THE INCREDIBLE LINDNER REPEATER: A GOOD IDEA THAT DIDN'T WORK

by David H. Hanes

In the history of firearms development, perhaps buried deep within a catacomb labeled "Good ideas that didn't work," there dwells a unique invention, engrossing as it is obscure: the self-priming, tubular-magazine, revolving-cylinder, shoulder-fired percussion firearm patented in 1857 by Edward Lindner. Examining the complex mechanism that automatically feeds combustible cartridges into a rotating cylinder from a tubular magazine, while automatically cycling percussion caps from a spring-loaded magazine unveils a fascinating specimen of creativity in firearms engineering.

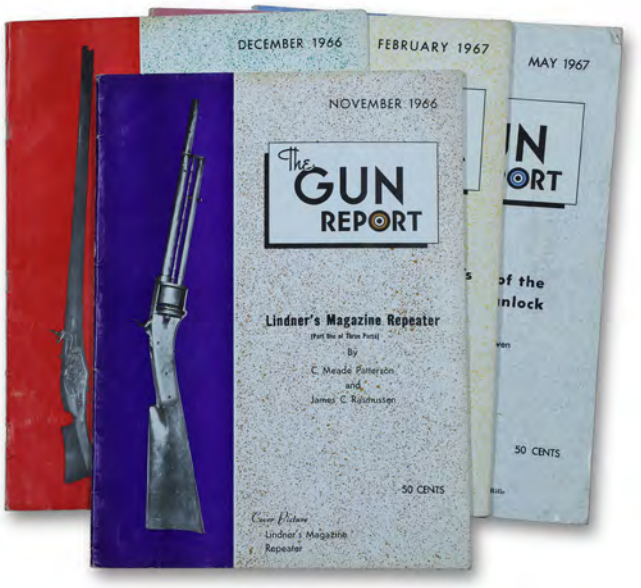

Figure 1. The first of four Gun Report issues featuring the author's Lindner Repeater began with a November 1966 cover story.

Lindner's intriguing brainchild and the subject of this essay was featured in a comprehensive three-issue *Gun Report* article, along with a one-issue follow-up article, in 1966-67 by C. Meade Patterson and James C. Rasmussen[1] (Figure 1). The firearm described herein is the same gun featured in these articles and is now in the author's collection. Those who study the rapid firearms technology growth in the decade preceding the American Civil War—where any number of inventors were scrambling to design marketable breechloaders, self-loading mechanisms, firing systems and cartridges – will find Lindner's creation particularly interesting.

The subject firearm, henceforth referred to as the "Lindner Repeater" in this text, is possibly a patent model or prototype and one of two known examples.[2] The identity of this unmarked firearm remained a mystery until 1965, when then-owner Frank Russell brought it to an American Society of Arms Collectors meeting in Washington, D.C. He appealed to the membership for their help in ascertaining the origin of the piece, from which a thorough patent search (presumably by Patterson and Rasmussen) uncovered its source.

Lindner's "Improvement in Fire-Arms," as his patent is titled[3] (Figure 2, next page), is an intricate mechanism somewhat suggestive of a Rube Goldberg contraption. However, it is a rather straightforward concept that performs what Lindner saw as a logical evolution in revolving cylinder technology: a means to automatically and continually replenish cartridges into the rotating cylinder as each round is fired, thereby effecting a significant increase in firepower. In addition to loading the cylinder from a tubular magazine, Lindner integrated cylinder rotation and lock-up, automatic percussion cap positioning and ejection and striker-fire operation into the mechanism. His challenge, of course, was transforming his abstract thought into a functioning device.

Lindner's Other Patents

Edward Lindner was born in Germany in 1819 and immigrated to New York in the early-1850's. By the mid-1860's he was back in Germany, where he died in 1870. In a little over a decade, Lindner registered a respectable list of ordnance-themed inventions in the patent records of the U.S. and Britain, as shown in Table 1.

Lindner is best known today for his breechloading concept that appeared in several variations of the same basic patent, including: the Hall rifle and carbine improvement, the U.S. Model 1841 *"Mississippi"* Rifle conversion, the Austrian Jaeger carbine conversion, and a newly-made cavalry carbine which bore his name.[4] His approach to providing an operable breechloading mechanism received a tepid response, but due to wartime demand, a few thousand Lindner breechloaders saw service in the American Civil War in the aggregate of the above configurations. His breechloading approach was the most useful of his patents, but Lindner was also a visionary.

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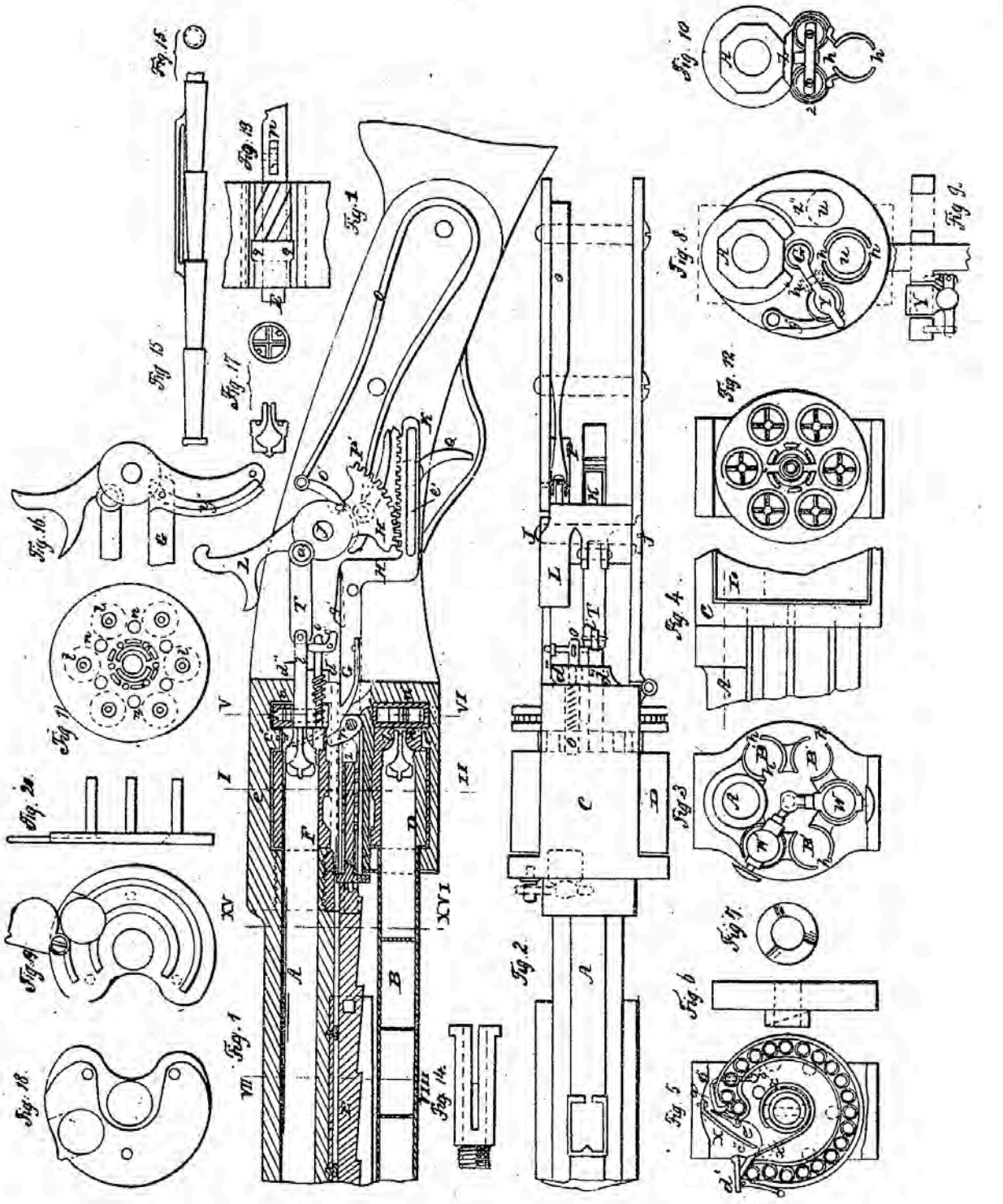


Figure 2. Lindner's 1857 "Revolver" patent.[3] His official patent carries the nonspecific title, "Improvement in Fire-Arms." Detail of the percussion cap magazine in the lower right (Fig. 5) reveals a spiral torsion spring automatically feeding up to twenty-one primers, as each is stripped away in succession by the striker during the firing cycle.

Table 1. Lindner's United States and Great Britain Patents

Patent No.	Patent Date:	Patent Description
US 11,197	27 Jun 1854	Tubular magazine repeating revolver (predecessor to US 17,382)
US 14,819	6 May 1856	Mechanical- or Gas-operated breech opening mechanism
GB 1,415	14 Jun 1856	Mechanical- or Gas-operated breech opening mechanism
US 17,287	12 May 1857	Improvement to needle-fire cartridges
US 17,382	26 May 1857	Tubular magazine repeating revolver (subject of this article)
GB 1,966	30 Aug 1858	Hinged chamber breech action similar to US 23,378
US 23,378	29 Mar 1859	Breechloader alteration and carbine that bears his name
US 32,949	30 Jul 1861	Improved mode of preparing projectiles for ordnance
US 37,173	16 Dec 1862	Air pistol, rifled, with pump handle in grip
GB 3,275	28 Dec 1863	Sealed interrupted thread breech for cannon
GB 358	8 Feb 1865	Sliding bolt, interrupted thread, needle fire
GB 2,512	30 Sep 1865	Sliding bolt, interrupted thread, striker-fire
GB 1,143	18 Apr 1867	Sliding bolt, interrupted thread, breech block conversion

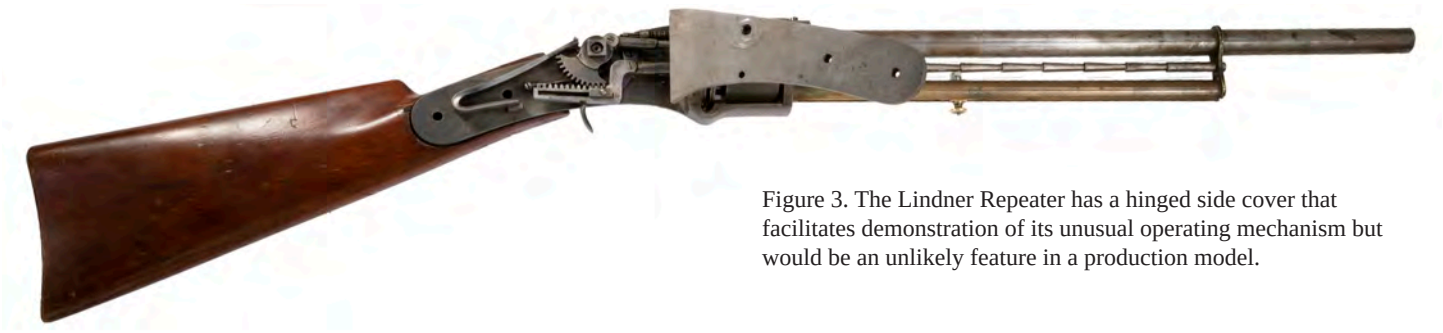


Figure 3. The Lindner Repeater has a hinged side cover that facilitates demonstration of its unusual operating mechanism but would be an unlikely feature in a production model.

To those who study the history of firearms innovation, the most revolutionary of Lindner's inventions is referenced from an unlikely source. In his exhaustive multi-volume work, *The Machine Gun*, Col. George Chinn credits Lindner with recording the first U.S. patent contributing to the development of the machine gun. Chinn delineates *"a comprehensive collection"* of nearly 1,260 U.S. patents "that are pertinent to the field of automatic weapons," of which Lindner's 1856 patent is the earliest reference given.[5] Lindner was apparently the first to patent a means by which energy from ignition, both mechanical and gas, could be used in the automatic operation of a firearms mechanism. In his patent description, Lindner states: *"The manner of disengaging and opening the breech by a motion obtained either by the passage of the cartridge through the gun-barrel or by the action of the expansive power of the powder when the gun is fired off."*[6]

Other Lindner patents include improvements in needle fire cartridges, artillery shells, air guns, and breechblock mechanisms, as shown in Table 1. There is also some dispute over Lindner's involvement in the invention of the Parrott gun, that it was actually Lindner's, not Parrott's, creation.[7]

Operation of the Lindner Repeater

The Lindner Repeater features a hinged side cover (Figure 3), removed in the following photos to better illustrate the firearm's operating mechanism. In some cases, modern or more explanatory terms offering better clarity have been substituted for Lindner's original terminology. As this firearm utilizes a conventional hammer/ trigger/ sear/ tumbler/ mainspring arrangement, this portion of the firing sequence is assumed to be understood by the reader and will not be described. However, Lindner does not refer to the cocking piece as a hammer as in traditional usage, for it does not directly impinge a percussion cap or a firing pin. To avoid confusion, the term *cocking piece* will be used, and Lindner's *hammer* will be referred to as a *striker* in this text.

The loading and firing sequence of the Lindner Repeater is demonstrable except for actual firing, as the striker appears to have been deliberately shortened so as not to impinge the percussion cap, probably to prevent inadvertent discharge during test cycling.

The manual manipulation of the cocking piece and trigger integrates these automatic functions into the sequence of operations:

1. Cylinder loading from the tubular magazine
2. Cylinder indexation and timing
3. Cylinder lockup
4. Percussion cap-to-nipple placement
5. Cylinder lock release
6. Spent percussion cap removal.

The sequence of operation is described as follows (refer to Figure 4 and Figure 5). A more detailed version can be found in either the patent description or in the *Gun Report*[1] articles cited previously:

1. The tubular magazine is manually filled from the front by removing the brass follower piston, which is accomplished by pulling down on the spring-loaded brass knob until the finger clears the feed cone, then sliding the follower piston out the front end of the tube. On this prototype, nine, one-inch, .48 caliber

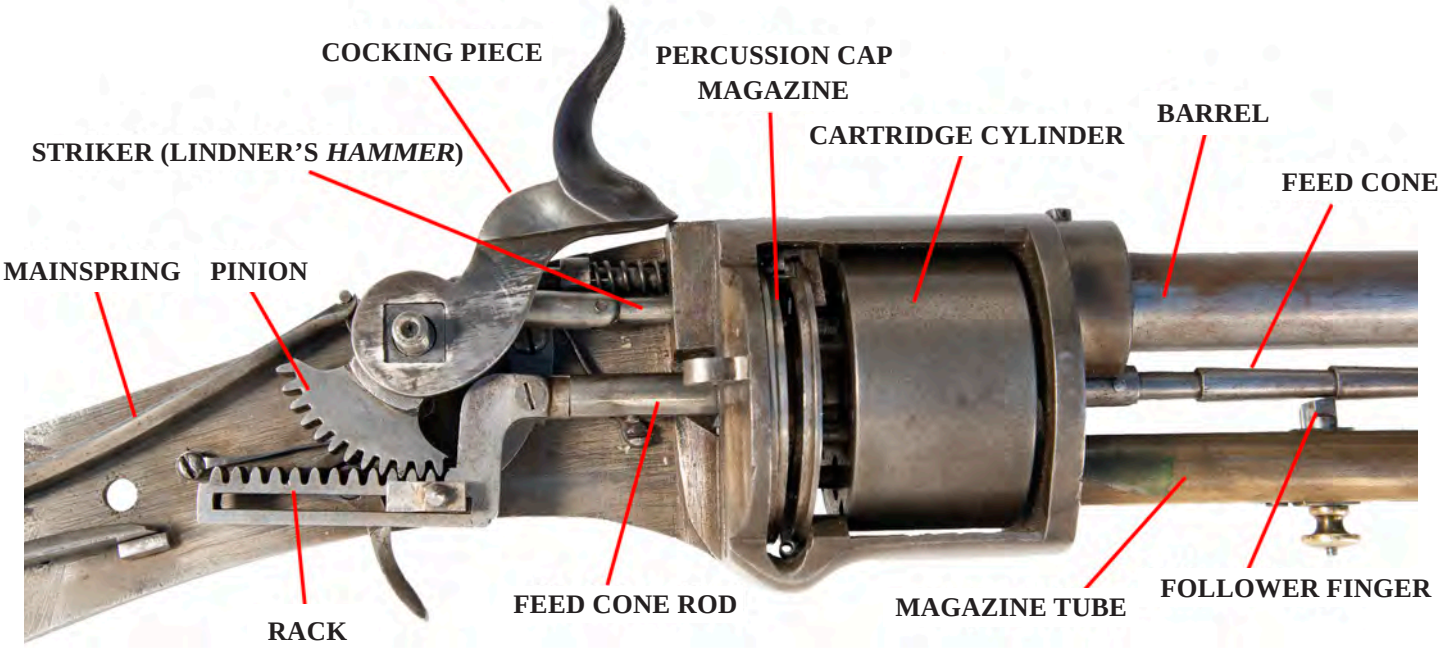


Figure 4. The Lindner Repeater with cocking piece un-cocked. Note how the rack is in its rearmost position and the follower finger is parked on the smallest diameter of the feed cone.

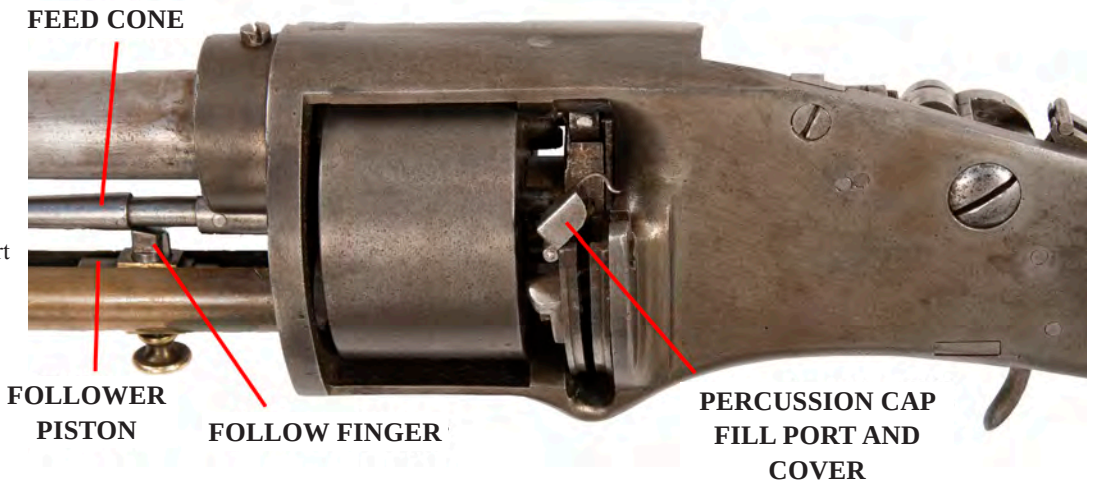


Figure 5. Left side view of the Lindner Repeater showing the percussion cap magazine fill port and cover. The cocking piece is removed.

combustible cartridges can be inserted. The follower is then re-inserted by reversing the removal steps.

2. The percussion cap magazine is positioned directly behind and c axially with the cartridge cylinder and is manually filled with up to twenty-one percussion caps. These percussion caps are held in place and advanced automatically by a spiral torsion spring (Figure 2).

3. The cocking piece is drawn back with the thumb in a rearward arcing motion as in the typical fashion.

   a. The lower portion of the cocking piece, below its axis of rotation, is an integral pinion that engages the rack.

   b. The rack is pinned to a round shaft passing through the cylinder, becoming the feed cone device.

   c. A 60-degree rotation of the cocking piece/ pinion conveys a one-inch linear motion to the rack, the length of travel required for each cartridge feed.

   d. The feed cone device is the means by which combustible cartridges are fed into the cylinder. Mounted between and parallel to the barrel and tube magazine, the truncated cone-shaped steps are each one inch long, the same length as a cartridge.

   e. The spring-loaded follower finger, connected to the follower piston located in the magazine tube, follows the linear motion of the feed cone. This finger engages the cone steps in succession, feeding one cartridge with each firing cycle.

4. As the cocking piece is moved rearward to half-cock (Figure 6):

   a. The pinion acts on the rack, the rack now begins moving forward.

   b. A pin protruding from the side of the rack engages a spring-loaded crescent-shaped lever, which pivots and engages a shoulder at the rear of the spring-loaded cylinder locking pin, forcing it rearward to begin unlocking the cylinder (Figure 7 and Figure 8).

   c. The feed cone device, connected directly to the rack, moves forward approximately one-third of an inch.

5. As the cocking piece continues its arc to full-cock (Figure 7):

   a. The unlocked cylinder begins to rotate counterclockwise.

   b. The cylinder lock pin release lever has now slipped past the shoulder of the cylinder locking pin, releasing the spring-loaded locking pin to bear upon the rear of the cylinder as it rotates.

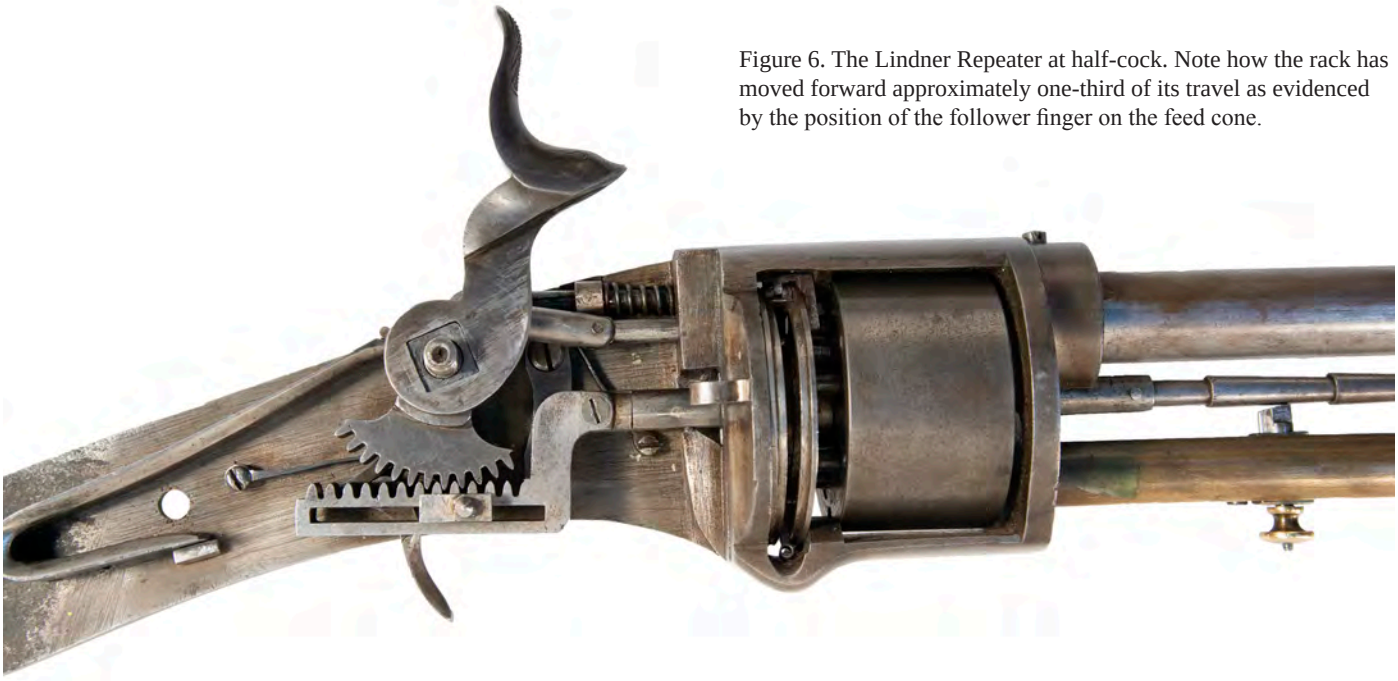


Figure 6. The Lindner Repeater at half-cock. Note how the rack has moved forward approximately one-third of its travel as evidenced by the position of the follower finger on the feed cone.

c. The rack and the feed cone device continue to move forward. The vertical spring-loaded finger on the cartridge follower, captive in the magazine tube, follows the increasing cone taper. Note that the cartridge follower finger can be in contact with any one of the nine cones, position dependent on how many cartridges remain in the tube. When the follower has reached the end of its rearmost travel in the magazine tube, the tube is now empty of cartridges. Removal of the follower and reloading is described in Step 1 above.

d. The percussion caps, held under spring pressure by the spiral magazine spring (Figure 2), and following cartridge cylinder rotation, have pushed a spent cap from the previous firing out the ejection port as the next cap in line advances into firing position.

6. When the cocking piece reaches full cock, the following condition exists:

a. The spring-loaded cylinder locking pin has snapped into its forwardmost travel as one of six radial position holes in the cartridge cylinder is presented. The cylinder is now locked with a cartridge at the 12 o'clock position.

b. The cocking piece has rotated to the limit its rearward travel.

c. The rack is at the limit of its forward travel.

d. The striker is in its rearmost position.

e. As the rack moves to its limit, the largest diameter of the feed cone in contact with the follower finger has now slid past the follower finger, which now snaps into position at the beginning (smallest diameter) of the next cone.

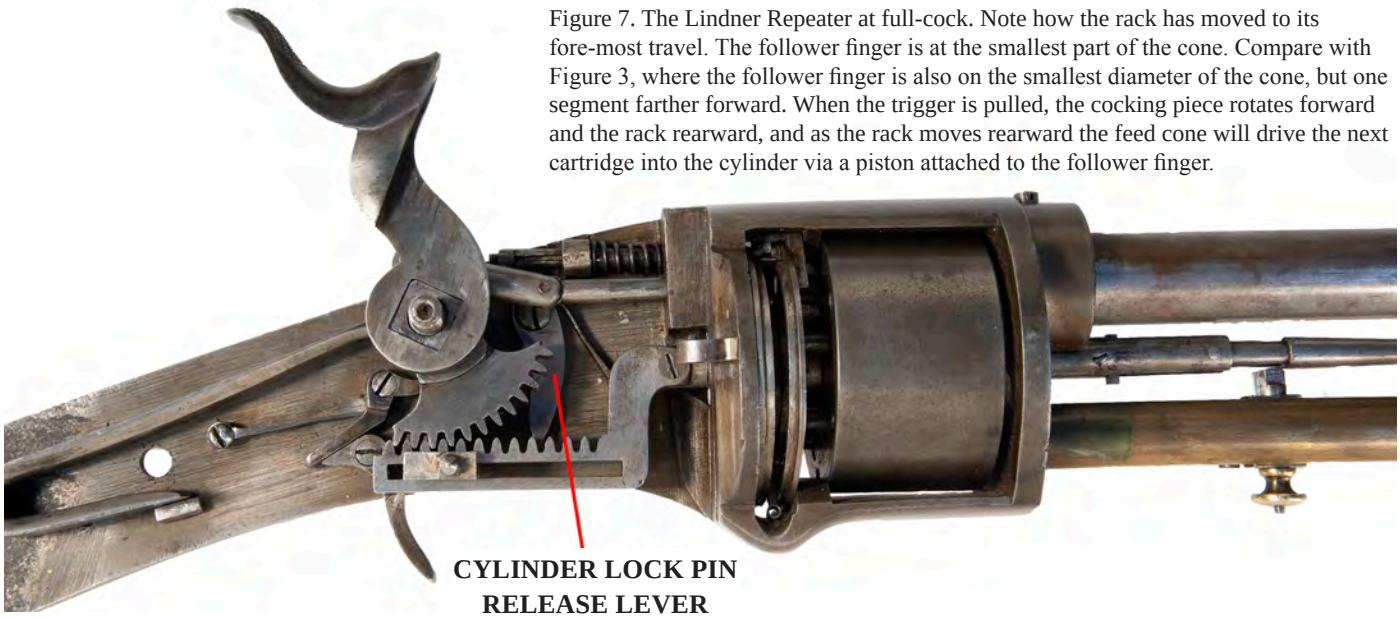
f. The percussion cap magazine presents a new primer into the 12 o'clock firing position.

7. When the trigger is depressed:

a. The conventional sear/tumbler arrangement releases the mainspring-loaded cocking piece from full-cock.

b. The striker, attached via swivel pin to the top of the pinion, is thrust forward from the force of the unleased mainspring.

Figure 7. The Lindner Repeater at full-cock. Note how the rack has moved to its fore-most travel. The follower finger is at the smallest part of the cone. Compare with Figure 3, where the follower finger is also on the smallest diameter of the cone, but one segment farther forward. When the trigger is pulled, the cocking piece rotates forward and the rack rearward, and as the rack moves rearward the feed cone will drive the next cartridge into the cylinder via a piston attached to the follower finger.



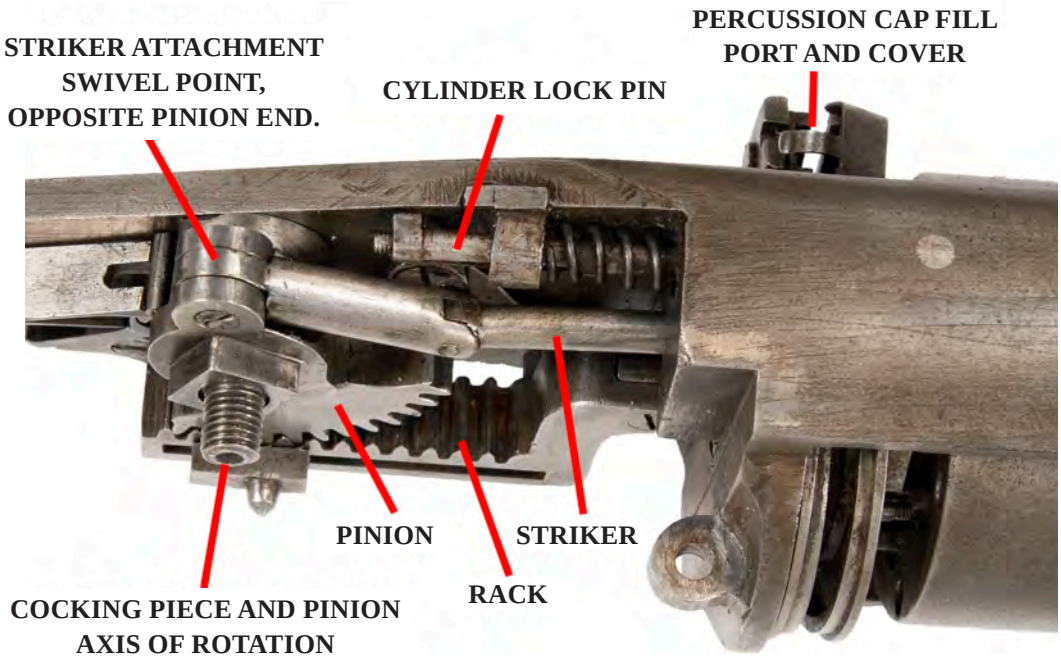


Figure 8. The Lindner Repeater at full-cock, cocking piece removed. Note Lindner's "hammer" is the pinned shaft attached to a swivel at the top of the pinion gear, above the pinion's center of rotation, referred to as a striker in this text.

c. The striker strips a percussion cap from the percussion cap magazine.

d. The striker forces the percussion cap onto the nipple directly behind the cartridge held in battery at the 12 o'clock position.

e. The striker impacts the percussion cap, initiating the firing sequence. The combustible cartridge is consumed.

f. The clockwise rotation of the cocking piece and pinion drives the rack and feed cone device rearward. As the cartridge follower finger is locked in the small end of one of the cone steps, the feed cone action draws the cartridge follower rearward, delivering a cartridge from the magazine tube into an empty cylinder chamber. An illustration of this alignment using reproduction cartridges may be found in Figure 9. An illustration of this alignment using reproduction cartridges may be found in Figure 9. At this time, the new cartridge is pressed onto the front of a nipple, which is equipped with a cross cutter that serves to open the rear end of the cartridge. A small spillage of powder primes the inside of the nipple and facilitates detonation. In this prototype, the magazine tube is aligned with the 6 o'clock cylinder position. However, as we shall see, other magazine tube positions are possible.

Not a Firing Model:

Patterson and Rasmussen identified fifteen reasons why this prototype is not a firing model[1], the five most significant being:

1. The striker is not long enough to engage the percussion cap.
2. The barrel is attached with a set screw only; the barrel and receiver are not threaded.
3. There is no rifling in the barrel.
4. There is no trigger guard, nor provisions for one.
5. There are no sights, nor provisions for them.

Figure 9. The loaded Lindner repeater with cartridges in the magazine tube feeding the rotating cylinder. Note the empty cylinder chamber is ready to accept the next cartridge to be fed from the tubuar magazine. As no original Lindner cartridges are thought to exist, these .48 caliber x 1.00 inch-long reproductions were made to demonstrate the loading operation. Cartridges courtesy Garry James.

Table 2. Lindner Repeater Specifications

Caliber	.48 Combustible-envelope cartridges, one-inch longn
Overall Length	33.125 inches
Barrel Length	15.375 inches
Weight	5.75 pounds
Cylinder Capacity	6
Tube Magazine Capacity	9 cartridges in prototype*
	*limited only by barrel length, in one-inch increments
Total Cartridge Capacity	15 in prototype (one, 9-round tube mag. + 6 rounds in cylinder)
	33 in author's alteration (three, 9-rd. tube mags. + 6 rds. in cyl.)
Total Theoretical Capacity	256 rounds (five, 50 round tube mags. + 6 rounds in cylinder)

In addition, there are no markings of any kind. With serial numbers, maker marks, inspection stamps, proof marks, and match marks lacking, this is likely a tool room model.

Multiple Tubular Magazines:

Lindner stated in his patent description that multiple "charge-barrels" (magazine tubes) could be applied, envisioning up to five tubes, one for each of the cylinders not in battery. In this model there are provisions for three magazine tubes. Lindner also stated that the number of cartridges that could be loaded in each tube, "which, according to its length, contains from thirty to fifty cartridges." So, fifty cartridges per tube, times five tubes, amounts to 250 cartridges. Now that's some firepower – or some imagination! Presumably Lindner would have provided a tripod or other mechanical support once shoulder firing became unwieldy. With multiple tube magazines, each follower finger would also act as a magazine disconnect to insure only one tubular magazine was feeding the cartridge cylinder. In addition to a significant increase in firepower, Lindner's design also offered the advantage of the shooter being able to "top off" the tube magazine at any time due to its front-end loading capability (Table 2).

The Author's Alteration to Lindner's Prototype:

Lindner made provisions for mounting three tubular magazines on the cylinder faceplate of the prototype model, but only one tube was applied (Figure 10). The author machined two additional magazine tubes to show how Lindner's concept might have looked had the inventor added them (Figure 11 and 12). The linear slots in each tube are oriented toward the centerline of the feed cone device so that any one of the follower fingers can engage the feed cone, while any two tubes not in use can be disconnected. To apply this alteration, the artifact was not modified in any way; a cloverleaf-shaped plate slides over the original end plate to support the added tubes. Lindner could have easily accomplished this same functionality with one end plate had he chosen to do so. Also, brass nuts are used in the author's version to facilitate assembly and disassembly of the extra tubes for demonstration purposes and would have been unnecessary had Lindner soldered extra tubes in the prototype. Alternatively, the author's design suggests that extra preloaded magazine tubes could be carried allowing for swift magazine changes rather than recharging fixed tubes, thereby further increasing firepower.

The Lindner Legacy:

Lindner's self-priming, tubular-magazine, revolving-cylinder, shoulder-fired percussion firearm never saw production. In examining the prototype, it is possible that with additional development work it would function as intended – the rigor and vagaries of actual combat use notwithstanding. The Lindner Repeater incorporated many novel tactical advantages:

1. Magazine tube capacity limited only by the length of the barrel.
2. Up to five magazine tubes could be mounted.
3. Preloaded magazine tubes could be made available for quicker reloading.
4. Front-end magazine "top-off" capability.
5. A primer magazine with automatic feed device.

These were all compelling and virtually unrivalled – albeit theoretical – benefits to consider in a martial firearm. One wonders how many combustible cartridges could actually be fired in succession before overheating and fouling became problematic and compromised said theoretical firepower.

Three intrinsic issues might have rendered Lindner's firearm unattractive to investors in the first place: 1) Questionable viability of the design, 2) Unlikely military acceptance due to its revolutionary nature, and 3) Manufacturability and attendant cost of this complex machine. The principal reason for failure of his invention, however, sprang from an external force. As Lindner was trying to optimize an existing cartridge technology, a significant paradigm-

Figure 10. Underside view of the Lindner Repeater showing a single magazine tube and piston. Lindner made provisions for two more magazine tubes in the cylinder faceplate, but he did not make provisions to support additional tubes at the muzzle end.

Figure 11. The author machined two magazine tubes to show Lindner's vision of increased firepower. Note that the "cloverleaf" end plate merely slips over the original end plate and the tubes are locked in with the two large, knurled nuts.

Figure 12. Underside view of the three magazine tubes. Any two of the three pistons can be disconnected by turning the follower finger nuts clockwise, unseating the fingers from the feed cone. This ensures that only one cartridge at a time can be advanced into the cartridge cylinder when the feed cone is in motion.

shift intervened: the integrated metallic cartridge. The successful marriage of the rimfire cartridge to a reliable firearm, notably the Smith and Wesson No. 1 revolver, foreshadowed the beginning of the end of the percussion era. Lindner's unique creation was swiftly and unceremoniously rendered obsolete when the vector of firearms development suddenly pivoted. Linder's device requires a consumable cartridge to function and no provision for ejecting a spent casing was anticipated in the plan. By 1860, Spencer and Henry had successfully built their tubular magazine repeaters around the incipient metallic cartridge technology.

The decade leading up to the American Civil War was replete with aspiring firearms inventors and their sundry devices which might be referred to as "the good, the bad and the ugly" of innovation. All manner of breechloading conversions, carbines, rifles and repeaters were pressed to meet the inevitable demand of the looming conflict. For example, one source identifies nineteen separate carbine models procured by the U.S. government, with the Lindner ranking eighteenth in terms of number sold, or only about 0.33% of the total.[8] The end of the conflict would, in turn, determine which inventors would enjoy the reward of posterity as a Darwinian-like trajectory of technology vetted out the unworthy when demand waned. Only a few wartime breechloaders would endure in the postbellum world. Due to the high demand for arms, Lindner's breechloaders were acquired by the U.S. government during the Civil War, but his concept was not among the post-war survivors.

To say an invention "works" requires both practicable and practical considerations… and, as it turned out for Lindner, an ability to anticipate a shift in technology. To what degree Lindner's unconventional concepts influenced contemporary and future firearms inventors during this incredible age of firearms evolution cannot be measured. But Lindner's "good idea that didn't work" recalls a dynamic age of firearms transformation, manifested here in an ingenious prototype model. For those who study firearms history, and for lovers of gadgetry, Lindner's raw genius and mechanical wizardry is much respected and by any measure, fascinating.

Endnotes

1 Patterson, C. Meade and Rasmussen, James C. "Lindner's Magazine Repeater," *The Gun Report, Vol. XII, No. 6 (Part 1, Nov. 1966), No. 7 (Part 2, Dec. 1966), No. 9 (Part 3, Feb. 1967).* These issues contain the original three-part article, with a follow-up fourth article appearing in *No. 12 (Part 4, May 1967).* See Note 2 below.

2 In their first three articles, Patterson and Rasmussen claim that the firearm under study and now in the author's collection is, "the original patent model" *(Vol. XII, No. 6, p.7 and No. 7, p. 16).* However, follow-up correspondence from Henry M. Stewart Jr. convinced the two authors that Stewart himself actually had the original patent model in his possession. The authors wrote the fourth article to clarify this point, that theirs, "…must have been a prototype, or a pilot model, or a mechanically operating demonstrator." (from Henry Stewart's letter to the authors). Two points should be noted: 1) Patterson and Rasmussen never saw Stewart's gun, so a direct comparison was never made at that time to delineate the similarities and differences, and 2) This author traveled to VMI recently to peruse the Stewart collection. While Stewart's "patent model" was listed in inventory, it could not be located, so again, no direct comparison could be made. Therefore, this author will refer to the subject firearm as a "prototype" until better definition can be established.

3 Lindner, Edward. 1857. *Improvement in Fire-Arms. US Patent 17,382,* 26 May 1857.

4 Lindner, Edward. 1859. Breech-Loading Fire-Arm. US Patent 23,378, 29 March 1859. For a detailed description of the Lindner breechloaders made under this patent, see: Edward Hull, *Lindner Carbines and Rifles: A Collectors Guide to the Rarest of Civil War Breech Loading Firearms* (CreateSpace Independent Publishing Platform: 2014).

5 Chinn, Col. Geo. M. (USMC). *The Machine Gun, vol. IV (Bureau of Ordnance, Department of the Navy, 1955)* 541.

6 Lindner, Edward. 1856. *Improvement in Breech-loading Guns. US Patent 14,819,* 6 May 1856.

7 See the dispute letter in: "Correspondence: 'A New Gun'," *United States Service Magazine, vol 3.* (1865): 82-84. https://babel.hathitrust.org/cgi/pt?id=mdp.39015073424320&view=1up&seq=96

8 McAulay, John D. *Carbines of the Civil War.* Union City, TN: Pioneer Press, 1981.