

A BRIEF HISTORY OF PRIMER MAGAZINES, INCLUDING WILLIAM NEEDHAM'S PATENT PERCUSSION DOUBLE GUN

by Matthew Schneiderman

I collect exotic percussion primers (Figure 1).¹ Odd primers are often part of odd systems, and recently I have researched and grown fond of both flintlock-priming-powder and percussion-primer magazines. I have found a 160-year-long Magazine Cabinet of Curiosities, so I can show you some cool stuff and explain how it works.

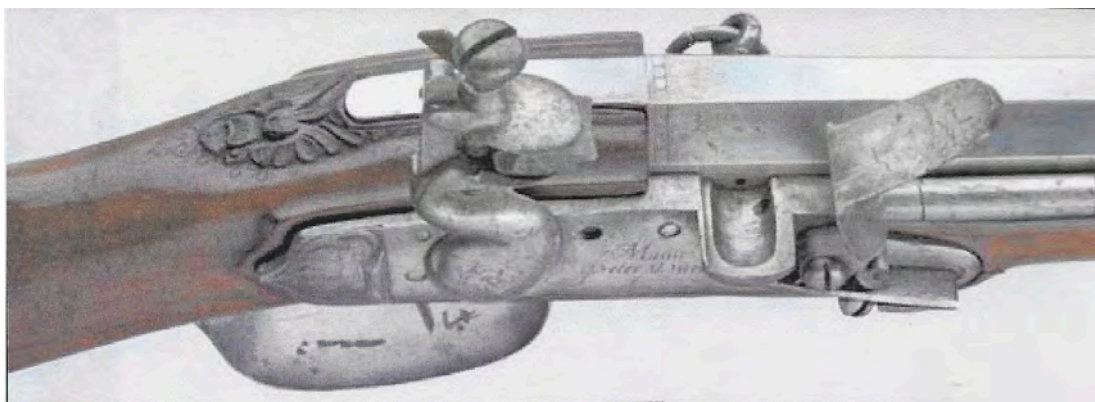


Figure 1. The first page of my percussion primer collection.

Modern small-arms magazines supply cartridges,² but I'm interested in early ones that hold percussion primers or flintlock priming powder and/or gunpowder and ball. You must still fill them,

but you save time with the priming step and you increase the rate of fire. No need to pour priming powder into a pan or place a primer onto a nipple before each shot. Most percussion primers

Figure 2. The Durringer rifle's priming powder magazine tube next to the barrel on the right. The tube's opening is in the upper forward side of the pan. Photo courtesy of Hermann Historica.



are small and a challenge to manipulate with gloves or cold fingers. A magazine prevents fumbling and dropping. These magazines are sometimes called “self-priming” or “self-capping”, and both flintlock and percussion examples are sometimes said to offer “automatic priming”.³ To me these three terms mean the shooter need only pull back the cock or the hammer, and rarely also pull the trigger, in order to prime. These phrases had a broader meaning to the original inventors and buyers. Period advertisements and trade labels sometimes use them for products which require the shooter to do something additional: tilt the gun, manipulate the magazine, etc. We’ll see which systems offer true automatic priming and which claims are a bit exaggerated.

Flintlock Priming Magazines

I will begin with three types of flintlock priming magazines. All require help from the shooter.

A PRIMING TUBE ADJACENT TO THE BARREL, FEEDING A FIXED PAN BY GRAVITY (BARREL RAISED).

A German-states muzzleloading rifle marked on the lock “Maintz Peter Durringer” was auctioned at Hermann Historica, Munich, on April 28, 2011, as lot 47, and dated circa 1660. The tube runs along the right side of the barrel for 2/5 of the barrel length, and opens into the pan (Figure 2). I assume it has a removable front-end cap for filling with priming powder.

COMMENTS: The barrel and tube must be tilted upward to prime. This is the earliest priming magazine I’ve seen, and the simplest. It looks like a good idea. Why haven’t I seen any others?

A GATED SPACE FOR PRIMING POWDER, FEEDING A MOBILE PAN BY GRAVITY (MAGAZINE POINTED DOWN).

Small numbers of matchlock, wheel lock, flintlock and percussion firearms use front-loaded, reloadable metallic cartridges. This earliest and longest-serving breechloading system lasted from the early 16th century into the 1870s. A very small subgroup of such flintlocks in the first half of the 18th century in England used a special priming powder magazine. Mine is by James Paul Freeman, from the 1720s (Figure 3).⁴ Figure 3 (upper left) shows the barrel raised up (released by pulling back on the trigger guard) and the cartridge removed. The cartridge has a touchhole, on the side away from us in this image, which lines up with the touchhole of the barrel. The cylindrical priming powder magazine is behind the pan (with its door open in Figure 3, upper right). In this design, the floor of the pan is attached to the barrel, not the lock, so when the barrel is raised that floor tilts down until it rests in front of the magazine. Pointing the magazine down will move priming powder into the pan through a small opening in the forward wall of the

magazine chamber, and moving the barrel back down to its normal position will raise the primed pan. Note that the pan does not scoop – it’s filled by gravity.

The cartridges were carried in small holsters, in sets of five or six, so I assume the magazine holds five or six primings. There are guns like this in which the barrel is swung to the side or downward to remove and change the cartridge. These have either a magazine frizzen (see below) or no magazine at all. The choreographed movements required to operate the Freeman gun and its siblings must have taken some time to master: barrel up, cartridge out, new cartridge in, keep cartridge from falling out, tilt magazine downward to prime while the barrel is still raised, move barrel back in place—no wonder these guns are rare. Perhaps operating them required a servant’s extra hands....

The second unusual breechloading system is named for Michele Lorenzoni of Italy, though many makers produced it and someone else invented it.⁵ It appeared in the second half of the 17th century and lasted into the early 19th. These are true repeaters, with magazines for balls and gunpowder in the body or butt and the same kind of gated priming powder magazine behind the pan (Figure 4). In this system the pan is attached to the central cylindrical action, not to the barrel. One continuous turn of a long lever rotates a central cylinder that picks up a ball and a gunpowder load; positions them properly; pivots the pan into position to fill with priming powder by gravity through a similar opening in the magazine wall and cocks the action and lowers the frizzen. Moving the lever back returns the pan to its firing position, with priming powder in place. I have seen this happen – it’s an amazing performance. The shooter does not have to raise or lower the frizzen. However, to make all this work requires help from gravity, by tilting the firearm down at the proper times, to correctly position ball, gunpowder and priming powder.

COMMENTS: The linking of the cock and frizzen in the Lorenzoni system is not sufficient for automatic priming. Both these designs provided rapid fire of multiple shots, but their expense, complexity and sheer difference from prevailing standards probably limited their popularity.

3. A PRIMING POWDER MAGAZINE FRIZZEN, MECHANICALLY CONTROLLED.

The “magazine frizzen” combines a priming powder reservoir and dispenser with the frizzen’s striking surface, which forms its rear-facing wall when it’s on the pan. It has a covered opening at the top through which it’s filled and a rectangular open slot in the bottom (Figure 5). The key part is an internal rotating cylinder or drum at the bottom, held in place by one or two axial screws. It has



Figure 3. The Freeman gun (top). The gun's barrel released and lifted upward, and the cartridge removed (upper left, photo by Dan Retting). The protrusion at the left edge of the cartridge fits the slot in the breech for indexing. The powder magazine with its gate open (upper right). The floor of the pan is attached to the barrel, not the lock. (blue background, photo courtesy of Ton Bolk). As the barrel is raised, the floor of the pan drops down in front of the magazine (photo by Dan Retting). The opening in the forward wall of the magazine through which priming powder flows when the magazine is tilted downward (bottom, photo by Matthew Schneiderman).

a smooth surface, except for a trough. When the frizzen is up, the trough faces inward and is filled with priming powder. In this position, the cylinder blocks the bottom opening of the magazine and keeps powder from falling out. As the frizzen is lowered by hand, the cylinder is mechanically rotated, bringing the trough in line with the open slot and dumping its priming powder into the waiting pan. Only the pre-measured amount of powder is dispensed, the rest is held inside the magazine. When the frizzen is struck and flipped open, the cylinder and its trough are rotated back to the starting position, trough facing up and immediately filled, smooth cylinder surface downward. It seals the opening, keeping the powder inside and the ignition flame out of the magazine.

Several different mechanisms have survived. In the second-model Collier revolver, a lever arm turns the priming cylinder 180 degrees as the frizzen moves onto the pan, and reverses it by the same amount as the frizzen is thrown back by the cock strike (Figure 6). This is the basic structure and function I just described. In a unique English-made pepperbox revolver retailed by Richard Constable of Philadelphia, a pair of gears do the same thing, one mobile and attached to the magazine cylinder, the other fixed to

the frame next to the barrel group (Figure 6, upper right). In the more complex first model Collier, the cylinder has either three or four priming-powder-holding troughs. It's rotated 360 degrees in one direction, in increments of either 120 or 90 degrees, by means of notches pushed by a fixed spur. It releases the powder from each space in turn. In all examples, this cycle is repeated until the magazine is empty. These three revolvers are from the 1820s, the last decade of the magazine frizzen. All of them save a step in the loading process (priming from a flask before each shot), but they are not linked to the cocks and require movement of the frizzen by hand – they are not automatic.

A British patent by James Thomson, GB#3784, March 9, 1814, illustrates the two extremes of the “self-priming” claim. The patent shows a highly unusual “poli-chambered”, multishot gun with a magazine frizzen.⁶ In the patent, the priming is truly automatic, with the frizzen linked to the cock. When the cock is drawn back, the frizzen is lowered onto the pan and a dose of priming powder dispensed. In the real world, Thomson obtained a military trial of a simplified version. There was no link to the cock, and rotation of the internal cylinder required hand-turning an external knob, i.e.



Figure 4. Lorenzoni system gun by William 1 Wilson, London, the 1770s. The closed priming powder magazine in front of the cock, and one of the axis screws for the large brass cylindrical action (left). The door for the ball and gunpowder magazines is behind the long action-rotating lever (right). Photos courtesy of Rock Island Auction.

the frizzen movement and the magazine priming movement were each done manually, as separate operations (Figure 7). The only (minor) advantage: turning the knob took less time than using a priming flask. A flask was still needed to fill the magazine, but only “about [every] twenty primings”. The military rejected it.⁷

The magazine frizzen had a long life. The earliest example I’ve found is a Northern Italian breechloading gun signed “Acqua Fresca” and dated 1694.⁸ There are a few other survivors from the intervening 130 years until the grand finale in the 1820s, but it’s a very rare design.



Figure 5. The raised magazine frizzen of Collier second model revolving pistol #89. The striking surface facing upward. The filling opening facing right. The priming powder dispensing slot facing left (top, photo by Frank Graves). A Collier magazine frizzen with the cylinder removed (bottom, photo set by Ben Nicholson). The left image shows the striking surface facing up, the filling opening facing left and the priming-powder-dispensing slot facing right. The right upper image shows the cylinder and its trough.



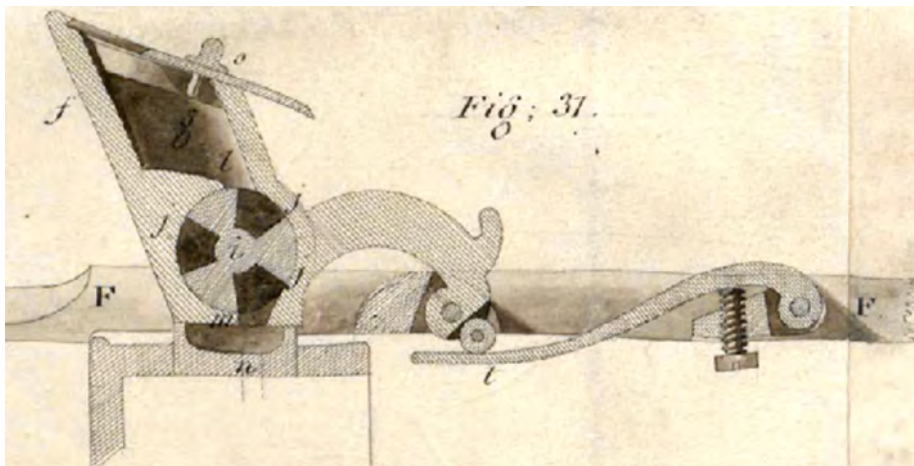


Figure 6. Collier #89. The lever arm and the cylinder axis screw (top left, photo by Frank Graves). The magazine frizzen of the Constable flintlock pepperbox, showing its gear system (top right, photo by Ben Nicholson, courtesy of Jonathan Tavares and the Art Institute of Chicago). A drawing of the first-model Collier magazine frizzen, side view, from the Collier patent (lower left). From the top: loading cover; space for priming powder; internal cylinder with three troughs; pan. A first-model Collier magazine frizzen, side view (bottom right, photo by Ben Nicholson). This one has three priming-powder troughs on its internal cylinder. When the frizzen is pushed down, the fixed spur catches one of the three raised teeth on the side and rotates the cylinder 120 degrees, dumping powder from one of the troughs.

COMMENT: It seems simple enough to link the cock and frizzen and have true automatic priming. I'm not sure why this wasn't done, but here's a thought. There are times when you'd want to cock without moving the frizzen and unavoidably priming the pan, for example when you have to change the flint.

Percussion (Fulminate Ignition) Primer Magazines

Fulminate ignition lent itself to experimentation and a century-long outbreak of inventiveness. New ideas and new patents were driven by imagination, intense competition and creative salesmanship. The practical results were variable, but inventors kept trying. Here are some of the examples I've discovered.

ALEXANDER FORSYTH'S BRITISH PATENT FOR FULMINATE IGNITION, GB#3032 OF APRIL 11, 1807.

Forsyth designed and marketed the two earliest percussion-primer-magazine locks. The first, in 1807, was the "roller-primer". Figure 8, (top left) shows the "primer", a magazine filled with loose fulminate powder, in the firing position. Forsyth invented the firing pin, which he called the "punch", and which protrudes from the top of the primer. The primer is loaded from the other end and screws onto the "roller" (Figure 8, top right). The roller is a short,

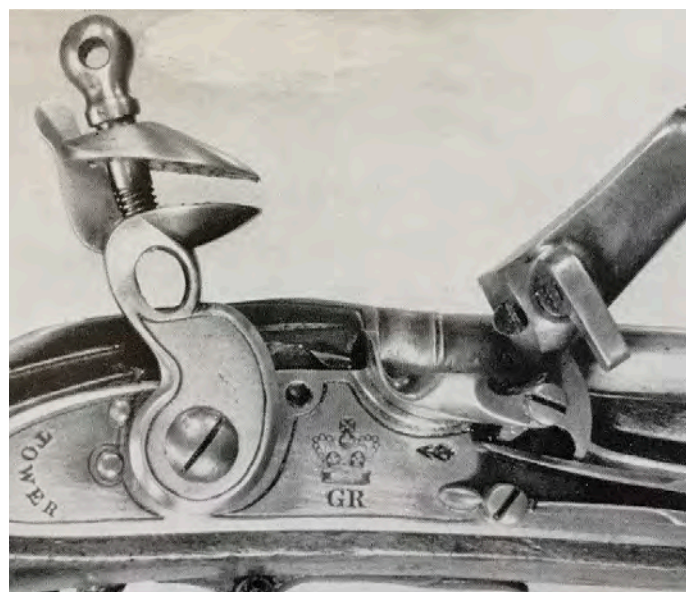
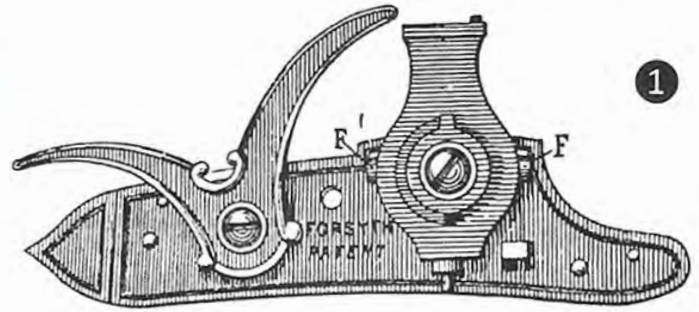


Figure 7. A simplified version of the Thomson patent magazine frizzen, with a hand-turned knob. Photo from reference 7.

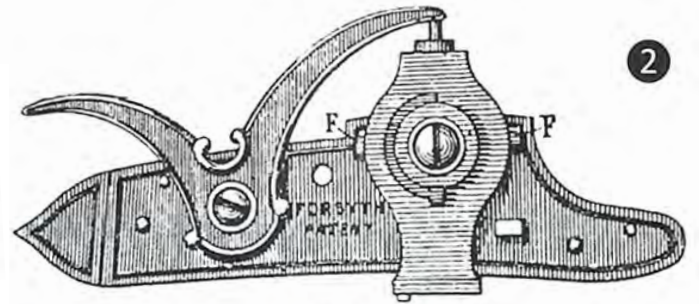


THE FORSYTH LOCK.

- A. The Roller.
- B. The Pan in the Roller.
- C. The Cavity in the Magazine for the priming powder, and capable of containing 40 "primings".
- D. The Cavity containing the punch and spiral spring.
- E. The punch and spiral spring.
- F.F. The Screws between the points of which and the cork fixed in the inside of the Magazine, the grease for oiling the Roller is contained.

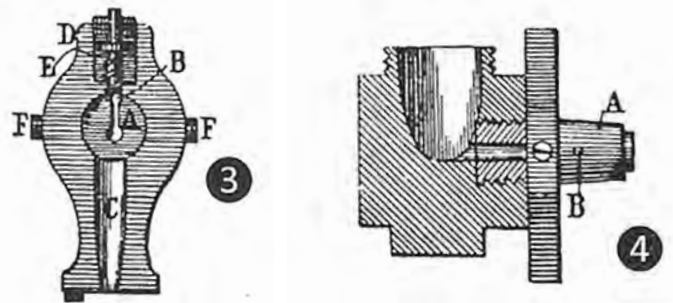


Magazine in the priming position.



Magazine in the firing position.

Figure 8. A Forsyth primer in the firing position, with the firing pin pointing up (top left image). The screw connects the primer to the Forsyth roller (top right image) that is screwed into a breech piece, which takes up most of the photo. The pan is shown. As the primer rotates around the roller, the priming powder will fill the pan. Note the roller is slightly tapered (photos by Matthew Schneiderman). To the right is one of Forsyth's many pieces of instructional and illustrative printed material (courtesy of Clyde Barden and Fred Bienvenu).



Section of the Magazine.

Section of the Breech with the Roller screwed into it.

thick, tapered rod that screws into the breech and contains both the pan and the ignition channel. One of Forsyth's many advertising and instructional sheets is shown in Figure 8, right. Image "3" is a cross section of the primer. As the primer rotates 180 degrees on the roller to the upside-down "priming" position (image "1"), the fulminate powder has nowhere to go except into the pan. As the primer then rotates back 180 degrees to the "firing" position (image "2"), the pan stays filled with the small amount of priming and the rest stays in the magazine. (Rotation of the primer is done by hand.) The hammer hits the firing pin (controlled by a small "spiral spring"), which in turn hits the priming in the pan. Then repeat! Note the estimate of forty primings.

Forsyth's second type of magazine, the sliding primer, is a small box of priming powder sliding on a track. (Figure 9) It first appeared in 1812. The box is loaded from the top, and is attached to the hammer by a bar. If you looked at the magazine box removed from the pistol, you would see no bottom – it's open. However, the track functions as the bottom, the fit is tight and no powder escapes. Under the hammer nose in the photo is the pan, which is a depression in the track opening into the ignition channel. It looks like the pan in Figure 8. As the hammer is cocked, the box is pulled backward and deposits a small amount of primer into the

pan. As the hammer falls, the box is pushed forward and the pan is left open for hammer strike. Note the sliding primer is exactly the same as the roller-primer, except the slider's movement is in a straight line on a flat track and the roller-primer's movement is rotational. The concept of scraping a bit of powder from the moving magazines into the pans is the same. Note also that the sliding primer, with its linking of hammer and magazine box, is an automatic priming system, requiring the shooter only to cock the hammer. The roller-primer, requiring hand-rotation of the primer, is not an automatic priming system.

By 1810 at least two Continental makers, Le Page in France⁹ and Ronge in Liege, had stolen Forsyth's ideas for fulminate priming powder and the firing pin but not his roller-primer magazine. A flat-nosed hammer struck the firing pin, which in turn detonated priming powder poured from a flask into the pan before each shot (Figure 10). Not every maker and buyer wanted the earliest magazine, which was complex, hard to use and hard to maintain.

COMMENT: Although Forsyth's patent drawings include the primer, he wisely and specifically patented the broad concept of fulminate ignition. Almost all firearms to the present day are covered by the Forsyth patent.



Figure 9. A third model Forsyth sliding-primer pocket pistol. Photo by Matthew Schneiderman.



Figure 10. A very early fulminate-powder-detonated pistol by Ronge, Liege. What looks like a magazine is a big firing pin and its housing. It's moved onto the pan (pointing toward 10 o'clock) and then flipped back up, both by hand. Photo courtesy of Czerny's Auctions.

2. ANOTHER PRIMING POWDER MAGAZINE.

Westley Richards, British patent GB#4611, November 10, 1821 (just after the expiration of Forsyth's patent). A rocking bar connects the hammer and the magazine, which is filled through a screw-off top. When the hammer is cocked, the magazine is moved onto the pan and deposits a small amount of fulminate powder (Figure 11). When the trigger is pulled and the hammer falls, the magazine is moved up and off the pan.⁹

COMMENT: A theme emerges: linkage of cock or hammer to magazine is one key to true automatic priming.

3. PERCUSSION HAMMER MAGAZINES.

In this design, the hammer contains a hand-rotated magazine wheel. The earliest is from Isaac Riviere, with estimated dates 1817-1820 (Figure 12). This hammer magazine is removable; supplied in multiples and interchangeable; hand-rotated and loaded with pills in indentations along the edge.¹¹ Though the wheel says "Riviere Patent", there is no such patent recorded. Similar hammers marked "Sykes Patent" are known, also without a recorded patent, and two cased sets of spare Sykes magazines exist.¹ Since the pill about to be detonated hangs upside down in the magazine wheel, it must be sticky (e.g. fulminant in wax or a pill held in place by wax). I have seen two firearms with pill-loaded hammer magazines like this.¹

Figure 11. The Westley Richards patent lock. The hammer cocked, the priming powder magazine on the pan. The linking arm between hammer and magazine is screwed onto the front of the lock plate. As the hammer falls, the magazine is pushed up and away, leaving the primed pan open. Photos by Fred Bienvenu.



Figure 12. The Isaac Riviere hammer magazine. A raised handle for turning or removing the wheel and notches around the edge for indexing (left). The magazine wheel removed, showing the spaces for the sticky pills (right). At the lower border of the hammer head, the opening that allows the nipple to detonate the pill. Photos courtesy of Thomas Del Mar auctions.



Two known patents also show hammer magazines. Thomas Cartmell of Doncaster, GB#5033 of November 6, 1824, used a small “receptacle” (i.e. not a wheel) for pills in the head of the hammer and Joseph Manton, GB#5106 of February 26, 1825 used a similar design. We will see yet another design below that’s automatic.

4. JOSEPH EGG’S PILL PRIMER MAGAZINE.

Figure 13 shows a special Joseph Egg percussion double gun. This is one of my favorite firearms, an unbeatable combination of clever design and flawed function. We see grooved slots behind the breech that serve as pill magazines, the line of pills (not sticky) advancing by gravity when the barrels are tilted downward. A metal cover, raised in this photo, protects the pills and keeps them in place. The first pill in each line enters its respective lock through the small hole at the end of the magazine groove. Inside the action it lands in an opening cut into a small metal slide which rests on a metal track. When the hammer is cocked, that slide moves forward, exiting the action along the track, taking the pill with it. As it slides over the small pan, the pill drops in. The slide continues further along the track, covering the pill and preventing it from falling out. As the hammer falls, the slide is fully withdrawn and the pill is exposed for detonation by the hammer nose.¹

Figure 14 shows another way of visualizing this construction. Drawing 3 shows that the slide, labelled D, is part of the lock mechanism, and that it’s angled uphill. Drawing 1 shows the hammer cocked and the slide D extended, having just dropped a pill into a cup-like pan. Drawing 2 shows the hammer strike, with the slide D fully withdrawn into the action.

Two Joseph Egg patents cover this pill magazine, GB#4727 of November 26, 1822, and the “improvements” of GB#6829 of May 9, 1835. Neither patent shows the grooved magazines on the long breech tang shown in Figure 27. (We’ve all seen firearms that don’t totally match their patents.) Both patents show the magazines as tubes placed in front of the breech on either side of the central rib (Figure 15). These work exactly the same way, except the shooter has to tilt the barrel up, not down, to advance the pills.

I know of only four surviving Joseph Egg double guns with this system. Two are still cased. Two use the magazine behind the breech on the long barrel tang and two use the tube magazine along the rib. All use the slide pill-delivery action. Despite this rarity, both these Egg patents appear in the core book on English firearms patents, which presents a very small selection of the most important ones over 140 years.¹ Why were they chosen? I think the editors appropriately judged the early primers that superseded Forsyth’s powder to be important, and they included Joseph Manton’s designs using pellets and tubes and these Egg magazines for

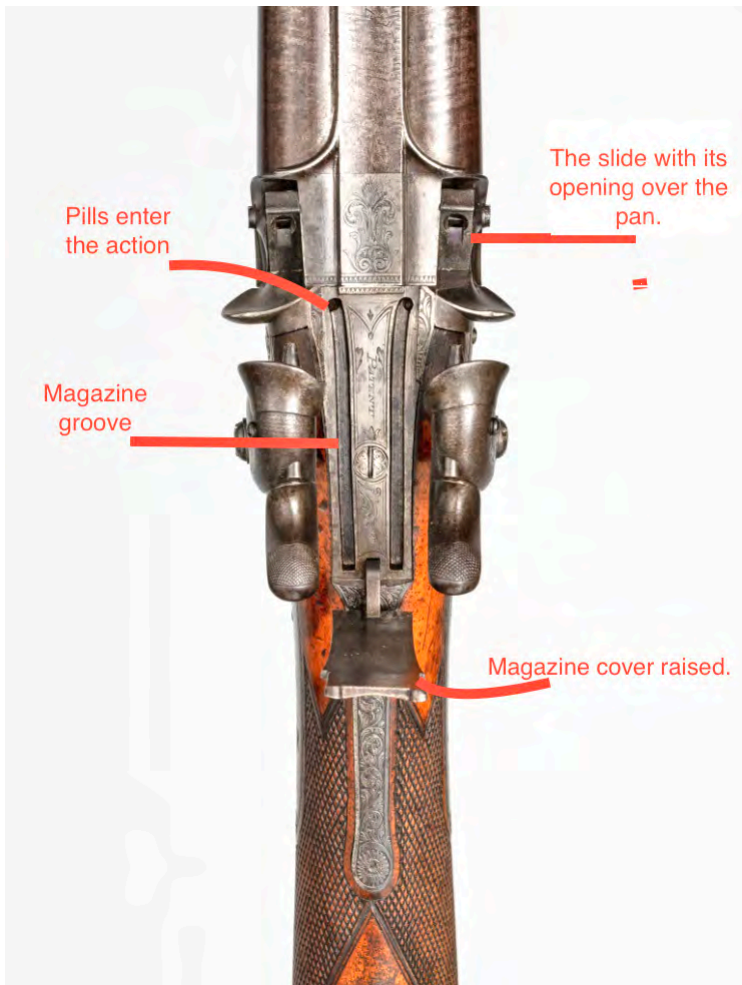


Figure 13. The Joseph Egg double gun's pill magazine and action from above, as described in the text and as marked. Photo courtesy of the Metropolitan Museum of Art, accession # 19.53.65.

pills. Joseph Egg did not patent his invention of the copper cap. Two thoughts come to mind. First, the Egg gun cannot be fired upside-down (contact me if you wish to discuss this). Second, this Egg patent seems to have an additional problem. As the pill is moved along the ramped track toward the pan, the slightest disturbance – it wouldn't take an earthquake – should make it fall out, because it's uncovered and open.

Finally, it's worth noting that Egg took this invention seriously: he featured it on two of his trade labels. An earlier one (1822-1835) said "Patentee of a Self Primer", and a later one (1835-1837) said "Patentee of Self Priming Percussion Guns".¹ As we've discussed, putting gravity to work by tilting the gun up or down is not pure "self priming", but perhaps we can cut Egg and his fellow inventors some slack and say "close enough".

5. WILLIAM WESTLEY RICHARD'S MAGAZINE PRIMER FOR COPPER CAPS.

Westley Richard's patent GB#7582 of March 8, 1838 offers a copper cap magazine attached to carbines or pistols on the right side of the barrel in front of the nipple (Figure 16). Not all primer magazines required exotics. Caps are loaded side-by-side into the magazine through a spring-controlled flap at the forward end, and are kept precisely in line inside. Gravity advances the caps toward the hammer and nipple by raising the barrel. The entire magazine is pulled forward to position the foremost cap over the nipple, and that cap is then pushed down onto the nipple by the prominent knob or "thumbpiece". Finally, a return spring moves the entire magazine back to its resting position.¹⁷

COMMENT: This odd and very rare system shows how many tasks an inventor was willing to assign to the shooter in order to avoid the handling of caps one by one.

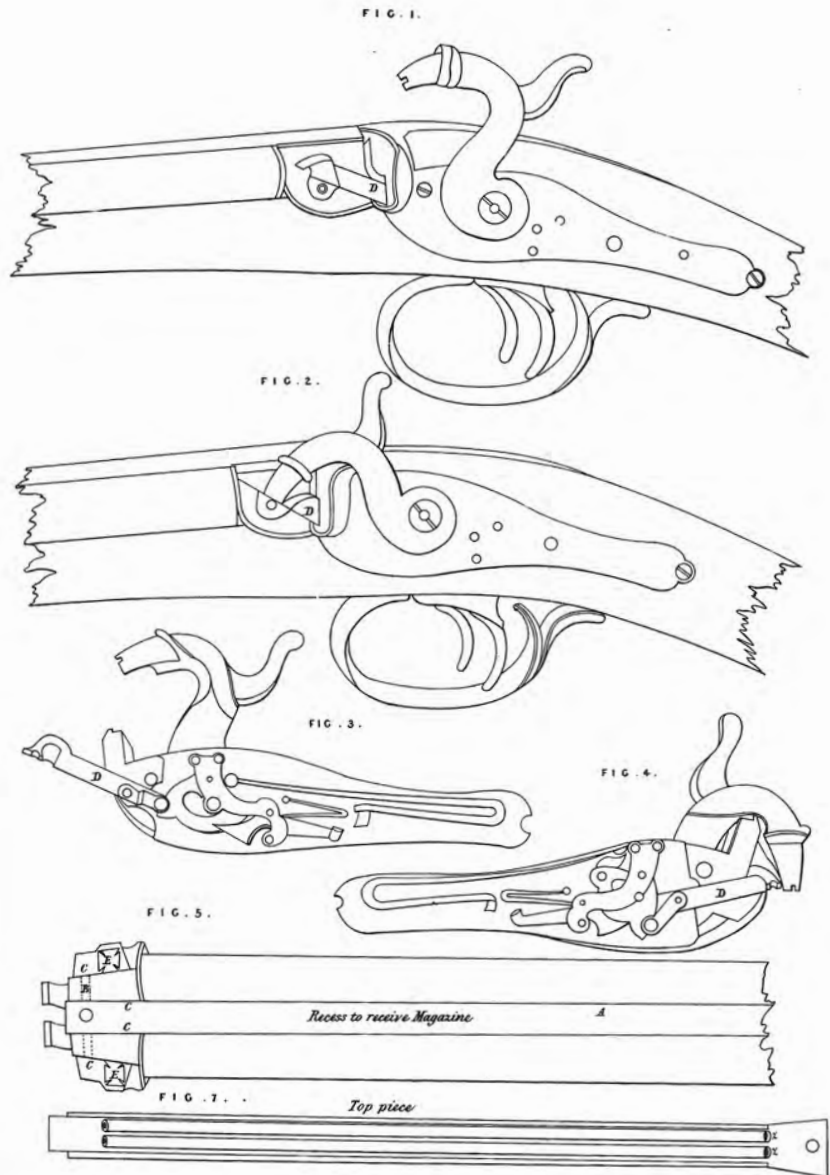
6. A BUSY SEVENTEEN YEARS.

Between 1832 and 1849, at least 17 "self-priming" and capping devices were patented in Great Britain.¹⁷

7. CHARLES JAMES SMITH'S PATENT PELLET PRIMER AND MAGAZINE.

C. J. Smith's long patent GB#10,667 of May 14, 1845 introduced a special and complex pellet primer (Figure 17) and a magazine to dispense it. The 4.2 mm x 2 mm pellet surrounds the fulminate with an inner layer of tin foil and an outer cover of brass. In this one known surviving double gun, the magazine is a two-part tube (outer and inner) attached above each lockplate (Figure 17). The pellets are stacked top against bottom in the inner tube, not side by side. They are advanced by a spring, so this gun is truly auto-primed. What we might call the pellet-management structure, beneath and linked to the hammer, rotates to accept the next primer in line when the hammer is raised and then rotates back as the hammer falls to bring that pellet under the hammer nose for ignition.¹

In the extremely rare C.J. Smith pepperbox (four known examples, one of them converted to copper cap), the magazine takes the form of an internal circular path at the breech, with the pellets advanced by a circular spring.¹



The enrolled drawing is colored.

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE, Printers to the Queen's most Excellent Majesty. 1835.

Milby & Sons, lith.

Figure 14. The drawing from Joseph Egg's patent GB#6829, May 9, 1835.



Figure 15. The tube magazine version of Joseph Egg's system, placed next to the central rib between the barrels (see reference 14, page 70).

COMMENT: In the percussion era, spring-advancement is the second automatic-priming theme.

8. AMERICAN AUTOMATIC PRIMING SYSTEMS.²⁰

The most famous and most common American system is probably Edward Maynard's tape primer, U.S. patent #4208, September 22, 1845. This paper tape has regularly-spaced bubbles of fulminate, just like the toy gun caps we played with as kids (Figure 18). The tape roll sits in a round covered space in front of the hammer (the magazine), and is mechanically (hence automatically) advanced. The Maynard tape primer was popular, and provided ignition for many different firearms in the mid-19th century.



Figure 16. Westley Richard's patent brass cap magazine. At the far left, the "thumbpiece" that's pressed down to place the cap on the nipple. Photo by Brian Godwin, courtesy of the Bob Freeman Collection.



Figure 17. The Charles James Smith pellet primer (left, photo by Jas van Driel). The C.J. Smith double gun (center, photo by Fred Bienvenu). The magazine taken apart; the action ready to receive the pellet primer. The magazine together (right). The action rotated and the primer detonated.

Maynard had followers. James Durrell Greene patented a cloth tape roll in Great Britain for his Greene carbine (GB#447, February 21, 1856), which used a Maynard primer magazine with a Maynard patent acknowledgement on the cover. I'd like to hear from anyone who knows if Greene's tape was ever used in his carbines. I've seen a Greene tape roll, and I snipped off a piece of it with permission (Figure 19). Edward Savoral the optimist patented his anachronistic metal tape roll in 1876 (U.S. Patent No. 174, 675, February 15, 1876) (Figure 20). This is the latest primer shown in Jim Gooding's book.^{1,21}

My favorite automatic priming system is by Christian Sharps, U.S. patent #9308, October 5, 1852. A stack of copper or copper and foil disc primers are inserted into the gun's vertical tube magazine by a "charger", which is then discarded (Figure 21). The magazine is spring- (hence automatically) advanced. As the hammer falls, the disc is flung into the air. In the midst of its flight, as in a circus trapeze act from hell, it's intercepted and caught by the

hammer, which carries it down onto the nipple, where it explodes. I have been assured by multiple Sharps collecting specialists that this system actually works.

Finally, a highly unusual automatic self-priming system was patented by George W. B. Gedney, U.S. #23,241 of March 15, 1859. This was a different type of magazine hammer, devised (though it seems rarely used) as a method of conversion from flintlock (Figure 22). A spring-containing tube inserted into the hammer is loaded with a very rare stick primer (fulminate shaped as a short, thin stick). This looks like a standard metal tube primer, except it's made entirely of fulminate. When the hammer is cocked, the fulminate is advanced by the spring, the end protruding from the hammer nose. "As the hammer falls, the magazine rotates ... inside the space in the hammer causing a disc of fulminate to be sheared off [the end of the stick] by the sharp cutting edge of the [hammer's] interior milling."²² I envision this as being like slicing a very small, highly explosive salami. The hammer guides that new-



Figure 18. Maynard tape primer rolls, unwrapped and wrapped, and their container. The tape primer roll in its magazine, with the end fulminate bubble over the nipple. The magazine door of a model 1850 Sharps is open. Photo by Ron Paxton.

ly-shorn-off slice onto the nipple. I welcome any thoughts on why shearing a disc off the end of a stick of fulminate didn't immediately detonate the whole thing.

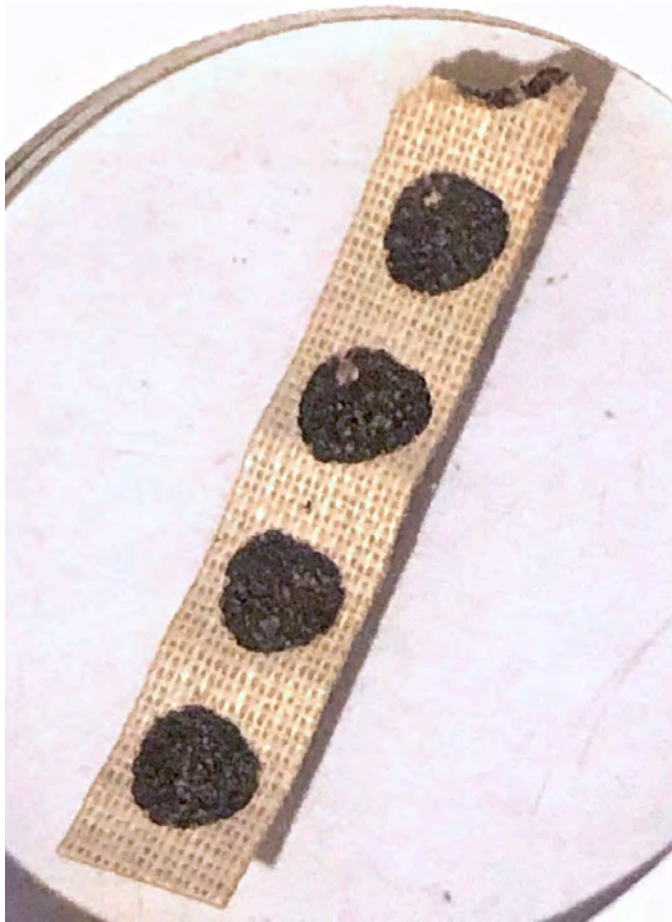


Figure 19. A piece from a James Durrell Greene tape primer roll. Photo by Matthew Schneiderman.

Jim Gooding's book does not mention the Gedney fulminate stick, but does list two others. George Tomlinson Bousfield's "combustible stick", GB#2882, November 17, 1857, is also designed to have the end sheared off as part of the firing process, which involves the stick in a small "box" pushed forward on a short track by a lever attachment as the hammer falls. A spring in the box advances the stick downward, allowing more shearing with each

subsequent shot. Shades again of Forsyth's sliding primer! The second is by D. G. Martin, U.S. #20,129, April 27, 1858, for a thin continuous priming stick. Gedney almost certainly knew of one or both of these patents.



Figure 20. A piece from an Edward Savoral 1876 metal tape primer roll. Photo by Matthew Schneiderman.

9. WILLIAM NEEDHAM'S PATENT PRIMER MAGAZINE DOUBLE GUN.

William Needham's business was at Royal Hotel Yard, Temple Row, Birmingham, London from 1842-1845. He moved to 26 Piccadilly, London in 1844, trading as William Needham & Co. 1844-1849, and as William Needham 1850- 1851. He was in partnership with Joseph Needham, known for his needle-fire patent and guns, from 1851-1853. The business continued as Joseph Needham & Co. 1854-1870, and as Joseph and Henry Needham 1870-1874. W.W. Greener took over the business in 1874, but continued to use the Needham name.²³ William and Joseph exhibited at the Great Exhibition of 1851 at London's Crystal Palace, and their display included the type of gun I'm going to show you, plus variations.²⁴ Genealogical information about William and his family is available on the internet.²⁵

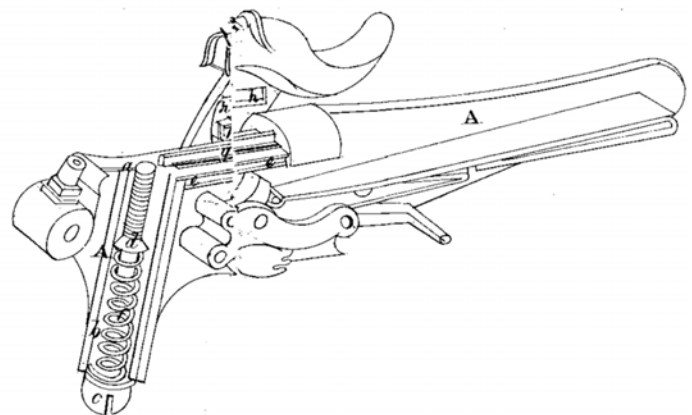


Figure 21. Sharps copper disc primers in their "chargers". The wooden piece is for pushing the stack of primers into the magazine. The metal at the top makes it easier to push down (photo by Ron Paxton). A drawing from the Sharps patent #9308. To the left is the magazine with its spring and a stack of primers in place.



Figure 22. A Gedney conversion of a Waters flintlock U.S. martial pistol. Note the end of the spring-activated magazine tube that holds and advances the stick primer. Photo courtesy of Rock Island Auction.

Needham's patent GB#9801, June 24, 1843 describes a very rare and unique primer cap; an eyebrow-raising magazine to carry, advance and dispense it; and a highly idiosyncratic hammer and nipple-equivalent to detonate it. To avoid suspense, I'll start by showing the gun (Figure 23), which from a distance looks like a standard English percussion double, but with an unusual long structure along the side of each butt. It's 46" overall, with 29", .69 caliber (15 bore), browned damascus-pattern barrels bearing London proof and view marks. "William Needham 26 Piccadilly London" appears on the rib, dating the gun to 1850-1851. There's a dog on the right lockplate, birds on the left and even more birds on the breech.

The patent cap is .250" in diameter and .115" in height. It's one of only two "outside primed" caps shown in Jim Gooding's primer book.²⁶ This means the fulminate is applied to an outer surface of the cap, not inside like other caps (Figure 24). I was surprised to discover this is the bottom. What looks like the inside, or what Needham called the "hollow", is actually facing up, and features a crown.

The primer magazines along the sides of each butt are covered by long metal strips that run from the end of the butt to the rear of each lock (see Figure 23). The caps are hand-fed into the primer magazine side-to-side, fulminate surface facing down, and crown facing up. At the rear end there's a trap door for inserting the caps. If we remove the metal strips, we see the grooves in which the caps rest and advance (Figure 25, top). The patent says there's room for a "considerable number". When I look at Figure 25, my first thought is "*lots of friction!*" However, we're assured that gravity moves the

line of caps forward, when the gun is pointed downward. An image from the patent drawings shows the line of patent caps progressing from the grooved magazine in the stock through the lock up to the breech. The lever "g" inside the lock pushes the foremost cap out of the lock and into the specialized pillar (my term), which takes the place of a standard nipple. This pillar has four openings: top for the hammer strike, bottom for the ignition channel, rear to receive the cap from the magazine via the lock mechanism and forward as an exit slot for the detonated cap. The hammer's long nose enters the pillar and ignites the cap, sending flame down into the ignition channel at the bottom. Note that the hammer directly strikes the crown. (Does this mean Needham was a Republican? We'll never know...) Finally, what's left of the detonated cap is pushed out the pillar's front slot by the next cap entering from the rear. The patent points out that the relatively enclosed space of the pillar reduces the risk of flying caps and cap debris, always a threat to shooters' eyes.

A final comment about the Needham gun. The previous William Needham literature, just two very short articles, presents the two other guns I've discovered made to patent GB#9801.²⁷ Both have been converted to copper cap, replacing the pillars with standard nipples and ignoring the magazines while leaving them in place. Sadly, this suggests Needham's patent caps and magazine were not a hit, and that owners abandoned the patent features, returning to the old familiar copper cap system and accepting the inconvenience of capping before each shot.

CONCLUSION.

*"Any plodding fellow can torment you with a complicated invention; but it requires a man of genius to discover a simple thing which answers good purposes and saves useless trouble."*²⁸ Peter Hawker's witticism does seem to target some of the systems we've examined today, particularly my Needham gun, but I think it misses the mark. All the inventors of these many magazines were bright, clever and skillful—no plodding fellows here. Forsyth was a genius, but his "simple thing" was the concept of fulminate ignition. Making actual early percussion locks was difficult and complex, and the initial results were imperfect. However, the idea itself was wonderfully plastic, and a firearms industry filled with inventive craftsmen soon created a huge array of primers and many magazines.

We have to face the fact that most of the systems I've shown were not successful. Almost all of them are very rare, some profoundly so, and not because of an unusually low survival rate. I think there wasn't a big market for primer magazine systems, though they make great collectibles. Inventors were probably more enthusiastic than their customers. Why persist? Imaginative and creative people like to create new things, it's what they do. Some customers



Figure 23. The William Needham double gun, with the long cap magazine sweeping down from the rear of the lock to the butt. Photo courtesy of Rock Island Auction.

are drawn to those new things, though most people prefer the old ways. The arms trade was a competitive business, and any advantage, real or imagined, could be advertised and used for hoped-for commercial success.



Figure 24. A Needham patent cap. The fulminate-coated surface faces down (left) and crown side faces up (right). Photo by Will Adye-White.

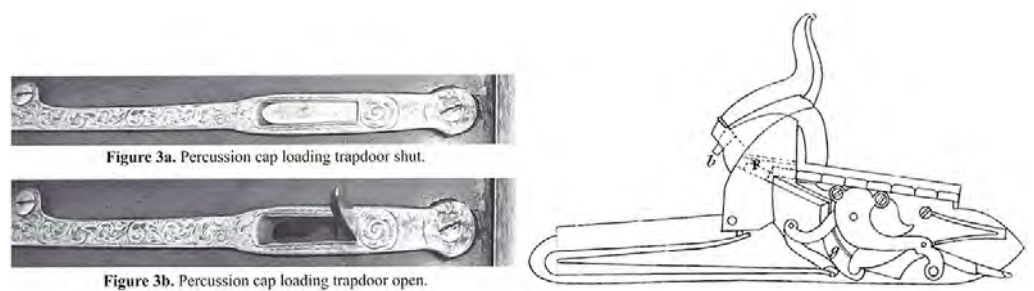
For centuries firearms technology moved slowly toward a future, a dream, in which all loading steps but one were eliminated; after 1807 it achieved that goal within a few decades. Priming was the simplest step to do away with initially, though also the least burdensome.²⁹ There certainly was functional automatic priming mixed in with all those raised and lowered barrels and flipped, tugged and twisted magazines. However, the rapidly-approaching future, which remains our present, was the mature inside-primed cased cartridge (pinfire, rimfire, centerfire), and these gunmakers played their small part in reaching it. I hope you've enjoyed this look at a bit of what human imagination, skill and energy, combined with rampant capitalism, could accomplish.

ACKNOWLEDGMENTS:

Thanks to Will Adye-White, Fred Bienvenu, Ted Bradstreet, John Byck, Brian Godwin, Frank Graves, Ed Marron, Ben Nicholson, Ron Paxton, Janet Uzane Schneiderman, Chris Smith, Jonathan Tavares and Jas van Driel for information and discussion.

As always, I welcome questions and comments at schneiderman615@gmail.com

Figure 25. The magazine cover removed and the path of the caps revealed (top).²⁴ The patent marking on the cover. The cap-loading door at the end of the magazine (upper left).²⁴ A drawing from the Needham patent (upper right).²⁴ The line of caps advances through the magazine and then through the lock by gravity. The first cap in line (F) is pushed by lever g into position for detonation. The special patent pillar in which the cap is detonated (lower left). The entry for the hammer nose at the top, the entry to the ignition channel at the bottom (lower center). Behind, the bridge through which the cap is pushed into position (lower center). A different view of the patent pillar (lower right). In front, the exit slot for the fired cap. Note the unusual hammer nose and the shielding behind it. Bottom photos courtesy of Rock Island Auction.



Endnotes

- ¹ THE book on this subject is by late ASAC member S. James Gooding: *Early Percussion Primer Identification*, Museum Restoration Service, Bloomfield, Ontario, 2005. Jim also wrote the main antique arms journal articles on this subject. I can supply details—contact me if you'd like the references.
- ² These are essentially all inside-primed. The one magazine-fed separate-primed cartridge I know of is the first: Walter Hunt's Rocket Ball (1848), an uncased bullet partly filled with gunpowder. It was designed for the Hunt Volitional Repeater, the Jennings, and the Smith-Jennings magazine repeating rifles. See Michael, Danny. Hunt Volitional Repeaters and Jennings Breechloaders: Tracing the Origin of the Lever-action Rifle, *Armax*, Volume VIII, No. 2, (Fall 2021), unpagged.
- ³ Stewart Jr., Henry M. "Automatic Priming of Flint and Percussion Firearms", *American Society of Arms Collectors Bulletin* 10 (Fall 1964) pages 2-11. This is the only review article I've found on this broad topic. It mentions many American examples and presents an idiosyncratic classification system.
- ⁴ For a more detailed discussion of the Freeman gun and this breechloading system, see Schneiderman, Matthew. "Samuel Pauly and I: An Ignition Odyssey", *American Society of Arms Collectors Bulletin* 111 (Spring 2015), pages 75-89.
- ⁵ I can supply four good references discussing the Lorenzoni system—contact me if you'd like them.
- ⁶ Whatever your area of interest, you should read about James Thomson's "poli-chamber gun", a contender for the antique firearms world's "most bizarre object" award. See Rimer, Graeme J. A "Poli-Chambered Gun" and James Thomson's Patent of 1814, *Journal of the Arms and Armour Society*, Volume 13 #6 (September 1990) pages 58-95. Reprinted in *The Journal of the Historical Breechloading Smallarms Association*, Volume 4 #4 (December 2012), pages 24-40. I can supply the latter if you wish.
- ⁷ Blackmore, Howard. *British Military Firearms*. Herbert Jenkins, London, 1962, pages 152 and 156.
- ⁸ Blackmore, Howard L. *Guns and Rifles of the World*. Viking Press, New York, 1965, illustrations 425-426.
- ⁹ Winant, Lewis. *Early Percussion Firearms*. Bonanza Books, New York, 1959, pages 79-82 and frontispiece. This shows and discusses the Le Page pistols.
- ¹⁰ Winant, Lewis. Op. Cit., pages 65-68.
- ¹¹ Gooding, S. James. "Pellets, Tubes and Caps An Introduction to Percussion Priming", *Man at Arms*, October 2006, page 43.
- ¹² Bonhams London April 20, 2011, lot 191, and Christie's London July 18, 2002, lot 86. The latter is from the fourth of the five Keith Neal collection sales.
- ¹³ A Staudenmayer single gun converted from flintlock (Holts December 2007 lot 668), and a double barrel pistol by Towlson (Winant Op.Cit. page 76, Figure 48).
- ¹⁴ This Joseph Egg magazine and action is shown and described in Winant, Op.Cit., pages 68-70.
- ¹⁵ *Illustrated British Firearms Patents 1714-1852*. Edited by Stephen V. Grancsay and Merrill Lindsay. Winchester Press, New York, 1969.
- ¹⁶ Neal, W. Keith and Back, D.H.L.. *British Gunmakers Their Trade Cards, Cases and Equipment*. Compton Press, England, 1980. Page 44, plates 121 and 122.
- ¹⁷ Godwin, Brian. Westley Richards' Self-Capping Carbine of 1838. Work in progress.
- ¹⁸ Bienvenu, Fred. Charles James Smith (Part 1)—"Patent Self-Priming Shotgun", *Caps & Flints (Journal of the Antique and Historical Arms Collectors Guild of Victoria, Australia)*, No. 7, (February 2023), pages 12-18.
- ¹⁹ van Driel, Jas. Charles James Smith (Part 2)—"Patent Self-Priming Pepperbox", *Caps & Flints (Journal of the Antique and Historical Arms Collectors Guild of Victoria, Australia)*, No. 7, (February 2023), pages 19-21.
- ²⁰ Salzer, Dick. "Automatic Priming Systems", *American Society of Arms Collectors Bulletin* 106 (Fall 2012), pages 22-26.
- ²¹ Why would anyone want a tape primer in 1876? Old guns continue to work, owners keep using them, and percussion ones always need primers. Also, Savoral's metal tape has one good feature: the cut-off end doesn't get wet, an issue with paper tape primers like Edward Maynard's.
- ²² Gerhardt, Richard. "The Gedney Automatic Priming System", *Man at Arms*, Volume 32, #2, (April 2010), pages 31-35.
- ²³ Basic information about William Needham and his business is found in these books: Blackmore, Howard. *Gunmakers of London 1350-1850*. George Shumway Publisher, York, PA, 1986. Pages 147-148. Blackmore, Howard. *Gunmakers of London Supplement 1350-1850*. Museum Restoration Service, Bloomfield, Ontario, 1979. Pages 90-91. Bailey, De Witt and Nie, Douglas. *English Gunmakers The Birmingham and Provincial Gun Trade in the 18th and 19th Century*. Arco Publishing, New York, 1978. Page 46. Brown, Nigel. *British Gunmakers Volume One—London*. Quiller, Shrewsbury, England, 2004. Page 188.
- ²⁴ White, Peter. "Needham's 1843 Continuous Primed British Patent Percussion Shotguns in Australia", *Caps & Flints (Journal of the Antique and Historical Arms Collectors Guild of Victoria, Australia)*, Volume 21, #2, (June 2010), pages 46-54, 57.

- ²⁵ The internet has revealed some additional information about William Needham, on the website thedoublegunshop.com. This is both a business and an online meeting place for double gun aficionados, via a number of discussion forums. The forum I found is from March 27, 2013, and the post is by PeteM. The research about Needham family genealogy and businesses is impressive and looks reliable to me. However, there are no sources listed, so I can't include the information in the article's text. Here's the link: <https://www.doublegunshop.com/forums/ubbthreads.php?ubb=showflat&Number=319028>. William Needham was born in 1801, and his younger brother Henry in 1812. He was related to Joseph Needham (born 1811), but exactly how is unclear. [I think it's likely the three were brothers.] William married Suzannah (also born 1801), and they had four sons and three daughters. In 1851, Suzannah is listed as a widow, at the 26 Piccadilly address. The post lists extensive information about the family business, basically confirming the dating I report in the text. In the Joseph and Henry business starting in 1870, Henry was William's nephew, the son of William's brother Henry.
- ²⁶ The other is by Charles Jones of Birmingham and London, who used it in a patented enclosed percussion action gun in the 1830s. The fulminate is on the outside top, and it's a "hammer cap"—placed on the tip of the hammer instead of on the nipple. The Needham cap, though outside-primed, is not a hammer cap.
- ²⁷ The first is White, Peter, Op.Cit. The second is Bradstreet, T. E. Needham's 1843 Patent A "Successively Primed" Percussion Shotgun. Unpublished (2000-2017), 3 pages.
- ²⁸ Gooding, S. James. The Percussion Primer, *Canadian Journal Arms Collecting (CJAC)* Volume 4 #4 (November 1966), pages 127-149. Colonel Peter Hawker was a sportsman and author in the first half of the 19th century. His quotation is the epigraph for Jim's article.
- ²⁹ See Salzer, Dick, Op.Cit, page 22.

