

United States Patent Office.

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Letters Patent No. 76,595, dated April 14, 1868; antedated October 14, 1867.

IMPROVEMENT IN BREECH-LOADING FIRE-ARMS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN BROUGHTON, of the city, county, and State of New York, have invented certain new and useful Improvements in Breech-Loading Fire-Arms; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of the breech part of a gun constructed according to my invention, showing a portion of the breech-receiver removed, to expose the breech-piece and lock to view.

Figure 2 is a similar view, representing the parts in a different position from fig. 1.

Figure 3 exhibits a vertical longitudinal section of the breech-piece and lock.

Figure 4 is a rear view of the breech-piece and the upper part of its operating-lever.

Figure 5 is a transverse section in the plane indicated by the line *x x* in fig. 1.

Figure 6, a transverse section of the recoil-brace and the hammer-shaft.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in an improvement in the means of unlocking, opening, closing, and locking the swinging breech-piece of a breech-loading fire-arm; also, in a novel means of half cocking the hammer by the act of opening such swinging breech-piece; also, in a novel arrangement in such swinging breech-piece of the firing-pin, through which the hammer is made to explode the fulminate priming of the cartridge; and further, in novel means of operating the cartridge-shell extractor by the act of opening such swinging breech-piece.

To enable others skilled in the art to construct my invention and apply it to use, I will proceed to describe it with reference to the accompanying drawings.

A is the breech-receiver, which is mortised out for the reception of the breech-piece B, and into which the barrel C is screwed or otherwise secured in a suitable manner. The breech-piece B, made in the form of a cylindrical sector, and fitted between the sides of this mortise, is arranged to swing on a fixed shaft, *a*, which is inserted through the breech-receiver A, with its axis some distance below and in the same plane with the rear opening of the chamber of the barrel; and the face *c* of this breech-piece, which closes the chamber, is radial or nearly so to the axis of the shaft *a*. The said breech-piece is made with a hub, 14, which projects forward under the socket-like portion of the breech-receiver into which the barrel is inserted.

To provide for the insertion of the firing-pin D within the breech-piece, and the reception of the lever E by which the breech-piece is operated, and which also serves as the trigger-guard, the breech-piece is divided centrally, vertically, and longitudinally, into two parts, which are secured together by two screws, *b b*, fig. 3, inserted transversely through the two.

The firing-pin D, upon which the hammer strikes, and through which it acts to produce the explosion of the fulminate priming arranged in the head of the cartridge-shell, is itself of a form substantially like that of a hammer, as shown in figs. 1 and 3, and it works upon the shaft *a*. The arc upper portion of this pin, which is concentric with the shaft *a*, works in an arc-formed guide-groove, *d*, fig. 3, turned or otherwise cut in each half of the breech-piece, and its nose is caused, by the blow of the hammer, to protrude through the face *c* of the breech-piece far enough to indent the primed part of the head of the cartridge and produce its discharge. The head *e* of the said pin is exposed to the action of the hammer through a suitable opening in the breech-piece, but is so far back as to be always covered up by the part *f* of the breech-receiver, which fits snugly enough against the arc-formed back of the breech-piece, to prevent dirt from entering the lock through the upper opening of the mortise in the breech-receiver.

The hammer G is arranged within the breech-receiver, with only its comb *g* projecting through a slot of such length and width as to permit of the necessary movement of the comb in cocking and firing, and this slot is filled by the head of the hammer, so that dirt is prevented from entering the lock by the opening provided in the receiver for the hammer.

The hammer works upon a fixed shaft, *h*, which is inserted through and secured in the sides of the breech-

receiver, at about the same height as the shaft *a*, relatively to the line of bore of the barrel; and this pin also serves as a pivot for the swinging recoil-brace H, which serves to brace the breech-piece at the time of firing. This brace, which is wider than the hammer, locks the breech-piece when the latter is closed, as shown in fig. 1, by entering two notches, *i*, figs. 1 and 2, provided one in each side of the back part of the breech-piece.

The lower part of the said brace is mortised, as shown at *j* in fig. 6, to admit the tumbler G' of the hammer, and the upper part of the same is slotted, as shown at *k* in the same figure, for the passage of the nose of the hammer, but a portion of the said brace, between the upper and lower slotted portions, is left solid, as shown in section at *ll* in figs. 3 and 6, and in dotted outline in figs. 1 and 2.

Instead of being thus made of a single piece, and mortised, the said brace may be made of two pieces, having interposed between them an anti-friction roller in the position occupied by the solid portion *ll*. The said brace has applied to it, on opposite sides of the hammer, two springs, *m*, figs. 1 and 2, which press it forward against the breech-piece, the said springs being made with eyes to fit the trigger-pin *n*; and bearing against shoulders *p*, provided in the breech-receiver.

The lever E is not rigidly connected with the breech-piece B, but pivoted into a mortise therein by a pin, *q*, on which it is allowed a movement limited by a stop, *r*, in the breech-piece, and a shoulder, *s*, on the lever itself. The upper part of this lever, which is within the breech-block, has its back part of a profile-form, corresponding with the arc-formed back of the breech-piece.

I is the cartridge-shell extractor, consisting of a sliding piece fitted to work under the barrel, in a groove in the breech-receiver, having an upturned end formed to fit the neck and front part of the head of the cartridge-shells, and having on its under side a toothed rack, which gears with a toothed sector, J, figs. 2 and 5, pivoted by a pin, *t*, into the lower front portion of the receiver. On one side of this sector there is a hub, J', in which is a notch, *u*, for the reception of a hook, K, which is connected by a pin, *v*, with the breech-block, and which is held down in contact with the said hub by means of a spring, L, secured within the breech-receiver.

Let it be supposed that the gun has just been fired; the several parts are in the respective positions represented in fig. 1, and the operations of reloading and of half cocking the hammer are effected by the manipulation of the lever E in the following manner: The lever is pulled downward and forward from the stock, and as its upper part is drawn back from the stop *r*, where it has been previously held by the recoil-brace H having been pressed against it by the springs *m m*, the said part presses back against the front of the part *ll* of the said brace, and so presses back the said brace out of the notches *i* of the breech-piece, and unlocks the latter, while at the same time the back of the said part, *ll*, of the brace presses back the hammer to half cock, as shown in fig. 2. By the time the breech-piece has been thus unlocked, the forward portion of the shoulder *s* of the said lever has come into contact with the bottom of the breech-piece B, and the continued downward and forward movement of the lever causes the breech-piece to swing backward and downward, through the open bottom of mortise in the receiver A, to open the chamber of the barrel. After the face, *c*, of the breech-piece has moved back from the rear of the chamber a sufficient distance, the hook K, moving back with the breech-piece, comes into operation on the tooth *z*, formed in rear of the notch *u* of the hub J' of the sector J, and the further continued downward and forward movement of the lever, and opening of the breech-piece, causes the said hook, by its action on the said tooth, to pull the sector forward, and by that means to move forward the extractor I, which is thus made to withdraw the discharged cartridge-shell from the chamber of the barrel.

By the time the shell has been thus withdrawn, as shown in fig. 2, the portion, *w*, of the hub J' in front of the notch *u* has, by its cam-like action on the hook K, lifted the said hook from the tooth *z*, and the sector being then left under the influence of the spring *y*, is thrown forward by the said spring, and the extractor is thereby returned to the position shown in fig. 1, ready for reloading.

The gun being held upright at the time the shell is thus withdrawn, the cartridge-shell will drop out of the receiver, though, if the opening movement of the breech be quickly performed, the great range of the sector, as compared with that of the tooth *z* on the hub J', upon which the hook acts, gives such great rapidity of movement to the ejector that it will throw the shell out, whatever may be the position in which the gun is held. The breech-piece is prevented from opening further than is necessary to effect the velocity by coming in contact with a stop, *l*, in the receiver, as shown in fig. 2.

The operation of reloading is simply to introduce a cartridge into the chamber of the barrel, and return the lever E to the position shown in fig. 1, close under the stock. In this movement, the upper end of the lever, coming into contact with the stop *r* in the breech-piece, brings the latter to its closed position, and causes it, in doing so, to push the cartridge home into the chamber; and as, during this movement, the upper parts of the notches *i i* in the breech-piece pass the upper end of the recoil-brace H, the springs *m m* press the said brace into the notches, so that by the time the breech is closed, the said end of the brace has come home into the said notches and locked the breech-piece, leaving the hammer at half cock.

When it is desired to fire, the hammer is drawn back to full cock by applying the thumb to the comb, and the hammer is then let off by pulling the trigger in the usual manner, which causes it to strike on the head *e* of the firing-pin, and drive the nose of the latter against or into the primed part of the cartridge.

The axis of the respective shafts *a* and *k* of the breech-block B and brace H, being, as hereinbefore stated, at about the same height, relatively to the line of bore of the barrel, and consequently both in a plane perpendicular, or thereabouts, to the face, *c*, of the closed breech-piece, and the angle formed by two lines drawn from the said axis, and meeting in the apex *l* of the recoil-brace when the breech-piece is closed, being considerably greater than a right angle, the brace H does not act merely as a right-angled prop to resist the opening tendency of the breech-piece at the time of the discharge; but the said apex occupying, when the breech-piece is closed, a position forward of the culminating-point at which it would form a right-angled prop, the

recoil or back pressure produced by the explosion, and acting upon the face of the breech-piece, has a tendency to carry the said apex still further forward, with a toggle-like action upon the breech-piece, and thus to press and lock the breech-piece and the rear face of the barrel more firmly together, transmitting the whole force of the recoil in the manner of a direct longitudinal tensile strain on the breech-receiver A, the tensile strength of which must be the measure of the greatest strain of which any breech-loading fire-arm is capable.

The breech-piece is, moreover, still further sustained in its closed position, and prevented from being blown out, by the forward projection 14 of its hub passing under the socket-like portion of the breech-receiver, into which the barrel is inserted, while its arc-formed back is in contact with the receiver at the point *f*.

Thus, it may be understood that the breech-piece cannot be opened or displaced otherwise than by the proper action of the lever E; and accidents arising from defective cartridge-shells, or the leakage of gases, tending to displace the mechanism, are effectually guarded against.

I will remark, in conclusion, that the ejector-mechanism may be considerably modified from that represented, without essentially changing its character. For instance, the portion, *w*, of the hub J' which disengages the hook K may be cut away or omitted, and the spring *y* dispensed with, and the spring L be made to very rapidly complete the action of the ejector commenced by the hook K. The tooth *z* of the hub J' must in that case be so constructed and arranged that, after the hook has moved it a certain distance, the point of the said tooth will so far pass a position vertically above the axis of the sector, that the downward pressure of the hook, produced upon it by the spring L, will complete the backward movement of the ejector. In such case the ejector and sector will be returned by the pressure of the head of the cartridge against the former in reloading.

Having thus described my invention, I will proceed to state what I claim, and desire to secure by Letters Patent.

1. The combination of the swinging breech-piece B, which, in opening, swings down through the open bottom of the breech-receiver; the swinging recoil-brace H, working upon an axis, *h*, arranged, relatively to the axis of the breech-piece, in or nearly in the same plane, perpendicular to the face of the closed breech-piece; the lever E, pivoted to the lower and rear portion of the swinging breech-piece, and acting centrally upon the front of the brace H, and through it upon the hammer; the spring or springs *m*, held in place by the trigger-pin *n*, and acting on the rear of the brace H; the hammer G, vibrating on the axis *h*, independent of the brace H, and with its head working, relatively to the breech-receiver, in such manner that the slot in the upper surface of the receiver, through which the comb of the hammer projects, is filled by the said head both at the "down" and "full-cock" positions of the hammer, the whole arranged and constructed to operate together, substantially as herein shown and described.

2. The firing-pin D, constructed in the form of a hammer, and swinging within, but sufficiently independent of, the swinging breech-piece, upon the same shaft or axis as the breech-piece itself swings upon, as herein described.

3. The hook K, spring L, and sector J, in combination with each other and with the swinging breech-piece and extractor, substantially as and for the purpose herein specified.

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Witnesses:

J. W. COOMBS.

G. W. REED.