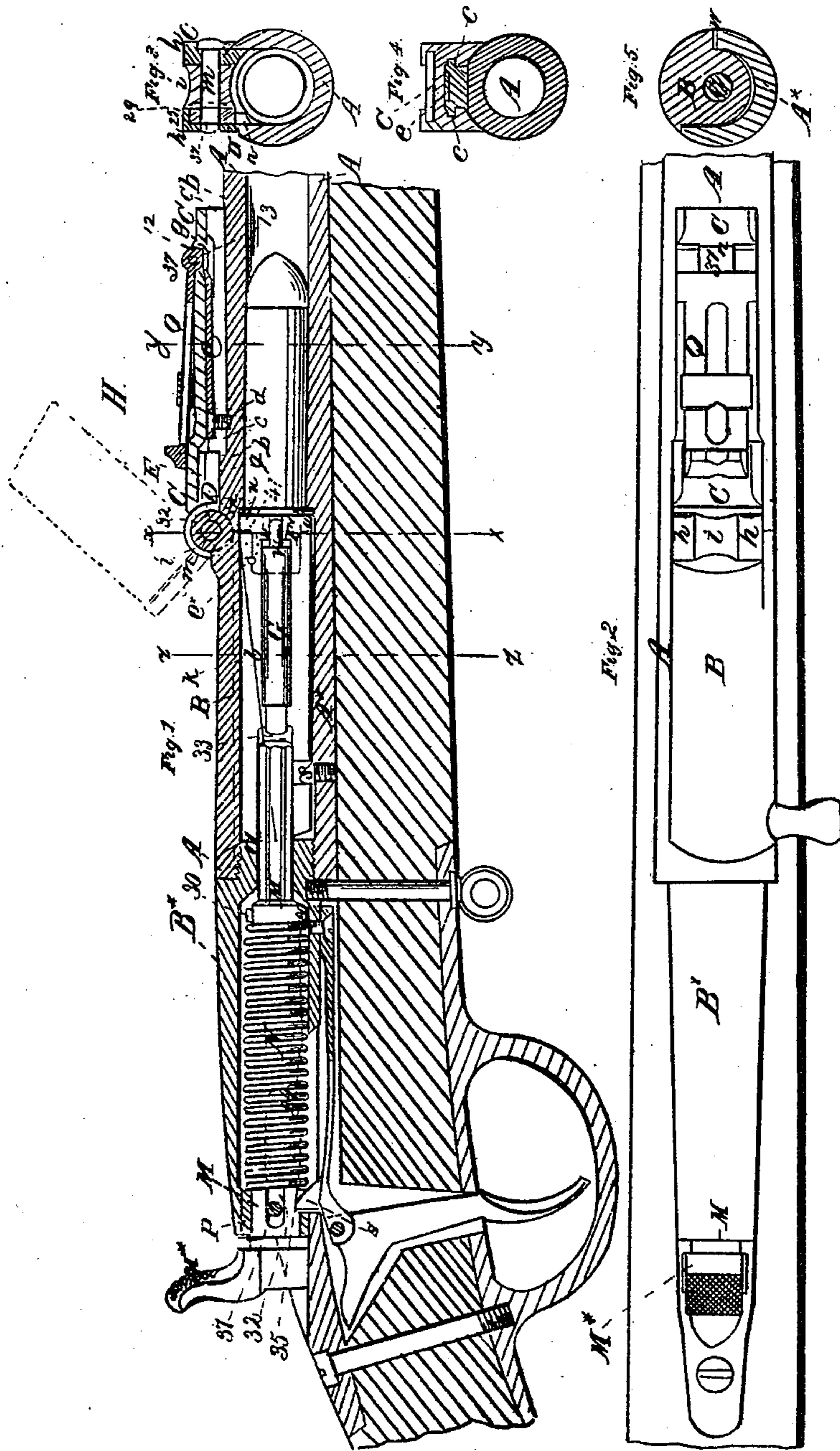


H. Berdan, Breech Loader.

No 88436.

Patented Mar 30 1869



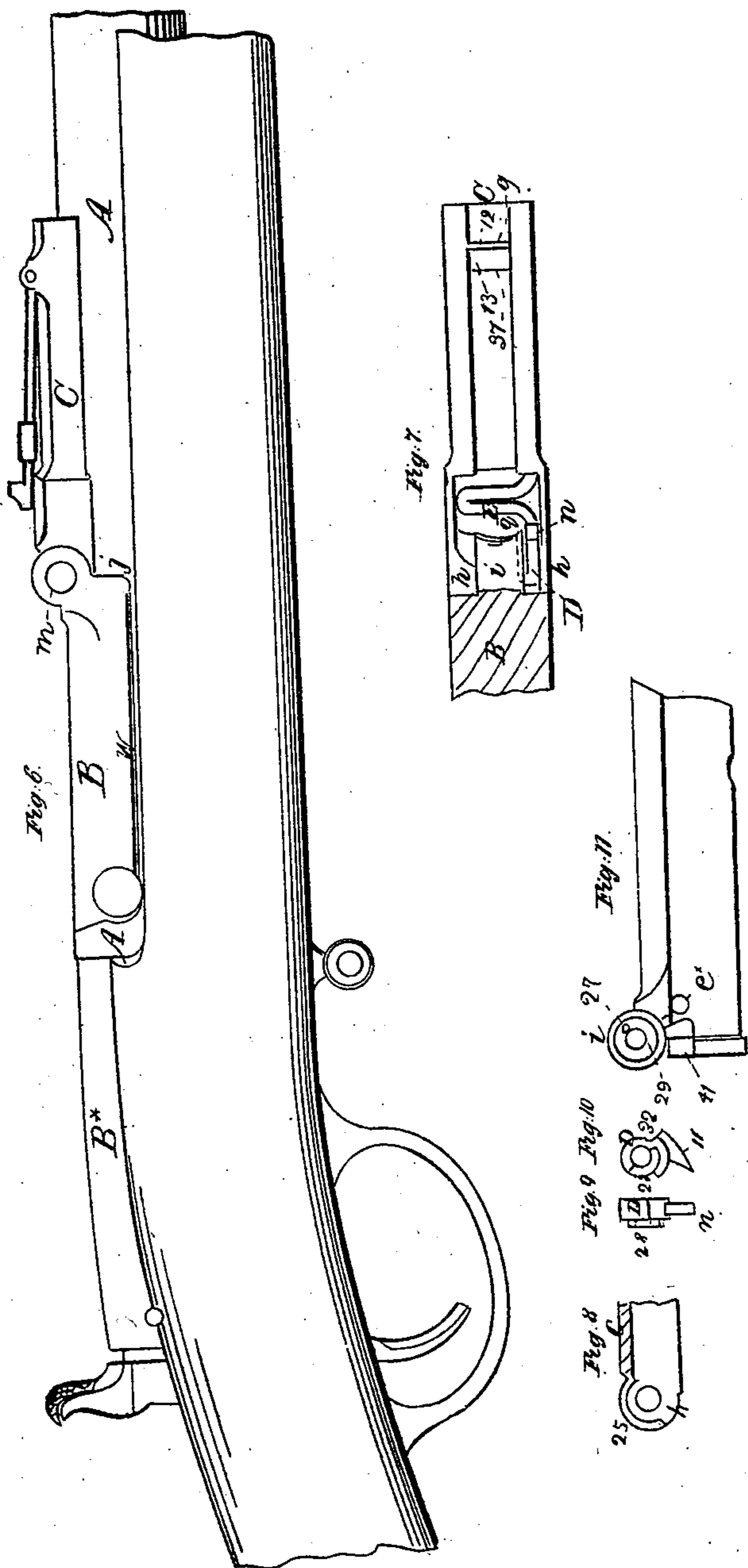
Witnesses:
Abell
Himmel

H. Berdan
per Brown & Combs
atty

H. Berdan, Breech Loader.

No. 88,436.

Patented Mar 30, 1869.



Witnesses
A. K. ...
A. K. ...

H. Berdan
per Brown & Cambridge
Atty.

United States Patent Office.

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

Letters Patent No. 88,436, dated March 30, 1869.

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, 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 drawing, 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, with these improvements.

Figure 2 is a top view of the same.

Figure 3 is a transverse section of the connection of the breech-piece in the plane indicated by the line $x x$ in fig. 1.

Figure 4 is a transverse section of the same parts in the plane indicated by the line $y y$ of fig. 1.

Figure 5 is a transverse section of the breech-receiver and breech-piece in the plane indicated by the line $z z$ in fig. 1.

Figure 6 is a side view corresponding with figs. 1 and 2.

Figure 7 is an inverted plan of the strap-piece, which connects the breech-block with the barrel.

Figures 8, 9, 10, and 11, are detail views, which will be hereinafter explained.

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

One branch of this invention relates to the construction of and mode of fitting and attaching and locking a swinging breech-piece, which is hinged above the barrel, and which opens by swinging upward over the top thereof. Some features of this branch of the invention are also made available in the application of the sight.

Another branch of the invention relates to the construction of and mode of applying and operating the ejector, for throwing out the discharged cartridge-shells from the fire-arm.

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

A is the barrel, the rear portion of which is counter-bored sufficiently larger than the regular bore, to admit the head of the cartridge-shell. The greater part of this counterbored portion has a longitudinal opening in the top, extending also to the right-hand side, as shown in fig. 5, to make it form a receiver, A*, for the breech-piece B, and into the rear end of it is screwed the breech pin B*.

C is a strap-piece, by which the breech-block is hinged to the barrel, that it may open, as shown in dotted outline in fig. 1, the outer parts, $h h$, of the hinge, being represented as formed upon the said strap-piece, and the inner portion, i , upon the breech-block, as shown in figs. 1, 2, 5, and 7.

The breech-block is fitted into the receiver in such

manner as to have a rear bearing against a recoil shoulder, a , the upper part of which is square, or nearly so, with the line of the bore of the barrel.

The strap-piece C has its under side grooved to fit, as shown in fig. 4, and slide quite freely upon the flanged spline c , which is firmly secured on the top of the barrel in front of the receiver. This spline is represented at $b b$, in fig. 1, as being fitted and soldered into a transverse dovetail groove in the barrel, and further secured by a countersunk screw d , which also serves the purpose of securing in place the rear end of the spring-catch e , by which the strap-piece is secured on the spline.

This spring-catch is formed of a strip of steel, and is inserted between the strap-piece and spline c , in a groove in the latter, and having its forward end bent upward, as shown in fig. 1, to enter an opening, g , shown in figs. 1 and 7, and so prevents the strap-piece from being drawn off the spline, and the breech-block from being detached, without the necessity of screws screwing into and weakening the barrel, and which might be lost, in detaching the breech-block, in active service, while at the same time it admits of the instantaneous drawing off of the strap-piece from the spline, and detachment of the breech-block at any time, on the depression of the forward end of the spring-catch. This depression may be effected in various ways, as by the pressure of the thumb or finger on a portion of the catch, which may protrude from under the strap-piece; or by the operation of the sight, as will be hereinafter explained.

When the strap-piece is slipped on to the spline again, the end of the spring-catch enters the notch g , and secures it. This facility for detachment and reattachment of the breech-block, provides for the cleaning of the breech-block and its appurtenances, and allows the breech-block to be carried in the pocket of the soldier on march, in wet weather or over dusty roads, and the detachment permits the gun to be disabled, by throwing away the breech-block when capture is inevitable.

A portion of the spring of the catch bears against the strap piece, in such manner as to produce friction upon it, for the purpose of preventing it from moving too easily in the operation of the breech-piece.

In opening and closing the breech-block, the strap-piece slides a short distance, say about one-twentieth part of an inch, along the spline c .

In opening, the movement of the strap-piece takes place in a forward direction, to allow the rear end of the breech-block to clear the recoil-bearing a , and in closing the breech-block, the movement is backward, to allow the block to come close up to the recoil-bearing a .

As the completion of the closing-operation, during which the strap-piece moves longitudinally backward, is being performed, the fulcrum on which the breech-block moves, is on one side of the front of the breech-receiver, as shown at j in fig. 6, such fulcrum being

formed by slightly cutting away the portion of the receiver above. This fulcrum is thus brought nearly to a level with the centre of the bore, and, by its being brought so low, the breech-piece, in closing, has a more direct backward movement given to its upper part, and is thereby caused to be brought back to a firmer bearing against the recoil-shoulder *a*.

When the firing takes place, even though there were no special locking-device applied to the breech-piece, the latter would be prevented from rising from the closed position shown in fig. 1, by reason of the upper edge of the cartridge-shell pressing against the face of the breech-piece, and becoming to the breech-piece the fulcrum of a lever, on which it must move, and the red line *k*, drawn from this fulcrum in the above-mentioned figure, to the lower part of the recoil-bearing, is larger than the line *l* drawn from the same fulcrum to the top of the said bearing.

It will be seen, therefore, that the breech-block is, in a measure, hooked under the recoil-bearing, and the greater the pressure of the cartridge-shell against it, the closer and tighter it is hooked, and the more effectually is its upward movement counteracted.

After firing, the shrinkage, or forward movement of the cartridge-head, and forward movement of the strap-piece *C*, allow the breech-block to open in the fulcrum *j*. It may be said that the breech-piece has, at different stages of its operation, three different fulcra, viz, the pin *m* of the hinge, the point *j* on the side of the breech-receiver, and the upper part of the edge of the cartridge-shell.

The recoil-face *a*, instead of being positively square with the face of the barrel, may be an arc, described from the point occupied by the top of the but of the cartridge-shell.

The face of the breech-block is constructed of a plug, *F**, shown in fig. 1, which is fitted into a cylindrical bore in the front of the block, and the flanged head *u* of which forms a boss, to enter and fit the counter-bore provided in the barrel, for the reception of the head of the cartridge-shell. By this construction of the face of the breech-block, a boss is formed upon it, to enter the counter-bore of the barrel, at much less expense, and much better than such a boss could be formed by cutting it out of the solid metal of the breech-piece.

This plug *F** is held in place by means of a transverse pin, *e**, inserted through the breech-piece.

In the manufacture of the guns, plugs *F**, having heads *u* of different thickness, varying about one hundredth of an inch, are kept on hand, and in what is called "assembling" the parts of the gun, one with a thicker or thinner head is selected, as may be required, to fill up the space between the front of the closed breech-block and the head of a steel cartridge-shell, which is inserted into the chamber of the barrel as a gauge, and by providing for this selection, the plug *F**, serves as a means of adjustment and compensation for such variations in the depth of the counter-bore provided in the barrel for the flanged head of the cartridge, and in the distance of the recoil-shoulder from the counter-bore, as may be unavoidable in the manufacture.

The said plug is also made to serve as a means of preventing the firing-pin *G* from slipping too forward through, or dropping out from the breech-piece in that direction, by boring out the rear portion of the said plug, as shown in fig. 1, larger than the hole through which the point of the said pin protrudes to fire the cartridge, thereby forming a shoulder, *v*, within the said plug, which serves as a stop to a shoulder, *v'*, formed on the firing-pin.

To provide for the free escape under the breech-piece of any gases which might, owing to a defective cartridge, or otherwise, leak into the breech-receiver at the time of firing, and so tend to blow out the breech-piece, there is provided, between the breech-piece and one side of the receiver, an opening, *w*, shown in figs. 5 and 6,

extending nearly the whole length of the breech-piece, such opening being so made, by a suitable construction of the breech-piece and breech-receiver, that it will remain open when the breech-piece is closed, and that it communicates with whatever space there may be between the bottom of the closed breech-piece and the breech-receiver.

In order to give additional security to the breech-piece at the time of firing, provision is made for locking it by a centre-bolt, *M*, which also serves as the hammer of the fire-arm, and is arranged within the breech-pin *B**, which is also made long enough for the reception of the spiral main-spring *N*, which is coiled around the said bolt, or hammer.

The bore of the breech-pin *B** is, as shown in fig. 1, of uniform size nearly through the entire length, but in the front portion it is reduced in size, and in the rear portion it is made of larger size, to receive the collar *P*, which, with the smaller front portion of the bore, forms the guides to the centre-bolt, the front portion of which is made smaller than the rest of the bolt, to fit the said smaller front portion of the said bore.

The main-spring *N* has its front end bearing against a pin, *30*, which is inserted through the centre-bolt, and the rear end of the said spring has its bearing against the front of the collar *P*, which is secured in place in the rear portion of the breech-pin *B**, by the stationary transverse pin *31*, which passes through the said collar and the breech-pin, and also through the longitudinal slot *32*, in the centre-bolt, and so prevents the said bolt from turning.

The smaller front portion of the centre-bolt is made long enough to protrude some distance through the front of the breech-pin, that it may, when the breech-piece *B* is closed, enter the hole *33*, bored in the rear end of the breech-piece, for the purpose of locking the latter.

The centre-bolt strikes upon a firing-pin, *G*, which is inserted into a hole bored for its reception in the breech-piece *B*. It is provided in its under side with a cocking-notch, *34*, into which, when it is drawn back by applying the thumb to the comb *M**, at its rear end, the sere *S* enters, and it is also provided, further back, with a safety-notch, *35*.

The strap-piece *C*, by which the hinge of the breech-piece is attached to the barrel, serves also as the base of the sight, and the spring-catch *e* serves as the sight-spring.

The sight *Q*, figs. 1 and 2, is hinged, at *37*, to the strap-piece *C*, in substantially the same manner as it usually is to the base-plate ordinarily employed for attaching it to the barrel.

The part of the hinge which is formed upon the frame of the sight is constructed in the usual manner, shown in fig. 1, with two flat surfaces, *12* and *13*, and this part of the hinge is situated, as shown in fig. 1, within the opening *g*, before mentioned as provided in the strap-piece, so that when the sight is down, as shown in fig. 1, a flat portion of the spring-catch *e* presses against the flat surface *13*, and so holds it down, and when the sight is raised up to the upright operative position, the same portion of the said spring-catch presses against the flat surface *12*, and holds it up, thus operating substantially like and serving the purpose of the sight-spring commonly employed.

The angle formed between the two flat surfaces, *12* and *13*, of the hinge of the sight, also serves as a cam to depress the forward end of the spring-catch *e* out of the opening *g*, in the strap-piece *C*, and thus permit the strap-piece to slide backward off the spline *c*, when it is desired to detach the breech-piece from the gun, the said angle or cam being made so to operate by bringing the sight to a position, in which it inclines at about forty-five degrees to the barrel.

A passage is provided between the strap-piece and the barrel, for the escape of any gas that may get under

the strap-piece, by a groove that is made in the bottom of the strap-piece, for the reception of the spring-catch *e*, the said groove being open at the front end, as shown in fig. 1.

D is the cartridge-shell ejector, consisting of a small steel hub, with a radially-projecting spur, *n*, and working within or between the leaves of the hinge on the pin *m* thereof.

The spur *n* works through a mortise cut in the rear part of the chamber.

The ejector D has applied to it, within a cavity, *q*, figs. 1 and 7, in the under side of the strap-piece C, a spring, E, of wire, the form of which is best shown in fig. 7, and one end of which is pivoted into the strap-piece C, and the other end enters a notch, 32, in the edge of the ejector D.

This spring, when the breech-block is closed, presses upon the ejector, above the axis of the pin *m*, in such manner as to hold up the spur *n*, as shown in fig. 1, to such a position that the lower and forward edge of the said spur will be close to the front end of the flanged head of the cartridge-shell in the chamber of the gun.

The hub of the said ejector is covered up and protected from wet and dirt by a hood-piece, 25, shown in figs. 3 and 8, left on the face of the adjacent cheek *h* of the hinge, by boring out the said face.

The margin of the lower part of the rim thus left is cut away, for the passage of the spur *n*.

The side of the ejector D next the part *i* of the hinge, has a nearly semicircular projection, 28, figs. 9 and 10, which enters a cavity, 29, bored in the face of the adjacent side of the part *i* of the hinge, as shown in fig. 11, and from the back of this cavity there projects a pin, 27, which acts upon the projection 28, as will be presently described.

While in the opening-movement of the breech-block, its face moves back far enough to leave plenty of room in front of it for a shell in the chamber to move back, the ejector remains stationary, its spur *n* being held against the forward end of the mortise provided for it in the chamber, by the pressure of the spring E, acting as just above described; but when the breech-piece has moved a suitable distance to permit the backward movement of the shell without difficulty, the pin 27, in the leaf *i* of the hinge, comes in contact with one end of the projection 28 of the hub of the ejector, and the continued opening-movement of the breech causes the ejector to move with it, and the spur *n* is caused to start the shell, and commence drawing it back out of the chamber, the breech-piece, in this case, acting as a lever on the ejector, and overcoming any tendency of the shell to stick; and as by the time the shell has been, by this means, drawn back the short distance which is sufficient, on account of its taper-form, to loosen it in the chamber, the ejector D has been turned so far that the end of the spring E, which presses against its edge, has passed the line of culmination, or what may be called the dead-centre, in which its pressure is directly toward the axis of the pin *m*, and the spring has come to such a position, that while having exerted comparatively little of its force, it presses against the ejector far enough below the axis of the said pin to enable it to act with greatly-increased force, to turn the ejector in the same direction in which the latter has been turned by the action of the pin 27, when the said spring suddenly expands, and causes the ejector to turn suddenly, or with a motion accelerated relatively to that of the pin 27, and causes the spur *n* to throw out the shell.

This action is so forcible that a bevelled stud, *s*, or any suitable inclined ways, or guides provided in the rear part of the receiver, to direct the shell upward, will cause it to be thrown completely over the recoll-shoulder and out of the gun, in whatever position the gun may be held.

In reloading the gun, the ejector is returned to the position shown in fig. 1, by the flange of the new car-

tridge being pressed forward against the spur *n*, and the spring E is thus "reset" for another operation; but, in order to prevent altogether the action of the ejector, or setting of its spring, in case of closing and opening the breech-piece, when there is no cartridge, or shell in the gun, and thereby to prevent any unnecessary wear, or working of the parts, there is provided in that side of the breech-piece on which the ejector is arranged, a recess, 41, (shown clearly in fig. 11, and in dotted outline in fig. 1,) for the reception of the spur, when the breech-piece is closed.

The spur being always left in the forward position, by the opening of the breech-piece, whether there has or has not previously been a cartridge, or shell in the chamber, is allowed, by entering the said recess, to remain in the said position during all succeeding movements of the breech-piece, so long as no cartridge is inserted, the presence of the flanged head of the cartridge-shell being necessary to "set" the ejector.

The ejector D is also made to serve as a means of securing in place the pin *m* of the hinge of the breech.

When such pin is screwed into the hinge, or otherwise secured by a screw, there is always danger of the screw working loose, and the pin working out.

This pin *m* is made without a screw, and turned plain to fit the holes bored in the parts *h h i*, of the hinge, for its reception, and the part which is received within the ejector E, is turned slightly smaller, forming a shallow groove, as shown at 31, in fig. 3.

The hole bored in the ejector, for the pin to pass through, is made of the same size as those in the parts *h h i* of the hinge, that the larger part of the pin may pass through it.

The pressure of the spring E against the ejector, presses it into the groove 31 of the pin, and so prevents the pin from moving endwise, and obviates all possibility of its accidental withdrawal, or slipping out of the hinge.

The pin is inserted into the hinge before the spring E is put into its place; and on the removal of the spring, when it is desired to withdraw the pin, the withdrawal may easily be effected.

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

1. The attachment of the hinged breech-piece to the barrel of a breech-loading fire-arm by a sliding connection, operating substantially as and for the purpose herein specified.

2. Securing the strap-piece C, or its equivalent, to the barrel, by means of a spring-catch, which provides for its easy attachment and detachment, substantially as and for the purpose herein specified.

3. The strap-piece C, serving the two purposes of attaching the hinge-joint of the breech-piece to the barrel, and as a base for the sight, as herein described.

4. A spring, so constructed and applied as to serve the two purposes of securing the strap-piece, or plate, which forms the attachment of the hinge-connection of the breech-piece with the barrel, and of a sight-spring, substantially as herein described.

5. Providing a passage for the escape of gas between the said strap-piece and the top of the barrel, substantially as and for the purpose herein specified.

6. The formation of one side of the breech-receiver, whereby the fulcrum-point, on which the swinging breech-piece works as a lever in closing, is brought nearly to a level with the centre of the bore, substantially as illustrated at *j*, in fig. 6, and herein described.

7. The direct-action, or centre-bolt hammer, with a comb at its rear end, in combination with a swinging breech-piece, which opens with an upward and forward movement over the barrel, or breech-receiver, when the said hammer serves also as a means of locking the said breech-piece, substantially as herein described.

8. The combination of longitudinal slot 32, in the centre-bolt hammer, the collar P, inserted into the rear

end of the breech-pin, to serve as a bearing for the main-spring, and the stationary pin 31, passing through the said slot and collar, for the purpose of securing the said collar, and preventing the turning of the hammer, substantially as herein specified.

9. A spring, so applied, in combination with the ejector of a breech-loading fire-arm that, by the act of opening the breech-piece, it is caused to act alternately above and below the centre of motion of the ejector, and thereby to restrain the action of the ejector during the first part of the motion of the breech-piece, and afterward to produce its sudden action, substantially as herein described.

10. The arrangement of the ejector-spring between the barrel and the strap-piece, which attaches the breech-piece thereto, substantially as herein described.

11. A recess, 41, in the breech-piece, for the reception of the spur of the ejector, whereby the latter is rendered inoperative, when there is no cartridge, or cartridge-shell in the fire-arm, substantially as herein described.

H. BERDAN.

Witnesses:

A. LE CLERC,

A. KINNIER.