric-
tion.
- C22a 1859 — MA&R Walker Metal, gilt washer.
English patent No. 286, 1 February 1859.
Waterproofed paper covered with a gilt or
silvered washer over red, pressed into place.
- C22b 1859 — M.A. & R. Walker Small diameter
English patent No. 286, 1 February 1859,
Caps made smaller and longer than usual with
an enlarged head to fit into an enlarged nipple.
M.A. and R. Walker.
- C23 1869 — J. Talbott 2-step, Gutta Percha
U.S. Patent No. 92,398, July 6, 1869. Cap
with ring of rubber or gum around the inside
of its mouth to make a waterproof joint with
the gun nipple.
- C24a 1870 — B.F. Woodside Paper, common cap
U.S. Patent No. 105,874, July 26, 1870. Per-
cussion cap made of paper pulp reinforced
with hair and coated with collodion or shel-
lac. A second design (C24b) with serrated
rim folded out to simulate a top-hat cap was
also submitted.
- C25 1847+ — Gevelot *à Collier*
A copper cap enclosed in a shaped band or
collar of copper or brass. (See also C80,
C84).
- C26 xxxx— Liège Heavy Ribbed
A common-like cap but with deep, wide
flutes. Probably of Belgian manufacture.
- C27a 1847 — Gevelot/Le Maire. Donut shaped
French patent No. 5,454, 19 April 1847. *Cer-
tificate d'Addition*, 3 June 1847, *Capsule à feu
dirigé*; drilled washer covers the priming mix-
ture.
- C27b 1849 — Gevelot Patented caps
French patent No. 5,454, 19 April 1847. *Cer-
tificate d'Addition*, 3 June 1849, *Capsule à
double échancrure*, A notched lining inside a
cap. Gevelot and Germain
- C28a xxxx— Cardinal cap .342" dia.
- C28b xxxx— Cardinal cap .280" dia. 4-split
- C28c xxxx— Cardinal cap .330" dia.
- C29 1868 — Newens Paper
French patent No.80,949, 16 May 1868.
Newens, cap of cardboard, parchment, skin,
leather, made by molding or stamping. (see
also C47)
- C30 1839 — M. Germain With moveable anvil
French patent No. 6,285, 2 May 1835. cap
with moveable anvil. Martin Germain.
- C31 1835 — M.J. Gevelot *Capsule à bombe*
French patent No. 6,511, 18 September 1835.
Capsule à bombe intérieur hemispherical
concentration of priming compound inside
the center of the cap. Marie Joseph Gevelot.
- C32 xxxx — Unidentified Mortar-board cap
From the miscellaneous accumulation of a
Liège cap manufacturer left with the Musée
d'Armes, A plain copper cap with the hole
in a .310" brass square soldered flush with
the crown.
- C33 1841 — T. Starkey Crown Mk.
English patent No. 9,188, 16 December 1841
A number of variants consisting of an inner
and outer case or a distinctive shape are il-
lustrated. Thomas Starkey (see C7).
- C34 184± — F.W. Mills Hammer cap
Specimen: package labeled "F. W. Mills In-
ventor." with caps similar to those sold by
Needham & Jones.
- C35 1820 — Deboubert Patented Caps
French patent 22 Sept 1820; Deboubert, cop-
per cap and nipple using the Howard mer-
cury. Deboubert. (See also C60).
- C36 1856 — French military Paper cap
A thick walled paper cap. An inexpensive
cap described in the *Aide mémoire des
officiers d'artillery*, 1856, for target practice.
- C37 1838 — Gevelot, Capsule à Bombe
French patent No. 9,107, 20 March 1838. A
ribbed *Capsule à Bombe extérieure* with the
priming in a nipple raised on the crown.



C38 1838—Jourdan



C41 1837—Austrian



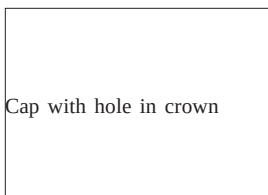
C44 1856—Nut Caps



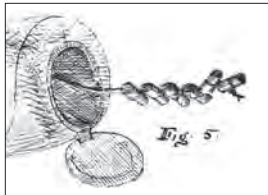
C47 1872—Rossignol



C50 xxxx—Unidentified



C53 1841—M. Berry



C56 1863—Lepage



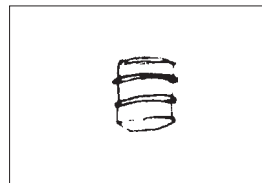
C39 1853—Scheidt Bros.



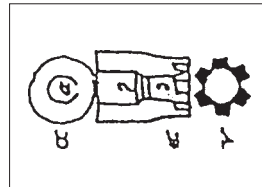
C42 1862—Frankford



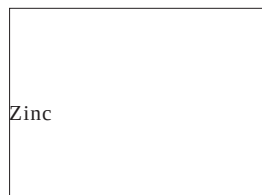
C45 1821—Lepage



C48 1822—Guillemin



C51 1836—A.F. Gaupillat



C54 1852—Gaupillat



C57 1868—Newens



C40 1846—Flobert/Tillet



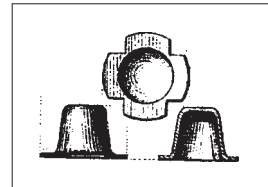
C43 xxxx—Clere & Dupeyon



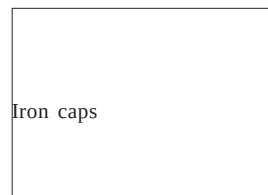
C46 1867—Gevelot



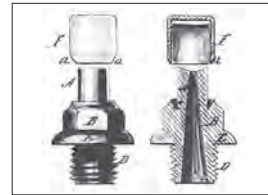
C49 xxxx—Unidentified



C52 1845—Russian



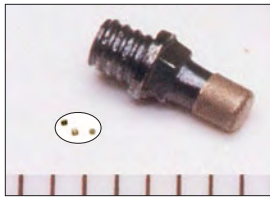
C55 1852—Gaupillat



C58 1849—Edward Brooks

30 Appendix IX — Primers

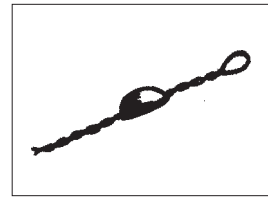
- C38 1838 — Jourdan, Patented Caps
French patent No 4,642/8,227, 21 Feb 1838;
primer with ear to, tie it at the bottom of a
paper cartridge. Jean Joseph Napoléon
Jourdan.
- C39 1853 — Scheidt Bros. Priming cover
Specimen: "Percussion Caps of Superior
Quality with Metallic Cover Warranted Wa-
terproof" "Exhibition of the Industry of all
Nations, New York, 1853." Scheidt Bros. in
Dillenberg.
- C40 1846 — Flobert & Du Tillet Patented Caps
French patent No. 3,589, 18 May 1846;
Flobert & Tillet, Truncated cone capsule fit-
ting the nipple, Louis Nicolas Auguste Flobert
and Antoine Paul Du Tillet.
- C41 1837 — Austrian Top hat cap
Holes in the flange to fasten the cap, by wire,
to a paper cartridge. Illustrated in *Auflösung
des wichtigen Problems, die Percussions-
Schlösser auch in der Armee einzuführen* by
H...de B... B..., Vienna: Carl Gerold, 1837.
- C42 1862 — Frankford Arsenal top hat cap
Specimen: A small top hat cap packed 1000
in a canvas bag. . 180"×.175" high .262" brim
diameter
- C43 1842± — Clere & Dupeyon Cap
A two-step copper cap with loops or ears
soldered to the sides to tie the cap to a paper
cartridge.
- C44 xxxx — Celebrated Nut Caps Common cap
Specimen: Labeled container in the W. K.
Neal Collection. There is no visible distinc-
tion from a common cap.
- C45 1821—Lepage Cap
French patent 12 March 1821. Although the
cap is not illustrated, a distinctively shaped
nipple suggests a special cap.
- C46 1867 — Gevelot Patented Caps
French patent No. 75,266, 31 March 1867,
Jules Felix Gevelot.
- C47 1872 — Rossignol Patented Caps
French patent No. 95,493, 3 May 1872;
Rossignol; cap pressed from a paper patch.
(see C29)
- C48 1822 — Guillemin-Lambert Special Design
French patent No. 1,417, 27 /Sept 1822; cap
with two thin shoulders, by this way it is
possible to tie up the cap to the cartridge,
Charles Guillemin-Lambert.
- C49 xxxx — Unidentified Cardinal cap
A small cap, .174 inch dia. inside a large,
heavier shaped cap .327" o/a dia.×.216" high.
- C50 xxxx — Unidentified Dished crown
This variation with a dished crown is found
in a number of sizes, always with smooth
sides.
- C51 1836 — Gaupillat Gaupillat
French patent No. 7,396, 26 Sept 1836; split
primer made in one pass with the illustrated
punch die, André François Gaupillat.
- C52 1845 — Russian Tapered cap
Illustrated in Russian manuals and possibly
also Prussian
- C53 1841 — Berry Cap Design
French patent No. 10,526, 28 Feb 1841; cap
drilled in the center with a 1.5 millimeter hole,
to be used "with a combined nipple/firing-
pin."
- C54 1852 — Gaupillat Zinc
French patent No. 13,935, 21 August 1853;
zinc primer.
- C55 1853 — Gaupillat Iron caps
French patent No. 15,543, 5 Feb 1853; iron
caps
- C56 1836 — Lepage Chain of caps
French patent No. 7396, 13 July 1836. A
link arrangement to join a string of caps to-
gether. Lepage Freres.
- C57 1868 — Newens Paper+
French patent No 80,949, 16 May 1868; a
cardboard paste, material: parchment, skin,
leather, made by moulding or stamping,
Edmund Newens.
- C58 1849 — Brooks Watertight cap
English Registered Design Act, No 1941, 30
June 1849. Edward Brooks & Son. Rim of
cap chamfered to mate with groove in the
nipple.



C59 1860—miniature



C60 1820±—T. Mortimer



C61 1842—C.J. Monteiro



C62 xxxx—Sellier/Bellot



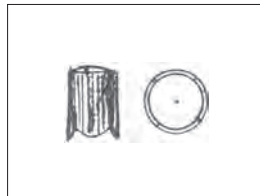
C63 xxxx—Unidentified



C64 1845—C.J. Smith



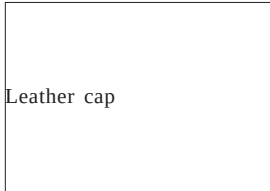
C65 xxxx—Alderman



C66 1852—R. Walker



C67 xxxx—Unidentified



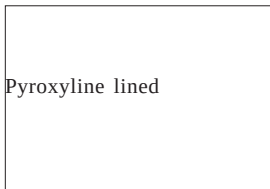
Leather cap



C69 1860+—Confederate



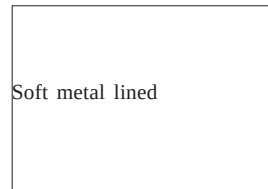
C70 xxxx—Gevelot



Pyroxyline lined



C72 1849—G. H. Ritchie



Soft metal lined



C71 1853—F. Joyce



C75 xxxx—Unidentified



C76 1820—Prèlat ?



C77 xxxx—Unidentified



C78 1838—Gevelot



C79 xxxx—Unidentified

32 Appendix IX — Primers

- C59 1860± — Gevelot Miniature cap
Specimen, Embossed brass container. Made for miniature firearms. Inside dia. of copper cap 1.36mm; height 1.5mm, metal thickness, 0.1mm. Caps illustrated are full size. Scale of nipple with cap in place is in mm.
- C60 1820± — Thos. Mortimer Tapered cap
A tapered cap with a rim similar to, and possibly covered under, Deboubert's 1820 patent. Caps associated with Thomas Mortimer rifle S/N 4230. T.M. retired in 1822. (See also C35)
- C61 1842 — Monteiro Calotte
Conversion of flint to percussion by the 2nd pattern suggested by Col. Costa Monteiro. The wire was to be wrapped around a hook on the nose of the hammer.
- C62 xxxx — Sellier & Bellot Two-piece cap
A two-piece cap with raised crown and small rim. Embossed SB.
- C63 xxxx — Unidentified
A shallow copper cap with notches on the rim.
- C64 1845 — Smith Caps
English patent No.10,667; 14 May 1845. Charles J. Smith. (See also P11a) Caps measure .140 to .148 diameter by .129 to .135 high. Charles James Smith. This may possibly be a primer illustrated in the 1885 Kynoch catalog described under "Military and Sporting Percussion Caps" as a "Double Primer."
- C65 xxxx — Alderman Brass cap
Specimen: Alderman's Improved Anti Corrosive, brass, ribbed.
- C66 1852 — Walker "percussion cap"
English Registered Design Act No. 85,386 dated 19 June 1856; An "Ornamental design for [a] percussion cap." Richard Walker.
- C67 xxxx — Unidentified Narrow brim
The narrow brim and bunted crown seems intentional..
- C68 1860+ — Confederate Leather cap
It has been documented that leather percussion caps were produce by at least one Confederate cap making facility.
- C69 1860+ — Confederate Top hat cap
Specimen: Obtained with paper cartridges manufactured for the Confederacy. Some caps embossed from the inside with "R" (reading reversed from the outside), have been attributed to, but not confirmed as, Richmond Arsenal.
- C70 xxxx — Gevelot Gilded cap
Specimen: A design similar to C8 by Thomas Starkey, but compare size. .156"×.304" Embossed crown; brass, apparently gilded or gold washed.
- C71 1853 — F. Joyce Pyroxyline lined
English patent No. xxxxxx 3 April 1853. "Joyce's Patent Pyroxyline [a soluble gun cotton, mainly cellulose tetranitrate] Percussion Caps" This patent date is listed on an advertising flyer but is not recorded in the *Abridgments of the Patent Specifications*.
- C72 1849 — Ritchie Square copper cap
English patent No. 12,648, 7 June 1849. A "self acting priming apparatus ... the caps may be made square, and have one side removed so that they may be easily pushed upon the nipple. William Henry Ritchie.
- C73 1854 — Cox Lined cap
English Patent No. 1,153, 23 May 1854. A cap "completely lined with tin or other thin metallic foil." John Cox.
- C74 1866 —Chassepot Cartridge
Top hat cap with two holes in the crown designed for the Chassepot needle-fire cartridge. Discontinued in 1868.
- C75 xxxx— Unidentified Top hat cap
Specimen, SFM Archives: Artillery top hat 9.46mm (od)x15.15mm (.37x.60 in.)
- C76 1820—Prélat Cap
Specimen, SFM Archives: These copper caps have the configuration of those illustrated in Prelat's 1820 *cérificate de addition* to his 1818 patent. They were acquired with other very early caps, including the Egg caps (C1), made at about the same time, which can be traced back to 1820. 2.7mm brim; 4.0mm dia.x8.25mm high (.106x.157x.325 in.)
- C77 Unidentified Top hat cap
Specimen, SFM Archives: Possibly an unfinished cap. Large top hat, 9.5mm (od)x 15.54mm (.374x.612 inch)
- C78 1838—Gevelot.Capsule á bombe extérieure
French patent No. 9,107, 20 March, 1838. A plain cap with the priming in a nipple raised on the crown. A number of sizes were available. (See also C37)
- C79 xxxx— Unidentified Copper Cap
Speciment, SFM Archives: Large top hat 4.75mm (od)x 10.92mm (.19x.43 in.).



C80 1847—E. De Lachée



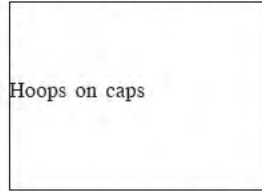
C81 1839—French Mil.



C82 1839—Danish Mil.



C83 1945—"Uni"



C84 1857—W.T. Eley



C85 1857—W.T. Eley



C86 xxxx—Mexico



C87 xxxx—Mexico



C88 xxxx—Mexico



C89 xxxx—Prussian



C90 xxxx—Prussian



C91 1854—C.W. Armstrong



C92 xx—Gevelot Miniatures



C93 xxxx—Bavaria



C94 xxxx—xxxx

- C80 1847—De La Rachée á Collier
A copper cap strengthened with a brass “*enveloppe*.” Patent applied for but not issued. Edouard de La Rachée. The design was developed by Gevelot. (See also C25, C84).
- C81 xxxx—French Military Common Cap
Specimen, SFM Archives; French smooth common cap 5.26mm (od)x6.55mm (.21x.26 in.).
- C82 1839—Danish Military Copper Cap
A large cap with embossed crown over the monogram of Frederick VI of Denmark (1808-1839). 12.57mm (od)x9mm (.5x.35 in.).
- C83 1945—French Childrens’ Toy
1940+—Iron cap-like detonator incorporated into the nose of a toy aeroplane which detonated when the plane crashed into the ground. A dished crown impressed with “Ofi” 10.25/18.30mm(od)x8mm (.40/.72x.31 in.).
- C84 1857—Eley Hoops on caps
British Patent No. 2,440, 19 Sept. 1857. Provisional protection only—no illustration. “Strengthening metal hoops are fixed exterior of the percussion caps. Such hoops may be simple disks or short tubes which being placed around the percussion caps, prevents their bursting.” William Thomas Eley (See also C25, C80)
- C85 xxxx—Unidentified Nipple on Cap
A fluted, common cap with a distinct nipple on the crown. .131 in dia x.186 in. high. (Ex WKN).
- C86 xxxx—Mexico Iron top hat cap
A tinned (? shiny white metal plating) iron musket cap with silver cover over black compound—most of which are loose. The round top is distinctive and boxes are labeled ‘ “La Jalisco” Fabrica de Capsules.’
- C87 xxxx—Mexico Iron common cap
A tinned iron common cap with a round top and a very small flange. Packaged with the same label as C86.
- C88 xxxx—Mexico Copper top hat
A copper top hat cap of non military size. The cap tin is labeled “Tiger Percussion Caps” and contains 100 Sombreros.
- C89 xxxx—Prussian Musket size cap
A smooth side, musket size, cap without flanges. The crown has a pronounced blister which is impressed with a single headed eagle. This crown mark is also found on common caps by Dreyse & Collenbusch.
- C90 xxxx—Prussian Musket size top hat
A top hat cap with four flanges but otherwise the same as C89. There are minor variations in the eagle shape and the quality of the stamping dies varies considerably in this series.
- C91 1854—C.W. Armstrong Reinforced Cap
A cap within a cap. A sample box with advt. included caps ribbed and ribbed GD crown marked caps inserted into plain ribbed caps. British Patent No. 157 dated 23 January, 1854. (See also C17).
- C92 xxxx—Gevelot Miniature caps
- C93 xxxx—xxxx Top Hat variant
- C94 xxxx—Unidentified Ribbed top hat cap
Miniature caps in white (non ferrous) metal, by Gevelot. (See also C59).
- C93 xxxx—Bavaria Top Hat variant
A top hat cap with embossed crest of Bavaria, four small flanges and unusual enlarged crown.
- C94 xxxx—Unidentified Ribbed top hat cap.
A typical four flange top hat cap with unusual side ribs. Smaller in size than musket, larger than British military revolver.