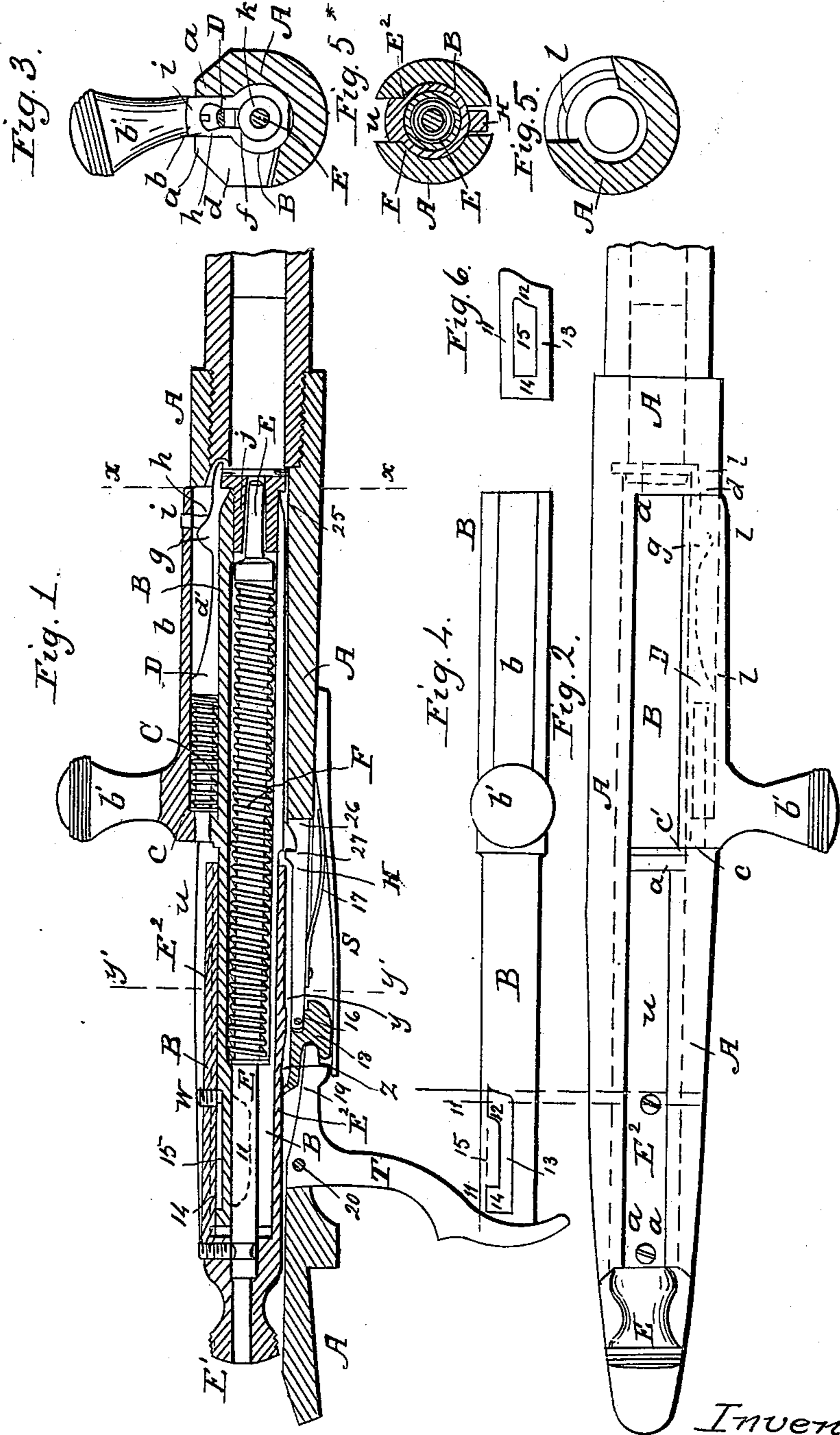


H. BERDAN.
Breech Loader.

No. 108,869.

Patented Nov. 1, 1870.



Witnesses:
Heller
E.P. Drach

Inventor:
H. Berdan
Per Brown, Coombs & Co.

UNITED STATES PATENT OFFICE

HIRAM BERDAN, OF NEW YORK, N. Y., ASSIGNOR TO THE BERDAN FIRE-ARMS MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN BREECH-LOADING FIRE-ARMS.

Specification forming part of Letters Patent No. 108,869, dated November 1, 1870.

To all whom it may concern:

Be it known that I, HIRAM BERDAN, 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 central longitudinal vertical section of the breech parts of a breech-loading fire-arm illustrating my invention. Fig. 2 is a top view of the same. Fig. 3 is a transverse section of the same in the plane indicated by the line $x x$ in Fig. 1, and showing the parts in the rear of the plane of section. Fig. 4 is a longitudinal view of the sliding breech-bolt. Fig. 5 is a transverse section of the breech-receiver in the plane $x x$ of Fig. 1, showing the parts in front of the plane of section. Fig. 5* is a transverse section of the breech-piece, breech-receiver, and firing-pin in the plane indicated by the line $y' y'$ in Fig. 1. Fig. 6 is a diagram of a groove in the breech-bolt, which will be hereinafter explained.

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

This invention relates to that class of breech-loading fire-arms the breech-piece of which is in the form of a sliding bolt, opening and closing with a movement parallel, or nearly so, with the bore of the barrel. In this class of breech-loaders it has been heretofore difficult to obtain a cartridge-shell extractor positive and reliable in its action.

The first part of this invention consists in a novel construction and arrangement of, and mode of actuating, a hooked extractor attached to the sliding-bolt breech-piece, whereby a very effective operation is insured. This part of the invention is illustrated in Figs. 1, 2, 3, and 5 of the drawings.

A represents the breech-receiver, bored centrally and longitudinally in the manner common to the breech-receivers of other sliding-bolt breech-loaders, for the reception of the sliding-bolt breech-piece B, and having in its upper side a longitudinal opening, $a a$, for the passage of the locking-projection b and handle b' of said breech-piece, and from the longitudinal opening a lateral recess, $c d$, for the

reception of the said projection when the breech-piece is locked, the rear end, e , of this recess serving as the recoil-shoulder.

The projection b is bored longitudinally throughout, as shown at d' in Figs. 1 and 3, for the reception of the extractor D, the rear portion of the bore being made smaller, to form a shoulder, e , for the bearing of the spiral spring C, which is coiled around the extractor, for the purpose of pressing it forward; and in the bottom of the front part of the bore there is cut a slot, f , as shown in Figs. 1 and 3, for the passage of the front part of the extractor, which is made thicker, as shown at g , than it is near the middle of its length; the middle portion of the bearing being thin enough to give it a moderate amount of elasticity, and the greater thickness at g being to stiffen the front portion, which terminates in the hook j .

On the back of the above-mentioned thicker portion of the extractor is an inclined surface, h , and above this inclined surface there is screwed into the breech-piece a screw, i , which protrudes into the bore d , and the inner end of which forms an inclined bearing-surface for the inclined surface h , on the back of the extractor.

The hook j of the extractor protrudes through the front end of the projection b of the breech-piece, and projects beyond the face of the breech-piece, which is composed of a steel plug, k , inserted and screwed into the end of the bolt B.

In front of the recess $c d$ the breech-receiver and as much of the barrel as comes in the way are cut away, as shown at l in Figs. 1 and 5, to permit the hook of the extractor to pass round the exterior of the head of the cartridge-shell as it turns with the breech-piece when the latter is turned to be locked after loading the gun.

The cartridges to be used are to have a flange around the exterior of their heads for the hook of the extractor to take hold of.

The operation of the extractor is as follows: After loading, and when the breech-piece B is being moved forward to close the breech, the extractor moves forward with the breech-piece until after its hook has come in contact with the head of the cartridge-shell and has been partially arrested or had its motion retarded

by the resistance of the cartridge to its further forward movement, and until the face of the breech-piece comes to a bearing against the cartridge, after which, if the cartridge is not home, the extractor continues its forward movement with the breech-piece until the cartridge has been pushed home; but in the slight movement of the breech-piece which thus takes place while the forward movement of the extractor is partially arrested or retarded, the inclined surface of the under end of the hook coming in contact with the head of the cartridge causes the hook to rise high enough to pass over the head of the cartridge-shell, and then the spring presses forward the extractor relatively to the breech-piece. As the extractor thus moves forward its inclined surface *h*, moving in contact with the bearing-surface of the point of the pin *i*, causes its hook to be depressed over the head of the cartridge-shell, where it remains ready for the extraction of the shell when the breech-piece is drawn back.

In turning the breech-piece to bring its projection *b* into the recess *c d* of the breech-piece, and thereby lock it, the hook of the extractor passes freely within the cavity *l*.

When the breech-piece is drawn back after firing, the bearing-point of the screw *i*, coming in contact with the inclined projection *h* on the extractor, acts like a wedge to press and hold down the hook, and thereby insure its proper action.

In order to prevent any failure in the action of the extractor, owing to its becoming rusted into the bore *d*, or to the breakage or failure of the spring *C*, the recoil-shoulder *e*, at the rear of the recess *c d* in the breech-piece, is slightly beveled or rounded, as shown at *e'* in Fig. 2, at its junction with its longitudinal opening *a a* of the breech-piece, and as when the hook of the extractor does not project forward far enough to work over the head of a cartridge-shell with which the face of the breech-piece may be in contact, the rear end of the extractor will project through the rear end of the projection *b* of the breech-piece. This end of the extractor, passing in contact with the beveled or rounded portion of the shoulder *e*, will cause the extractor to be pushed forward in a positive manner the requisite distance in the act of locking the breech-piece.

Another part of the invention relates to the firing-pin, which works through the sliding-bolt breech-piece, and to the connection of said firing-pin with the breech-piece; and it consists in a sleeve or tubular projection formed upon or attached to said firing-pin, and extending over a portion of the breech-piece, for the purposes of forming a part of the cocking-connection between the breech-piece and firing-pin, and of protecting such connection, and of providing for the use of a larger mainspring.

This feature is fully illustrated in Figs. 1 and 5 of the drawings; but its explanation

will be further assisted by reference to Figs. 2 and 4.

E is the hammer, in the form of a long pin, working entirely through the breech-piece *B*, which is bored longitudinally for its reception. This hammer has its front portion reduced in size, and its front end sufficiently pointed to enable it to serve as a firing-pin, thereby dispensing with a separate pin or needle, and its rear end extends some distance through the rear end of the breech-piece. *F* is the spiral mainspring, coiled around the hammer within the breech-piece. To that portion of the hammer which extends through the rear of the breech-piece there is firmly secured the knob or head *E*¹, which is taken hold of to cock it when it has not been left cocked by the act of closing the breech-piece. This knob or head *E*¹ has made in the same piece the tube or sleeve *E*², which is bored cylindrically, to fit easily to the cylindrically-turned exterior of the rear portion of the breech-piece; and on the exterior of this sleeve there is a pin, *u*, which is received within the longitudinal opening *a a* in the top of the breech-receiver, and which thereby prevents the hammer ever turning with the breech-piece. In the bottom of this sleeve there are formed the cock-notch *y* and safety-notch *z*.

In the portion of the breech-piece which is received within the sleeve *B*¹ there is cut an endless groove, 11 12 13 14, the form of which is best shown in Fig. 6, where it is represented as projected on a plane, though it is also, to some extent, represented in Fig. 4 and in dotted outline in Fig. 1. This groove receives the end of a pin, *w*, which is screwed into and projects within the sleeve *B*². The portions 11 and 13 of the said groove which are parallel with the length of the breech-piece are at a distance apart, from center to center, equal to the distance which the breech-piece turns to release its projections *b* from the recesses *c d* of the breech-receiver; and the length of the longer portion, 11, which is presented in range of the pin *w* when the breech-piece is turned in position for firing, is sufficient to permit the movement of the pin *w* the whole distance required for the movement of the hammer within the breech-piece for cocking and firing. The portion 14 extends directly across at right angles to 11 and 13, and the portion 12 has its front side inclining backward from 11 to 13.

In the forward movement of the hammer to fire the charge the pin *w* passes freely along the portion 11 of the groove 11, 12, 13, 14; but when, after firing, the breech-piece is turned to the left from the position shown in Fig. 2 to that shown in Figs. 1 and 3, the front side of the portion 12 of the said groove acts like a cam on the pin *w*, and so draws back the hammer far enough to withdraw its point within the face of the breech-piece, as shown in Fig. 1, forward of which position it cannot advance during the longitudinal movement of the breech back and forth, nor until the breech is again turned to the right to bring its projection *b*

into the recess *c d*, and hence there is no possibility of its penetrating or even striking the cartridge until the breech-piece is in a position for it to do so without danger.

The portion 13 of the groove contains the end of the pin *w* while the breech is being moved forward to close it after loading, when the hammer has been left cocked by the act of opening the breech-piece; and the portion 14 contains the said pin while the breech is being moved to the right to secure it, when the hammer is in the same position.

The portion 11 of the groove also serves as a passage for the pin *w* in the act of cocking the hammer, while the breech is closed and secured.

If the hammer has not been cocked previously to the backward opening movement of the breech-piece, it is drawn back with the breech-piece and cocked during the said movement by the front of the groove being in contact with the pin *w*.

The half-cock or safety-notch *z* and the groove 11, 12, 13, 14 are, relatively, so arranged that, when the hammer is drawn back to the position in which the sear enters the said notch, while the breech-piece is turned to the right in position for firing, the pin *w* serves as a stop to the portion 15 of the breech-piece, which is left within the said groove, and the breech-piece is, therefore, effectually locked by the act of pulling back the hammer to engage its safety or half-cock notch with the sear.

By forming the cock and safety-notches *y* and *z* on a tube or sleeve which projects forward from the head of the hammer over the exterior of a portion of the breech-piece, the mainspring may, if the breech-piece and tube be of sufficient length, have its rear end extended in rear of the sear, and a greater length of mainspring be thereby obtained.

Another advantage of the tube or sleeve is that it covers in and protects the connection of the hammer and breech-piece from dirt and from the weather.

Another feature of the invention consists in providing in the lower part of the breech-receiver a hook or pawl, which is actuated by a spring, and which serves the purposes of assisting to jerk out the discharged cartridge-shells after they have been withdrawn from the chamber of the barrel, of preventing the sliding breech-piece from accidentally slipping forward when it is open, while the muzzle of the gun is depressed, and of stopping the breech-piece when it has been drawn back far enough for loading. This feature is illustrated in Fig. 1, in which *H* is the pawl, pivoted at the end of its shank by the sear-pin 16, or by any other pin, within a slot in the bottom of the breech-receiver. This pawl has, besides its turned-up tooth-like extremity 26, a second tooth, 27, some distance in rear thereof. It is pressed upward by a light spring, 17, bearing upon the sear-spring *S* of the lock, which is secured to the bottom of the breech-receiver.

While the breech-piece is closed or partly open, the tooth 26 bears against its lower sur-

face with a sufficient friction to prevent its slipping backward or forward accidentally in case of the muzzle of the gun being elevated or depressed. While the tooth 26 is thus held in contact with the bottom of the breech-piece, the tooth 27 is barely out of contact from it; and hence, when the breech-piece is drawn back for reloading, the tooth 27 prevents that 26 from rising high enough to enter the notch 25, which is formed in the breech-piece immediately in rear of the head of the hardened-steel plug *k*, of which the face of the breech-piece is formed, and so allows the said head to pass the latter tooth; but as soon as the said head has passed the tooth 26, the notch 25 arrives over the tooth 27, and so allows the hook to rise and the tooth 26 to enter between the face of the breech-piece and the head of the cartridge-shell which is being withdrawn; and, as the continued pulling back of the breech-piece causes the cartridge-shell extractor to continue pulling back the upper edge of the head of the shell, while the lower part thereof is arrested by the tooth 26, the shell is tripped upward and thrown out of the breech-receiver. By the time the shell has been thus thrown out, the back of the head of the plug *k* has come in contact with the tooth 27, and the further backward movement of the breech-piece is arrested.

By thus providing for the stoppage of the opening movement of the breech-piece by a pawl, the necessity of a separate stop-pin and for cutting a groove in the breech-piece of the said pin to work in, and consequent weakening of the breech-piece, is obviated. The said pawl, operating to assist in throwing out the cartridge-shell, obviates the necessity of cutting the groove in the sliding breech-piece, which is necessary when a fixed tooth is used for the same purpose.

When the breech-piece is closed, the beveled back of the tooth 26 allows the head of the plug *k* to depress it easily without obstruction to the movement of the breech-piece.

In Fig. 1 of the drawing, *V* is the sear, working in a slot in the bottom of the breech-receiver on the pin 16, and having its operating-point 19 extended rearward a considerable distance from the said pin, and having below the said operating-point, and some distance nearer the pin 16, a notch, 18, for the reception of the trigger *T*, which is in the form of an inverted letter *L*, and has a long upper arm extended forward from the pin 20, on which it works.

The sear-spring *S*, which is attached to the exterior of the bottom of the breech-receiver, pressing against the trigger, and acting through it upon the sear at a point much nearer the pin 16 than the operating-point 19, produces comparatively little pressure upon the sear, and, consequently, causes it to produce very little friction on the sleeve *E*² during the drawing back of the hammer; but, as the trigger is acted upon by the sear-spring near the extremity of its long upper arm, it requires to be pulled with considerable force to make it with-

draw the sear from the notch in the sleeve of the hammer.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the inclined surface *h* on the extractor, the bearing *i* in the breech-piece, and the spring *C*, applied to the extractor, substantially as herein described.

2. The combination of the extractor, having its rear end capable of protrusion through the part of the breech-piece within which it is applied, and the inclined or rounded surface *c* on the breech-receiver, substantially as and for the purpose herein described.

3. The sleeve *E*² on the sliding pin-hammer or firing-pin, extending forward over a portion of the sliding-bolt breech-piece, substantially as and for the purpose herein described.

4. The yielding pawl *H*, constructed with two projections, 26 and 27, and operating substantially as herein described, for the two purposes of assisting to throw out the cartridge-shells and stopping the breech-piece.

H. BERDAN.

Witnesses:

THEO. G. ELLIS,
ARTHUR DUNLAP.