

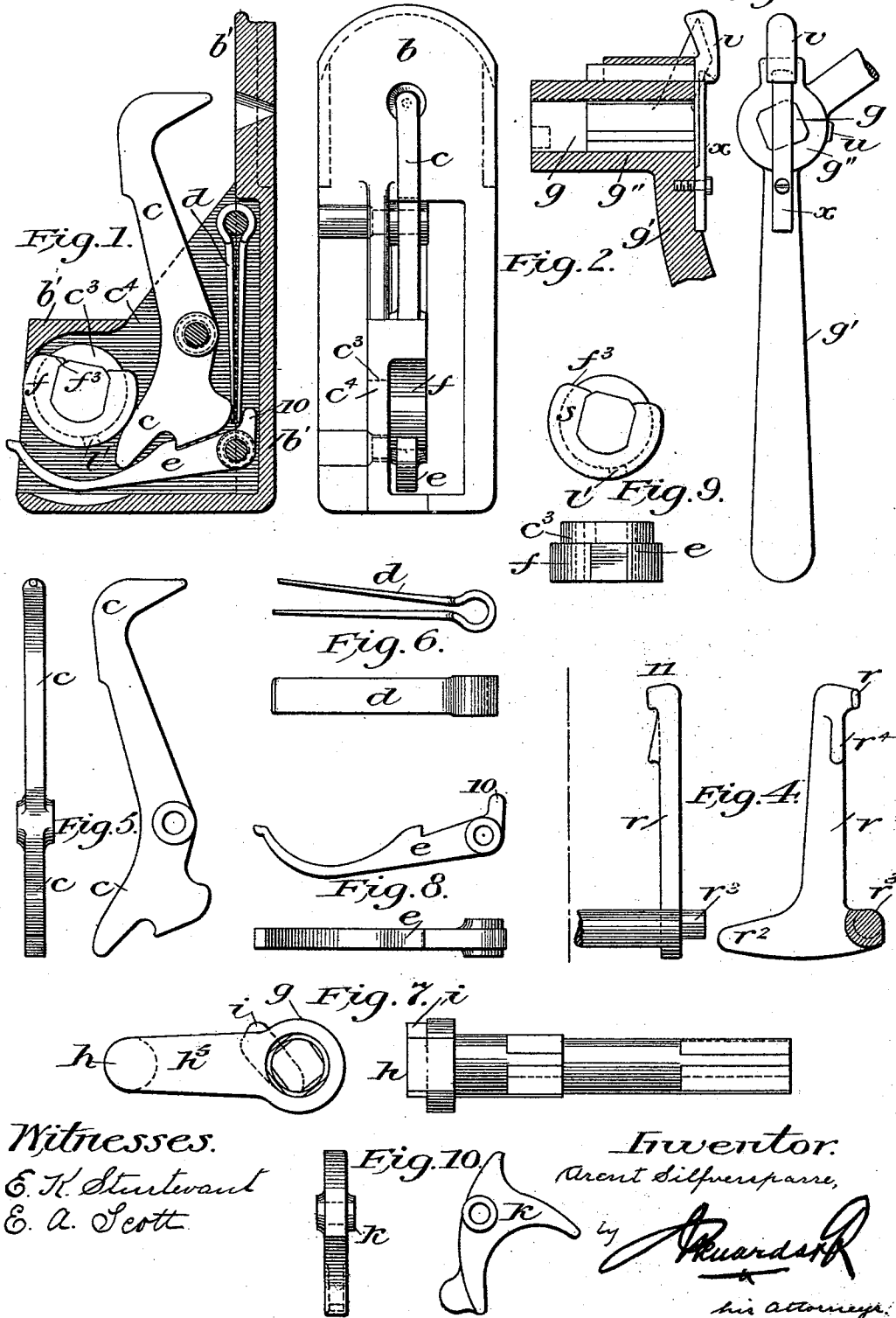
(No Model.)

5 Sheets—Sheet 1.

A. SILFVERSPARRE.
BREECH LOADING ORDNANCE.

No. 540,698.

Patented June 11, 1895.



Witnesses.

E. H. Stewart
E. A. Scott

Inventor.

Arnt Silfversparre,

by *Quander*

his attorney.

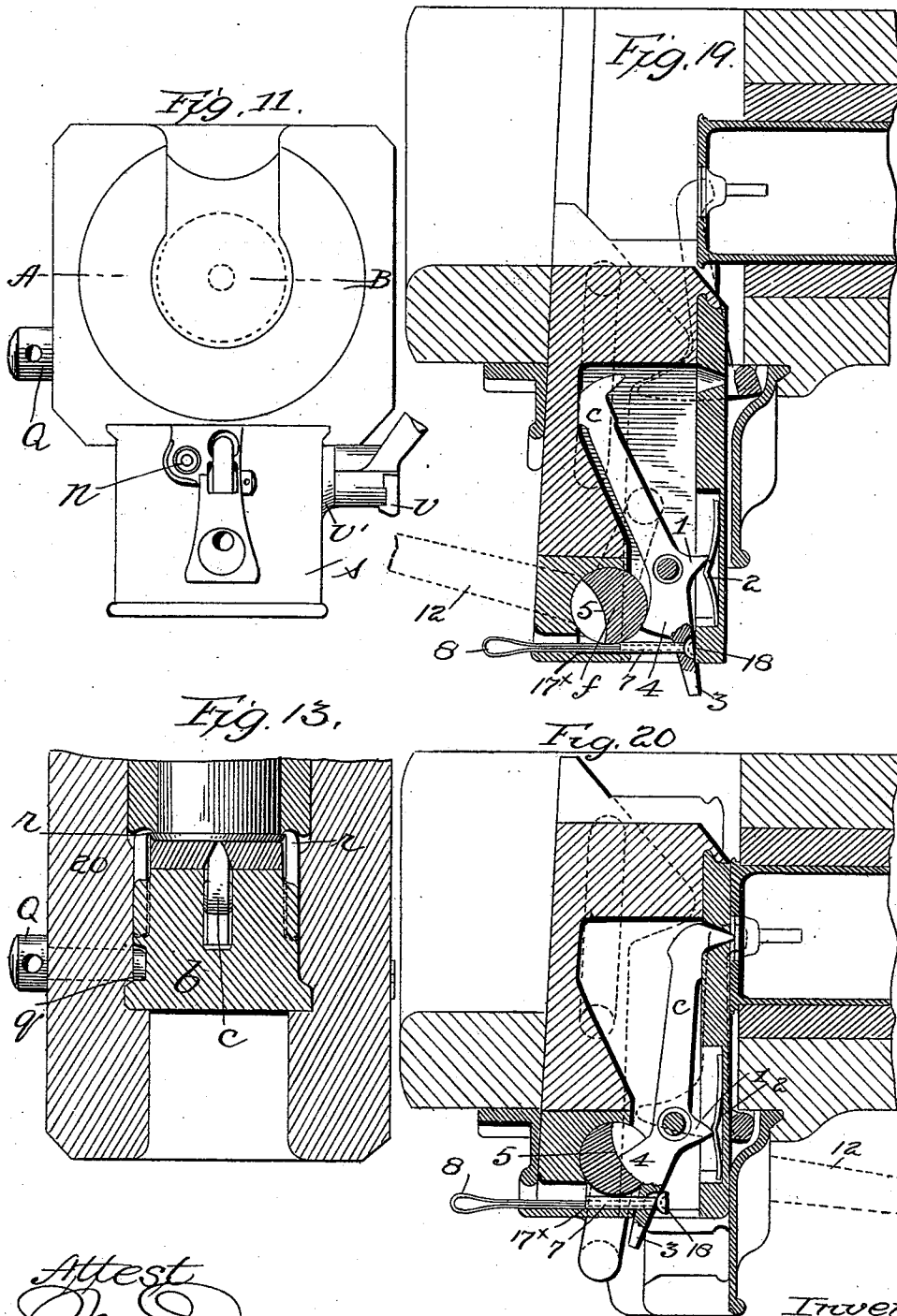
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A. SILFVERSPARRE.
BREECH LOADING ORDNANCE.

No. 540,698.

Patented June 11, 1895.



Attest
Walter Donaldson,
F. L. MacArthur

Inventor
Arent Silfversparre,
by Richards & Co
Attorney

(No Model.)

5 Sheets—Sheet 3.

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Fig. 12.

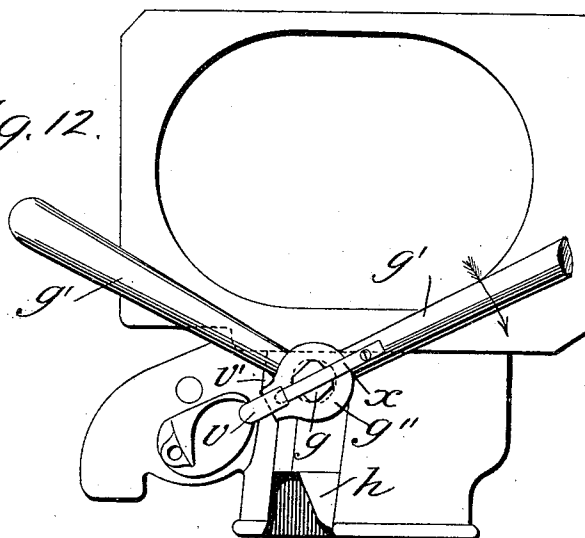
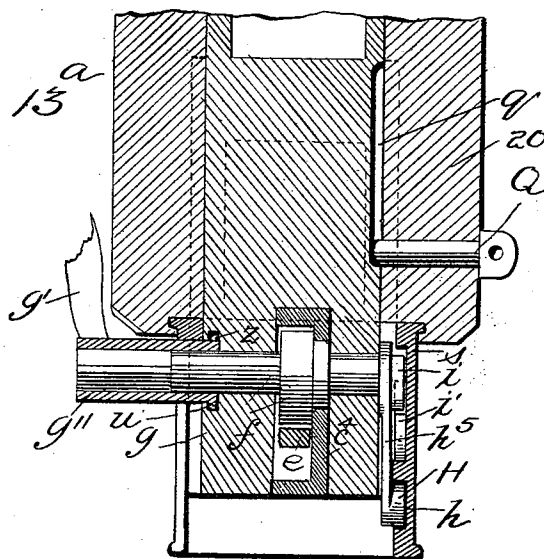


Fig. 13^a



Attest
Philo. M. Madsen
F. L. Madsen

Inventor
Arent Silfversparre
by Richards & Co
ATTYS

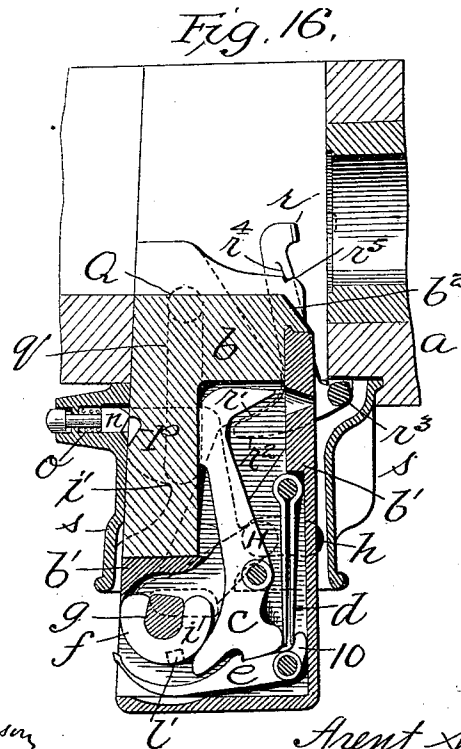
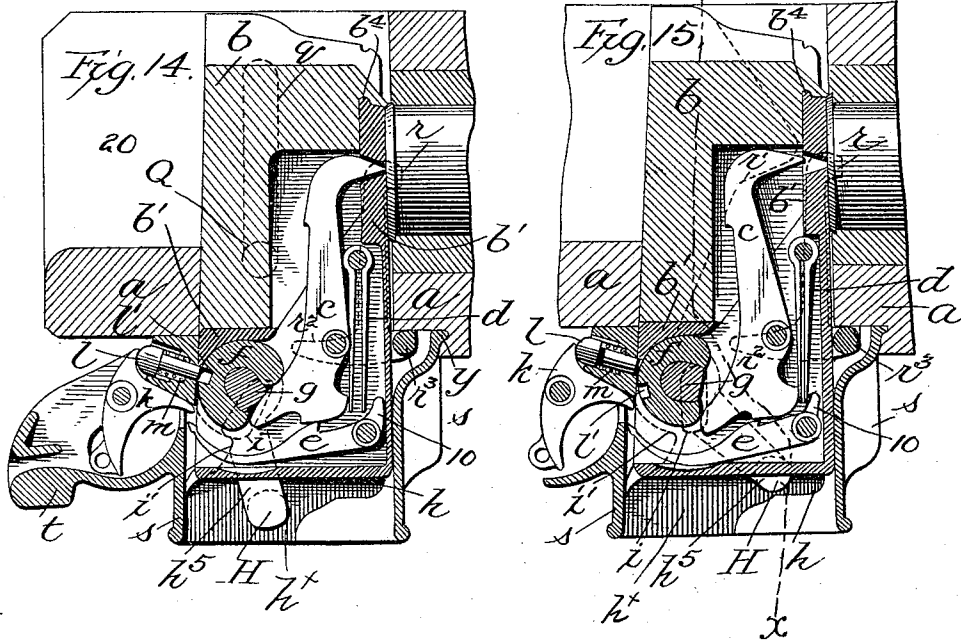
(No Model.)

5 Sheets—Sheet 4.

A. SILFVERSPARRE.
BREECH LOADING ORDNANCE.

No. 540,698.

Patented June 11, 1895.



Attest
J. L. Miskleton

Inventor
Hent Silverspang
by Richards & Co
ATTYS.

UNITED STATES PATENT OFFICE.

ARENT SILFVERSPARRE, OF BOFORS, SWEDEN, ASSIGNOR TO THE BOFORS-GULLSPANG COMPANY, LIMITED, OF SAME PLACE.

BREECH-LOADING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 540,698, dated June 11, 1895.

Application filed December 23, 1891. Serial No. 416,011. (No model.) Patented in Sweden October 30, 1889, No. 2,271.

To all whom it may concern:

Be it known that I, ARENT SILFVERSPARRE, engineer, residing at Bofors, county of Werm-land, Kingdom of Sweden, have invented new and useful Improvements in Hammer-Lock Mechanism for Rapid-Fire Guns, (for which I have obtained Letters Patent in Sweden, No. 2,271, dated October 30, 1889,) of which the following is a specification.

10 This invention relates to a hammer-lock mechanism for rapid fire guns, which entire mechanism can by a simple grasp be removed from the gun without the help of any tools, while at the same time its separate parts can also easily be taken out and replaced by others. The mechanism is moreover of such a construction, that in case of high elevation the sliding-back of the cartridge introduced into the gun becomes impossible and that in the event of missing fire the hammer can be 20 cocked anew without it being necessary to open the mechanism.

In the annexed drawings, Figures 1 and 2 show a sectional and rear view of the hammer-lock box with its cock, mainspring, full-cock hook, and cocking-piece. Fig. 3 shows a sectional and side view of the handle with the catching-shoulder belonging to it. Fig. 4 shows the extractor; Fig. 5, the hammer; Fig. 6, the mainspring; Fig. 7, the shaft of the cocking-piece with the arm and shoulder upon it; Fig. 8, the gear; Fig. 9, the cocking-piece, and Fig. 10 the trigger. Fig. 11 is an end elevation; Fig. 12, a side view; Fig. 13, 30 a plan view of a section on line A B of Fig. 11. Fig. 13^a is a vertical section through the plane of the cocking-piece shaft on line x x of Fig. 15. Fig. 14 shows a sectional view on line C D, Fig. 11, of the hammer-lock mechanism attached to a gun just after a shot has been fired off. Fig. 15 shows the same lock mechanism after the opening has commenced, and Fig. 16 shows the mechanism fully opened. Fig. 17 shows the position of the lock mechanism in the occasion when, after missing 45 fire, the hammer is being cocked again without opening the mechanism. Fig. 17^a is a detail view, and Fig. 18 shows the position of the mechanism when being taken off from the gun. Figs. 19 and 20 show two sections of a similar hammer-lock mechanism, but modified

in such a manner that the hammer is automatically cocked at the firing of each shot, Fig. 19 showing the position of the mechanism before, and Fig. 20 after, the firing.

The hammer-lock mechanism consists of three principal parts, viz., the hammer-lock box *b*', Figs. 1, 2 and 14, with the lock mechanism contained in it, the wedge-shaped block *b*, Figs. 14 and 18, into which the lock box is pushed to be carried thereby, and the frame 60 *s* surrounding the block and connected with the trigger. The lock mechanism is placed in the hammer-lock box *b* and consists of the double-armed hammer *c*, Fig. 1, the lower part of which is pressed outward by the main spring *d*, placed between the back of the hammer and a hind arm 10 of the double armed and angular sear *e*, which is pivoted in the box and on its upper side has a shoulder corresponding with a recess in the hammer. Above this sear *e* and in front of the lower part of the hammer *c* there is placed the cocking-piece *f*, with a trunnion portion *c*³, passing through the bearing *c*⁴ of the lock box and with a central opening for the shaft *g* and with a projecting collar *f* which in its circumference has a recess *l*, and a planed off surface *f*³, (Figs. 1 and 9.) Both the hammer and the main spring *d* as well as the sear 80 are held in the box by bolts, so that they can easily be pushed into their places. When this is done the cocking piece *f* is put in, and the box is pushed into a cut or notch *b*⁴ in the block *b* and the shaft *g* is pushed from the side into the central opening of the cocking 85 piece through an opening in the block *b*. Upon the end of the shaft, outside the block a handle *g*' is then attached, Figs. 3 and 12, consisting of a hub *g*^{''} with two arms placed at an angle one to another in such a way that a shoulder *u* on the hub *g*^{''} (Fig. 3) is introduced through a recess *y* (Fig. 18) in the edges of the opening in the block, Figs. 13^a and 18, through which shaft *g* passes. The recess 95 communicates with a ring-shaped groove *z* into which the shoulder *u* passes from the recess *y*, and in which it is thus retained after the turning of the handle, thereby preventing disengagement of the handle *g*' from the shaft *g*. On one side of the block *b* there is a 100 groove *q* (Figs. 13 and 13^a) for the end of a lock-screw *Q* screwed in the usual manner

through the side of the main frame 20 of the gun, when the block has been pushed into the gun. The groove g determines by its length the length of the movement of the block during the opening and closing.

On two opposite sides of the block there are besides two projecting edges r' for the purpose of effecting the movement of the extractor. See Fig. 18 full lines and dotted lines 10 Figs. 14, 15 and 16.

The frame s on the upper edge at y , Figs. 14, 17^a and 18 is provided with flanges fitting into corresponding recesses in the gun frame. On the one side it has an opening or depressed 15 or channel portion h^x communicating with a groove h and intended to receive a trunnion H on a lever h^5 , Fig. 13^a, placed at one end of the shaft g , Figs. 7, 14, 15, 16, 17 and 18. On the frame s there is also fixed a pistol-handle 20 t , containing the trigger k , one arm of which lies in front of a bolt l , which is pressed outward by a surroundingspring m (Figs. 14 and 15), and is movable in a groove in the frame s ending opposite the collar-shaped part of 25 the cocking piece f .

In one edge of the frame s there are recesses s^x serving as bearings for the pivots r^3 of a shaft passing across the inner side of the frame and supporting the extractor (Fig. 30 4 and Figs. 14 to 18). The extractor consists of angular arms placed at the ends of the shaft on each side of the block b when this is pushed in, the upper ends of which arms move in the closing box. At the side of the trigger and the bolt l belonging to it, the frame supports another bolt n "the lock hasp" moving in a groove (Figs. 11 and 16), which by a surrounding spring o is pressed 40 against the outside of the block b sliding in the frame, so that at a special position of the block the bolt will catch into a recess p on the latter. The frame s has also on the inside a shoulder i' placed in such a way, that at the pushing in of the block a shoulder i , on the 45 shaft g can pass over the same and thus keep the block supported. The extractor being placed in its pivot bearings in the frame s , and this frame being placed in the corresponding recess in the gun frame, the block b 50 carrying the hammer and its described controlling devices, is from below pushed into the frame s until the trunnion H on the lever h^5 of the shaft g enters into the channel or mouth h^x (Fig. 18) when the handle g' is carried forward. The trunnion H hereby enters 55 into the groove h and raises the shaft g together with the block b , thereon. During this lifting up the shoulder i carried by the rotary shaft g moves first vertically past the shoulder i' on the inside of the frame, but at the 60 further forward motion of the handle it is moved laterally over the said shoulder (Fig. 14) thus holding the block firmly in the frame. After this the lock screw Q is introduced into 65 the closing piece box, so that its end rests in the groove g .

If the mechanism is to be taken off from

the gun one need only loosen the screw Q and move back the handle g' , thus depressing the block from the position in Fig. 14 to that of 70 Fig. 18, when the block can be taken out. By removing the shaft g it is possible afterward to separate the block and the hammer-lock box, the different parts of which can then be disengaged. 75

The mechanism works in the following manner: When a shot has just been fired off (Fig. 14) and the gun is to be loaded anew, the mechanism is opened by moving the handle 80 g' , backward, whereby the shaft g and cocking-piece f placed upon it will turn around, as indicated by the arrow, Fig. 15; the latter cocking the hammer c and pressing together the spring d (Fig. 15). At a further turning of the shaft the shoulder i leaves its support 85 on the corresponding shoulder i' , the trunnion H entering into the groove h and pressing the block b downward during the movement of the said trunnion in the groove. During this operation the hammer is still farther 90 cocked its shoulder catching finally into the corresponding recess of the sear e . At the further moving back of the handle the block sinks still farther, the edges r , on its sides first engaging and depressing the ends of the arms 95 r^2 on the extractor (Fig. 16) and then engaging the arms r^2 at points near the pivots r^3 , and consequently the extractor is at first forcibly and afterward less forcibly but more quickly 100 turned round, thereby throwing out the empty cartridge-case, the edge of the same being clasped by the jaws r' of the upper arms of the extractor, (Figs. 13 to 18.) On account of the speed given to the extractor by the turning, it continues its backward movement somewhat 105 farther than the edges r force it to do, and thereafter it in consequence of its own weight retains this backward position (Fig. 18). Hereby the shoulders r^4 on each extractor-arm fall into position to engage corresponding 110 recesses r^5 on the upper end of the block, thus preventing the raising of the block (Fig. 16). At the introduction of a new cartridge its flange presses against the jaws r of the extractor, whereby it is turned 115 forward at the continued pushing in of the cartridge, the shoulders r^4 being thereby lifted out of the recesses r^5 , thus permitting the block to be raised again by the forward movement of the handle in the direction of the 120 arrow, Fig. 12. The block thus cannot be lifted again before the cartridge has been pushed so far into its chamber, that it cannot be jammed by the raised block. The upper end of the block is beveled at b^3 (Fig. 16) 125 so that the sloping surface thus formed at the lifting of the block meets the back part of the cartridge and pushes it still farther into its chamber.

If the gun is fired off with a high elevation 130 it may however happen that the cartridge glides back, whereby loss of time and some trouble are occasioned at the introduction of the cartridge. This can be avoided by means

of the cocking-hasps *n* (Fig. 16) above mentioned. When the extractor at the vigorous introduction of the cartridge-case into the chamber is pushed forward, it turns and lifts the block *b* so much, that the cocking-hasps *n* under the influence of its spring *o* is pressed into the recess *p* in the block, and prevents the sinking down of the block. On this account the upper end of the block prevents the introduced cartridge from gliding back farther than against the beveled faces *b*² of the block and thus nothing prevents the introduction of the cartridge into the chamber and the closing of the mechanism by the moving forward of the handle *g*'. The upper edge of the hasp or bolt *n* and the recess *p* as well as the strength of the spring *o* are proportioned in such a manner, that the block *b* cannot be impeded in its movement, if the movement is sufficiently vigorous, but also that it cannot be set free by its own weight and thus sink down again, when the bolt *n* is caught into the recess *p*. After the cartridge has been completely introduced the handle *g*' is pushed forward still farther until a projecting movable part *v* (Figs. 3, 11 and 12) which is kept in its place by a spring *x*, strikes against a shoulder *v*' on the frame, at which time the block is fully pushed in and at the same time supported, whereupon the shot can be fired off. This is done in the usual way by pulling the trigger *k*, the one arm of which thereby pushes the bolt *l* into the recess *l*' of the cocking-piece, which in this position of the handle lies just opposite the said bolt. The trigger thereby becoming free to turn the fore arm *k* again depresses the locking catch *e*. The hammer *c* thereby is set free and under the influence of the main spring it is driven forward against the percussion cap and this fires off the shot.

In case of missing fire the mechanism need not be opened, it being possible to cock the hammer anew by drawing out the locking part *v* so that it can move past the shoulder *v*' on the frame and thereby allow of a farther pushing forward of the handle—that is to say, of a further turning of the shaft *g*, whereby the hammer is again fully cocked by the cocking-piece *f* (Fig. 17). If afterward the handle *g* is moved back again, until the part *v* has taken its former position against the shoulder *v*' it may be tried anew to fire off the shot by touching the trigger.

From the above specification it is evident that the back part of a gun arranged in this manner need not either be bored or worked out more than a usual field-gun. This arrangement has also the advantage over other similar mechanisms, that the trigger cannot be drawn before the forward movement of the handle has been finished and the block is fully supported. In other mechanisms of a similar kind the trigger can come in contact with the cocking arrangement before the forward movement of the handle is finished, but after the block has taken its position. This causes

certainly no danger to life, but contributes on the other hand, to missing fire, as the hammer in this case does not get the full blow forward, but only follows the return movement of the cocking mechanism, which in most cases will prevent its hitting the percussion cap with sufficient force to ignite the detonating composition.

The modification shown in Figs. 19 and 20 has for its object to construct the hammer in such a manner, that the trigger with its parts becomes superfluous, it being possible to cock the hammer automatically after every shot, and at the same time to obviate all danger of hanging fire. The double-armed hammer *c* in this case on its front edge about opposite the turning-center has a projecting part 1 in front of which is placed a knee-shaped spring 2, over which the projecting part moves at the movement of the hammer. The hammer besides at its outer end projecting beyond the lock-box is provided with a tail 3, and besides which has on the part facing the cocking-piece *f* a cam 4, which on one side is rounded off in a circular form. The cocking-piece, which here is in one piece with its shaft, has also in its circumference a corresponding recess 5, and its shaft can be turned in the usual way by an arm attached to its end as at 12 in dotted lines.

When the hammer at the firing off of the shot strikes against the percussion-cap, the latter gives the hammer so vigorous a recoiling motion, that the projecting part 1, glides over the knee of the spring 2 which then presses the hammer farther back. So long as the hammer is not fully cocked, that is to say, so long as it has not been pushed back as far as possible, the cocking-piece *f* cannot be turned, it being stopped by the cam 4, which then rests in the recess 5. As soon as the hammer has taken the position shown in Fig. 1, the cam is free from this recess and the cocking-piece now can be turned without hinderance. In case of missing fire, whereby the danger of hanging fire arises, the mechanism cannot be opened in consequence of the arrangement just described before the hammer is again fully cocked, which then must be effected by hand by moving tail 3 forward, because the hammer is in that case not thrown back by the shot.

The firing arrangement consists of a case or tube 7 connected with a cord 8 which case passes through the outer arm 3 of the hammer and is loosely resting on the same with a spherical head. At the firing off the cord is pulled, whereby the case is drawn back until its hind edge rests against the inside of the breech-lock-box, at 17^x, whereafter the hammer continues its motion until its point strikes against the percussion-cap, this continued motion being due to the spring 2 acting on the projection 1 which projection has passed below the high part of the spring when the case or tube 7 comes to rest against the shoulder 17^x of the frame. The socket part

of the arm 3 in which the head 18 is seated in Fig. 19, is at this time moved back away from the head slightly so that the arm 3 will be allowed a slight forward movement before the socket therein contacts with and again takes up the case and cord and this forward movement of the arm 3 is sufficient to allow the hammer to fly back under the force of the recoil far enough so that the projection 1 will again ride up over the high part of the spring 2 and then the hammer will be re-cocked by the action of the spring. If the operator continues to pull the firing cord 8 even after the firing off of the shot, the case will not prevent the hammer from moving so far backward, that the projecting part 1 can pass over the knee of the spring 2. As soon as the cord is afterward released the hammer continues its backward movement (under the influence of the same spring) until it is again fully cocked.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In combination in a gun, the frame, the wedge block sliding therein, a pivoted hammer, a cocking-piece with its shaft, the sear spring, and the box *b'* of right angular form having a front plate and a rearward extension, the said hammer being pivoted at the front of the box and the cocking-piece with its shaft being journaled in the rear extension said box being removable from the wedge block, substantially as described.

2. In combination in a gun, the recessed frame, the wedge block carrying the hammer lock mechanism and movable in said recess, the trigger, the extractor and the removable frame *s* carrying said trigger and extractor, said frame being arranged to permit the wedge block to move through the same.

3. In combination with a gun having a suitable recess, a frame detachably connected with the gun at the mouth of said recess, a pivoted extractor having its shaft removably supported in recesses in said frame, a wedge block sliding in said frame and recess and carrying the hammer lock mechanism, means for reciprocating the block in loading and unloading, and projections on the block engaging the arms of the extractor whereby as the block is lowered it will engage and operate said extractor, substantially as described.

4. In combination, the frame, the reciprocating block and box containing the hammer lock mechanism, the rotating shaft carrying the cocking-piece, and serving also to reciprocate the block, the trigger for releasing the hammer, and means for preventing the premature release of the hammer, comprising a spring pressed pin *l* having one end engaging a projection on the trigger, and its other end

bearing against the cocking-piece and entering a recess therein to release the trigger at the completion of the movement of the shaft, substantially as described.

5. In combination, the frame, the reciprocating block carrying the hammer lock mechanism, means for reciprocating the block, means for retaining the block in a slightly elevated position comprising a spring pin and the extractor engaging part of the block and adapted to raise it slightly when the newly inserted cartridge presses the extractor, substantially as described.

6. In combination, the frame having a recess and groove the block carrying the hammer lock mechanism reciprocating in said frame, the operating shaft journaled in the block, and carrying a suitable operating handle, a lever or arm projecting from the shaft and having a trunnion adapted to enter the recess and travel in the groove as the shaft is turned thereby raising the block, the said shaft moving with the block and the cocking-piece for the hammer lock mechanism carried thereby, substantially as described.

7. In combination, the frame, the block carrying the hammer lock mechanism reciprocating therein, the operating shaft *g* carrying an arm and trunnion engaging a slot in the frame to reciprocate the block as the shaft is turned, and a locking part *v* engaging a projection *v'* on the frame to limit the movement of the shaft and said part *v* being movable to clear the projection when it is desired to give the shaft a further rotation, substantially as described.

8. In combination, the main frame, the removable frame *s* secured thereto, the sliding block, the hammer lock mechanism, and the extractor held in place by the removable frame *s* and between the same and the main frame, substantially as described.

9. In combination, the main frame, the sliding block, the shaft carried thereby, the arm projecting from the shaft and engaging a groove in the frame to operate the sliding block, the locking lug *i'* on the frame and the locking lug *i* on the shaft to engage the same and hold the block in place, substantially as described.

10. In combination in a gun, the frame having the recess, the wedge block movable therein, the hammer lock mechanism carried thereby and the extractor engaging the block to hold the same down and adapted to release the block when the cartridge is introduced, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ARENT SILFVERSPARRE.

Witnesses:

E. SVANBERG,
EMIL OLSSON.