UNITED STATES PATENT OFFICE.

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BREECH-LOADING FIRE-ARM.

SPECIFICATION forming part of Letters Patent No. 465,354, dated December 15, 1891.

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To all whom it may concern:

Be it known that I, WILLIAM H. DAVENPORT, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Fire-Arms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in breech-loading guns of the class more particularly adapted for the use of sportsmen, such class of fire-arms being generally termed "shotguns."

My invention consists, essentially, of a hammer connected with a spiral mainspring adjustably mounted in the breech-frame forward of the breech-block, a vertically-movable breech-block carrying a spring-resisted firing-pin, an operating-lever jointed to the breech-block, the inner end of the lever being in yielding contact with the barrel-lug, a stationary cross-tie arranged to engage with the barrel-lug, and a pin or key passing through the frame and barrel-lug for securing the barrel to the frame, all as will be set forth and claimed.

The object I have had in view in the gun forming the subject of this my present invention is to produce a fire-arm possessing in a greater degree than guns heretofore made the following advantages, viz: The gun is more efficient and can be handled and operated with greater facility; it is stronger; it can be taken apart and put together more easily and quickly; it possesses fewer parts; the cocking and firing mechanisms are positive in their action; the tension of the mainspring may be quickly adjusted or varied, as desired; the hammer is positively caught on the "rebounder" or half-cock notch by the combined action of the springs of the firing-pin and trigger, the tension of the mainspring at the time being *nil*, and, finally, the gun can be manufactured more cheaply, owing to the form and arrangement of the lessened number of the operating parts.

In the accompanying three sheets of drawings, Figure 1, Sheet 1, is a side elevation of the breech portion of a gun embodying my improvements. Fig. 2 is a plan view. Fig. 3, Sheet 2, is a longitudinal sectional view taken, substantially, on line $x\,x$ of Fig. 2, the barrel being in elevation and showing the breech-block dropped to its limit. Fig. 4 is a similar sectional view, the several parts being in position ready for firing. Fig. 5 is a central sectional view showing the relation of the hammer, firing-pin, &c., immediately succeeding the explosion of the cap. Fig. 6 is a side elevation showing a portion of the rear end of the barrel and lug, the lug being in engagement with a stationary cross-tie provided with an adjusting-screw. Fig. 7, Sheet 3, is a longitudinal sectional view taken through the front portion of the frame, showing the manner of connecting the mainspring to the hammer, the line of section corresponding, substantially, to the line $y\,y$ of Fig. 10. Fig. 8 is a longitudinal sectional view taken on line $z\,z$ of Fig. 10, showing the extractor, &c. Fig. 9 is a similar view of the parts, the breech-block being dropped and the extractor being in the act of withdrawing the cartridge-shell. Fig. 10 is a transverse sectional view taken on line $x\,x$ of Fig. 8. Fig. 11 is a side elevation of the rear portion of the barrel, a portion being broken away to show the spring-follower. Fig. 12 is a side elevation of the screw-key adapted to secure the barrel to the frame, and Fig. 13 is a plan view of the connection arranged to unite the mainspring and hammer.

A more detailed description of my improved gun and the manner of its operation is as follows:

The gun as a whole is indicated by A.

I would state here that the construction and arrangement of the breech-stock f^3, the fore-wood f^2, and barrel b, the latter having a lug b', are substantially as common, and to which I make no claim, except certain improvements in the lug itself, soon to be described.

b indicates the barrel, having its rear portion bored or otherwise adapted to receive the cartridge-shell p, as common. To the under side of the barrel is secured the longitudinally-arranged lug b', its rear end being pro-

vided with a transverse notch *o*, thereby forming a lower projection or hook b^2. (See Fig. 11, &c.) Just forward of the said hook the lug is provided with a vertical hole, in which are mounted a coiled spring m^2 and a follower-pin *m*, backed by the said spring, the under side or face of the lug being slightly concave, as at r^2. The pin *m* is provided with a smaller laterally-projecting guide-pin m', adapted to work vertically in a slot m^3, formed in the sides of the barrel-lug.

The breech-frame as a whole is indicated by *f*, its rear portion being rigidly secured to the breech-stock f^3. The upper portion of the frame is provided with an enlarged opening made at the rear of the barrel to receive the breech-block *a*, the latter having oppositely-arranged lateral projections a', fitted to work up and down in correspondingly-shaped grooves or channels f'. (See Fig. 2, &c.) These side grooves do not extend through the lower portion of the frame, thereby rendering the latter stronger. The two vertical sides of the frame are united by a short tie or bar *c*, located directly below the rear end of the barrel, the said tie being of such size and shape as to enter the notch *o* of the barrel-lug, before described. The depth of the frame-tie may, however, be slightly less than that of the notch, in which case I provide the former with a threaded adjusting or compensating screw c^2. (See Fig. 6.) By this arrangement any variations in the depth of the tie and notch due to wear and tear, &c., may be readily corrected.

The front portion of the breech-frame is grooved longitudinally along the center to receive the barrel-lug b', the latter in practice being about three-eighths of an inch thick. The barrel is firmly secured in position in the frame by means of a nicely-fitting screw key or pin *k*, passing transversely through the frame and the barrel-lug. (See Fig. 2, &c.) In order to screw the key out and in more readily, I provide it with a short arm or crank k'. (See Fig. 12.) By this arrangement of the tie and key the barrel is rigidly and accurately secured to the breech-frame. The barrel is readily detached from the breech-frame by simply withdrawing it endwise from the tie *c*, after having first removed the key *k*. I would add that the fore-wood f^2 is secured to the barrel itself, and need not necessarily be disconnected therefrom in order to connect and disconnect the barrel to or from the breech-frame.

To the under side of the breech-frame is pivoted at l' the operating-lever *l*, its long end being bent so as to form an exterior guard for the trigger *t*, substantially as common. The head portion of the lever—that is, the part lying wholly within the frame—is connected to the breech-block by means of a link *e*, jointed to both, also as usual. The short arm of the lever *l* is provided with a small roll *r*, the same being in constant engagement with the face of the yielding follower-pin *m*, the arrangement of the last-named parts being such that when the block *a*, &c., are in the normal position the tension of the spring m^2 acts to maintain the lever and block in place, the fulcrum l' then being between the roll and block. (See Figs. 4 and 8.) When the lever is swung forward to drop the breech-block to its limit, the center of the roll then stands between the lever's fulcrum and block, (see Figs. 3 and 9,) the same spring then acting to prevent the block, &c., from accidental movement. It will be seen that the act of opening and closing the gun causes the roll *r* to be vibrated back and forth past the fulcrum l' and along the face of the follower-pin *m*, the latter yielding sufficiently for the purpose.

To the left side of the breech-frame is pivoted at e^2, Fig. 10, &c., an extractor e', the same being essentially a bell-crank lever having its upper arm adapted to pass through a vertical slot o', formed in the rear end of the barrel, so as to engage the rim of the cartridge-shell. The other arm of the extractor is arranged to engage a shoulder a^4, formed on the lower side of the breech-block. (See Figs. 3, 4, 6, 8, 9, and 10.) By this arrangement upon bringing the shoulder a^4 of the block into sudden engagement with the corresponding portion of the extractor the latter quickly forces the shell rearwardly into the space vacated by the block, when it can be easily removed and a new one replaced in the barrel, so that upon returning the block, as in closing the gun, the face of the block engages the shell and forces it home, and at the same time carries the extractor forward with it, the parts then appearing as represented in Fig. 8.

The breech-block *a* is provided with a firing-pin *d*, mounted at an angle therein. The under side of the rear portion of the pin is slotted, a pin d^2 passing transversely through it, and the contiguous portions of the block serve not only to maintain the pin in place axially, but prevent its rotation. The forward portion of the firing-pin is reduced in diameter, its axis being eccentric to that of the rear or enlarged portion of the pin. A chamber or recess is formed in the block in advance of the rear part of the pin, in which is mounted a spiral spring d', the object of the spring being to maintain the firing-pin in the rearward or normal position. (Represented in Figs. 3 and 4.) By thus making the axis of the reduced or actual cap-exploding portion of the pin above that of the rear portion I am enabled to drop the hammer to a greater extent, thereby permitting a freer passage for the introduction or removal of the cartridge.

h indicates the hammer, loosely mounted on a screw or pin h', substantially as common. The hammer is provided with a rebounder or half-cock notch h^2 and full-cock notch h^3, also as common. To the right side of the hammer is jointed a connection *n*, its forward end portion n^2 being enlarged and cylindrical

and fitting an inclined hole formed in the lower portion of the breech-frame and to one side and in advance of the breech-block. (See Fig. 7.) The outer end n' of the connection is still further enlarged to serve as a follower and fitted to move longitudinally in a hole forming a continuation of that just referred to. The outer or front end of the hole is screw-threaded and provided with a fine-threaded screw or plug s^2. Within the hole or chamber thus produced is located the main spring s, bearing against the adjacent faces of said plug and follower. By this arrangement it will be seen that the axes of the spring, follower, and center of the joint-pin n^3, mounted in the hammer, are at all times substantially in line with each other. By means of the screw s^2 the force or pressure of the spring (and consequently the blow given by the hammer) may be regulated and controlled as desired.

Below the hammer-pin h' is located a pin t', on which is loosely mounted the trigger t, its inner or upper end being adapted to engage the notches h^2 h^3, formed in the hammer, before referred to, a small spiral spring u at the back of the trigger serving to maintain the latter in contact with the hammer at all times.

Now assuming the parts to be in the position represented by Fig. 4, the hammer being in the full-cock position and the spring s being fully compressed, the operation may be described as follows: The trigger is first withdrawn from the notch h^3, when the reaction of the mainspring s immediately throws the hammer forward into engagement with the end of the firing-pin d, thereby causing the latter to advance and explode the cartridge, the position of the hammer, pin, and trigger at the instant of firing being represented by Fig. 5. This is immediately followed by the reaction of the firing-pin spring d', which forces the hammer rearwardly (see arrows, Fig. 5) until it assumes the safety or half-cock position (represented by Fig. 7,) the spring u at the same time causing the trigger to engage the rebounder-notch. When in this position, there is no resistance offered by the mainspring s, so that even though the trigger be withdrawn from the notch there would not be force enough to drop the hammer.

Among the many advantages possessed by my improved gun may be named the following: It can be manufactured more cheaply than other guns of its class. The barrel is rigidly secured to the frame by means of the removable screw-key and the stationary tie c, interlocking with the barrel-lug. There are no flat springs employed. The breech-block is securely held in its extreme positions by means of a yielding follower-pin m, combined with the lever-roll r. The breech-block is guided and strongly backed by the breech-frame and adapted to be moved back and forth independently of the pressure of the mainspring. The tension of the mainspring may be readily varied or adjusted, as desired, by simply removing the barrel from the frame and turning the screw-plug s' in a proper direction by means of a screw-driver. The reaction of the firing-pin spring readily forces the hammer rearwardly to the safety or rebounder-notch position, the spring u at the same time causing the trigger to engage said notch and hold the hammer in place, the pressure of the mainspring meanwhile being removed from the hammer. The barrel may be quickly removed from the frame and the several parts disconnected without the use of a vise or other special tools. Further, it is unnecessary to remove the stock and forewood in order to get access to the operating mechanism, and by the employment of the compensating-screw c^2, fitted into the stationary cross-tie c of the frame, the barrel may at all times, in combination with the screw-key k, be rigidly secured in place.

I would further add in explanation of the action of the mainspring s that when the hammer stands in the rebounder or safety position, as in Fig. 7, the rear face of the head n' of the connection abuts or bears directly against the shoulder formed in the breech-frame. Consequently the spring cannot force the hammer farther forward to explode the cap. It will be observed that the connection pin n^3 is loosely fitted into the hammer, a space n^5 being produced in front of said pin. This space corresponds to the angular distance or amount of "play" required by the hammer in moving rearwardly by the spring d' to the safety position.

Fig. 5 shows the relation of the parts at the instant of exploding the cap, the momentum of the mainspring having caused the hammer to traverse the space n^5 after the connection had been arrested by the shoulder, above referred to.

I claim as my invention—

1. In a breech-loading gun, the combination, with the breech-frame carrying operating and firing mechanisms and provided with a stationary bar or tie, of a barrel having a lug or projection arranged to engage said tie, and a barrel-securing pin or key mounted in advance of the tie.

2. In a breech-loading gun, the combination, with a breech-frame having a cross-tie or bar and provided with operating and firing mechanisms, of a barrel supported by the frame, having its rear end portion arranged to engage the tie, and a securing pin or key passing transversely through the frame and the under side of the said barrel portion, substantially as described.

3. A breech-loading gun having a breech-block and firing-pin connected and arranged to move up and down between the rear end of the barrel and the face of the hammer and having the barrel removably secured to the breech-frame by means of a stationary bar or tie, and a movable key or pin located in advance of the tie, substantially as described.

4. A breech-loading gun having hammer-

acting mechanism consisting of a spiral mainspring mounted in a hole formed longitudinally in the forward portion of the breech-frame, a follower or connection jointed to the hammer and bearing against the rear end of said spring and having the rearward movement of the follower arrested by an abutment or stop, substantially as hereinbefore described.

5. In a breech-loading gun, the combination, with a pivotally-mounted spring-actuated hammer provided with a safety or rebounder notch, of a mounted spring-retractile firing-pin arranged to engage the hammer, and a trigger arranged to automatically engage said notch, whereby the rearward movement of the firing-pin rotates the hammer until the trigger springs into the notch, substantially as hereinbefore described.

6. In a breech-loading gun, hammer-actuating mechanism consisting of a pivotally-mounted hammer, a spiral mainspring located in a longitudinal recess or hole formed in the forward portion of the breech-frame, and a follower or connection jointed to the hammer and bearing against the rear end of said spring and having a shoulder or abutment formed in the bottom of the recess for limiting the rearward movement of the follower, substantially as hereinbefore described.

7. In a breech-loading gun, a pivotally-mounted hammer, a connection loosely jointed thereto, a spiral mainspring mounted forward of said connection and in contact therewith, and an adjusting-screw for regulating the force of the spring, substantially as described.

8. In a breech-loading gun, a barrel having its rear end provided on its under side with a lug b', arranged to receive locking devices, and, further, having a spring-resisted vertically-guided pin m, mounted in the under side of said lug, in combination with a pivotally-mounted block-operating lever having its short arm provided with a roll engaging the face of said lug-pin, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM H. DAVENPORT.

Witnesses:
CHARLES HANNIGAN,
GEO. H. REMINGTON.