

LAMSON BREECHLOADING MUSKETS OR WHY THE SPRINGFIELD MODEL 1868 RIFLE HAS A LONG RECEIVER

by Edward Hull

Ebenezer G. Lamson was an entrepreneurial businessman of the first order. He built a small cutlery business in Vermont into a powerhouse manufacturing concern. Of interest to collectors, however, is his foray into the development of breechloading infantry arms in the 1860s. Here is that story. First, a bit of history on Lamson himself, as well as on his innovative associate, Albert Ball. The two of them would influence the design of the Springfield Model 1868 Rifle.



Figure 1. Ebenezer G. Lamson.¹

Lamson (Figure 1) was born on December 7, 1814, to Silas Lamson, a prosperous maker of a patented scythe design. In 1842, he left his father's business to expand into making cutlery at Shelburne Falls, Mass. There he joined with his uncle Able F. Goodnow to form Lamson & Goodnow in 1842, establishing a cutlery business that still exists today as the brand "Lamson Sharp." When the gunmaking firm Robbins & Lawrence Company failed, the pair — along with Buchanan B. Yale — bought the factory at Windsor, VT, in 1858. There the trio, operating as Lamson, Goodnow & Yale (LG&Y), began sewing machine manufacture. The advent of the American Civil War opened up new opportunities and they reestablished the gunmaking capability of the Windsor factory; LG&Y ultimately produced 50,000 Special Model 1861 Rifle Muskets on military contracts. In mid 1864, Goodnow and

Yale bowed out of the company, which now became E.G. Lamson & Co. In June, 1864, Lamson tried to enter the market with two breechloading carbine designs and his company obtained contracts under which it produced 1,001 Palmer Patent bolt action and 1,002 Ball Patent repeating breechloading carbines: all were delivered too late to be issued during the war (they sat unused in a government warehouse until the turn of the century). In 1865, Lamson once more transformed the company, now called the Windsor Mfg. Co. In 1869, this Windsor company reinvented itself as a mining machinery maker, selling off all of its gunmaking machinery to Winchester. Lamson remained in business profitably as a mining equipment maker and then cotton fabric maker. He died on January 2, 1881.²

Albert Ball was brought into the LG&Y factory when Lamson, while buying machine tools for LG&Y, happened to see his model for a repeating pistol. Ball was born May 7, 1835, in Boylston, Mass., to attorney Manasseh Ball. After a good primary education he apprenticed as a machinist in Worcester, Mass. He ended up at the machinery firm of Lucius W. Pond in Worcester; starting in 1860, that company made Pond Patent revolvers. While there, on June 23, 1863, Ball obtained a patent (38,935) on a "Magazine Fire-Arm," illustrated as a pistol in the patent drawing. It is this design which caught Lamson's attention when he visited the Pond factory and he bought the rights to the patent. Lamson brought Ball to Windsor, where he was thereafter employed as the superintendent of Lamson's factory. While there he perfected the design of the Ball repeating carbine, and obtained a second patent (45,307) on August 16, 1864, for an improved design for its under-barrel magazine. He remained with the Windsor Mfg. Co., until 1868. He then moved on to the design of mining tools, finally becoming a partner in the Sullivan Machine Company, where he remained for 50 years as chief mechanical engineer. Ball died February 7, 1927. A truly innovative mechanic, over his lifetime Ball obtained a total of 115 patents.³

Ball's Repeating Musket

Both Lamson and Ball were responsible for two breechloading musket designs. The first design, was an infantry version of the Ball cavalry carbine (U.S. patents 38935 and 43827, see Figure 2) shown in Figures 3 - 6.⁴ Unlike the various versions made of the cavalry carbine, only three examples of a musket are known: the two shown here and another in the Tøjhusmuseet (Danish Army Museum) in Copenhagen. These muskets appear to be carbine actions fitted with long barrels and forestocks.

No record has been found of any military trials of the musket, while the carbine was extensively tested by military ordnance boards in the U.S. and Britain. The musket version was never adopted for military use while the 1,002 carbines of the 1864 contract were never issued (they were sold off unused in June of 1901).⁵ This factor, and the observation that in the post-war era the U.S. Army and the state military organizations were only interested in cheaply converting their muzzle-loading arms to breechloaders, led Lamson and Ball to develop a different musket design.

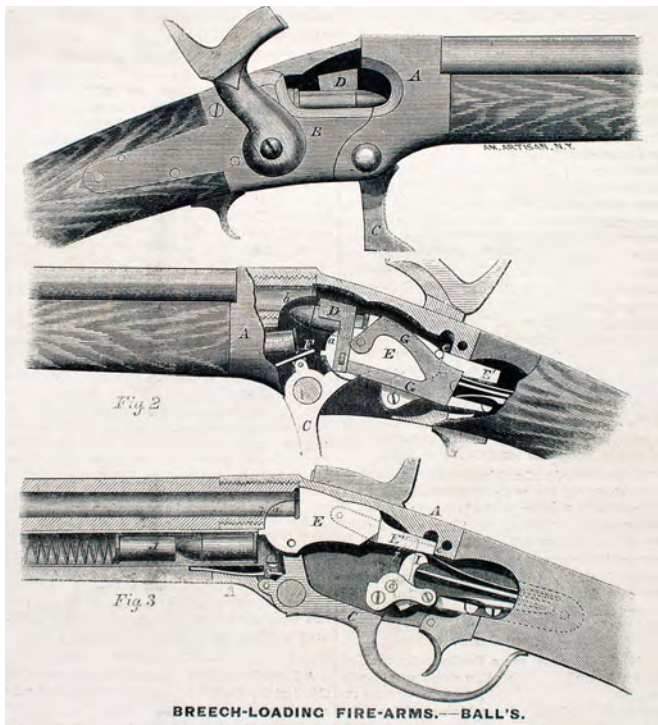


Figure 2. Illustration of the inner workings of the Ball Patent carbine. (American Artisan and Patent Record magazine, November 14, 1866).



Figure 3. Compare this photograph of the Ball Patent design with the drawings of Figure 2. The Ball breechloading mechanism suffered from the same limitation as the Spencer carbine design: it was limited to the use of short cartridges of limited power. (Courtesy the Institute for Military Technology, Michael Fullana photo).

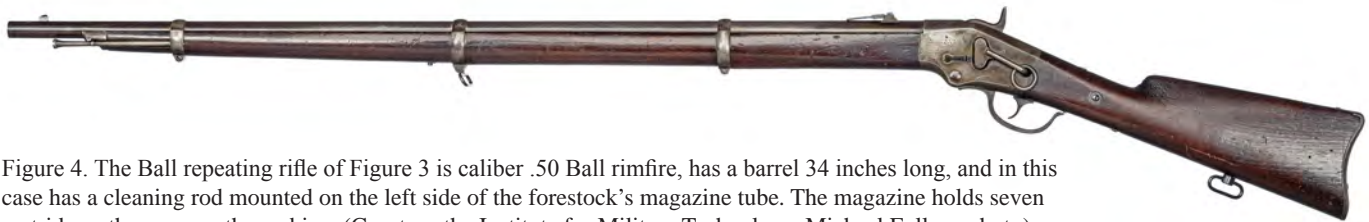


Figure 4. The Ball repeating rifle of Figure 3 is caliber .50 Ball rimfire, has a barrel 34 inches long, and in this case has a cleaning rod mounted on the left side of the forestock's magazine tube. The magazine holds seven cartridges, the same as the carbine. (Courtesy the Institute for Military Technology, Michael Fullana photo).



Figure 5. The Ball rifle of Figures 3 & 4 is marked in six lines, "E. G. LAMSON & CO. / WINDSOR. VT U.S. / BALLS PATENT. / JUNE 23.1863 / MAR. 1 ____." The rotating magazine cutoff lever obscures the rest of date "15, 1864," the reissue date of the first patent. (Courtesy the Institute for Military Technology, Michael Fullana photo).

The Lamson Conversion Musket

The second breechloading musket the pair developed (Figure 7) is a *trapdoor* design, a spinoff of a design of Hiram Berdan. Berdan had been working with the Windsor Mfg. Co. factory in mid-1866, to develop what would come to be known by collectors as his "sliding breech" or Type II *trapdoor* conversion system. In this design of Berdan's, a solid breechblock without any separate locking device is allowed to slide rearwards against the flat vertical surface of the breech plug. The idea was that the force of the exploding charge would force the flat rear surface of the breechblock so tightly against the breech plug that it locked it in place. Berdan had at least one sample of this design made at Windsor (see Figures 10 - 11), before moving on to the Colt factory for additional experiments.⁶ For some reason, Berdan did not obtain a U.S. patent on this "sliding breech" design until March 30, 1869 (number

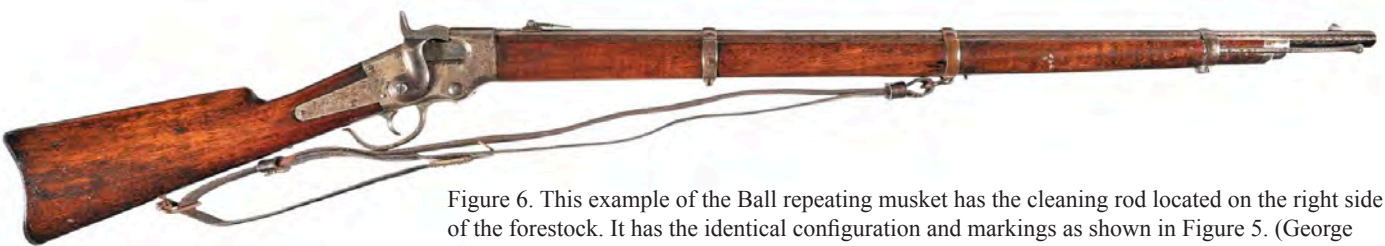


Figure 6. This example of the Ball repeating musket has the cleaning rod located on the right side of the forestock. It has the identical configuration and markings as shown in Figure 5. (George Moller Collection, courtesy Rock Island Auction Co.).



Figure 7. This example of the Lamson-Ball *trapdoor* musket retains the overall length of the original Springfield Model 1864 Rifle Musket, but the barrel length in-the-bore is now 37 inches. Its barrel is relined to .50 caliber like the Springfield Model 1866; it's chambered in caliber .50-70 Government. This is one of two known examples, the other being a caliber .58 rimfire version that had the breechblock pivot pin affixed to a strap on top of the barrel. (Author's collection and photo).

88,436).⁷ He had already obtained a British patent, number 3253, on December 10, 1866.⁸

Ball certainly observed Berdan's design as it was being made at Windsor in mid-1866, and may even have played a part in fabricating Berdan's first prototype. Whatever the case, Ball conceived an alternate design which used the same sliding-block *trapdoor* system. In his design, however, the breechblock was made in two parts: an upper carrier-block and an attached breechblock which slides rearward. The similarity between the functioning of the two designs is evident: as an *American Artisan* article, illustrated here in Figure 9, notes, "This gun bears some resemblance to Col. Berdan's... in the mode of opening and closing the breech-block."⁹

For his trapdoor design, Ball also adopted a unique extractor/ejector system. This consisted of a semi-circular extractor that was pivoted on the breechblock hinge bolt, a design for which the Miller brothers were already pursuing a patent (to become number 68,099 of August 27, 1867).¹⁰ Ball improved on the Miller design by devising an extractor that was spring operated, which actually ejected the cartridge as the breechblock was swung open. He was working on this improvement by late 1866, because he obtained a patent (60,664) on January 1, 1867, for his extractor design — but not for his basic trapdoor breech system (Figure 8). In the patent Ball assigned half of the rights to the Windsor Mfg. Co.¹¹ In this patent Ball explains:

*"My invention consists in the ejector, E, rotating freely, for the purpose of taking on it suddenly accelerated movement or jerk, which said movement, is created by the spring, S, striking its protuberance, 10, into the notch, N. I thus generate a movement equivalent to that of a rotating cam, and my principle is the same whether jerk is produced by a cam or by a spring playing over or under the rotating ejector, or endwise thereto; the essence of my invention being the rotating ejector taking on accelerated movement or jerk by a spring."*¹¹

Refer to the drawing in Figure 8 to understand how the notch in the ejector provides the "jerk" which expels the cartridge. This simple idea almost won government royalties for Ball and Lamson, as discussed hereafter.

Lamson and Ball (Berdan as well) were a year too late to have their design tested by the U.S. Army's Hancock Board, which held breechloader trials in early 1866. The first opportunity offered in 1867, was the trials New York State held at the New York Arsenal, when testing began January 10. Both Lamson and Berdan entered their competing designs; both suffered similar fates.

Two examples of the "Lamson Breech-Loading Rifle" were entered in the trials by the Windsor Mfg. Co. They were both .58 caliber, and of identical configuration except that one used rimfire

and the other centerfire cartridges. The description recorded by the board is as follows:

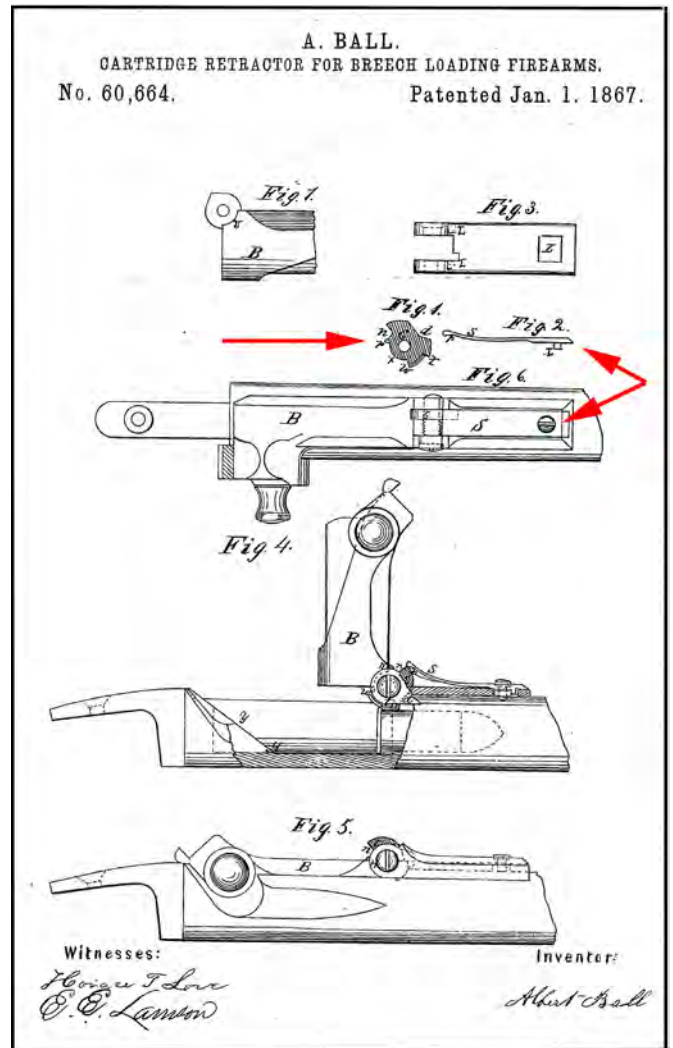


Figure 8. The drawing from Ball's 1867 patent illustrates the ejector disc "Fig. 1" in relationship to the flat accelerator spring "Fig. 2." As the breechblock opens the disc rotates clockwise until the spring gives it a snap acceleration — the same principle later applied in the spiral spring version that was finally adopted in the Springfield Model 1868 Rifle. (U.S. Patent and Trademark Office).

"The breech-receiver is formed by cutting away the upper part of the barrel in front of the breech-pin. The breech-block is rebated longitudinally to the carrier-block, which is hinged on its front end to a strap firmly secured by means of lugs and screws to the top of the barrel in front of the receiver. The firing pin passes through both blocks and is retained by a small

screw on top of the carrier-block, which screw also limits the sliding motion of the blocks on each other to 0.05 inch. This motion is necessary to obtain the square recoil shoulder combined with rotary motion on the hinge. The retractor is rotary, consisting of a small disk or cam working on the pin of the hinge, the cartridge case being drawn by a positive motion as the breech is opened, when at a certain point a sudden accelerated motion is given to the retractor by a flat spring on top of the strap, which motion ejects the case over-ways in back of receiver. A lip on the carrier-block projects beneath the hammer when closed, and prevents accidental explosion before breech is closed, and by aid of the hammer assists in locking the breech.”¹²

Figure 9 gives a visual representation of this design. Both of Ball’s ideas – the two piece breech-block and the accelerating ejector – were incorporated in the muskets. Figures 10 - 11 show the Lamson-Ball breech design in comparison with the similar design of Hiram Berdan.

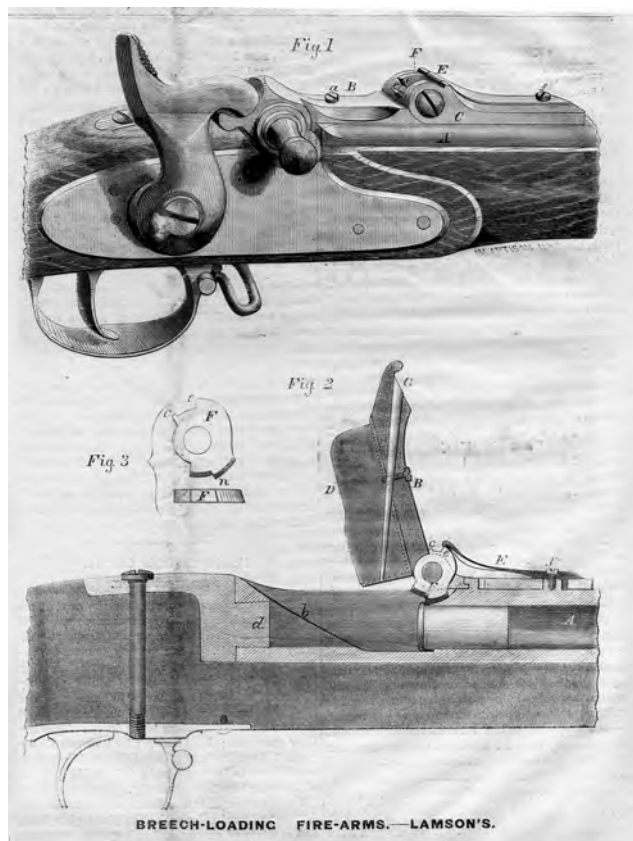


Figure 9. Another illustration of the Lamson-Ball breechloader. Note that the musket shown is the Special Model 1861 Rifle Musket, as produced by Lamson, Goodnow & Yale on contract. (*American Artisan and Patent Record* magazine, February 6, 1867).

Both Lamson muskets satisfactorily passed the endurance, proof load and rapidity-of-fire tests. When it came to the test for safety when fired with cartridges with defective cases, the design failed. This test consisted of taking cartridges and filing the rims to weaken the metal. In this test, both muskets similarly failed:

“5th Test. Fired with a 60 grain cartridge...fired on the head half way round; the breech-block was blown open, the lip beneath the hammer being broken off and the hinge broken; the strap attached to the barrel was also loosened. (The gun being completely disabled by test No. 5, was not submitted to further trials...)”¹²

At the conclusion of the testing in April, the ordnance board’s report said the failures in the fifth test disqualified the design. However, the ordnance board members were unable to definitively recommend a design for converting the state’s muzzle-loading muskets, so the board resumed meeting, with a second set of trials in June. These trials lasted through the end of 1867.

Once again the Windsor Mfg. Co. submitted two examples of the “Lamson Breech-Loading rifle,.” One was caliber .50 centerfire (i.e. .50-70 Government) and the other was .58 centerfire. Figure 7 shows the .50 caliber musket; as we shall see, it was borrowed from the Ordnance Department for use in this trial. The general configuration of both muskets remained as described in the earlier tests, with the two-piece breechblock let into the top rear of the original musket barrel. However, the breech system was modified:

“Since previously exhibited to the Board in January, 1867, marked modifications have been made in this gun. The previous attachment of breech-block hinge to the barrel by strap or saddle has been changed to a band clasping the barrel and reinforcing at a desirable point. The breech-block now enters the chamber like a stopple. The peculiarity of this gun, as compared with others of its class, is in the division of the breech-block into the carrier-block and the breech-block proper, sliding longitudinally on each other...[with the stopple design] it is claimed that the breech-block is well inserted in the chamber, fitting closely the mouth thereof, [so] that compensatory movement is allowed for variations in the thickness of cartridge case heads, that the rear end of the block, when cartridge is inserted, rests firmly in the recoil seat cut perpendicularly to the axis of the bore, and in the stable breech of the gun preventing it from upsetting by recoil and removing all strain from the hinge of the carrier block. To prevent the carrier block from uprising in case of bursting of cartridge case, the forward end is secured by entry into the cartridge chamber, while it is firmly locked down in the rear by the double friction concave and convex surfaces respectively.”¹³

Basically, in Ball’s improved design, closing the carrier-block forced the sliding breechblock forward to enter the rear of the chamber like a cork into a bottle. In this way the breech system was supposedly made more secure in resisting a failed cartridge case. It didn’t work. When the .50 caliber musket was tested with weakened cartridge cases, the result was:

“Fired one cartridge with head filed all around, blowing open the breech-block one and a half inch, but the gun not in any way disabled. [Then] a cartridge with head filed all around being fired, the breech block was blown open one and three quarters inch. Two similar cartridges were then fired and breech blown open two inches each time.”¹³

When the .58 caliber musket was tested the same way, the board reported:

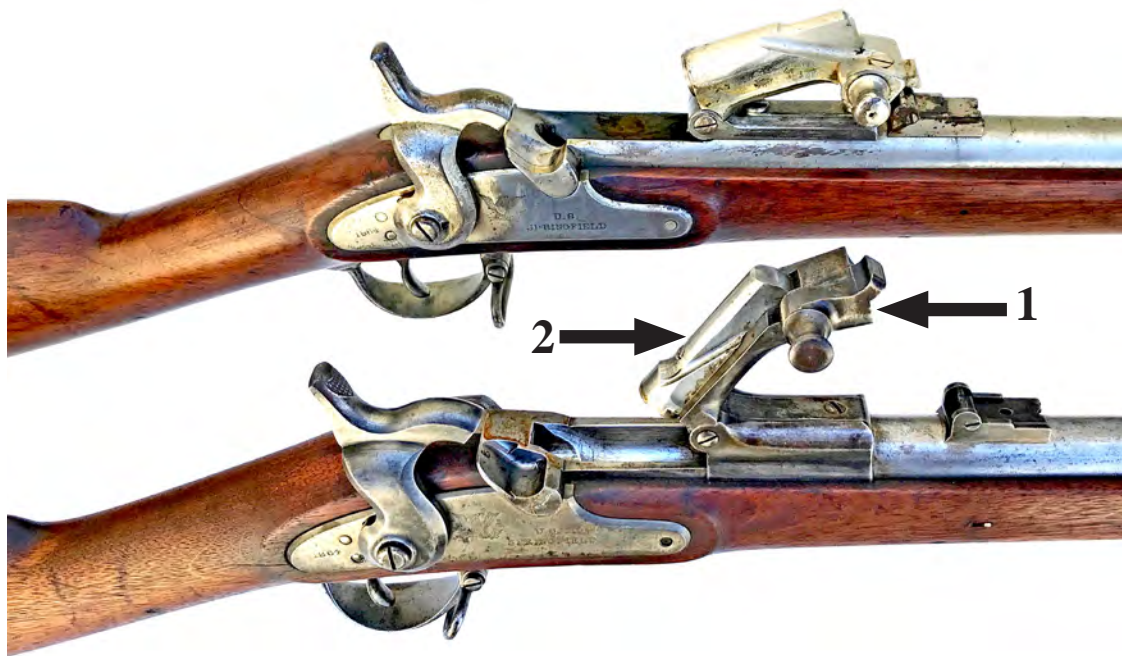
“Four cartridges with heads filed all around, and one with the head filed two thirds around, were fired without opening the breech or deranging the gun. It was apparent that the hammer held the breech block down.”¹³

Note that Berdan’s similar Type II “sliding breech” conversion musket exhibited the same failure mode during these state trials. At the conclusion of testing, the ordnance board’s report of January 30, 1868 said:

Figure 10. The overall breech design of the Lamson-Ball musket (bottom) is copied from the prototype “sliding breech” trapdoor design of Hiram Berdan (top). Berdan was working at Lamson’s factory in 1866, to develop his trapdoor designs, only later to move to the Colt Fire Arms factory. (Author’s collection and photo).



Figure 11. Ball’s design replaces Berdan’s one-piece breechblock with a two-piece system, wherein a carrier block “1” holds a separate sliding breechblock “2.” Why Ball thought this was an “improvement” on Berdan’s design is unknown; it is certainly more complicated to fabricate. He did not obtain a patent on his breech design. (Author’s collection and photo).



“The Lamson Gun. This gun has no independent locking device, and the ability to close the breech and secure it when in position, depends upon a divided breech-block, the relative motion of one portion of which upon the other is equivalent in effect to the loose hinge in Berdan’s No. 2 gun. As in that arm, nice adjustments and workmanship are required, nor even then can they be considered as efficient...[As] at the previous session of the Board both the guns exhibited were disabled by the explosion of defective cartridges, and at the present session the breech of the gun... was blown open by similar cartridges... [and] it is obvious that a system requiring such nice adjustments is undesirable for military arms.”¹⁴

Both the Lamson and Berdan conversion systems were rejected by the ordnance board, which recommended the adoption of the Roberts Patent tipping-block design. With this failure, Lamson and Ball ceased offering this conversion system for trials at the state level.

Lamson and the Springfield Model 1868 Rifle

There was one further important note in the New York State ordnance board’s final report on the Lamson musket:

“The retractor and ejector of this gun are highly approved by the whole Board, and its easy application to the hinge band around the barrel, or to a separate receiver, further commends it.”¹⁴

The U.S. Army’s Chief of Ordnance, Gen. A. B. Dyer, as well as Colonel J. G. Benton at the Springfield Armory, were similarly impressed with the Ball Patent extractor/ejector design. How they first came to see the design is not known, but both Lamson and Ball were well known to the Ordnance Department. By April, 1867, Ball was already working on an improved design to overcome the malfunctions identified by New York State ordnance board. This is shown by a note in this board’s report of April 6: *“Since the close of trials by the Board this gun has been exhibited to the members with such improvements as would obviously appear to avoid the serious objections made to it....”¹³*

After seeing an example of the improved Lamson/Ball musket conversion design, in May of 1867, Gen. Dyer ordered two caliber .50 samples (presumably .50-70) from the Windsor Mfg. Co. On May 22, Lamson wrote to Col. Benton asking if the Springfield Armory had yet sent two muskets to be converted.¹⁵ Since the conversion of Springfield Model 1864 rifle muskets was contemplated, the Ordnance Department was not interested in samples made from Special Model 1861 Rifle Muskets such as Lamson had previously manufactured.

The two converted muskets for the Ordnance Department would exhibit the improvements which Ball had developed. These included a wide band around the barrel to which the carrier-block pivoted on a hinge bolt, and a wider spring, located on top of the band, which actuated the ejector. When looked at, the wide band deceptively makes it appear that a new receiver had been incorporated (see Figure 12 and the description in the foregoing N.Y State report).



Figure 12. The breechblock of this .50 caliber version of the Lamson musket is marked in two lines merely "PAT JAN 1 / 1867." The flat spring of the Lamson-Ball ejector is inset into the top of a cylindrical band which encircles the barrel at the chamber. (Author's collection and photo).

At the Springfield Armory the adoption of a separate receiver for use in converting Model 1864 Rifle Muskets to breechloaders was also in the works (Figure 13). Col. Benton had Master Machinist Samuel Porter estimate the cost of manufacturing such a receiver; on June 8, Porter provided his analysis in detail and in summery said, "The whole cost is estimated to be less rather than to exceed the present model" (i.e. Model 1866).¹⁶ Meanwhile, as noted previously, Lamson received permission to borrow one of the two ordered .50 caliber muskets to submit to the second session of the New York State ordnance board that summer. At some point Gen. Dyer directed the return of both .50 caliber muskets. In a letter to Col. Benton on November 22, 1867, Lamson reported:

*"We have two of cal. .50... we will send one of them to you as directed. I think these are yours which Genl. [sic] Dyer sent us to be altered & I think he desired them ret'd [sic] to the Armory or the Ordnance Office... We will get the gun from N.Y. and send it to you as soon as we can."*¹⁵



Figure 13. The standard Springfield Model 1868 Rifle has a longer receiver than on all subsequent Models 1870/73/84/88. (George Moller Collection, courtesy Rock Island Auction Co.).

Col. Benton continued to be impressed with the Lamson extractor design and on November 30, he wrote to Gen. Dyer that he recommended either the Lamson (Ball Patent) or the Miller Patent extractor be adopted:

"Understanding that it is the intention of the War Department to continue the work of alteration, I would suggest before doing so that certain changes be made in the present model to cover defects developed in service and diminish the cost of alteration.

*"After a careful examination it is found that the cost may be reduced \$.50 by substituting a receiver for the present hinge strap and cuts in the barrel. The adoption of Miller's or Lamson's extractor is desirable on the score of cheapness, strength and durability."*¹⁶

This new design yet needed approval by the chain of command.

The Secretary of War had convened an ordnance board in an order of December 17, 1867, to study a variety of topics. The 1868 Ordnance Board, composed solely of ordnance officers and chaired by Brevet Brig. Gen. P. V. Hagner, began its deliberations on January 4, 1868.¹⁷ This board is often overlooked by firearms historians because it examined only four breechloader designs. Yet it was a significant event in that it set the configuration of the Springfield *trapdoor* rifle for the next two decades.

The Hagner Board was directed to examine 83 different ordnance topics. One topic was what changes should be incorporated in the next model of breechloading conversion rifle musket. Col. Benton provided this board with a wooden model of the recommended breech system, which incorporated the Lamson extractor, as well as a sample rifle musket with a shorter barrel than that of the Model 1866. The board members ultimately recommended eight design changes, which list included a new receiver instead of the design of the Model 1866 (where the breechblock was let into a cut in the top of the barrel). Concerning the ejector the board's report said:

*"The Board recommend the shell ejector shown on the wooden model submitted to the board be adopted as being simpler; cheaper; stronger; and better adapted for service than the one on the altered musket of 1866 now in use, or any known to the board."*¹⁷

There was no immediate action taken on the new design as the armory was fully occupied in the rapid production of the Model 1866 Rifle Muskets. When Gen. Dyer queried Col. Benton on July 10, about progress on incorporating the Lamson ejector into the Model 1868 design he replied, "No arms [M1868] have yet been altered in this way nor is it known when any will be."¹⁸ Apparently he had received no authorization from the Ordnance Office to expend funds on new design work.

Finally, on Jul 13, 1868, Gen. Dyer directed Col. Benton:

*"The Secretary of War having approved the proceedings & Recommendations of the Ordnance Board, convened under order of the 17th December, 1867...[I] have to direct that you take measures to resume the alteration of Springfield muskets on the plan recommended by the Board... You will receive future instructions as to the extent of your operations in pursuance of this letter."*¹⁹

On July 18, Gen. Dyer sent back to the Springfield Armory the wooden model which the ordnance board had used. The configuration of the Model 1868 receiver continued in development. Col. Benton kept a “Book of Experiments” as an *aide memoire*, where an entry dated August 31, says:

“Commenced trial of new model [1868], Caliber .50 inch. This model is an improvement over the plan of 1866, for altering the Springfield rifle musket to a breech loader in accordance with the recommendations of the Ordnance Board convened at Washington D.C., January 4th, 1868.”

“1st. The barrel terminates in a housing, or receiver which contains the breech block and ejector...”

“8th. Substituting the Lamson ejector.”²⁰

Benjamin F. Adams in the armory’s model shop was also working on incorporating the Lamson ejector into the receiver design, but he claimed in a later court deposition that the “Lamson ejector and accelerator” exhibited problems, in that it was “exposed to sand and dirt” by its location on the top of the receiver. In its place he invented the spiral-spring-and-plunger accelerator, which would be incorporated on all subsequent Springfield *trapdoor* models.²¹



Figure 14. This is the model rifle with the “Lamson extractor” made at Springfield in mid 1868. Note how the flat spring spans the entire receiver and the ejector disc is located on the right side of the breechblock pivot pin. The breechblock is marked with the U.S. eagle and “AUG 1868.” (Courtesy the Springfield Armory National Historic Site, SPAR 5658).

Meanwhile, to illustrate the two alternative ejector designs, on September 25, Col. Benton sent a sample Model 1868 Rifle (Figure 14) to the Ordnance Office, accompanied by these comments:

“I have this day sent to you by express a box containing a rifle musket altered to breech loader of the plan of 1868, and a wooden model of the same with a spiral spring extractor. The specimen gun is arranged so that either the flat spring or the spiral spring extractor can be used for purpose of testing the merits of both.

“This gun has been fired about 5,000 times — 3,700 with the spiral spring extractor. Both the extractors worked throughout and it would, in my opinion, be be suitable for the service.

“The spiral spring extractor has the advantage of being cheaper to make and better protected from dirt and moisture. The other [Lamson] is more accessible in case of accidents. Not having any authority to make any of these changes, the models are being made for the flat spring. Mr. Adams, one of our workmen, suggested the peculiar arrangement for the spiral spring.”²²

While the Ordnance Office considered Col. Benton’s alternatives, plans for manufacture continued apace. On October 6, the Ordnance Office sent an authorization to the armory that said in order “to convert Fifty thousand (50,000) Springfield muskets

into breech loaders, upon the plan recommended by the Ordnance Board at its last session, you will proceed to carry out that recommendation...on the plan named, as soon as practicable.”²³ Thus, the armory was to begin Model 1868 Rifle manufacture using the approved design: the Lamson ejector.

Meanwhile, the evaluation of both extractors continued at the Springfield Armory. Col. Benton wrote to the Ordnance Office on November 2, saying that the flat spring design was now found faulty:

“ Unless the point of the [flat] spring is kept well lubricated it will grind and wear the ejector. In two instances...it was found impossible to open the breech block fully owing to the sticking of the point of the spring against the ejector...The spiral spring ejector...is found to be entirely free from these objections and to work well under all circumstances.”²⁴

The Ordnance Office needed to vet this change, and the model gun was evaluated by the members of the original 1868 Ordnance Board. The board members reported in favor of this change on November 11, and the Secretary of War subsequently gave his approval. Consequently, Col. Benton received direction dated November 12, 1868, saying:

“The model converted musket which accompanied your letter of 2d inst. [sic] will be returned to you by this day’s express.

“The Secretary of War has approved of the spiral spring ejector which you have adapted to this gun, and the number of muskets your are authorized to alter, will be altered to conform to this model.”²⁵

Since the tooling for the Model 1868 receiver had already been made, the armory continued to manufacture the longer receiver; the cuts for the Lamson-Ball flat spring were merely left out. When the Model 1870 Rifle was adopted the receiver was shortened to eliminate the excess metal. With this change of course, Lamson and Ball were denied the receipt of any royalties for the use of their design. One wonders if this cost savings was not the true reason for the adoption of Adams’ spiral spring design, which had been developed internally to the Springfield Armory.

Summary

This story covers the history of only eight breechloading muskets made by Lamson and Ball: three Ball repeating muskets and five Lamson breechloading *trapdoor* muskets (three in caliber .58 and two in caliber .50-70). Of these eight, only five muskets have been located: three repeating muskets, and one .58 and one .50 caliber *trapdoor* breechloader. Yet the influence of the Lamson *trapdoor* lasted in the design of over 55,000 Model 1868 Rifles and Model 1869 Cadet Rifles that were manufactured.

From all their exertions Lamson and Ball made only a little profit. Lamson subsequently received a royalty on the first 8,000 of the Berdan Russian I rifles produced by the Colt’s Patent Firearms Manufacturing Co. in 1868-69. Colt’s attorneys had determined that the spring-loaded ejector on the Russian I rifle infringed on Ball’s patent. Consequently, Colt agreed to a royalty of 10 cents on each rifle delivered with this spring. In a bit of subterfuge, Colt and the Russians left the spring out of the remaining 22,000 rifles delivered, the spring being inserted after delivery in Russia in order to avoid the royalty.²⁶ As noted in their biographies above, both Lamson and Ball soon discontinued designing firearms and moved on to other pursuits.

Acknowledgement

With thanks to Roy Marcot for research assistance, and also to Austin Ellis at the Institute of Military Technology and Alex Mackenzie at the Springfield Armory National Historic Site for photographs.

Endnotes

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- ³ Hubbard, Guy, "Development of Machine Tools in New England," *American Machinist*, Vol. 59, July 5, 1923. pp. 3-4. Johnson, Allen, Editor, *Dictionary of American Biography*, Vol. I. Charles Scriber's Sons, New York. 1935.
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- ⁸ British Patent Office, *PATENTS FOR INVENTIONS, ABRIDGEMENTS CLASS 119, SMALL-ARMS*. Vol. 1. for His Majesty's Stationary Office, by Love & Malcom, LTD, London. 1905. pp.229.
- ⁹ "Breech-loading Firearms — The Lamson Gun," *American Artisan & Patent Record*. New York: Vol. IV, No. 14, February 6, 1867. pp. 1.
- ¹⁰ USPTO.gov.
- ¹¹ Ibid.
- ¹² Adjutant-General, New York State, "Report of the Board for Examination of Breech-Loading Military Small Arms," *Annual Report of the Adjutant-General of the State of New York*, 1867. Charles Van Benthuyzen & Sons, Albany. 1868. pps. 363-4.
- ¹³ Ibid, pp 405-7.
- ¹⁴ Ibid. pp. 418.
- ¹⁵ U.S. Army Ordnance Office, Records of the Office of the Chief of Ordnance. Record Group 156. Washington, DC: in the National Archives. Entry 1362. (Hereafter CoO RG156)
- ¹⁶ Frasca, Albert J. *The .45-70 Springfield Book II*. Frasca Publishing, Springfield, Ohio. 1997. pp. 64.
- ¹⁷ U.S. Army Ordnance Office, "Proceedings of the Ordnance Board, Convened Under Authority from the Secretary of War," *Ordnance Memoranda No. 9*. Washington: Government Printing Office, 1868.
- ¹⁸ CoO RG156, Entry 1354.
- ¹⁹ CoO RG156, Entry 1365.
- ²⁰ Benton, J.G., Captain, aide memoire: a notebook of chronological entries of experiments done at the Springfield Armory, 1866-68. Located in the library of the Springfield Armory museum.
- ²¹ U.S. Court of Claims, The Berdan Fire Arms Mfg. Co. versus The United States, Case No. 15726. Deposition of Benjamin F. Adams, August 20, 1889.
- ²² Frasca, pps. 64-5.
- ²³ CoO RG156, Entry 1365.
- ²⁴ Frasca, pp.65.
- ²⁵ CoO RG156, Entry 1365.
- ²⁶ U.S. Court of Claims, Case 15726. Deposition of Hiram Berdan.

