Jan. 14, 1930. C. D. MEYER 1,743,472

SEMIAUTOMATIC RIFLE

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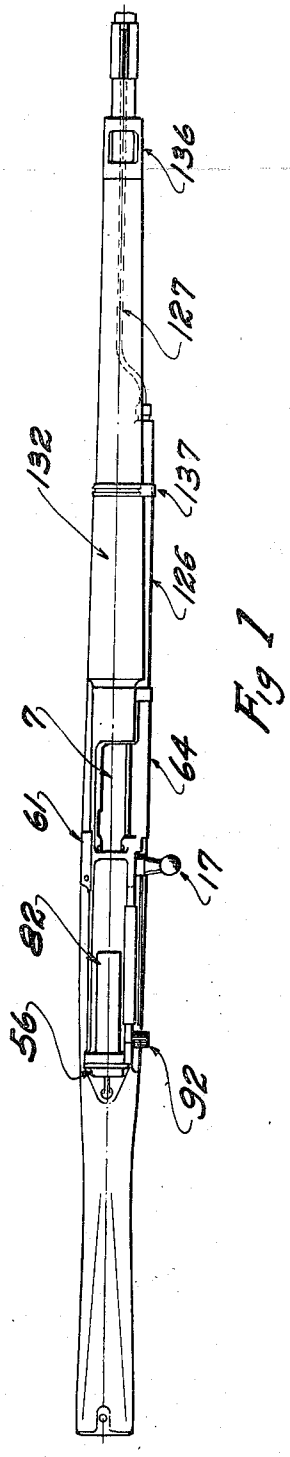


Fig 1

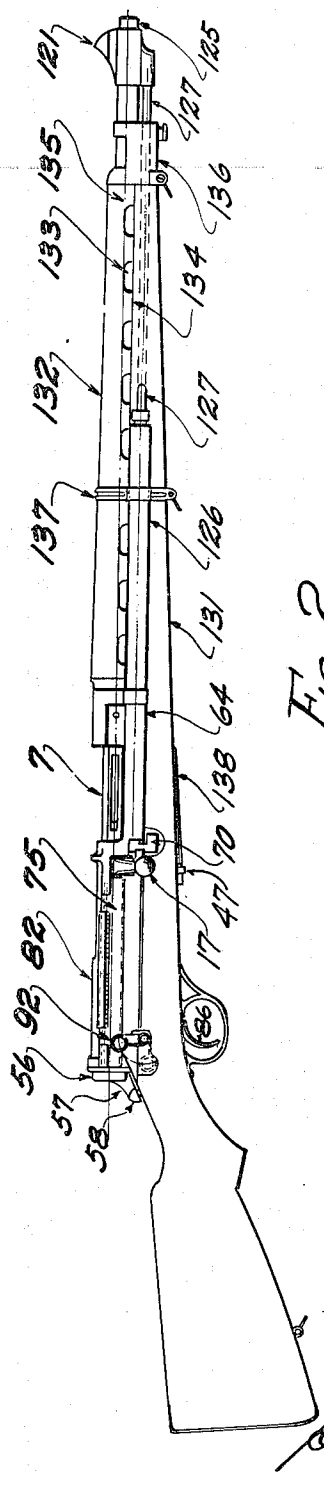


Fig 2

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Jan. 14, 1930. C. D. MEYER 1,743,472

SEMIAUTOMATIC RIFLE

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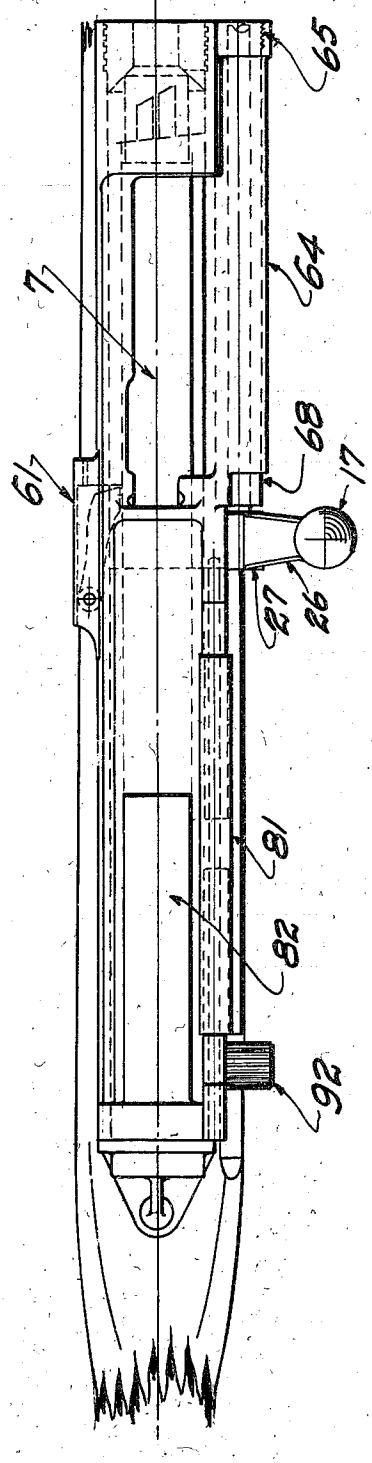


Fig 3

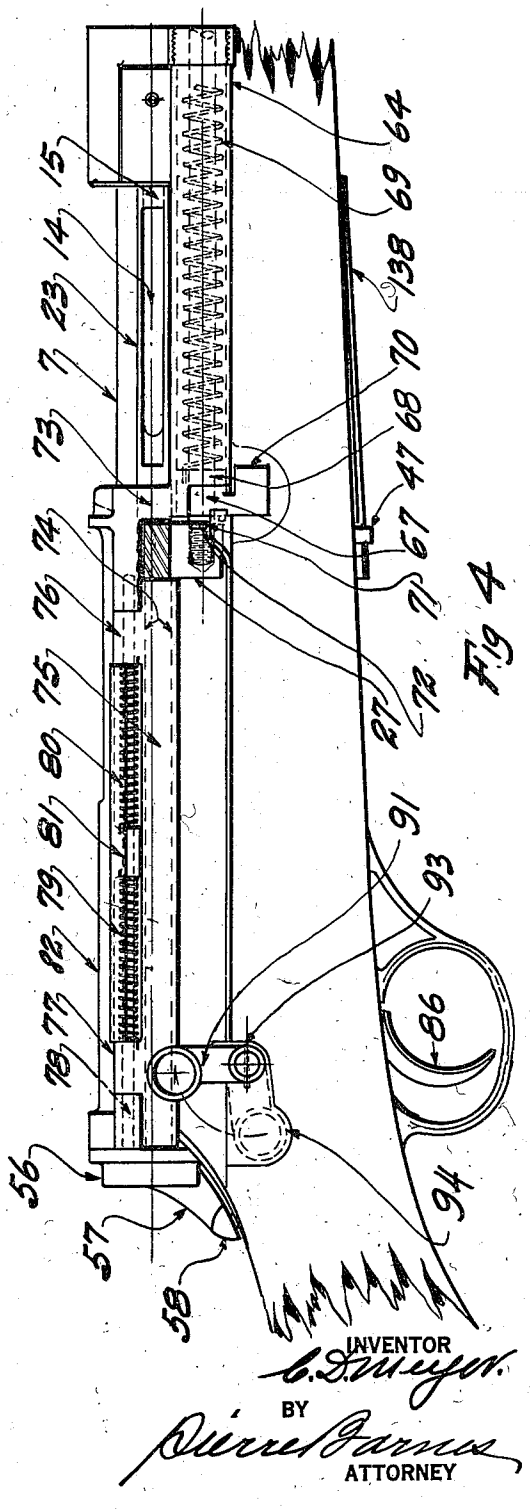


Fig 4

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Pierce Barnes
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SEMIAUTOMATIC RIFLE

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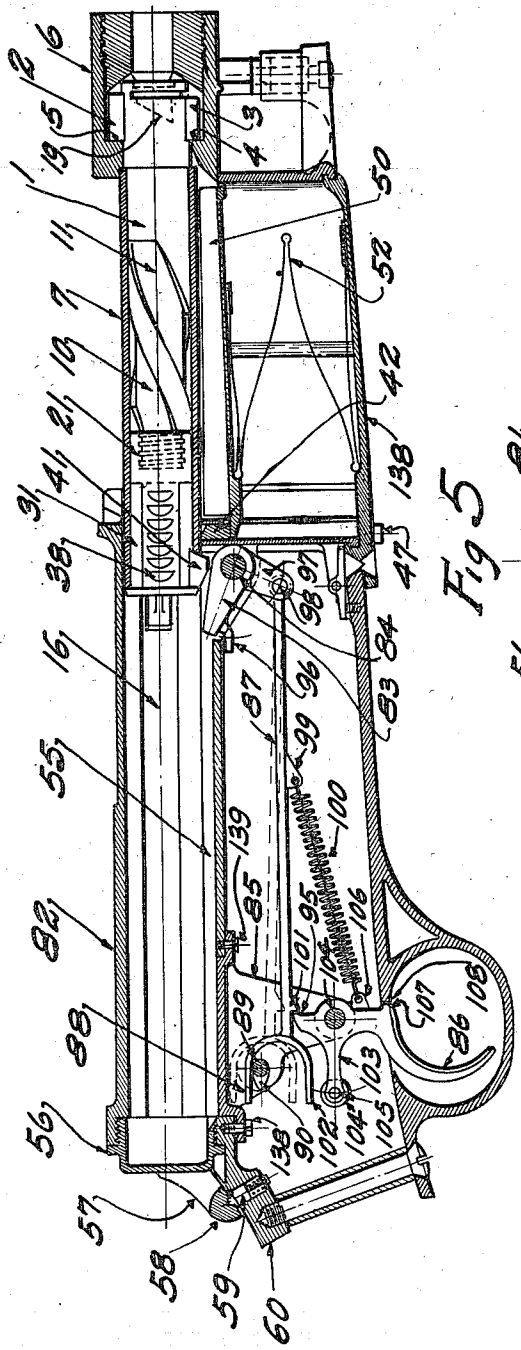


Fig 5

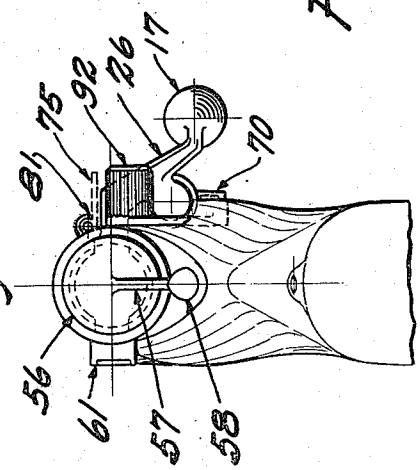


Fig 6.

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Jan. 14, 1930. C. D. MEYER 1,743,472

SEMIAUTOMATIC RIFLE

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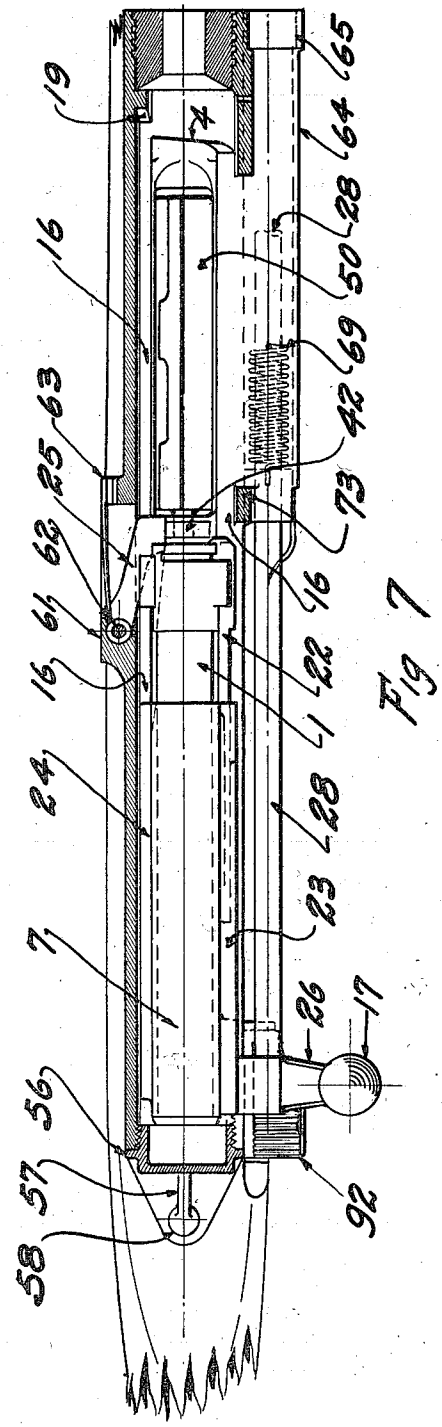


Fig 7

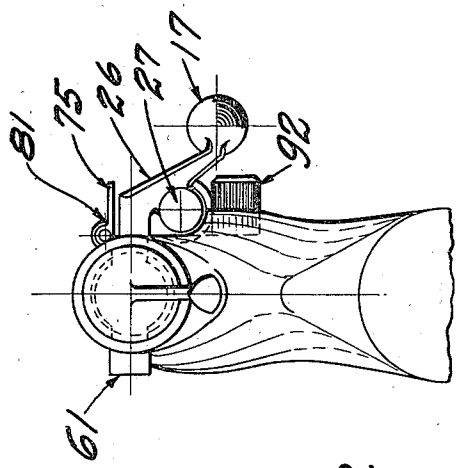


Fig 8.

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SEMIAUTOMATIC RIFLE

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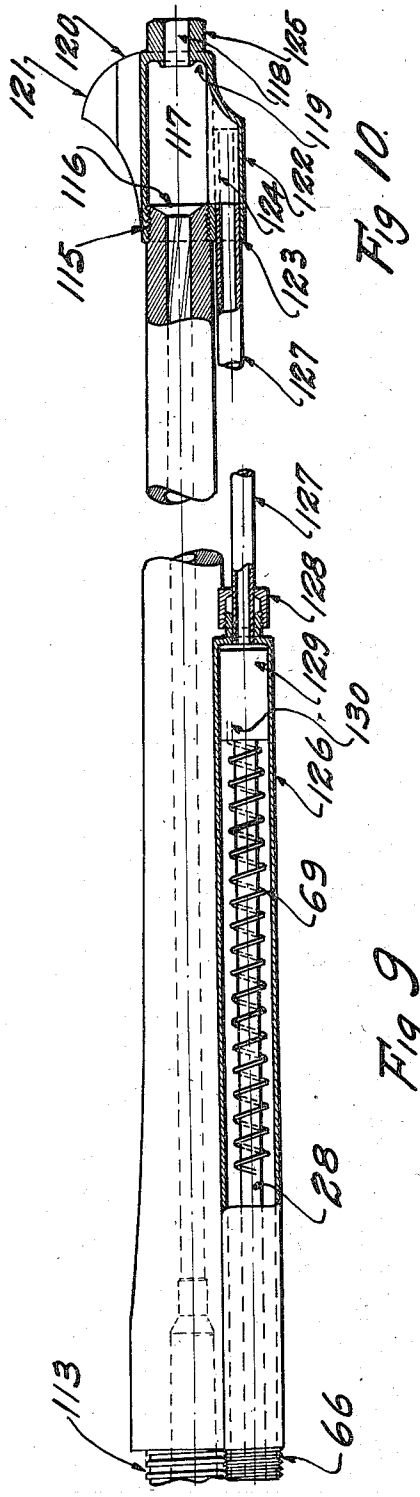


Fig 10.

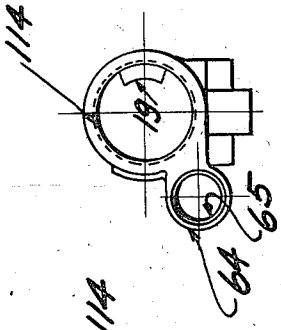


Fig 12.

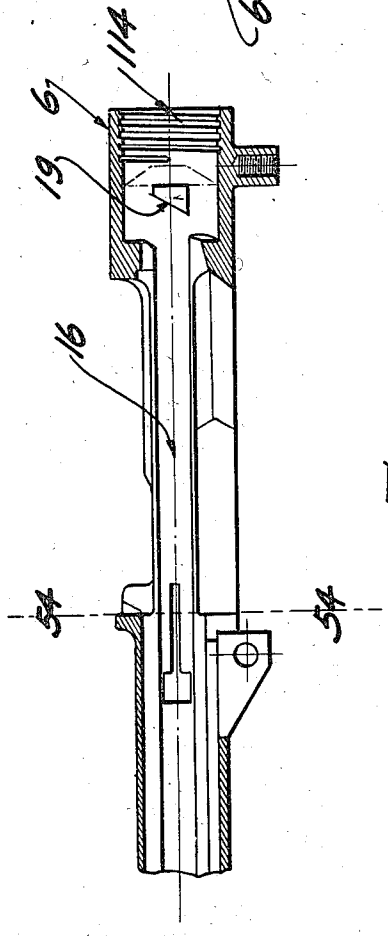


Fig 11

Fig 9

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SEMIAUTOMATIC RIFLE

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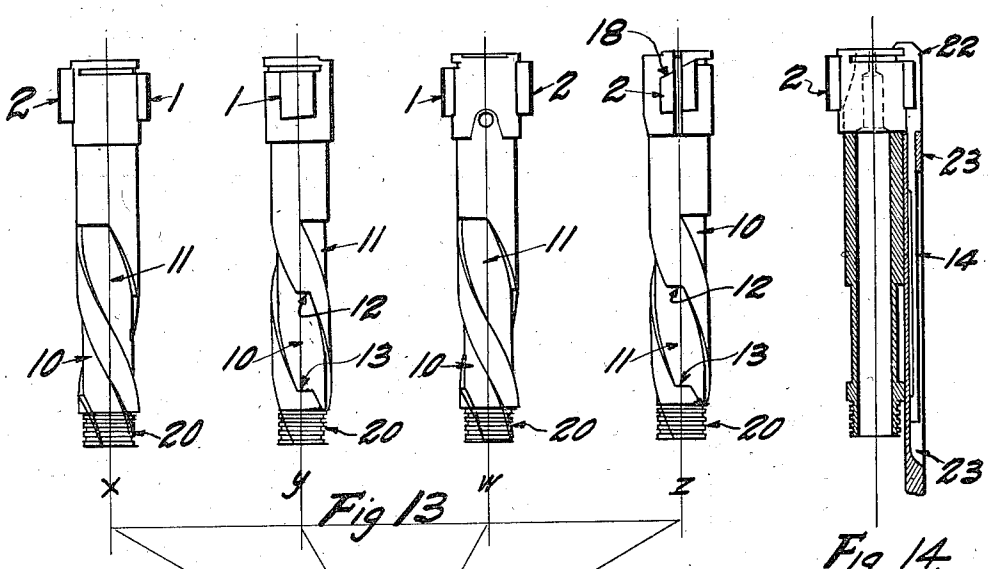


Fig 13

Fig 14

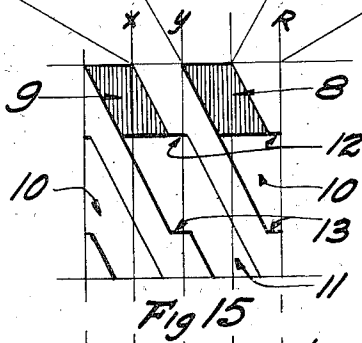


Fig 15

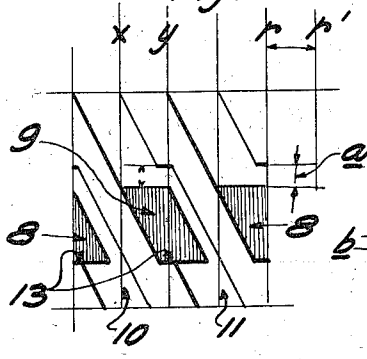


Fig 16

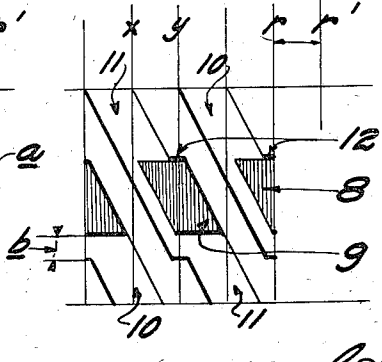


Fig 17

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SEMIAUTOMATIC RIFLE

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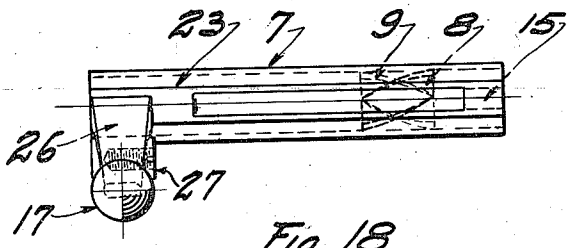


Fig 18

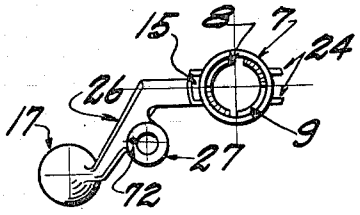


Fig 19.

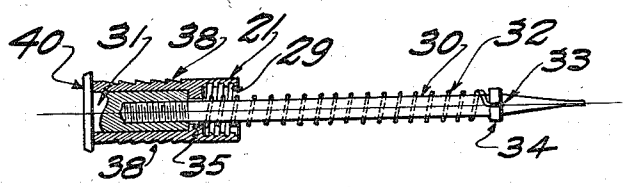


Fig 20

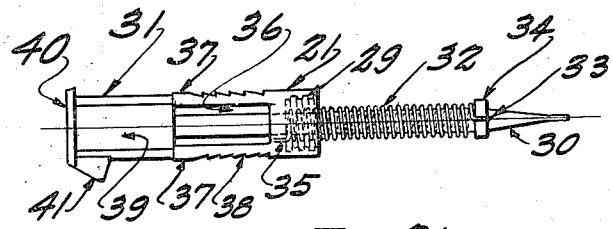


Fig 21

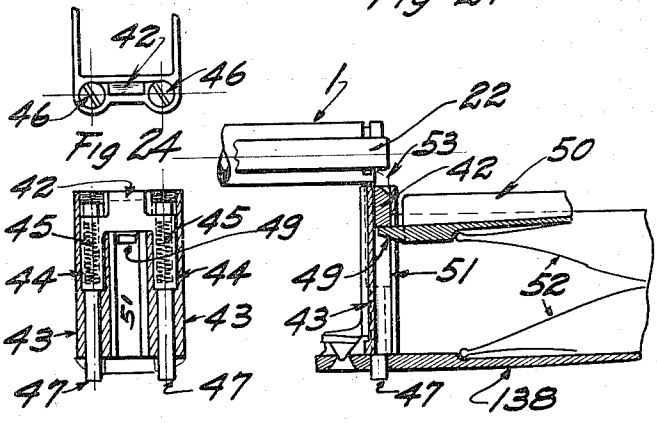


Fig 24

Fig 23.

Fig 22.

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Jan. 14, 1930. C. D. MEYER 1,743,472

SEMIAUTOMATIC RIFLE

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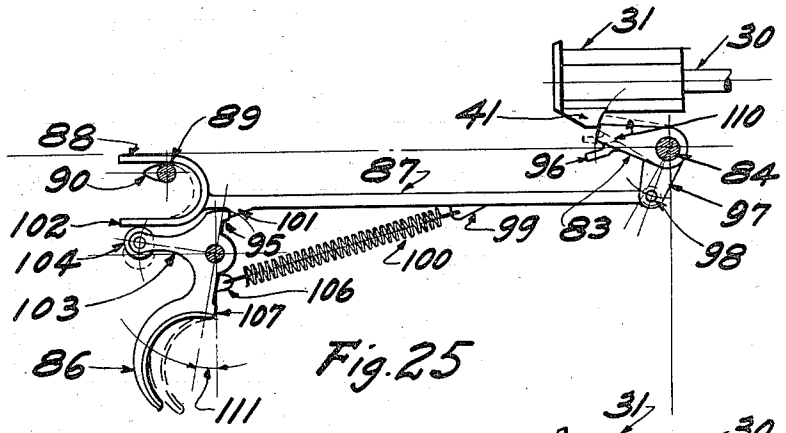


Fig. 25

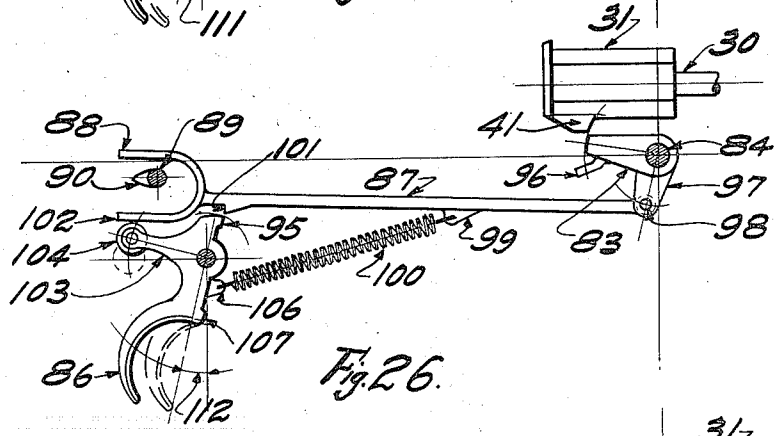


Fig. 26.

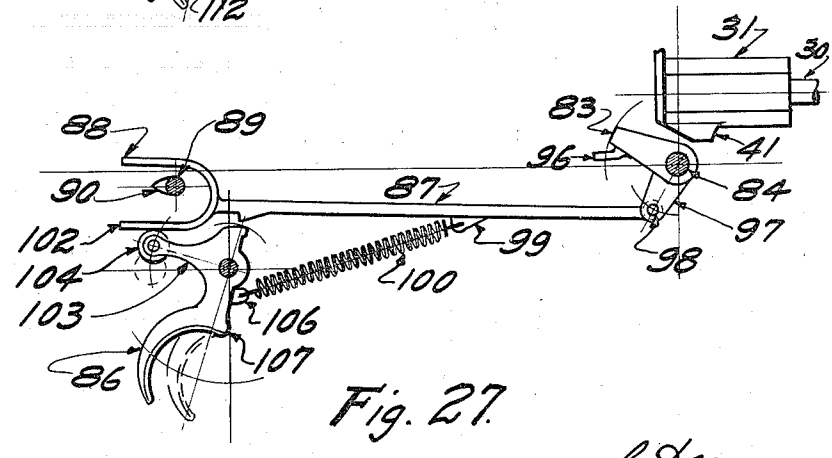


Fig. 27.

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Jan. 14, 1930. C. D. MEYER 1,743,472

SEMIAUTOMATIC RIFLE

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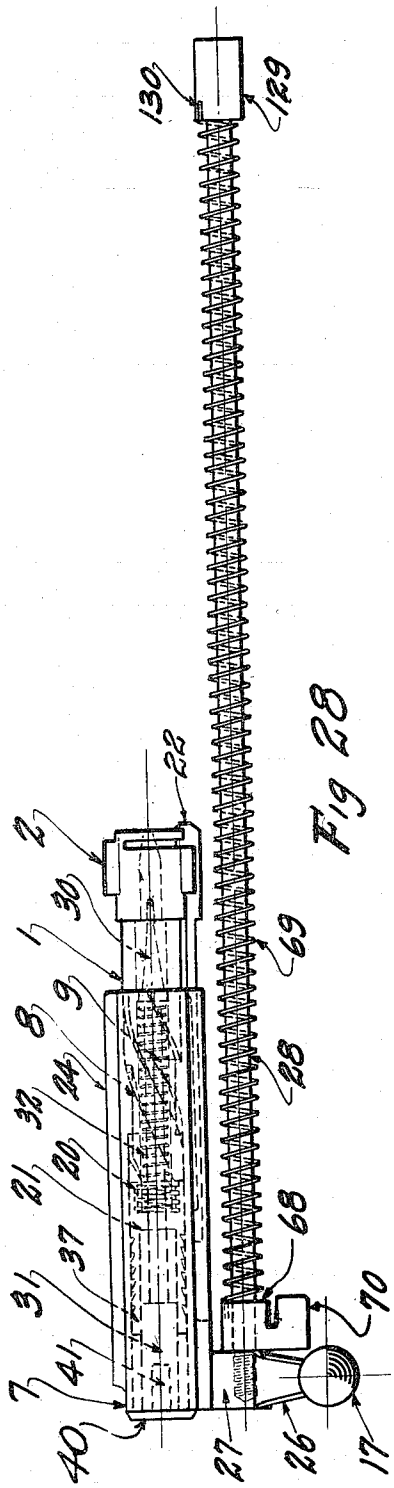


Fig 28

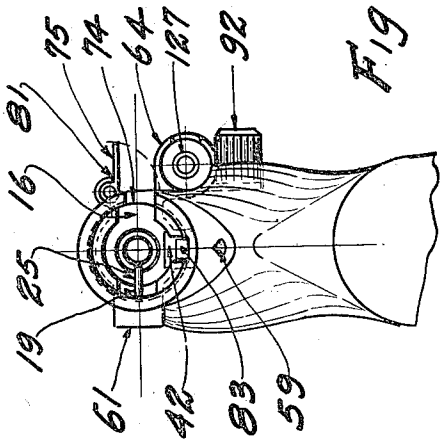


Fig 29.

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Patented Jan. 14, 1930 1,743,472

UNITED STATES PATENT OFFICE

CHARLES D. MEYER, OF SEATTLE, WASHINGTON

SEMIAUTOMATIC RIFLE

Application filed December 8, 1924. Serial No. 754,458.

This invention relates to semiautomatic fire arms and has for its object to produce a shoulder rifle which will be simple in construction and more efficient in action than those heretofore proposed.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawing forming a part of this specification in which the like numerals designate like parts in all the views, in which,—

Figure 1 is a general top view of the assembled rifle showing the action closed gate cover down and safety on. Fig. 2 is a right hand side view of the assembled rifle, gate cover down and safety on; it also shows the system of ventilation. Fig. 3 is an enlarged plan view of the rifle action shown in Fig. 1. Fig. 4 is also an enlarged side view of the action shown in Fig. 2. Fig. 5 is a vertical longitudinal section of the rifle action shown in Fig. 4 illustrating the mechanism assembly of its component parts in their normal position. Fig. 6 is a rear view of the rifle shown in Figs. 1 and 2. Fig. 7 is a horizontal section of Fig. 3 with breech bolt and parts associated therewith illustrated in retracted positions. Fig. 8 is a rear view of the assembled rifle showing the safety lever down and gate cover open. Fig. 9 is a side elevation, partly in section, of the power cylinder to show its component parts; it also illustrates a fragmentary part of the rifle barrel to show their relative positions when assembled to the rifle action shown in Fig. 4. Fig. 10 is a vertical longitudinal section of the front end of the rifle to show the gas retarder. Fig. 11 is a fragmentary vertical section of the receiver showing details hidden by the breech bolt in Fig. 5. Fig. 12 is the forward end view of Fig. 11. Fig. 13 is four side views of the bolt shown in different rotary positions. Fig. 14 is a view partly in section and partly in plan, showing the bolt and a portion of the operating slide. Figs. 15, 16 and 17 are development views of the peripheral surfaces of the rear portion of the bolt shown in Fig. 13 to illustrate the grooves thereof with respect to the operating slide lugs which are represented by shaded areas in Figs. 15, 16 and 17. Fig. 18 is a right side elevation of the operating slide. Fig. 19 is a front end view of Fig. 18. Fig. 20 is a view partly in plan and partly in section of the firing pin assembly. Fig. 21 is an elevational view of the firing pin assembly with the main spring compressed. Fig. 22 is a detail view, partly in side elevation and partly vertical, of portions of the magazine to disclose the bolt stop; Fig. 23 is a sectional view taken substantially on line 23—23 of Fig. 22; and Fig. 24 is a fragmentary plan view of Fig. 23. Figs. 25, 26, and 27 are side views of the sear-and-trigger mechanism illustrating the progressive position of the respective parts. Fig. 28 is a plan view of the breech bolt power piston assembly. Fig. 29 is a rear view of the rifle with the receiver cap and breech bolt power piston assembly removed.

The locking mechanism in this automatic loading rifle is practically the same as the one found in the Springfield, model of 1903, which consists of a bolt 1, Fig. 5, having the locking lugs 2 and 3 engaging the recesses 4 and 5 in the receiver ring 6 by means of a rotary motion of the bolt. This rotary motion is communicated to the bolt 1 by the operating slide 7 which has two internal operating lugs 8 and 9, Figs. 18 and 19. These two lugs are of suitable length and width to fit the operating grooves 10 and 11 provided therefor on the periphery and diametrically opposite side of the rear portion of the bolt.

As best shown in Fig. 13, each of said grooves has an angle or pitch such that when the operating slide is pulled to the rear one inch, approximately, the bolt is rotated one quarter of a turn.

These grooves 10 and 11 are offset circumferentially of the bolt and having a widened communicating portion which constitutes a neutral region and provide shoulders 12 and 13 shown in Fig. 13 and also in the development views Figs. 15, 16 and 17. Said neutral region or space allowing the operating lugs 8 and 9 a small longitudinal movement within such neutral region, as indicated by *a* and *b*

in Figs. 16 and 17, without imparting any rotary motion to the bolt 1 when the operating slide 7 is reciprocated within the receiver grooves or races 16.

The neutral region between the shoulders 12 and 13 in the grooves 10 and 11 eliminate or annul the rotary motion of the bolt when the operating lugs 8 and 9 are within the neutral space or region inclosed by the sides of said offset portions of the grooves and between the shoulders 12 and 13, as represented in Figs. 16 and 17. The reciprocating movement of the operating slide 7 along the receiver groove 16 (Fig. 5) will cause the operating lugs 8 and 9 to move in a rectilinear direction or parallel to the lines x and y in Figs. 15, 16 and 17. In Fig. 5 the breech bolt is illustrated in its closed position; the development view for which position is shown in Fig. 15 wherein the two operating lugs 8 and 9 are at the forward end of their travel and fit into the grooves 10 and 11, and thus positioned the bolt cannot rotate either way it is thereby locked in closed position. However, the operating slide can be moved to the rear by hand and in doing so will force the operating lugs 8 and 9, which are integral with it, to travel in a rectilinear direction or parallel to the lines x and y in the Figs. 13, 15, 16 and 17 causing the grooves 10 and 11 to be moved to the left a distance rr^1 Fig. 16 equal to a quarter of a turn of the bolt. At this instant the bolt will be unlocked from the receiver recesses 4 and 5 and the locking lugs 2 and 3 will thereupon register with the receiver groove 16.

A continued pull on the operating slide will not produce any further rotary motion to the bolt because the operating lugs 8 and 9 are arrested by the shoulders 13, see Fig. 16, of the grooves 10 and 11.

The operating slide and the bolt are now free to be reciprocated together with an absence of rotary motion without being locked together. They can thus be pulled back as far as they will go or to the open position in which it is illustrated in Fig. 7.

Pushing the operating slide ahead by means of the operating handle 17 to close the breech bolt and will cause the operating lugs 8 and 9 to move ahead a distance a (Fig. 16) without, however, imparting any rotary or axial movement to the bolt, because said lugs 8 and 9 being within the neutral space common to both grooves can be transferred from the left sides (Fig. 16) of the grooves 10 and 11 to the right sides thereof as represented in Fig. 17 where the longitudinal distance a and the angular distances rr^1 (Fig. 16) is equal to the distances b and rr^1, respectively in Fig. 17 where the operating lugs 8 and 9 are arrested by the shoulders 12. A further push on the handle 17 will cause the operating lugs 8 and 9 to close the breech bolt without, however, imparting to it any rotary motion until after it is completely closed and ready to lock; this change occurs when the locking lug 2, which has its front face 18 (Fig. 13) machined at a suitable angle, engaged axially the cam having a helical face 19, Figs. 6, 7 and 11, thereby causing a rotary movement to the said bolt sufficient to disengage the operating lugs 8 and 9 from the shoulder 12, Fig. 17. Said operating lugs now being in line to register with the grooves 10 and 11 presses against their right sides complete the locking movement of said bolt; the action is thus closed and locked as represented in Fig. 5 and also in the development Fig. 15.

It will be seen by the above explained action that there are no means whatever to lock or prevent the breech bolt from rotating during its reciprocating motion, that it is absolutely free from rotating movement. That its opening movement is completed by the operating lugs which are in contact throughout their lengths with the left sides of the respective operating grooves, see Figs. 15 and 16, prolongs the usefulness of the opposed parts and with a minimum of stress and wear.

In its closing motion, the operating lugs are also in contact throughout their lengths with the right hand sides of the grooves thereby permitting the breech bolt to be rammed home even with a considerable force without danger of breaking any of its parts. The helical cam 19, which is used as a disengaging cam, is also used as an extracting cam but only when said action is employed as a hand operated arm. This cam 19, moreover, which can only receive glancing blows from the locking lug 2 makes an ideal combination for a semi-automatic rifle action, as it is not subject to dead shocks, that is to say—metallic surfaces meeting head on—makes this action extremely smooth. In actual practice, the opening movement cannot be heard and its closing is hardly audible.

The interior of the bolt 1 is bored as shown in Fig. 14 to accommodate the firing pin and main spring assembly, as shown by dotted lines in Fig. 28. At its rear end, said bolt is externally screw threaded as at 20 to interlock with internal threads 29 provided in the bolt sleeve 21, as shown in Figs. 20 and 21.

The head of the bolt 1 in this invention is provided with a helical face 18 on its lug 2 (Fig. 13) to coact with the cam 19 to effect two important functions, first to produce a rotary movement to the bolt itself when the bolt in an axial movement thereof engages the cam and, second, to produce an axial movement to the bolt when the latter rotatably engages the cam.

The extractor 22 Figs. 4, 14 and 22 has a head substantially similar to that of the Springfield, model of 1903. Its rear part, however, is provided with a spring tail 14 slidingly mounted within a guide 23 of the operating slide 7 as shown in Figs. 4, 14 and 19.

The operating slide 7, see Fig. 18, is tubular in shape provided interiorly with the two operating lugs 8 and 9 which are also shown in the development views, Figs. 15, 16 and 17.

On its exterior and disposed at diametrically opposite sides are the guides 23 and 24 (Figs. 18 and 19) the guide 23, on the right-hand side, is provided with a socket 15 which serves as a way for the extractor tail 14. The guide 24, which is located at the left-hand side of the slide, is grooved its full length to enable it to pass the ejector 25, Fig. 7.

These guides 23 and 24 are, moreover, arranged to slide in the receiver grooves 16, Figs. 5 and 7.

At its rear end the operating slide 7 is provided with an operating handle comprising an arm 26 projecting from the side guide 23 and terminating in a knob 17 as best shown in Figs. 18 and 19. At about its midlength the arm 26 is formed to provide at its underside a boss 27 which is bored and tapped to receive an end of a piston rod 28, shown in Figs. 4, 7, 9 and 28.

The bolt sleeve 21, Figs. 5, 20 and 21, is of the same outside diameter as the rear part of the bolt, its front end is interiorly threaded as denoted by 29 for the purpose of interlocking with the thread 20 provided at the rear of the bolt 1, as shown in Fig. 5. Said bolt sleeve is bored for the passage of the firing pin 30 which is screwed into the cocking piece 31. Surrounding said firing pin is the main spring 32 one end of which is held in a slot 33 milled in the firing pin flange 34 and its other end engages in a hole 35 provided in the bolt sleeve as shown.

At its rear end the bolt sleeve is bifurcated to provide two cheek elements 37 with plane inner surfaces at opposite sides of a slot 36 and between which the cocking piece 31 slidingly fits. Each cheek 37 is provided with a series of notches 38 (Figs. 5, 2, and 21) to afford a non-slip hand gripping surface. The cocking piece 31 has its opposite sides 39 plane to fit against the plane inner surfaces of the cheeks 37 of said bolt sleeve 21. The bolt sleeve has also at its rear end a flange 40 of the same diameter, or nearly so, as the diameter of the main body of the operating slide 7, Fig. 5, and has at its under side a cocking nose 41.

The bolt stop 42 (Figs. 22, 23 and 24) is located in and at the rear of the magazine well, its housing 43 forming the back wall of said well. At each side of the stop 42 and integral with it are two tubular plungers 44 (Fig. 23) acting as guides. On the inside of said plungers are located springs 45 which are held under compression by the screw plugs 46. The plungers 44 have at their lower end extensions 47 which project below the magazine floor plate 138. This bolt stop 42 is limited in its travel downward by the lower ends of the plunger 44 engaging shoulders provided thereon in the housing 43, and its upward travel is limited by the screw plugs 46 which are regulated to allow but a small movement of about one-eighth of an inch. When the magazine is loaded with one or more cartridges the bolt stop 42 is held down by the two springs 45 in the position shown in Figs. 22 and 23. However, when the last shot is fired, or the magazine is empty, the finger 49 of the magazine follower 50, which extends into the slot 51, under the tension of the magazine spring 52 elevates the stop 42 in front of the bolt face, as shown by dotted lines 53 in Fig. 22, thereby holding the bolt in the open position in which it is represented in Fig. 7.

The interior details of the receiver, forward of dotted line 54—54 Fig. 11, are similar to the Springfield, model of 1903, with the exception of the cam which, in the present invention, has a helical face 19 located in the receiver ring 6 instead of at the back of the receiver bridge, above referred to, and back of the line 54—54 the receiver is extended as shown in Figs. 3 and 4 which show the exterior details. In Figs. 5 and 7 are shown the interior details of the said extension, its purpose being to guide the breech bolt in its rearward travel. It is accordingly bored and has the longitudinal grooves 16 in which slide the locking lugs 1 and 2 and also the operating slide guides 23 and 24, shown in Figs. 5 and 7. It has also at its bottom a guideway 55, for the cocking piece nose 41. At its rear end the receiver is threaded to receive the receiver cap 56 which is made hollow and adapted to be filled with a resilient material (not shown) such as cork for use as a buffer to the breech bolt assembly. This receiver cap 56 is provided with a handle 57 at the end of which is a knob 58 having in its under side a recess within which engages the tapering upper end of a spring actuated plunger 59 which is located on the center line of the receiver tang 60 to serve as a lock with respect to said receiver cap.

At the left side of the said receiver is located the ejector housing 61 containing the ejector 25, ejector pin 62 and ejector spring 63, Fig. 7.

According to the present invention, the receiver is formed or constructed to provide a cylindrical extension 64 at the forward righthand side of said receiver as shown in Figs. 3, 4, 7, 12 and 29. The extension 64 is threaded at its forward end as at 65 to receive the threaded end 66 of a power cylinder which is shown in Fig. 9. At its rear end the cylindrical extension 64 has a bayonet-joint member 67 engageable with the wing plug 68 Fig. 4 which serves as a thrust bearing to the action spring 69 surrounding the piston rod 28 as represented by Figs. 9, 4 and 7. This

wing plug 68 has a wing or thumb piece 70 and a short dowel 71 which fits into a hole 72 provided for it in the boss 27 of the operating arm 26, Figs. 4 and 19.

Above the cylindrical extension 64 (Fig. 4) the receiver is cut away like the Springfield, 1903 model, for side ejection as illustrated in Figs. 1, 2, 3 and 4, and immediately back of said cut there is the bridge 73, Figs. 4 and 7. At the rear of this bridge 73 is the gate opening 74 through which the operating handle arm 25 operates Fig. 4. This gate opening extends to the rear end of the receiver, as shown in Figs. 7 and 29, said gate opening being provided with a gate cover 75 which is hinged to the upper side of the said gate opening through the medium of apertured lugs 76—77 through which extends a hinge pin 78. Surrounding the hinge pin 78 are two springs 79—80 so wound and installed that their reaction will tend to force the gate cover 75 open and against the stop 81 as shown in Figs. 8 and 29. This gate cover 75 when closed, as shown in Figs. 2 and 4, protects the action mechanism from the entrance of sand, rain or dirt, and also acts as a lock to the breech bolt assembly. It will be seen in Figs. 2 and 4 that this gate cover is directly behind the operating handle arm 26 thus preventing the accidental opening of the action when the rifle is dropped on its butt as is done in rifle exercise of military organizations.

The top of the receiver is finished as shown in Figs. 1, 2, 3, and 4, the flat surface 82 of which is provided for the emplacement of a rear sight, not shown. The underside of the receiver is made to accommodate the sear 83 with its pin 84 and the trigger bracket 85 which is secured to the receiver by the two screws 138—139.

Said trigger bracket 85 is made of two housings integral with the base, one-half of which is shown in Fig. 5. Between these two housings is located the trigger 86 and the forked end of the sear link 87, the upper fork 88 of which rests or is supported by the safety cam shaft 89 which carries the cam 90. This cam shaft 89 is rotated by the safety lever 91, Fig. 4, having a fluted head 92, the safety lever 91 being secured to the cam shaft 89 by the pin 93 in such a manner that the cam 90 and the lever 91 are similarly oriented so that when the cam 90 is in the position shown in Fig. 5 the safety lever 91 will be in the position in which it is shown by dotted lines 94 in Fig. 4 which is the firing position or "ready".

By turning the lever 91 up to the position in which it is shown in Figs. 4 and 6 causes the cam 90 (Fig. 5) to raise the forked end of the sear link 87 thereby disengaging it from the trigger nose 95 which is the position of safety or safe, see dotted lines Fig. 5. The safety lever 91 also serves as a lock to the gate cover 75 (Fig. 4) when the lever 91 is in front of the cover 75 thereby keeping it shut, said gate cover 75, subject to the action of its springs, in turn, tends to keep the safety lever locked, thus affording mutual locking relation with respect to the safety lever and the gate cover.

The trigger and sear mechanism (Figs. 5, 25, 26 and 27) is composed of the sear 83 pivoted on the pin 84 and having the sear stop 96, the arm 97 to which is attached the sear link 87 by means of the pin 98. This sear link 87 is provided with an apertured lug 99 to which is attached an end of the combination sear and trigger spring 100 whose other end is attached to the trigger lug 106. This link is provided with a detent 101 adjacent to its rear end which is forked, as shown, one arm of which 88 rests on the safety cam shaft 89 and its other arm 102 is suspended therefrom, as shown in Figs. 5, 25, 26 and 27.

The trigger 86 has its nose 95 adapted to engage the detent 101 of the sear link 87. Said trigger is provided with a spur 103 which carries the spur roller 104 and held by the pin 105.

The trigger heel 107 which bears against the end of the trigger guard slot 108 (Fig. 5) limits its forward travel. Except as above described the trigger may be of standard type and is connected to the trigger bracket 85 by means of a pin 104 upon which it oscillates.

This trigger and sear mechanism assembly is illustrated in Fig. 5 in which it is shown in its normal relation, where it will be seen that the sear-trigger spring 100 which is under tension acts to pull the lower part of the trigger ahead and the sear-link back causing the end of the sear 83 to raise into the cocking piece nose guideway 55 until it is arrested by the sear stop 96 contacting with the bottom of the receiver. When in the above referred to position there is a small clearance between the trigger nose 95 and the detent 101 to allow the sear link to be raised or lowered or oscillate around the pin 98 when the safety cam 90 is rotated by means of the safety lever 91 from its safe position, in which it is represented by full line in Fig. 4, is movable into its ready position 94, indicated by dotted lines in the view, or vice versa.

Due to the angularity at which the spring 100 is disposed with respect to the sear link fulcrum and other supports, its tendency is to pull and keep said link down to the position illustrated by full line in Fig. 5. Now, if by means of the operating handle 17, Fig. 6, the breech bolt assembly is pulled to the rear from the position shown in Fig. 5 the cocking piece nose 41 will depress the sear 83 when passing over it, but which will return instantly to the normal position as soon as the nose 41 is to the rear of the said sear 83. On returning the breech bolt to close position, however, the cocking piece nose 41 will remain hooked behind the sear 83 as shown by dotted line 110 in Fig. 25, the action then is said to be cocked.

To release the action or fire the gun by a finger presser against the bow of the trigger 86, this movement can be described as a first light pull which serves to partly disengage the sear 83 from the cocking nose 41. This light pull is continued until the trigger spur roller 104 comes in contact with the lower arm 102 of the forked sear link 87: the result of such trigger movement is illustrated in Fig. 25 where the dotted lines show the original or normal position of the mechanism and the full lines the result of this pull, the movement with respect to the trigger being represented by the angle 111.

Now the finger pressure on the trigger 86 must be increased due to the spur roller 104 being in contact with the lower arm 102 of the sear link 87 causing a sharp and distinct resistance for the finger to overcome; but as soon as the trigger is pressed back a little further the sear 83 becomes disengaged from the cocking nose 41, the friction of the said nose 41 on the sear 83 also ceases; and the finger pressure pressed the trigger back still further causing the trigger spur roller 104 to raise the sear link still higher thereby disconnecting the trigger nose 95 from the detent 101 as illustrated in Fig. 26 which shows the result of the first and second pulls mentioned above, the total trigger movement being represented by the angle 112.

The cocking piece 41 being now free, under the impulse of the main spring 32 is propelled forward and the sear 83 with its link 87 return to normal position under the tension of the spring 100, as illustrated in Fig. 27.

The trigger 86 can now be released and will return to its normal position whereat its nose 95 is again behind the detent 101 as shown by full lines in Fig. 5.

The rifle barrel is of the standard type it is bored and chambered for standard military or commercial ammunition. At its rear end it is threaded (113 Fig. 9) to be screwed into the receiver ring as at 114, Figs. 11 and 12; its other end is also threaded as at 115 and the muzzle opening is chamfered as at 116 in Fig. 10.

The rifle as described above is capable of being used as a hand functioning arm in case the automatic features are disabled. Such automatic features which will now be described include a gas retarder, shown in section at the muzzle end of the rifle barrel in Fig. 10, is so named because its purpose is to retard the gases issuing from the bore of the barrel after a shot is fired; in such a manner that the power of this retarded gas can be utilized to operate the gun.

More particularly, this gas retarder is made cylindrical in form, either integral with said barrel or as an attachment, having a chamber 117 and, as shown, one end of which is screw threaded for engagement with the barrel thread 115. At the other end of this chamber, and concentric with its axis is an aperture 118 bored of slightly larger diameter than the barrel bore. The end of the chamber 117 between its peripheral wall and the aperture 118 is machined to provide an annular concavity 119 that has a transverse contour corresponding to a half circle, or nearly so, which serves to divert the powder gas issuing from the barrel bore at the instant the bullet leaves it, and prevent the said gases escaping through the aperture 118 into the atmosphere before the bullet passes through the said aperture to momentarily obstruct it.

On top of the main body of the gas retarder and integral with it is the front sight base 120 having a slot within which the sight blade 121 is mounted and held in position as by means of a pin, not shown.

At the under side of the said gas retarder and slightly protruding from it is the gas outlet 122 having a hole 123 into which a tube 127 slidingly fits. This hole, moreover, is of sufficient diameter and length to allow the tube to have a longitudinal movement therein to facilitate the assembling or disassembling same, as indicated by dotted lines 124 in Fig. 10, showing the end of the tube extending temporarily into the outlet 122.

The gas outlet communicates with and constitutes in effect a part of the chamber 117. At its end the gas retarder body surrounding the aperture 118 is formed to provide a bayonet seat 125 adapted to engage within the guard socket of a bayonet.

From the gas retarder the powder gases are lead to the power cylinder 126 (Fig. 9) by means of the gas tube 127 which is connected to said cylinder as by means of a union coupling 128. Within the power cylinder 126 is a piston 129, the piston rod 28 and surrounding said piston rod the action spring 69. Said piston is provided with an aperture indicated by 130 to receive an end of the spring 69.

The power cylinder 126 is threaded as at 66 (Fig. 9) for engaging the threads 65 of the receiver extension 64, Fig. 12.

The rifle stock 131 is of the regular one piece full length military pattern. The hand guard 132 as shown in Fig. 2, is provided with a plurality of openings 133 in its opposite sides and directly above the joint 134 where hand guard 132 meets the stock 131. These openings are desirably of the shape shown in Fig. 2 to allow ventilation to the gun to prevent charging or overheating the wood. The hand guard and stock joint 134 referred to above, are located below the axis 135 of the barrel thereby allowing the complete action to be installed as a single piece on the stock.

The action is secured to the stock in the same manner as the U. S. Springfield, 1903, that is with two screws as illustrated in Fig. 5. The upper band 136 is the U. S. standard. The lower band 137, however, is formed to

provide at one side thereof a D-shaped offset to encircle both the stock and the power cylinder to enable the band 137 being slid on or off in the usual manner.

The operation of my invention may be described as follows, with reference to the accompanying drawings: Assuming the action is assembled closed, the trigger pulled, and the safety on, the action will then be as represented in Figs. 1, 2, 3, 4, 5, and 6.

The operator holding the rifle in the usual manner, places his right thumb on the fluted head 92 of the safety lever 81, Figs. 4 and 6, pulls it back and down into ready position 94, Fig. 4; in so doing the sear link 87 is lowered from the position in which it is shown by dotted lines to that shown by full lines in Fig. 5 and the gate cover 75, Fig. 4 is released and thereupon opens against the stop 81 in a horizontal position as shown in Fig. 8.

The operator then opens the action by means of the operating handle 17, Figs. 3, 7 and 8, drawing it back as far as it will go, see Fig. 7, this exposing the opening or entrance to the magazine and uncovering the bolt stop 42 at the back of the magazine, allows the said stop 42 to raise in front of the breech bolt, said stop being pressed up by the magazine follower 50 under the action of its spring 52.

The magazine can be filled by inserting one cartridge at a time—or the full quantity (5) by the use of a cartridge clip as is done in the Springfield—then drawing back slightly on the operating handle 17, thereby releasing the bolt stop 42 which was held up by the breech bolt assembly under the tension of the action spring 69 which was compressed by the opening movement.

Said stop 42, now free, drops back into its recess under the action of its own springs 45, Figs. 23. The action now can close, let go the handle 17 permitting it to go forward, which will push a cartridge into the chamber and having, in the meanwhile, hooked the cocking piece 31 to the sear 83 and locked the breech bolt to the barrel.

The rifle is now ready to fire. Should it be desired to carry the rifle loaded, press down the gate cover 75, Fig. 8 with the finger of the right hand and with the thumb of the same hand push the safety lever 91—92 into safe position, illustrated in Fig. 4, these last two mentioned operations are done with a twist of the wrist. The action is now completely closed and protected from the entrance of sand, rain, dirt, etc.

However, if it be desired to fire, replace safety lever 91 to ready, gate cover will again open, and pull the trigger, which is similar in action to that of the present U. S. service rifle although radically different in principle, that is to say—it has a light first pull, after which there is no appreciable backward motion until the sear is released.

The firing pin having struck the primer of the cartridge in the chamber fires the shot, the bullet is on its way down the bore of the barrel, the breech bolt 1 remains locked in position. When the bullet leaves the rifle bore, however, the powder gases escape into the chamber of the gas retarder trying to pass the bullet in its flight, but are turned back or deflected by the annular cavity at the end of the gas retard chamber 117, the bullet passing through the aperture 118 and momentarily obstructs it, the powder gas being then trapped cannot escape except through the gas tube 127 into the power cylinder 126.

Within the cylinder the powder gases act to force the piston 129 back and through the medium of the piston rod 28, which is connected to the operating handle arm boss 27, Figs. 19 and 7, effects the unlocking of the breech bolt. Meanwhile the bullet has been projected from the aperture 118 into the atmosphere, but a part of the powder gases remain in the rifle bore, power cylinder and the communicating connections. By reason of the retarding effect which the gas retarder has upon the gases, the latter cannot escape into the atmosphere in as short a time as when no retarder is employed, this is due specifically to the expansion and deflecting forces which the gases are subject to before they can escape through the aperture 118. It is possible with my improved system to utilize the gas force or power for relatively long periods of time. The breech bolt being unlocked is pressed back by the power remaining in the retarded gases, referred to above, acting on the power piston 129 and also on the fired shell completing the opening movement of the breech bolt. When all the energy of the said powder gases is spent, the rifle action is free, whereupon the action spring 69 returns the breech bolt forward to again push a cartridge from the magazine into the chamber and locking the bolt. The trigger is now released and the rifle is again ready for firing.

If it is desired to recharge the magazine after firing one or more shots, the operating handle 17 is drawn back as far as it can go at the same time pressing upon the bolt stop plunger-rods 47, which projects on both sides of the magazine floor plate 138, and release the handle 17 which will hold the breech bolt open, refill the magazine, draw back on the operating handle 17 and then let it go.

To employ the rifle as a single loader, press a cartridge into the magazine, draw back on the operating handle 17 and release it or follow it up with the hand. To empty the magazine, draw back on the operating handle 17 as far as it will go, permit it to go forward slowly by holding the handle 17 until closed, or partly so, repeating the process until the action remains open.

To close the action when the magazine is

empty, draw back on the operating handle and at the same time press down upon the magazine follower 50, let the handle 17 go ahead slowly in the same manner as in the Springfield.

To remove and replace breech bolt for inspection or cleaning, place the safety lever 91 down at ready 94, Fig. 4, unscrew the receiver cap 56 by means of its handle 57—58 then disengage the power cylinder wing plug 68, Fig. 4, from the bayonet joint 67 by pushing it forward and then turning it up by means of the thumb piece 70, Fig. 4. When in such position the action spring 69 will push it back and the dowel 71 is in line to register with the hole 72 in the operating handle boss 27 will drop into it and hold said wing plug horizontally. Now by means of the operating handle 17 the complete breech bolt power-piston action spring assembly, shown in Fig. 28, can be withdrawn from the receiver.

The barrel can now be inspected and cleaned from both ends and the power cylinder can be cleaned and inspected from the rear, as shown in Fig. 29. The breech bolt power-piston action spring assembly (Fig. 28) is then replaced in the receiver, the wing plug 68 pushed ahead and its thumb piece 70 turned down and the receiver cap replaced, making the rifle again ready.

To dismount and assemble the action:

Remove the breech-bolt-power-piston action-spring assembly as explained above, then with one hand compress the action spring 69 toward the operating handle 17 to disengage it from the piston and, with the other hand, unscrew the piston rod 28 from the operating handle arm boss 27, and remove from the piston rod 28 the wing plug 68 and the action spring 69.

In all probability when the breech bolt assembly is removed from the receiver or during the operation mentioned above, the bolt 1 has receded into the operating slide 7 under the impulse of the main spring 32 which caused the operating slide 7 to slide upon the bolt 1, or vice versa, and which are held apart by the operating lugs 8 and 9 resting on the offset shoulder 12 of the bolt grooves 11 and 12, Fig. 17. However, if it has not, make it do so by rotating the bolt to the left (the only way it can turn when in that position) the main spring 32 will then pull it back into the operating slide 7. Now holding the operating slide 7 on one hand, with the other pull back the cocking piece 31 by hooking one finger on the cocking piece nose 41 and the thumb on the flange 40 until said cocking piece is out or to the rear of the side cheek 37 of the bolt sleeve 21, then rotate it a quarter of a turn to the left and release the pull; the cocking piece 31 will then rest upon the end of the side cheek 37 of the bolt sleeve 21. When in this position rotate it to the right to unscrew the bolt sleeve 21 from the bolt thread to which it is held by a left hand thread 20. When unscrewed, pull the firing pin assembly back to be as illustrated in Fig. 21. The bolt 1 can be pulled ahead by revolving it to disengage the operating lugs 8 and 9 from the bolt grooves 10 and 11 the extractor 22 will come out at the same time.

The firing pin assembly being now as illustrated in Fig. 21, by holding the bolt sleeve 21 and rotating the cocking piece 31 to right or left said cocking piece 31 will return between the bolt sleeve cheeks 37, as shown in Fig. 20. Now with one hand compress the main spring 32 toward the bolt sleeve 21 to disengage it from the flange and with the other hand unscrew the firing pin 30 which will allow all component parts of the firing pin assembly to be examined separately.

To reassemble the action, proceed in the reversed order to that above explained and when the last operation is performed, that is—the screwing the piston rod 28 in position and before inserting the end of the action-spring 69 into the hole 130 on the piston 129, wind said spring by rotating it around the piston rod 28 in an opposite direction to that in which the rod 28 was screwed, for one turn or more, then insert the spring end in its hole, which prevents the piston rod 28 from unscrewing and also serves to hold the wing plug 68 in its down position.

Now pull on the breech bolt head while turning it to the right (the only way it can be turned when pulling it) until the operating lugs 8 and 9 of the operating slide 7 rests upon the offset shoulder 12 of the bolt operating grooves 10 and 11. When the above named parts are thus arranged insert the breech bolt power piston assembly into the receiver by guiding the power piston along the receiver side into its cylinder 126 and the breech bolt in the receiver grooves 16; push the handle 17 as far as it will go thereby locking the action; push the wing plug 68 ahead and turn down the thumb piece 70 into the bayonet joint 67; and finally put on the receiver cap 56.

The action is now fully reassembled ready to use.

General remarks

From the foregoing explanation it will be seen that this semi-automatic shoulder rifle has a rectilinear-type action and can be used as a hand operated arm; that its automatic features are very simple; its mechanism is composed of few parts; and is easy to dismount for cleaning without the use of any tools.

The safety and trigger system used in this rifle make it almost fool proof as, for example, when this safety is at safe position, should any one attempt to pull the trigger to fire, or to ascertain if the rifle can be fired,

as is oftentimes done by riflemen, it will be seen by referring to Fig. 5, dotted line safety on, that he will defeat his own purpose, because by pulling the trigger, he not only is unable to disengage the sear but produces a contrary effect by increasing the tension on the sear trigger spring 100 thereby causing the sear 83 to be more secure, and furthermore causing the trigger spur roller 104 to raise the sear link and detent 101 still further from the trigger nose 95, as illustrated in Fig. 27.

An attempt, moreover, when safety is on the fire a shot by lowering the safety lever to ready position with the trigger held back will also result in failure because, when the trigger is held back, the detent 101 is held up by the trigger spur roller 104 (see Fig. 27); the lowering of the safety lever from safe to ready position therefor cannot affect the sear trigger mechanism in any way, and the trigger must be released and again pulled before a shot can be fired.

While the action of this rifle is of the rectilinear (straight pull) type, it has not the same characteristics found in this type as heretofore constructed, its principles being different and with none of their disadvantages. Hitherto all straight pull actions have been unsatisfactory chiefly because they lack the power to insert and extract cartridges from the chamber.

This deficiency of power after considerable experimenting is found to be due to the system used in their actions to prevent the bolt from rotating during its reciprocating movement.

The prior systems above referred to may be divided into four types, to wit:

1st, the friction type which employs the simple expedient or forcing the bolt along the receiver races without obviating the turning movement imparted to it by the slide, causing excessive friction with some makes of rifles and machine guns;

2nd, The catch-type employing a spring catch adapted to lock the bolt and slide during their mutual reciprocating motion;

3rd, The auxiliary rotating type which employ a cam in the receiver to give additional rotary motion to the breech bolt which causes it to engage some suitable threads or in a recess in the sleeve to lock the bolt for sliding during the opening and closing operation; and

4th, The helical groove type which employs a receiver having helical grooves by means of which the locking lugs are given a supplementary rotary motion in traveling in said grooves to couple the bolt and slide together.

In any of the actions mentioned above, if a cartridge from the magazine is hard to insert into the chamber or if a fired shell is hard to extract therefrom, their cams, catches, helical grooves, etc., (which are used to prevent rotary motion of the bolt in its reciprocating movement) begin and cease their functions at the precise moment when the maximum power of insertion or extracting is required, which is at the instant the bolt is unlocked from the receiver and the reciprocating movement starts, and vice versa.

These independent or auxiliary functions taking place at the critical moment where the bolt changes its rotary motion into a rectilinear motion or from the rectilinear to a rotary motion, is the principal cause of the lack of power in the respective actions.

Whereas with my rifle action no auxiliary rotary movement is necessary, no catches nor other means are requisite to hold and lock the bolt and slide together. The operating slide unlocks fully the bolt from the receiver and also draws it back into the receiver grooves. The bolt and slide are not locked together and are reciprocated along the receiver grooves without any tendency to rotate about one another.

When the operating slide is pulled or pushed the operating lugs 8 and 9 are transferred from one side of the bolt grooves 10 and 11 to the other side without, however, imparting rotary motion to the bolt when the bolt is within the receiver grooves.

It will be noted that a neutral region is provided with respect to the operating grooves to allow longitudinal movement of the slide, on the bolt, or of both of them, is utilized not to prevent (as is done in the other actions mentioned above) the rotary motion of the bolt, but to overcome said rotary motion at the instant the bolt is unlocked from the receiver and until it is ready to lock again.

By axially engaging said bolt and slide in this action wear will in no way affect its operation, but simply make this axial movement a little longer without affecting the action in the performance of its functions; whereas in the rotary system as used for instance in the Ross rifle a slight wear will render such action inoperative, as, for example, wear at the edges of the internal teeth of the operating slide, or on the spiral ribs of the bolt will act to prevent the latter rotating sufficiently in its unlocking movements so that, when the bolt head strikes the cam to give it the required auxiliary rotative motion to lock it to the operating slide, the teeth in the sleeve fail to register with the teeth spaces of the bolt it is accordingly stuck, and it takes but little wear to do that.

The actions using the catch system are no better; those using helical races promote friction and are expensive to make.

In the present invention, the short longitudinal movement afforded by the neutral region provided in the respective grooves to axially engage the bolt groove with the operating slide lugs, moreover, is automatically taken up by the firing-pin main spring 32

causing the cocking piece 31 to press the operating slide 7 ahead and the bolt sleeve 21 to pull the bolt back causing a mutual contracting or telescopic motion of the bolt and slide.

Also making the operating slide movement somewhat short in locking the breech bolt compared with the unlocking movement, and incidently shortening the overall length of the combined bolt and slide in the unlocked position are important features when a rectilinear action is employed in a semi-automatic rifle, as it is possible to make the receiver shorter than it would be otherwise.

In a rifle action of this type, it will be seen by referring to Fig. 5, that the only part subject to great stress is the receiver ring 6 and the head of the bolt 7, the remainder of the action, such as the receiver, is made very light.

The breech bolt assembly in my improved action may be of little weight, say—about 1¼ pounds—making the actions extremely fast; in actual practice its movement is almost imperceptible and its recoil energy is so small that it is entirely absorbed by the action spring 69; only when using extreme loads does the breech bolt assembly come into contact with the buffer in the receiver cap 56.

When firing this rifle none of the jerking and jarring of the weapon is felt by the rifleman as it is the case when firing the semi-automatic rifle of the barrel-recoil type or those using the inertia system of (blow-back).

The automatic system used in my rifle is very flexible and will operate the action equally well when shooting either high or low pressure cartridges in the same gun, that is—within certain limits or a variation of say, 10 grains of powder from maximum load.

It may be mentioned, an experimental gun has demonstrated that the gas retarder additional to its regular function, hereinbefore explained, embodies other beneficial characteristics, namely,—it reduces the recoil of the gun an appreciable amount; it reduces the report of the gun perceptibly, and decreases the flash considerably. Furthermore, its structure acts as a guide for the cleaning rod to prevent the rod injuring the muzzle of the rifle and also permits the bayonet to be attached so as to interfere in no way with the proper operation of the rifle.

What I claim is,—

1. In a fire arm, the combination of a receiver having locking-lug races and lug recesses, a bolt having a head adapted to engage in said recesses and to slide within said races, a longitudinally movable operating slide associated with said bolt, and connections comprising helical offset grooves on said bolt interengaging with helical lugs on said slide by which the bolt is rotated and reciprocated by the movement of the slide, the offsetting of the respective grooves serve to provide neutral spaces within which the helical lugs are capable of reciprocating for a distance without imparting motion to the bolt.

2. In a fire arm, the combination of a bolt and an operating slide slidingly associated and provided with connections comprising helical lugs on said slide, helical offset grooves on said bolt forming a neutral space for said lugs, said neutral space permitting retrograde longitudinal movement of the bolt with respect to the slide, a receiver having locking lug recesses, a head carried by said bolt and adapted to engage in said recess, a cam on said receiver adapted to be axially struck by said head to rotatably move said bolt to re-engage said grooves with said lugs and cause said head to rotate into locking engagement within said lug recesses when said slide is moved forward, and whereby said cam is rotatably struck by said head to axially move said bolt a short distance to the rear for primary extraction when said slide is retracted.

3. In a fire arm, the combination of a bolt and an operating slide slidingly associated and provided with connections comprising operating lugs on said slide, helical offset grooves on said bolt to provide a neutral space for said lugs, said neutral space permitting retrograde longitudinal movement of the bolt with respect to the slide, a bolt sleeve, a main spring held under compression by said bolt and slide when said lugs are within said neutral space, a receiver having locking lug recesses, a head carried by said bolt adapted to engage said lug recesses, a cam on said receiver adapted to be axially struck by said head to rotatably move said bolt thereby re-engaging said lugs to said grooves and cause said head to rotate into locking engagement within said lug recesses when said slide is moved forward, and whereby said cam is rotatably struck by said head to axially move said bolt a short distance to the rear for primary extraction when said slide is retracted.

4. In a fire arm, the combination of a bolt and an operating slide slidingly associated and provided with connections comprising operating lugs on said slide, helical offset grooves on said bolt to provide a neutral space for said lugs said neutral space permitting retrograde longitudinal movement of the bolt with respect to the slide, grooves and lugs, a bolt sleeve, a firing pin, a main spring surrounding said pin and held in compression when said lugs are within said neutral space, a receiver having locking lug recesses, a head carried by said bolt adapted to engage said lug recesses, a cam on said receiver adapted to be axially struck by said head to rotatably move said bolt out of neutral thereby re-engaging said grooves with said lugs and cause said head to rotate into locking engagement with said lug recesses when said slide is moved forward, and whereby said cam is rotatably struck by said head to axially

move said bolt a short distance to the rear for primary extraction when said slide is retracted.

5. In a fire arm, the combination of a bolt and an operating slide slidably associated and provided with grooves formed to have a neutral region and lugs, a receiver having lug recesses, a head carried by said bolt and adapted to engage and be locked in said recesses, a firing pin, a bolt sleeve, a cocking piece associated with said slide and bolt, and a main spring adapted to be compressed by said slide when retracted and to cause said bolt to recede axially within said slide when unlocked to longitudinally engage said bolt to the slide within said neutral region and to hold said main spring under compression.

6. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses, in which said locking lugs are adapted to engage and be locked, an operating slide provided with internal lugs, said slide slidingly fitting said bolt, said bolt having externally spiral grooves arranged in laterally offset relation with each other to provide a neutral region, said internal lugs being adapted to engage with the sides of the respective grooves and to be idle when within said neutral region.

7. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses in which said locking lugs are adapted to interlock, longitudinal grooves in said receiver in which said locking lugs slide, an ejector on said receiver projecting into one of said grooves, a longitudinal slot in one of the said locking lugs to allow free passage to said ejector within such lug, a spiral front face on said slotted lug, a cam on said receiver adapted to be axially struck by the slotted lug to rotatably turn said bolt, an operating slide slidingly fitting said bolt, said bolt having externally spiral grooves, said grooves being offset laterally with respect to each other to provide a neutral space on said bolt, and internal spirally arranged lugs in the said slide adapted to engage in the grooves with their sides and the shoulders with their ends and to be free when within said neutral space.

8. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses, in which said locking lugs are adapted to engage and be locked, an operating slide slidably fitting said bolt, operating lugs provided on said slide, said bolt having communicating spiral grooves arranged in laterally offset relation with each other to provide a relatively wide area of communication between said grooves, said wide area permitting inoperative axial and rotative movements of said bolt within said slide, a bolt sleeve, a firing pin carried by said bolt, a main spring surrounding said pin, and a flanged cocking piece on said pin for facilitating the compression of said spring when said operating slide is retracted.

9. In a fire arm, the combination of a bolt provided with grooves, an operating slide provided with lugs slidingly associated with said bolt, said grooves including a neutral region through which said lugs are compelled to pass in each cycle of operation of said bolt, a firing pin, a bolt sleeve, and a main spring associated with said slide and bolt, and connections between said bolt and slide whereby said spring may be held under compression while said bolt and slide are permitted an axial movement on one another.

10. In a fire arm, the combination of a bolt and an operating slide slidingly associated with said bolt, lugs provided on said slide, a firing pin, a cocking piece, a main spring, and a bolt sleeve associated with said slide and bolt, and connections on said bolt comprising longitudinally engageable and rotatably disengageable grooves with said slide lugs, said connections including a neutral region, said neutral region permitting longitudinal retrograde movement of the bolt with respect to the slide, said spring being adapted to be held under compression while said bolt and slide are pressed together to be handled as a single piece.

11. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses within which said locking lugs are adapted to be locked and unlocked, and longitudinal grooves in which said locking lugs can slide, an operating slide slidingly fitting said bolt, a bolt sleeve, a firing pin carried by said bolt, a main spring surrounding said pin, a flanged cocking piece on said pin for facilitating the compression of said spring when said slide is retracted, and connections between said bolt and slide, said connections comprising a neutral region with respect to said grooves permitting a longitudinal movement of said bolt within said slide whereby when the said slide is retracted the said bolt is unlocked and said main spring is allowed to retract the bolt within said slide thereby causing the said grooves to change their contact from one side and the rear of said slide lugs to the other side and front of said lug.

12. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses with which said locking lugs are adapted to interlock and be locked, and longitudinal grooves in which said locking lugs can slide, an operating slide having operating lugs slidingly fitting said bolt, a bolt sleeve, a firing pin carried by said bolt, a main spring surrounding said pin, a flanged cocking piece on said pin for facilitating the

compression of said spring when said slide is retracted, and connections between said bolt and slide, said connections comprising longitudinally engageable and rotatably disengageable grooves on said bolt having a neutral space in a portion of their length through which said operating lugs must pass in each cycle of their operation whereby when the said slide is retracted said bolt is unlocked and said main spring is allowed to retract said bolt within said slide thereby causing the said grooves to change their contact from one side and the rear of said slide lugs to the other side and front of said lug and thereby shortening the overall length of said bolt and slide.

13. In a fire arm, the combination of a bolt provided with a head having locking lugs, a receiver provided with locking lug recesses with which said locking lugs are adapted to interlock and be locked, and longitudinal grooves in which said locking lugs can slide, an operating slide having operating lugs slidingly fitting said bolt, a bolt sleeve, a firing pin carried by said bolt, a main spring surrounding said pin, a flanged cocking piece on said pin for facilitating the compression of said spring when said slide is retracted, and connections between said bolt and slide, said connections comprising longitudinally engageable and rotatably disengageable grooves on said bolt, said grooves having therebetween a neutral region through which said operating lugs must pass in each cycle of their operation whereby when the said slide is retracted the said bolt is unlocked and said main spring is allowed to retract said bolt within said slide thereby causing the said grooves tc change their contact from one side and the rear of said slide lugs to the other side and front of said lug and thereby annulling the rotations of said bolt when said slide is further retracted.

14. In a fire arm, the combination of an operating slide, a bolt slidingly associated with said slide and having an external thread, a bolt sleeve provided with an internal thread adapted to engage said external thread, cheek projections on said bolt sleeve, a firing pin, a main spring surrounding said pin, a cocking piece having flat parallel sides adapted to slide between said cheek projections, a flange on said cocking piece engageable with said slide, and means whereby said cocking piece may be made to rest on the end of said cheek projections to facilitate the assembling and disassembling of the said bolt sleeve firing pin, main spring, and cocking piece to or from the said bolt and within the said slide.

15. In a fire arm, the combination of a bolt provided with a head having an extractor groove and locking lugs, a receiver provided with longitudinal grooves and lug recesses in which said locking lugs may be reciprocated and locked, an operating slide slidingly associated with said bolt and having guides adapted to slide in said receiver grooves, a combination groove-and-socket in one of the said guides, and an extractor adapted to be rotatably engaged by said bolt extractor groove and to axially engage said combination groove-and-socket on said slide.

16. In a fire arm, the combination of a receiver in which operates and slides a breech bolt, said receiver having a magazine opening, a magazine having a follower actuated by a spring adapted to feed cartridge through said opening, an housing on said magazine wall, a pawl in said housing having at each side a tubular guide adapted to guide said pawl and extending through the magazine floor, springs in said guides to normally hold said pawl within said housing, and a finger projection on said follower adapted to engage and raise said pawl out of said housing to in front of said breech bolt when the latter is fully retracted and whereby said pawl will return within said housing when said follower is depressed.

17. In a fire arm, the combination of a receiver provided with longitudinal grooves having a gateway, a slide provided with guides and a handle-arm adapted to slide in said grooves and gateway, a spring actuated gate cover hingedly connected to said receiver and adapted to close said gateway and a safety lever adapted to hold said gate cover in its closed position.

18. In a fire arm, the combination of a receiver provided with longitudinal grooves having a gateway, a slide provided with guides and a handle-arm adapted to slide in said grooves and gateway, a safety lever and a spring actuated gate cover adapted to close said gateway and to lock said safety lever when the latter is in safe position.

19. In a fire arm, the combination of a receiver provided with longitudinal grooves having a gateway, a slide provided with guides and a handle-arm adapted to slide in said grooves and gateway, a gate cover hinged to said receiver, a stop on said receiver, springs associated with said receiver and the gate cover to normally hold the latter in its open position and against said stop.

20. In a fire arm, the combination of a receiver provided with lug recesses and longitudinal grooves having a gateway, a power cylinder on said receiver, a bolt in said receiver having a head adapted to lock within said recesses, a slide slidingly associated with said bolt and adapted to slide in said grooves, connections comprising interlocking grooves on said bolt having a neutral region and lugs on said slide which are compelled to pass through said neutral region when the bolt is rotated and reciprocated by means of the slide, a handle-arm on said slide adapted to slide within said gateway, a rod on said arm,

a piston on said rod adapted to reciprocate within said cylinder, and a spring on said rod to normally hold said bolt head locked within said recess.

21. In a fire arm, the combination of a receiver provided with lug recesses and longitudinal grooves having a gateway, a power cylinder on said receiver having a bayonet joint, a bolt in said receiver having a head adapted to interlock with said recesses, a slide having operating lugs slidingly associated with said bolt and adapted to slide in said grooves, connections comprising grooves on said bolt, said grooves having a neutral region, and lugs provided within said slide so that said lugs must pass through said neutral region when the bolt is rotated and reciprocated by the slide, a handle-arm on said slide adapted to slide within said gateway, a rod on said arm, a spring on said rod, a piston on said rod, and a bearing on said rod adapted to interlock said bayonet joint to hold said spring under compression.

22. In a fire arm, the combination of a sliding gas-operated breech bolt, a receiver in which the breech bolt slides, a threaded opening at rear of said receiver through which said breech bolt may be withdrawn, a cap adapted to engage within said threaded opening to close the same, said cap being provided with a cavity to contain a resilient substance to act as a buffer to said breech bolt, a handle on said cap having a knob adapted to engage a pointed spring-plunger mounted on said receiver to lock to said cap when the latter is in closed position.

23. In a fire arm, the combination with a sear, a detent lever, a trigger, and a spring connected together, of a safety cam adapted to be employed in opposition to said spring for retaining the detent lever in disengageable relation with respect to said trigger.

24. In a fire arm, the combination with a trigger having a nose and a spur element, a detent lever having a hook element and a bifurcated end adapted to be respectively engaged by said trigger nose and spur, a sear pivotally connected to said detent lever, and a single spring connecting said trigger with said detent lever, said parts being arranged with respect to each other whereby the pulling of the trigger will serve to successfully fire said sear, disconnect said detent hook from said trigger nose and increase the effective tension of said spring when the said trigger is pulled.

25. In a fire arm, the combination with a trigger having a nose and a spur element, a detent lever having a hook element and a bifurcated end adapted to be respectively engaged by said trigger nose and spur, a sear pivotally connected to said detent lever, and a single spring connecting said trigger with said detent lever, said parts being arranged with respect to each other whereby the pulling of the trigger will serve to successfully fire said sear, disconnect said detent hook from said trigger nose and increase the effective tension of said spring when the said trigger is pulled, said sear, detent lever, spring and trigger being at all times connected together.

Signed at Seattle, Washington, this 2nd day of December, 1924.

CHARLES D. MEYER.