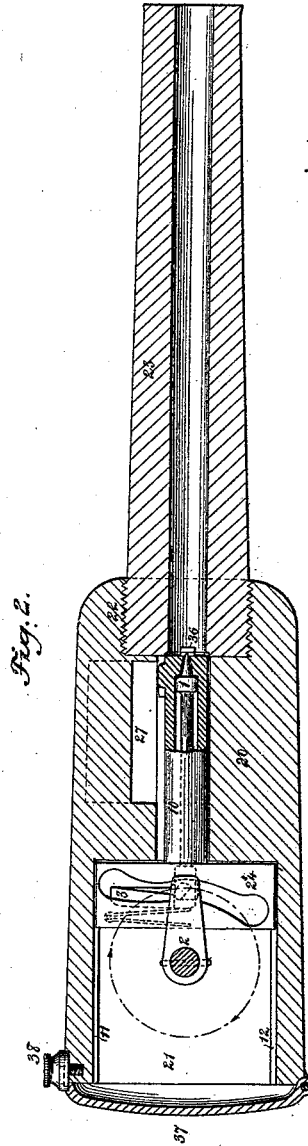
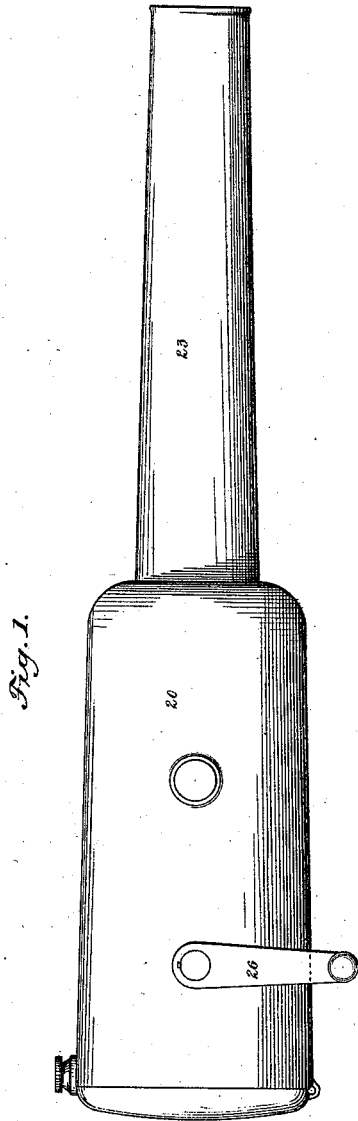


B. B. HOTCHKISS.
Machine-Gun.

3 Sneets—Sheet 1.

No. 211,737.

Patented Jan. 28, 1879.



Witnesses:

Geo. H. Graham.
John B. Kluber.

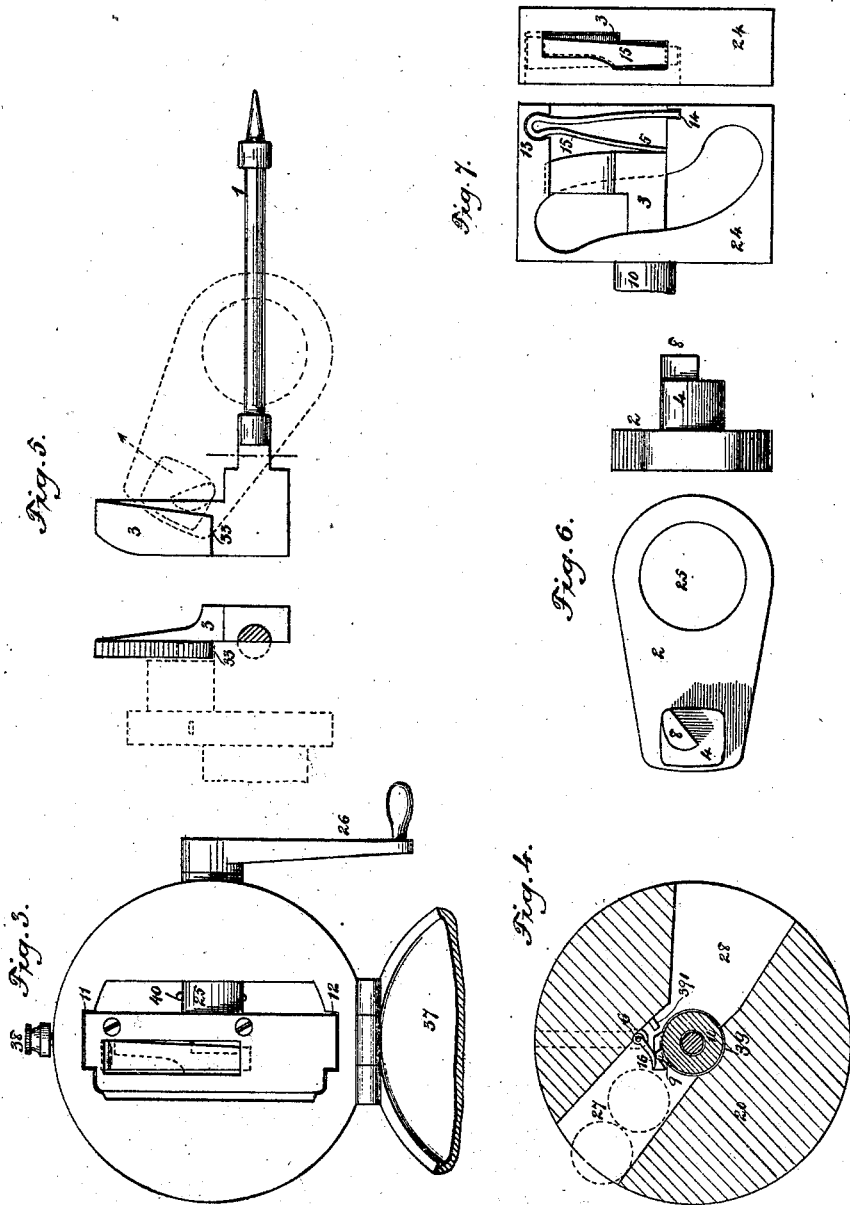
Inventor:

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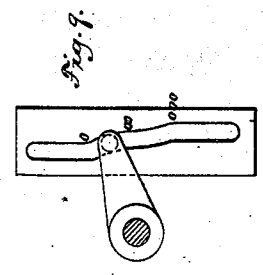
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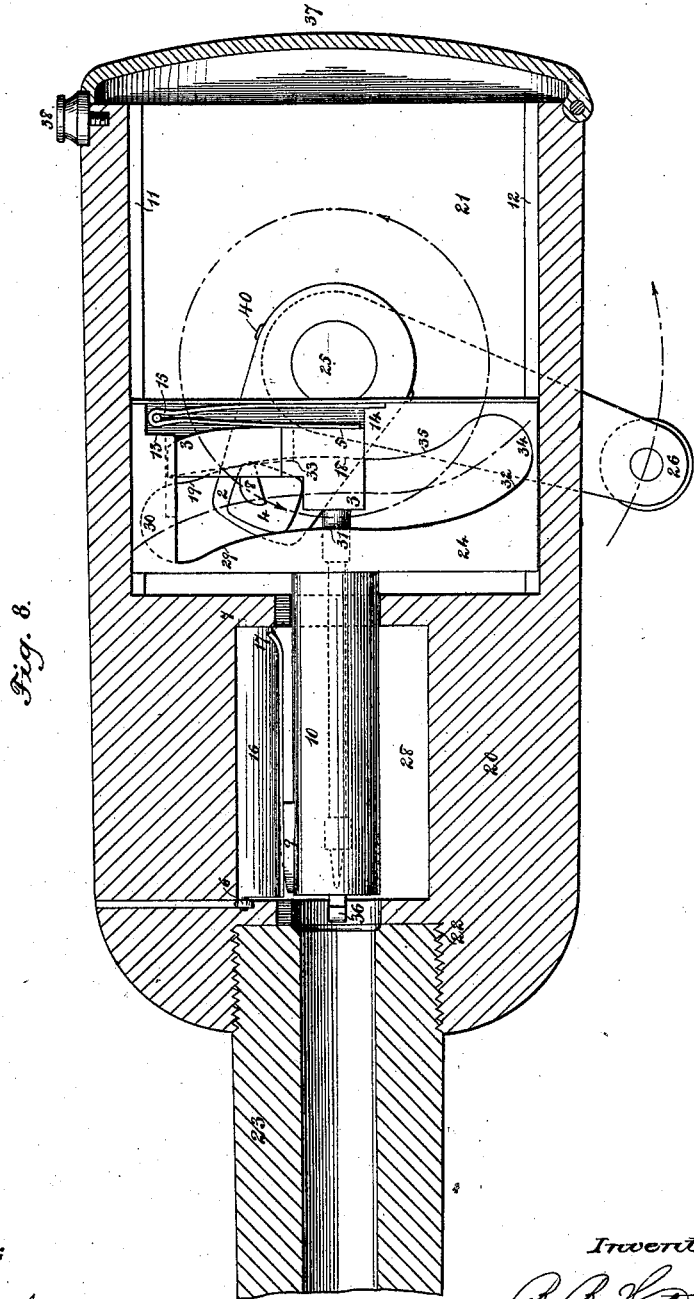


Fig. 8.

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UNITED STATES PATENT OFFICE.

BENJAMIN B. HOTCHKISS, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINE-GUNS.

Specification forming part of Letters Patent No. **211,737**, dated January 28, 1879; application filed January 31, 1877.

To all whom it may concern:

Be it known that I, BENJAMIN B. HOTCHKISS, of the city, county, and State of New York, now temporarily residing in Paris, France, have invented a certain new and useful Improvement in Single-Barrel Repeating-Cannon, of which the following is a specification:

In the accompanying drawings, Figure 1 is a side elevation of a dismantled cannon; Fig. 2, a longitudinal section thereof; Fig. 3, a rear elevation; Fig. 4, a vertical section through the breech-piece, plunger, and cartridge-controlling gate; Fig. 5, side and rear views of the firing-pin detached; Fig. 6, similar views of the actuating crank-arm; Fig. 7, similar views of the yoke and other parts detached; Fig. 8, an enlarged longitudinal section of the breech-piece and a portion of the barrel, showing all of the parts in position; and Fig. 9, a modification of the yoke.

This invention relates to that class of ordnance known as "machine-guns"—that is, such as automatically feed the cartridges into the firing-chamber, explode the same, and discharge the cartridge-shell. Such guns, when provided with multiple barrels, which are revolved or otherwise moved into one position to receive the cartridges and into another position to discharge the same, necessitates a construction which involves a complexity of motions and parts.

The object of this invention is the construction of a machine-gun which, while composed of a small number of parts, is capable of rapid and effective operation.

It consists in details and combinations too fully hereinafter set forth to need preliminary description; but, as embodied and illustrated herein, the improved gun will now be particularly described.

A massive breech-piece, 20, is bored centrally at its front end with a screw-threaded socket, 22, to receive the barrel 23, and in its rear end with a chamber, 21, in which are contained portions of the system, as will more fully hereinafter appear.

A central aperture extending from the chamber 21 to the socket 22 forms a continuation rearward of the chamber of the gun, and constitutes the loading-chamber, which also serves

as the guideway for the loading-plunger 10. The loading-plunger 10 is provided at its rear end with a yoke, 24, either securely fastened to it or formed in one piece with it. This yoke 24 is seated at top and bottom in guideways 11 12, in which it slides, and its movements or reciprocations are produced by means of a crank-arm, 2, securely fixed upon a shaft, 25, which, seated in a transverse bearing bored through the breech-piece 20, is actuated by a crank, 26.

The yoke 24 is pierced from side to side by an obliquely-curved slot, in which the stud 4 on the crank-arm 2 travels. It is also cut away rearward, to form a recess for the arm 3, projecting from the rear end of the firing-pin, to slide in, which said recess also permits the introduction of the firing-pin into its place in both plunger 10 and yoke 24, through the rear end of the yoke, in the manner illustrated in Fig. 7, and as will more fully hereinafter appear. This yoke is furthermore provided with recesses 13 and 14, the former receiving the head of the plunger-spring 15, and the latter one leg of said spring, the other leg, 5, of the spring 15 being left free to bear upon the rear face of the plunger-arm 3 and hold the same up to duty.

The plunger is provided, upon one side, at its forward end, with a cartridge-retractor, which is a simple hook, 36, on the end of a flat spring let into the plunger side, and protruding forward a distance sufficient to engage the cartridge-shell, as will be explained. This plunger is also bored centrally to receive a firing-pin, 1, which, at its rear end, is provided with a right-angular arm, 3, adapted to slide to and fro in the recess cut in the plunger-yoke 24.

The breech-piece 20 is perforated with radial passages 27 and 28, (see Fig. 4,) each communicating with the loading-chamber—the one, 27, on the upper side being provided for the introduction of the cartridges, and the one, 28, on the lower side being provided for the expulsion of the cartridge-shells.

The passage 27 is intercepted at the point where it joins the loading-chamber by a controlling-gate, 16, which is hung on pivots 6 7, so as to swing freely. Its rear end is bent, as at 17, to form an incline, which operates in

connection with a wedge, 9, on the forward end of the plunger, as will shortly appear.

The means for properly guiding the yoke 24 may be one or more ribs projecting from its side faces, and entering suitable guideways in the breech-piece 20.

The chamber 21 is closed at its rear end by a cap, 37, hinged to the breech-piece, and secured in its closed position by a flanged screw, 38.

The passages 27 28 may be cut at any angle with respect to the transverse axis of the gun or that formed by the trunnions, the only requisite being that the passage 27 shall incline at an angle sufficient to facilitate the easy descent of the cartridges from a hopper, usually placed in communication with such passage, and that the passage 28 shall incline enough to aid the ready exit of the shells withdrawn from the gun. This passage, however, is preferably so cut that the lower surface of the loading-chamber is left intact, so as to form a bed or seat, 39, to receive and support the cartridge as it enters the loading-chamber, and is carried forward into the chamber of the gun.

Operation: In operating this cannon, a slow revolution is imparted to the crank-arm 2 by means of the actuating-crank 26. The stud 4 on the crank-arm, moving in the obliquely-curved slot in the yoke 24, causes a reciprocating movement to be imparted to the system. When the actuating-crank is raised to its highest vertical position the plunger 10 will have been drawn into its extreme rearward position, which movement carries the wedge 9 behind the incline 17 on the rear end of the controlling-gate 16, and allows it to drop by its gravity and that of the cartridges surmounting it into a position determined by the stop 39, which permits the lowermost cartridge to descend into the loading-chamber, where it rests upon the bed or seat 39 in front of the loading-plunger. While this movement of the cartridges is taking place, the stud 4 on the crank-arm 2, which latter is constantly moving, will pass upwardly from the point 18 to the point 19 of the slot in the yoke; and as the said slot describes between said points a true circular arc, of which the crank-shaft is the center, it follows that no movement of the yoke will take place at that time, and hence that the loading-plunger and yoke will remain in a state of rest. But during this movement of the crank-arm 2, the nose 8, which projects from its stud 4, will bear upon the inclined shoulder of arm 3, attached to the firing-pin, and withdraw the same to its rearmost position, thus compressing the spring 15. When the stud 4 passes the point 19 it will impinge against the surface 29 of the said slot, and, traversing the same until the highest point, 30, is reached, will reverse and move in the opposite direction, still bearing against the surface 29, the result of which will be that the plunger-yoke and system will be carried forward. When the stud has reached a position

just below that shown in Fig. 8, the plunger will be in the position for discharging the gun. In thus moving forward, the front end of the plunger abuts against the cartridge resting in the loading-chamber, and carries it forward into the chamber of the gun. The wedge or stud 9 on the plunger also bears under the incline 17 on the controlling-gate 16 and raises it, thus forcing upward the cartridges in the recess 27, and supporting them from interference with the movements of the said plunger and the cartridge being carried forward. The gate, in its raised position, forms a guiding-surface for directing the forward movement of the cartridge. As the stud 4 moves downward from the point 30 to the point 31, the nose, 8, projecting from it still bears against the inclined shoulder of the arm 3 on the rear end of the firing-pin and retains it in its rearmost position, as in Fig. 8.

It will be observed that the nose 8 and the inclined bearing on the arm 3 are so shaped that the rearward movement of the firing-pin begins just before the controlling-gate is dropped, to allow the entrance of a cartridge into the loading-chamber, and that the firing-pin is held back until the said cartridge has been fully introduced into the chamber of the gun, and the parts are ready for the discharge of the cartridge. Thus the firing-pin is removed, so as not to interfere with the introduction of the cartridge, and kept from contact with it until the proper time for its operation in exploding said cartridge. This construction and operation of the firing-pin and its operating mechanism is of the highest advantage, insomuch that it wholly removes the danger of prematurely exploding the cartridge.

As the stud 4 in descending reaches a point fairly behind the plunger—viz., a position a little below that shown in Fig. 8—the nose 8 passes off the shoulder constituted by the end 33 of the inclined bearing on the arm 3, and thus suddenly releases the firing-pin 1, which, under the pressure of the compressed spring 15, moves quickly forward and strikes a percussive blow upon the head of the cartridge of sufficient power to explode the same.

As the rotative movement of the crank continues, and the stud 4 passes from the point 31 to the point 32 of the slot, no movement of the yoke or any other part of the system will be effected, for the reason that between said points the slot forms an arc of a circle, of which the crank-shaft is the center. The lost motion at this time is of the utmost importance, since, as is well known to those skilled in the use of ordnance, it not infrequently happens that a charge hangs fire for a time after the exploding-blow has been struck. Hence, by holding the plunger in its foremost position for a period of time equal to that occupied by the stud in traversing from the point 31 to that 32, during which movement of it the said stud sustains the plunger, the re-

coil of the plunger under the force of the exploding-charge is prevented, and injury either to the gun or its attendants avoided.

It will be observed that the construction of the yoke and the operation of its actuating crank-arm and stud are such that, whether the stud be directly in alignment with the plunger or at any position between the points 31 32, a perfect support is given to the plunger. This dwell of the plunger in its forward position is also important, from the fact that it gives the spring-seated extractor the requisite time for it to perfectly operate and securely clasp over the cartridge-flange.

As the crank-stud reaches the point 34 and begins to bear upon the surface 35 of the slot, the withdrawal of the plunger commences and will be wholly effected when the stud reaches the point 18. All parts of the system except the firing-pin will thus remain stationary as the stud passes to the point 19, when the forward movement of the whole system will begin and proceed as before explained.

In the rearward movement of the plunger the extractor 36 withdraws the cartridge-shell with it, and when the forward end of the said shell has cleared the chamber of the gun it will descend by its own gravity and fall through the recess 28, and drop upon the ground, or into a receptacle, if it is desired to save the shells.

When the plunger has reached its rearmost position the wedge 9 will have passed the incline 17 of the gate 16, thus permitting the gate to drop into such a vertical position as will allow the entrance of a cartridge into the loading-chamber; and if the cartridge-shell withdrawn from the chamber of the gun has for any reason remained in the hold of the extractor, the entering cartridge will forcibly thrust the same out through the recess 28. As the plunger again moves forward, the gate will be raised, and the cartridge will be carried into the chamber of the gun and discharged, as before explained.

The controlling-gate is of a length about equal to that of the cartridge, and is held in a raised position until the wedge on the forward end of the plunger has cleared the incline 17 in the gate, which may then fall to admit the passage of the cartridge which it has sustained, which construction and operation enable it to support the cartridge until the plunger has cleared the loading-chamber, when it deposits the cartridge bodily in said chamber. The cartridge is thus prevented from tilting or being otherwise misdirected into place.

The parts of this gun are so constructed that they may be readily removed and introduced into place.

Upon loosening the screw 38 the hinged cap 37 may be swung down, as in Fig. 3, so as to expose the system.

The removal of the pin 40, which secures the crank-arm 2 upon the shaft of the actuating-

crank 26, will permit the removal of the latter and allow the system to be bodily withdrawn, when the crank-arm may be readily detached. The firing-pin may then be removed from the yoke 24 by drawing the spring 15 laterally from its seat in the recesses 13 14, which will remove all obstruction to the withdrawal rearward of the firing-pin.

The yoke 24 will usually be constructed of a single piece, cut away as is shown in Fig. 7, though it is practicable, of course, to provide it with a cap-plate screwed to its rear face, as in Figs. 3 and 8.

The advantage of a construction which permits the convenient dismemberment of the parts is readily apparent.

Although a single barrel, 23, has been shown, it is obvious that two, three, or more barrels may be arranged upon a common axis, and each be automatically brought in succession into proper position to receive and discharge a cartridge; or they may be thus moved after any predetermined number of shots has been fired from one barrel. Moreover, this change of the barrels may be accomplished by hand at the will of the operator.

Though the crank-arm is herein described as provided with a projecting nose, 8, which operates directly upon the firing-pin head 3, it is obvious that the stud 4 may be made long enough to perform this office.

The stud 4, instead of being circular, is provided with elongated bearing-surfaces for the purpose of affording an extended bearing upon the slot in the yoke. In such construction it is necessary to enlarge the ends of the slot in the yoke, to provide a space for the said stud to turn in.

The mechanism for actuating the system in this cannon is so constructed as to produce a double lost motion in the reciprocations of the loading-bolt—viz., at the forward and rearward ends of its stroke; and though this feature of invention is embodied in a slotted yoke having an obliquely-curved slot, it is apparent from Fig. 9 that a straight slot may be constructed to accomplish this effect, since in that case the end of the crank-arm in passing over the arc from the point 0 to 00 will permit the yoke to stand still in its foremost position, while in passing over the arc 00 to 000 the crank-arm will permit the yoke to stand still in its rearmost position.

Other forms of the plunger-actuating mechanism which will provide a dwell for said plunger in its extreme forward and rearward positions may readily be constructed, and it is therefore to be understood that the scope of this invention is such as will include the combination, with the plunger, of any actuating mechanism having the mode of operation of that herein described.

What, therefore, is claimed is—

1. A loading-plunger-actuating mechanism constructed and operating, substantially as described, so that while continuously revol-

ing it sustains the loading-plunger stationary at the forward end of its stroke, to support the cartridge in the chamber of the gun a sufficient time for its manipulation therein, and at the rearward end of its stroke for a period sufficient to permit the entrance of a new cartridge into the loading-chamber.

2. A plunger-actuating yoke constructed with a slot or opening having two bearing-surfaces formed by circular arcs, of which the shaft of the crank-arm is the center, substantially as described.

3. The combination of a reciprocating yoke or head carrying the plunger, a firing-pin and its arm sliding therein, and a crank-arm for actuating said parts, all substantially as described, the construction being such that at each revolution of said crank-arm the firing-pin is withdrawn and the loading-plunger retracted, to permit the entrance of a cartridge, the said plunger is advanced to charge the gun,

and the firing-pin tripped to explode the cartridge.

4. The combination of the transversely and laterally recessed yoke, firing-pin, and spring, substantially as described.

5. The combination of the crank-arm having projections 4 8, firing-pin, slide, and actuating-spring, substantially as described.

6. The combination of the yoke 24, having enlargements at the extremities of its slot, with a crank-arm carrying a stud having elongated bearing-surfaces, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:

H. T. MUNSON,
M. B. PHILIPP.