

THE “ENIGMAS” OF CLAY BEDFORD’S COLLIER COLLECTION

by Ben Nicholson

Clay Bedford concluded his landmark 1971 ASAC article “Collier and His Revolvers” (Figure 1) with the following, “*Now, the last word. If you have any information leading to the solving of any of these enigmas, adding to them, or challenging the information presented, please drop me a line.*”¹ Fifty years later a team of six have worked on a response to Mr. Bedford, all of whom have contributed to this article. They include ASAC members Frank Graves and Matthew Schneiderman, David J. Williams, President of the Arms & Armour Society U.K., Jonathan Ferguson, Keeper of Firearms and Artillery at the Royal Armouries and John McLean, author and member of various Australian arms collecting groups. Over the past five years we have made a global search for Artemas Wheeler and Elisha Collier revolvers visiting fifteen museums in six countries and several private collections and have made a full reassessment of the literature. Over seventy signed and numbered authentic Wheeler and Collier revolving arms have been located and to this list are added a dozen more revolvers made in partnership with other makers. Eight Collier-copies have also come to light. In essence, Bedford’s article on Collier is short – but it is watertight. After five years of work, the Collier Team has no major challenge to what he presented. However, we can fill out his story with the weight of material that was not readily available to him.



Figure 1. Clay Bedford’s display of English revolving firearms at an ASAC meeting circa 1970s (source: photograph Ben Nicholson Collection).

The Historical Context for the Design

While the name of Collier is associated with the birth of the modern revolver, it was not he who developed the concept but rather Artemas Wheeler of Concord, Massachusetts.² On 2 May 1818, *The Gazette* newspaper included an article “Something New” in which “...a new modeled rifle-gun, which promises to be of some consequence, and is said to be the invention of Capt. Artemas Wheeler...”³ (Figure 2) The War of 1812 was likely the catalyst for developing multi-shot small arms in the U.S.A. Captain Wheeler would have recognized the need for a fast-acting force-multiplier weapon both on land and over water.

In 1814, the British captured and reported on the Chambers superimposed load American musket. In 1818, Wheeler developed the revolving cylinder type. Three years later, in 1821, the 4-shot J. Jennings slide lock musket was being produced. Thus, in the short space of seven years three very different repeater systems had been designed and all were based on older concepts.

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**THE GAZETTE.**  
CONCORD, MASS.  
SATURDAY.....MAY 2.  
~~~~~  
SOMETHING NEW.

We have seen a new modelled rifle-gun, which promises to be of some consequence, and is said to be the invention of Capt. Artemas Wheeler, of this town. We have not had sufficient opportunity to examine it so minutely as to give a description of it that would do it justice — we are inclined to think it a new and important invention, more particularly in case of an action with an enemy; — It has one barrel through which the charges pass, that is of common length, also seven short ones, not much longer than sufficient to contain a charge each; these have a pan attached to them to contain powder for priming, and are kept perfectly tight by a slide that covers them: these barrels are made to move circularly round, near the lock, which is also of new construction; after firing the first charge, the half cocking moves by a spring one of these short barrels round, and confines it tight in the breech end of the long barrel, through which the charge must pass; the shutting the pan of the lock opens the slide which covers the priming. This gun is but little heavier than the common one, and when once loaded, which requires little more time than to load a common rifle, it can be fired as expeditiously as will be convenient to cock the piece and take sight, until the seven are discharged.

It is thought the mammoth still exists in the vast unexplored regions north of the Missouri.

Figure 2. ‘Something New’ Wheeler’s new modelled rifle gun described in *The Middlesex Gazette and Advertiser*, May 2 1818 (source: Concord Free Public Library).

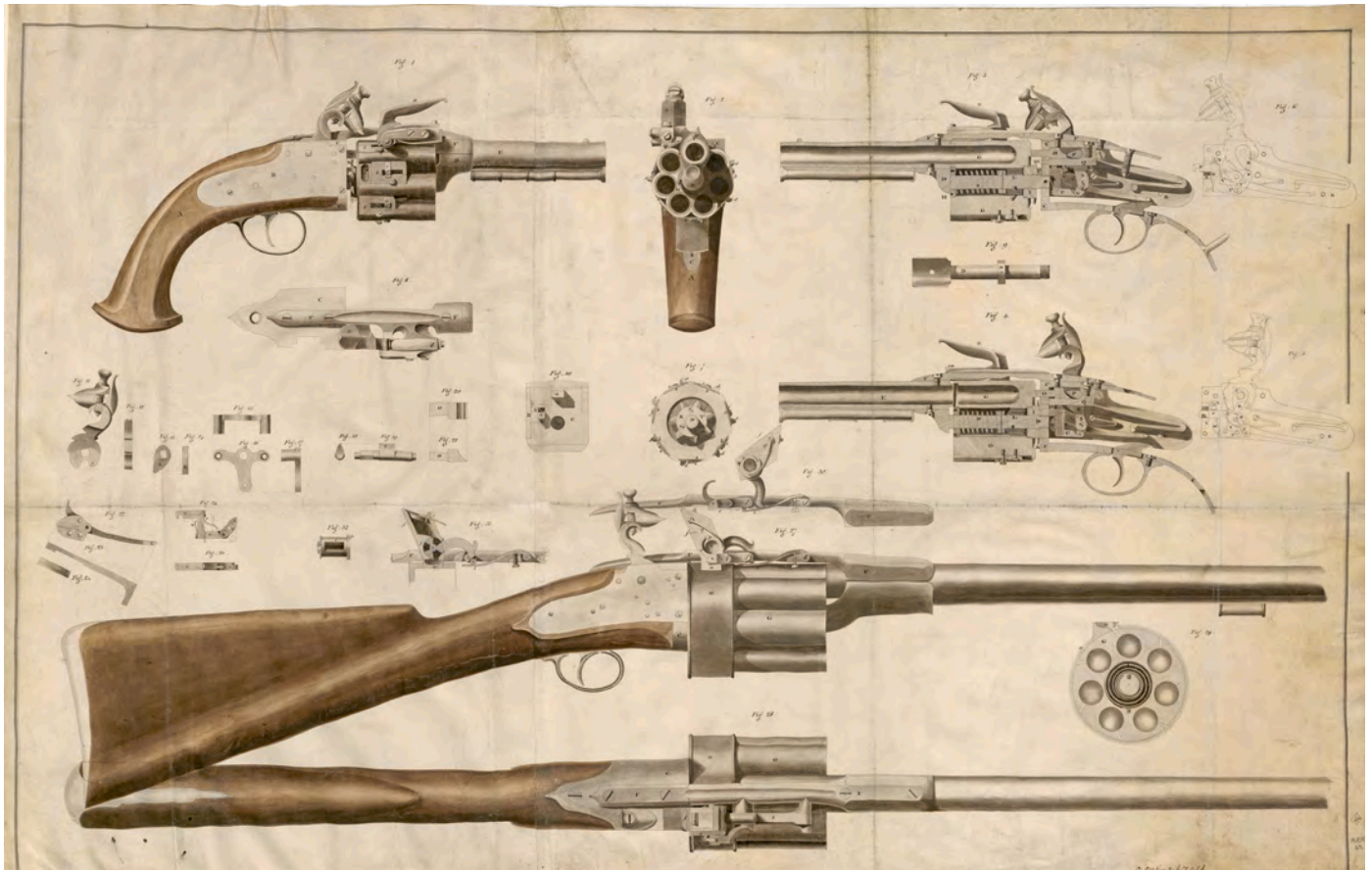


Figure 3. The drawing accompanying Elisha Collier's 1818 English Patent No. 4315, showing the clockwork mechanism for both a pistol and longarm 36 in ' 23 in (914 mm ' 584 mm) (source: National Archives UK; reference MPA 1/62/6).

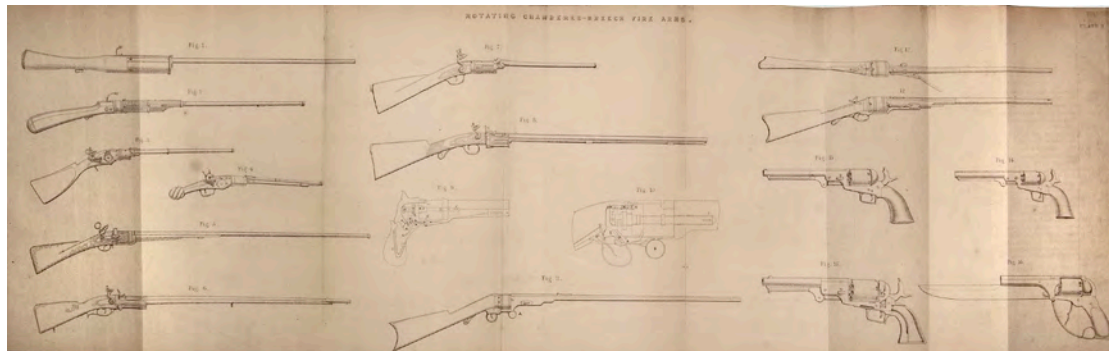


Figure 4. The illustration Plate 2, 'Rotating Chambered-Breech Fire Arms', measuring 26.9 ' 8.1 in (68.3 ' 20.6 cm), depicts some of the ancient and modern firearms Samuel Colt refers to in his 1851 London lecture to the Institution of Civil Engineers (source: Colt, 1851, Plate 2).



Figure 5. Collier First Model No. 1, flintlock pistol, manually rotated 5-shot cylinder, fitted with a multi-charge magazine frizzen (source: National Museum of American History (NMAH) ID number AF.81317M).



Figure 6. Collier First Model No. 3 is a seven-shot .48 cal. flintlock pistol, constructed with a clockwork mechanism to advance the cylinder. This is the only known photograph of this Collier, essential to the design sequence. (source: Christie's; 1978, lot 222).



Figure 7. Collier First Model No. 5 smoothbore long gun has a clockwork mechanism to advance the .56 cal. seven-shot cylinder and is fitted with a magazine frizzen (source: Nebraska History Museum; object ID 8241-252).



Figure 8. Collier First Model No. 5 lock with catchbolt mechanism (source: Nebraska History Museum; object ID 8241-252).

Wheeler received a U.S. patent for his invention *Gun to discharge seven or more times* on 1 June 1818, but the Patent was burned in the 1836 Patent Office fire and no copy has been located. It is not known if either of Wheeler's patents were reinstated but, at a later date, the 10 June 1818 Patent was numbered 2964X and the 19 February 1819 patent was numbered 3074X.⁴ Elisha Hayden Collier, who worked with Wheeler, went to England and was

granted English Patent No. 4315 on 24 November 1818 for *Fire-arm combining Single Barrel with several Chambers, to obtain Succession of Discharges from One Loading* (Figure 3). Collier's version of Wheeler's invention was then patented in France on 5 August 1819 by Boston businessman Cornelius Coolidge. Collier's patent drawing illustrates the Collier No. 3 pistol and Collier No. 4 rifle that incorporate a clockwork mechanism to advance the cylinder and reprime the pan upon recocking the hammer.

It is fair to say that Collier's notoriety begins and ends with the unwitting help of Samuel Colt. In a lecture Colt delivered in London at the Institution of Civil Engineers in 1851 (Figure 4), he gives the first historical survey of revolving cylinder firearms dating from the 16th century and concludes with an unflattering description of the Collier revolver. In 1851 and 1852, Colt brings two patent infringement lawsuits, first against the Massachusetts Arms Company and second against Young & Leavitt in which Collier features prominently.⁵ He is called as a witness to the stand and his revolvers are used as key evidence. Paradoxically, as Colt was dismissing Collier's contribution to firearm history, as well as belittling his impact upon Colt's 1836 Patent, he inadvertently cemented Elisha Collier's notoriety for all time.

The Collier First Model: Prototype Phase

One improvement that Bedford might have made in his study of Collier revolvers would be his classification of the First, Second and Third Model Collier. In principle, it is a fair system and has been retained by the Collier Team but what Bedford terms as "First Model" has three distinct types of prototype development. By great fortune, Colliers No. 1, 2, 3, 4, 5, 6, 9, 17 are all known

Figure 9. Collier First Model No. 5 lock with catchbolt mechanism hooking onto the ratchet wheel on the rear of the cylinder. (source: Nebraska History Museum; object ID 8241-252).



and, in this flush of the first six revolvers, it is possible to study a careful and logical progression of prototyping. Collier No. 1 (Figure 5) and No. 2 test the concept of a revolving 5-shot pistol using a hand-turned cylinder, combined with a manually operated magazine frizzen to deliver the primer. Wheeler and Collier next prototype a clockwork mechanism that advances the cylinder and reprimers the pan upon recocking the hammer with No. 3, 4, 5, and 6. No. 3 is a pistol mounted with sliding pans for each chamber (Figure 6) and Nos. 4, 5 and 6 are long guns that use the magazine frizzen primer. Bedford's collecting associate Walter Charnley owned Collier No. 5 that he donated to the Nebraska History Museum (Figure 7, 8, 9). It is in beautiful condition and almost perfect working order.



Figure 10. Collier First Model, un-numbered (# F-C), flintlock 5-shot manually rotated cylinder with a scrape primer magazine. This version was modeled after the Baker rifle (source: Christie's, 2013, lot 96.).



Figure 11. Collier No. 17 is a manually operated five-shot rifle. Its assembly number is "5", internal scribed letters are "VIII", in addition to the lockplate number "17". This may indicate that it was the fifth prototype that Collier built (source: NMAH; ID number AF.85467M).

There is no better description of the Collier revolver's clockwork operation than that provided by Elisha Collier on the witness stand at the Samuel Colt vs. Mass. Arms Co. in 1851. He stated:

"...the cocking of the lock was one of the processes necessary to make it revolve; the cylinder is connected with the barrel, and by cocking the lock you release the cylinder from the lap joint; then, by the act of cocking, the tooth catches the ratchet-wheel behind, and drawing up the cock, the spring inside throws it around to the next chamber, and the helical spring upon the axis locks it again, and then upon the act of firing, the tooth upon the tumbler falls against the back end of the bolt, which bolts the cylinder and barrel, so that the recoil cannot separate them; the bolt which holds them together is for no other purpose than to prevent the recoil".⁶

The clockwork Collier was demonstrated successfully in 1819 at the first trial at the Woolwich Arsenal in London, but was deemed to be too complicated for military use.⁷ Collier then built two simplified designs that were most likely demonstrated in a second series of trials in 1824 (Figure 10, 11).⁸ One revolver followed the layout of the Baker rifle, complete with patch box and bayonet lug. The trials were to no avail as Collier did not receive a military contract.

The Collier Second Model: Standardizing the Design.

The Second Model pistol is the quintessential Collier, whose mechanical and aesthetic balance are recognized as being picture perfect. Weighing a modest 2.125 lb, with a 14.13 in overall length, the .47 cal. barrel measures 6.31 in. It is a surprisingly slight pistol that fits like a hand in a glove. The form is modelled after the contemporary dueling pistol—albeit with five-shots. The design advance over the First Model pistol is its relatively quick release of the barrel, cylinder, and magazine assemblies with the removal of just two robust screws, making it simple to field strip and clean. The screws attach through the upper rib (top strap) and cylinder axle (arbor), making a secure two-point connection to the frame (Figure 12).

Manufacture

In the 1820s, English manufacturing was progressing towards the change from hand craft to mechanical manufacture. To build a reliable 5-shot revolving cylinder firearm in any quantity required a level of accuracy of production that the new generation of British lathes (Figure 13) and metal cutting machinery could provide. For the First Model revolvers, Collier had engaged master gunmaker S. Nock to hand-build at least one lock, and William Fullard's mark is stamped on some barrels. Collier now engaged tool maker and engineer, John Evans, to manufacture the cylinder assembly that required a consistent tolerance of two-thousands of an inch to rotate properly (Figure 14).⁹

Unable to secure a military contract for his complex clockwork-lock weapons, Collier simplified the design and returned to a manually rotated cylinder for the Second Model. It was produced in a line of four different styles that include a shotgun, rifle, removable stock pistol-carbine and smoothbore pistol. In a series of three different broadsheets, he advertised his revolvers to hunters and to travelers requiring personal protection (Figure 15). He kept open the possibility for a martial or law-enforcement contract and sent a broadsheet and letter dated 19 May 1824 to Henry Goulburn, Chief Secretary of Ireland, Irish Office, Westminster, London, seeking a personal audience for discussion of an invention "...of great importance to the safety and protection of Ireland...".¹⁰ A 5-shot Collier blunderbuss would have made an excellent coach gun to ward off highway robbers, but no large contract was forthcoming.¹¹

Bedford categorizes Collier's production firearms as the "Second Model". It was a high-quality firearm, partially machine-made, and the lock and stock were hand built with the exacting craftsmanship of London's best gunmakers. Now that the pressure was off to construct a weapon that had to withstand handling by a campaigning army or navy, Collier utilized a magazine frizzen to provide primer for each shot fired. The concept for the magazine frizzen was not new, but Collier redesigned the linkage to open and close a cylindrical valve to deliver priming powder into the pan.

Figure 12. Second Model Collier pistol, No. 89, that is likely in unused condition. The barrel, cylinder and magazine assemblies easily demount for fieldstripping with just two screws through the upper rib (top strap) and cylinder axle (arbor). (source: Frank Graves Collection).



Mechanics' Magazine,
MUSEUM, REGISTER, JOURNAL, AND GAZETTE.
No. 1473.] SATURDAY, NOVEMBER 1, 1851. [Price 3d., Stamped, 4d.
Edited by J. C. Robertson, 166, Fleet-street.

COLT'S REVOLVER AN ENGLISH INVENTION.

Sir,—A great deal has been said lately respecting the claims of Mr. Colt to the invention of the revolving pistol; it will, perhaps, throw a further light upon the subject when we state that in the year 1822, between the months of February and September, we made the barrels of 200 muskets and 200 pistols, upon precisely the same principle as those exhibited by Mr. Colt, for a gentleman named Collier, of Fountain-court, Strand, upon which occasion the lubricating fluid, now so universally used by engineers, viz., soap and water, was first introduced by us; one of these very barrels was, we are informed, exhibited in the English Firearm department of the Exhibition. We have one also in our possession, and can easily prove our assertion by our books, which we shall be happy to show to any gentleman upon application, so that the matter may be set at rest as to Mr. Colt being the original inventor.

We are, Sir, your obedient Servants,
JOHN EVANS AND SON.

Engine Lathe and Tool Manufactory,
104, Wardour-street, London, October, 1851.

Figure 13. In 1851, John Evans describes his manufacture of barrels [meaning cylinders] of Collier revolvers in 1822, 14 years before Colt's 1836 patent for a revolver (source: Mechanics Magazine, 1851, p. 351).

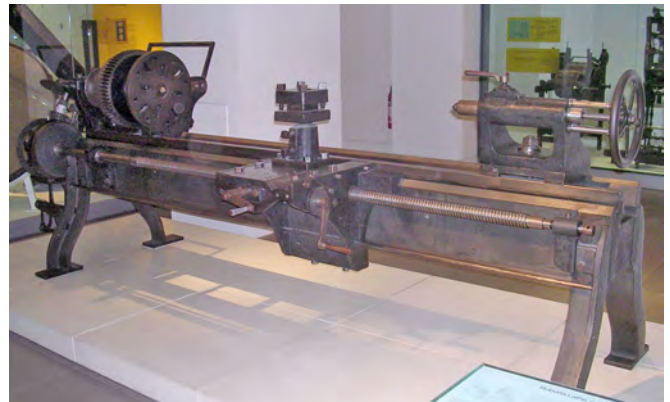


Figure 14. Lathe and early example of a slide rest, designed by Richard Roberts circa 1816 (source: Science Museum Group, U.K. https://www.gracesguide.co.uk/File:JD_Roberts_lathe01.jpg).

Decoration

Bespoke English firearms of the era had beautifully engraved metal surfaces that display the confident power of understated Georgian artistry. All Collier Second Model revolvers are engraved to the same exacting standards (Figure 16). The engraver selected motifs from a cornucopia of martial and musical emblems that were *de rigueur* for the time and each frame, lock, barrel and triggerguard has a unique combination of motifs. By the 1820s, Neo-Classical design was in its maturity and the cognoscenti enjoyed the meaning of symbols. Thus, acanthus leaves symbolize immortality, battle standards recall victorious regiments, oak leaves stand for peace and the *fascies* bundle of reeds signify Law & Order. The intertwining of weaponry and musical instruments of both indigenous and European origin represents Great Britain's uneasy march across the earth, and a Mercator globe might be included as a symbol of world domination. In addition are a small menagerie of exotic animals, Chinese pheasants for bird hunters, Indian tigers for big game hunters and the mythical Basilisk serpent who would "kill with one glance". This was a good friend to have engraved on your pistol when used for personal protection.



DESCRIPTION, &C.
OF
COLLIER'S PATENT FEU - DE - JOIE
Fire - Arms.

A SPORTING Piece, Rifle, or Pistol, constructed on the principles of *this invention*, is primed and loaded ready for *five distinct discharges* in *less time* than is required to prime and load a double barrelled gun, and the *whole five discharges* can be effected, singly, and successively in less than fifteen seconds.

Besides the *vast advantages* which this piece possesses, on account of the rapidity with which it may be loaded and discharged, it is on almost *every other account* greatly to be preferred to all others in use.

It is loaded with more *safety*, carried with more *safety*, and operated with more *safety* than any other.

It is loaded with more *ease*, carried with more *ease*, and operated with more *ease* than any other.

In *all forms* it shoots with as *much accuracy* as any now used and in the *Rifle form* it shoots with much *greater accuracy* than any now in use.

It may be loaded *on horseback* with quite as much facility as in any other situation, and consequently affords extraordinary advantages to mounted sportsmen.

In wet weather it has the advantage of securing with absolute certainty, both in flint and in percussion guns, a *perfectly dry priming*.

Arms of this kind are of novel, but at the same time of exceedingly beautiful appearance, and are of less weight than any double-barrelled piece of equal bore.

The safety and certainty of the operations of this species of arms, the great simplicity of its structure, and its consequent exemption from all liability to disorder or derangement, are attested (as will be seen in the annexed Report of the Board of Ordinance, as also a Certificate), by several Gun-Makers of the highest professional reputation.

Pistols on this plan are particularly recommended to the notice of Gentlemen designing to travel on the Continent, of Officers of the Navy and large Merchant Ships, and of such Gentlemen as chuse to possess the most efficient means of Self-defence within their own houses.—Rifles upon this plan are recommended to Gentlemen who are in the habit of shooting Deer in their own Parks, and to all who use Rifles for any sporting purpose.—Sporting Pieces, Rifles, and Pistols of this sort are particularly worthy the attention of persons shipping to the East India Markets, on account of their peculiar and admirable applicability to the sports of those countries.—The advantages of this species of Arms for Military, Naval, and a variety of other purposes, must appear obvious to all.

REPORT.

OFFICE OF ORDNANCE,

30th March, 1824.

SIR,

With reference to your letter of the 27th inst. I have to acquaint you, that the Select Committee of Artillery Officers, appointed to examine your Invention, state, That on your appearance at Woolwich on the 24th inst. you selected a Rifle Piece from among those you brought down; and that with a charge of two drams you loaded and fired from the shoulder one hundred rounds in twenty-nine minutes, at a Target, distance one hundred yards, putting seventy-one balls through the target, and lodging one in it:—you then fired five rounds at two hundred yards, and put the ball through the target:—and there was not a miss-fire in the 105 rounds.—That the short chambers continued to revolve freely and without clogging,—that Detonating Caps were used with this Rifle, which, as well as the other Fire Arms, shewn by you, appeared to be well finished.

I am, SIR,

Your most obedient Servant,

[turn over

(Signed)

FITZ ROY SOMERSET.

CERTIFICATE.

WE, the undersigned Gun Makers of the City of London, having attentively and minutely examined Mr. COLLIER's newly invented Gun, do certify as follows: That the said Gun is constructed on a plan of great simplicity: The magazine hammer is a *perfection* in its kind; its construction being exceedingly simple, and at the same time such as render its safety for explosion, physically certain.—The method of uniting the chamber (which contains the charge,) with the carrying barrel by a *lapped and male and female joint*,—and the very simple contrivance by which the lock is restrained in its action, and the discharge of the Gun, thereby *effectually prevented till this joint* is formed.—And the method of securing a *continuance of this union* till the discharge is effected, are most happily conceived: Indeed from the construction of the piece, and the laws by which its operations are performed, as well as by the result of a great number of experiments made at various times in the presence of some of us, We cannot perceive the existence of a cause by which it is rendered more liable to disorder or derangement than any other Gun, and we are fully persuaded that it is perfectly safe and perfectly certain in its operations.

SAMUEL NOCK, 180, Fleet Street;
W. A. BECKWITH, 58, Skinner Street, Snow Hill;
THOMAS MORTIMER, 44, Ludgate Hill.

* * * Orders for elegant Sporting Pieces, Rifles and Pistols, constructed on this plan, will be thankfully received, and promptly executed in the most approved style, by E. H. COLLIER, Inventor, Patentee and sole Manufacturer, No. 8, Herbert's Passage, Beaufort Buildings, Strand.

Figure 15. The 1824 Collier's Patent Feu-de-Joie Fire-Arms broadsheet is printed on both sides and includes a description of the Collier revolver, the Report of the 1824 Woolwich Trials, and a Certificate of gunmakers (source: An Chartlann Náisiúnta/ National Archives of Ireland CSO/RP/1824/1368).

Figure 16. The decorated frame and lockplate of Collier Second Model Pistol, No. 82b (courtesy of Rock Island Auction), showing a cornucopia of emblems depicting military icons of the British military. The Hunters Star of Second Model Pistol, No. 67 (Private Collection, Canada) is a traditional emblem of the 'Kentucky' long rifle.



Figure 17. Four different systems of proving the cylinders of Collier revolvers. Top left, clockwise - One pair of V & GP, No. 1 (sources: top - N.M.A.H. AF.81317); Two pairs of V & GP, No. 125 (No. 73; Museum of Connecticut History TG 67); Five pairs of V & GP, No. 17 (NMAH AF.85467M); Alternating V or GP, No. 4 (Royal Armouries XII.1503).

Each field of decoration is unique to the gun but, when Collier revolvers were sold as a brace, the engravings were identical, as were the engraved 'serial' numbers.

Collier placed an eight-pointed 'Hunter's Star' on the left side of the stock (Figure 16), which was usually left blank on 19th century English firearms. It was one of several traditional emblems used on a 'Kentucky' long rifle and emblematic of guiding the backwoods hunter home. By adding the Hunter's Star, Collier may have been making a cheeky nod to his own American tradition of firearms decoration.

Gun Proof "GP" and View "V" Marks

The Collier revolver accomplished several 'firsts' and one was to devise a system to consistently proof mark the cylinder. From 1637 onwards, English gun barrels were required to have a standardized proof mark provided by the London Proof House, rather than trusting individual barrel makers to set their own standards of safety.¹² The new revolving cylinder firearm produced a conundrum: what constituted the barrel? Was it the long barrel or the cylinder of individual "short barrels" that we know today as chambers? Different combinations of proof marks were used for First Model Colliers that demonstrate the gradual development of a logical and safe system.

There were four systems: the long barrel was proofed on the side of the barrel at the breech end; the rear of the cylinder was proofed with one pair of "GP" and "V" marks or two pairs as a double check; a "V" or a "GP" mark was struck at the location of a chamber on the rear of the cylinder; and a pair of "V" and "GP" marks was stamped on the rear of the cylinder above each chamber (Figure 17). This last method was to become the standard for later English pistols that proves each chamber independently. Second Model long guns have two pairs of "V" and "GP" marks struck on the rear of their cylinders but, for some reason that is still not understood, only one pair of Collier Second Model pistols have proof marked cylinders (Figure 18, middle). All other pistols are unmarked.

'Serial' Numbers'

By 1820, it was becoming standard practice in England to give firearms a unique 'serial' number, stamped on one or more components of each firearm produced.¹³ Collier chose to internally *stamp* a number on the main assemblies of each gun produced to make a set (Figure 18), and that number was then *engraved* externally on the lockplate, magazine and barrel assemblies. Thus, *stamped* numbers can be found on the frame, stock, barrel assembly, cylinder, rear cylinder guard, trigger guard tang and the upper edge of the lock. While this was the general rule, there are important exceptions, the main one being that long guns frequently have a different stamped number for the lock and stock assembly than for the barrel, cylinder and cylinder shroud assemblies. The reason for this is not known, but it may depend on the client choosing between a shotgun or rifle, whose barrel and cylinder were pre-marked as a set. Generally, Collier revolvers are engraved with the stamped number of the frame, stock and trigger guard, but there are exceptions to the rule. The Collier was produced at a time when the concept of issuing firearms with a unique serial number was still being worked out, which makes it an especially interesting firearm to study.



Figure 18. Four examples of 'serial' numbers stamped on the seven assemblies of the Second Model Collier (sources: top - Frank Graves Collection; middle two images - Peter Baldwin Collection, U.K.; second from bottom - Auckland Museum W0100 38005.63; bottom - Victoria & Albert Museum M.680-1927).

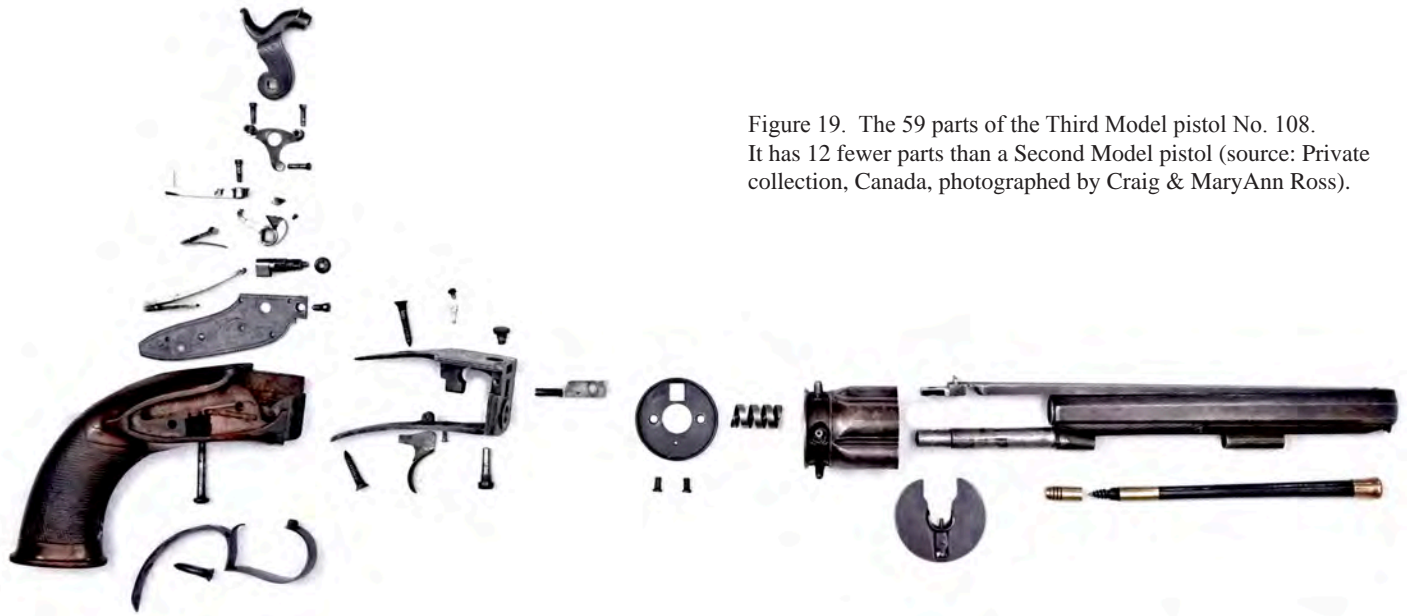


Figure 19. The 59 parts of the Third Model pistol No. 108. It has 12 fewer parts than a Second Model pistol (source: Private collection, Canada, photographed by Craig & MaryAnn Ross).

The Collier Third Model: Adapting the Flintlock to Caplock

As Elisha Collier was developing his revolving cylinder pistol, a revolution was occurring in firearm priming systems. Forsyth's 1807 patent for percussion expired in 1821 and Joseph Egg's patent-free copper percussion cap was on the market. Elisha Collier was quick to adapt the system, for not only was it reliable but he could also retire the complicated and delicate magazine primer and make this pistol cheaper with 12 fewer parts (Figure 19).¹⁴ Collier designed what Bedford termed the "Third Model" and it could be ordered as a pistol, shotgun or rifle. Remarkably, Collier demonstrated a cap lock revolving cylinder rifle at the 1824 trials at the Woolwich Arsenal. Although not accepted, it was a visionary proposal and a portent for the future.

Perhaps the biggest problem for Collier is that the nipple posts project out from the side of the cylinder and are liable to be accidentally struck. Two signed Collier caplocks have a shield to protect the posts and it may be that these two pistols were prototype designs (Figure 20). This demonstrates the difficulty of adapting the traditional geometry of a flintlock revolver with a side mounted cock to caplock. The design problem was solved by Samuel Colt who placed the percussion nipples into recesses at the rear of the cylinder rather than on the side.



Figure 20. Collier Third Model pistol # P-A is likely a prototype design and it includes a plate with "EVANS" inset on the left side of the stock. A large, scalloped shield is fitted to protect the nipples and still permit access to the caps. The lock has an additional screw holding the lockplate, indicating that it might have been designed for military use (source: Rock Island Auction).

Second Model Gunsmith Conversions

Apart from Collier's 'factory' caplock design, independent gunsmiths were making their own conversions from flintlock to caplock. It is not known if the conversions were made before or after Collier's redesign, but examination of the variants makes for a compelling study. One added a bulky shield for protection (Figure 21 bottom left). A problem of adapting the flintlock design to caplock is that the nipple posts were screwed into the side of the cylinder and there was not the space for them to rotate beneath the upper rib. Some conversions cut a path through the rib and added a top strap for the nipples to pass under (Figure 21 top). A third solution welds a nipple-seat onto the pan, which requires recapping after each shot, but it was a simple fix (Figure 21 bottom right).

Collier addressed some of these problems by making a new cylinder. It is necked down and uses a 'tunnel' chamber at the base, unlike the Second Model chambers that have a flat bottom (Figure 22 right). This allows enough room for a percussion nipple to be screwed into the side of the cylinder and still pass beneath the upper rib (top strap).

While there are Collier caplock pistols and long guns with his name engraved on the lock, the slow dissolution of Collier's involvement in firearm design is indicated by new names appearing on the lock plates. They include "Collier & Co", indicating that he was in partnership and "Edward's Maker Collier's Patent", likely meaning that Mr. Edwards had licensed Collier's patent. Finally, "Mills' Patent" suggests that a Mr. Mills had bought Collier's 1818 Patent sometime before it was to expire in 1832.

Elisha Collier's patents for steam-boilers and nail-making machines

Collier stayed in London until 1848 and had a vibrant engineering career, during which time he received six English patents for both marine boilers (Figure 23) and nail making machines. His engineering career was during a time when London was a bit like a Silicon Valley for machinery, but it did not end well for him. In 1848, Collier became an insolvent petitioner and likely beat a hasty retreat to the relative safety of his home in Boston, U.S.A in 1849.¹⁵ Upon his return, he would have witnessed a very dif-



Figure 21. Three different solutions for converting the Collier Second Model to cap lock. Top – No. 121 (Private Collection, Australia); bottom left – No. 90 (Bonhams, 1997); bottom right - No. 96 (Bonhams, 2019).



Figure 22. A Collier Third Model cap lock pistol No. 106, showing the necked-down cylinder and an opening cut in the upper rib (top strap) to permit the nipples to pass. At the base of each chamber (No. 192) is a narrow tunnel (source: location not known, photographs by Frank Graves).

ferent manufacturing landscape but he did have time to receive U.S. Patent No. 7,437 for a nail making machine.¹⁶ In his waning years before he died in 1854, he would have the satisfaction of his groundbreaking revolver design being a key part of the Colt trials in 1851 and 1852 mentioned above. The newspapers of the time describe him as, “...a man about six feet two inches tall, well dressed, and with a face expressive of the cardinal virtues and ten commandments, and you would as soon expect to hear the Judge commit perjury as him.”¹⁷ So he had kept his dignified composure to the end. No doubt, he understood the importance of his revolver developments, made a full eighteen years before those patented by Samuel Colt in 1836.

Studying the Mechanism of the Collier First Model Clockwork Revolver

Reading the different generations of Collier studies from the 1850s onwards, it is clear that there has been a recognition of Collier’s contribution to cock-activated ‘auto-rotating’ cylinder firearms. But the facts are hazy as to how the design worked. To

put this question to rest, it is necessary to make an exhaustive examination of a clockwork Collier to figure out how the mechanism operated.

The search by Team Collier for clockwork First Model revolvers has been long and unpredictable. The armourer at the Royal Armouries disassembled their Collier No. 4, only to find that essential components of the lock were missing. Then a rusty ‘dug-up’ gun was spotted in a non-firearms auction, that even has two bolts drilled through the barrel to hold the shaky construction together (Figure 24). Our friends at the Institute of Military Technology had the vision to buy it and opened it up to see how it worked. A military museum ‘reference collection’ studies firearms in a very different manner to a fine art museum, and beneath the rust they found vital clues to its construction, including the mark of “S. Nock” stamped onto the lockplate. Collier No. 5 has spent decades in storage at the Nebraska History Museum and, after scores of hours of negotiation, the museum authorized a full-Monty disassembly. It was conducted according to best art-museum prac-

tice, albeit by the conservation team who were not firearm specialists and were let loose on a Collier with a six-figure value. Under the Collier Team's watchful eyes, the conservator did a good job and the disassembly finally solved the enigma of the clockwork Collier. Then it was necessary to find a way to share the discovery and articulate the complex and unusual mechanism.

Digital Firearm Scholarship in the 21st Century

Skeletonized or 'cutaway' firearms are key in helping to understand the mechanism of 19th and 20th century firearms, made at a time when the inside of a device is recognized as being of equal value to the outside appearance. With a team of four students from Cornell's Architecture school, Collier's clockwork mechanism was digitally reconstructed to better understand its operation. The parts were redrawn from the patent drawing and supplemented with measurements of the Collier No. 4 in the Royal Armouries. Cobbling together those dimensions, a series of 3D models were plotted in resin as well as laser-cut Plexiglas (Figure 25). Sundry components from the local hardware store were incorporated as and when necessary. Although scrappy, the model worked, but it was still not easy to understand.

'Millennials' born between 1981–1996 have an entirely different knowledge bank than do 'Boomers' born between 1946–1964, for the two generations are born on both sides of the digital revolution. The Collier Team was introduced to Millennial expertise with the video game *World of Guns: Gun Disassembly*. Here was the solution to articulating how the Collier operated. A firearm can be seen in three dimensions as well as in X-ray. It can also be rolled around from every viewpoint while all the components could be seen operating in any aspect. Even better, if a clunky iron frame obscures the operation of the lock, it can be instantly removed with the click of the mouse. This form of digitally animated articulation reveals the mechanism like no other method can. *World of Guns* was approached to ask if they would be interested in developing the Collier and they took the project on as a challenge.

At best, a digital rebuild requires access to an actual firearm for exact measurements. Shop drawings are important to have, if available, but the manufactured object does not necessary accord with what has been drawn at one or another point in time. To further complicate matters, the collaboration between the Collier Team and *World of Guns* agreed to reconstruct a prototype Collier for which there was no actual example, just a written description. As the Collier Team had access to the entire First Model series from No. 1–No. 6, the digital model was designated "Collier No. 7", even though its whereabouts is unknown (Figure 26).

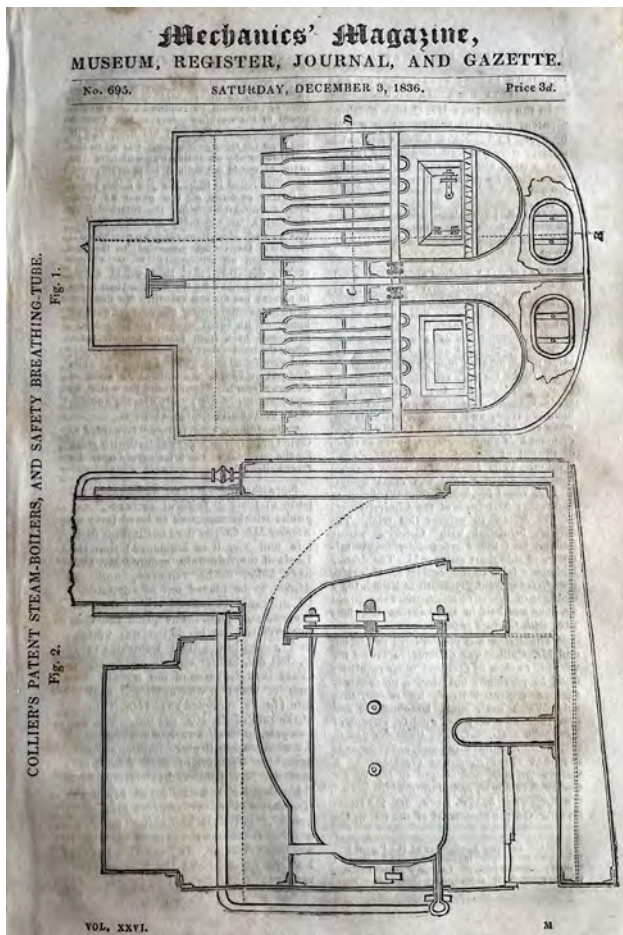


Figure 23. Collier's English Patent No. 4631, 1836, for Improvements in Steam Boilers. This boiler design was trialed by the British Navy in HMS Meteor with spectacular results, but it was not adopted (source: Ben Nicholson Collection).



Figure 24. Collier First Model rifle No. 6, with clockwork action. Even though in 'dug-up' condition, it reveals "S. Nock" as the lock maker, and the presence of the spring that powered the cylinder rotation (Institute for Military Technology).

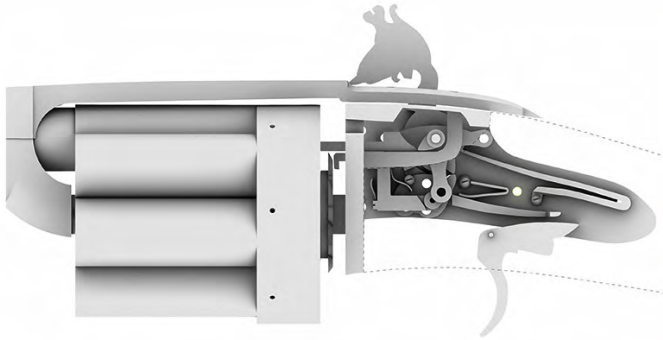


Figure 25. Digital drawing and model of ‘Collier No.7’ pistol, using a 3D printer, laser-cut acrylic and sundry items from the local hardware store (Danny Salomoun, Chris Andras, Alejandro Finol, and Thomas Rushton).

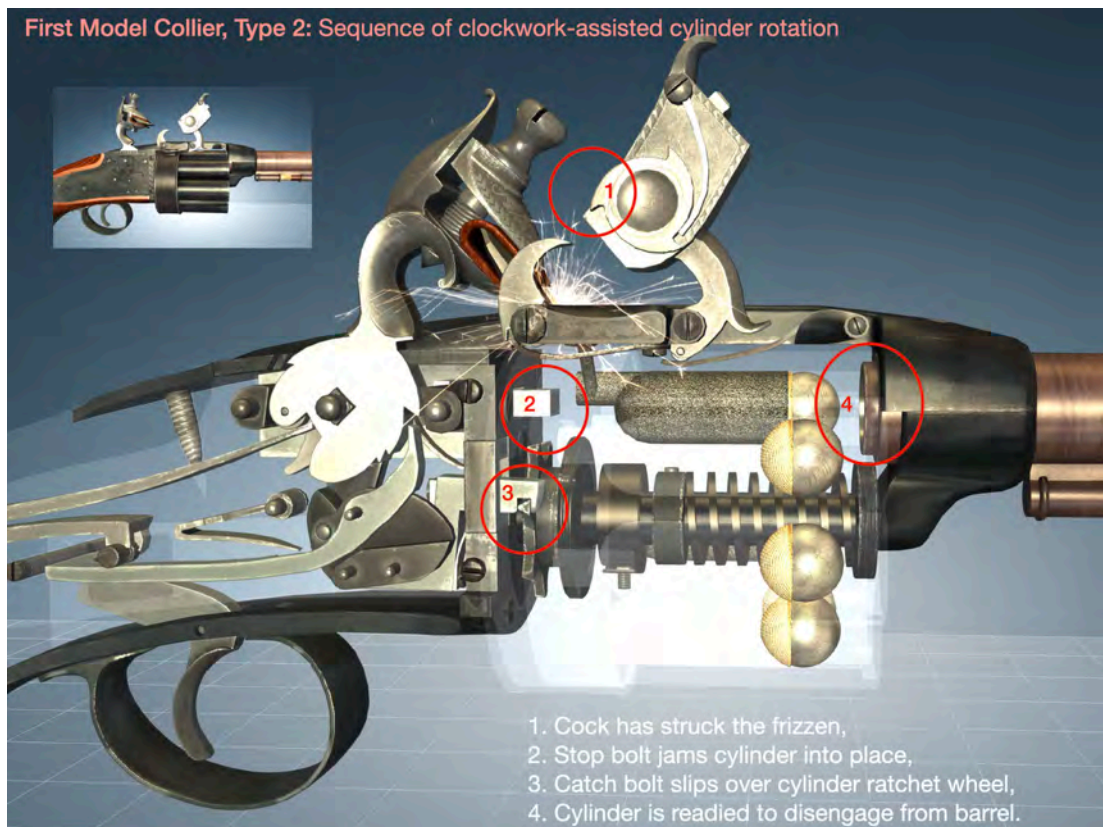


Figure 26. Digital cutaway drawing of the clockwork mechanism of a Collier First Model pistol. This digital reconstruction is of a Collier whose whereabouts is unknown, but it was described in print. It is named Digital Collier No. 7 by the author (source: World of Guns; Disassembly Collier).

Digital Animation requires a new level of analysis

The process took several hundred hours and more research, as animating the operating parts required a whole new level of precise study and examination. For example, the curvature of the ‘steel’ face of the frizzen has a sophisticated geometry to make it resist the flint (Figure 27). In order to produce a shower of sparks directly onto the priming powder, it must rapidly spring out of the way as the cock drops. Everything that we had taken for granted was put under the microscope in the reconstruction, from the threads of screws, the shape of ratchet blades and the taper of the barrel wall. To determine the correct angle of grain in the stock, a survey of cracked Collier stocks that had failed under the constant impact of fire was made. We now better understood why wood was carefully selected. The blank profile is cut so that the grain di-

rection maximizes the structure of the wood behind the lock, while at the same time displaying the more brittle wood for the decorative tiger’s eye figuration.¹⁸ The digital reconstruction demanded an entirely new level of examination because faults are so much more visible when animated in three-dimensions (Figure 28, 29).¹⁹

Future Publication

To conclude the Collier Project, a two-volume book – *Clockwork Basilisk: the Early Revolvers of Elisha Collier and Artemas Wheeler*, its chapters variously authored by the team – is now in process of production and will be available to pre-order in 2023 (Figure 30). The 120,000-word book covers every aspect of the design and history related to Wheeler and Collier revolvers, from the 16th century right up to the present day. The ‘brains’ of the book

Change 90: Side Profile of Magazine Frizzen

The face (called the 'steel') of the Magazine Frizzen is designed with a graduated curve that increases its concavity toward the base. The physics of this curve will rapidly 'flick' the magazine frizzen out of the way while the hot sparks fall towards the pan. This optimizes the length of time that the sparks are on the priming powder, measured in fractions of a second and therefore have a greater chance of ignition. Gunmakers designed this curve for best results.



Figure 27. The pictorial correspondence between the Collier Team and World of Guns team discussing the angle of the frizzen steel (source: *World of Guns* and the Collier Team).



Figure 28. First Model Collier "No. 7", clockwork action pistol, digitally constructed by *World of Guns: Gun Disassembly* (source: *World of Guns*).

is the *Catalogue Raisonné*, which addresses more than 70 original Collier firearms (i.e. those engraved with "E. H. Collier"), as well as over 30 licensed variants and copies. This has been made possible with the unstinting help of collectors, museums and auction houses across the globe, as well as by generous benefactors. The scholarship of Team Collier is enlivened by the high 'art book' production quality of *Headstamp Publishing*, and the book will be offered in both 'standard' (anything but!) and collector's editions.

The relatively new method of 'crowdfunding' books has been successfully employed by Headstamp, supported by additional discussion videos on the *Forgotten Weapons* YouTube channel. The book is directed towards all generations, from new enthusiasts in their early 20s, to seasoned collectors of considerably more years. Headstamp's impeccably crafted books are a natural fit with those who are unable to own firearms due to rarity, cost or residing in countries and cities with restrictive firearm laws. Like it or not,



Figure 29. The First Model Collier “No. 7” disassembled into 95 parts in the *World of Guns: Gun Disassembly* game (source: *World of Guns*).

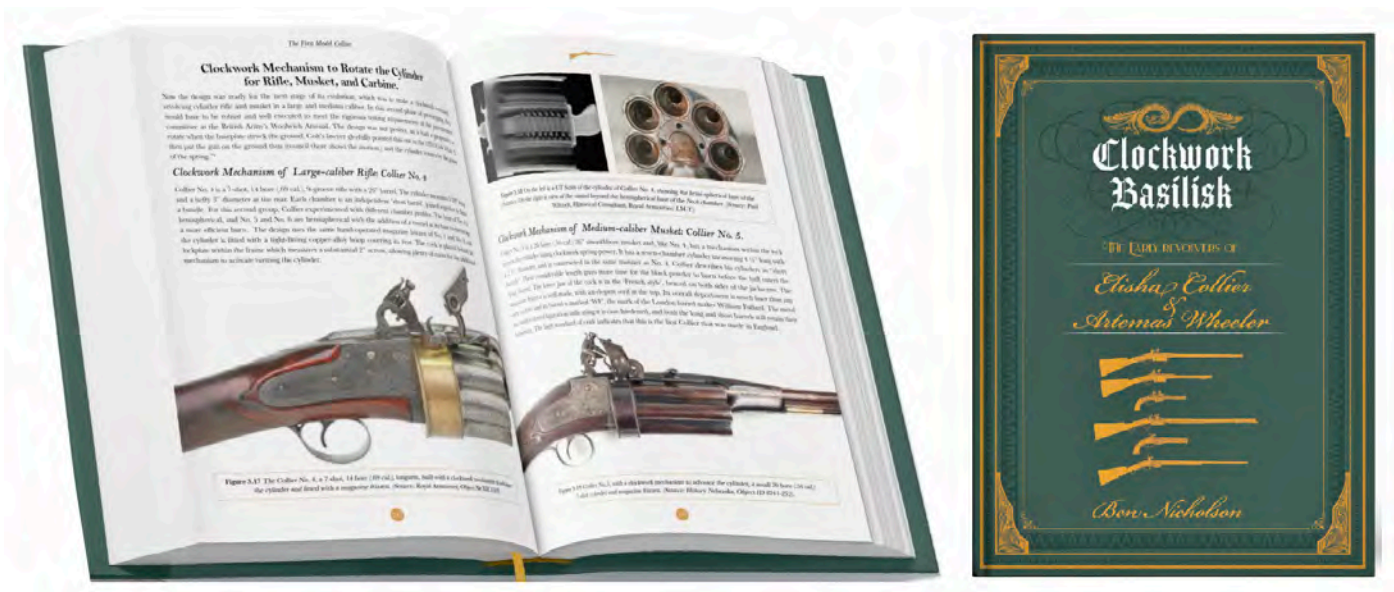


Figure 30. Page from *Clockwork Basilisk: the Early Revolvers of Artemas Wheeler and Elisha Collier* (source: Headstamp Publishing).

‘virtual collecting’ has now become a viable form of appreciation. The firearm collector’s adage of “For every gun – buy a book” has been flipped by Headstamp to “For every book – buy a gun.”

Perhaps one of the most interesting aspects of the project has been to consider the way firearm collectors and writers have approached their passion over the decades. A chapter of the Collier book will be dedicated to the art of collecting and examines the academic value of copied and restored Colliers. An Appendix reveals the process of digital reconstruction. Whether an original, a copy or a digital reproduction, each variant tells their own story and, from the scholar’s point of view, they all have value as counterpoints to the genuine article.

Clay Bedford collected every sort of Collier, be it a perfect version, a scrappy prototype, or a late model. Being an engineer, he was committed to the truth of the whole story, warts and all. While we probably have not taught the old dog any new tricks, we have filled in the spaces between some of his questions. The enigmas Bedford mentions are now fewer than they were a half a century ago, but there are still important Collier revolvers and associated documents that may yet come to light. A collector’s day is never done, and to the new generation we pass on Bedford’s enigmas – that still hang in the air.

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- ⁵ For the 1851 trial see *Colt v. Massachusetts Arms Co.*, 6 F. Cas. 161, 1 Fish. Pat. Cas. 108 (1851) Aug. 1851. United States Circuit Court for the District of Massachusetts, 6 F. Cas. 161, 1 Fish. Pat. Cas. 108 <https://cite.case.law/f-cas/6/161/>. For the 1852 trial *Samuel Colt against Hiram Young and Edw. Leavitt*. U.S. Circuit Court, case 3,032, May, 1852 through Nov. 1852, see *The Federal Cases*. 1897b. 'Case No. 18,155 YOUNG et Al v. Colt. [2 Blatchf. 373.] Circuit Court. S.. C. New York. May 14, 1852.' *The Federal Cases comprising cases argued and determined in the Circuit and District Courts of the United States...* Book 30, pp. 841–843.
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- ⁸ Collier, Elisha H.. c. 1826. *Description &c. of Collier's Patent Five-Chamber Fire-Arms*. Broadsheet. London: G. Hazard. The Collier broadsheet includes the report on the second Woolwich trial of 1824.
- ⁹ David J. Williams has researched manufacturing techniques of the early 19th century and is the lead author of Chapter 9, *Manufacturing the Collier Second Model* in the forthcoming Collier book.
- ¹⁰ National Archives of Ireland. 1824. Letter from E.H. Collier to Henry Goulburn. 26 May 1824. CSO/RP/1824/1368/2.
- ¹¹ *Ibid.* In Collier's letter to H. Goulburn he writes, "...Sir. Edwd. Lee...considered it admirably notable for the use of the Mail Coach guards and gave an order for a Carbine and a brace of Pistols..."
- ¹² Thanks to Derek Stimpson, Honorary Archivist of The Worshipful Company of Gunmakers who, with David J. Williams, advised on the British system of proving firearms.

- ¹³ Thanks to Matthew Schneiderman who has pointed out that serially numbering firearms was being adopted by several makers in the late 18th and early 19th century, the first known instances being Robert McCormick of Belfast and Dublin in 1787 and John & Joseph Manton in 1789. The practice of numbering firearms was soon begun by others, including H. Nock (c.1785), S. Staudenmayer (1804), Forsyth (1808), W. Smith (1809), Purdy (1816), Rigby (1821) and Moore (1821). In private correspondence, David J. Williams adds, “*Nock’s earliest known numbered ‘fine best’ long gun is number 319. No 658, is silver marked for 1787. Nock made around 200–300 ‘fine best’ long guns a year so this puts him serial numbering from 1785 or so.*”
- ¹⁴ Thanks to a Private Collector, Canada who made a full disassembly of his Collier Third Model pistol # P-A, with the aid of Craig and MaryAnn Ross.
- ¹⁵ National Archives and Records Administration. No Date. ‘Massachusetts, Boston Passenger Lists, 1820-1891’. NARA microfilm publication M277 roll 032; FHL microfilm 419,926, p. 2857. Washington D.C.: National Archives and Records Administration.
- ¹⁶ <<https://patents.google.com/patent/US7437A/en>>
- ¹⁷ *New York Times*, 1852c, page 6, column 2.
- ¹⁸ Of the small sample of pistol stocks measured, the straight grain direction was around 17° from the line of the barrel.
- ¹⁹ *World of Guns: Gun Disassembly*. 2021. ‘Collier Flintlock Revolver # 247’ For an outtake of the Collier animation see, <<https://www.youtube.com/watch?v=rXGkMvMrV3Y>>

