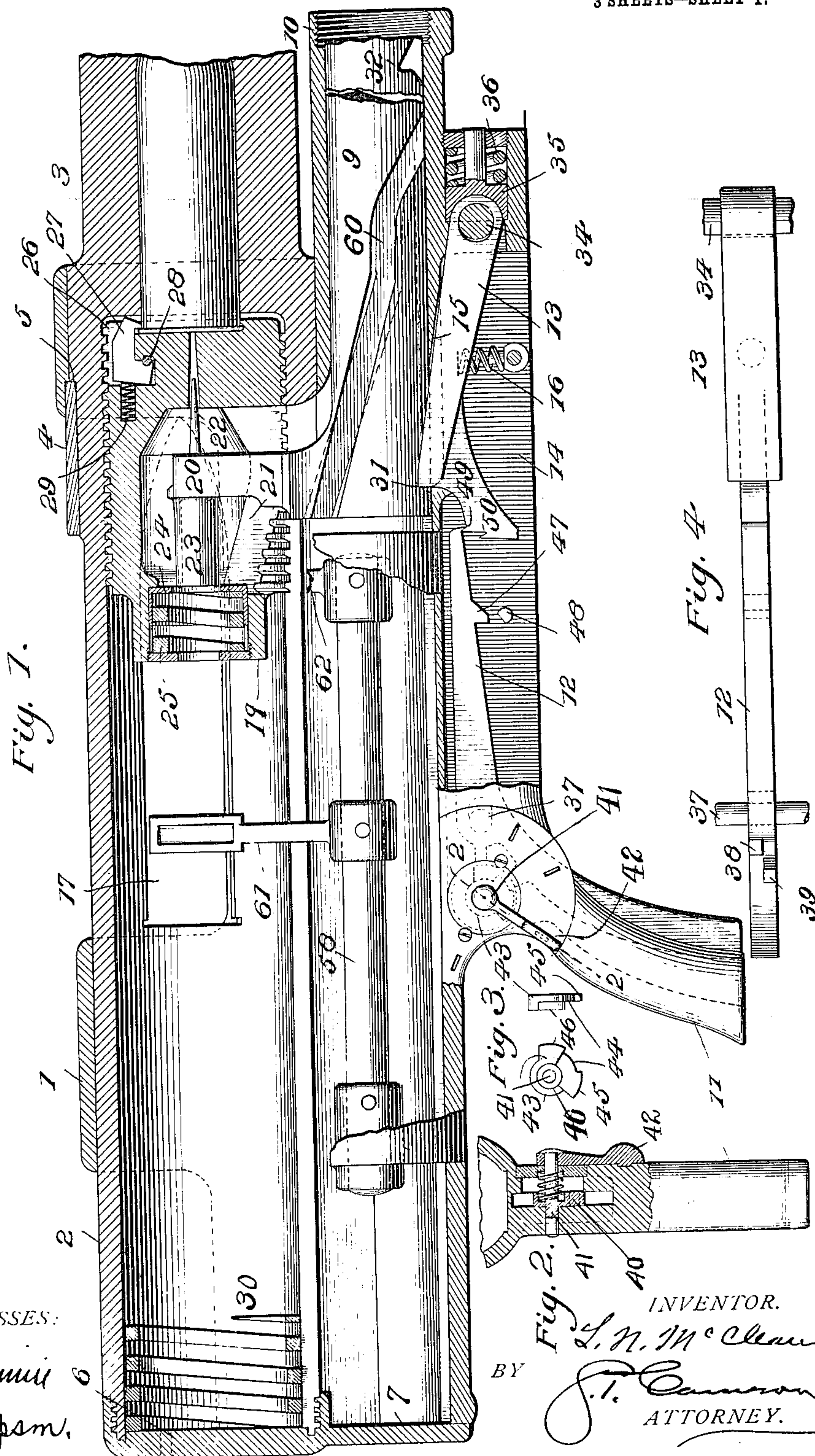


No. 858,745.

PATENTED JULY 2, 1907.

S. N. McCLEAN.  
ONE POUNDER MACHINE GUN.  
APPLICATION FILED JUNE 20, 1902.

3 SHEETS—SHEET 1.



WITNESSES:  
*Wm. Miller*  
*G. R. Thompson.*

INVENTOR.  
*S. N. McClean*  
BY *J. T. Cameron*  
ATTORNEY.

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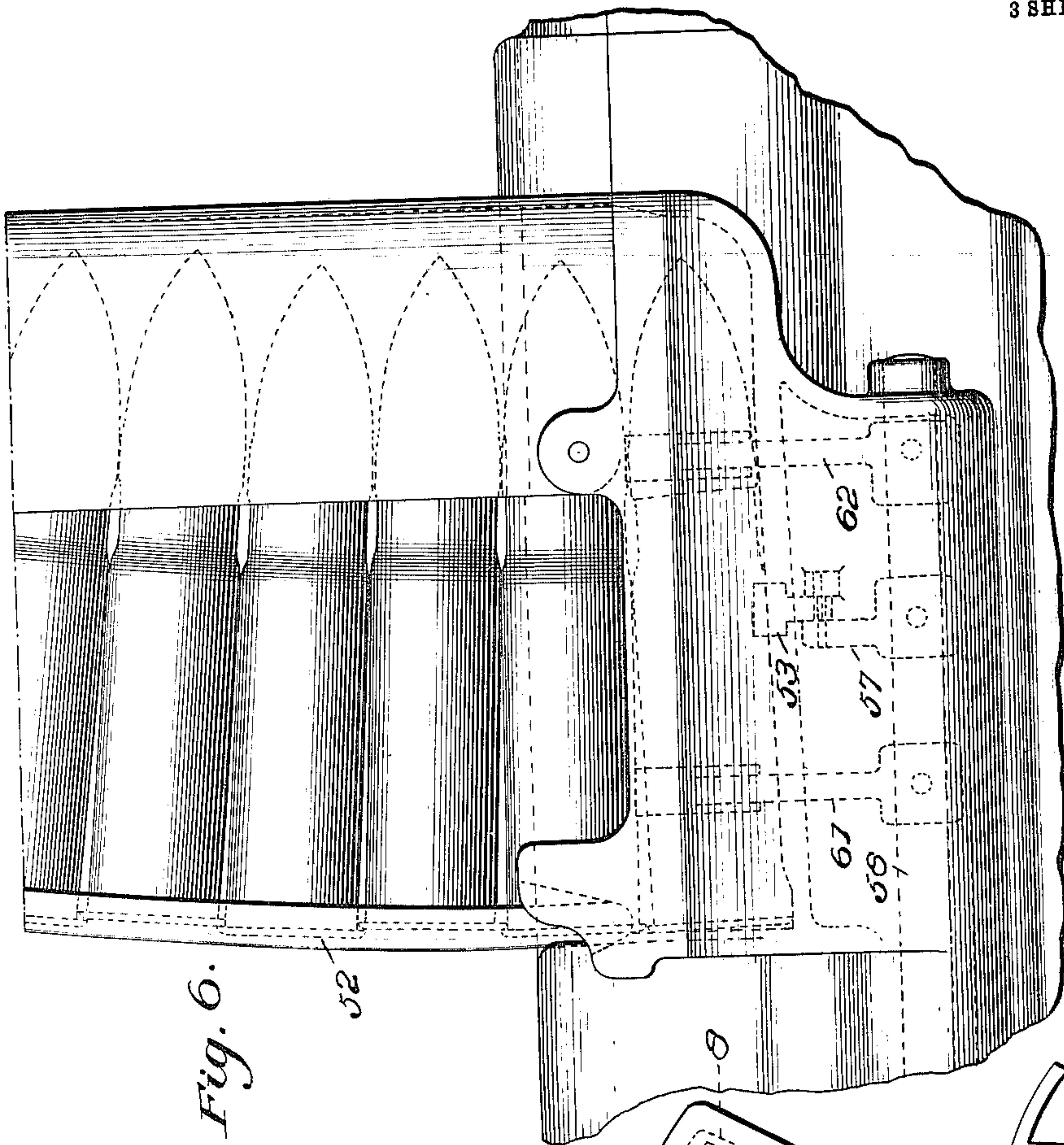


Fig. 6.

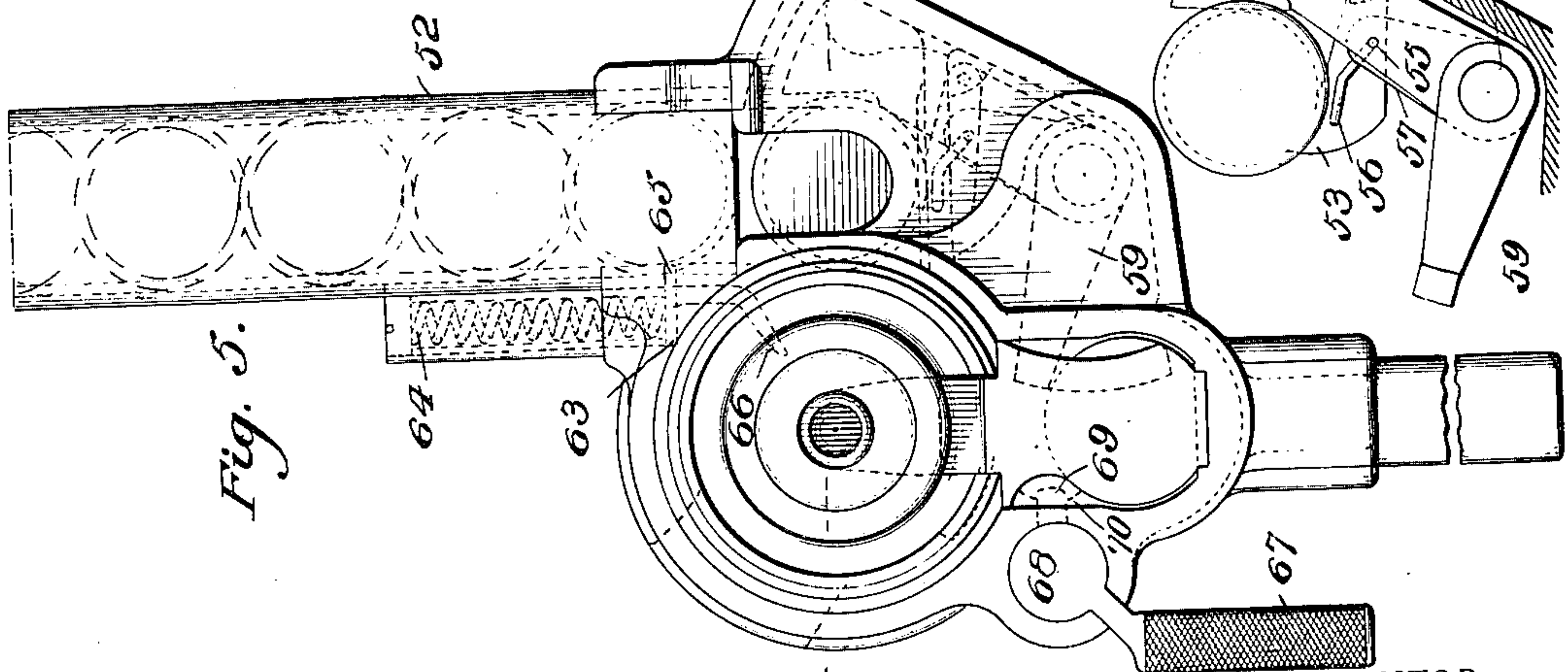


Fig. 5.

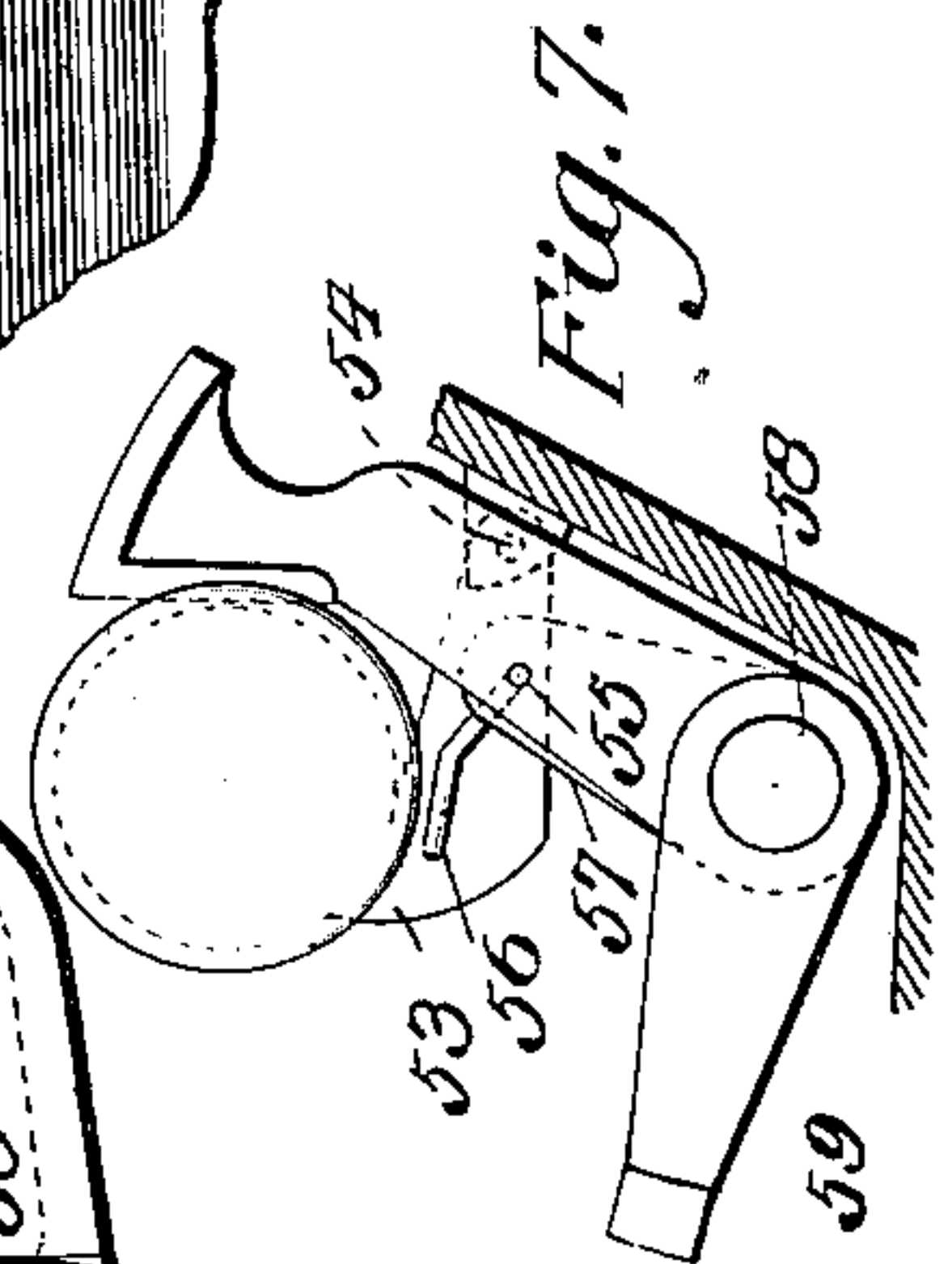


Fig. 7.

WITNESSES:

*Wm. H. H. H.*  
*G. R. Thompson.*

INVENTOR.  
*S. N. McClean*  
BY *J. T. Cannon*  
ATTORNEY.



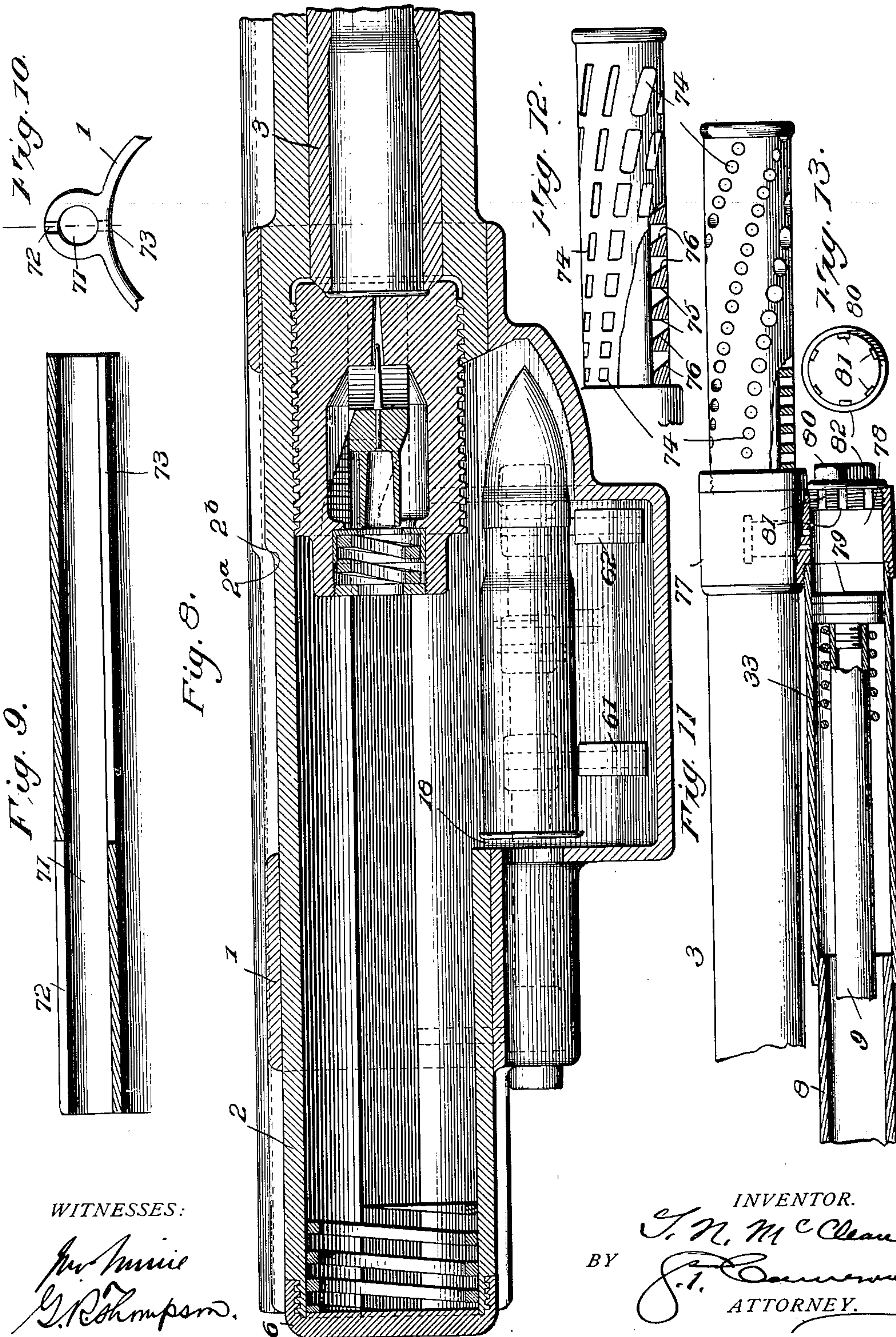
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3 SHEETS—SHEET 3.



WITNESSES:  
*J. I. Carruth*  
*G. P. Thompson*

INVENTOR.  
*S. N. McClean*  
BY *J. I. Carruth*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

SAMUEL N. McCLEAN, OF CLEVELAND, OHIO, ASSIGNOR TO THE McCLEAN ARMS AND ORDNANCE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF NEW JERSEY.

## ONE-POUNDER MACHINE-GUN.

No. 858,745.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed June 20, 1902. Serial No. 112,471.

*To all whom it may concern:*

Be it known that I, SAMUEL N. McCLEAN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga, Ohio, have invented a new and useful Improvement in One-Pounder Machine-Guns, which invention is fully set forth in the following specification.

My invention relates to breech loading guns and more particularly to that class of machine guns in which a portion of the energy of discharge is employed as the motive power for operating the gun.

In guns as heretofore constructed, a part of the recoil has been due to the reaction of the gases of discharge between the gun and the projectile; that is to say, the effort of the powder gases to throw the projectile in one direction resulted in a movement of the gun in the other direction. A further part of the recoil has been due to the reaction of the gases between the gun and the air, upon which the gases impinge with great violence as they issue from the muzzle of the gun after the escape of the projectile. The violence and instantaneous action, as well as the enormous velocity of the gases, results in such reaction of the gases between the gun and the air as to materially augment the gun's recoil. Moreover, in guns wherein the gases of discharge are employed to operate the gun, it is essential to so graduate and control the pressure with which the gases act on the operating parts, as to avoid breaking or damaging the parts.

One of the objects of the present invention is to lessen or entirely eliminate the recoil movement of the gun; and a further object is to provide means for so controlling and applying the gases of discharge as to render their use in operating the gun free from liability to break or otherwise injure the weapon.

Furthermore, it is an object of the invention to produce a gas operated machine gun characterized by simplicity and strength of construction, and ease of manufacture, assemblage and operation of parts.

With these objects in view, the invention consists in a gun provided with a gas motor for utilizing the gases of discharge as a motive fluid in such manner as to oppose and prevent the recoil movement of the gun. This motor is so formed and arranged that as the gases of discharge flow into and through it they impinge or act upon certain areas of resistance and then escape to the atmosphere. The effect of this construction and operation is two-fold. First: The gases, as they act upon the areas of resistance, exert a direct forward pull upon the gun in opposition to the recoil, thereby tending to nullify that part of the recoil due to the reaction of the gases between the gun and the projectile; and Second: By reason of the escape to the atmosphere of that portion of the gases which act upon said areas of resistance, the tension of the gases remaining in the gun barrel may be so greatly reduced as to produce

little or no recoil due to the reaction of the gases between the gun and the air after the projectile has left the muzzle.

Furthermore, the invention consists in a non-recoiling machine gun, automatically operated by the energy of discharge, not only to open and close the breech and eject the empty shell, but to feed the loaded cartridges into the receiver.

More specifically stated, it consists in a non-recoiling machine gun provided with a motor piston actuated by the energy of the gases of discharge, which motor piston is in operative engagement with a reciprocating and rotating breech block to open and close the breech, and with a positive cartridge feed which directly engages the cartridges and feeds them singly from a magazine into the receiver, whence they are inserted into the barrel by the reciprocation of the breech block.

One of the incidental, but extremely important features of the invention, which contributes materially to the strength and durability of the weapon, as well as greatly facilitating its manufacture, consists in a gun frame for receiving and supporting the operative parts of the gun, which frame is provided with few breaks or openings in its contour, whereby its strength is enhanced, and whose general shape and construction is such that the machining operations involved in its manufacture are simple and easy to effect.

The inventive idea involved is capable of expression in various mechanical forms, any one of which would fall within the scope of the invention.

The accompanying drawings, forming part of this specification, show one form which the invention may assume, but it is to be understood that said drawings are illustrative only.

Figure 1 is a vertical longitudinal section of the breech end of the gun with parts shown in elevation; Fig. 2 is a detail sectional view on the line 2—2, Fig. 1; Fig. 3 is a view showing, in side and end elevation, the device for controlling the firing operation of the arm; Fig. 4 is a plan view of the sear and trigger; Fig. 5 is an end elevation of the gun; Fig. 6 is a broken side elevation showing the magazine; Fig. 7 is a detail of the cartridge feed mechanism; Fig. 8 is a sectional plan on the line 8—8, Fig. 5; Fig. 9 is a sectional detail of the housing for the operating handle for cocking the arm by hand; Fig. 10 is a rear end elevation of Fig. 9; Fig. 11 is a broken side elevation, partly in section, of the muzzle end of the barrel and the motor cylinder and piston for operating the gun; Fig. 12 is a like view of a modified form of the muzzle end of the barrel; and Fig. 13 is a rear end elevation of the cap for closing the front end of the motor cylinder.

Referring to the drawings, 1 is the frame of the gun supported in any suitable way (not shown), and consists of a sleeve of somewhat irregular contour in cross-



section. The receiver 2, which forms a rearward extension of the gun barrel 3, is inserted into and passes rearward through the sleeve of the frame until an interior shoulder 2<sup>b</sup> on the frame comes into contact with an exterior shoulder 2<sup>a</sup>, (Fig. 8), on the receiver, thereby determining the relative longitudinal position of these parts. The receiver is then turned until it reaches a proper axial position in the frame, when a key 4 is inserted in a key-way 5 to retain the parts in proper axial relation. The extreme rear end of the receiver is provided with a screw thread on which a cap 6 is screwed, this cap having a depending arm or part 7 which bears firmly on the rear end of the frame 1, when the cap is screwed tightly home, thereby bringing the exterior shoulder 2<sup>a</sup> on the receiver firmly against the interior shoulder 2<sup>b</sup> of the sleeve of the gun frame.

The rear end of the inclosing tube 8, (Fig. 11), for the drive rod 9 is secured to the gun frame at 10, in any suitable manner, as by the screw threads shown, and the pistol grip 11 is secured to the under side of the frame, while the trigger 12 and sear 13 are hung in a recess 14 formed in the under side of the frame, the sear projecting upward through a sear opening 15, under the influence of sear spring 16. An opening 17 is formed in the upper left hand side of the receiver for the ejection of the fired shell, and a corresponding cartridge feed opening 18, (Fig. 8), is formed on the right hand side of the receiver, substantially opposite the axis thereof, the frame 1 being cut away opposite each of these openings to permit the free and unobstructed passage of the cartridges.

The breech block 19 is of the interrupted screw variety, which is reciprocated and rotated in the receiver by means of an arm or lug 20 on the drive rod 9, which arm projects through a cam slot 21 in the breech block and carries the firing pin 22 on its front face, while its rear face has a guide arm 23, which, when the lug 20 is in the rear part of cam slot 21, passes centrally through a housing 24 for a buffer spring 25, in the rear end of the breech block, which spring receives the impact of the driving rod as it is driven rearward by the gases of discharge to open the breech. The breech block is very compact and has screw-threads extending throughout its entire length, thereby providing a very strong locking engagement with the receiver and enabling the weight of the block to be reduced to a minimum.

The breech block has a slot or recess 26, constituting an extractor seat, formed in its upper forward end, the extractor 27 being substantially in the form of a bell crank having the extractor hook on one arm, while the other arm is inserted into the extractor seat and held from displacement by means of a transverse pin 28 engaging the block and extractor, which latter does not quite fill the extractor seat, but is free to have a slight rocking movement around the pin 28, and being normally held by its spring 29 in position to engage the flange of the cartridge. The whole construction is such that a pull on the cartridge serves to cause the extractor hook to tighten its hold thereon.

Located in the rear of the receiver is a buffer spring 30 which receives the impact of the block at the terminal part of its rearward movement.

The drive rod 9 is provided with two sear notches 31

and 32 in different horizontal planes, the forward notch 32 being in the higher plane, so that the sear may rise high enough to engage notch 31 without engaging notch 32 as the drive rod is driven forward by the usual drive rod spring 33, Fig. 11. Whether notch 31 or 32 is engaged, the shock to the sear is relieved by a spring bearing for its pivot pin 34. As here shown, this spring bearing is in the form of a piston 35 bearing against a very stiff spring 36 confined in a cavity in the frame. The trigger turns on and has longitudinal movement on a pivot 37, and to the rear of this pivot it is provided with two lugs 38 and 39 arranged in different vertical planes, (Fig. 4). Referring to Figs. 1, 2 and 3, 40 is a stop device, here shown in the form of an irregular disk rigidly secured to a bearing pin 41 hung to turn in the gun frame and operated by a handle 42 projecting outside of the gun frame. Disk 40 has three arc-like surfaces 43, 44 and 45, all in the same vertical plane, but at different distances from the center, and a fourth arc-like surface, which is the same distance from the center as surface 45, but is in a different vertical plane. As shown in dotted lines, Fig. 1, this disk is mounted to turn in the frame immediately to the rear of lugs 38 and 39 on the trigger, with surfaces 43, 44 and 45 in the plane of lug 38, and surface 46 in the plane of lug 39. When the surface 43 is adjusted opposite lug 38 and the trigger pulled with the sear in notch 31, it will depress the sear out of notch 31, the cam surface 47 on the trigger engaging the pin 48 on the frame and forcing it rearward, thereby causing the trigger nose to slip entirely off of the sear after the latter has been depressed out of notch 31. The driving rod 9 thereupon moves forward under the influence of its spring and causes the firing pin 22 to explode the cartridge. Upon the rearward movement of the rod 9, the sear, which has been set free from the trigger, rises and engages the notch 32 on the rod, thereby retaining the parts in their positions with the breech block open. A single cartridge being now inserted into the receiver in any suitable way, as by hand, the trigger is again pulled, disengaging the sear from notch 32, the trigger nose slipping off the sear entirely. This permits the sear to rise and engage notch 31 on the drive rod and stop said rod before the firing pin strikes the cartridge, and the trigger being released and given a second pull, fires the gun and repeats the operation. The position of the firing disk just described I call "single load" position.

When the disk is turned with surface 44 opposite lug 38, the trigger can be pulled so as to depress the sear out of notch 31 and cause the trigger nose to slip slightly rearward off of sear shoulder 49, but not far enough rearward to miss sear shoulder 50, as lug 38 and surface 44 abut before this occurs. The result of this is that the trigger holds the sear below the plane of notch 32, but not below notch 31, and when the gun is fired the drive rod 9 moves rearward, opens the breech, ejecting the empty shell, a new cartridge is fed into the receiver from the magazine, as hereinafter described, and the drive rod immediately moves forward to close the breech, but not to explode the cartridge, since the sear engages notch 31. A second pull repeats the operation. This I call the "semi-automatic" position.

In order to secure the full "automatic" operation of the gun, the disk is turned with the surface 45 opposite the lug 38, so that when the trigger is pulled it cannot



slip off of the sear, and the latter is therefore held depressed out of both notches 31 and 32 so that the rod 9 continues to reciprocate and automatically fire the gun as long as the supply of cartridges is maintained.

5 When the surface 46 is turned opposite lug 39, it exactly abuts against it and locks the trigger so it cannot be pulled.

A suitable dial or indicator is arranged on the side of the gun, with means (as a tooth and notches) for holding  
10 the handle in the proper positions.

Referring now to the means for automatically feeding the cartridges into the receiver, 52, (Figs. 5 and 6), is a vertical guide-way or chamber, here shown as composed of the two vertical channels which guide the  
15 base and nose, respectively, of the cartridge. This magazine chamber is mounted on one side of the receiver and is open at the top and bottom. Immediately beneath this chamber is a shelf, preferably in the form of a lever 53, pivoted at 54 to a part of the frame.  
20 This lever is supported, with its upper surface sloping slightly away from the receiver, by a pin 55 engaging in a cam groove 56 in the side of the lever, which pin is carried by one arm 57 of a bell-crank lever keyed to a shaft 58, the other arm 59 of said bell-crank extending  
25 into the path of a cam groove 60, (Fig. 1), in the side of driving rod 9. A pair of arms or levers 61 and 62 are also keyed to shaft 58 on opposite sides of the cartridge supporting lever 53 and operate as pushers to move a cartridge off of shelf-like lever 53 into the receiver when  
30 shaft 58 is rocked. The bottom cartridge in the magazine rests upon the shelf-like lever 53, as heretofore stated, but preferably the column of cartridges in the magazine do not rest upon this bottom cartridge. Instead of this I prefer to provide means for engaging  
35 the cartridge next to the bottom. One form of such means is shown in Fig. 5, in which 63 is a vertically movable plunger normally held depressed by a spring 64, said plunger having a shoulder 65 normally projecting far enough into the magazine so as to leave a distance  
40 less than the diameter of the cartridge between said shoulder and the opposite wall of the magazine, so that as the column of cartridges descends, the one next to the bottom cartridge on the lever 53 is caught between the shoulder 65 and the wall of the magazine  
45 and held until the shoulder is withdrawn. This is accomplished through a cam-like resilient finger 66, which projects into the feed opening 18, and as a cartridge is moved into the receiver by the pushers 61, 62, said cartridge strikes the finger 66, causing it to slightly  
50 yield to the left and also move upward. This has a checking effect to prevent the throw of the cartridge too violently into the receiver, and also serves to free the column of cartridges in the magazine which descends until the bottom one rests upon the tops of levers 61, 62. As these levers return to their normal position, the bottom cartridge falls upon lever-shelf 53 and the cartridge next above it is caught by shoulder 65. It will thus be seen that shaft 58 is rocked by the cam in slide 9 engaging arm 59, thereby depressing lever 53  
60 until it tips or slopes toward the receiver, and pusher arms 61, 62 thrust the cartridge into the receiver and free the next succeeding cartridge in the magazine, when the forward movement of slide 9 withdraws the pushers 61, 62 and permits the bottom cartridge to  
65 drop on shelf-like lever 53 ready to repeat the operation.

For the purpose of manipulating the slide 9 by hand and cocking the gun for the first shot, I provide a handle 67, (Fig. 5), connected to a sliding rod 68, having a lug 69 projecting in front of a shoulder 70 on the slide 9. This sliding rod 68 moves longitudinally in a channel 71, (Figs. 9 and 10), which has a slot 72 on one side, in which the arm of handle 67 reciprocates, and a slot 73 through which the lug 69 projects to engage shoulder 70, and in which slot it reciprocates.

In Figs. 11, 12 and 13, I have illustrated the means  
75 for utilizing the motive power of the gases of discharge to counteract the recoil, as well as the means for operating the gun. In said Figs. 11 and 12, the gun barrel 3 is provided with a multiplicity of openings 74 extending from the muzzle, for a considerable distance back  
80 therefrom, each of said openings presenting a surface 75 on their forward side against which the gases impinge, so as to exert their motive force forward, that is, contrary to the movement of recoil. These surfaces 75 are preferably formed at right angles to the bore of  
85 the barrel, and that portion of the openings opposite the surfaces 75 is beveled inward and rearward, as at 76, Fig. 12, so that as the gases rush forward they will impinge upon the surfaces 75 with a more direct forward propelling motive force. These openings 74 may  
90 be of any desired form in cross section. I have shown them of both circular and rectangular form, and preferably they increase in size as they are nearer to the muzzle end of the barrel, the circular openings increasing in diameter and the rectangular ones increasing in  
95 length until they become oblong slots. I prefer also to arrange the openings spirally around the barrel, following the twist of the rifling.

As the gases of discharge flow through the opening 74 they act as a motive fluid against the surfaces 75,  
100 the result being that of a motor pulling forward, and hence tending to counteract the recoil due to the reaction of the gases between the gun and the projectile. These openings 74 not only act as motor channels for the passage of the gases, but they also serve as vents,  
105 whereby the gases escape in large quantities from the barrel before the projectile reaches the muzzle, thereby greatly reducing the pressure of the column of gas that impinges upon the air after the projectile leaves the muzzle. The size and number of these openings  
110 is so regulated that the pressure of the gas column is reduced to a degree below that where it is capable of exerting any large amount of back pressure, and hence the recoil due to the reaction between the gas and the atmosphere after the projectile leaves the muzzle is  
115 nearly or entirely obviated.

Just to the rear of that portion of the barrel having the perforations 74 is a band 77 surrounding the barrel, and gas openings are formed from the barrel into an annular chamber in the band (shown in dotted lines in  
120 Fig. 11) which chamber communicates with the cylinder 78 within which a piston 79 reciprocates, said piston being connected to the drive rod 9 and serving to operate the breech mechanism and cartridge feed devices, as hereinbefore described. The forward end  
125 of cylinder 78 is closed by a screw-plug 80 having longitudinal channels 81 cut therein, which channels terminate against a flange 82 on the cap, so that, when the cap is partly unscrewed, the channels permit the gas to escape and impinge upon the flange.



From the foregoing, it will be seen that I not only utilize the gases as a motive fluid for operating the gun, but that I also cause the gases to act as a motive fluid against surfaces where they exert a force directly against the recoil, and at the same time reduce the gas pressure within the gun and thereby eliminate or greatly reduce the recoil due to this cause.

Having thus described my invention, I claim:—

1. The combination of a reciprocatory and rotary breech block, an oscillating cartridge-feed lever, and a discharge actuated slide operatively engaging said block and a cam groove on a slide engaging said lever.
2. The combination of a reciprocatory and rotary breech block, an oscillating cartridge-feed lever, and a discharge actuated slide operatively connected to said block and to said lever by pin and cam slot connections.
3. The combination of a reciprocatory and rotary breech block, an oscillating cartridge-feed lever, and a slide actuated by the gases of discharge the block having a cam slot engaged by said slide and the slide having a cam groove engaged by said lever.
4. The combination of a receiver, a reciprocating breech block, and a cartridge-receiving chamber or magazine, with a reciprocating slide having a cam slot, an oscillating shaft having a lever arm engaging said slot and a feed arm on the shaft engaging the cartridges to feed them from the magazine into the receiver.
5. The combination of a receiver, a cartridge-receiving chamber or magazine, a vertically oscillating table or lever receiving the bottom cartridge from said magazine, a cartridge-feed lever having a cam engagement with said table, and a reciprocating slide having a cam engagement with said feed lever.
6. The combination of a receiver, a magazine, a reciprocatory and rotary breech block, a cartridge-receiving lever or table under said magazine, and a cartridge-feed lever having cam engagement with said table, with a gas-actuated slide having cam engagement with said block and said feed-lever.
7. The combination of a receiver, a breech block, an oscillating cartridge-feed lever, a gas-actuated slide having cam engagement with said block and lever, and a manually operable reciprocating handle adapted to operatively engage said slide.
8. The combination of a receiver, a breech block, an oscillating cartridge-feed lever, a gas actuated slide having cam engagement with said block and lever, and a reciprocating handle having a shoulder adapted to engage a part on the said slide.
9. The combination of a receiver, a breech block, an oscillating cartridge-feed lever, a slide actuated rearward by the gases of discharge, a spring driving said slide forward, and a reciprocating handle having a shoulder or part in front of and adapted to engage a shoulder or part on said slide when the handle is reciprocated.
10. In a gun, the combination of a reciprocatory and rotary breech block, a slide directly engaging said block to operate it both for the opening and closing movements, and

a buffer spring carried by the block and interposed between said slide and block.

11. In a gun, the combination of a reciprocatory and rotary breech block, a gas-actuated slide directly engaging the block for operating it in its opening and closing movements, and a buffer spring carried by the block and interposed between said slide and block.

12. The combination of a breech-block-operating, reciprocating slide having sear notches or shoulders formed thereon, a sear engaging said shoulder, and a yielding pivot-bearing for said sear.

13. The combination of a breech-block-operating reciprocating slide having sear notches or shoulders, a sear engaging said shoulders, a pivot-bearing for said sear, and a spring yieldingly supporting said pivot-bearing.

14. The combination of a breech-block-operating reciprocating slide having sear notches or shoulders, and a yieldingly mounted sear engaging said shoulders.

15. The combination of a breech-block-operating slide having a plurality of sear notches or shoulders, a yieldingly mounted sear engaging said shoulders, a trigger engaging said sear to trip it from the notches, and means throwing the trigger off the sear after said sear is tripped from a sear shoulder in the slide, whereby the sear is freed to rise and engage a succeeding sear shoulder or notch on the slide.

16. The combination of a gun-frame having a sleeve provided with an interiorly projecting shoulder, a receiver fitting in said sleeve and having an exteriorly projecting shoulder engaging the interior shoulder on the sleeve, and means drawing and retaining the shoulders closely abutting each other.

17. The combination of a gun-frame having a sleeve provided with an interiorly projecting shoulder, a receiver entering said sleeve and having an exteriorly projecting shoulder, and a screw acting to draw the shoulders closely together.

18. The combination of a gun-frame having a sleeve provided with a shoulder, a receiver inserted into said sleeve and having a shoulder abutting the shoulder on the frame, and a screw cap engaging the projecting end of the receiver and bearing against the frame.

19. The combination of a gun-frame and a receiver having abutting shoulders, and a screw cap engaging one of said parts and reacting against the other, whereby the gun-frame and receiver are secured together.

20. The combination of a gun-frame, a receiver embraced by a sleeve on the frame, and a key and slot connection to prevent the receiver from turning in the frame.

21. The combination of a gun-frame, a receiver embraced by a sleeve on the frame, said receiver and sleeve having abutting shoulders, a screw cap engaging one of said parts and reacting against the other part, and a key and slot connection between the parts.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SAMUEL N. McCLEAN.

Witnesses:

S. T. CAMERON,

GUSTAVE R. THOMPSON.