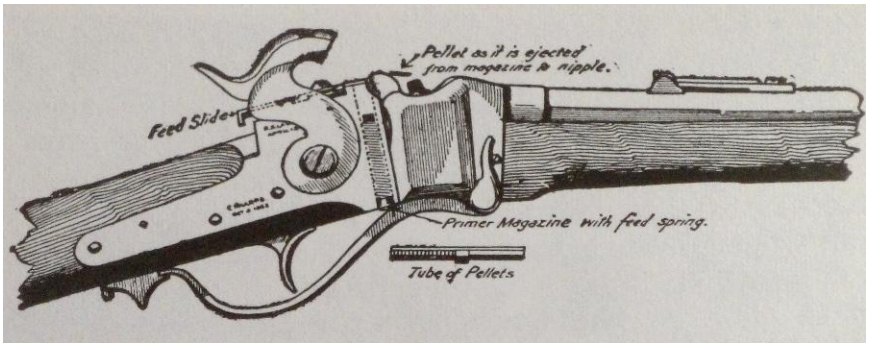
Everything you wanted to know about the Lawrence Pellet Primer System (but were afraid to ask)

by

Bill Skillman

Like the vast majority of reenactors who portray the U.S. Sharpshooters; until recently, I never had the opportunity to examine an original Lawrence pellet priming system in the New Model 1859 Sharps rifles; let alone see how one worked. My curiosity began when I bought my first Sharps; it was a New Model 1863 carbine but with all the pellet primer parts missing. While Bannerman's (America's first Army-Navy surplus store) catalogues continued to list pellet primers for sale until the early 1900's the system had largely become obsolete and faded into obscurity. Over the generations shooters removed the pellet system parts and threw them away.



A page from Bannerman's Antique catalog showing that pellet primers were still for sale well into the early years of the 20th century

Early in my USSS career, I wanted to restore the pellet primer system so I could 'swap' the carbine's lock plate and install it on my Shiloh Sharps rifle. Dixie Gun Works and S & S Firearms sell most of the parts I was looking for, but they were expensive. I found the last missing part (an original pellet feeder arm) at the Mansfield, Ohio Civil War Collectors show five years ago. Once home, I gathered up the carbine, the pellet system parts, and following the diagram in Winston O. Smith's book, I finally had a fully functioning Lawrence pellet system. Now if only somebody made reproduction pellet primers.

With the exception of the Garrett Sharps (manufactured by the respected Italian shotgun maker, IAB of Brescia, Italy and imported by Garrett Arms of Norfolk, VA during the 1970-80's) all the rest of the reproduction Sharps rifles today have lock plates machined from a single piece of steel that approximates the general shape of the original Sharps lock plates. It is curious why only Garrett Sharps were manufactured with a fully functional Lawrence pellet primer system. This dedication to accuracy has made Garrett imports the 'best of the breed' for reproduction Sharps and other Civil War firearms (Garrett also imported an excellent Model 1841 "Mississippi" rifle reproduction).

History of the Lawrence Pellet Priming System: Christian Sharps' first patented rifle (1848) incorporated the innovative Maynard tape system. The Maynard consisted of a roll of metallic tape with dots of fulminate of mercury (not unlike modern cap guns). When the hammer was pulled back, the tape would advance over the cone. When the hammer fell on the dot, it would explode sending flame from the cone to the powder charge inside the chamber. Ultimately, the Maynard system, though incorporated into the Model 1855 Rifle, proved unreliable and was rejected by the U.S. Army.

Richard Lawrence, the master armorer and superintendent of the Sharps Rifle Mfg. Co. was responsible many innovations to the Model 1852 through 1874 Sharps. The original pellet system (invented by Sharps in 1852), was improved by Lawrence, by adding a sliding 'cut off' arm that kept the primers inside the magazine until needed. By sliding back the cut off, the primers would automatically feed every time the hammer was pulled back. Lawrence also improved the rear sight; and replaced the Conant platinum ring with his own gas check ring/plate (patented on Dec. 20, 1859) that fit into the breechblock face, effectively solving the problem of gas escaping from the gap between the breechblock and chamber.

Terminology for the Lawrence pellet system components: One challenge for identifying all of the Lawrence pellet system is what source provides the best description for each of the components? Below, I've provided two sources; the first by August V. Kautz (from his book; The Company Clerk) and the second by modern Sharps researcher, Winston O. Smith. I have provided a photo of each of the parts so the reader can begin to familiarize themselves what each part looks like:

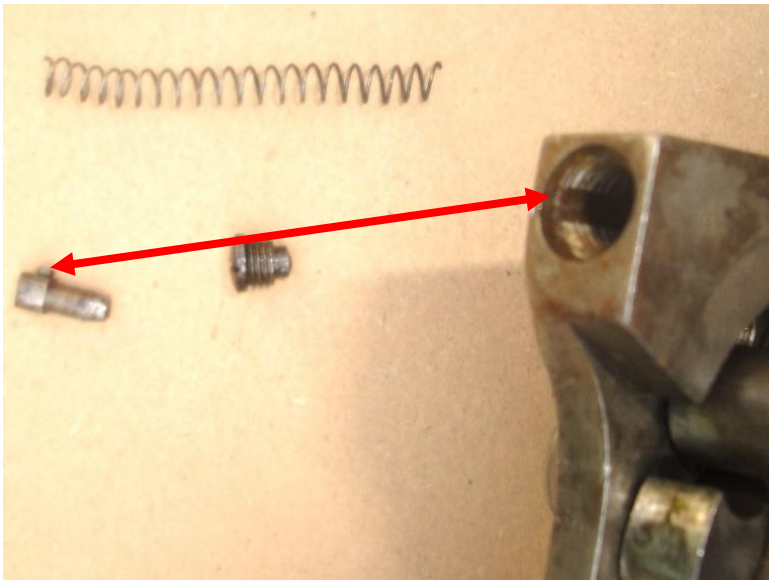
August V. Kautz (1863)	Winston O. Smith (1943)
Primer spring	Magazine plunger spring
" " screw	" " " screw
" follower	Magazine plunger
" " pin	
" driver	Pellet feeder
" slide	Pellet feeder cover
" cover	Pellet feeder spring
" " screw	" " " screw
" " pin	
" shut off	Pellet feeder cut off
" " screw	" " " screw

Lock-plates and Lawrence pellet primer system parts

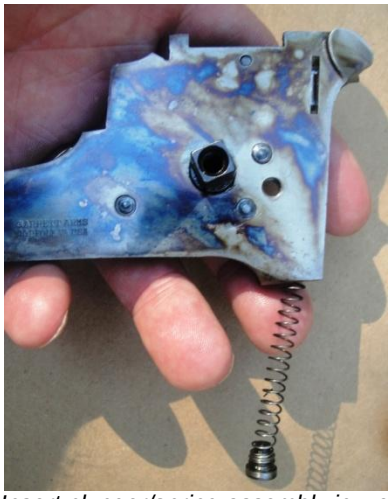
Left Garrett Arms (circa 1977) Right Original New Model 1863 Sharps
Note the attention to parts detail between the two Sharps

How to assemble a Lawrence pellet primer system in a Sharps rifle

1. Install the Magazine assembly



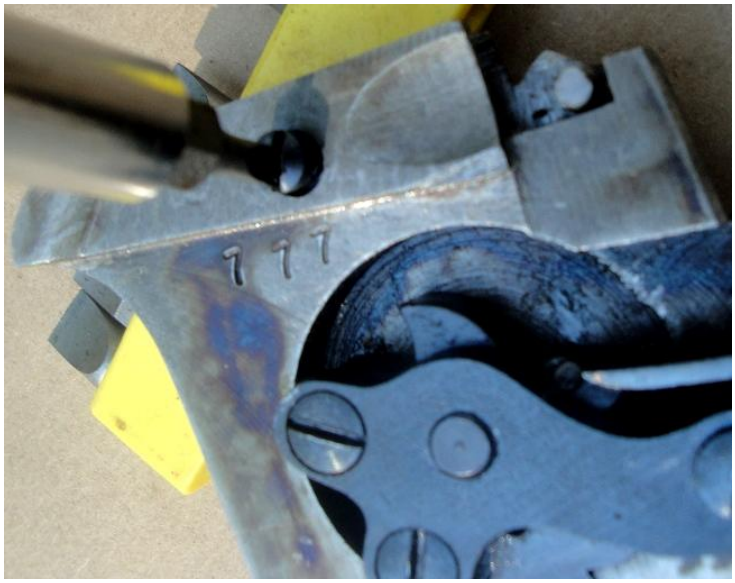
Parts: Magazine spring, magazine plunger, magazine screw and Sharps lock plate with magazine well-(red arrow: note the plunger nub that fits into the groove in the magazine well). The tapering waist of the plunger fits into the spring, while the top acts as a base for the primers. pp



Insert plunger/spring assembly in well

Tighten magazine screw into base of lock plate

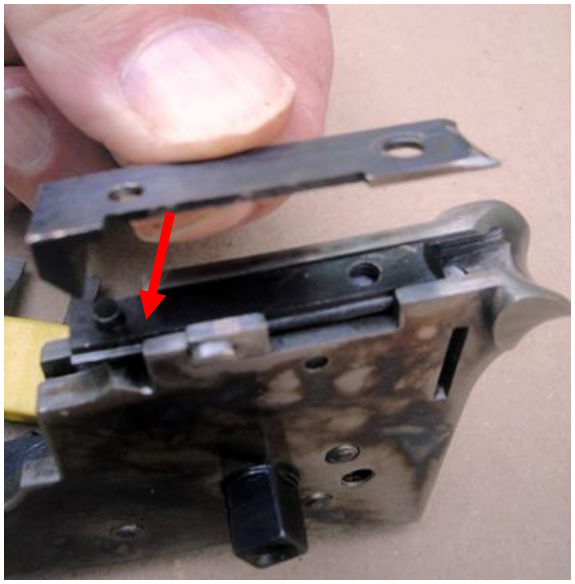
Slide pellet cut off arm into slot



Secure pellet cut off arm by installing cut off screw

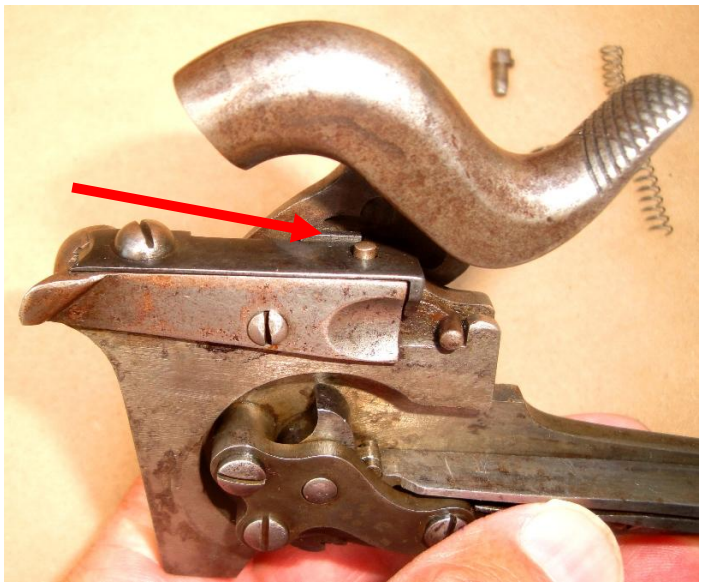
Install feeder arm-(arrow: nub fits hammer mortise)

Slide pellet cover in slot (red arrow-top of plunger/magazine well)



Install pellet cover spring-line up with cover nub

Secure spring cover screw; align feeder arm with hammer



Completed pellet primer system; note mortise on inside the hammer-that mates with pellet feeder arm nub (the mortise is featured on all reproduction Sharps arms, even though they lack the pellet feeder system).

Study: Interchangeability of pellet primer parts between original and Garrett Sharps

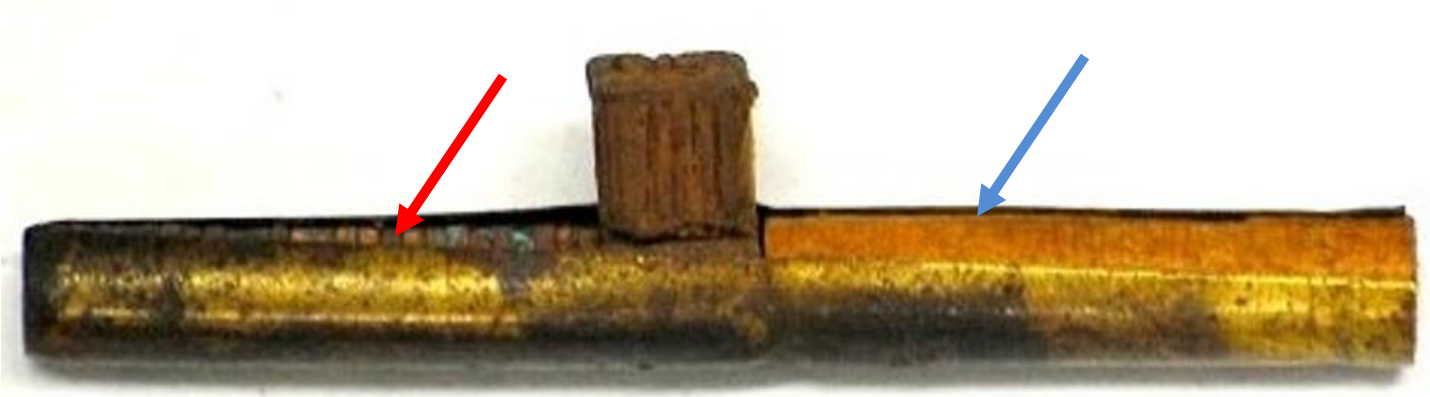
Calum Monroe, (who posts on the Co. C 2nd USSS Forum), inspired this study. Cal purchased a Garrett lock plate that was missing some parts and he asked if it was possible to substitute originals to replace the missing Garrett parts. I am extremely fortunate to be able to finally answer both Calum's question and satisfy my own curiosity; how many Garrett and original parts are interchangeable? Listed below are the results of my study:

Part	**Fit/No fit**
Pellet cut off screw	Fit
Magazine spring	No
" follower	No
" screw	No
Pellet cover screw	No
" " spring	No
" " follower	No

Needless to say, I was pretty disappointed with the results. Not only would the original parts not fit the Garrett, but the Garrett parts wouldn't fit the original lock plate either, except for the cut off screw. This means anybody who owns a Garrett with missing pellet primer system parts must try to find Garrett parts. Considering original pellet parts cost anywhere from $35 to $10 apiece (at 2012 prices); I suspect replacement costs for Garrett primer parts are likely double—if they can be found. Below I've listed the cost of original Sharps pellet system parts available through S& S Firearms: *Heading: Sharps (pg 42)*

Part description	serial #	unit cost
Pellet feed cover	SH108	$ 65
Pellet feed cut off (repop)	SH108A	$ 30
Lawrence Primer top screw	SH142	$ 3
Lawrence Primer side screw	SH143	$ 18
" Primer Pellet follower	SH165	$ 35
" Primer bottom screw	SH166	$ 25
" Primer Pellet feeder (repop)	SH199	$ 27
Total cost		$203 (FYI-my original Sharps cost $300)

What did the pellet primers look like?



The photo above shows an enlarged view of a Sharps pellet primer tube. It is made of thin copper with a slot that runs lengthwise. The red arrow points to the stack of 25 primers. The tab sticking from the tube is attached to a wood dowel inside the right section of the tube (see blue arrow). The overall length of the pellet tube is 2 inches. The primers were made of two thin copper discs encasing a pellet of fulminate of mercury. The primers were .188" (4.78mm) in diameter and .034" (.87mm) thick. The primer tubes were packed in tin boxes holding 1000 primers in 40 to 50 tubes. The Sharpshooters would have kept spare primer tubes inside the patchbox of their Sharps rifles.

Although I've occasionally seen a pellet primer on display at the Horse Soldier or Mansfield gun show, the cost of these little copper wafers has curbed my urge to buy one for study. A number of years ago I heard of a couple USSS guys trying to recreate them. While forming the copper disks posed no problems, getting the fulminate of mercury charge sounded a bit dangerous (I was told they were using a solvent to dissolve the mercury compound from percussion caps to use in the primers). I recently read in the NSSA blogs that the USSS boys were eventually successful. A PA Bucktail posted that he was given a tube of primers that he used for living history displays. After he retired from the hobby he decied to see if the primers would actually work. He proceeded to 'pop' thru his supply with no problems. Unfortunately, he didn't bother to first load his Sharps with a blank or live round to see if the primer would ignite the charge.

Two examples of pellet primer tins: (Left) tin-carries pre-loaded tubes (Right) tin holds individual pellet primers.

How was the pellet primers loaded into the Sharps rifle?

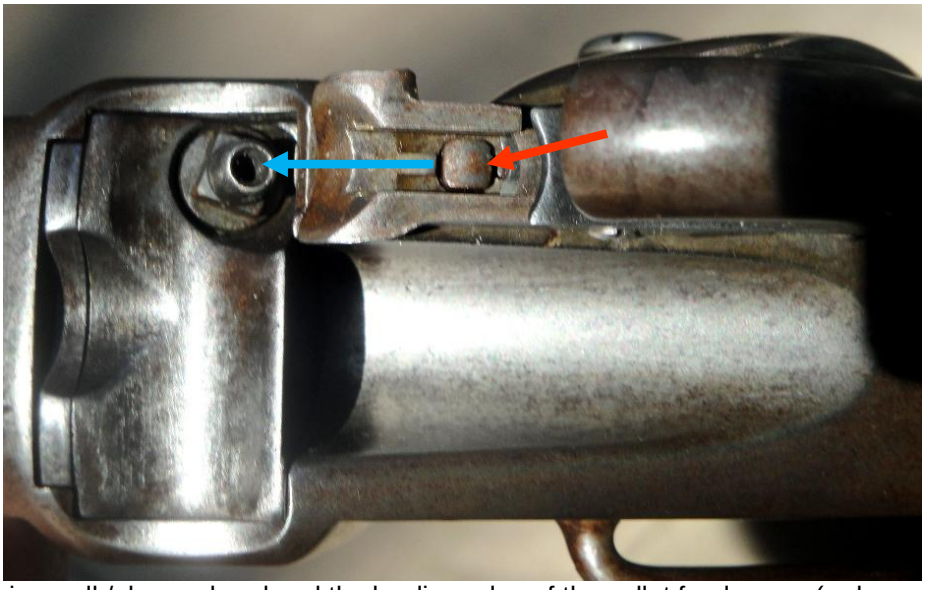
To load the pellet primers into a Sharps rifle or carbine the following steps were necessary; first draw the hammer back to full cock. Next the pellet cover is slid back, exposing the magazine well. The brass tube is centered over the magazine opening and the wooden 'tab' is pushed downward; causing the primers to be loaded into magazine (the plunger and spring contracting). After all 25 primers were loaded, the cut off arm was slid forward to keep the primers inside the magazine. The cover was slid forward, keeping the pellet primers in reserve until needed. When the pellet primers were needed, the cut off arm nub was slid back and the system was activated. The original instructions to load the primers are described below:

TO CHARGE THE LOCK WITH "SHARPS' PRIME (R)S" Cock the Arm, shove back the magazine cover on the top of the surface of the lockplate, by pressing the left thumb against the screw head beneath the cup of the hammer . Withdraw the tack nail from the charging tube, insert the primer's end of the tube in the magazine with the left hand, the slot in the tube in line with the slot in the face of the lockplate, and press it down as far as the spiral spring will admit, then with the right hand thrust the tack nail through the slots in the tube and lockplate above the primers, withdraw the tube, bring the lock to half cock and withdraw the tack nail. The priming magazine charged, the cover must not be moved back, lest the primers escape. Nor should the hammer be worked, between half cock and full cock, for the same reason. "

Left: sliding back the magazine cover/spring/screw.

Right: side view of the Garrett Sharps lock plate showing the magazine cover/spring assembly pushed rearward for loading.

Note the primer cut off screw, directly below the cover screw, and the nub attached to the cut off arm (directly below the magazine cover). When the cut off arm is moved to the rear of the assembly, this allows the primers to be loaded into the magazine. Slide the arm forward to engage the 'cut off' system that keeps the pellets in the magazine until needed.



Top view of the magazine well /plunger head and the leading edge of the pellet feeder arm (red arrow). It is the feeder arm that pushes the primer from the magazine to the edge of the lock plate. The primer flies the short distance (blue arrow) to the cone, where it is crushed by the descending hammer.

When I followed the instructions to load the primers into the magazine the space between the hammer and top cover was very tight. I pranged my thumbnail every time I slid the cover back to the loading position. I next tried to fit a brass tube over the magazine well, only to find that it was forced 'off center' by the lip of the hammer.

The Lawrence Pellet Primer System in Combat

Despite dozens of Federal infantry, cavalry and heavy artillery regiments were armed with Sharps weapons, I have yet to find a single account of a soldier or trooper using pellet primers in combat. So, let's return to Berdan's United States Sharpshooters in the Army of the Potomac to tell us what the Sharpshooters thought about the pellet primers when skirmishing and sharpshooting.

Pg. 75: *"On the 8th the regiment received the long expected Sharps rifles, now needed more than ever, as the Colts were for our dangerous service found defective in many respects, and they gladly turned in the "fiver shooters". On receiving the new arms the men were impatient to get again within shooting distance of the enemy. These rifles shot both linen and skin cartridges, of 52 caliber, and also had primers, little round, flat coppered things, which were inserted below the hammer; but the regular army or hat cap was more generally used as the primers were not always a "sure thing;" also carried the angular bayonet."*

Pg 252 ("The Furnace" Chancellorsville): "*B.E. Loomis had his cap box shot way, but luckily his rifle was well stocked with primers, whereby he could snap away. These primers were not always equal to the emergency, frequently failing to explode the cartridge "first pop", whereas the hat-caps were always sure, and were therefore generally relied on."*

Pg. 386 (Mine Run)*: "It was a bitter cold morning, the men's fingers were too benumbed to quickly cap their pieces, and the Sharpshooters resorted to primers, which was seldom done excepting causes of necessity. The enemy were observed striking their hands across their body after firing, to warm up, and taking considerable time to reload."*

Among the collections at the University of Michigan's Bently Library I located some fascinating information from Captain Merriman's (Co. F-VT-1st USSS) Ordnance report covering from May 7-9, 1864, during the Wilderness campaign:

Form 9 (A)

Abstract of Materials expended or consumed in Co. F 1st Regt. USSS during the First Quarter 1864

Date 1864	How	Sharps rifle 52/100	Primers	Percussion caps
March	Practice firing	1800	---	2500
May 5	Wilderness, VA	600	300	300
" 6	" "	320	400	100
" 7	" "	"	300	430

It is very clear that the Vermont company used pellet primers extensively-almost 20% more than percussion caps, during the battle of the Wilderness. Because of the near-constant combat, the additional primers would have been used during the Overland Campaign.

Wyman White (of Company 'F' New Hampshire in the 2nd USSS) provides one of the few 'first person' accounts where a Sharpshooter used the pellet primer system in combat; his description is also from the Wilderness—suggesting that men from both regiments were compelled to use pellet primers in this action: "*About three o'clock in the afternoon we learned that the enemy was approaching. We could hear them smashing their way through the brush and about that time our pickets opened fire on them. Their pickets piled in on us and we opened fire on them. Our regiment with our breech loading Sharps rifles had no trouble in holding them back in our front although they poured in on us a terrific infantry fire but no artillery. As I was doing my best sending bullets into their ranks* ***having put in use primers on my rifle, so as not to have to put caps on, only open the slide, put in a cartridge in the breech, shut the slide and give the rebels another bullet****…*"

The above accounts show that, while not generally used, the Sharpshooters did employ the pellet primers whenever they were severely pressed by more numerous Confederates (for example, Pitzer's Wood at Gettysburg) or during bitterly cold weather (Fredericksburg, Kelly's Ford, Locust Grove), It is clear from White's account, the men activated the pellet primers to enable them to keep up a high rate of fire-to push back the enemy or buy time to enable the USSS time to withdraw. Even if a primer failed to explode the cartridge on the first try, all they needed to do was re-cock the hammer and pull the trigger. When seconds count and the enemy is close at hand; using the pellet primers makes the most tactical sense to me.

According to Civil War firearms authority, William B. Edwards, when the War Department placed orders for the New Model 1863 carbines, the patch box was eliminated; a strong indication the U.S. Cavalry did not use primers. It also reflects the technological influence of the Spencer repeating arms coming into general use for the mounted service. However, Edwards writes: "*In spite of the limited success of these primers, there remained a demand for them. On January 7, 1865, 1,000 additional rifles with triangular bayonets were ordered at $36, and an additional lot of 5,000 at $33 on March 7. Of the last lot of 5000, it was specifically noted that "these rifles are to be adapted to use Sharps primers".* Despite limited use, the last order of New Model 1863 Sharps rifles incorporated the pellet primer system. In less than seven weeks after the second order of Sharps rifles the two major CSA armies would surrender, and for all purposes the American Civil War was over.

Conclusion: The Lawrence pellet system that was added to Christian Sharps' original 1848 rifle design reflects the high standards of American innovation and manufacturing expertise in the 19th century. While not used extensively on the battlefield (at least based on current research); the pellet primer served as an effective 'back up' to the percussion cap, especially during cold or intense combat situations. Combined with the strong toggle-block action and gas check system invented by Mr. Lawrence, the Sharps weapon system was recognized as the most effective arm during the Civil War and for the decades following.

Today, the venerable Sharps is being reproduced on both sides of the Atlantic, and they are still collected and shot by legions of modern shooting enthusiasts. For those of us who portray the United States Sharpshooters, the almost all of our reproduction Sharps rifles lack a Lawrence pellet primer system. When considering the cost of a new, 'out of the box' Pederosoli or Armi-Sport is over a $1000 (with a Shiloh Sharps NM1863 costing more than double), the extra cost to recreate a primer system would make a reproduction Sharps beyond the reach for the vast majority of shooters. Second, no modern manufacturer makes pellet primers; original primers (when they can be found) cost between $125 and $150 per tube of 25. Finally, even the soldiers themselves found the primers to 'not be a sure thing' and rarely used them in combat.

I have long been fascinated by all aspects of the Sharps rifle. For me, the Lawrence pellet primer system has proved to be the most elusive to study first hand. Intrigued by the descriptions of the system, the cooper 'frisbee' pellets and how they worked, it has taken me years to acquire the all of the original parts and assemble them in my own Sharps. Recently, I took ownership of a Garrett 'Berdan' Sharps rifle, the only reproduction with the Lawrence Pellet Primer system. With having both of these weapons to study, this has finally given me the opportunity to answer questions that have baffled me for decades. Because so many modern Sharpshooters share the same curiosity and affection for the Sharps rifles as I do, I wanted to be able to share what I have learned about one of the most obscure aspects of this remarkable weapon.

I welcome your thoughts and comments

~ Bill ~

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