No. 870,719. PATENTED NOV. 12, 1907.

C. FREEMAN.

AUTOMATIC FIREARM.

APPLICATION FILED AUG. 17, 1905.

3 SHEETS—SHEET 1.

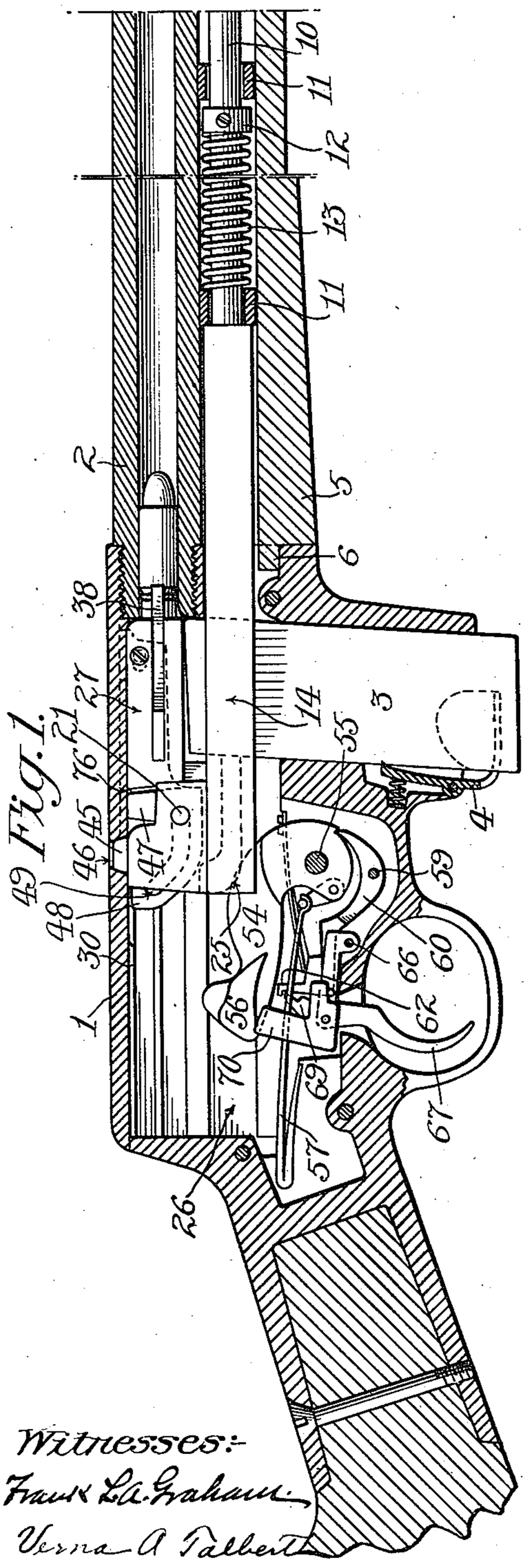

Fig. 1.

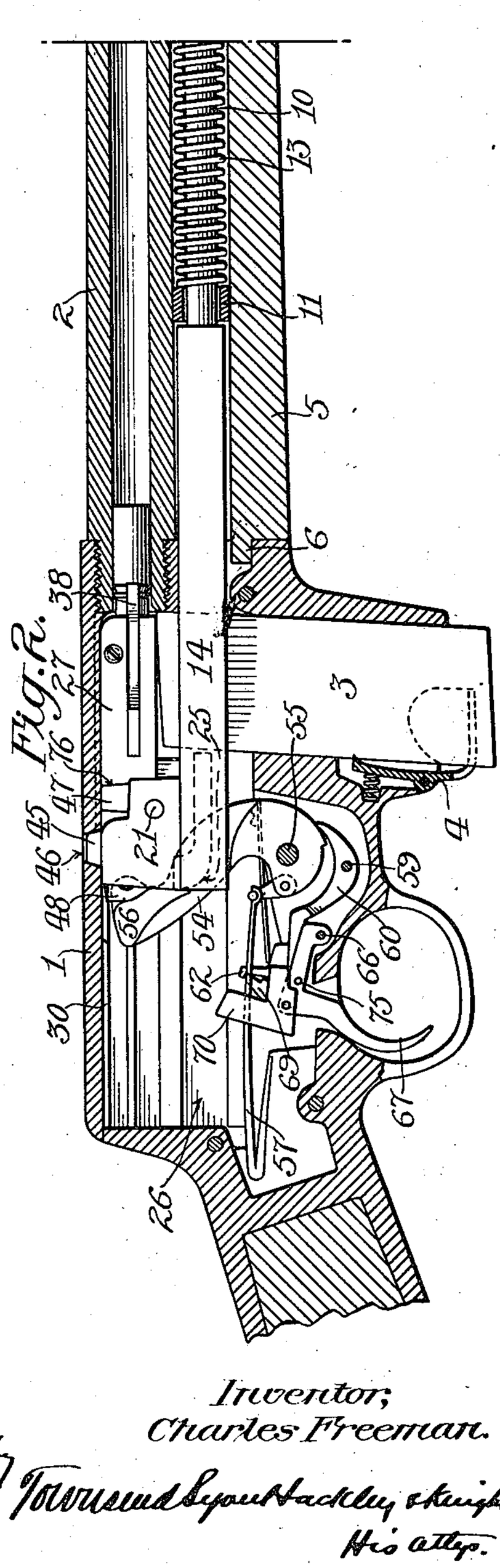

Fig. 2.

Witnesses:-
Frank L. A. Graham.
Verna A Talbert

Inventor;
Charles Freeman.
by Townsend Lyon Hackley & Knight
His attys.

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3 SHEETS—SHEET 2.

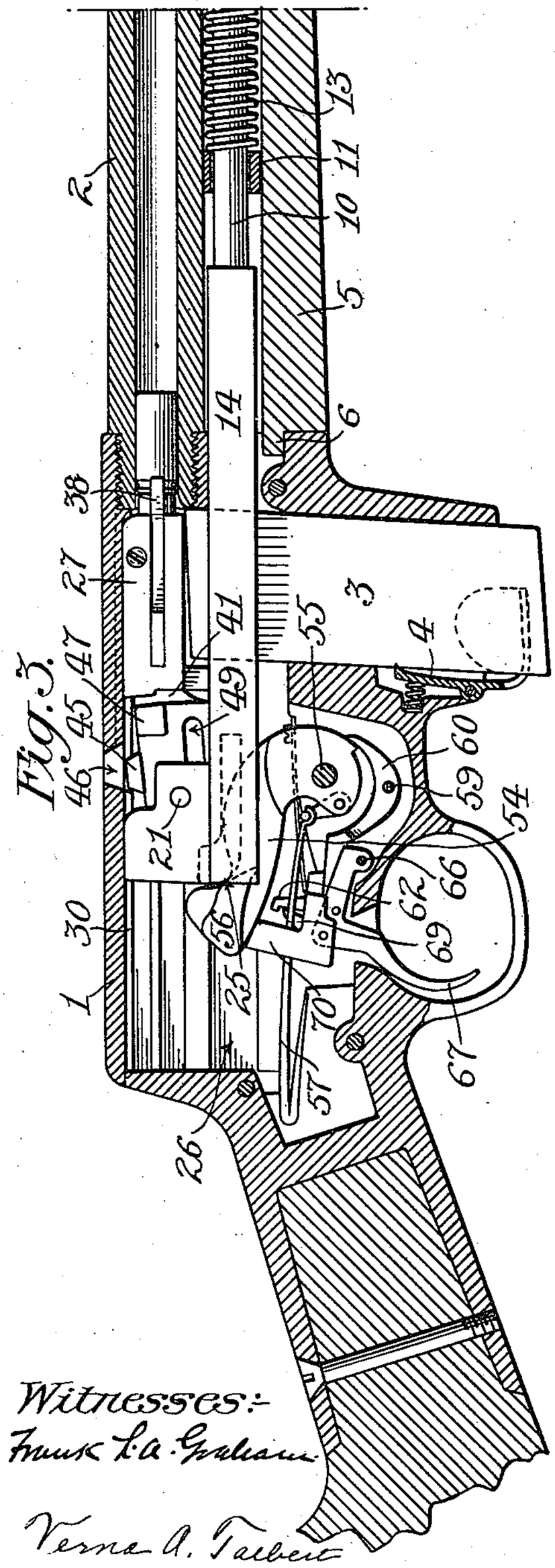

Fig. 3.

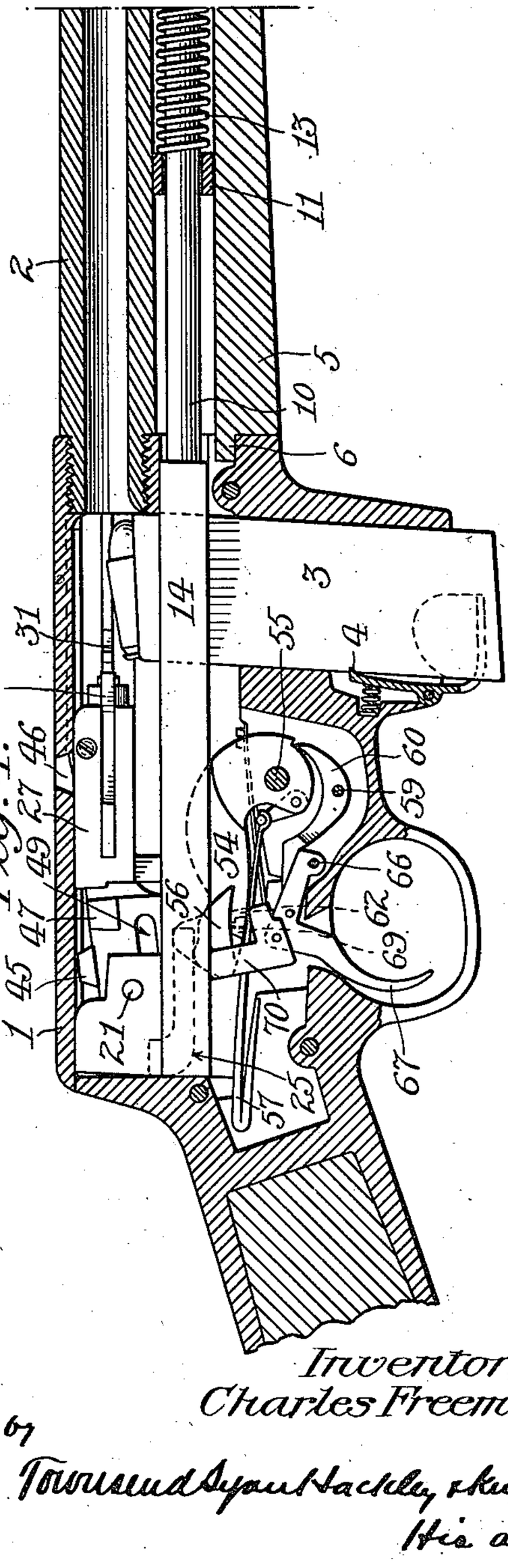

Fig. 4.

Witnesses:-
Frank L. A. Graham
Verna A. Talbert

Inventor;
Charles Freeman.
by
Townsend Sperry Hackley & Knight
His attys.

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3 SHEETS—SHEET 3.

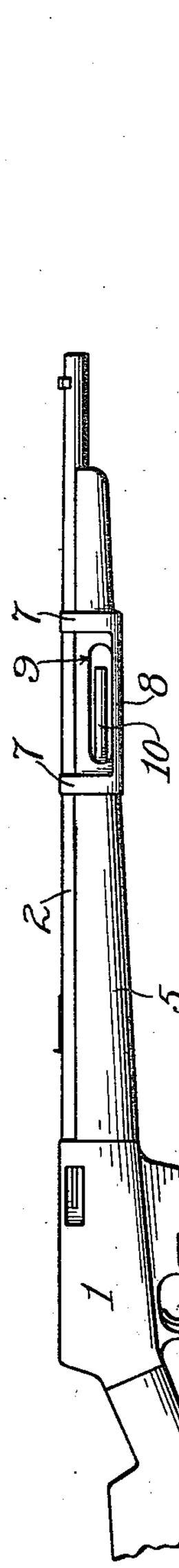

Fig. 5.

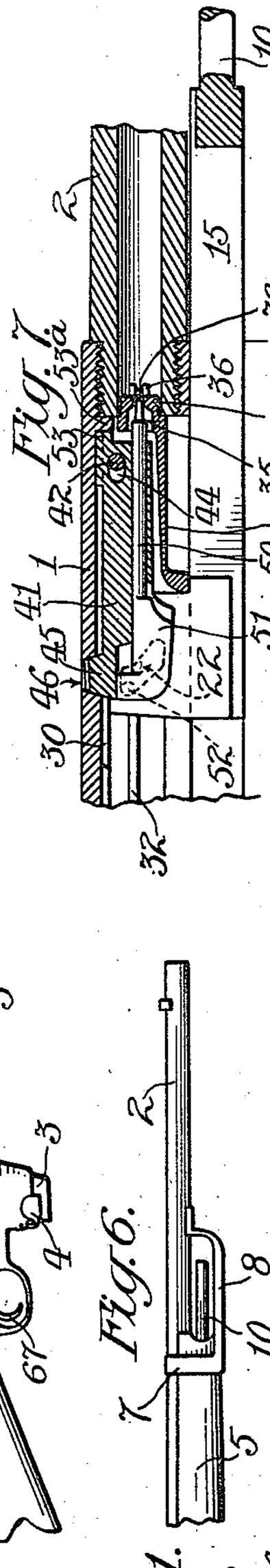

Fig. 6.

Fig. 7.

Fig. 7a.

Fig. 15.

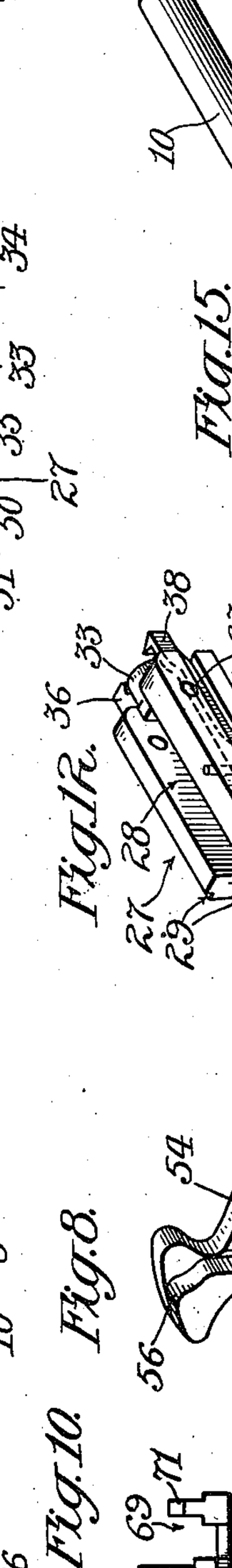

Fig. 15.

Fig. 12.

Fig. 12.

Fig. 8.

Fig. 9.

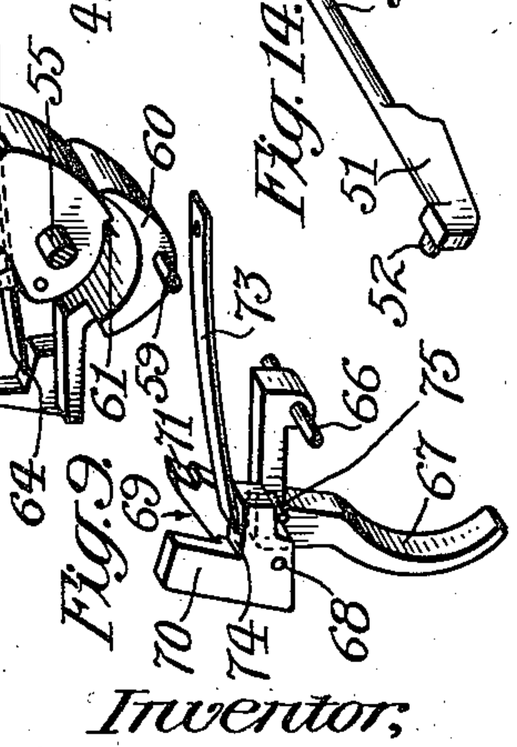

Fig. 14.

Fig. 14.

Fig. 11.

Witnesses:-
Frank La. Graham.
Verna A. Talbert.

Inventor;
Charles Freeman.

by Townsend Sperry Hadley & Knight
Their attys.

UNITED STATES PATENT OFFICE.

CHARLES FREEMAN, OF LOS ANGELES, CALIFORNIA.

AUTOMATIC FIREARM.

No. 870,719. Specification of Letters Patent. Patented Nov. 12, 1907.

Application filed August 17, 1905. Serial No. 274,522.

To all whom it may concern:

Be it known that I, CHARLES FREEMAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Automatic Firearm, of which the following is a specification.

This invention relates to automatic fire-arms of the type shown and described in a former application of mine, filed August 15, 1904, Serial Number 220,740, embodying a new principle in automatic fire arms which consists in allowing a device such, for instance, as the breech-bolt, a short backward primary movement upon the discharge of the arm, this movement being stopped by a suitable locking means; the great bulk of the backward thrust from the explosion in the barrel being solidly opposed by this locking means to the breech-bolt; meanwhile a momentum-block which, while the parts are in their closed and locked position, is in intimate contact with the breech-block (which, in fact, it holds in its forward position through pressure exerted by a reaction spring) receives impulse from the short primary movement of the breech-block the momentum thus imparted to the momentum-block being sufficient to reciprocate it along the frame, unlock the breech-bolt, pull it back from the breech, compress a reaction spring and operate the arm, the pressure of the reaction spring then reverses the movement of the momentum-block which then operates to close the breech and leave the arm in its normal closed position.

The main object of the present invention is to improve the construction of this type of automatic fire arms throughout the mechanism to secure compactness, strength, durability and easy action.

A further object is to provide an improved trigger mechanism.

Another object is to provide means for protecting the external manual operating device against accidental interference.

The accompanying drawings illustrate the invention, and referring thereto:—Figure 1 is a vertical longitudinal section through the breech of the fire-arm, showing the parts in the position which they have before the trigger is pulled. Fig. 2 is a similar view, showing the position of the parts immediately after the discharge, the breech-bolt and momentum-block having been moved back a slight distance to the point at which the backward movement of the breech-bolt is stopped by the locking-block. Fig. 3 is a similar view, showing the next position of the parts in which the momentum-block has moved farther back and has tilted the locking-block and unlocked the latter from the frame. Fig. 4 is a similar view, showing the next position of the parts in which the momentum-block has moved to the extreme rearward limit of its stroke, cocked the hammer and retracted the breech-bolt, the shell having been ejected and a fresh cartridge being shown springing into place. Fig. 5 is a side elevation of the fire-arm, part of the stock being broken away and illustrates one form of guard for protecting the stem of the momentum-block. Fig. 6 is a side elevation of the forward end of the barrel and fore-stock, and illustrates a modified form of guard which protects the stem of the momentum-block. Fig. 7 is a longitudinal vertical section taking diametrically through the breech-bolt locking-block and adjacent parts of the frame, showing the firing-pin in elevation, the locking-block being in locked position. Fig. 8 is a perspective view, showing in detail the hammer and sear. Fig. 9 is a perspective view, showing in detail the trigger and sear operating device. Fig. 10 is a front elevation showing in detail the sear operating device detached from the trigger. Fig. 11 is a perspective view showing the trigger only. Fig. 12 is a perspective view showing in detail the breech-bolt. Fig. 13 is a perspective view showing in detail the locking-block. Fig. 14 is a perspective view showing in detail the firing-pin. Fig. 15 is a perspective view showing in detail the momentum-block, part of its stem being broken away.

1 designates the frame to which is rigidly attached the barrel 2. The lower part of the frame 1 is chambered to receive a magazine 3 which may be of the common box magazine type as shown and detachably held in place by a spring controlled detent 4. The fore-stock 5 projects forward from the frame 1 underneath the barrel 2, its rear end being held in place by a toe 6 which engages the frame 1 while its forward end is retained by straps 7 which are united by a guard 8, the fore-stock 5 being cut away to form a slot 9, into which projects the end of the stem 10 of a momentum-block about to be described. The slot 9 allows the stem 10 to be manually retracted when desired, and as the stem 10 lies in the slot 9 and is protected by the guard 8 and walls of the slot, its accidental operation is prevented.

As shown in Fig. 1, guides 11 which depend from the barrel 2, serve to guide the momentum-block stem 10. A collar 12 is fastened to the stem 10 and a reaction-spring 13 is interposed between the collar 12 and the rear guide 11, and the reaction-spring 13 operates to actuate the momentum-block stem 10 forward together with its connected parts, as will be hereinafter described. As shown in Fig. 15, the rear end of the momentum-block stem 10 is joined to a bifurcated member 14 having legs 15 and 16 which are respectively provided at their rear ends with raised lugs 17 and 18, each of which has shoulders 19 and 20. The lug 18 is provided with an inwardly projecting pin 21. The lug 17 is provided with an inclined slot 22, enlarged at its upper end and formed with a shoulder 23. Projecting inwardly from the rear end of the leg 16 and from the lug 18 is a boss 24, having a rounded shoulder 25. The bifurcated member 14, stem 10, together with the

lugs 17 and 18, form what will be termed a momentum-block. The legs 15 and 16 are slidably mounted in grooves or ways 26 formed in the side walls of the frame 1, as shown in Figs. 1, 2 and 3.

Slidably mounted in the frame 1, directly back of the barrel 2, is a breech-bolt 27, shown in detail in Fig. 12, being provided with a longitudinal recess 28 and with grooves 29 on one side. The upper wall of the frame 1 has a downwardly projecting rib 30 which projects slightly into the recess 28 and serves to strengthen the top wall of the frame 1 and also to guide the breech-bolt. As shown in Fig. 4, an ejector 31 is arranged on the frame over which the groove 29 of the breech-bolt slides. The left side of the frame is provided with a longitudinal rib 32 and with a corner rib (not seen), over which the grooves 29 in the breech-bolt 27 slidably fit. The extreme forward nose 33 of the breech-bolt is centrally perforated at 34 and is counterbored to form a recess 35 adjoining the perforation 34. One side of the breech-bolt is provided with claws 36 against which the rim of the cartridge rests, while the other side of the breech-bolt is provided with a spring retractor hook 38 which engages the rim of the shell to carry the same back with the breech-bolt until the shell is ejected. The rear end of the breech-bolt has abutments 39, which act against the shoulders 20 of the momentum-block to impart movement to the momentum-block when the fire-arm is discharged, as will be hereinafter described. The rear end of the breech-bolt 27 is also provided with abutments 40.

Mounted in the recess 28 of the breech-bolt is a locking-block 41, the latter being pivoted to swing vertically in the recess 28 by means of a pin 42 which is fixed in the breech-bolt 27 at the perforations 43, and the locking-block 40 is provided with an elongated slot 44 which allows a slight longitudinal movement of the breech-bolt relatively to the locking-block. The locking-block near its rear end is provided with an upwardly projecting lug 45, which is adapted to engage in a locking-notch 46 formed in the upper wall of the frame 1. (See Figs. 1, 2, 3 and 7). The locking-block 41 is provided with a pair of side lugs 47, against which the abutments 40 of the breech-bolt strike and serve to stop the backward movement of the breech-bolt when the locking-block is in locked position, engaging the notch in the frame. The locking-block 41 is provided with a wing 48 having a tortuous slot 49, and the wing 48 lies between the lugs 17 and 18 of the momentum-block, while the pin 21 of the latter projects into the slot 49.

The locking-block 41 near its lower edge is bored longitudinally to receive the stem of a firing-pin 50, as shown in Fig. 7. The rear end of the firing-pin 50 has a flattened shank 51 with a laterally extending stud 52, which projects into the slot 22 in the lug 17 of the momentum-block. The forward end of the firing-pin 50 extends into the recess 35 of the breech-bolt and into the perforation 34 when in normal position, as shown in Fig. 7. The forward end of the locking-block 41 has a projection 53 which strikes against a shoulder 53ª on the frame to limit the forward movement of the locking-block.

54 designates the hammer which is pivoted at 55 to the frame, and is provided with an off-set lug 56, against which the rounded abutment 25 of the momentum-block strikes when the momentum-block moves back, and as the latter continues toward the rear end of its stroke, the abutment 25 rides over the lug 56 and throws back the hammer.

57 designates the main-spring which acts upon the stirrup 58 to throw the hammer forward when it is released. Pivoted at 59 below the hammer is a sear 60 which is adapted to normally engage the cocking-notch 61 of the hammer. The rear end of the sear 60 is provided with an arm 62 having a rearwardly extending lip 63 and with a shoulder 64, against which a sear spring 65 presses, as shown in Fig. 8.

Pivoted at 66 is a trigger 67, and pivotally mounted at 68 on the trigger 67 is a sear-operating device 69 comprising an arm 70 and a finger 71 which is adapted to coact with the arm 62 to operate the sear, as will hereinafter be described. A flat spring 73 presses against the off-set shoulder 74 of the arm 70 and serves to normally hold the arm 70 against a stop pin 75, which projects laterally from the trigger 67, to yieldingly hold the trigger in normal position.

The operation of the trigger mechanism will first be described.

The hammer 54 is pushed back by the backward movement of the momentum-block 14 through the medium of its rounded abutment 25 which presses against the lug 56 on the hammer. The first cartridge is inserted by manually retracting the momentum-block by pressing back the stem 10 and then releasing it, and the subsequent operation of the fire-arm is performed automatically as will be described.

Fig. 3 shows the hammer being pressed back by the rounded abutment 25, and it will be observed that the finger 71 of the sear operating device stands under the lip 63 of the sear arm 62. This is due to the trigger being manually held back, for the hammer is swung back automatically after the discharge of the fire-arm with great rapidity before the trigger can be released. As the momentum-block continues further back, the rear end of its leg 16 strikes the arm 70 and tilts the sear operating device, as shown in Fig. 4, so that the finger 71 is retracted from under the lip 63 of the sear arm, whereupon the sear 60 becomes operative so that it engages the cocking notch 61 of the hammer. If the finger 71 of the sear operating device was not moved back from under the lip 63, the sear would be held out of engagement with the cocking notch and the hammer would not be caught by the sear. As soon as the sear engages the cocking notch, and when the momentum-block moves forward and releases the arm 70, the spring 73 tilts the sear operating device upon its pivot 68 until it is stopped by the finger 71 striking against the edge of the lip 63, and as soon as the trigger is released it carries down the sear operating device bodily, and so that when the finger 71 clears the lower edge of the lip 63, the spring 73 snaps the sear operating device into normal position in which the lip 63 stands over the finger 71 ready to be operated thereby upon the upward movement of the finger 71 when the trigger is again pulled, thus the sear is always in condition to engage the hammer when it is cocked until the trigger is released and again pulled so that the hammer is always cocked upon the backward movement of the momentum-block even before the trigger has been released.

The fire-arm is ready to be discharged when the

parts stand in the position shown in Fig. 1. It will be noted that the locking-block 41 is locked with the frame, that the breech-bolt is in extreme forward position abutting against the rear end of the barrel and leaving a slight space 76 between the abutments 40 of the breech-bolt 27, and the lugs 47 of the locking-block 41; the momentum-block is also in extreme forward position with its shoulders 20 lying in contact with the abutments 39 of the breech-bolt, and its shoulder 19 lying under the lugs 47 of the locking-block 41 so that the latter is supported in locked position. The pin 21 of the momentum-block is in the forward horizontal portion of the slot 49 of the locking-block; the firing pin is in normal position with its end slightly back of the cartridge, the stud 52 of the firing pin being in the upper and rear end of the slot 22 of the momentum-block. Upon pulling the trigger the hammer is released and strikes the rear end of the firing pin 50 which is driven forward slightly and explodes the cartridge. The recoil drives back the breech-bolt and momentum-block together, but as soon as the breech-bolt has moved back the distance allowed by the slight space 76, it is stopped by the locking-block, the abutment 40 of the breech-bolt strikes the lugs 47 of the locking-block, the parts now being in the position shown in Fig. 2 in which it will be seen that the space 76 is closed. The momentum-block thus receives a definite amount of energy from this short movement of the breech-bolt and continues moving back after the breech-bolt has been stopped, and the shoulder 23 on the lug 17 of the momentum-block acting against the stud 52 retracts the firing pin so that the front end of the latter lies within the enlarged recess 35 of the breech-bolt. During this short part of the travel of the momentum-block, its pin 21 traverses the longitudinal portion of the slot 49, and the locking-block 41 remains locked with the frame, but the further backward movement of the momentum-block causes its pin 21 to ride along the inclined rear portion of the slot 49 which results in swinging down the locking-block 41 on its pivot and unlocking it from the frame, the locking-block in swinging down carries the firing pin bodily with it, but as the front end of the firing pin has already been retracted from the orifice 34, its forward end swings freely in the enlarged recess 35. The parts now stand as shown in Fig. 3. As the momentum-block continues moving back from this position it pulls the locking-block with it, and the locking-block pulls along the breech-block so that these three parts including the firing pin move back together to the position shown in Fig. 4. During this movement the fired shell in the grasp of the extractor is pulled back with the breech-bolt and strikes the ejector 31 and is ejected through the side of the frame in the well known manner, and a fresh cartridge from the magazine springs up in front of the breech-bolt as shown in Fig. 4.

During the operation of the parts above described, the reaction spring has been compressed by the backward movement of the momentum-block and at the termination of the rear stroke of the latter, the reaction spring expands and draws the momentum-block forward and the momentum-block pushes forward the locking-block and the breech-bolt which is linked with the latter. When the front projection 53 of the locking-block strikes the front part of the frame it is stopped, and as the momentum-block moves still further forward into its normal position, its pin 21 riding forward in the slot 49 swings up the locking-block and throws the lug 45 of the latter into the notch 46 in the frame, and the shoulders 19 slide under the lugs 47; at the same time the firing pin is pushed forward into normal position, its stud 52 being acted upon by the rear inclined wall of the slot 22. Towards the conclusion of the forward movement of the momentum-block, it brings the breech-bolt into its extreme forward position with its rear abutments 39 in intimate contact with the shoulders 20 of the momentum-block, leaving the slight space 76 between the abutments 40 of the breech-bolt and the lugs 47 of the locking-block, and as the hammer has been left cocked, as previously described, the arm is ready to be fired.

Experience has shown that the space 76 between the abutments 40 of the breech-block and the lugs 47 of the locking-block need not be greater than 1/32 of an inch to cause the desired amount of energy to be transmitted to the momentum-block.

What I claim is:—

1. In an automatic fire-arm a frame, a breech-bolt slidably mounted on said frame and being recessed for the greater part of its length, a locking-block pivoted therein and having a vertical locking movement against the frame, a firing pin mounted in said locking-block and extending forwardly through the breech-bolt, a momentum-block coacting with said firing pin to withdraw it from contact with the breech-block, before the unlocking movement begins.

2. In an automatic fire-arm, a frame, a hammer pivoted in said frame, a sear pivoted in said frame, a trigger mounted in said frame, a member pivoted on said trigger to engage the rear end of the sear when the parts are in their normal closed position, and means for cocking the hammer and throwing the pivoted member out of engagement with the sear.

3. In an automatic fire-arm, a frame, a hammer mounted in said frame, a sear pivoted in said frame, a trigger, a member pivoted on said trigger so as to engage the rear end of the sear when the parts are in their normal closed position, a reciprocating momentum-block mounted in the frame, contacting with the hammer to cock the same and with the pivoted member upon the trigger to throw the trigger out of engagement with the sear.

4. In an automatic fire-arm, a frame, a hammer mounted in said frame, a sear pivoted in said frame, a trigger, a member pivoted on said trigger so as to engage the rear end of the sear when the parts are in their normal closed position, a reciprocating momentum-block mounted in the frame contacting with the hammer to cock the same and with the pivoted member upon the trigger to throw the trigger out of engagement with the sear, and intermediate means between a cartridge in the barrel and the momentum-block whereby a limited amount of the total energy derived by the explosion is imparted to the momentum-block.

5. In an automatic fire-arm, a breech-bolt recessed longitudinally, a locking-block in said recess and provided with lugs for coacting with an abutment on the breech-bolt for stopping the latter when the locking-block is in locked position, and a firing pin carried bodily by the locking-block.

6. In an automatic fire-arm, a breech-bolt, a locking-block engaging the breech-bolt and controlling the operation of the breech-bolt, a firing pin carried by the locking-block, the forward end of the breech-bolt being perforated to receive the end of the firing pin, and means for retracting the firing pin in the locking-block before the locking-block is unlocked.

7. In a fire-arm, a breech-bolt recessed the greater portion of its length, a locking-block lying in said recess and mounted to swing in a vertical plane, a firing pin carried by the locking-block, the forward end of the breech-bolt having a perforation for receiving the end of the firing

pin, and means for retracting the firing pin free from the perforation before the locking-block is swung down from its locked position.

8. In an automatic fire-arm, a frame, a barrel fixed on the frame, a breech bolt slidably mounted on said frame and being recessed for the greater part of its length, a locking block pivoted therein and having a vertical locking movement against the frame, a firing pin mounted in said locking block and extending forwardly through the breech bolt, a momentum block coacting with said firing pin to withdraw it from contact with the breech block before the unlocking movement begins, the momentum block extending forward under the barrel, and means mounted on the barrel for slidably engaging the forward end of the momentum block and keeping it in alinement with the frame.

9. In an automatic fire arm, a frame, a barrel on said frame, a hammer mounted in said frame, a sear pivoted in said frame, a trigger, a member pivoted on said trigger so as to engage the rear end of the sear when the parts are in their normal closed position, a reciprocating momentum block mounted in the frame contacting with the hammer to cock the same and with the pivoted member upon the trigger to throw the trigger out of engagement with the sear, intermediate means between a cartridge in the barrel and the momentum block whereby a limited amount of the total energy derived by the explosion is imparted to the momentum block, the momentum block having a forward extension, an operating spring mounted upon said extension, and means mounted on the barrel for slidably engaging the forward end of the momentum block.

In testimony whereof, I have hereunto set my hand at Los Angeles California this 10th day of August 1905.

CHARLES FREEMAN.

In presence of—

GEORGE T. HACKLEY,

VERNA A. TALBERT.