No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

APPLICATION FILED SEPT. 11, 1905.

7 SHEETS—SHEET 1.

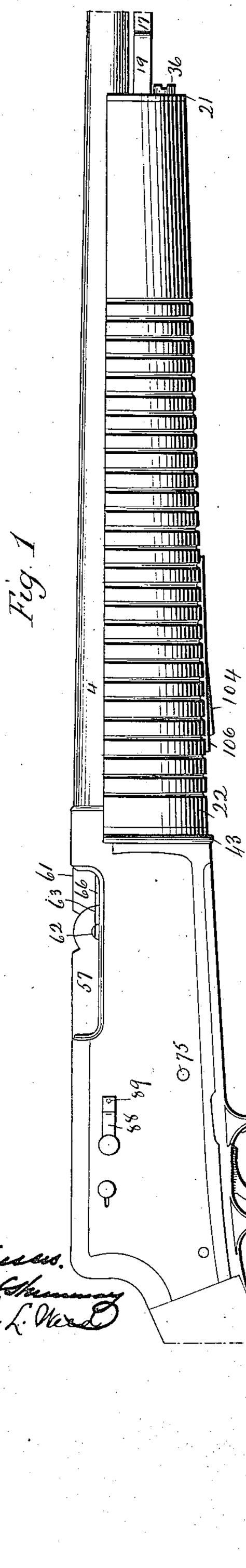

Fig. 1

Fig. 2

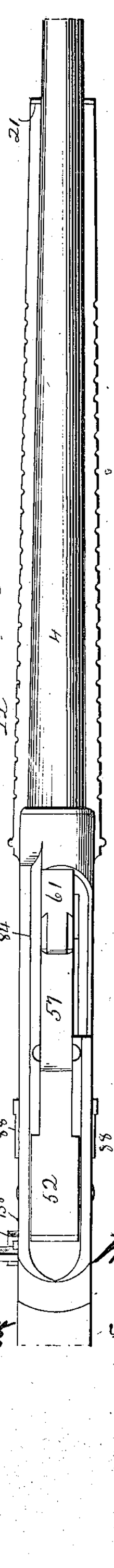

Fig. 3

Witnesses.
J. H. Shumway
Clara L. Ward

William Mason
Inventor
Seymour Keare
Atty

No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

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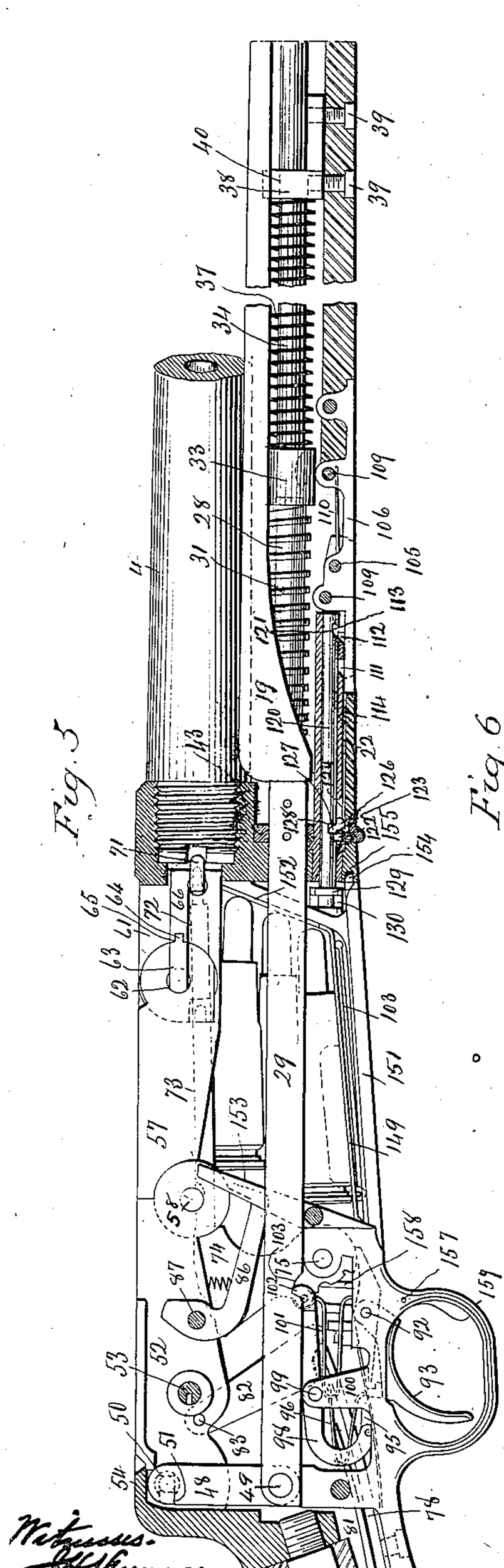
7 SHEETS—SHEET 2.



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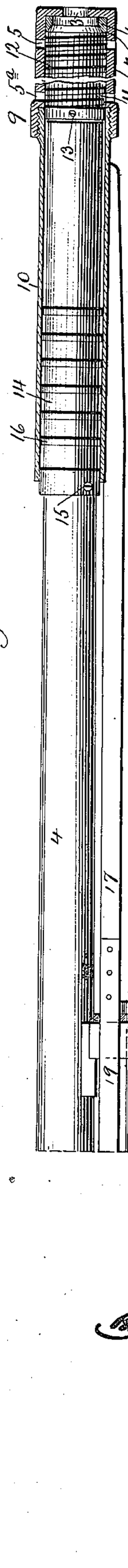

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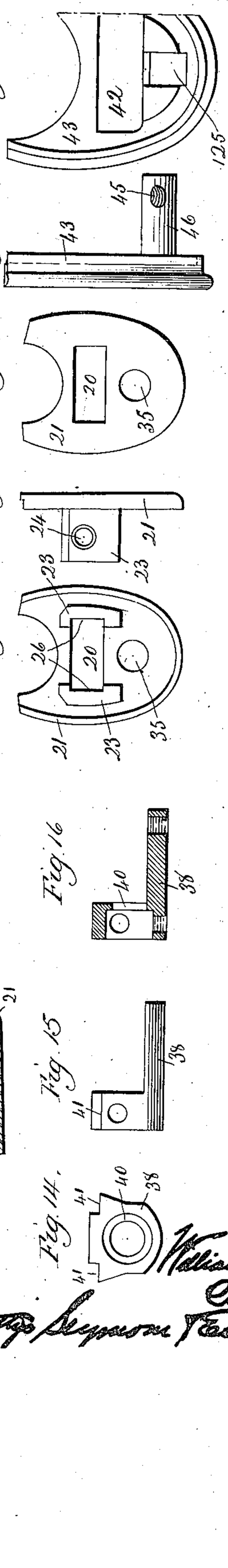

Fig. 21.

Fig. 20.

Fig. 19.

Fig. 18.

Fig. 17.

Fig. 16.

Fig. 15.

Fig. 14.

Witnesses.
J. H. Kinnaney
Chas. L. Reed.

William Mason
Inventor.
By Atty. Seymour Teare

No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

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7 SHEETS—SHEET 3.

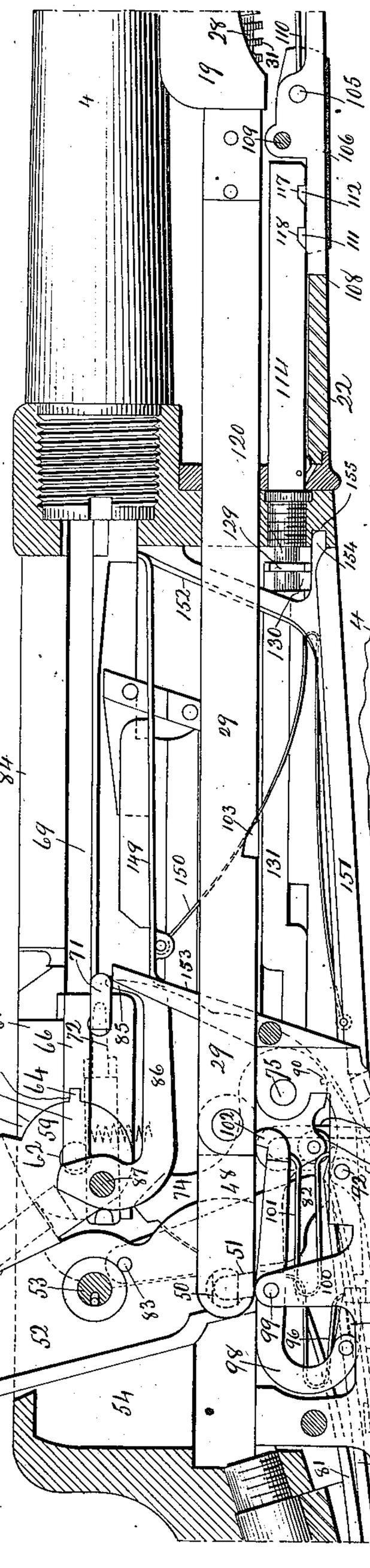

Fig. 7

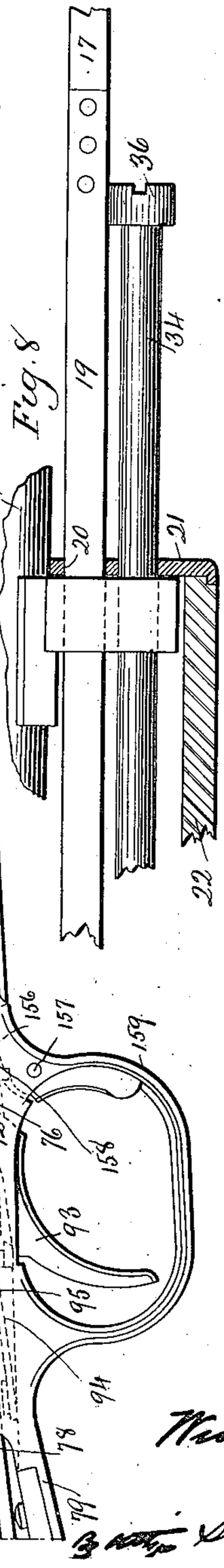

Fig. 8

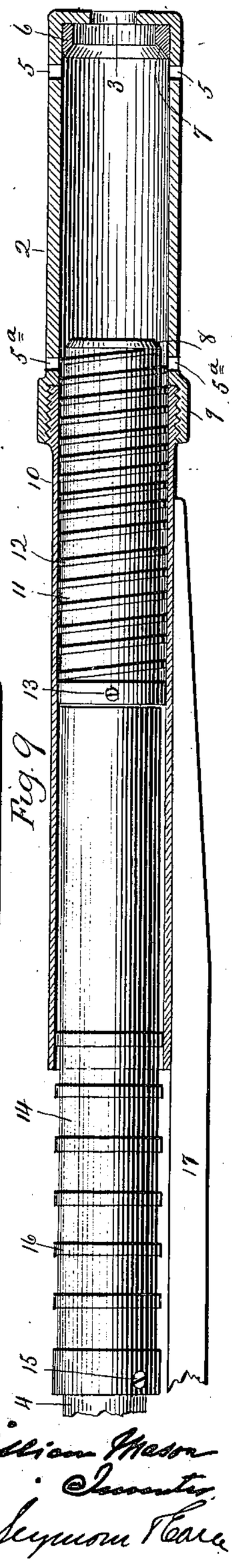

Fig. 9

Witnesses.
J. H. Kinnavy
Clara L. Reed.

William Mason
Inventor.
By Seymour Teare
Atty.

No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

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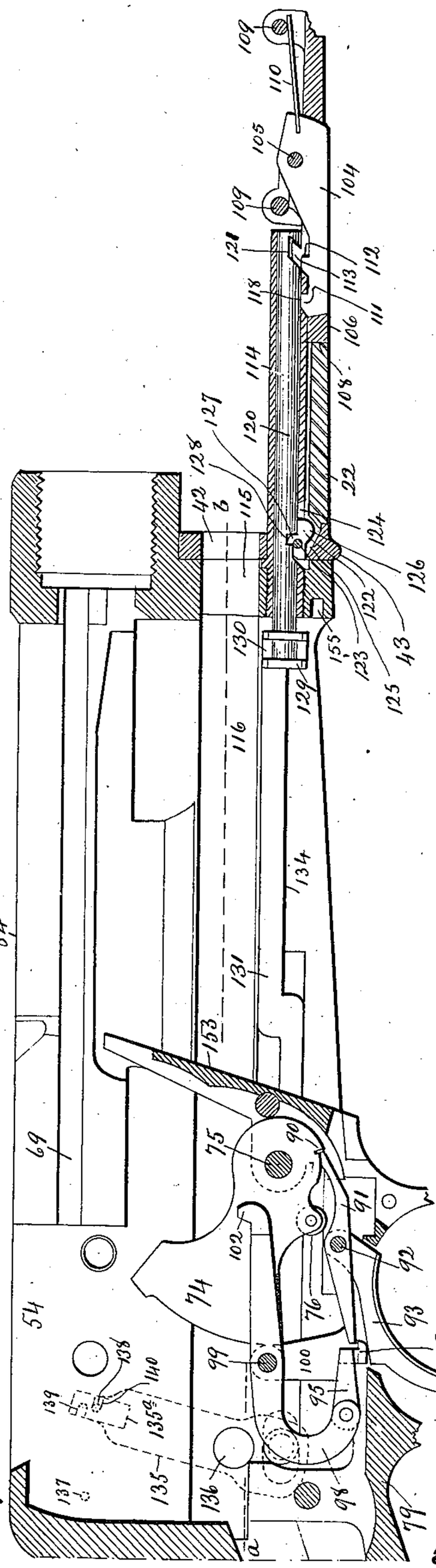
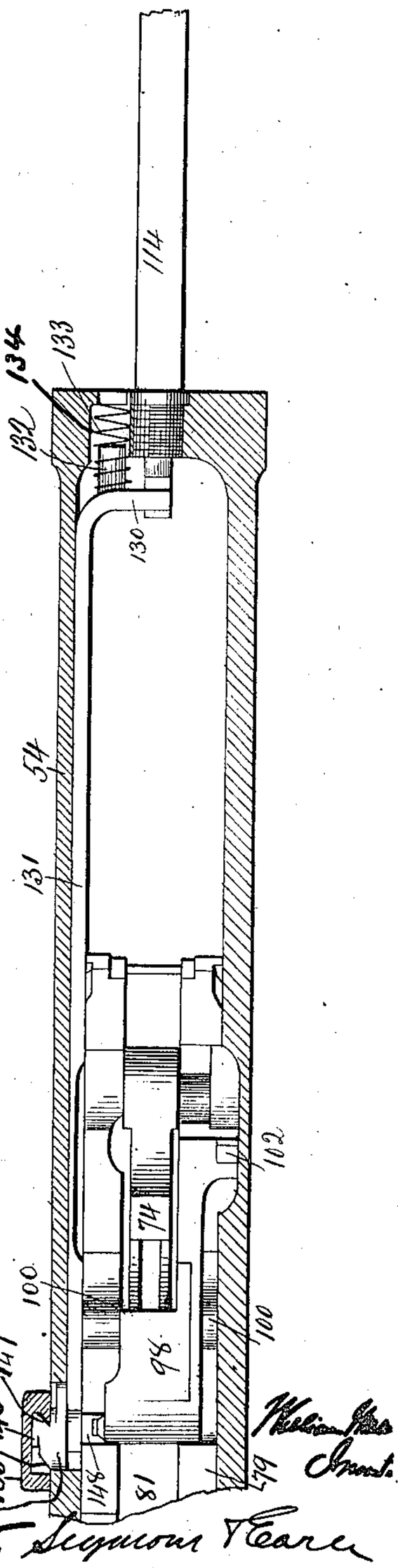
7 SHEETS—SHEET 4.

Fig. 10



Witnesses.
J. H. Thurman
Clara L. Weed.

Fig. 11.



William Mason
Inventor.
By his Attorneys Pearce

No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

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7 SHEETS—SHEET 6.

Fig. 12

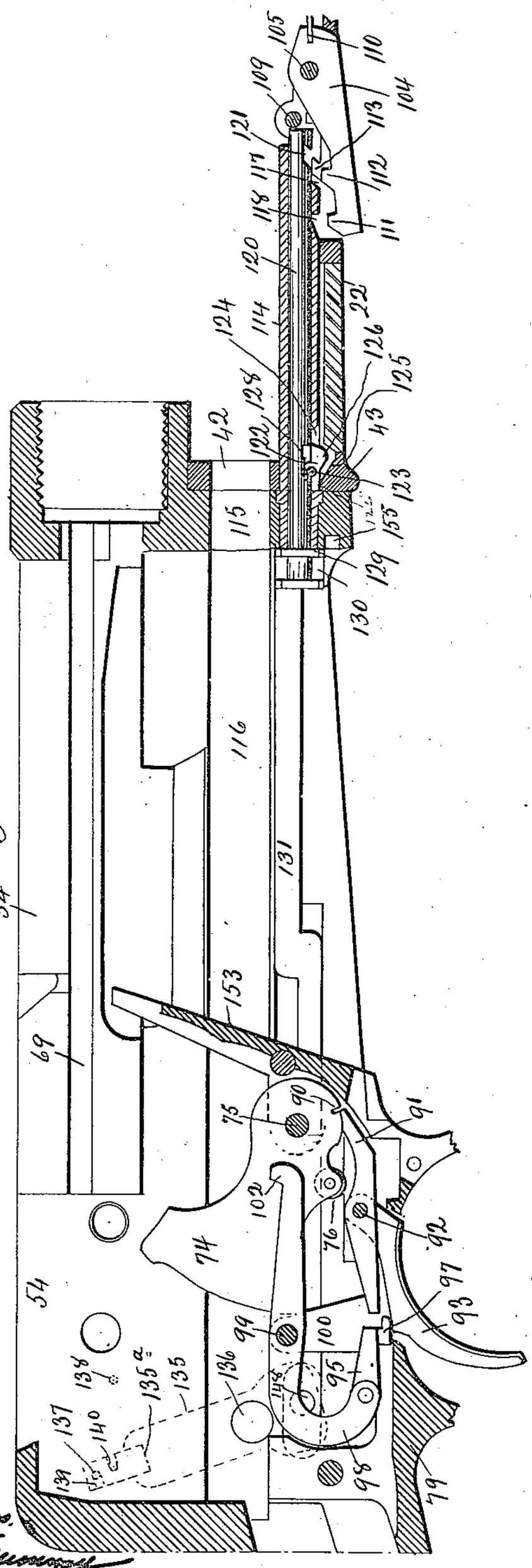
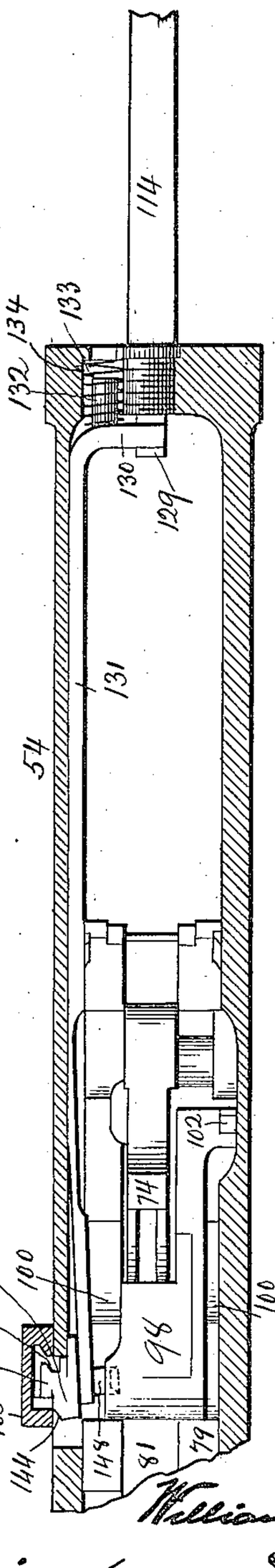


Fig. 13



Witnesses:
H. W. Hutchinson
Clara L. Weed.

William Mason
Inventor.
By Seymour & Earle
Attys

No. 885,166. PATENTED APR. 21, 1908.

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7 SHEETS—SHEET 6.

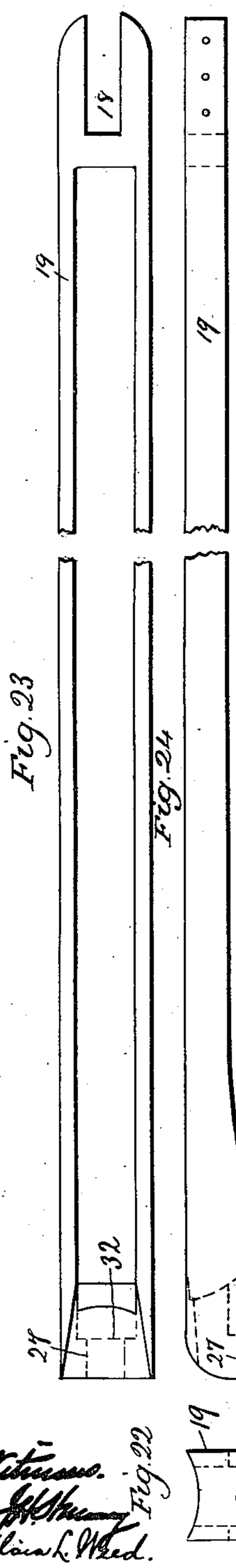
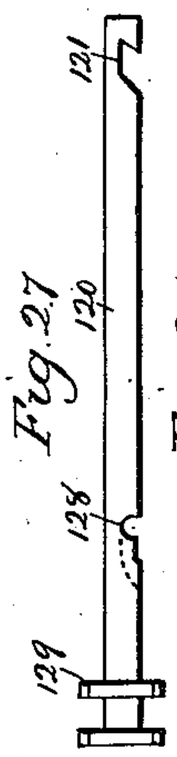


Fig. 23.

Fig. 24.



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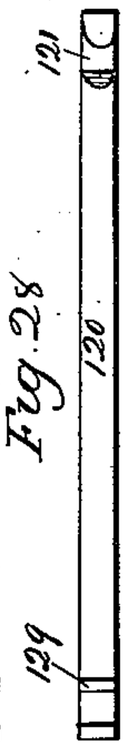
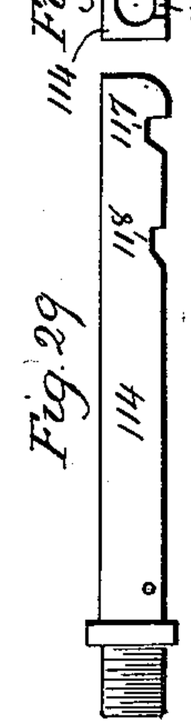


Fig. 28.



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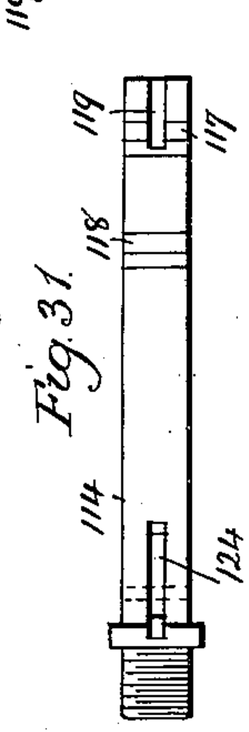

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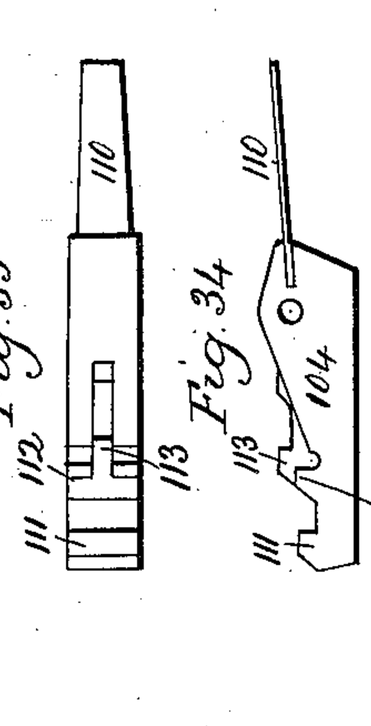


Fig. 33.

Fig. 34.

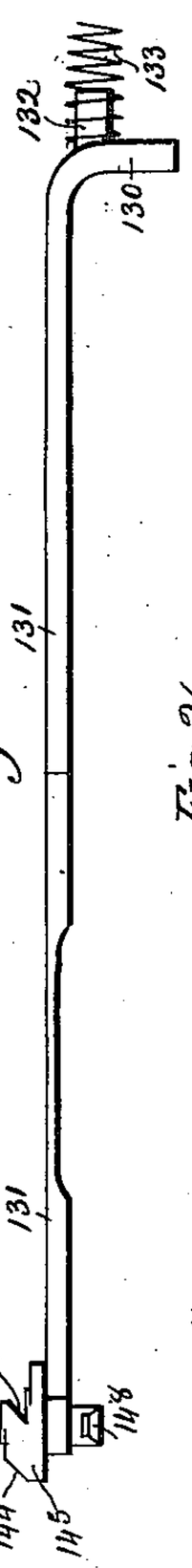
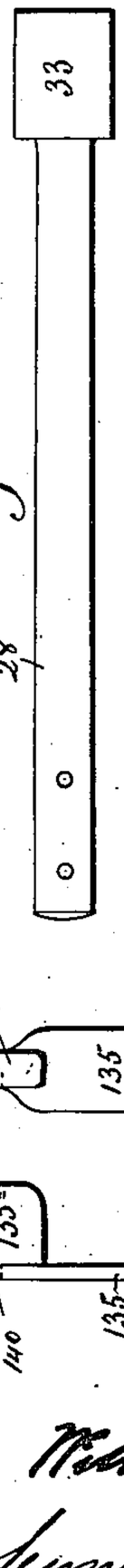


Fig. 25.

Fig. 26.



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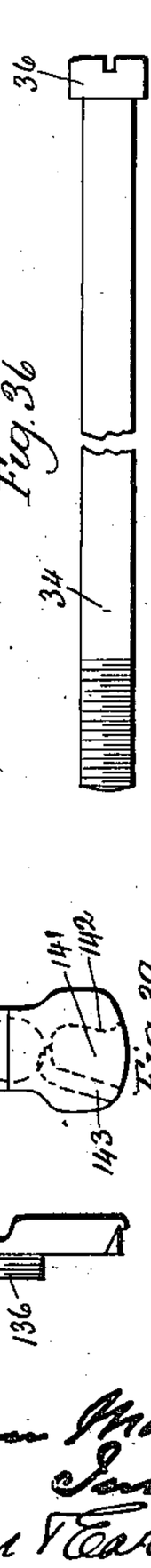

Fig. 36.

Fig. 22.

Fig. 25.

Fig. 26.

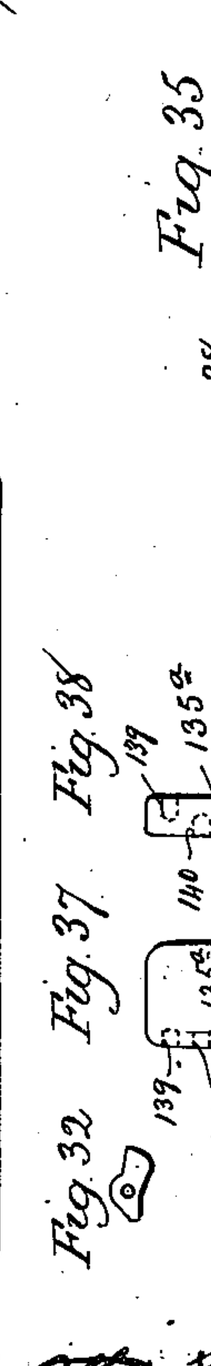

Fig. 35.

Fig. 36.

Fig. 37.

Fig. 38.

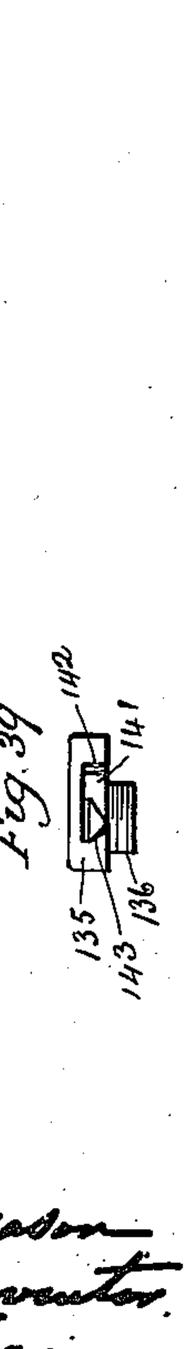

Fig. 39.

Witnesses.
Elias L. Weed.

William Mason
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Atty

No. 885,166. PATENTED APR. 21, 1908.

W. MASON.

GAS OPERATED GUN.

APPLICATION FILED SEPT. 11, 1905.

7 SHEETS—SHEET 7.

Fig. 46

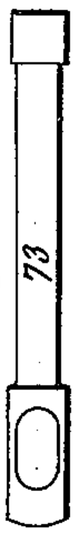


Fig. 47

Fig. 48

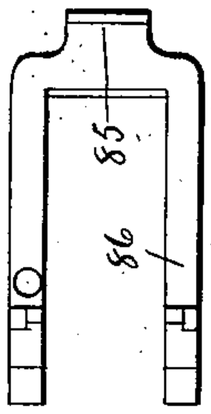


Fig. 49

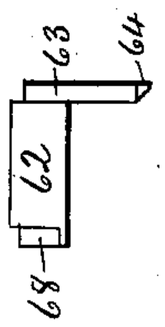


Fig. 50

Fig. 40

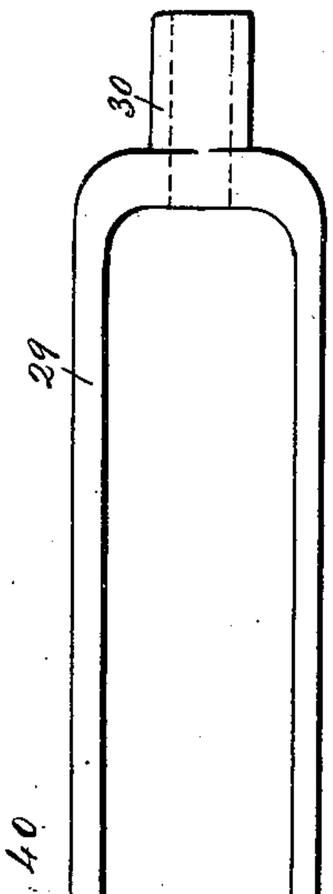


Fig. 41

Fig. 44

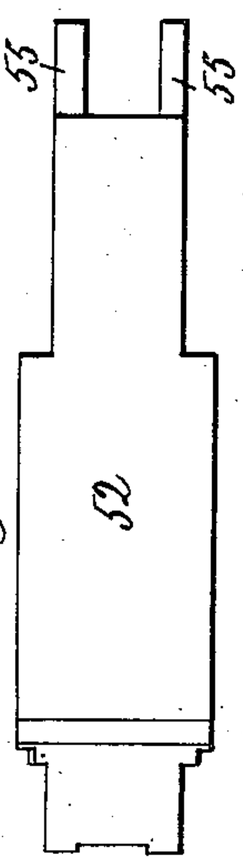


Fig. 45

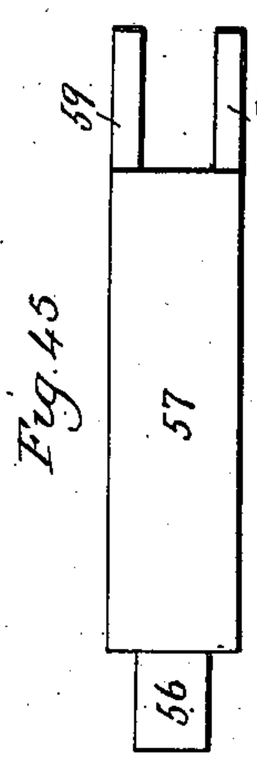


Fig. 51

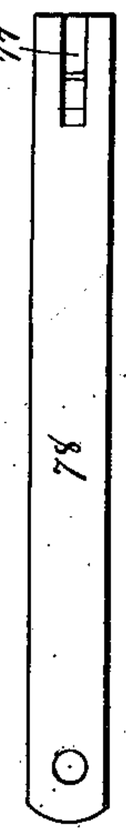


Fig. 43

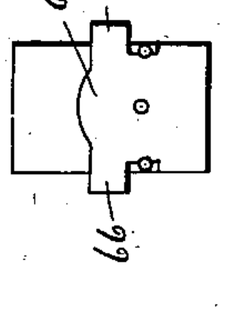


Fig. 54

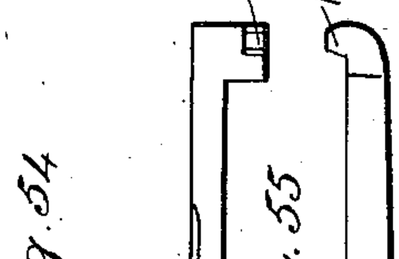


Fig. 56

Fig. 42

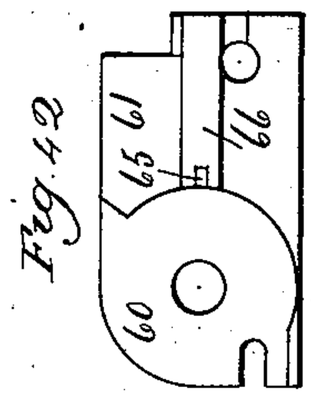


Fig. 55

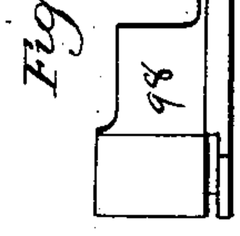


Fig. 53

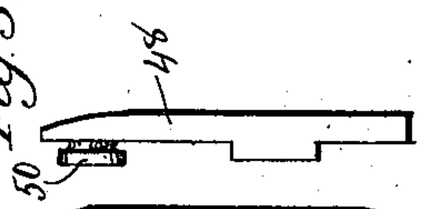
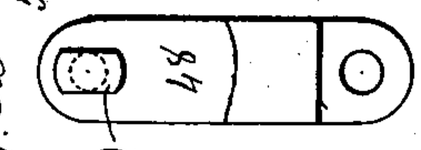


Fig. 52



Witnesses.
J. H. Sherman
Clara L. Reed

William Mason
Inventor.
By Seymour & Earle
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM MASON, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO WINCHESTER REPEATING ARMS CO., OF NEW HAVEN, CONNECTICUT, A CORPORATION.

GAS-OPERATED GUN.

No. 885,166. Specification of Letters Patent. Patented April 21, 1908.

Application filed September 11, 1905. Serial No. 277,927.

To all whom it may concern:

Be it known that I, WILLIAM MASON, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Gas-Operated Guns; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a view in right hand elevation of a gun constructed in accordance with my invention, with the front end of its barrel and the rear end of its butt-stock broken away. Fig. 2 a view in side elevation showing that portion of the barrel broken away from Fig. 1. Fig. 3 a plan view of what is shown in Fig. 1. Fig. 4 a broken view in left hand side elevation of the gun-frame to show the thumb-lever for operating the forearm lock. Fig. 5 a broken view of the gun in vertical longitudinal section with its parts in their closed positions, the front end of the barrel and the rear end of the butt-stock being broken away. Fig. 6 a sectional view to show as much of the barrel as is broken away in Fig. 5. Fig. 7 a broken view partly in elevation and partly in vertical longitudinal section drawn to natural size and showing the gun as open. Fig. 8 a broken view in side elevation showing the forward end of the guide-rod for the operating-spring. Fig. 9 a view partly in side elevation and partly in vertical section showing the sliding gas-chamber in its open position. Fig. 10 a view partly in vertical section and partly in elevation with particular reference to showing the forearm lock and the timing mechanism, the former being shown in its locked position and the latter being shown as ready for firing the gun. Fig. 11 a view of the same parts in horizontal section on the line *a*—*b* of Fig. 10. Fig. 12 a view corresponding to Fig. 10 but showing the forearm mechanism unlocked and the timing mechanism performing its safety function. Fig. 13 a view corresponding to Fig. 11 but showing the parts in the positions illustrated in Fig. 12. Fig. 14 a detached view in front elevation of the operating-spring abutment. Fig. 15 a view thereof in side elevation. Fig. 16 a view thereof in vertical longitudinal section. Fig. 17 a detached view in rear elevation of the forearm tip. Fig. 18 a view thereof in side elevation. Fig. 19 a view thereof in front elevation. Fig. 20 a detached view in side elevation of the forearm heel. Fig. 21 a view thereof in front elevation. Fig. 22 a detached view in rear elevation of the skeleton-bar. Fig. 23 a plan view thereof. Fig. 24 a view thereof in side elevation. Fig. 25 a plan view of the forearm locking bar. Fig. 26 a view thereof in inside elevation. Fig. 27 a view in side elevation of the forearm locking plunger. Fig. 28 a reverse plan view thereof. Fig. 29 a detached view in side elevation of the forearm locking stud. Fig. 30 a view thereof in front elevation. Fig. 31 a reverse plan view thereof. Fig. 32 a detached view in side elevation of the forearm locking dog. Fig. 33 a detached plan view of the forearm latch. Fig. 34 a view thereof in side elevation. Fig. 35 a detached view in side elevation of the buffer spring rod. Fig. 36 a similar view of the operating-spring guide-rod. Fig. 37 a detached edge view of the forearm locking or thumb-lever. Fig. 38 a view thereof in side elevation. Fig. 39 a reverse plan view thereof. Fig. 40 a detached plan view of the action-slide. Fig. 41 a view thereof in right hand side elevation. Fig. 42 a detached view in side elevation of the breech-block. Fig. 43 a view thereof in front elevation. Fig. 44 a detached plan view of the rear breech-link. Fig. 45 a detached plan view of the front breech-link. Fig. 46 a plan view of the firing-pin striker. Fig. 47 a plan view of the firing-pin. Fig. 48 a plan view of the ejector. Fig. 49 a plan view of the breech-block pin. Fig. 50 a plan view of one of the ejector studs. Fig. 51 a detached plan view of the hammer-spring. Fig. 52 a detached view in inside elevation of one of the action-slide links. Fig. 53 an edge view thereof. Fig. 54 a detached plan view of the timing-lever. Fig. 55 a view thereof in side elevation. Fig. 56 a detached view in side elevation of the timing-lever coupling piece.

My invention relates to an improvement in gas-operated guns of that class in which a portion of the gas developed by the explosion and burning of the powder is intercepted at the muzzle of the gun and utilized for the operation of the breech-mechanism thereof, the object being to use the power so derived in the operation of toggle-link breech-mechanism.

Further objects of my invention are to produce a gun of the character described constructed with particular reference to convenience and reliability of operation and safety and durability in use.

With these ends in view, my invention consists in a gun having certain details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In carrying out my invention as herein shown, I employ a sliding sleeve-like gas-chamber 2 having at its forward end a bullet-opening 3 located in line with the bore of the gun-barrel 4. This chamber is formed near its forward end with lateral gas-escape holes 5 which are left open or plugged up as may be required to properly gage the amount of gas intercepted at the muzzle of the gun-barrel. Within the extreme forward end of the chamber, I locate a gas-check 6 having its rear end formed with a bevel 7 to coact with a corresponding bevel 8 at the extreme muzzle-end of the barrel to prevent the rearward movement of the intercepted gas until a sufficient pressure of gas has been accumulated in the chamber to effect the operation of the breech-mechanism of the gun. The said bevels also coact to center the bullet-hole 3 with respect to the bore of the gun-barrel 4.

As soon as the pressure of gas in the chamber is sufficient to start the same forward, and hence start the operation of the breech-mechanism, the joint between the bevels 7 and 8 is broken when the gas immediately finds its way rearward and relieves the pressure. It will be noticed that the gas-escape holes 5 are located back of the gas-check 6 though at the front end of the chamber. At its rear end the said chamber is formed with a corresponding ring of lateral cleaning holes 5^a which provide for the ejection of the powder residue deposited by the gas as well as for the escape of the gas as will be described later on. The said chamber 2 is also formed at its rear end with an internally threaded collar 9 adapting it to be screwed upon the slightly enlarged and threaded forward end of a sliding guide-sleeve 10 which extends rearward over the barrel 4 and corresponds in diameter to the gas-chamber 2 which it supports and guides. This construction permits the chamber 2 to be readily removed for being cleaned and for giving access to the muzzle end of the barrel for the same purpose. In this connection it may be said that one of the great defects of gas-operated guns as heretofore made has been the accumulation of powder residues on such of the moving parts as are exposed to the gas.

In order to prevent the chamber 2 from fouling by the accumulation in it of powder residues, I locate upon the forward end of the barrel, a cleaning-sleeve 11 having a spiral rib 12, and secured to the barrel by a set-screw 13. This rib scrapes the inner surfaces of the chamber, the dislodged material being blown by the gases back through the spiral channel formed by the rib and ejected through the cleaning-holes 5^a aforesaid. The said rib 12 forms a bearing for the chamber 2 to ride back and forth upon and the spaces between the ribs provide, as it were, a receptacle for the residues that may not be carried rearward and away from the gun altogether by the gas. In the construction shown, the chamber 2 is slightly larger in diameter than the gun-barrel to permit the use of a sleeve 11 with its spiral rib 12. The spiral gas-escape channel formed by the spiral-rib 12 will, according to the pitch of the said rib, regulate the speed of the escape of the gas caught and imprisoned by the gas-chamber and hence the speed of the forward movement of the gas-chamber. Therefore by giving the rib 12 a predetermined pitch the action of the chamber 2 may be regulated as desired. Similarly the sleeve 10 is kept from being fouled by a cleaning-sleeve 14 secured in place upon the barrel by a screw 15 and furnished with a series of parallel rings 16 virtually corresponding to the coils of the spiral rib 12 of the cleaning-sleeve 11. The sleeve 10 is also made larger in diameter than the diameter of the barrel to provide a space through which the gas may travel rearwardly so as to escape at the rear end of the sleeve which bears upon the rings 16, the spaces between which provide a receptacle, as it were, for any residues which may not be carried away by the gas.

The motion derived from the forward movement of the chamber 2 and sleeve 10 is transmitted to the breech-mechanism by means of a connecting-rod 17 having its forward end fixed to the lower face of the guide-sleeve 10 and having its rear end entered into a slot 18 in the forward end of a skeleton-bar 19 which plays back and forth through an oblong horizontal opening 20 in a tip 21 applied to the forward end of the chambered forearm 22, the said forearm tip 21 being provided with two rearwardly extending arms 23 formed in their outer faces with screw-holes 24 for the reception of screws by means of which the tip is secured in place and having their inner faces formed with grooves 26 corresponding to the cross-sectional form of the side pieces of the skeleton-bar 19, whereby the said arms 23 constitute bearings for the skeleton-bar as the same moves back and forth. At its rear end the bar 19 is formed with a hole 27 for the reception of a buffer-spring rod 28 constituting a forward extension of the action-slide 29 which is formed at its forward end with a sleeve 30 in which the rear end of the said rod is pinned. The said rod 28 is encircled by a buffer-spring 31 which is interposed between a shoulder 32 at the rear end of the bar 19 and the rear end of a head 33 located at the forward end of the rod

and counterbored and threaded for the reception of the threaded rear end of an operating-spring guide-rod 34 extending forward through a hole 35 in the forearm tip 21, and having a head 36 slotted for the reception of a screw-driver. The said rod 34 is encircled by an operating-spring 37 interposed between the said head 33 of the rod 28, and an operating-spring abutment 38 located within the forward end of the forearm and secured in place by four screws 39. This abutment has a clearance hole 40 through which the rod 34 moves back and forth and two cuts 41 which respectively receive and support the side pieces of the skeleton-bar 19. When the gun is fired and the gases intercepted in the chamber 2 begin to exert their forward pull, the buffer-spring 31 is sufficiently compressed to take off the shock of starting the operation of the breech-mechanism. Then, as the chamber 2 moves forward, the operating-spring 37 is compressed concurrently with the further compression of the buffer-spring. When the gas intercepted by the chamber 2 is released, the two springs expand and pull the chamber 2 back into its gas-receiving position and at the same time close the breech-mechanism of the gun. It will thus be seen that I employ two springs, namely, the buffer-spring 31 and the operating-spring 37, whereas gas-operated guns have generally employed but one spring. In case but one spring is employed it must be made heavy enough not only to receive and store up the energy necessary to close the gun, but also heavy enough to absorb the excess of energy produced by the violent movement of the gas-operated parts of the gun. The excess of energy thus stored in the spring above what is required for closing the gun, is given off by the spring, so to speak, in the form of shocks injurious to the gun. In guns of large calibers requiring proportionately large operating springs, it will be seen that the shock to the gun produced by the excess of energy stored in the operating-spring is a serious drawback to the practical working of the gun. I avoid these objections by employing two springs as shown and described. The buffer-spring 31 receives all of the first shock of the forward movement of the gas chamber and is compressed thereby, but only to expand and harmlessly dissipate the energy so stored even during the opening of the gun. The operating-spring 37 may, therefore, be exactly proportioned to the work required of it in closing the gun without any shock to the moving parts thereof and without regard to the amount of energy generated by the exploding cartridge. In one view, therefore, of my improved construction, the buffer-spring 31 may be regarded as a regulating spring in so far as it governs or regulates the force employed. Therefore with two springs instead of one, I am enabled to secure a smooth, harmonious and balanced movement of the parts which conduce to safety in the working of the gun and to the durability of the gun.

The action slide 29 consists essentially of two parallel side bars having bearing in the opposite ends of a horizontal opening 42 in the forearm heel 43 which is secured in place by means of a screw passing through a screw hole 45 in an arm 46 extending forward into the forearm from the lower end of the heel. The rear ends of the two side bars of the slide, are formed with forks 47 which receive the lower ends of two action-slide links 48. Link pins 49 passing through the forks 47 and the links 48 pivotally secure the latter to the action-slide. The upper ends of the said links 48 are provided with inwardly extending undercut coupling studs 50 which enter horizontal undercut slots 51 in the rear end of the rear breech-link 52 which swings upon a pin 53 passing through the gun-frame or receiver 54. At its rear end the said heel 43 is made with a bead or rib which projects beyond the adjacent surfaces of the forearm 22 and the gun-frame or receiver 54 and forms a fender, as it were, for guarding the hand from being caught in the joint between the heel and the lower portion of the forward end of the gun-frame when the forearm slams back or moves back into its closed position. At its forward end the rear breech-link is formed with two perforated ears 55, 55, receiving between them a perforated ear 56 located at the rear end of the front breech-link 57, a pin 58 passing through the ears 55 and 56 pivotally connecting the links 52 and 57 together. The forward end of the front breech-link is formed with two perforated ears 59, 59, receiving a perforated lug 60 at the rear end of the breech block 61 which is pivotally connected with the link 57 by a pin 62 passing through the ears 59, 59, and the lug 60. The breech-block pin 62 has an arm or rib-extension 63 terminating in a finger 64 entering a notch 65 in the rear end of a guide-rib 66 on the right hand side of the block, the said rib-extension 63 and rib 66 riding back and forth in a groove (not shown) in the right hand wall of the receiver, whereby the breech-block is supported and guided so far as its right hand side is concerned. The left hand end of the pin 62 is extended to form a squared head 68 entering a horizontal groove 69 in the inner face of the left hand side wall of the receiver 54 and supplementing the action of the rib 70 on the left hand side of the breech-block. The breech block is furnished with two extractors 71 and with a firing-pin 72 the rear end of which is struck by a firing-pin striker 73 mounted in the front breech link in position to have its rear end struck by a hammer 74 which swings on a pin 75 in the gun-frame 54.

The hammer 74 carries an antifriction roller 76 entering a groove 77 in the forward

end of a hammer-spring 78 the rear end of which is secured in the lower tang 79 which enters a long slot or opening in the lower portion of the gun-frame. A hammer-buffer spring 81 located upon the hammer-spring 78 and shorter than the same extends forward into position to be engaged by the rear upper corner of the hammer when the same is automatically cocked. To reduce the power required to open the gun by hand by taking off a good portion of the pressure of the spring 78 from the hammer 74, I employ a hammer-spring depressor 82 secured by a pivot 83 to the rear breech-link 52 at a point very close to the pin 53 thereof and therefore at a point where the leverage thereof is very powerful even when the links are raised into nearly their full open positions when this depressor 82 acts to take off the pressure of the hammer-spring from the hammer.

The spent shells are extracted by two extractors 71 which draw them directly rearward after which they are ejected upward through an opening 84 in the top of the receiver 54, by the finger 85 of a yoke-shaped ejector 86 the arms of which embrace the breech-block 61. At their rear ends the said arms are turned upward and receive the ends of the threaded pins 87 of the ejector studs which extend through the receiver and are prevented from working loose by means of locking arms 88 located upon the outside of the receiver and engaged by spring pins 89 of familiar construction. The ejector is operated by the impingement against the forward edges of its upturned arms, of the rear end of the rib-extension 63 and the rear edge of the squared head 68.

The cocking-notch 90 of the hammer is entered by the forward end of a sear 91 which rocks upon the pin 92 of the trigger 93 under the control of a sear spring 94. In order to prevent the pulling of the trigger from operating the sear and releasing the hammer at any time other than when the gun is closed and locked, I employ timing-mechanism comprising a fly 95 constantly pushing downward by a spring 96 and having a leaf-like finger 97 which, when it is swung forward between the trigger and the rear end of the sear, constitutes, as it were, a block by means of which the former lifts the rear end of the latter. On the other hand when the finger 97 is cleared from the rear end of the sear, the pulling of the trigger is without effect. The fly 95 is pivotally hung upon the lower end of a hook-shaped timing-lever 98 hung upon a pin 99 supported in two arms 100 extending upward from the sides of the lower tang 79. A timing-lever spring 101 exerts a constant effort to swing the timing-lever 98 so as to move its lower end forward and bring the finger 97 of its fly 95 into operating position between the trigger 93 and the rear end of the sear 91. The forward end of the timing-lever is depressed with the effect of retracting its fly from such position, by the engagement of a lug 102 at the forward end of the lever 98 with the lower edge of the right hand bar of the action-slide 29. This bar is formed, however, with what I may call a firing-notch 103 located so that when the slide is at the limit of its rearward movement, which is when the gun is closed and locked, the notch will register with the lug 102 which then rises into the notch and permits the timing-lever 98 to be swung by its spring 101 and the fly 95 to be moved forward between the trigger and the rear end of the sear.

For the introduction of the first cartridge into the cartridge-chamber of the gun-barrel 4, as well as for the extraction of the cartridge in case of a misfire, it becomes necessary to manually open the gun for the operation of its breech-mechanism independently of the operation thereof by the pressure of gas intercepted at the muzzle of the gun-barrel. For such manual operation of the breech-mechanism, the forearm must be disconnected from the receiver 54 so that it may be worked back and forth for the operation of the action-slide which is connected with the rear breech-link as described, and hence with the other parts of the breech-mechanism. For the normal connection of the forearm with the receiver, I employ a forearm-latch 104 hung upon a pin 105 in a forearm-latch escutcheon 106 consisting of a long narrow plate set into a mortise 108 in the lower face of the rear end of the forearm 22 in which the escutcheon is secured by means of pins 109, the spring 110 of the latch 104 extending under the middle pin 109, whereby the latch is held in its locking position. The latch, which is formed with two locking hooks 111 and 112 and a tooth-like unlocking cam 113 which may be said to rise out of the center of the hook 112, coacts with a bar-like locking-stud 114 having its rear end threaded for being screwed into the forward lower corner of the gun-frame 54 at a point directly below a rectangular horizontal opening 115 formed therein for the passage of the action-slide 29 the side bars of which play back and forth in grooves 116 formed in the inner face of the side walls of the receiver. At its forward end the lower face of the stud 114 is formed with a notch 117 to receive the hook 112 of the latch 104, with a notch 118 to receive the hook 111 thereof, and with a longitudinal slot 119 leading out of the bottom of the notch 117 and adapted to receive the tooth-like unlocking cam 113 of the latch 104. Normally the hooks 111 and 112 enter the notches 117 and 118 and lock the forearm to the receiver.

For the purpose of throwing the teeth of the latch out of the notches of the stud, I employ a rod-like unlocking plunger 120 extending through the stud 114 and formed at

its forward end with an inclined notch 121 normally registered with the notch 117. When, however, the plunger is moved forward the inclined rear wall of its notch 121 engages with the unlocking cam 113 and forces the latch 104 sufficiently downward to force the hooks 111 and 112 out of the notches 117 and 118, whereby the forearm is disconnected from the receiver after which it may be manually moved forward for the manual operation of the breech-mechanism. The plunger 120 is locked in its forward position by means of a dog 122 rocking on a pin 123 and located in a slot 124 in the lower face of the rear end of the stud 114. When the forearm is started forward the lower wall of a square opening 125 formed in the heel 43 for the reception of the stud 114, engages with the lower face 126 of the dog and throws the nose 127 thereof upward into a locking-notch 128 in the lower face of the plunger 120, whereby the plunger is locked in its forward position in which it prevents the latch 104 from reëngaging with the stud 114. On the other hand, just before the forearm reaches the limit of its rearward movement, the lower wall of the hole 125 engages with the lower face 126[a] of the dog and swings the same on its pin 123, whereby its nose 127 is swung downward out of the locking-notch 128 whereby the plunger is thus released for being drawn back into its unlocked position in which it permits the hooks of the latch to enter the notches in the stud.

For the operation of the plunger 120, its rear end is formed with a head 129 grooved for the reception of the arms of a fork 130 turned inward from left to right from the forward end of a forearm locking-bar 131 located in a recess in the inner face of the left hand wall of the gun-frame. At its forward end the bar has a pin 132 encircled by a spring 133, both housed in a socket 134 in the gun-frame and the spring exerting a constant effort to push the bar 131 rearward.

For the purpose of moving the bar 131 back and forth, as well as for moving its rear end inward and outward, I employ a forearm locking-lever 135 having a thumb-piece 135[a] and also having a threaded stud 136 entering a threaded opening in the said left hand wall of the gun-frame, the oscillation of the lever being limited by two fixed pins 137 and 138 located out of line with each other and entering oppositely opening slots 139 and 140 formed in the inner face of the lever. At its lower end the lever is formed with a downwardly opening recess 141 having its rear wall 142 beveled and its forward wall 143 undercut, the former coacting with the beveled rear face 144 (Fig. 25) of a head 145 on the outer face of the rear end of the bar 131 for forcing the rear end of the bar inward. The wall 142 also coacts with a shoulder 146 on the head 145 for pushing the bar directly forward against the tension of the spring 133. On the other hand, the undercut wall 143 of the recess 141 coacts with the undercut 147 in the head 145 to draw the bar outward after it has been pushed rearward by the spring 133. Of course, if the spring should fail to act, the beveled wall 143 and the undercut 147 would draw the bar rearward as well as outward. The movement of the bar 131 back and forth is accompanied by a corresponding movement of the plunger 120 for disconnecting the forearm from and recoupling it with the receiver.

The lateral movement of the rear end of the bar 131 has a safety function and is designed to move a beveled pin 148 projecting inwardly from the rear end of the bar, into and out of operative connection with the left hand edge of the rear end of the timing-lever 98. When the lever 135 is drawn back by its thumb-piece 135[a], the bar 131 is pushed forward for the disconnection of the forearm from the receiver and at the same time the rear end of the bar 131 is forced laterally inward for moving the beveled pin 148 under the left hand edge of the rear end of the timing-lever 98 which at this time is in its safety position with its rear end elevated and its forward end depressed by the engagement of its safety nose 122 with the lower edge of the right hand bar of the action-slide 29. The gun cannot now be fired until the lever 135 has been moved forward into its normal position, drawing the bar 131 rearward and also drawing the beveled pin 148 outward out of engagement with the timing-lever 98 which is thus freed to swing on its pivot to bring the fly 95 into operative position as soon as the action-slide 29 is moved into position to bring its firing-notch 103 into registration with the safety-nose 122 of the lever. It follows from this that if in the manual operation of the forearm, the same should be "slammed" back into its locked position which would bring the firing-notch 103 into position for releasing the timing-lever 98 for the firing of the gun, the gun still could not be fired until after the lever 135 had been pushed forward for locking the forearm to the receiver, this forward movement of the lever retracting the beveled pin 148 from the timing-lever and so releasing the same. In other words, the operation of the locking-bar 131 by the locking-lever 135 precludes the possibility of firing the gun with the forearm in its closed position, but not positively locked to the gun-frame. If the gun should be fired with the forearm unlocked, it would, of course, be violently thrown forward. Therefore after the forearm has been unlocked from the gun-frame for the manual operation of the gun for the purpose of loading the first cartridge into the gun-barrel or for the purpose of extracting a misfire, the gun cannot be fired until the

forearm has been drawn back to the limit of its rearward movement and the lever 135 has been pushed forward for relocking the forearm to the gun-frame after which the trigger may be pulled.

In connection with this subject of the manual operation of the gun, I wish to call particular attention to the fact that the abutment 38 of the operating-spring 37 is carried by the forearm and is entirely independent of the barrel. Therefore when the forearm is disconnected from the receiver and employed for the operation of the action-slide 29, the operating-spring will move back and forth with the forearm without being compressed and so offer no resistance whatever to the manual operation of the gun which in fact is as easily operated manually as if its entire gas-operating mechanism formed no part of it. This result could not be secured if the abutment 38 were carried by the barrel.

The magazine, which is of the box-type, may be of any approved construction and equipment. As herein shown it has a follower 149 elevated by a spring 150 secured to a cover 151 with the forward end of which the forwardly inclined forward end wall 152 is made integral, the rear end wall 153 of the box-magazine being formed by the forward extension of the lower tang. At its forward end the cover 151 is formed with a lug 154 entering a groove 155 in the frame 54, while the rear end of the cover is engaged by a latch 156 hung on a pin 157 and controlled by a spring 158, this latch being located at the forward end of the finger-guard 159 which incloses the trigger, but the construction of the magazine and its adjuncts may be varied as desired. The breech-mechanism of the gun herein shown and described is more fully illustrated and explained in my prior patent No. 685,216 dated October 22, 1901, to which reference may be had.

It will be understood, without further explanation, that after one cartridge has been introduced into the gun-barrel, the action of the gun is purely automatic beyond the pulling of the trigger. In case of a misfire, the forearm may be uncoupled from the receiver to permit the unexploded shell to be removed from the gun.

It is apparent that in carrying out my invention some changes may be made in the construction herein shown and described. I would therefore have it understood that I do not limit myself thereto but hold myself at liberty to make such departures therefrom as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of a cleaning-sleeve mounted upon the said barrel, a guide-sleeve concentric with the said cleaning-sleeve and movable longitudinally over the same, a gas-chamber carried by the said guide-sleeve at the forward end thereof and formed at its forward end with a bullet-opening, and connection between the guide-sleeve and breech-mechanism.

2. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of a longitudinally movable sleeve-like gas-chamber located at the muzzle end of the barrel and having a bullet-opening, a gas-check located within the forward end of the said chamber and coacting with the muzzle end of the barrel to confine the gases of explosion and to center the said chamber and connection between the said chamber and breech-mechanism.

3. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of a cleaning-sleeve mounted upon the said barrel and having an external spiral rib forming a spiral gas-escape channel, a guide-sleeve concentric with the said cleaning-sleeve and longitudinally movable over the same, a gas-chamber carried by the guide-sleeve at the forward end thereof, and connection between the guide-sleeve and breech-mechanism, whereby a portion of the gas entering the gas-chamber is allowed to escape rearward through the said spiral gas-escape channel.

4. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of a sleeve-like gas-chamber located at the muzzle end of the barrel and formed at its forward end with gas-escape openings and at its rear end with cleaning openings through which the powder residues are forced by the escaping gas, and means connecting the said gas-chamber with the breech-mechanism of the gun.

5. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of a sleeve-like gas-chamber located at the muzzle end of the barrel, and means located upon the exterior surface of the said end of the barrel for removing the powder residues from the walls of the said chamber, and connection between the said chamber and the breech-mechanism.

6. In a gas-operated gun, the combination with the gun-barrel and the breech-mechanism thereof, of a sleeve-like gas chamber concentric with and projecting beyond the muzzle-end of the barrel, a guide-sleeve located upon the barrel and carrying the said gas-chamber, means for cleaning the interior surfaces of the gas-chamber, the said means forming a passage for the rearward movement of the gas, a receptacle for residues deposited thereby and a bearing for the chamber to reciprocate upon back and forth, and

connection between the said guide-sleeve and the breech-mechanism.

7. In a gas-operated gun, the combination with the gun-barrel and the breech-mechanism thereof, of a sleeve-like gas-chamber located at the muzzle end of the barrel, a guide-sleeve located upon the barrel and carrying the said chamber, a cleaning rib applied to the barrel for cleaning the inner surfaces of the chamber, means applied to the barrel for cleaning the inner surfaces of the guide-sleeve, and connection between the sleeve and the breech-mechanism.

8. In a gas-operated gun, the combination with a gun-barrel, of a breech-mechanism, a sleeve-like gas-chamber concentric with and projecting beyond the muzzle-end of the gun-barrel, a guide-sleeve located upon the barrel and carrying the said gas-chamber, an operating-spring for operating the breech-mechanism in closing the gun, a rod extending rearward from the said sleeve, a skeleton bar with which the said rod is connected, an action-slide connected with the said bar and the breech mechanism, a guide rod carried by the said slide, and operating and buffer springs encircling the said rod.

9. In a gas-operated gun, the combination with the gun-barrel and the breech-mechanism thereof, of a sleeve-like gas-chamber located at the muzzle end of the barrel, connection between the said chamber and the breech-mechanism, including a rod, a skeleton-bar, an action-slide, a buffer-spring-rod connecting the skeleton-bar and action-slide, a buffer-spring encircling the said rod, a guide-rod mounted in the buffer-spring rod, an operating-spring encircling the said guide-rod, and an abutment with which the said operating-spring coacts.

10. In a gas-operated gun, the combination with the receiver thereof, of a forearm, means for coupling the forearm to the receiver and uncoupling it therefrom to permit the forearm to be used as a handle for the manual operation of the gun, a breech-mechanism, means for utilizing a portion of the gases of explosion for operating the breech-mechanism automatically, and connection between the said forearm and the breech-mechanism for the operation thereof manually when the forearm is uncoupled from the receiver.

11. In a gas-operated gun, the combination with a barrel, a forearm, and a breech-mechanism, of a sleeve-like gas-chamber located at the muzzle end of the barrel, a forearm tip, a forearm heel, and connection between the said chamber and breech-mechanism including a skeleton-bar having bearing in the forearm tip, and an action-slide having bearing in the forearm heel, the action-slide being connected at its rear end with the breech-mechanism.

12. In a gas-operated gun, the combination with the gun-frame, of a forearm, means for disconnecting the forearm from the gun-frame for the manual operation of the gun, a barrel, breech-mechanism, gas-operating instrumentalities, connection between the said instrumentalities and the breech-mechanism including an operating-spring, and an abutment carried by the forearm and engaged by the said spring, whereby when the forearm is disconnected from the gun-frame, the gun may be manually operated without compressing the operating-spring.

13. In a gas-operated gun, the combination with a barrel and a breech-mechanism, of a sleeve-like gas-chamber concentric with and projecting beyond the muzzle end of the barrel, and yielding connection between the said chamber and breech-mechanism, including an operating-spring, and a buffer-spring, the latter being brought into operation as soon as the gun is fired and the sleeve moved forward.

14. In a gas-operated gun, the combination with a gun-frame, a gun-barrel, a forearm, and breech and timing mechanisms, of a sleeve-like gas-chamber located at the muzzle end of the barrel, and means controlled by the timing-mechanism for locking the forearm to and unlocking it from the gun-frame.

15. In a gas-operated gun, the combination with a gun-frame, a barrel, and breech and timing mechanisms, of a sleeve-like gas-chamber located at the muzzle end of the barrel, connection between the said chamber and the breech-mechanism, and means including a thumb-lever mounted in the frame for locking the forearm to and unlocking it from the frame.

16. In a gas-operated gun, the combination with a frame, a barrel, a forearm, a breech mechanism, a timing-mechanism, and a forearm locking mechanism, of a sleeve-like gas-chamber located at the muzzle end of the barrel and connected with the breech-mechanism, and means for locking the forearm to and unlocking it from the frame including a lever mounted in the frame, and a bar connected at its rear end with the timing-mechanism and having its forward end connected with the forearm-locking mechanism.

17. In a gas-operated gun, the combination with a frame, a barrel, a forearm, and breech and a timing-mechanisms, of a gas-operated mechanism located at the muzzle end of the barrel, connection between the said mechanism and the breech-mechanism, and a forearm-locking mechanism controlled by the timing-mechanism and including a forearm-latch, a stud mounted in the frame and coacting with the said latch, a plunger located in the said stud, a bar connected with the said plunger, and a locking-lever

mounted in the frame and coacting with the rear end of the said bar for the operation thereof and with the timing-mechanism.

18. In a gas-operated gun, the combination with the frame or receiver thereof, of a forearm and a forearm heel mounted in the rear end of the forearm and formed with a rib or bead projecting beyond the forearm and the gun-frame and forming a fender for the joint between the heel and the frame.

19. In a gas-operated gun, the combination with the barrel and the breech-mechanism thereof, of two cleaning-sleeves applied one ahead of the other to the forward end of the barrel, a guide-sleeve concentric with the said cleaning-sleeves and movable longitudinally over them for having its interior surfaces cleaned thereby, a gas-chamber carried by the guide-sleeve at the forward end thereof, and connection between the said guide-sleeve and the breech mechanism, the said forward cleaning-sleeve providing a channel for the escape, under control, of the gas rearward from the gas-chamber.

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

WILLIAM MASON.

Witnesses:
CLARA L. WEED,
GEORGE D. SEYMOUR.