

No. 818,920.

PATENTED APR. 24, 1906.

M. F. SMITH.
GAS OPERATED RIFLE.
APPLICATION FILED JAN. 30, 1904.

7 SHEETS—SHEET 1.

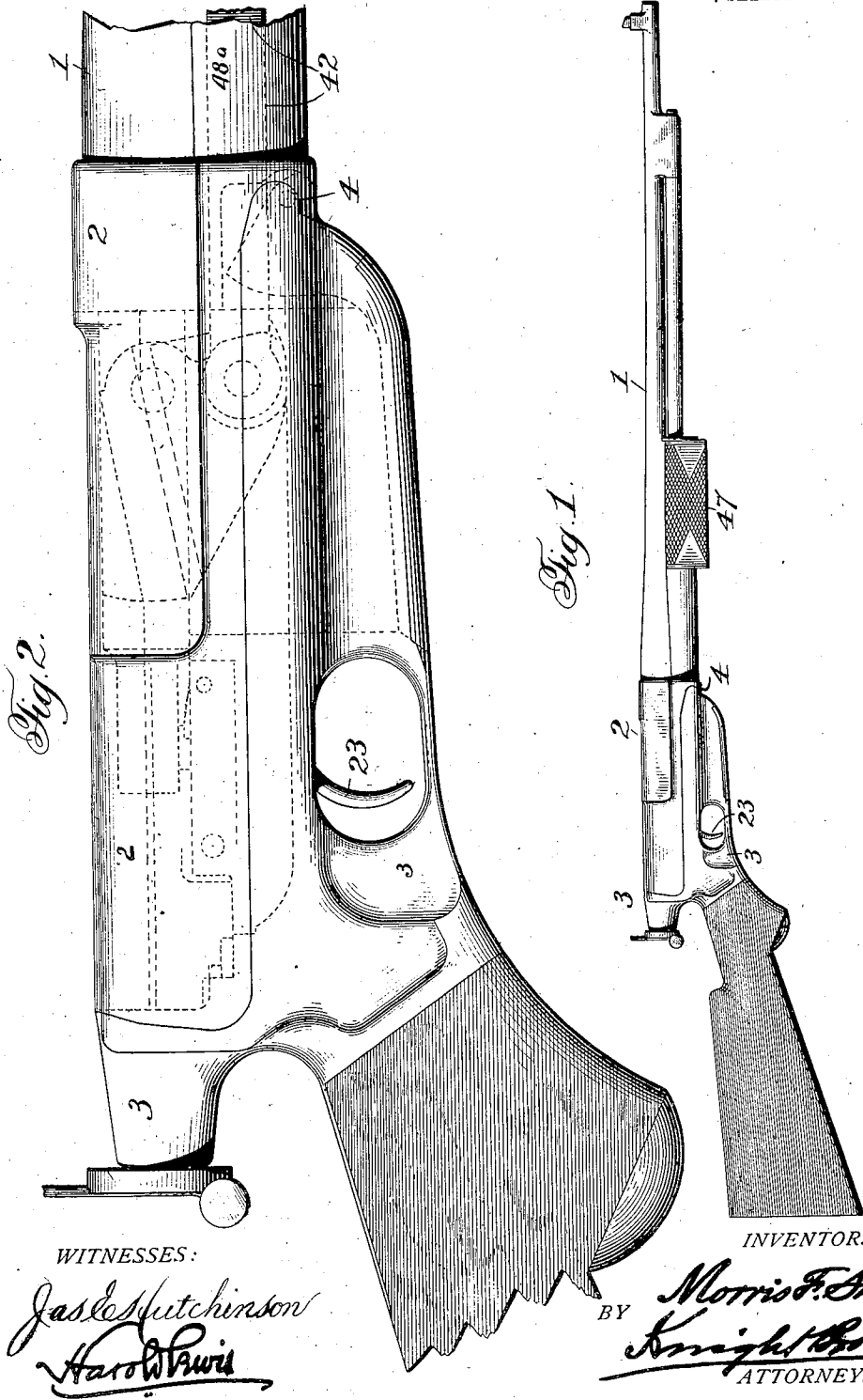


Fig. 2.

Fig. 1.

WITNESSES:

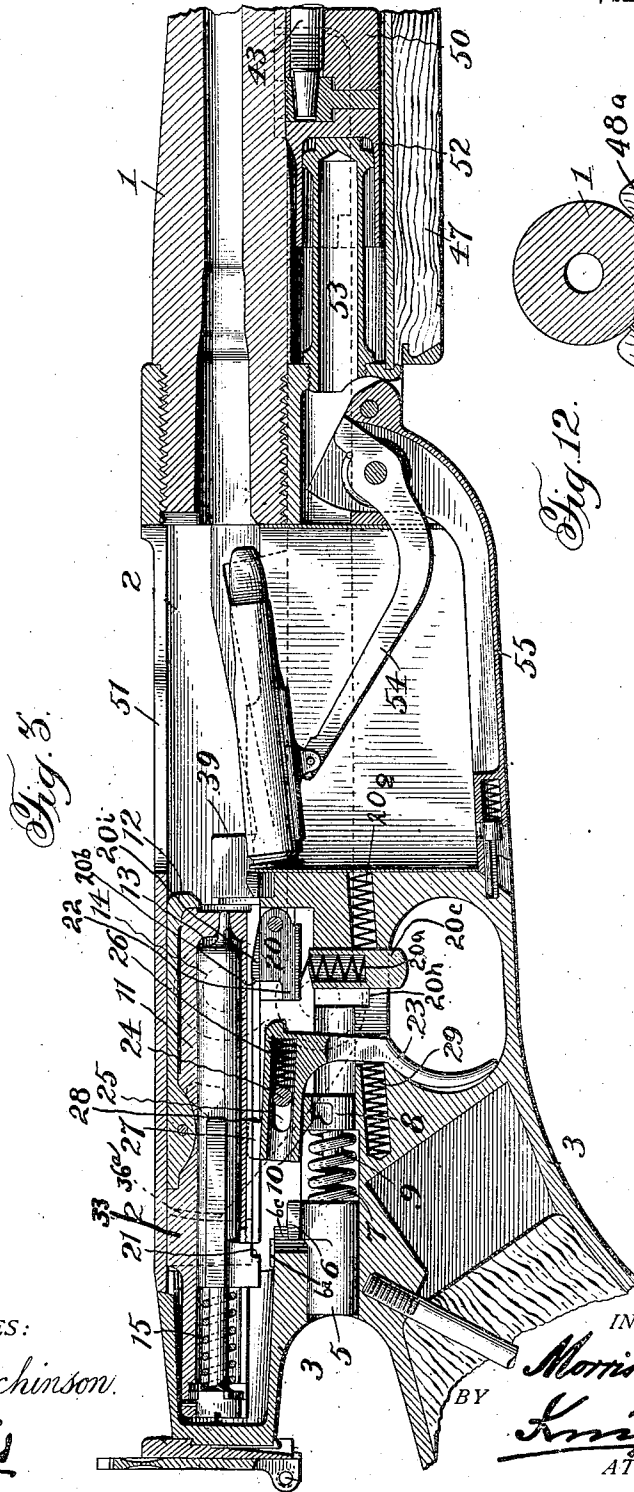
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7 SHEETS—SHEET 2.



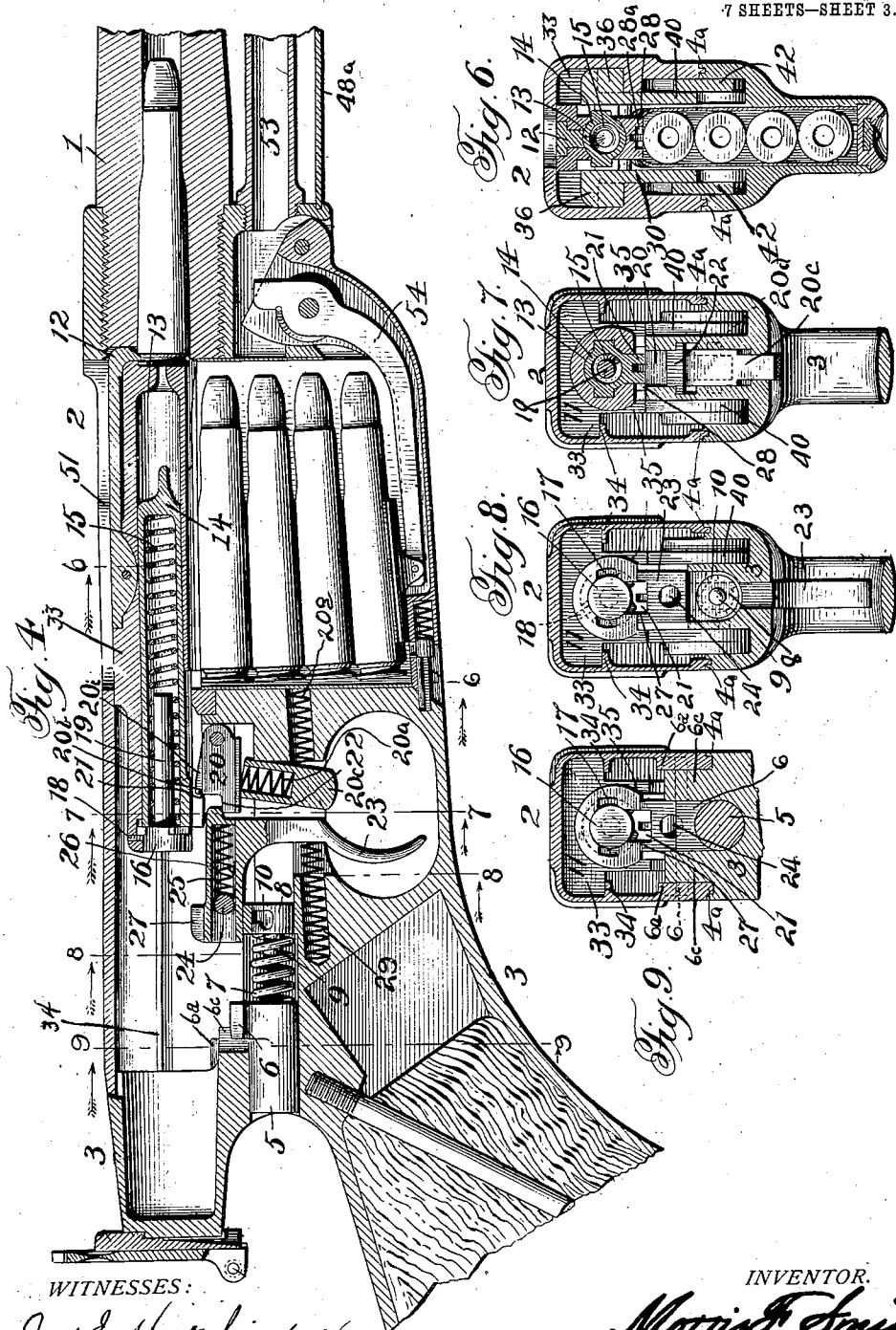
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7 SHEETS—SHEET 3.



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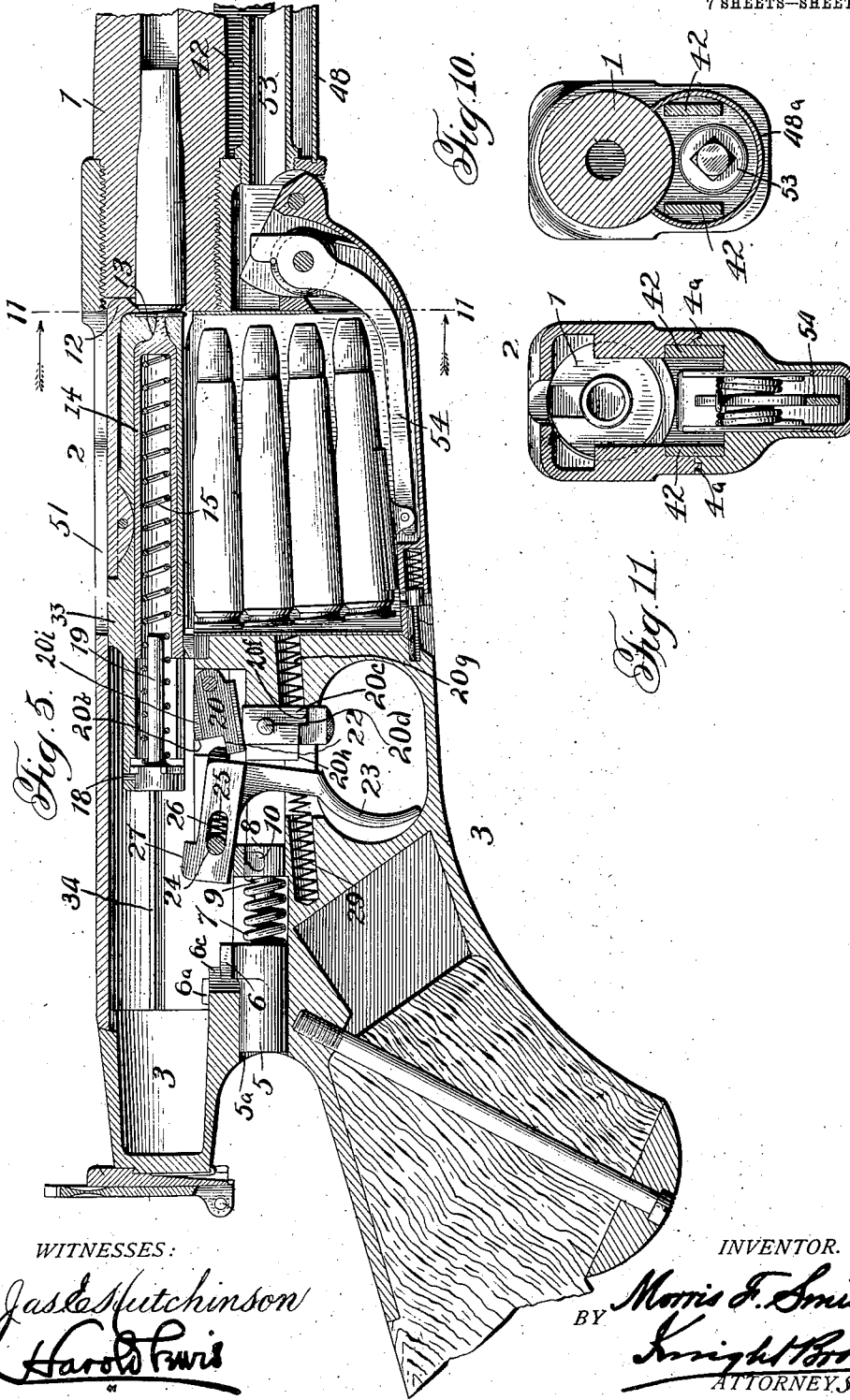
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7 SHEETS—SHEET 5.

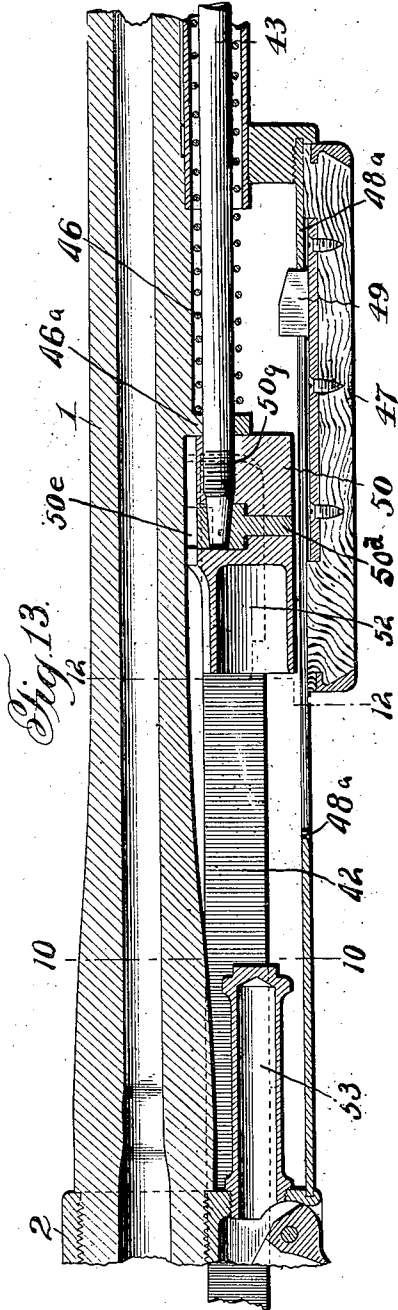


Fig. 13.

Fig. 14.

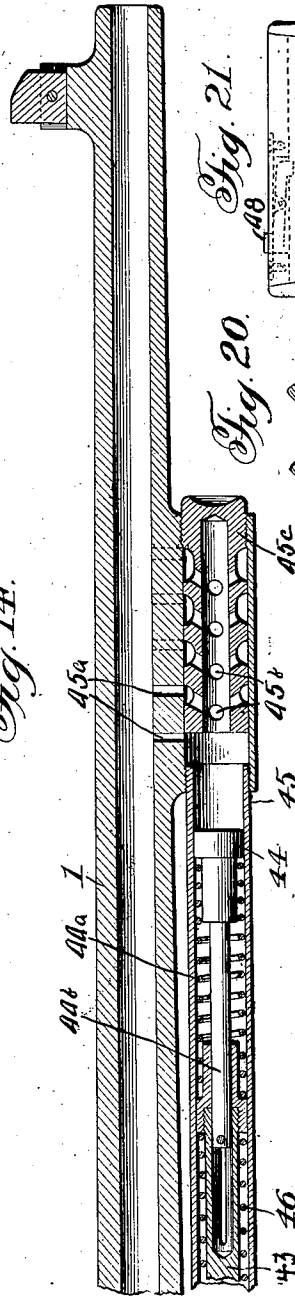


Fig. 21.

Fig. 20.



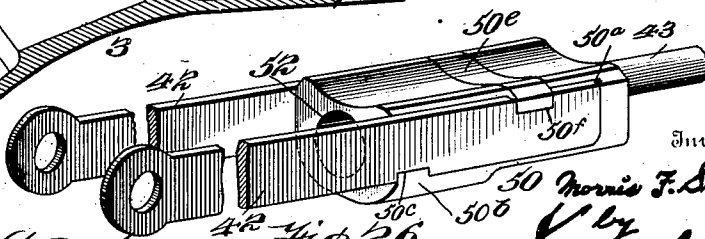
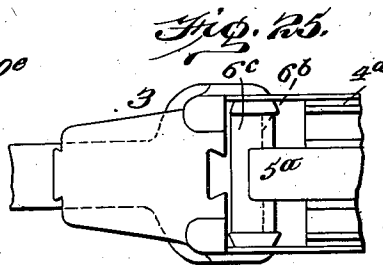
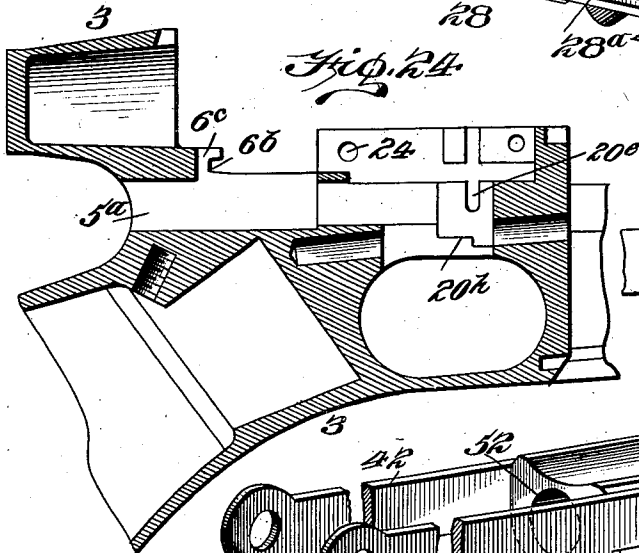
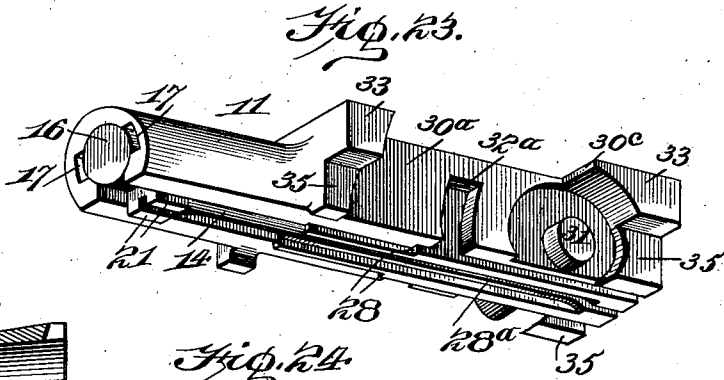
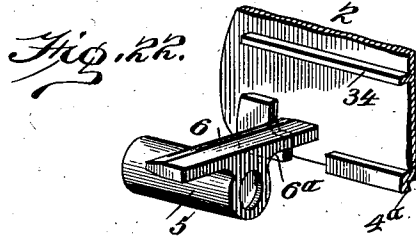
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UNITED STATES PATENT OFFICE.

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GAS-OPERATED RIFLE.

No. 818,920.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed January 30, 1904. Serial No. 191,323.

To all whom it may concern:

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

While my invention is designed primarily as a gas-actuated rifle, the several features of novelty are applicable to other types of guns—as, for instance, the hand-actuated type—with the so-called “fore-arm” action, and in the rifle selected to illustrate my invention I have shown the fore-arm action as an auxiliary means for operating the breech mechanism for such purposes as initial loading.

One feature of my present invention relates to a novel construction of breech closure, another feature to a novel construction of trigger mechanism and its combination with the breech mechanism.

A further feature relates to the combination with the peculiar form of breech mechanism of a gas-operated drive-rod, and still another feature relates to the combination of a dash-pot acting directly upon the gas-operated drive-rod and the peculiar form of breech mechanism whereby the movement of the rod is arrested at its rearward limit.

Other features will hereinafter be pointed out.

My invention will be fully understood upon reference to the accompanying drawings, which represent the several features of novelty embodied in a rifle of sporting type.

In the drawings, Figure 1 is a side elevation of the rifle on a reduced scale. Fig. 2 is a side elevation of the receiver portion of the rifle on an enlarged scale. Fig. 3 is a vertical longitudinal section of the part shown in Fig. 2 with the receiver opened and the magazine-feed in the position of presenting a cartridge for insertion into the chamber, but one cartridge being shown in the magazine in order to illustrate the range of movement of the cartridge-feeding device. Fig. 4 is a view similar to Fig. 3, except that a cartridge is in place in the chamber, the breech-bolt is closed, the firing-pin cocked, and the magazine supplied with cartridges. Fig. 5 is a view similar to Fig. 4 with the parts in the position which they occupy immediately after firing and be-

fore the receiver has been opened to throw out the spent shell. Fig. 6 is a section on the line 6 6, Fig. 4. Fig. 7 is a section on the line 7 7, Fig. 4. Fig. 8 is a section on the line 8 8, Fig. 4. Fig. 9 is a section on the line 9 9, Fig. 4. Fig. 10 is a section on the line 10 10, Fig. 4. Fig. 11 is a section on the line 11 11, Fig. 5. Fig. 12 is a section on the line 12 12, Fig. 13. Fig. 13 is a vertical longitudinal section of the portion of the rifle immediately in front of that shown in Figs. 2 to 5. Fig. 14 is a vertical longitudinal section of the forward end of the gun. Figs. 15 to 19 represent the breech-locking mechanism, Fig. 15 being a horizontal section through the breech-bolt and its cooperative parts, Fig. 16 being a side elevation of the same with the locking-wings in unlocked position, Fig. 17 being a view similar to Fig. 16 with a portion of the receiver shown in section and the locking-wings moved into locking relation therewith, and Figs. 18 and 19 being a side elevation and an edge view, respectively, of one of the locking-wings. Figs. 20 and 21, respectively, are sectional and plan views of the drive-rod grip. Fig. 22 is a detail view of a portion of the lock that holds the receiver 2 and frame 3 together. Fig. 23 is a perspective view showing the bottom of the breech-bolt. Fig. 24 is a vertical section of the frame 3 with all movable parts removed. Fig. 25 is a top plan view of the frame 3 to show a portion of the lock that holds the frame 3 and receiver 2 together. Fig. 26 is a perspective view of a portion of the drive-rod.

Referring to Figs. 1 to 5, 1 represents the barrel, which, with the receiver 2, is removably secured to the front end of the frame 3 by the undercut 4, which forms a pivotal connection between the parts, (see Fig. 2,) while the rabbet and tongue-and-groove connection 4^a prevents a relative lateral movement between the parts when assembled. The bolt 5 is provided with a bar 6, which overlaps portions 6^a on each side of the receiver and passes into recesses 6^b in the lugs 6^c on the frame, said bolt being pressed into engagement by a spring 7, guided by a pin 9 on a post 8, which is removably secured in the frame by a bayonet-joint 10.

11 represents the breech-bolt, (the construction of which is shown in Figs. 15 to 17 and 23,) which is suitably mounted to recip-

rocate in the receiver 2 and carries a suitable extractor 12. The breech-bolt is provided with a central bore 13, in which is fitted a tubular firing-pin 14, containing a projecting
 5 spring 15, which is sustained at its rear end by a plug 16, removably fitted in the rear end of the breech-bolt bore by means of a bayonet-joint 17, and secured against turning by a pin 18, inserted through the breech-bolt, Fig. 8. Plug 16 carries a centering-pin
 10 19 for spring 15.

20 represents a pivoted sear having a shouldered engaging end 20^b, which receives a projection 21 on the under side of the firing-pin, said sear being held upward by spring 20^a,
 15 mounted in a sear-lock 20^c, loosely trunnioned beneath the sear by means of trunnions 20^d, working in slots 20^e in the frame. This sear-lock is adapted to be moved upwardly by hand when the sear is engaged with the projection 21 on the firing-pin and is provided with a shoulder 20^f on each side which is when moved upwardly forced by the spring 20^a in front of the sear-lock onto
 25 rests 20^h on the frame and prevents the movement of the sear by the trigger. The shape of the firing-pin, together with projection 21, prevents the pin from turning in the breech-bolt.

30 The sear 20 has a shoulder 22 to provide an engaging portion for the trigger 23, which is mounted on a pivot 24 by a slot 25 and held by a spring 26 normally forward on its pivot in position to engage the sear. A projection 27 on the upper face of the trigger stands in position to receive, as the breech-bolt recedes, a shoulder 28 on the lower face of the breech-bolt, which moves the trigger rearwardly out of engagement with the sear to release the latter. By this means the sear is permitted to reengage the firing-pin when the breech-bolt is operated automatically. Shoulder 28 is grooved at 28^a to permit the engaging end 20^b of the sear to be passed by
 45 said shoulder without engaging therewith, the sear being provided with a groove 20ⁱ on each side for this purpose.

29 represents a spring for engagement with the trigger at one side of its pivot to return
 50 the lower end of the trigger to a place to be grasped.

When the sear is locked against movement, it is possible to move the trigger without operating said sear, owing to the fact
 55 that the trigger will move on its fulcrum away from the sear. This prevents any breakage to the trigger mechanism when the gun is handled by a person unfamiliar with its operation.

60 To lock the breech-bolt in closed position, it is provided with bell-crank locking-wings 30, symmetrically disposed in recesses 30^a on opposite sides of the breech-bolt and securely fulcrumed by trunnions 31 near the
 65 forward end of the said breech-bolt and by

naves or bosses 32, fitting in seats 32^a, in the sides of the breech-bolt and concentric with the trunnions. The naves or bosses 32 have tapered upper ends, as shown in dotted lines, Figs. 3 and 16, and engage with the forward
 70 ends of the ribs on the sides of the firing-pin when the wings are moved to unlocking position. These wings are provided with shoulders 30^b, which contact with shoulders 30^c on the breech-bolt, whereby their upward
 75 movement is limited. As will be seen more clearly in Figs. 7, 8, 9, 16, and 17, the breech-bolt has an enlarged upper portion 33, confined between slide-tracks 34 and the top of the receiver, and reduced lower portions 35
 80 extending between the tracks to guide the breech-bolt in its movement. As shown in Figs. 15 and 16, the locking-wings have corresponding upper enlarged portions 36 and reduced depending lower portions 40, which
 85 lie in the same vertical planes as the corresponding portions of the breech-bolt. When the wings swing upwardly, the enlarged portion 36 forms, with the enlarged portion 33 of the breech-bolt, vertically and laterally
 90 presented guiding-faces; but when swung downward the enlarged portions 36 of the wings move into engagement with the fixed shoulders 39, Figs. 6 and 17, formed on the side walls of the receiver and securely lock
 95 the breech-bolt in closed position. Obviously the shoulders 39 could be multiplied on each side, corresponding recesses being formed in the enlarged portions of the wings to receive them and to provide cooperating interlocking
 100 shoulders on said wings. As shown in Figs. 15 to 19, undercuts or tongue-and-groove connections 36^a are formed between the rear ends of the wings and the breech-bolt to guide said rear ends in their swinging
 105 movement and prevent the wings spreading. The unlocked and locked positions of the wings are shown in Figs. 16 and 17. To operate the wings, the reduced depending lower portions 40 have jointed connections 41 with
 110 the respective arms 42 of the bifurcated rear end of a drive-rod 43. By the rearward movement of the drive-rod 43 the wings are moved on their fulcrums 31 until their upper enlarged portions 36 coincide with the enlarged
 115 portion 33 of the breech-bolt 11, when the shoulders 30^b will contact with the shoulders 30^c and the breech-bolt is free to move rearward and has such movement imparted to it by the continued thrust of the drive-rod
 120 43 after the swinging movement of the wings is arrested.

During the rearward and forward movements of the drive-rod the swinging or trunnion action of the wings is prevented by their
 125 engagement between the guiding-tracks 34 and shoulders 30^b and 30^c. Consequently the breech-bolt moves forward until it seats against the breech end of the barrel, when the lugs on the wings are freed from the tracks
 130

34 and can reach their seats in front of the fixed shoulders 39 under the final portion of the forward movement of the drive-rod.

The drive-rod 43 is preferably gas-actuated by a suitable construction of piston 44, working in cylinder 45, moved rearward by pressure received through apertures 45^a in the gun-barrel and apertures 45^b in an axially-adjustable regulating-valve 45^c and moved forward by spring 46, which at its rear end bears against a perforated abutment 46^a, through which the rod 43 is guided. The drive-rod is divided into a member 44^b near the piston 44, and said member 44^b is movable axially relatively to the main portion of the drive-rod. An additional spring 44^a is provided between the two members of the drive-rod to act as a cushion. The return-spring 46 acts on the drive-rod, which in turn acts on the breech-bolt-locking means to hold the breech-bolt in closed or firing position when the receiver and the stock are separated, thereby holding the parts of the gun in position so that they may be assembled quickly.

A gas-actuated drive-rod is combined with peculiar advantage with the particular form of locking means employed herein. The first shock of the gas-pressure is received by the fixed shoulders through the wings, and the first part of the drive-rod's movement is utilized in swinging the wings, so that when the breech-bolt begins to move the shock has been somewhat tempered, and during the continued movement of the drive-rod the thrust is imparted largely to the top of the receiver, which further tempers the shock on the parts.

The drive-rod may be actuated by hand for initial loading or for opening the breech through means of the grip 47, held normally forward by latch 48, pivoted in one side of the grip and engaging within a slot in the casing 48^a, which surrounds the members 42 and other operative parts of the gun. The latch 48 is readily releasable, so that the grip, which has a shoulder 49 to engage the yoke 50 of the drive-rod, may carry the yoke back to the rear limit and the grip being then permitted to move forward to introduce a charge from the magazine, or the grip may be held back until a single charge is inserted through the ejecting-recess 51. The members 42 of the drive-rod are secured to the yoke 50 by means of rabbet-joints 50^a at the ends of the members 42, and lugs 50^b on each side of the yoke 50 over said lugs fitting notches 50^c on the under side of the members 42. A bolt 50^d provides an elongated head 50^e, which fits at each end in a notch 50^f in the upper side of the members 42. The bolt 50^d is held against movement by the rear end of the forward member of the drive-rod 43, which fits, after being screwed at 50^g into the head 50, into an opening in said bolt.

Located directly in the path of the yoke 50 of the drive-rod is a dash-pot comprising the cup 52, formed in said yoke 50, and the plunger 53, secured to the front end of the receiver and entering said cup 52 as the drive-rod reaches the rear limit of its movements. This dash-pot, while not claimed *per se* in my present application, being broadly claimed in my copending application, Serial No. 182,682, has a special advantage when used in combination with bell-crank wings, inasmuch as its action in gradually arresting the drive-rod and retarding the breech-bolt through its action in holding back on the wings at the end of the stroke, sets the parts in their new relation assumed during forward movement by the time the rearward movement is completed and prevents hammering and jerky movements which would result from too sudden reversal of the parts under the action of the return-spring.

For feeding cartridges I use substantially the same spring-pressed lever 54 and close the magazine by substantially the same cover 55 as claimed in my copending application, Serial No. 182,682, and hence I do not claim the same herein.

I claim—

1. The combination with the movable breech-bolt, a firing-pin, and a sear, of a trigger for moving the sear out of engagement with the firing-pin, and connections between the trigger and the breech-bolt for moving the trigger out of engagement with the sear upon the movement of the breech-bolt.

2. The combination with the reciprocating breech-bolt, a firing-pin carried thereby and a pivoted sear for holding the firing-pin in firing position, of a trigger for engagement with the sear, and a connection between the reciprocating bolt and the trigger for moving the trigger out of engagement with the sear on the movement of the bolt.

3. The combination with the reciprocating breech-bolt, a firing-pin carried thereby, and a sear for holding the pin against movement, of a trigger for engagement with the sear, connection between the trigger and the part on which it is mounted comprising a pivot on one part and a slot in the other, a spring for holding the trigger in engagement with the sear, and connection between the breech-bolt and the trigger for moving the trigger out of engagement with the sear.

4. The combination with the reciprocating breech-bolt, a firing-pin carried thereby, and a sear for holding the pin against movement, of a trigger for engagement with the sear, connection between the trigger and the part on which it is mounted comprising a pivot on one part and a slot in the other, a spring for holding the trigger in engagement with the sear, and means for locking the sear against movement.

5. In a gun, the combination with the

rearwardly-movable breech-bolt, a firing-pin, and a sear, of a trigger having connection with the sear for moving the sear out of engagement with the firing-pin, connections between the breech-bolt and the trigger for breaking the connection of the trigger with the sear when the breech-bolt moves rearwardly, and a lock for the sear; said trigger being movable out of connection with the sear when the trigger is pulled while the sear is locked.

6. In a gun, the combination with the rearwardly-movable breech-bolt provided with guide-faces on opposite sides thereof, of a pair of locking-dogs symmetrically arranged on opposite sides of the breech-bolt and provided with guide-faces which aline with the guides on the breech-bolt, and a single drive-rod connected to both locking-dogs.

7. In a gun, the combination with the rearwardly-movable breech-bolt provided with guide-faces on opposite sides thereof, of a pair of locking-dogs symmetrically arranged on opposite sides of the bolt and provided with guide-faces which aline with the guide-faces on the breech-bolt, and a drive-rod bifurcated at one end and having each member connected to one of the locking-dogs.

8. In a gun, the combination with the rearwardly-movable breech-bolt having enlarged longitudinal guiding portions on its opposite sides, of a pair of locking-dogs symmetrically arranged on opposite sides of the breech-bolt and provided with enlarged guiding portions, adapted, when the dogs are in unlocking position, to aline with the enlarged guiding portions on the breech-bolt.

9. In a gun, the combination with the frame having a recess opening in the rear thereof, of a barrel and a receiver separably connected to the forward end of the frame by an undercut, recessed lugs on the inside of the receiver, a rabbet connection between the receiver and the frame, a sliding bolt positioned in the recess and adapted to engage the recessed lugs to hold the receiver to the frame.

10. In a gun, the combination of a frame and a receiver adapted to swing on the forward end of the frame, one of said parts being provided with a recess opening at the rear of the gun, and a bolt positioned in the recess operative through the rear opening of said recess and adapted to engage the other part on both sides of the gun.

11. In a gun, the combination with a breech-bolt, of a drive-rod connected with

the breech-bolt and comprising a yoke, a pair of end members having a tongue-and-groove connection with the yoke, and means for locking the end members in the yoke.

12. In a gun, the combination with a breech-bolt, of a drive-rod connected with the breech-bolt and comprising a yoke, a pair of end members having a tongue-and-groove connection with the yoke, a single bolt for securing the end members to the yoke, and a forward member engaging the single bolt to hold it against movement.

13. In a gun, the combination with a breech-bolt, of a drive-rod connected to the breech-bolt and comprising a yoke, a pair of end members having a tongue-and-groove connection with the yoke and notched on their upper edges, a bolt provided with a head fitted into the notches in both end members, and a forward member fitted into the yoke and engaging the bolt.

14. In a gun, the combination with the breech-bolt and a track on which the breech-bolt travels, of a pair of pivoted locking and guiding wings carried by the breech-bolt on opposite sides and movable out of the breech-bolt track to lock the bolt and into the breech-bolt track to unlock the bolt and travel therewith, and a drive-rod bifurcated at its rear end and having each member thereof connected with one of the wings to control the said wings.

15. In a gun, the combination of the stock carrying the trigger, the sear and the magazine, and the receiver separable from the stock and carrying the barrel, the breech-bolt, breech-bolt-locking means, the gas-operated drive-rod connected with the breech-bolt-locking means and a return spring acting on the gas-operated drive-rod to hold the breech-bolt in firing position within the receiver when the receiver and the stock are separated.

16. The combination with the breech-bolt and the firing-pin carried thereby, of a pair of locking-wings mounted on opposite sides of the breech-bolt and carrying lugs engaging the firing-pin on opposite sides to move the pin rearwardly within the bolt when the wings are moved to unlocking position.

The foregoing specification signed this 14th day of January, 1904.

MORRIS F. SMITH.

In presence of—
FRANCIS C. ADLER,
JAMES WARNOCK.