

(No Model.)

14 Sheets—Sheet 1.

C. HOLMSTRÖM.
RECOIL OPERATED QUICK FIRING GUN.

No. 509,313.

Patented Nov. 21, 1893.

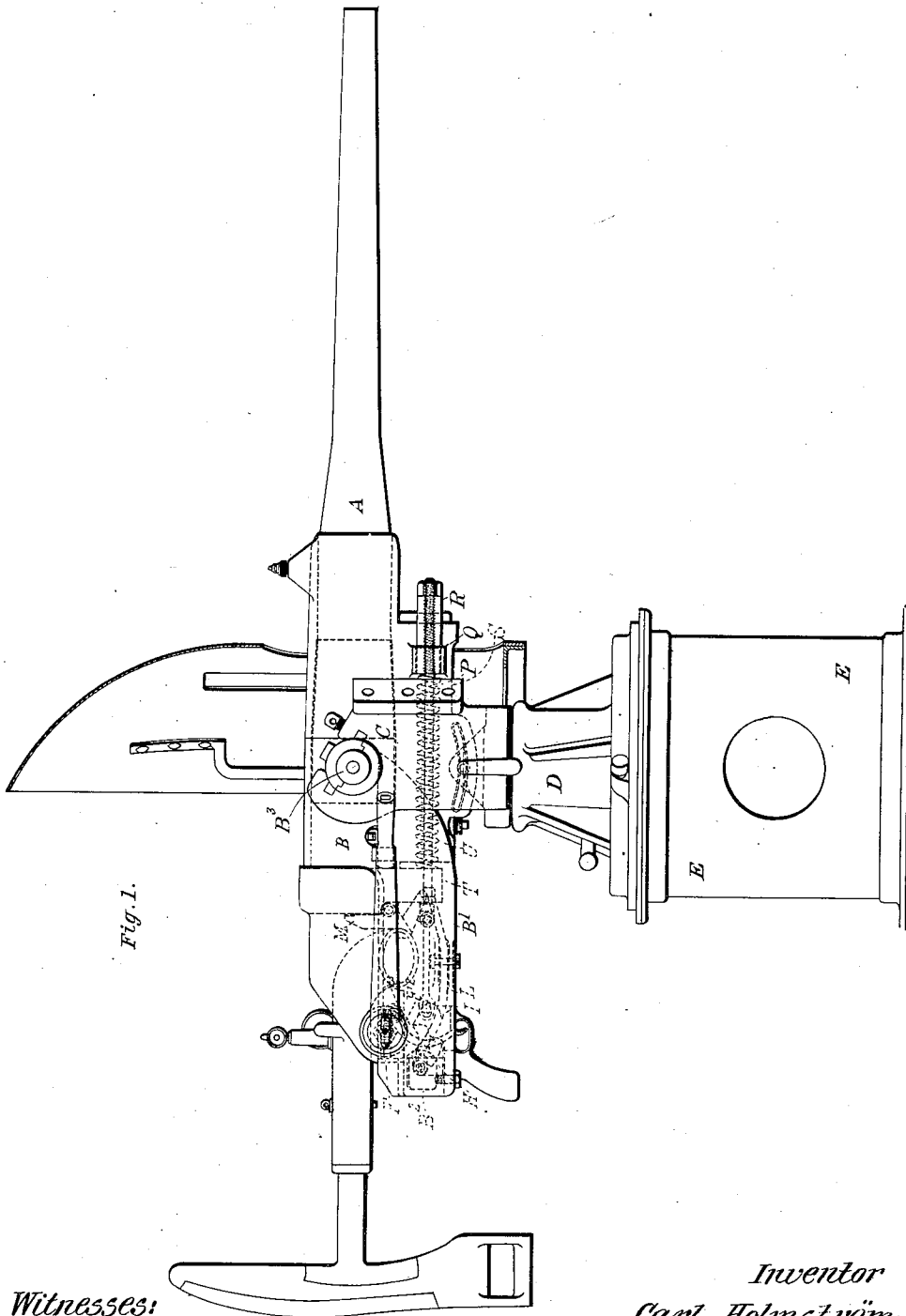


Fig. 1.

Witnesses:
Raphael Netter
Ernest L. Hopkinson

Inventor
Carl Holmström
by *Dureau & Page*
Attorneys

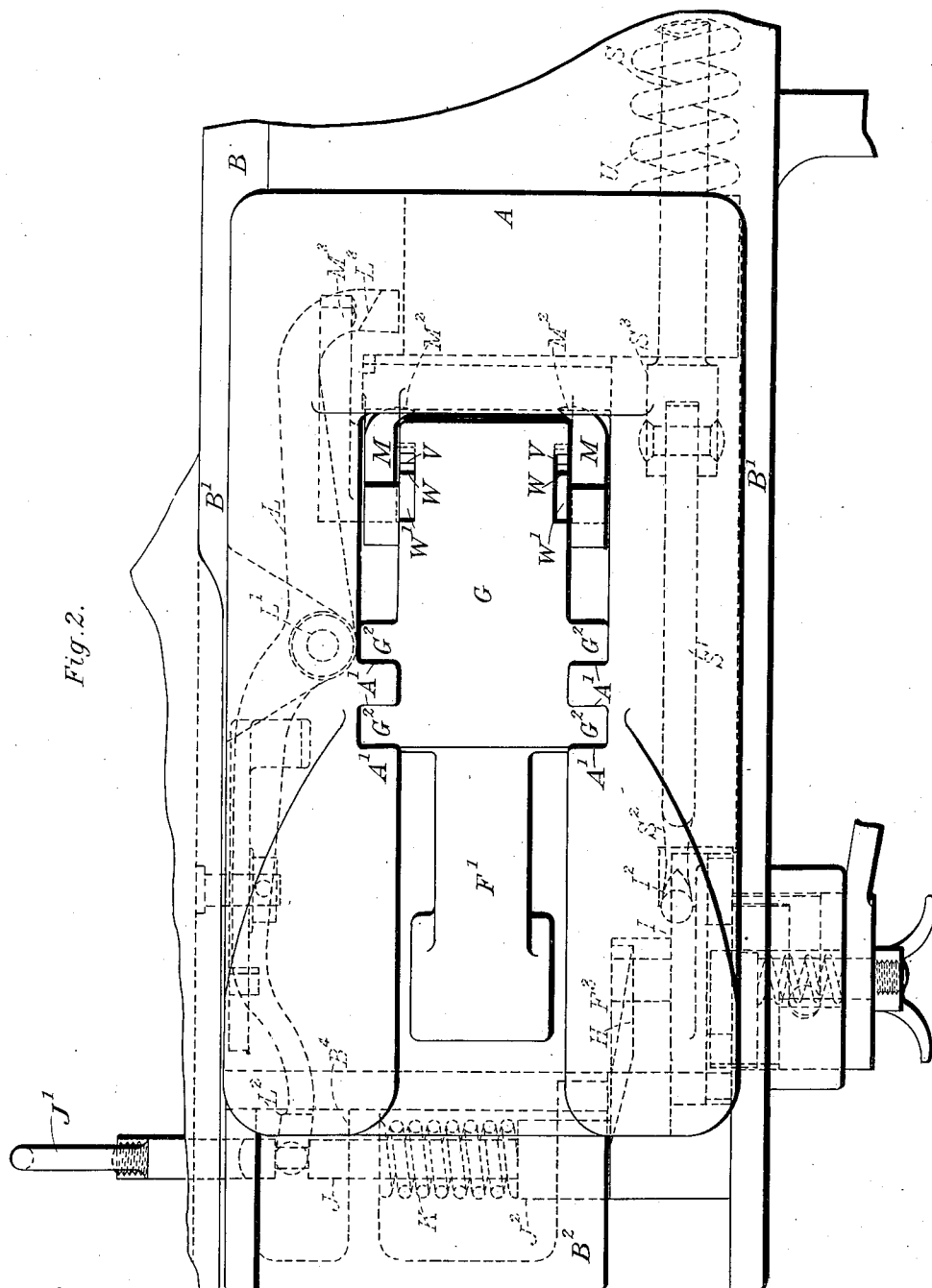
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Witnesses:
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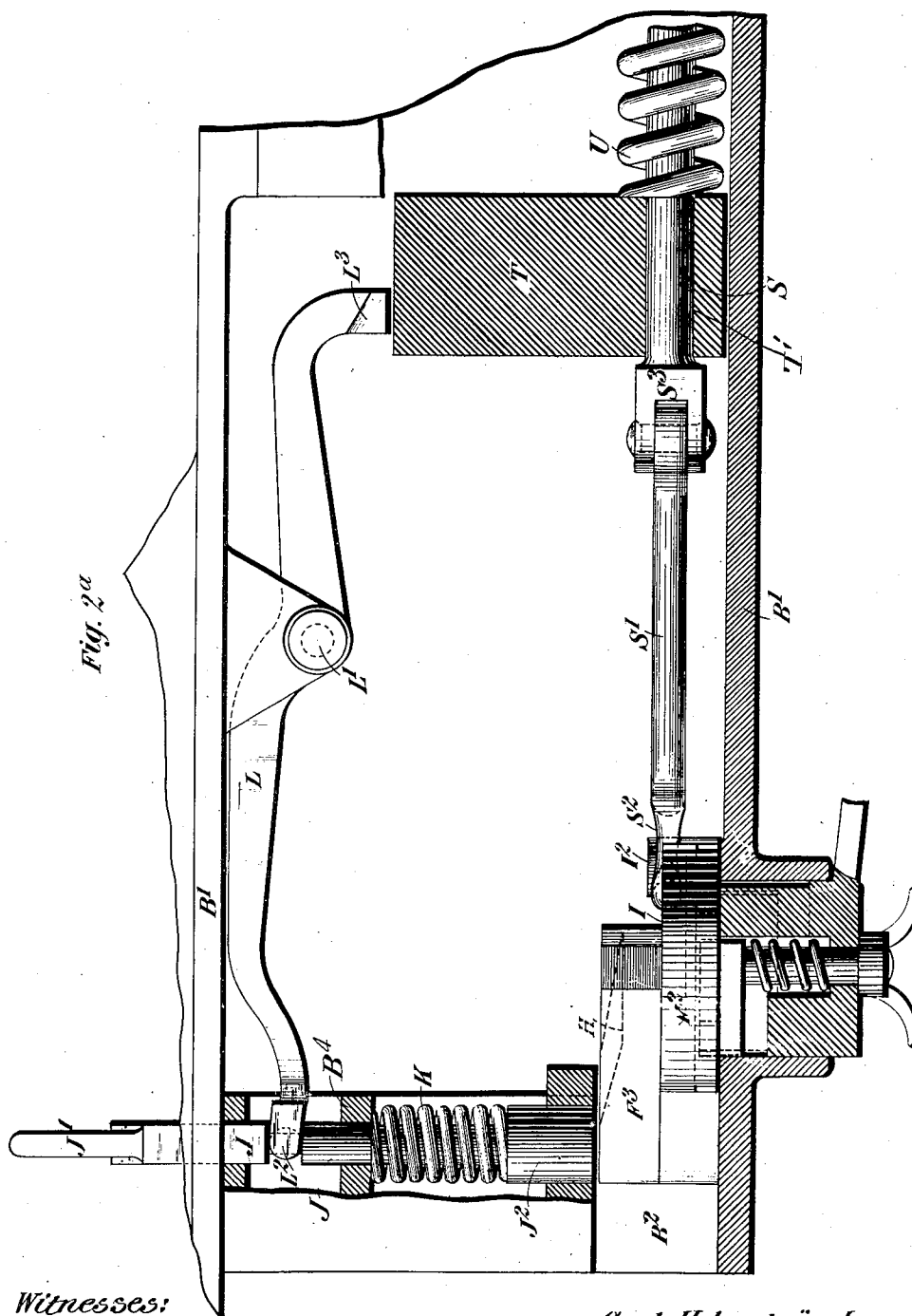


Fig. 2a

Witnesses:
Hansel Netter
James Catlow

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By his Attorneys
Duncan Page

(No Model.)

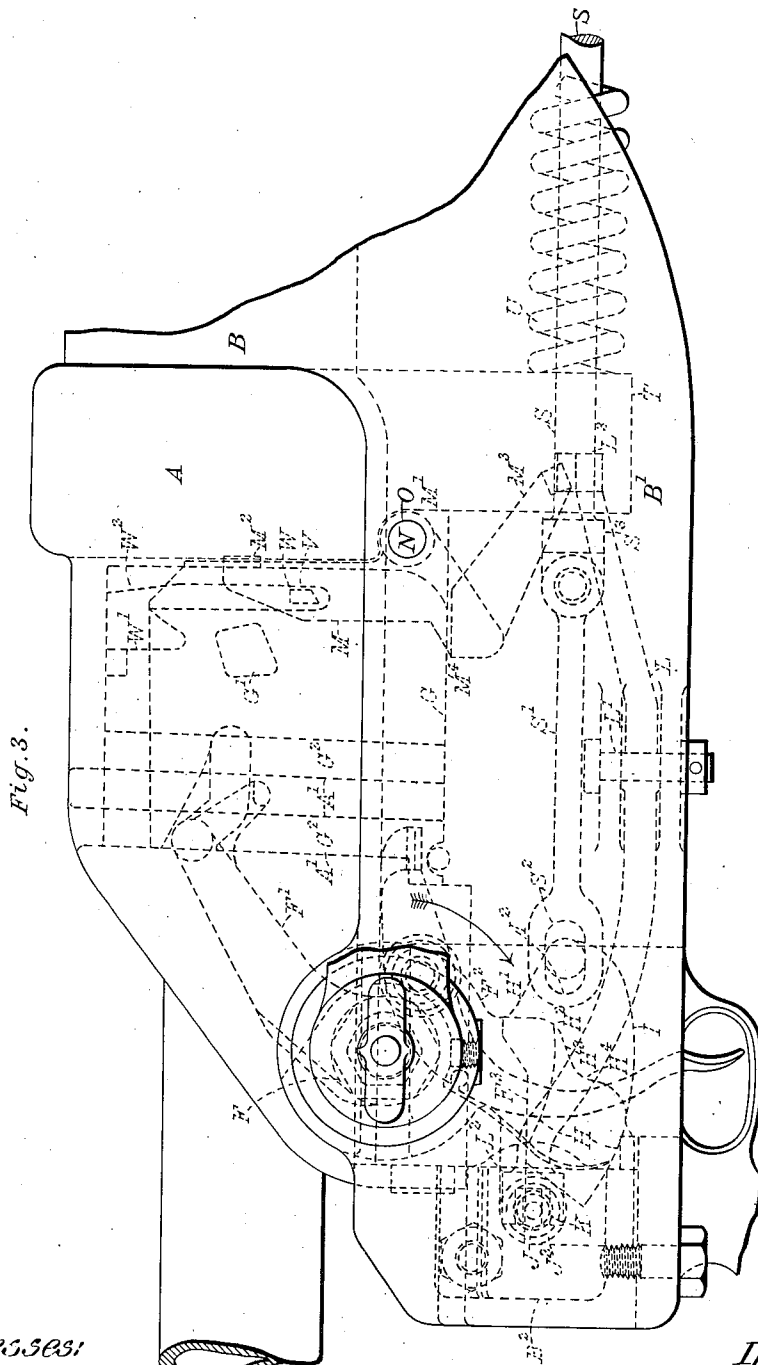
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C. HOLMSTRÖM.

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No. 509,313.

Patented Nov. 21, 1893.



Witnesses:
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(No Model.)

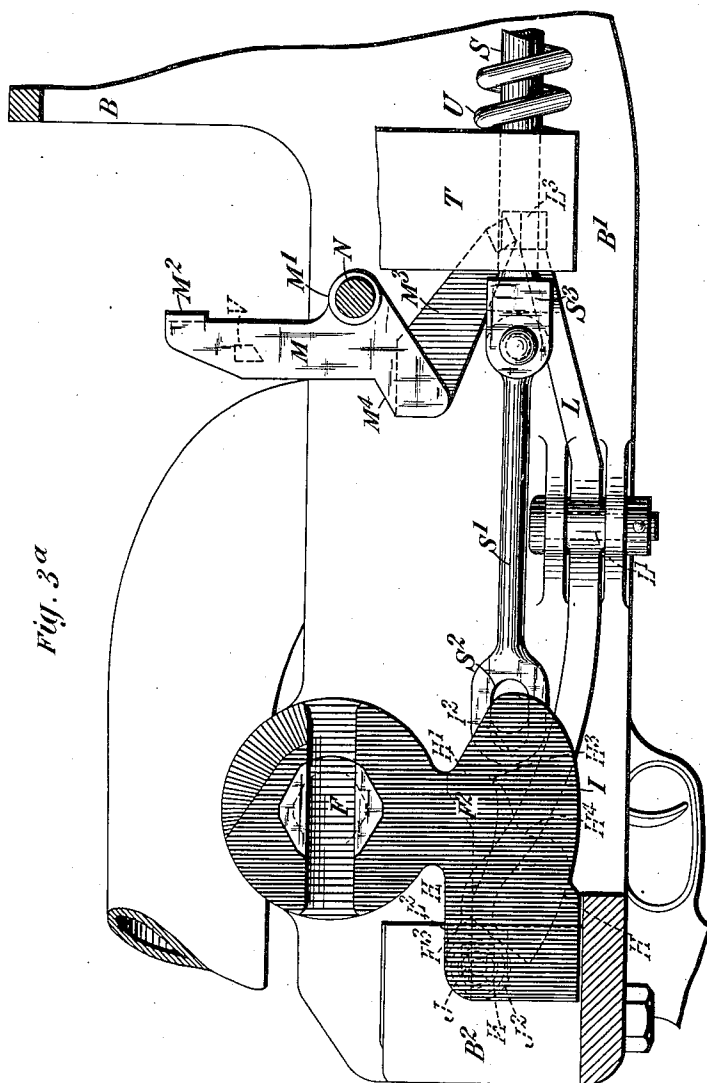
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Witnesses:

Raphael Netter
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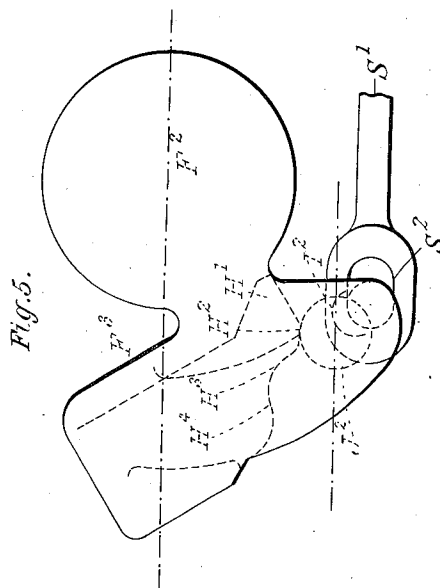
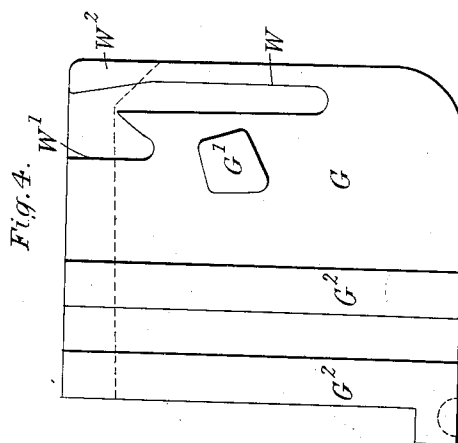
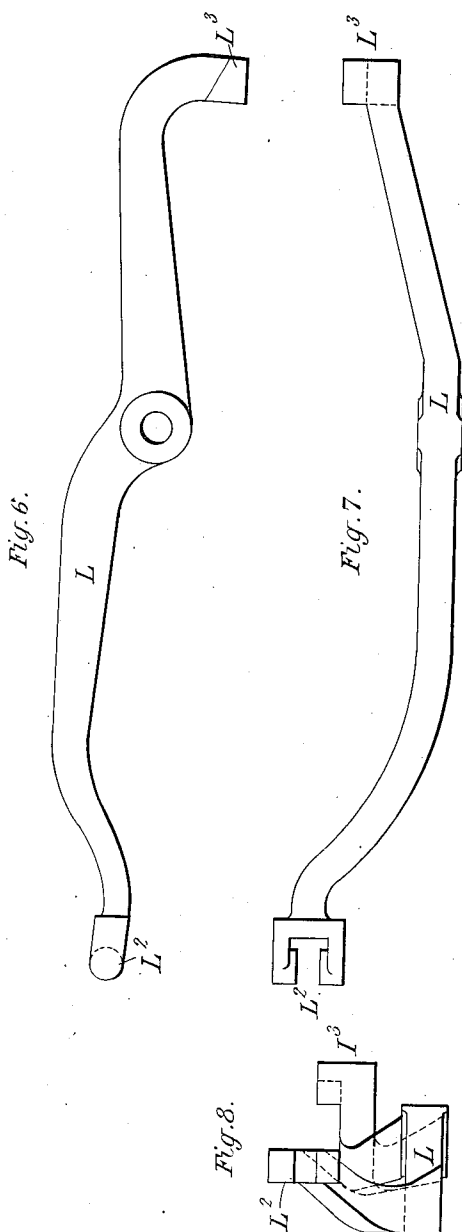
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14 Sheets—Sheet 6.

C. HOLMSTRÖM.
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Patented Nov. 21, 1893.



Witnesses:
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(No Model.)

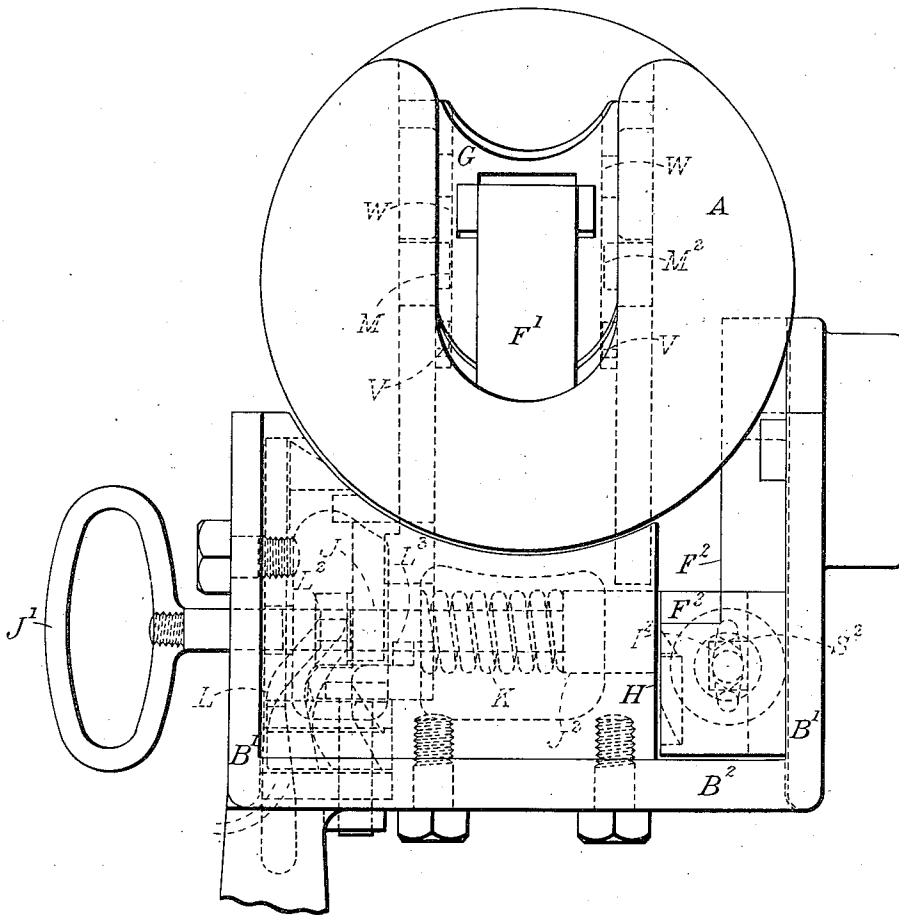
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Patented Nov. 21, 1893.

Fig. 9.



Witnesses:
Raphaël Netter
Emory Simpson

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(No Model.)

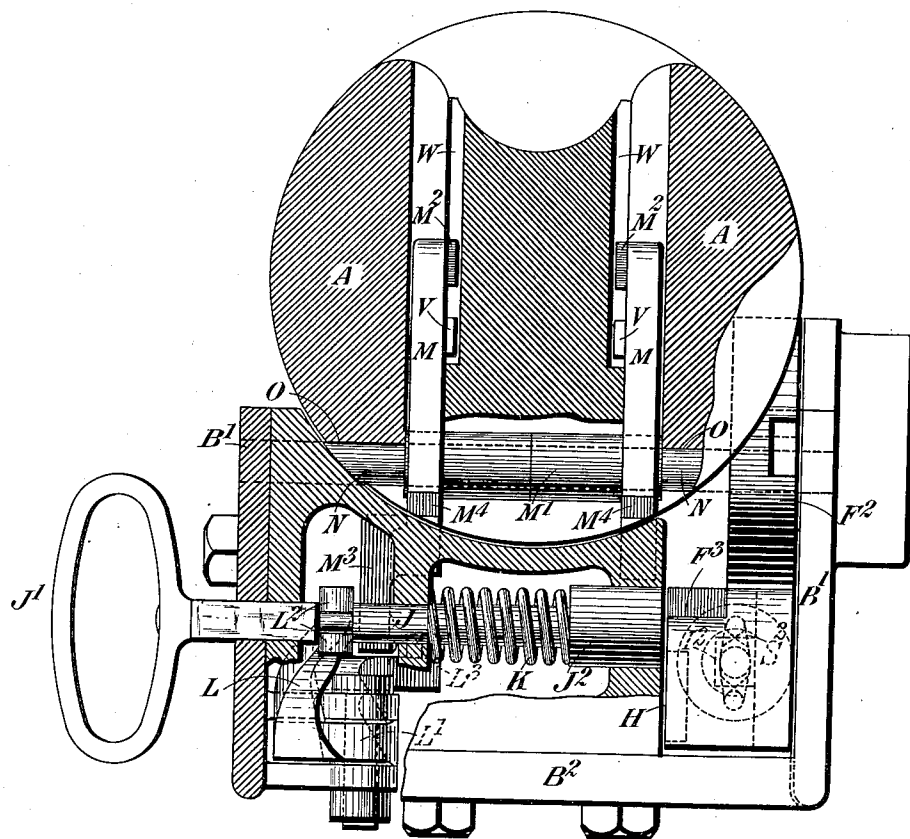
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Fig. 9^a



Witnesses:
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James Catlow

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(No Model.)

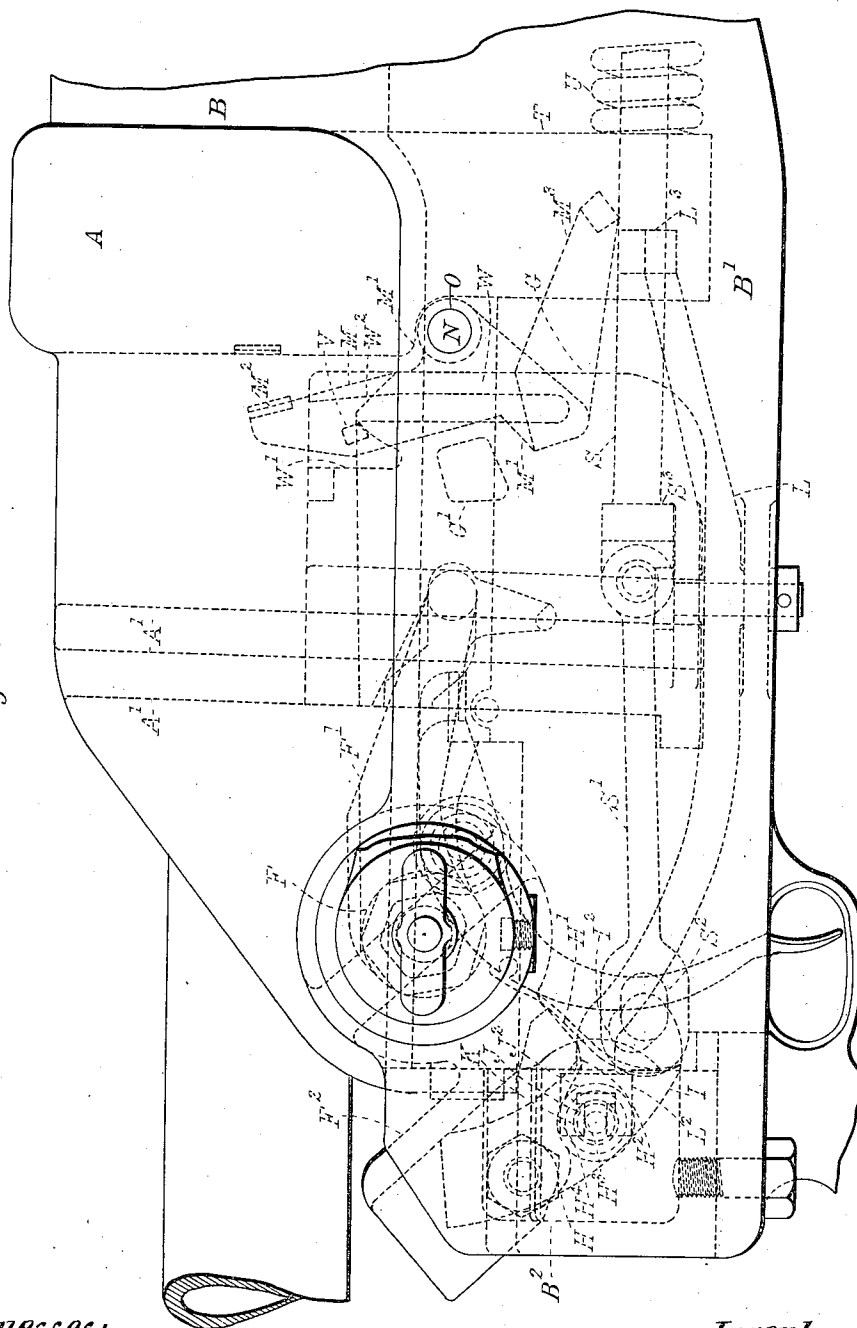
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Fig. 10.



Witnesses:
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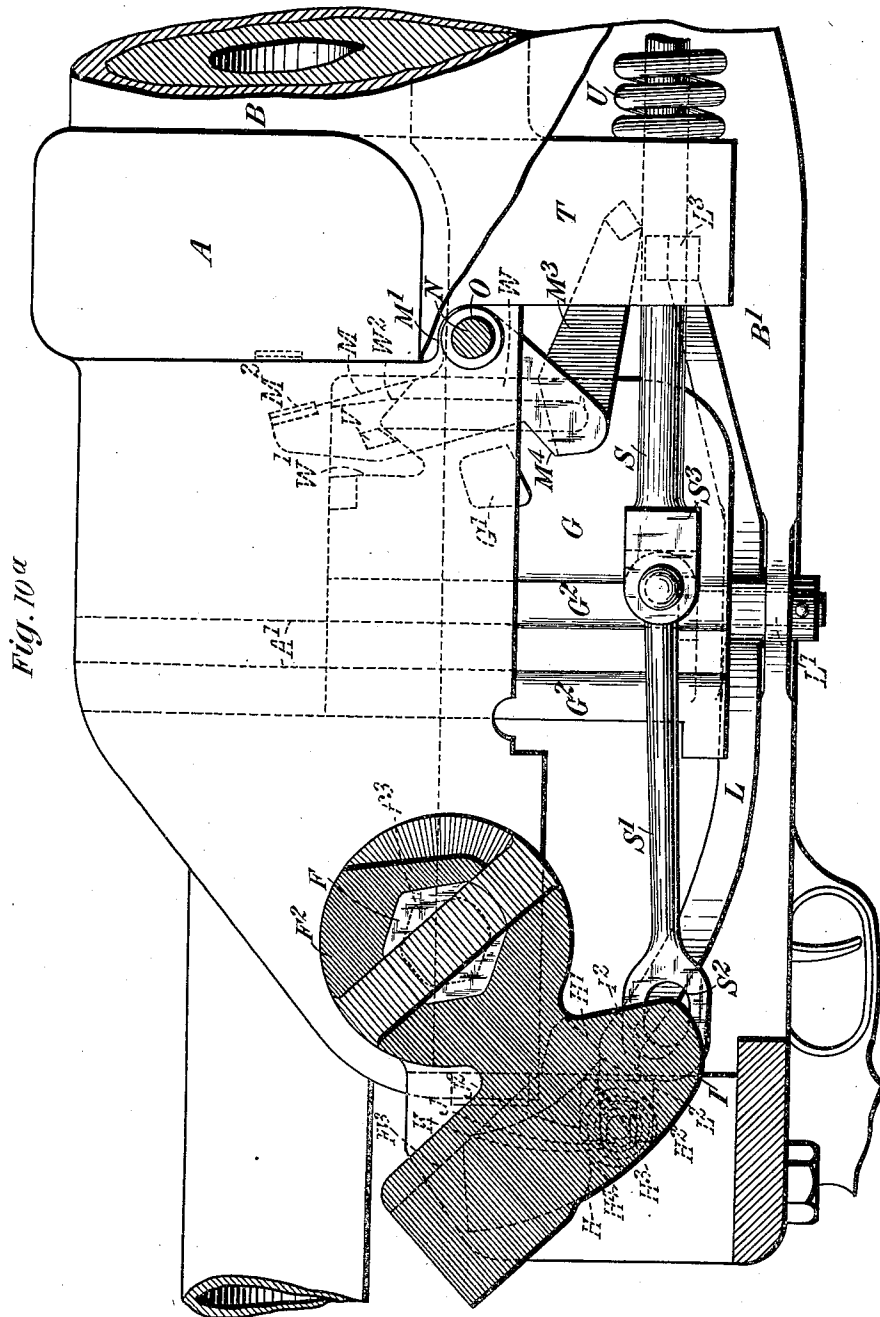
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14 Sheets—Sheet 10.

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Witnesses:
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(No Model.)

14 Sheets—Sheet 11

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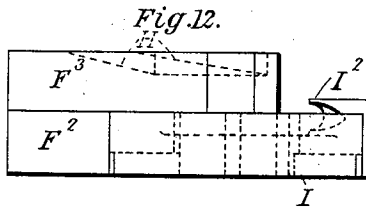
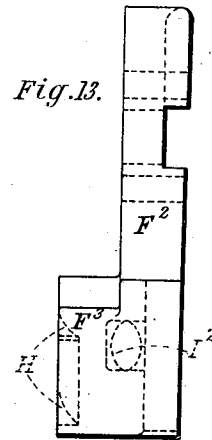
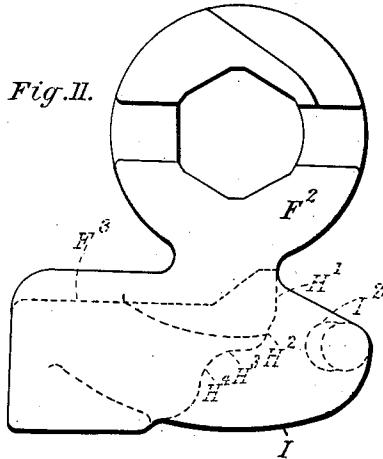


Fig. 15.

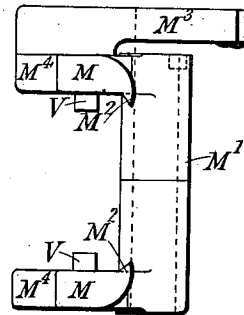
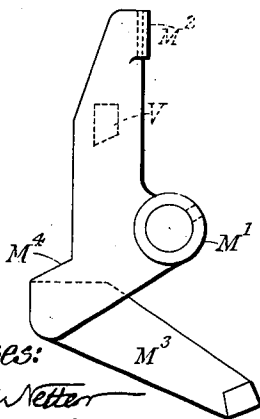
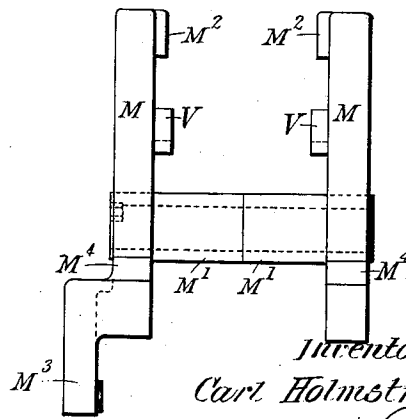


Fig. 14.



Witnesses:
Raphael Netter
Ernest Leopkinson

Fig. 16.



Inventor
Carl Holmström
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(No Model.)

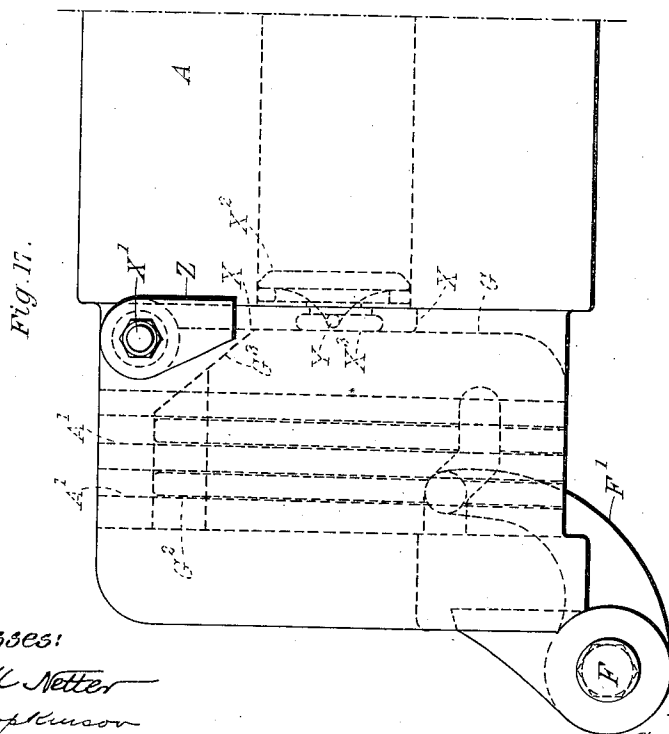
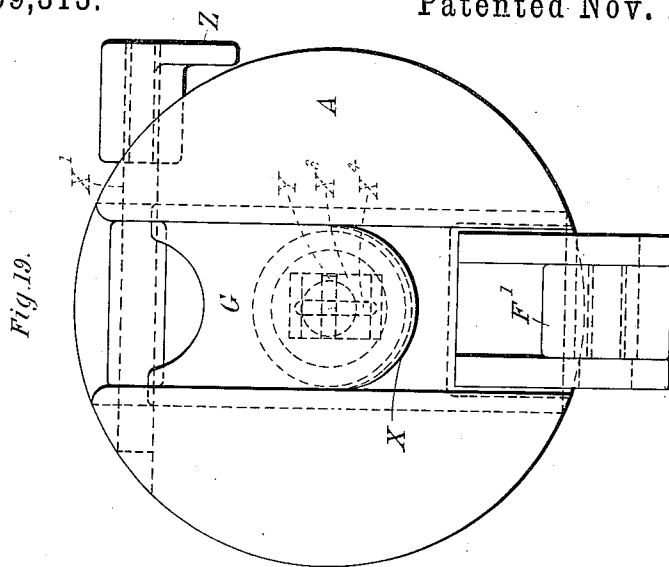
14 Sheets—Sheet 12.

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Witnesses:

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(No Model.)

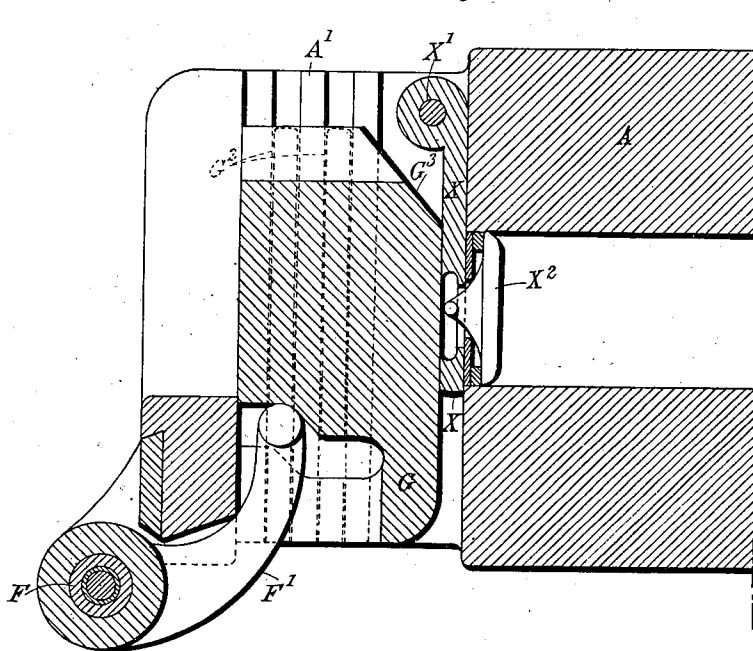
14 Sheets—Sheet 13.

C. HOLMSTRÖM.
RECOIL OPERATED QUICK FIRING GUN.

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Patented Nov. 21, 1893.

Fig. 18.



Witnesses:
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Ernst Hopkinson

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Carl Holmström
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(No Model.)

14 Sheets—Sheet 14.

C. HOLMSTRÖM.
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Fig. 20.

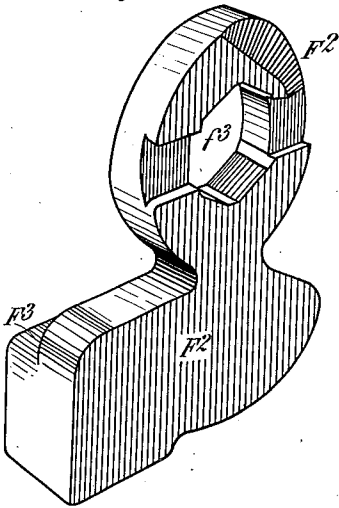


Fig. 23.

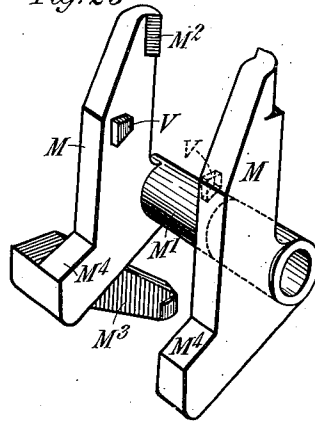


Fig. 21.

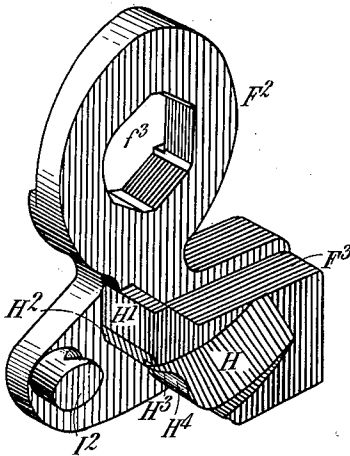


Fig. 24.

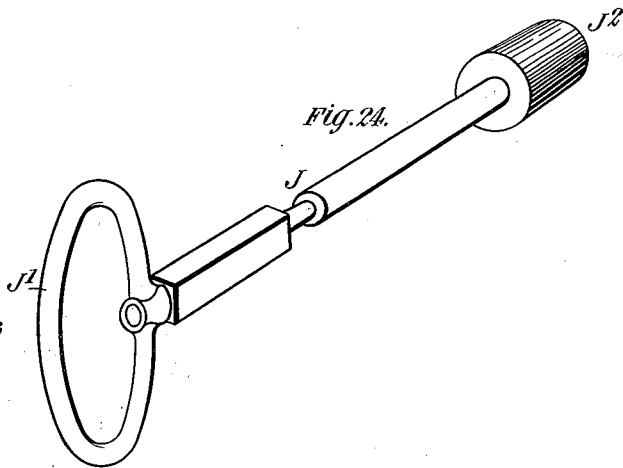


Fig. 22.

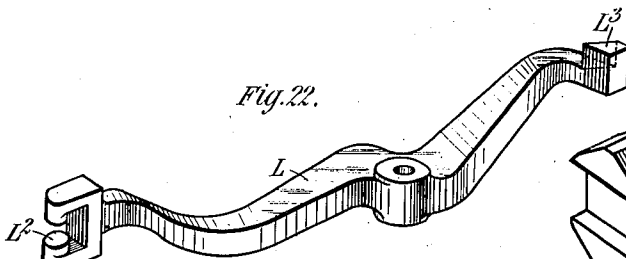
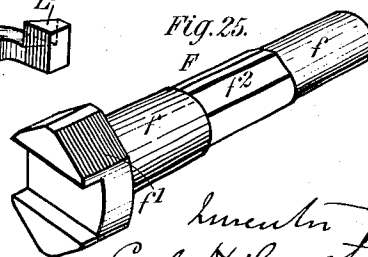


Fig. 25.



Witnesses:
Raphael Netter
James C. Lathrop

Inventor
Carl Holmström
By Dureau & Page
attys.

UNITED STATES PATENT OFFICE.

CARL HOLMSTRÖM, OF LONDON, ENGLAND, ASSIGNOR, BY DIRECT AND
MESNE ASSIGNMENTS, TO THE MAXIM-NORDENFELT GUNS AND AM-
MUNITION COMPANY, LIMITED, OF SAME PLACE.

RECOIL-OPERATED QUICK-FIRING GUN.

SPECIFICATION forming part of Letters Patent No. 509,313, dated November 21, 1893.

Application filed December 26, 1891. Serial No. 416,107. (No model.)

To all whom it may concern:

Be it known that I, CARL HOLMSTRÖM, en-
gineer, a subject of the King of Sweden and
Norway, and a resident of London, England,
have invented certain new and useful improve-
ments in Automatic and Quick-Firing Guns,
of which the following is a specification, refer-
ence being had to the accompanying drawings.

My invention relates to the breech me-
chanism of automatic and quick-firing guns.
In a gun of this kind or class as heretofore
constructed it is usual to utilize the extractor
for locking the breech block in the loading
position until a cartridge has been inserted
in the gun. I have found that this method
of locking is open to objection and my im-
provements are designed to provide mechan-
ism which shall have a more certain and ef-
ficient locking action.

According to my invention I mount on or
form upon the crank-shaft of the breech
block, preferably at one end thereof a cam.
I provide also a pin or bolt which is capable
of sliding in bearings in the cradle of the gun
in a direction transverse to the axis of the
said gun and extends into the path traversed
by the aforesaid cam on the breech block
crank-shaft, when the said cam moves with
the gun relatively to the cradle, in the recoil
or in the running out of the gun. I pivot to
the cradle of the gun a lever, one end of which
is actuated by the extractor, and the other
end of which is coupled, in any suitable man-
ner to the said sliding pin or bolt. This
mechanism is automatically operated to open
the breech block during the running out of
the gun, and, in combination with a breech-
actuating spring arranged for operating the
breech-block crank-shaft as hereinafter de-
scribed, will raise the breech-block to close
the breech. The said mechanism will oper-
ate either automatically, upon the insertion
of a cartridge into the charge chamber of the
gun and its engagement with the extractor or
will operate when manually released at the
proper time as for instance when applied to
a gun in which loose ammunition is used
and wherein the action of an extractor is not
available.

In automatic and quick-firing guns in which

powder charges separate from the projectile
are employed, I provide an advantageous ar-
rangement of obturator mechanism forming
another important feature of my invention
and hereinafter more particularly described.

My said invention comprises improvements
in the breech block and the extractor where-
by the extractor is operated slowly and with
considerable force to start the movement of
a spent cartridge from the charge chamber in
which it is tightly retained owing to its ex-
pansion by the powder gases and from which
it is ultimately ejected by the extractor op-
erating in the ordinary manner.

The said invention comprises also a safety
device whereby the premature release of the
breech block and the jamming of a partially
inserted charge in the breech is prevented.

In order that my invention may be clearly
understood I will now proceed to describe the
same with reference to the accompanying
drawings, in which—

Figure 1 is a side elevation of an automatic
quick-firing gun adapted for fixed ammuni-
tion, constructed according to my invention
and mounted on a naval carriage. Fig. 2 is
a plan of the breech end of the said gun and
a portion of the mounting. Fig. 2^a is a view
similar to Fig. 2 but with the gun removed,
and parts of the frame broken away to show
clearly the arrangement of mechanism indi-
cated by dotted lines in the said Fig. 2. Fig.
3 is a side elevation of Fig. 2 showing the
breech closed. Fig. 3^a is a view similar to
Fig. 3 but with the gun and the rear check-
plate of the breech-frame removed, in order
to show clearly the arrangement of mechan-
ism indicated by dotted lines in the said Fig.
3. Fig. 4 is a side elevation of the breech
block which in Fig. 3 is shown in place in the
breech. Fig. 5 is a side elevation of parts of
the mechanism. Figs. 6, 7 and 8 show in plan,
side elevation and end elevation respectively
a lever hereinafter referred to, for operating
the aforesaid pin or bolt. Fig. 9 is an eleva-
tion of the breech end of the gun. Fig. 9^a is
a view similar to Fig. 9 but with the rear por-
tion of the breech and breech-block removed
and with portions of the rear end of the breech-
frame removed, all in order to render clear

the arrangement of parts which are indicated by dotted lines in the said Fig. 9. Fig. 10 is an elevation similar to Fig. 3, with the breech open. Fig. 10^a is a view similar to Fig. 10 but with the rear check-plate of the breech-frame broken away, to show clearly the arrangement of parts which are indicated by dotted lines in Fig. 10. Fig. 11 is a side elevation of the cam which is carried by the breech-block crank-shaft. Fig. 12 is a plan of Fig. 11. Fig. 13 is an end view of Fig. 11. Fig. 14 is a side elevation of the extractor. Fig. 15 is a plan of Fig. 14. Fig. 16 is an end elevation of Fig. 14. Fig. 17 is a side elevation of the breech of a gun to which an obturator is applied according to my invention. Fig. 18 is a central longitudinal section of Fig. 17 and Fig. 19 is an end elevation of Fig. 17. Fig. 20 is a perspective view of the cam F² hereinafter referred to and shows the outer side of the same, that is to say, the side of the cam which faces the cheek plate of the cradle. Fig. 21 is a perspective view of the opposite side of the cam. Fig. 22 is a perspective view of the lever L hereinafter referred to. Fig. 23 is a perspective view of the extractor as it would appear if viewed from above and a little to the rear thereof. Fig. 24 is a plan view of the bolt J hereinafter referred to. Fig. 25 is a plan view of the shaft F hereinafter referred to. Figs. 2 to 16 are all drawn to a larger scale than Fig. 1 and Figs. 17, 18 and 19 are drawn to a slightly smaller scale than Figs. 2 to 16.

Like letters indicate the same parts throughout the drawings.

A is the gun.

B is the cradle in which the gun is supported and in which it moves in the direction of its length during recoil and running out.

B' B' are two cheeks formed by rearward extensions of the cradle which are secured together at their rear ends by the transom B² to which they are bolted. The said cradle is provided with trunnions B³ which rest in bearings formed in the extensions or cheeks C at the pivot about which the gun is trained.

D is a bearing within which the said pivot rotates and E is the carriage to which the said bearing is secured. The trigger and the cocking and firing mechanism of the gun may be of any suitable kind. As they form no part of my present invention they are not hereinafter referred to.

With reference now to the breech-actuating mechanism F is a crank-shaft which extends across the breech below the axis of the gun and turns in bearings formed in the said breech. A crank arm F' keyed or otherwise firmly secured to the said shaft, in the partial rotation of the shaft about its axis raises or lowers the breech block G by sliding it up or down the breech frame. The walls of the breech frame and the sides of the block are formed with grooves and projections A' G² which serve as guides and bearing or resisting surfaces by which the block is securely held

against the breech. With reference to Fig. 25, it will be seen that the said shaft is provided with two cylindrical portions *f* which act as journals and rest in cylindrical bearings in the cheeks of the breech. It is also provided with hexagonal portions *f'* *f*². The portion *f'* has one of its sides curved as shown and is shaped to enter a correspondingly shaped hole *f*³ in the cam F² (see Figs. 20 and 21) and the portion *f*² also has a curved side and is shaped to enter a correspondingly shaped hole in the breech-operating crank arm F'. The shape of the said portions and the holes which they enter insures that the cam and the breech-operating lever shall be put in proper position on the shaft, and retained in that position. One end of the shaft F projects beyond the side of the breech frame and has a cam F² secured upon the said projecting end. The said cam is an important feature of my present invention. A raised portion F³ of its face is beveled and inclined as shown. The edge of the said raised portion is shaped so that it has a plane surface at H' and another plane surface H² inclined to the said portion H' and merging by the curve H³ into a recess at H⁴.

I is an extension formed in one piece with the cam F² and provided with a hook I² for a purpose to be hereinafter explained.

J is the aforesaid pin or bolt capable of sliding in its bearing in the cradle in a direction transverse to the axis of the gun. The outer end of the said pin or bolt is fitted with a handle J' by which it may be actuated from the outside of the cradle, and the inner end of the pin or bolt is preferably provided with an enlarged head J² which serves as a stop. A spiral spring K surrounds the said pin or bolt and is held between the head J² thereof and a projection B⁴ forming part of the transom B². The said spring exerts pressure upon the pin or bolt tending to force it toward the cam F² and, with the parts in positions in which they are shown in Figs. 1, 2^a, 3^a and 9^a retains the head of the pin or bolt in contact with the face of the cam F².

A lever L shown in Figs. 6, 7 and 8 apart from the gun is pivoted at L' to a bracket formed upon one of the cheeks of the cradle. One end L² of the said lever is forked and engages with the rod J, and its opposite end L³ is bent inward and provided with an upwardly extending projection which is beveled as shown in Fig. 6.

The extractor comprises a pair of arms M each projecting from a boss or collar M', the two bosses or collars being carried upon a cross shaft N which turns in bearings O in the gun. The said bosses or collars are free to rotate upon the shaft N so that either part of the extractor may act independently of the other. A claw M² upon each arm engages with the rim of the cartridge when the same is placed in the gun. Inclined surfaces M⁴ are formed upon the extractor as shown. Stud G' on the breech block G will in the

descent of the said block strike these inclined surfaces and thereby operate the extractor to eject the spent cartridge from the gun. According to my invention I provide the said
 5 extractor with an arm M^3 extended downward therefrom as shown, so that in the movement of the extractor about its pivot when the lever L has moved into a position hereinafter referred to, the end of the said arm may come
 10 into engagement with the beveled end L^3 of the lever L and move the latter for the purpose hereinafter explained.

Projecting from the recoil-press cylinder P of the gun is a lug Q in which a hole is bored
 15 to receive the long cylindrical nut or sleeve R which is screwed upon one end of a rod S and may pass freely through the said hole. The other end of the said rod S passes through a projection T formed upon the gun and the
 20 said rod is connected by the link S' to the cam F^2 , an eye S^2 being provided upon the said rod, for the purpose of engaging with the hook I^2 upon the said cam. A spring U is held in compression between the nut or
 25 sleeve R and the projection T. The amount of compression put upon the said spring may be readily regulated by screwing the nut or sleeve R forward or backward upon the said rod S. If it is desired to disconnect the said
 30 link S' from engagement with the extension I from the cam F^2 in order to dismantle the gun it is only necessary to insert a tool between the shoulder S^3 on the rod S and the projection T on the gun and to move the said
 35 rod slightly toward the rear when the eye S^2 can be disengaged from the hook I^2 . By unscrewing the nut or sleeve R from the rod S the spring U may be removed and the rod S and link S' withdrawn from the gun through
 40 the hole T' in the projection T. Considerable force is sometimes required to extract a spent cartridge from the breech of the gun after it has been expanded tightly thereinto by the force of the explosion. I therefore
 45 provide means whereby the said spent cartridge may be slowly started from its position of rest, the extractor being afterward operated by the breech-block, to eject the cartridge-case smartly from the gun in the usual
 50 manner. For this purpose I form upon each arm M of the extractor a projection V extending into one of a pair of grooves W in the breech block G each of which is widened at its upper end and there provided with a recess
 55 W' . One edge of the said groove is inclined upwardly and rearwardly as at W^2 for a purpose which will be hereinafter explained.

I will now proceed to describe the manner
 60 in which the said improved breech mechanism operates, assuming to commence with that the gun is loaded and that the parts occupy the position in which they are shown in Figs. 1, 2, 3 and 9.

65 When the gun is fired it recoils in the cradle and carries the cam F^2 to the rear without rotating it and moves it past the head of

the bolt J, which, as aforesaid, rests in bearings in the cradle in which it may move in a direction at right angles to the direction of
 70 movement of the gun. The spring K, which, as aforesaid, always presses the bolt J in the direction of the inner side of the cam keeps the head J^2 of the bolt in contact with the
 75 raised portion F^3 of the said cam. Therefore the said head moves outward in the direction in which it is impelled by the said spring K as soon as it is permitted to do so by the
 80 movement of the cam sufficiently far to the rear with the gun, that is to say, as soon as the raised portion F^3 of the cam is no longer in front of the said head J^2 . By the said out-
 85 ward movement of the bolt its head is protruded into the path which the raised portion F^3 of the cam will traverse when it comes forward in the return movement or running out
 90 of the gun. During the recoil movement of the gun no rotation of the cam takes place and therefore the breech will remain closed, for the rod S, the link S' and the nut R all
 95 move toward the rear with the gun, the said nut being made cylindrical so as to slide freely through the hole in the lug Q, which acts as a bearing therefor. Therefore, at the
 100 termination of the recoil movement of the gun, the parts F^2 , S, S' , R and U will not have moved relatively to each other nor relatively to the gun, although they and the gun have
 105 moved to the rear in company. Moreover, any drag which may be exerted upon the cam F^2 through the rod S' during the said rearward movement, would tend to keep the
 110 breech closed. But by the protrusion of the said bolt head J^2 , as described, it is enabled to produce in the manner hereinafter explained, the rotation of the said cam as the
 115 latter returns with the gun. Movement of the pin or bolt J into its extreme position, as described, will move the lever L on its pivot L' so that the beveled portion of its end L^3
 120 comes into the path of the end of the downwardly extended arm M^3 of the extractor. During the running out of the gun the cam F^2 returning therewith brings the portion H'
 125 of its edge into contact with the head J^2 of the pin or bolt J so that by the movement of the shaft F with the gun relatively to the head J^2 the said cam commences to rotate in the
 130 direction of the arrow (Figs. 3 and 10) and causes the breech block to descend until the breech is fully open. In the downward movement of the breech block G the inclined
 135 portion W^2 of each groove W comes into contact with the projection V on each extractor arm, and in the further descent of the block moves the extractor arms M to the rear and causes them to start the empty case from the breech as hereinbefore described. The
 140 breech block continues to descend and the studs G' thereon, strike the inclines M^4 on the extractor, whereupon the arms M will be jerked or moved quickly to the rear to eject the cartridge and the projection V on
 145 each arm will be brought over the recess W' .

By the time that the breech is fully open the cam F will have assumed the position indicated in Fig. 5 and the straight surface H² thereof will be parallel with the direction of motion of the gun in the cradle. Consequently there will be a pause in the rotation of the cam F² while the said straight or plane surface slides over the head J² of the rod J and the descent of the breech block G will cease. During this pause in the rotation of the cam F² the breech block G is retained in its lowest position and the gun continues to run out. The maintenance of the said block in its lowest position insures that the studs G' shall bear upon the inclined surfaces M⁴ of the extractor so that the lower end of the arm M³ which, at the moment when the breech block assumes its lowest position is to the rear of the end L³ of the arm L, is kept well clear of the said end L³ until the extractor arm M³ traveling with the gun is above the beveled portion thereof. During the period in which, as aforesaid, the breech block is kept at its lowest level while the gun continues its forward or running out movement it is impossible for any rebound of the extractor to take place, for the studs G' continue to bear upon the surfaces M⁴, and should any rebound occur when the breech block rises from its lowest position into that shown in Fig. 10, the only effect would be that the end of the arm M³ might strike the end L³ of the lever L but would not exert sufficient force to operate it because of the resistance of the spring K to the movement of the bolt with which the opposite end of the lever is connected. The cam then moves farther forward with the gun after the straight surface H² leaves the head J² of the pin J and the cam and shaft then begin to turn in the opposite direction and slightly raise the breech block until the cam is brought to rest in the position indicated in Fig. 10 being held in this position by the head J² in opposition to the pull of the spring U. It will be obvious that during the said movement of the cam into the position indicated in Fig. 10 the movement of the cam and consequently of the breech block will be gradual owing to the curve of the portion H³ of the cam. During the rotation of the cam F² and the shaft F in the direction of the arrow the hook I² on the extension I of the cam draws the rod S and the link S' toward the rear and moves the nut R toward the projection T causing it to compress the spring U. In the slight return movement of rotation of the cam from the position indicated in Fig. 5 into the position shown in Fig. 10 the compression of the spring U is slightly relaxed but it maintains a pull upon the rod S and the link S' which is sufficient to cause the cam F² and shaft F to turn in a direction opposite to that of the arrow and into position to raise the breech block and close the breech if the pin or bolt J be withdrawn from contact with the edge of the cam.

The pin or bolt J may be withdrawn from

engagement with the cams F² by hand, by pulling the handle J' in a direction away from the gun, or automatically by the contact of the rim of the cartridge with the claws M² upon the extractor arms M which as the cartridge is pushed home into the chamber will cause the downwardly extended arm M³ of the extractor to descend in the vertical plane and to come into contact with the beveled end L³ of the lever L so as to move the said lever in the horizontal plane upon its pivot L' and cause its opposite end L³ to move the rod J transversely in its bearings against the resistance of the spring K and thereby withdraw the head J² from the cam.

To prevent the premature release of the breech block by the accidental contact of a partially inserted charge with one of the two arms of the extractor the said extractor and other parts of the apparatus hereinbefore described may be arranged as follows—that is to say, each arm of the divided extractor is provided with a projection which is situated and utilized in the same manner as the projections V on the extractor hereinbefore described, and for another purpose, for which other purpose the projections upon the arms of the double extractor are in the descent of the breech block brought over the recesses W' of the breech block so that should either portion of the extractor be operated by an ingoing charge and actuate the pin or bolt J to release the cam F² the breech block will tend to rise owing to the action of the spring U but will be retained by the reason of the engagement of the projection on the arm of the other portion of the extractor with the wall of the recess W' in the manner illustrated in Fig. 10. But as soon as the charge is properly inserted in the chamber both of the extractor arms will be disengaged from the breech block which by the action of the spring U will then complete its upward movement to close the breech. Thus by making the extractor in independent duplicate parts I obtain a very efficient safety device. The pin may as an alternative arrangement be controlled by two levers pivoted to the cradle like the lever L, instead of by one lever L, hereinbefore described. In such a case, the said two levers would be pivoted at opposite sides of the cradle, and each of the two would be either operated by a pair of downwardly-extending arms similar to the single arm M³ but suitably shaped at its lower end to operate two such levers instead of one; or I may arrange so that both of the extractor sections have a downwardly-extending arm similar to the arm M³ each to operate one of the said two levers, but I prefer that there should be only one of the said downwardly-extending arms for the purpose specified.

It should be clearly understood that the cam upon the breech block crank-shaft and the transverse rod which slides in the carriage and by which the cam is engaged may be in duplicate—that is to say, one set of the

mechanism with a corresponding breech-actuating spring may be arranged on each side of the gun so that the said transversely sliding rods are actuated by any of the arrangements of extractor hereinbefore described.

Automatic and quick-firing guns have heretofore been constructed for the use of fixed ammunition, but in Figs. 17, 18 and 19 I have shown a modification of my invention designed to adapt such guns for the use of ammunition in the ordinary form in which it is used in artillery—that is to say, for the use of powder in separate cartridges or envelopes. For this purpose I provide the gun with an arm or lever X fixed on a small transverse shaft X' supported in bearings in the breech frame in which the said shaft rotates. To the said arm or lever I attach an obturator X² of the usual or any suitable form or type. I hinge or otherwise attach the obturator X² to the said arm or lever X in such a manner that it may have a slight amount of play or free movement, in order that it may not become jammed in the chamber by reason of the angular movement of the arm or lever X. For example the obturator shown in the drawings, which is of the well-known De Bange type, has its stem provided with a cross head Y by means of which it is retained in place on the arm X the said arm being recessed at X³ and the bottom of the recess being slotted at X⁴ so that the cross head may first be passed through the slot X⁴ and afterward rotated about its axis through a right angle into a position in which the said cross-head, lying in the recess, and across and at right angles to the said slot retains the obturator upon the arm and allows it to have movement relatively thereto by sliding in the slot X⁴. The shaft X' is provided with a handle, not shown in the drawings, by which it may be turned in its bearings. The said shaft is also provided with a cam or projection Z. The arm or lever X is moved about the axis of the shaft X' in order to introduce the obturator into the chamber of the gun or to withdraw it therefrom and is so arranged that when the breech is closed by the obturator the said arm or lever bears against the end of the breech as shown and is held in that position by the breech block G which slides into position behind it; the said block is provided with projections G² which engage with similar projections A' formed in the wall of the breech frame, the said projections being preferably inclined to the end face of the breech so that as the block rises it moves forward and forces the obturator arm or lever X into close contact with the said end face. The arm or lever X may be operated by hand or by the cam or projection Z which in the recoil and running out of the gun will come into contact with stops or projections on the cradle or carriage of the gun and will operate the obturator automatically; or I connect the said arm or lever with the breech block or with the automatic or other mechanism which op-

erates the breech block, so that when the breech block is moved for the purpose of opening or closing the breech the obturator will be automatically withdrawn from or inserted in the chamber.

When the breech block or its arm or lever and the obturator are connected, I provide for a certain amount of lost motion in the connection, in order that in the opening of the breech the block may commence to move in advance of the obturator and the said block and obturator may be operated in the reverse order in the closing of the breech.

In order that the obturator shall be always forced completely home in the charge chamber in the closing of the breech I bevel one of the edges G³ of the breech block G so that unless the obturator is in its proper position, with the arm or lever X lying in close contact with the end of the breech the said beveled edge will strike the said arm or lever and force it into place, causing it to bear against the end of the breech in which position it is held by the breech block aforesaid as shown in Fig. 13.

The improvements hereinbefore described are applicable not only to an automatic or quick-firing gun which slides in a trunnioned cradle, but are applicable also to an automatic or quick-firing gun trunnioned in a cradle which travels in slides.

I claim—

1. In ordnance the combination of the gun A, the breech-block crank-shaft F turning in bearings in the gun, the cam F² secured upon the breech-block crank-shaft, the cradle B, the pin or bolt J in bearings in the cradle, and the spring K, substantially as set forth for the purposes specified.

2. In ordnance the combination of the gun A, the breech-block crank-shaft F turning in bearings in the gun, the cam F² secured upon the breech-block crank-shaft, the spring U connected to the breech-block crank-shaft and bearing on the gun, the cradle B, the pin or bolt J in bearings in the cradle and the spring K, substantially as set forth for the purposes specified.

3. In ordnance the combination of the gun A, the breech-block, the breech-block crank-shaft F turning in bearings in the gun, the cam F² secured upon the breech-block crank-shaft, the spring U connected to the breech-block crank-shaft and bearing on the gun, the cradle B, the pin or bolt J in bearings in the cradle, the spring K, the lever L, the extractor M with an extension M³ and cam surfaces M⁴ thereon, substantially as set forth, for the purposes specified.

4. In ordnance the combination of the gun A, the breech-block G provided with grooves having the cam surfaces W² therein, the pivoted extractor M having projections V thereon extending into the cam grooves in the breech-block, as set forth.

5. In ordnance the combination of the gun A, the breech-block G provided with grooves

having cam surfaces W^2 therein, the recesses W' in the cam grooves, the pivoted extractor M and the projections V on the same entering and engaging with the cam grooves of the breech-block, as set forth.

6. In a gun of the kind described the combination of the lug or projection Q on the recoil-press cylinder, the long nut or screw-threaded sleeve R passing through the same, the rod S secured to the sleeve R , the link S' , the breech-block crank-shaft F connected to rod S by the link S' , the cam F^2 ; the hook I^2 on the cam, the bolt J operated in conjunction with the cam and a spring U compressed or compressible between the lug Q and the sleeve R ; as set forth.

7. In ordnance the combination of the gun A , the breech-block crank-shaft F turning in bearings in the gun, the pin or bolt J in bearings in the cradle, the spring K , the cam

F^2 secured upon the breech-block crank-shaft and having upon its face a raised and beveled portion F^3 provided with a plane surface H' , another plane surface H^2 inclined to the surface H' , the curve H^3 and the recess H^4 , said recess being connected with the surface H^2 by the curve H^3 to cause the easy starting and stoppage of the shaft F in two angular movements with a pause between them, substantially as set forth for the purpose specified.

In testimony whereof I have hereunto signed my name, this 1st day of December, 1891, in the presence of two subscribing witnesses.

CARL HOLMSTRÖM.

Witnesses:

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