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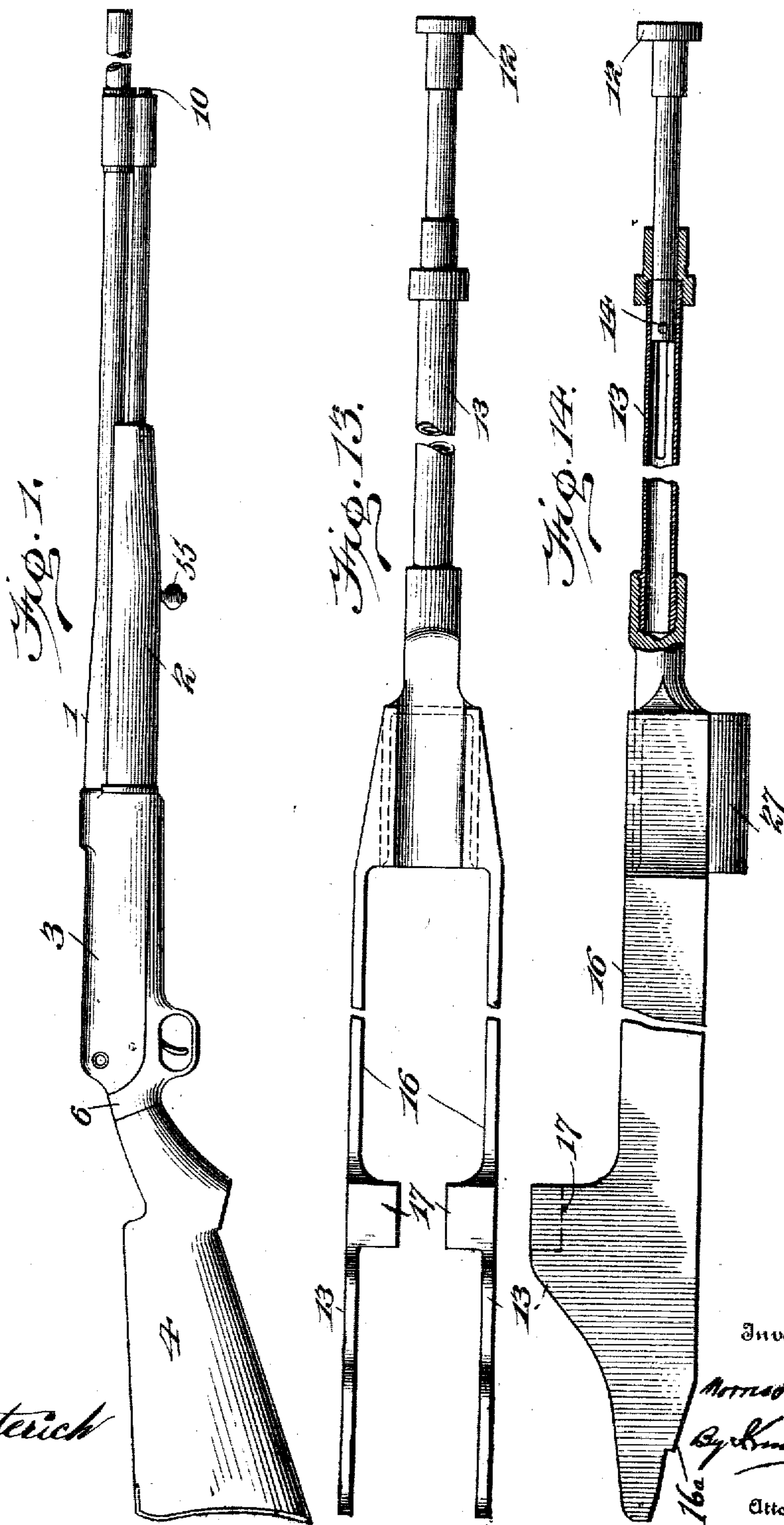
M. F. SMITH.

PATENTED MAR. 6, 1906.

AUTOMATIC GAS OPERATED FIREARM.

APPLICATION FILED NOV. 25, 1903.

6 SHEETS—SHEET 1.



Witnesses
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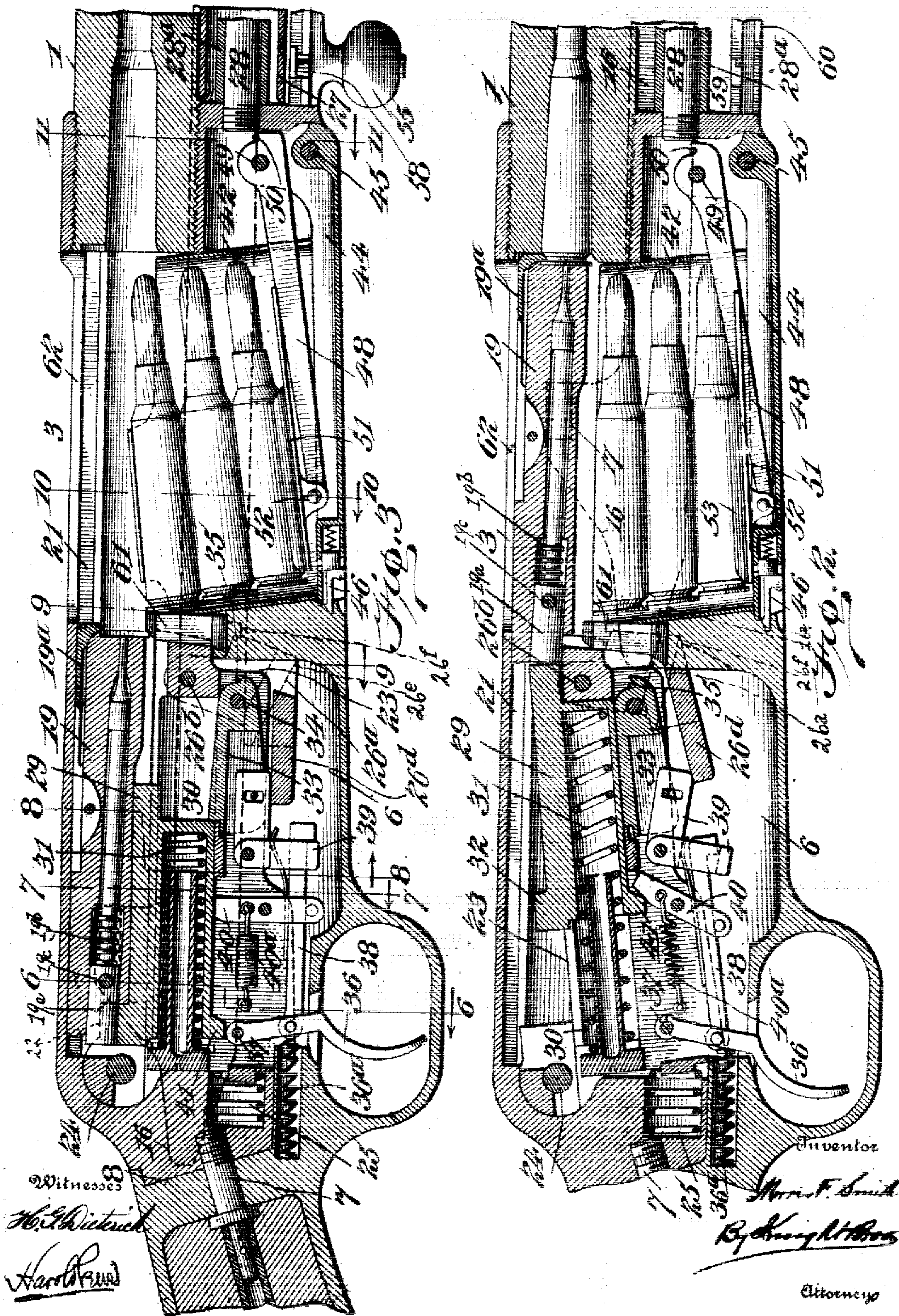
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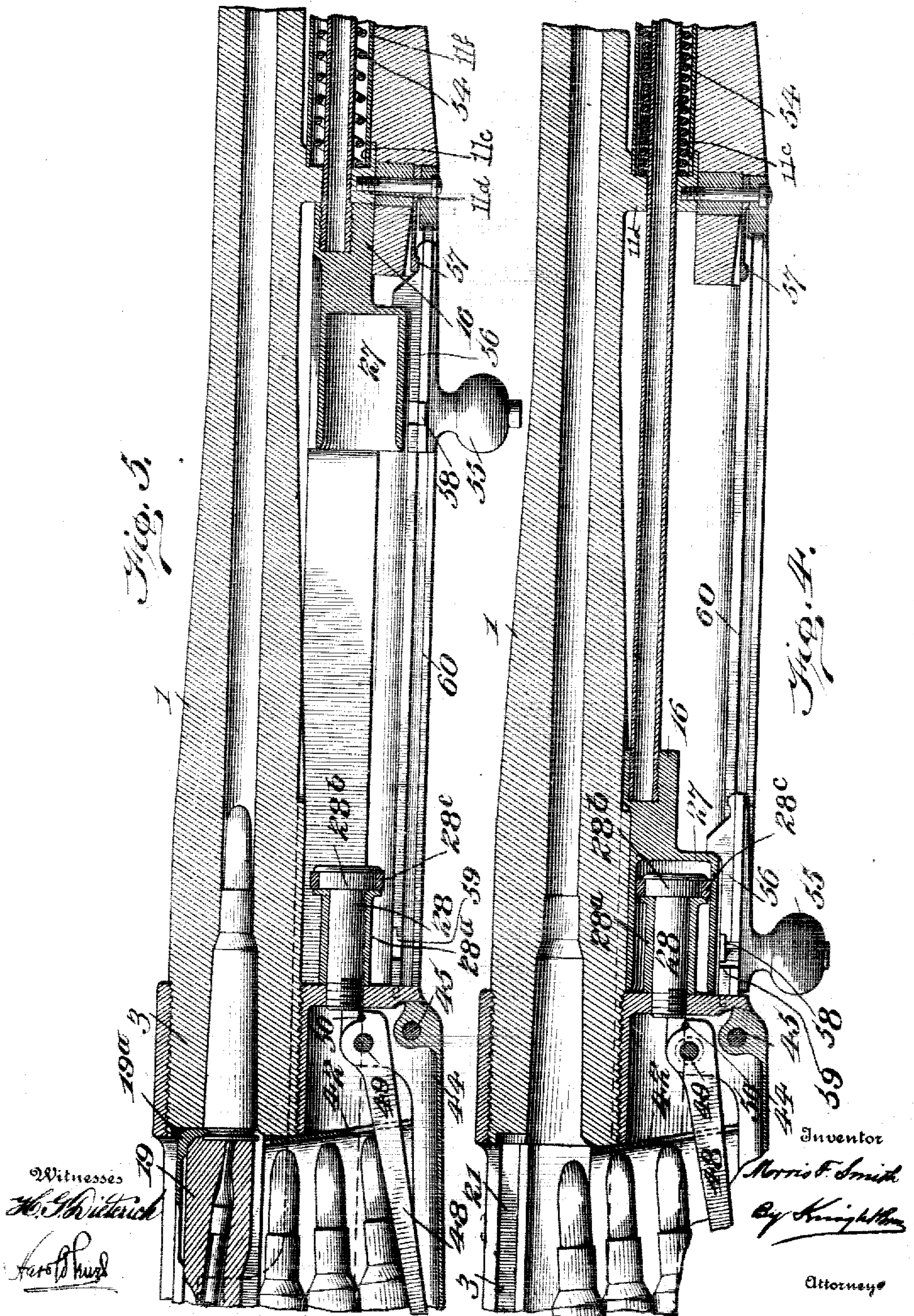
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8 SHEETS—SHEET 3.



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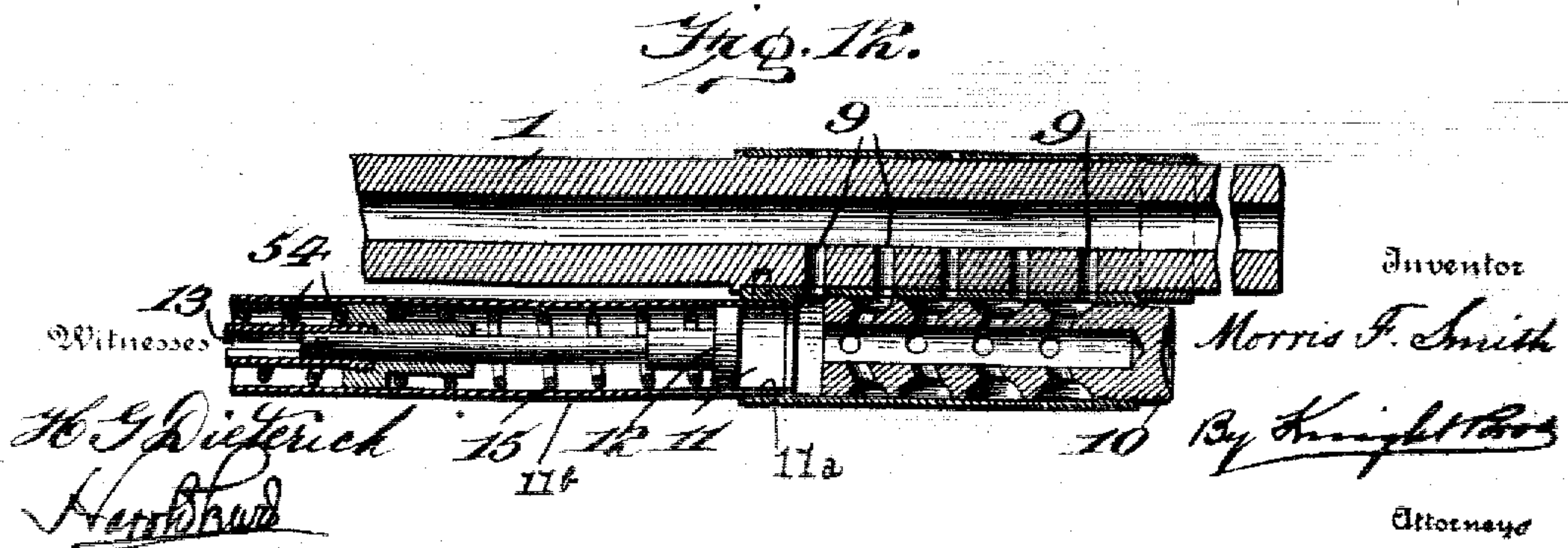
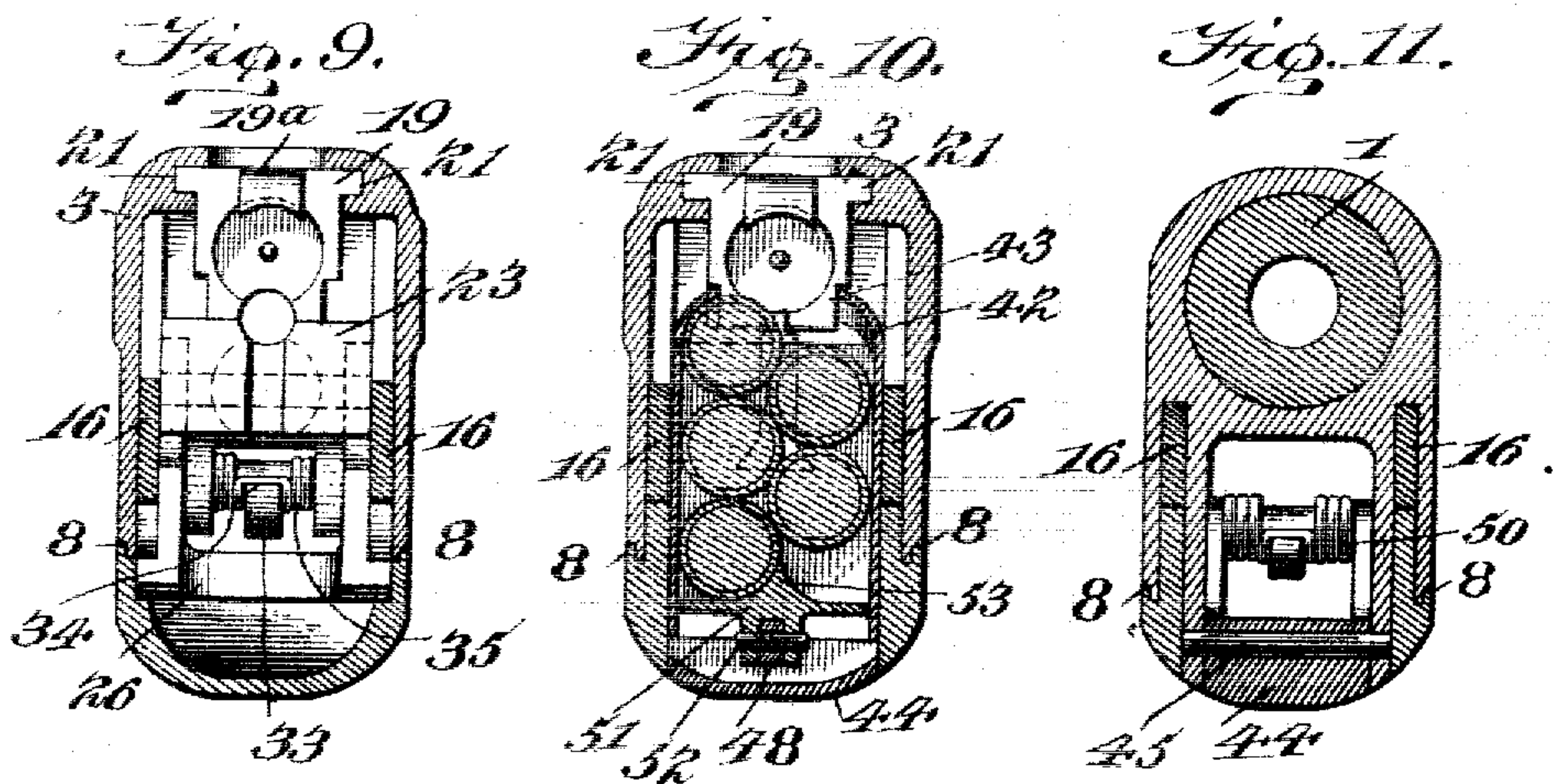
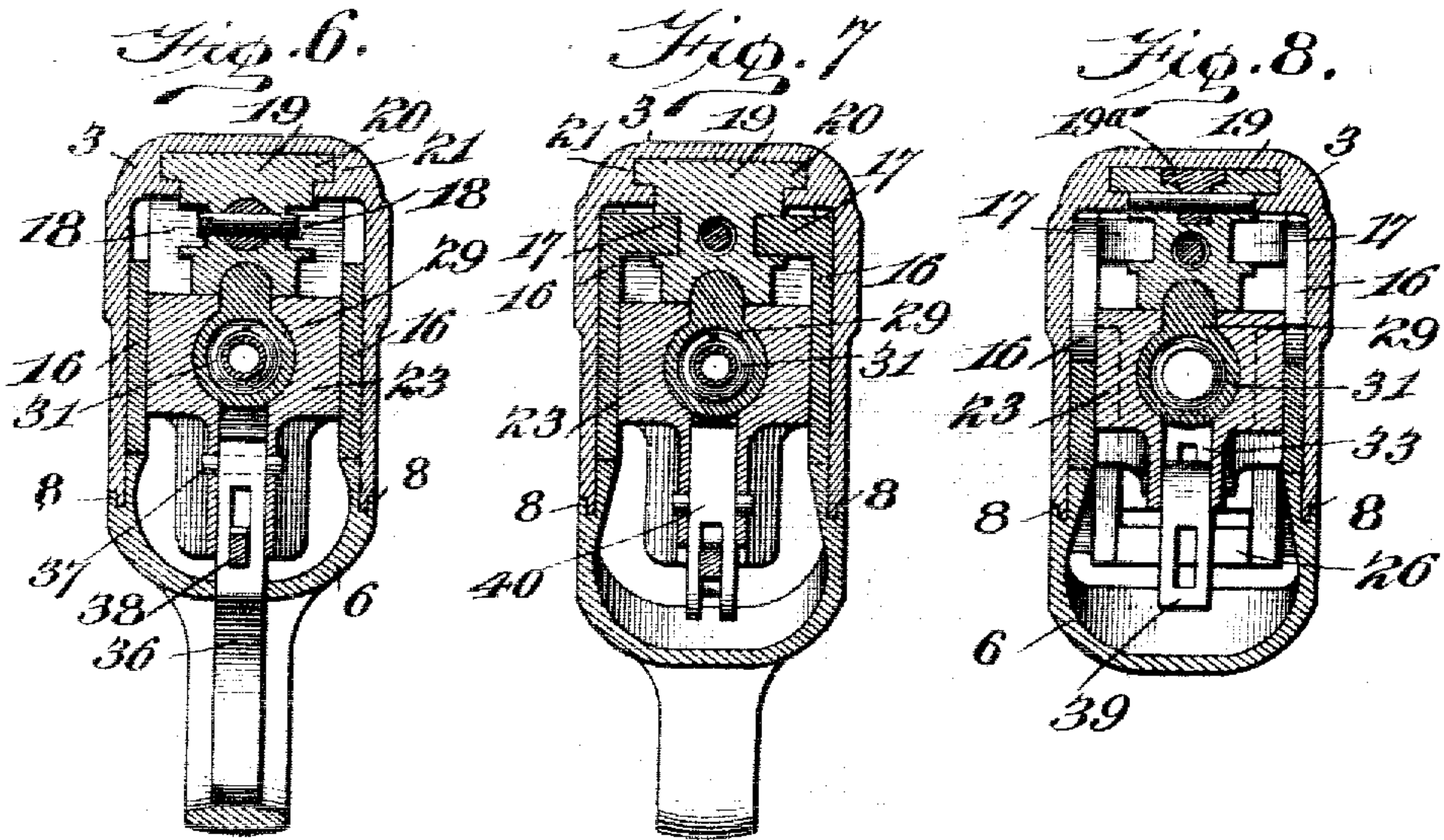
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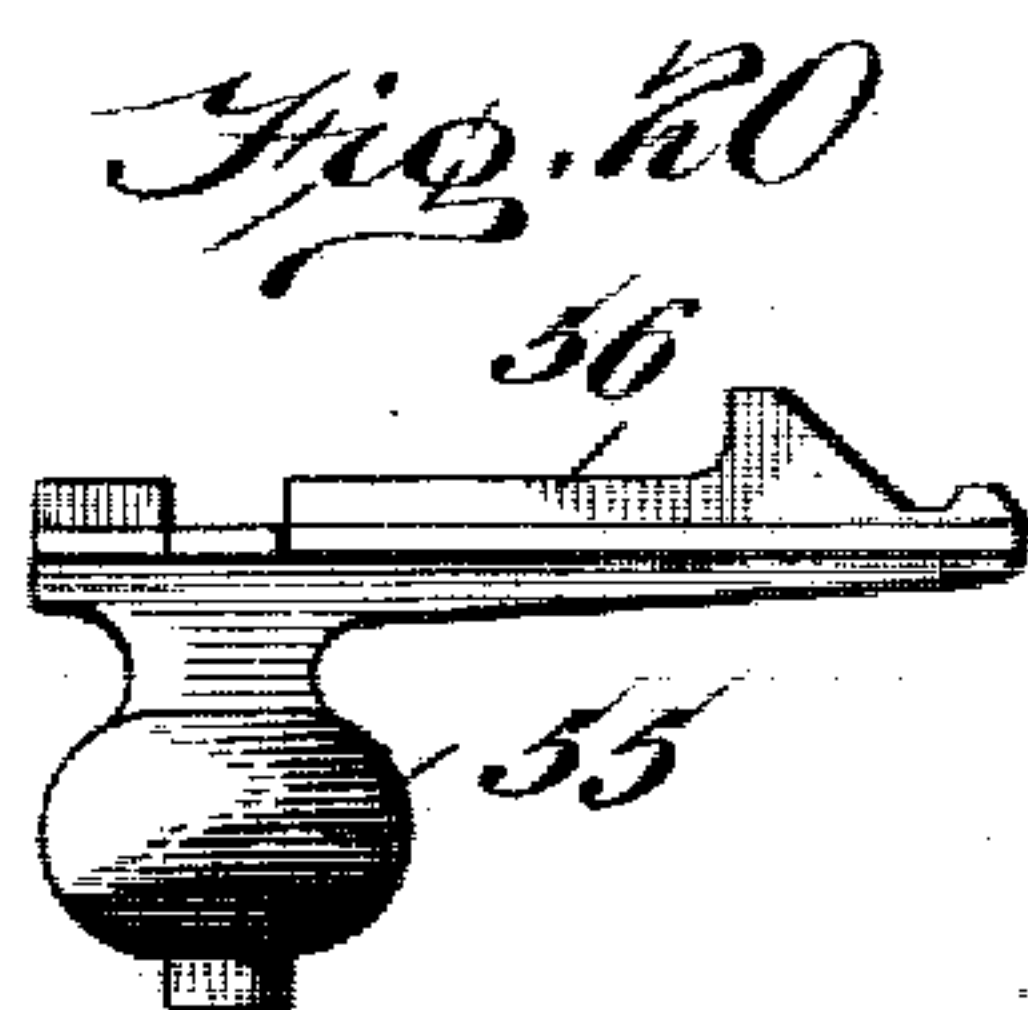
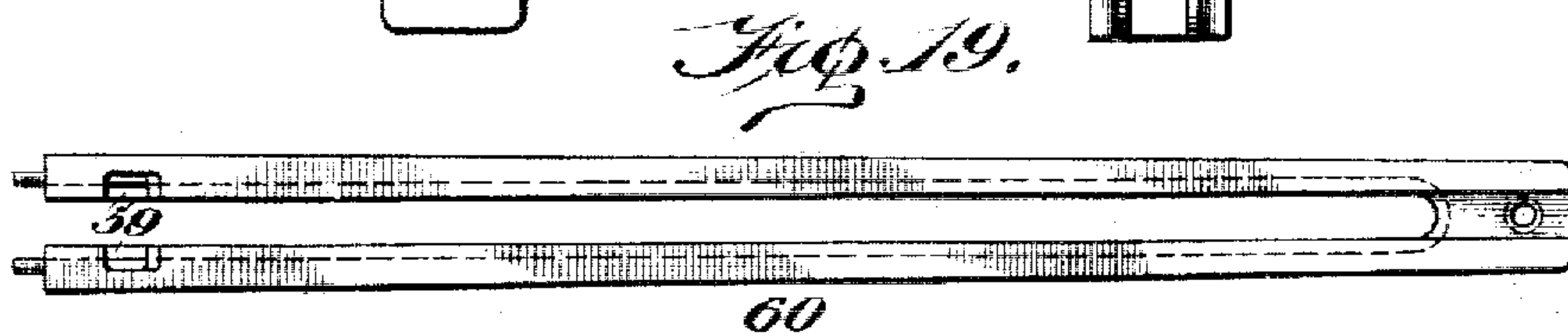
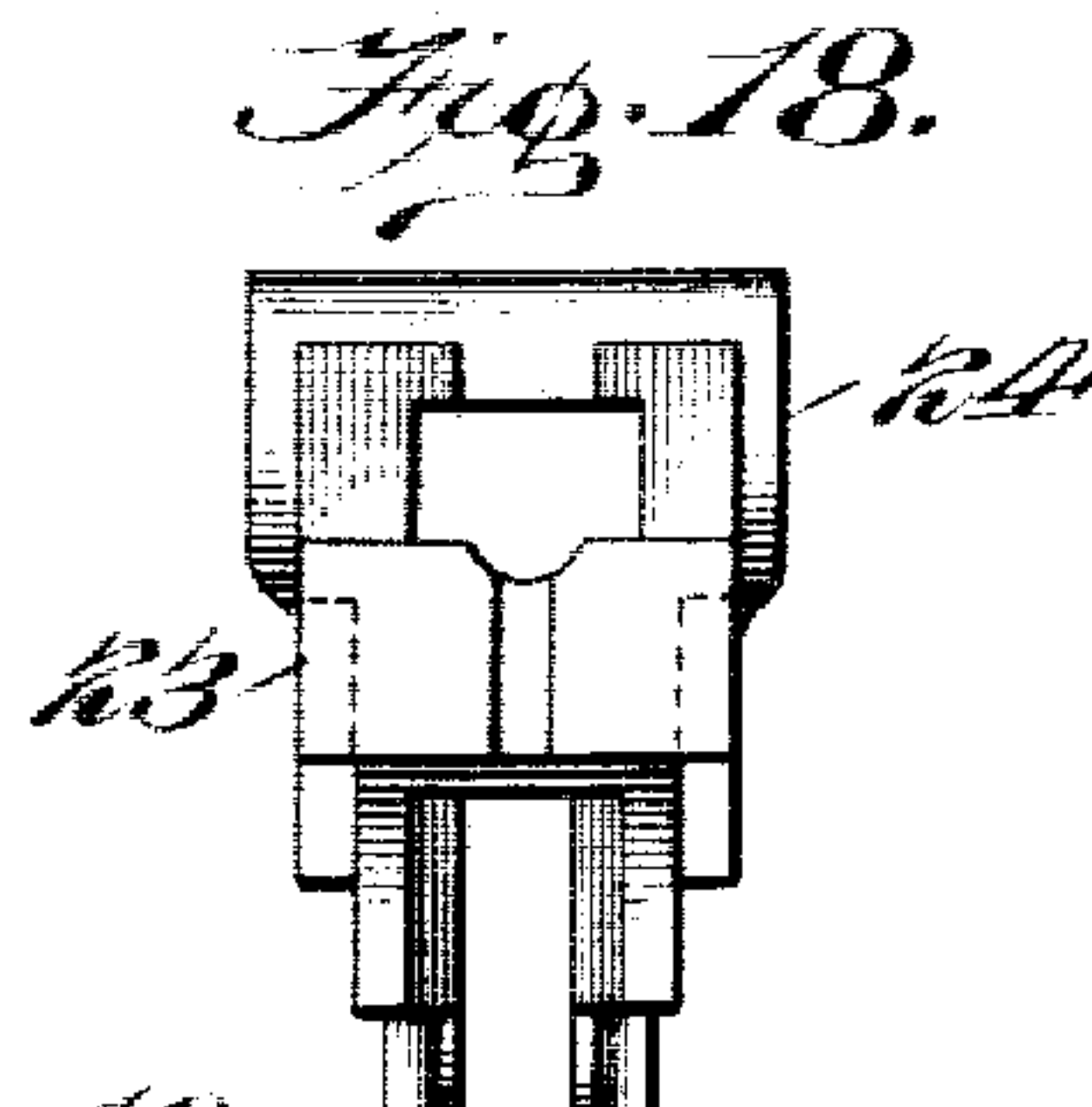
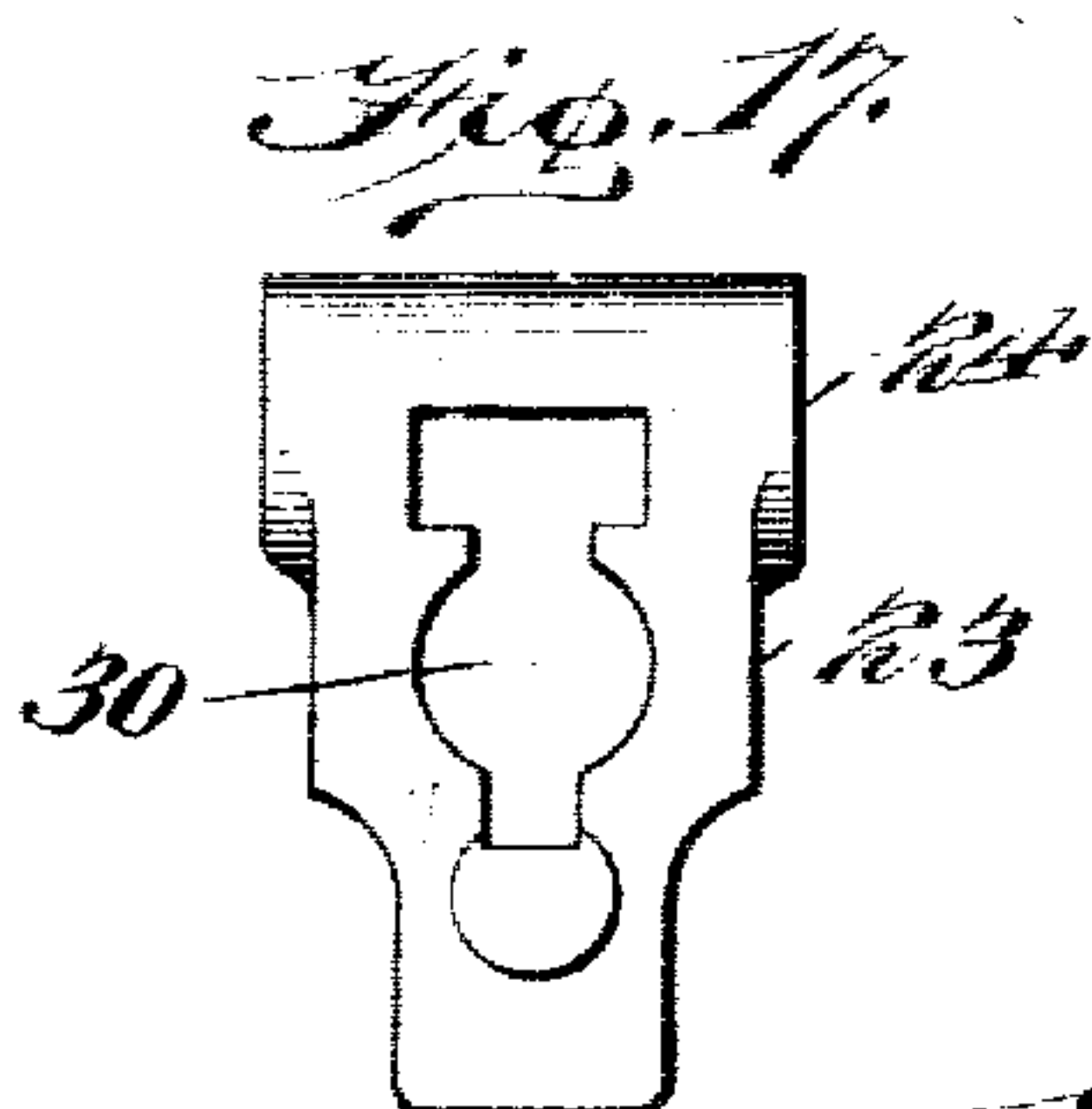
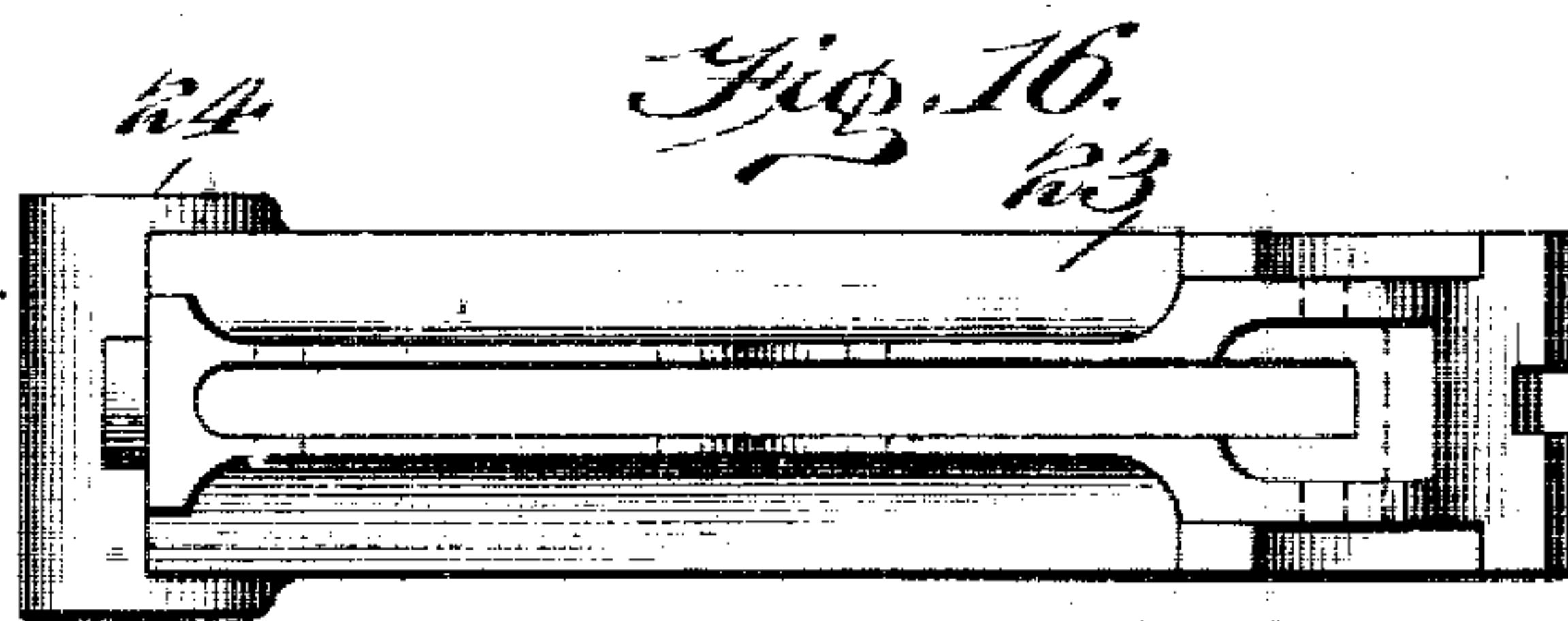
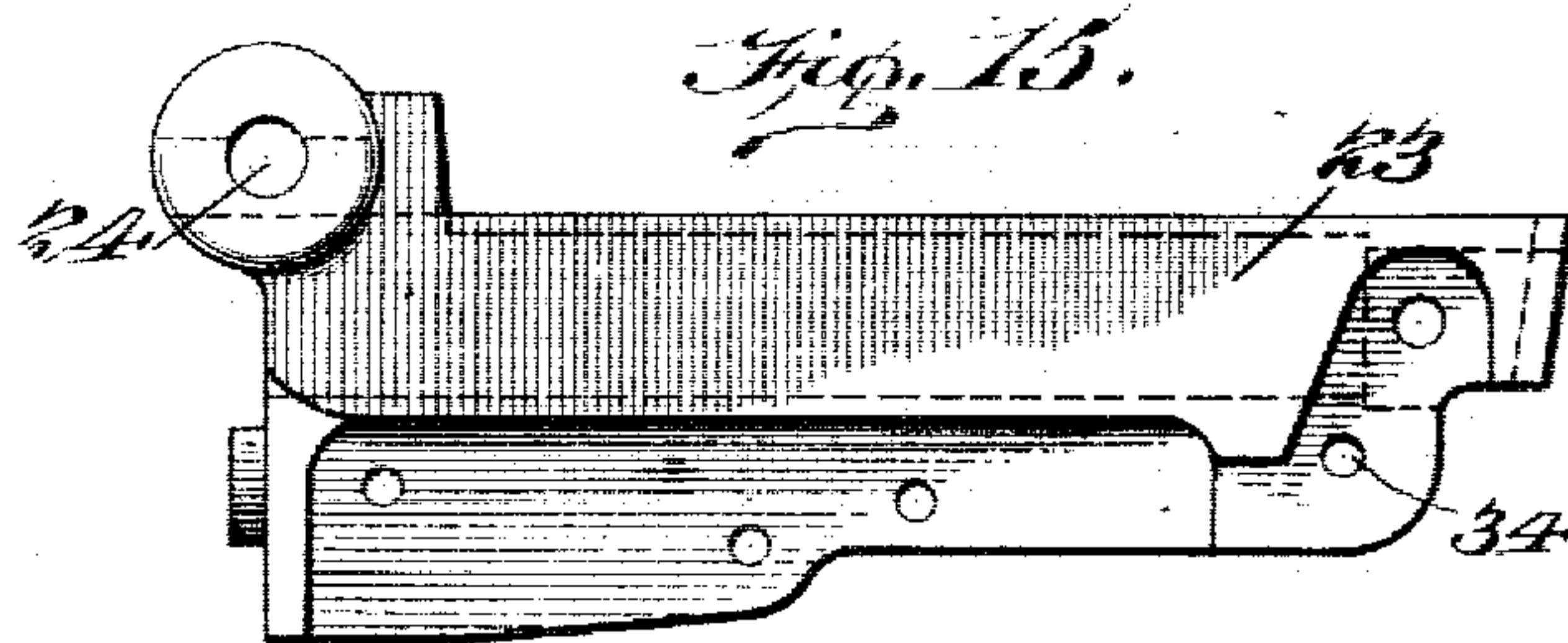
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6 SHEETS—SHEET 5.



Witnesses

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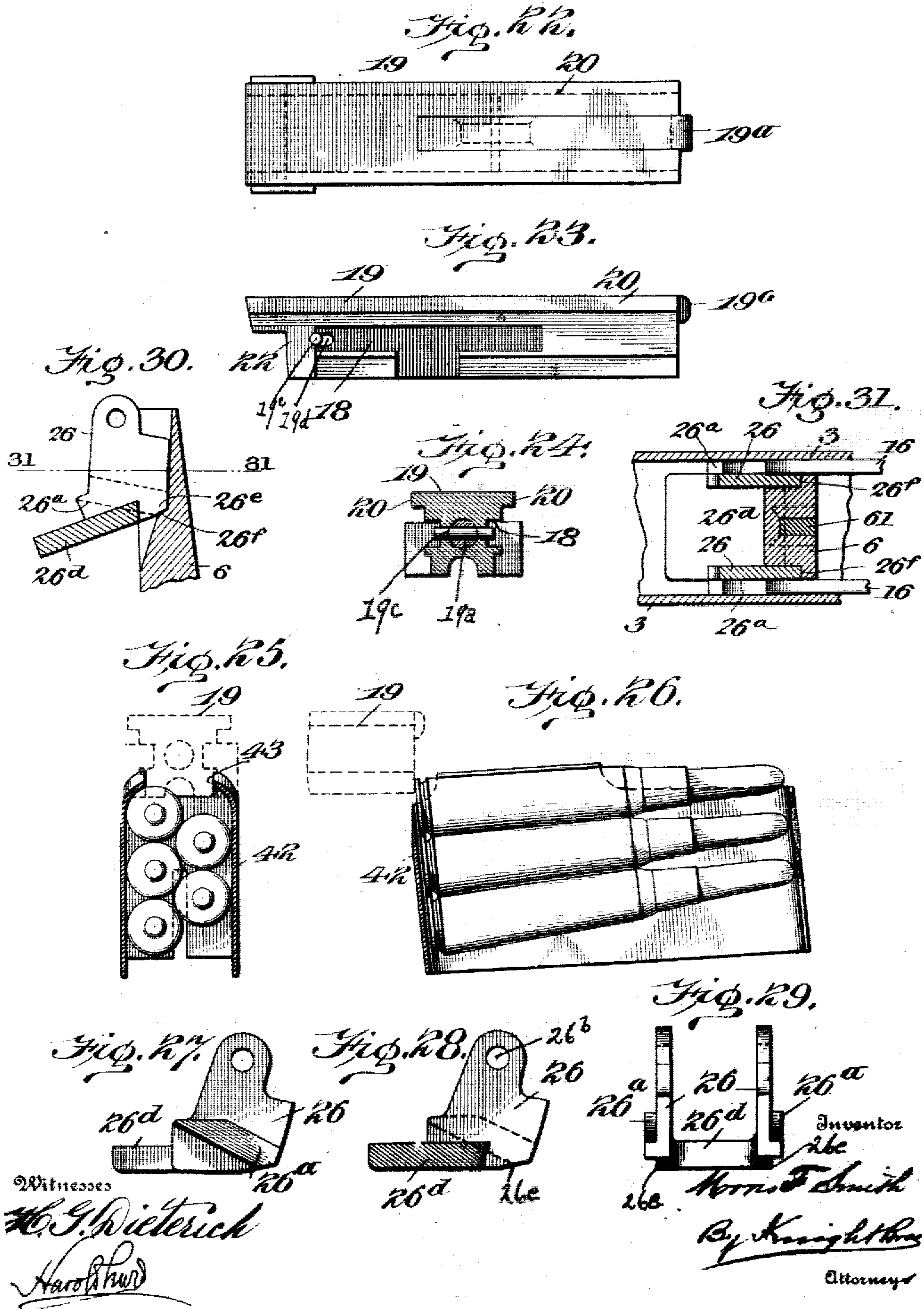
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6 SHEETS—SHEET 6.



UNITED STATES PATENT OFFICE.

MORRIS F. SMITH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF
THREE-FOURTHS TO WILLIAM D. CONDIT, OF DES MOINES, IOWA.

AUTOMATIC GAS-OPERATED FIREARM.

No. 814,242.

Specification of Letters Patent.

Patented March 6, 1906.

- Application filed November 25, 1903. Serial No. 182,882.

To all whom it may concern:

Be it known that I, MORRIS FORD SMITH, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Automatic Gas-Operated Firearm, of which the following is a specification.

My present invention relates to firearms or guns in which the powder-gas pressure developed in firing is utilized for actuating the working parts in reloading after each shot is fired, and has for its object to greatly simplify the mechanism of such a gun and to render it more reliable in action and more durable in use. By way of example merely I shall illustrate and describe my invention as applied to a small-arm or shoulder-gun adapted for military and for sporting purposes; but I desire it to be understood that my invention is applicable, with only slight structural changes, to other types of guns. I have also shown the invention embodied in the so-called "semi-automatic" type of gun; but the novel features may also be applied to the full-automatic type of gun.

In carrying out my invention I employ a reciprocating plunger; a piston on said plunger working in a cylinder that receives powder-gas pressure from the gun-barrel to drive the plunger rearward; a return-spring moving the plunger forward when the powder-gas pressure is exhausted; a breech-closing bolt reciprocated by the aforesaid movements of the plunger; a locking-dog automatically rising in rear of the breech-bolt (preferably by spring-pressure) as the latter reaches its seat and depressed from the path of said breech-bolt by the first part of the rearward movement of the plunger; a spring-driven hammer carried by and working on the locking-dog, so as to be prevented from reaching the firing-pin until the breech-bolt is secured, and having a shoulder abutted by the bolt for the purpose of cocking the hammer and arresting the rearward movement of the bolt by the hammer-spring; a trigger device which is disconnected from the sear automatically by the throwing of the hammer, so that in the rapid reloading and cocking the holding of the trigger will not interfere with the operation; a safety-catch carried by the dog behind the breech-bolt and which so overlaps the trigger connection that the trig-

ger is prevented from again connecting with the sear until the breech-closure is securely locked, so as to prevent premature firing, and a cartridge-feeding magazine of novel construction opening from the bottom, having a lifting-arm independent of the magazine-closure and presenting the cartridges successively into the path of the breech-bolt each time the breech is opened.

My invention resides in the novelty in some of the above-recited features *per se*, in certain novel combinations of such features, and in certain novel details of construction of certain of the parts, all of which will be hereinafter fully described, and specifically pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation, on a reduced scale, of a sporting or service rifle in connection with which my invention will be described for purposes of illustration. Fig. 2 is a longitudinal section of the intermediate portion of the gun, showing the positions of the parts at time of firing, but before the breech is opened, the trigger being pulled and the hammer being projected against the firing-pin. Fig. 3 is a vertical longitudinal section of the intermediate portion of the gun with the parts in the positions which they occupy immediately after firing, when the breech has been opened by the rearward movement of the plunger under the action of the gas-pressure and before the breech has been closed again by the forward movement of the drive-rod under the pressure of the return-spring. Fig. 4 is a vertical longitudinal section of portions of the frame and barrel in which the positions of the parts correspond to those shown in Fig. 3, but in which the breech has been opened and is being held open by the hand-operated slide on the under side of the fore-stock. Fig. 5 is a vertical longitudinal section of the same portions of the gun, showing the positions of the gas-actuated parts after the breech has been closed, but before firing. Figs. 6, 7, 8, 9, 10, and 11 are transverse sections taken, respectively, on the lines 6 6, 7 7, 8 8, 9 9, 10 10, and 11 11 of Fig. 3, the parts in the several sections being viewed in the directions of the arrows associated with the respective section-lines. Fig. 12 is a vertical longitudinal section through the forward end of the gun-barrel and the parts for developing movement from

the powder-gases. Figs. 13 and 14 are respectively a top view and a side view of the drive-rod with its gas-actuated piston. Figs. 15, 16, 17, and 18 show, respectively, a side view, a bottom view, a rear end view, and a front end view of the locking-dog for the breech-bolt. Figs. 19, 20, and 21 illustrate the means for opening the breech by hand, being a top plan of the slideway, a side view of the hand-operated slide, and a vertical transverse section of said slide. Figs. 22, 23, and 24 show the breech-bolt in top plan, in side elevation, and in transverse section. Figs. 25 and 26 are transverse and longitudinal sections of the magazine and show by dotted lines the relation thereto of the reciprocating breech-bolt which feeds the cartridges successively therefrom into the chamber. Figs. 27, 28, and 29 represent in side view, vertical section, and front view the safety-catch which holds the trigger inactive until the locking-dog is in position behind the breech-bolt. Fig. 30 is a detail vertical section of the swinging catch carried by the locking-dog. Fig. 31 is a horizontal section on the line 31-31 of Fig. 30.

Assembling the gun is accomplished in a manner to offer the fewest possible projections on the exterior of the arm, for which purpose the barrel 1 with the balance 2 and the receiver 3 are first assembled as one part, while the stock 4 and receiver-bed 6 are assembled as another part, and these two parts are then brought together by sliding the receiver longitudinally over the receiver-bed and into the frame and securing the parts against longitudinal movement by a screw 7, entered through the stock from the butt, (see Fig. 3,) and to permit these parts to fit together as stated they are provided with tongue-and-groove joints 8, as shown in Figs. 6 to 11.

Gas-pressure is taken from the barrel 1 through the ports 9, near its forward end, and delivered into an expansion-chamber 11, depending from the barrel near the latter's forward end and having a seat 11^a, into which fits the forward end of the tube 11^b. At its rear end the tube 11^b is seated at 11^c in a guiding-lug 11^d. The gas passing into the expansion-chamber through the ports is controlled by a screw-plug 10 and acts on a piston 12, which has a pin-and-slot connection 14 with piston-rod 13, a spring 15 being introduced between the piston and the piston-rod to absorb the shock of the gas-pressure which is suddenly communicated to the piston when the projectile passes the ports 9.

Opening of the breech takes place immediately upon communication of the gas-pressure to the piston 12 through the medium of piston or drive rod 13, which is guided in the guiding-lug 11 and has a bifurcated rear end forming members 16, (see Figs. 6, 11, 13, and 14 and dotted lines in Figs. 2 and 3,) which have upwardly-extending portions

carrying lugs 17, engaging in grooves 18 in the breech-bolt 19, Figs. 6, 7, 8, 13, and 22. The breech-bolt is provided with a firing-pin 19, which is held normally rearwardly or retracted in the bolt by means of a spring 19^b. The lugs 16, moving in the grooves 18, cause a lost motion between the drive-rod and the breech-bolt, and during this lost motion the lugs engage with a transverse pin 19^c, carried by the firing-pin and extending through slots 19^d into the grooves. This breech-bolt carries a suitable extractor 19^a and is constructed with lateral flanges 20 along its upper side, which work in tracks or grooves 21, which tracks extend longitudinally of the receiver and guide the bolt as it is reciprocated by the plunger. At its rear end the breech-bolt is provided with a seat 22, that receives the locking-dog 23, pivoted at 24 and pressed upward by a spring 25 into said seat in order to hold the bolt in locked position. During the lost motion between drive-rod 13 and the breech-bolt the beveled and stepped ends 16^a of the members 16 of the drive-rod engage lugs 26^a on the sides of the swinging catch 26. The swinging catch is pivoted at 26^b to the dog 23 and engages at its forward end 26^c in recesses 26^d in the frame to lock the locking-dog against movement due to a shock. By the engagement of the drive-rod with the catch the catch is first moved to unlock the dog, and the dog is depressed out of engagement with the bolt preparatory to moving the latter rearward. At the completion of the relative movement of the drive-rod permitted by the grooves 18 the continued movement of the drive-rod moves the breech-bolt until it occupies the position shown in Fig. 3.

Cushioning the rearward stroke of the parts at the end of the breech-opening movement is very important to the successful operation of a gun of this type, owing to the great rapidity of movement. It has been proposed to accomplish this purpose by introducing an elastic buffer behind the breech-bolt; but this alone is not effective, because the buffer is not in the proper place to avoid shock in the actuating mechanism. To successfully absorb the movement in the rearwardly-moving parts, it is necessary to locate a suitable absorber in position to arrest the movement of the drive-rod directly and not indirectly through the breech-bolt. In addition to this the life of the parts may be materially increased by providing an elastic buffer for the breech-bolt in addition. To accomplish this purpose, I provide a dash-pot, one member of which is connected with or mounted on the drive-rod, while the other member is mounted on a fixed part of the gun. This dash-pot preferably consists of a cylinder 27 on the drive-rod 16 and a piston 28 on a fixed part of the structure in a position to enter the cylinder as the drive-rod ap-

proaches the rear limit of its movement and forming an air-cushion therein to arrest the rearward movement of the drive-rod without permitting any of the parts to strike. Piston 28 is preferably built up of a sleeve 28^a and a headed bolt 28^b, inserted therein, screwed into the front of the receiver and confining a soft-metal packing 28^c between its head and the sleeve. 29 represents the hammer or firing-bolt, mounted to slide or reciprocate in a guideway 30 in the locking-dog 23 and provided with a projecting spring 31 for throwing it forward. The hammer is provided with a shoulder 32, that engages with the receding breech-bolt, thereby forming a connection between these parts by which the hammer is moved rearwardly to be cocked, and the breech-bolt is cushioned as the bolt completes its movement, and the hammer is held in cocked position by its forward end engaging the sear 33, fulcrumed at 34 on the locking-dog and pressed upward into engaging position by a spring 35. To release the hammer, the trigger 36, pivoted at 37 and held normally forward by spring 36^a, is provided with a draw-rod 38, adapted to engage the depending end of the sear-lever 39, the draw-rod and sear-lever forming the connection between the trigger and the sear. In the rapid action of the gun the trigger is prevented from holding the sear out of engagement with the hammer by disengaging the draw-rod from lever 39, for which purpose a pivotal lifting-arm 40, held in normal position by spring 40^a and through which the draw-rod works, is engaged by a boss 41 on the hammer, so that when the hammer is projected the draw-rod is lifted out of engagement with the lever 39, and the sear is free to return to position to receive the portion of the hammer with which it engages when the latter is cocked, and hence the holding back of the trigger has no effect on the sear, it being simply necessary to release the trigger, so that it can move forward and engage the sear prior to again firing the gun. The lifting-arm 40 thereby provides a means for breaking the connection between the sear and the trigger as long as the firing-hammer is in fired position. As a safety device to prevent firing the gun before the breech is closed the catch 26 has an extension 26^a, that projects beneath the horizontal arm of lever 39 until the locking-dog is in place behind the breech-bolt, when said lever is released and is free to be operated by the trigger. Thus the extension on the catch provides a means moved with the locking-dog when said dog is moved to its unlocking position to hold the trigger connection inoperative and moved with said locking-dog when said dog is moved to firing position to make the trigger connection operable.

Feeding ammunition is accomplished by placing a suitable number of cartridges in a

magazine 42, the construction of which is shown in Figs. 25 and 26, which magazine is of sufficient width to receive two columns of cartridges and is provided at top with an opening 43, in which a portion of the breech-bolt 19 projects. Each time the breech-bolt passes to the rear the columns of cartridges are pressed upward in position to be caught by the entering portion of the breech-bolt, as illustrated in Figs. 25 and 26, so that when the breech-bolt moves forward one cartridge will be forced into the chamber of the gun in advance of the breech-bolt. The magazine may be conveniently formed of a thin metal casing inserted into the receiver of the gun from the bottom through an opening which is closed by a hinged cover 44, pivoted at 45 and retained by a spring-latch 46 of such construction that it may be withdrawn to permit the cover to be drawn downward (or upward if the gun is reversed for filling the magazine) by pulling on the spring-catch. 48 represents a spring-pressed arm in the magazine, fulcrumed at 49 and pressed upward by a spring 50, so connected that when the cover is opened tension is removed from the spring. This arm carries at its swinging end a table 51, connected to the arm through a transverse pivot 52 and having a central longitudinal partition 53, (see Fig. 10,) which maintains the alinement of the two columns of cartridges. The relations of these parts are such that the arm is not restricted in its vertical movement by the cover, and while the latter is closed the arm feeds the columns of cartridges upward as they are used.

Closing the breech is accomplished by the return-spring 54 abutting at its rear end against the guiding-lug 11^a and at its front end against the drive-rod 13 to act on the drive-rod in the direction opposite to that in which it is moved by the powder-gases. When the parts have been moved, as already described, to the position shown in Fig. 3, the return-spring 54 immediately restores the parts to the positions which they occupy in Figs. 2 and 5, (except that the hammer will be left cocked,) after which the gun is ready for firing by pulling the trigger, which causes the hammer and trigger parts to assume the positions in which they are shown in Fig. 2, whereupon the powder-gases will again force back the drive-rod, causing the same cycle of movements as described.

Initial loading is accomplished by a hand-knob 55, Figs. 4, 5, 20, and 21, controlling a slide 56, which engages in front of the dash-pot cylinder 27 or some other suitable portion of the plunger or a part connected with it. By this means the parts can be moved to the positions illustrated in Figs. 3 and 4 by hand and then permitted to return under the action of spring 54 to the position shown in Fig. 5, when the gun will be ready for firing. Slide 56 is held in its forward position nor-

4 mally by latch 57, constructed to yield under a sufficient pull to operate the parts through the medium of the slide, and said slide may be returned in its rearward position to hold
5 the breech open by a lock comprising a push-pin 58, engaging in a notch 59 in the slide-track 60.

Exhaust of powder-gases will ordinarily take place to a large extent back through the
10 bores 9 and the barrel of the gun when the projectile has left the latter; but to insure greater rapidity of action this exhaust may, if desired, be facilitated by providing exhaust-ports in the cylinder 13 at such points that
15 they will be uncovered when the piston 12 approaches the rearward limit of its movement.

Extracting the spent shells may be accomplished by any suitable extractor; but I prefer to employ the spring-claw extractor 19^a
20 on top of the breech-bolt, which engages the neck of the cartridge formed by a projecting flange or a countersunk groove and draws the shell rearward as the breech opens until the
25 shell strikes the shoulder 61, Figs. 2 and 3, when it will be thrown upward through the opening 62 at the top of the receiver.

Having thus described my invention, the following is what I claim as new therein and
30 desire to secure by Letters Patent:

1. In a gas-operated gun, the combination with the fixed barrel, a breech-bolt movable to and from firing position, and means locking the breech-bolt in its firing position, of a
35 gas-operated drive-rod moved independently of the barrel by gases received from the barrel, connections between the breech-bolt and the drive-rod permitting the rod to unlock and lock the breech-bolt, and move it in both
40 directions, and an elongated dash-pot imposing a gradually-increasing resistance upon the drive-rod, at a point in advance of the connection between the drive-rod and the breech-block, and during a considerable portion of and to the end of the rearward movement of the parts, finally arresting and assisting to return the parts by the air trapped in the dash-pot.

2. In a gas-operated gun, the combination
50 with the fixed barrel, a sliding breech-bolt movable to and from firing position, a gas-operated piston moved independently of the barrel by gases received from the barrel, lost-motion connections between the breech-bolt and the piston, an air-cushion cylinder carried by the piston in advance of its connection with the breech-bolt, and a piston for movement in the cushion-cylinder located near the end of the movement of the gas-piston.
55

3. In a gas-operated gun, the combination with the fixed barrel, a sliding breech-bolt movable to and from firing position, a gas-operated piston moved independently of the barrel by gases received from the barrel, lost-
60

motion connections between the breech-bolt and the piston, an air-cushion cylinder carried by the piston in advance of its connection with the breech-bolt, a piston for movement in the cushion-cylinder located near the
70 end of the movement of the gas-piston, and independent cushioning means for the breech-bolt.

4. In an automatic firearm, the combination of the drive-rod, the breech-bolt, the
75 locking-dog for said breech-bolt, and the spring-driven hammer reciprocating on the locking-dog, engaged by the breech-bolt in the rearward movement of said bolt, and cushioning the breech-bolt at the end of its
80 movement.

5. In an automatic firearm, the combination of the drive-rod, the dash-pot directly cushioning said drive-rod, the breech-bolt, the locking-dog for said breech-bolt, and the
85 spring-driven hammer reciprocating on the locking-dog, engaged by the breech-bolt in the rearward movement of said bolt, and cushioning the breech-bolt at the end of its movement.
90

6. In a gun, the combination with the rearwardly-movable breech-bolt, a locking-dog movable to and from the path of the breech-bolt, a sliding spring-pressed hammer carried by the dog, and a sear and trigger for the
95 hammer.

7. In a gun, the combination with the rearwardly-movable breech-bolt, a locking-dog movable to and from the path of the same, a sliding spring-pressed hammer carried by the
100 locking-dog, a sear for the hammer carried by the locking-dog, and a trigger for operating the sear.

8. In an automatic firearm, the combination of the reciprocating breech-bolt, a locking-dog movable into the path of the breech-bolt, a hammer carried by the locking-dog, a sear-and-trigger mechanism for controlling the hammer, and means on the locking-dog arresting the sear-and-trigger mechanism
105 when the dog is in unlocked position.

9. In a gun, the combination with the drive-rod, the breech-bolt, the locking-dog, the hammer, the sear and the trigger connection; of the swinging catch carried by the
115 locking-dog engaging the trigger connection and holding it inactive when the locking-dog is out of engagement with the bolt.

10. In a gun, the combination with the drive-rod, the breech-bolt, the locking-dog, the hammer, the sear and the trigger connection; of the swinging catch carried by the
120 locking-dog engaging the trigger connection and holding it inactive when the locking-dog is out of engagement with the bolt and connections between the drive-rod and the swinging catch through which the drive-rod displaces the locking-dog.
125

11. In a firearm, the combination of the rearwardly-movable breech-bolt, the ham-
130

mer moved rearwardly by the breech-bolt; the sear for retaining the hammer in cocked position, a trigger, a draw-rod connecting the sear and the trigger, and a pivoted lifting-arm engaged by the hammer when the latter moves to fired position to cause the draw-rod to be moved to break the connection between the trigger and the sear.

12. In a gun, the combination with the drive-rod, the breech-bolt, and the pivoted locking-dog, of a swinging catch carried by the locking-dog, and connections between the drive-rod and the swinging catch through which the drive-rod displaces the locking-dog from its locking position.

13. In a gun, the combination with the drive-rod, the breech-bolt, and the pivoted locking-dog, of a swinging catch on the pivoted locking-dog, lugs on the pivoted catch and members on the drive-rod for engagement with the lugs on the pivoted catch to move the pivoted locking-dog.

14. In a gun, the combination with the breech-bolt, the pivoted locking-dog, the firing-hammer, and the trigger connection, of means moved with the locking-dog when said dog is moved to its unlocking position, to hold the trigger connection inoperative, and moved with the said locking-dog when said dog is moved to firing position to make the trigger connection operable.

15. In a gun, the combination with the sliding breech-bolt, and a pivoted locking-dog for the same, of a reciprocating spring-pressed firing-hammer carried by the pivoted locking-dog and a sear and a trigger for the hammer.

16. In a gun, the combination with the sliding breech-bolt, and a pivoted locking-dog for the same, of a reciprocating spring-pressed firing-hammer carried by the pivoted locking-dog, and connections between the breech-bolt and the firing-hammer for moving the firing-hammer rearwardly with the breech-bolt and a sear and a trigger for the hammer.

17. In a gun, the combination with the sliding breech-bolt, and a pivoted locking-dog, of a reciprocating spring-pressed firing-hammer carried by the pivoted locking-dog, connections between the breech-bolt and the reciprocating firing-hammer to cause the hammer to move rearwardly with the breech-bolt, a sear carried by the pivoted locking-dog holding the firing-hammer against movement, and means for operating the sear.

18. In a gun, the combination with the sliding breech-bolt, and a pivoted locking-dog, of a reciprocating spring-pressed firing-hammer carried by the pivoted locking-dog, connections between the breech-bolt and the reciprocating firing-hammer to cause the hammer to move rearwardly with the breech-bolt, a sear carried by the pivoted locking-dog holding the firing-hammer against move-

ment, means for operating the sear, and a swinging catch carried by the locking-dog and preventing the operation of the sear.

19. In a gun, the combination with a sliding breech-bolt, and a pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the pivoted locking-dog, and a pivoted sear for holding the firing-hammer in cocked position, carried by the locking-dog and a trigger for operating the sear.

20. In a gun, the combination with a sliding breech-bolt, and a pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the pivoted locking-dog, a pivoted sear for holding the firing-hammer in cocked position, carried by the locking-dog, a sear-lever pivoted to the locking-dog, and means for operating the sear-lever.

21. In a gun, the combination with a sliding breech-bolt, and a pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the pivoted locking-dog, a pivoted sear for holding the firing-hammer in cocked position, carried by the locking-dog, a sear-lever pivoted to the locking-dog, means for operating the sear-lever, and a swinging catch carried by the locking-dog for preventing the movement of the sear-lever when the locking-dog is out of its locking position.

22. In a gun, the combination with a sliding breech-bolt, and a pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the pivoted locking-dog, a pivoted sear for holding the firing-hammer in cocked position, carried by the locking-dog, a sear-lever pivoted to the locking-dog, means for operating the sear-lever, a swinging catch carried by the locking-dog for preventing the movement of the sear-lever when the locking-dog is out of its locking position, and a drive-rod having connection with the swinging catch for moving the locking-dog out of its locked position.

23. The combination with the sliding breech-bolt, and a pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the locking-dog, a trigger connection for the firing-hammer, and means for breaking the connection between the trigger and the firing-hammer when said firing-hammer is in its fired position.

24. The combination with the sliding breech-bolt, and a pivoted locking-dog, of a firing-hammer carried by the locking-dog, a sear and trigger connection for the firing-hammer, means for breaking the connection between the trigger and the sear when the firing-hammer is in its fired position and connections between the sliding breech-bolt and the firing-hammer for cocking the said hammer on the movement of said bolt.

25. The combination with the sliding breech-bolt, and a pivoted locking-dog, of a firing-hammer, a sear for holding the firing-hammer in cocked position, a trigger, a draw-

rod in the connection between the sear and the trigger, and a lifting-arm pivoted to the locking-dog connected to the draw-rod and moved by the firing-hammer when moving to firing position so that the sear cannot be held out of engaging position with the firing-hammer by the trigger after firing.

26. The combination with the sliding breech-bolt and the pivoted locking-dog, of a firing-hammer carried by the locking-dog, connections between the sliding breech-bolt and the firing-hammer for cocking the said hammer on the rearward movement of said bolt, a sear carried by the locking-dog and engaging with the firing-hammer, a sear-lever pivoted to the locking-dog and operating the sear, a swinging catch carried by the locking-dog and holding the sear-lever against movement when the locking-dog is in its unlocking position, and a drive-rod engaging with the swinging catch to move the locking-dog from its locked position.

27. The combination with the sliding breech-bolt, and the pivoted locking-dog, of a spring-pressed reciprocating firing-hammer carried by the locking-dog, connections between the sliding breech-bolt and the firing-hammer for cocking the said hammer on the rearward movement of said bolt, a sear carried by the locking-dog and engaging with the firing-hammer, a sear-lever pivoted to the locking-dog and operating the sear, a swinging catch carried by the locking-dog and holding the sear-lever against movement when the locking-dog is in its unlocking position, a drive-rod engaging with the swinging catch to move the locking-dog from its locked position, a draw-rod for engagement with the sear-lever for moving the same, and a lifting-bar carried by the locking-dog and moved by the firing-hammer on firing to move the draw-rod from engagement with the sear-lever.

28. In a gun, the combination with the sliding breech-bolt, and the pivoted locking-dog, of a firing-hammer, a sear for the firing-hammer, a trigger for operating the sear, of means breaking the connection between the trigger and the sear as long as the firing-hammer is in the fired position and means preventing the operation of the sear as long as the locking-dog is in an unlocking position.

29. In a gun the combination with the sliding breech-bolt and the pivoted locking-dog, of the reciprocating spring-pressed firing-hammer carried by the locking-dog and moved to cocked position by the sliding breech-bolt, a sear carried by the pivoted locking-dog, a trigger for operating the sear, means for breaking the connection between the trigger and the sear so long as the firing-hammer is in the fired position, and means preventing the operation of the sear as long as the locking-dog is in an unlocking position.

30. In a gun, the combination with the breech-bolt, of a gas-operated drive-rod, lost-

motion connection between the drive-rod and the breech-bolt, a cushion acting on the drive-rod in advance of the lost-motion connection near the end of the rearward movement of the drive-rod, and a cushion for the breech-bolt on the other side of the lost-motion connection.

31. In a gun, the combination of a breech-bolt provided with grooves on opposite sides, a lock for the same, of a bifurcated drive-rod, each member of which carries a lug moving in one of the grooves in the breech-bolt and controlling the lock during such movement.

32. In a gun, the combination of a breech-bolt provided with grooves on opposite sides, a firing-pin carried by the breech-bolt, and a bifurcated drive-rod, each member of which carries a lug moving in one of the grooves in the breech-bolt and controlling the firing-pin during such movement.

33. In a gun, the combination with the rearwardly-moving breech-bolt, of a gas-operated drive-rod for the breech-bolt, a lost-motion connection between the drive-rod and the breech-bolt, means for cushioning the drive-rod in advance of the lost motion, a spring-pressed sliding hammer moved rearwardly by the breech-bolt and cushioning the bolt, and a trigger and sear for the hammer.

34. In a gun, the combination with the firing-hammer, of a sear for holding the hammer against movement, a trigger, a connection between the sear and the trigger, and a lifting-lever pivoted intermediate its ends engaging at one end the connection and moved at its other end by the firing-hammer, when fired, to break the connection between the trigger and the sear.

35. In an automatic gun, the combination with the breech-bolt carrying a spring-tracted firing-pin, of a bifurcated gas-operated drive-rod, a lost-motion connection between the members of the drive-rod and the opposite sides of the breech-bolt, and means operated by the drive-rod moving the firing-pin rearwardly in the bolt on the rearward movement of the drive-rod.

36. In a gun, the combination with the rearwardly-moving breech-bolt, of a locking-dog movable into and out of the path of the breech-bolt, and a bifurcated drive-rod, the two members of the drive-rod engaging the locking-dog on opposite sides.

37. In a gas-operated gun, the combination with the barrel provided with a port near its forward end, of a guiding-lug provided with a perforation and a seat, and depending from the barrel, an expansion-chamber depending from the forward end of the barrel, communicating with the bore through the port, and provided with a seat, a tube fitted in the seat of the guiding-lug and the seat of the expansion-chamber, a piston-rod working through the guiding-lug and the tube and provided with a piston, and a spiral spring

surrounding the piston-rod and bearing against the guiding-lug and the piston.

38. In a gas-operated gun, the combination with the barrel, provided with a port near its forward end, of a guiding-lug provided with a perforation and depending from the barrel, an expansion-chamber depending from the barrel near the forward end and communicating with the bore through the port, a tube seated at its forward end in the expansion-chamber and at its rear end in the guiding-lug, a piston-rod working through the guiding-lug and the tube and provided with a piston at its forward end, and a spring seated at one end against the guiding-lug and at its other end against the piston.

39. In a gun, the combination with the magazine, the breech-bolt movable to per-

mit a feed from the magazine, and a gas-operated drive-rod, of a spring for moving the drive-rod in one direction, hand-operated means normally out of engagement and adapted to be thrown into connection therewith, and a lock for holding the breech-bolt in open position.

40. The combination with the breech-bolt, the locking-dog, the trigger and the sear, of means controlled by the locking-dog and preventing the movement of the sear when the locking-dog is in unlocking position.

The foregoing specification signed this 23d day of November, 1903.

MORRIS F. SMITH.

In presence of—

FRANCIS S. LAWS,
W. H. SHENEMAN, Jr.