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MAGAZINE RIFLE

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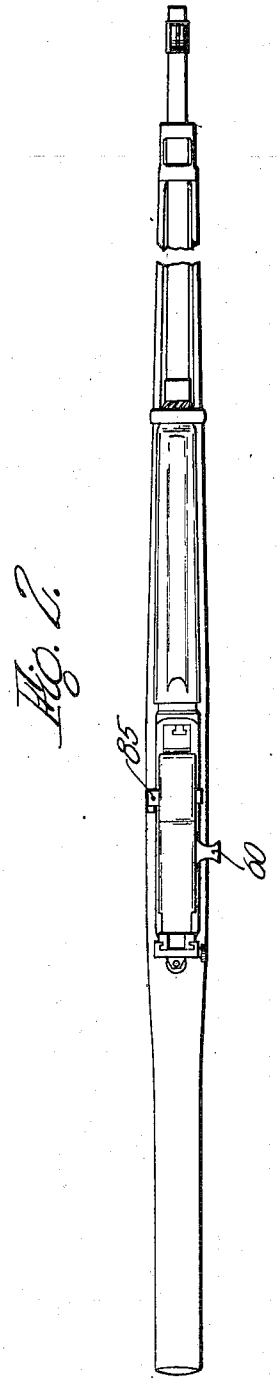

Fig. 2.

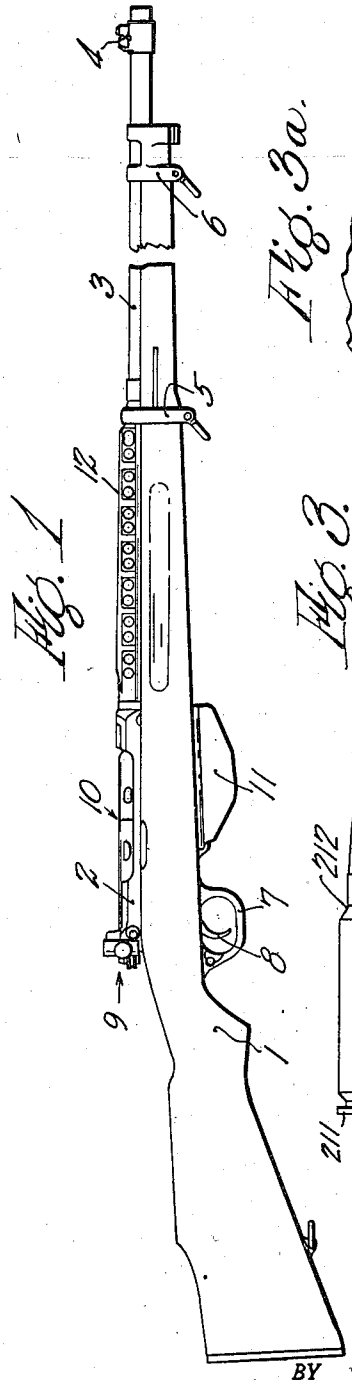

Fig. 1

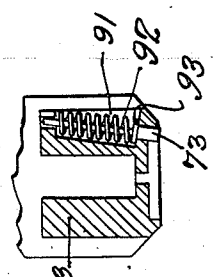

Fig. 3a.

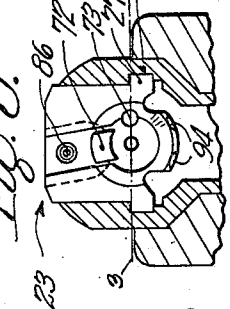

Fig. 3.

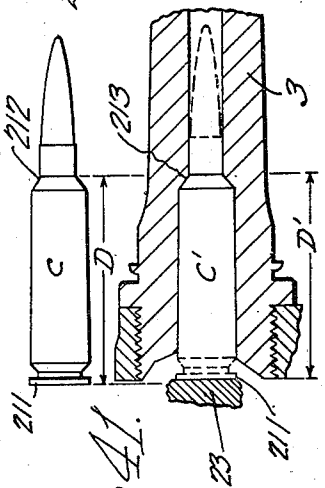

Fig. 4.

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Fig. 4.

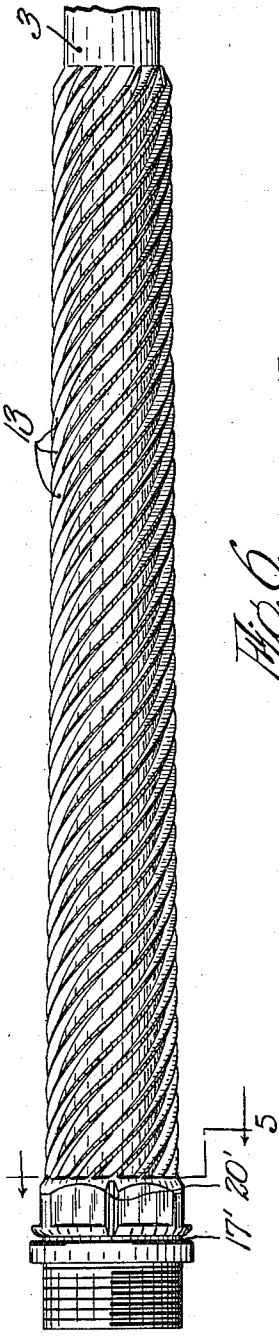


Fig. 6.

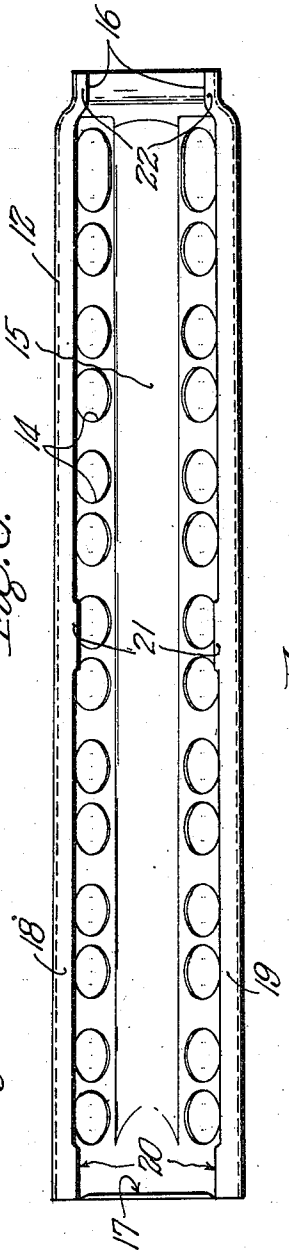
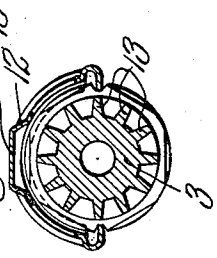


Fig. 5.



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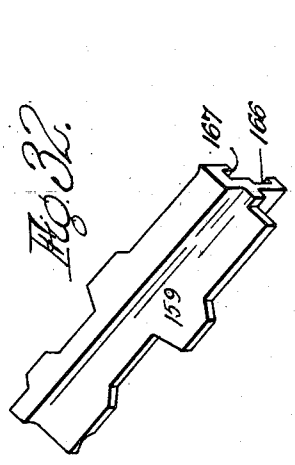

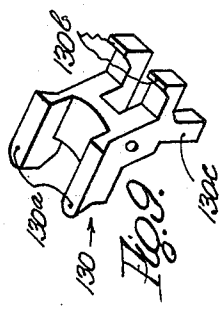

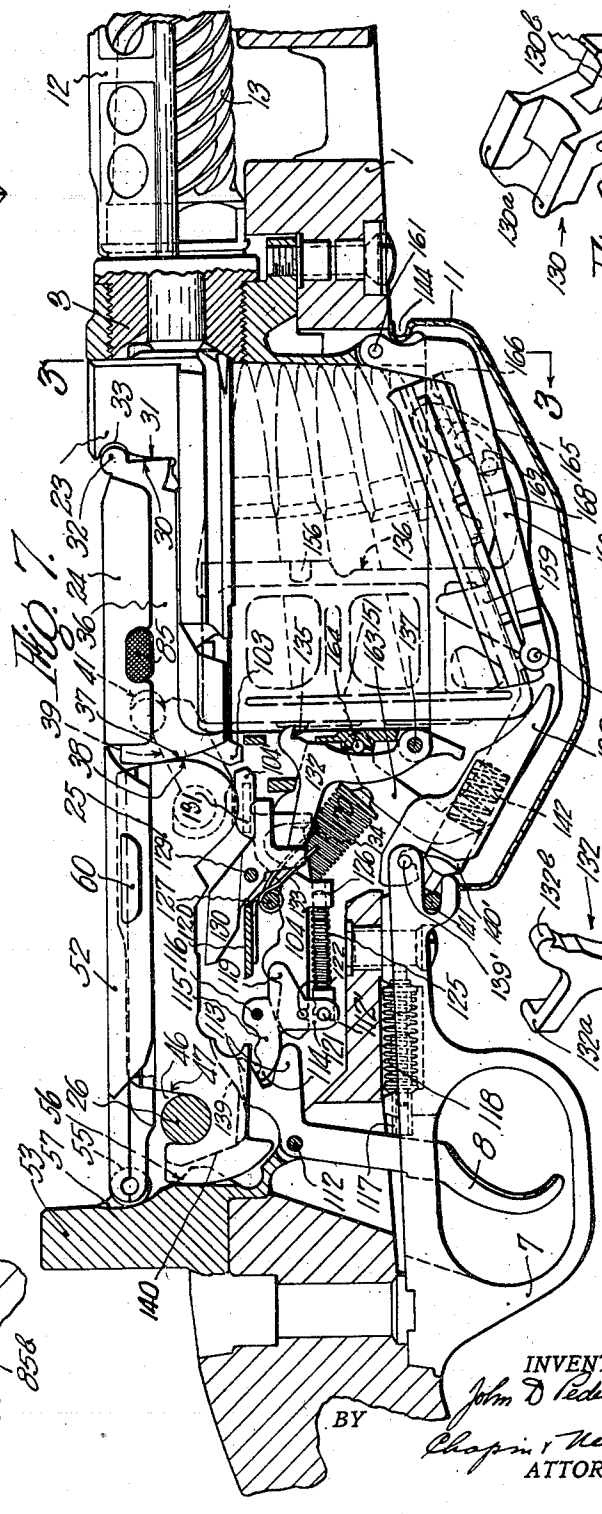

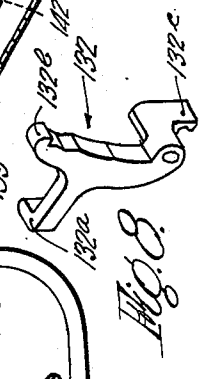

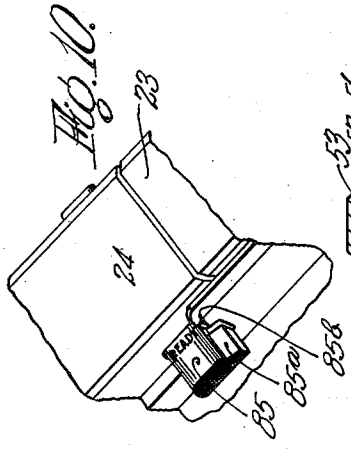

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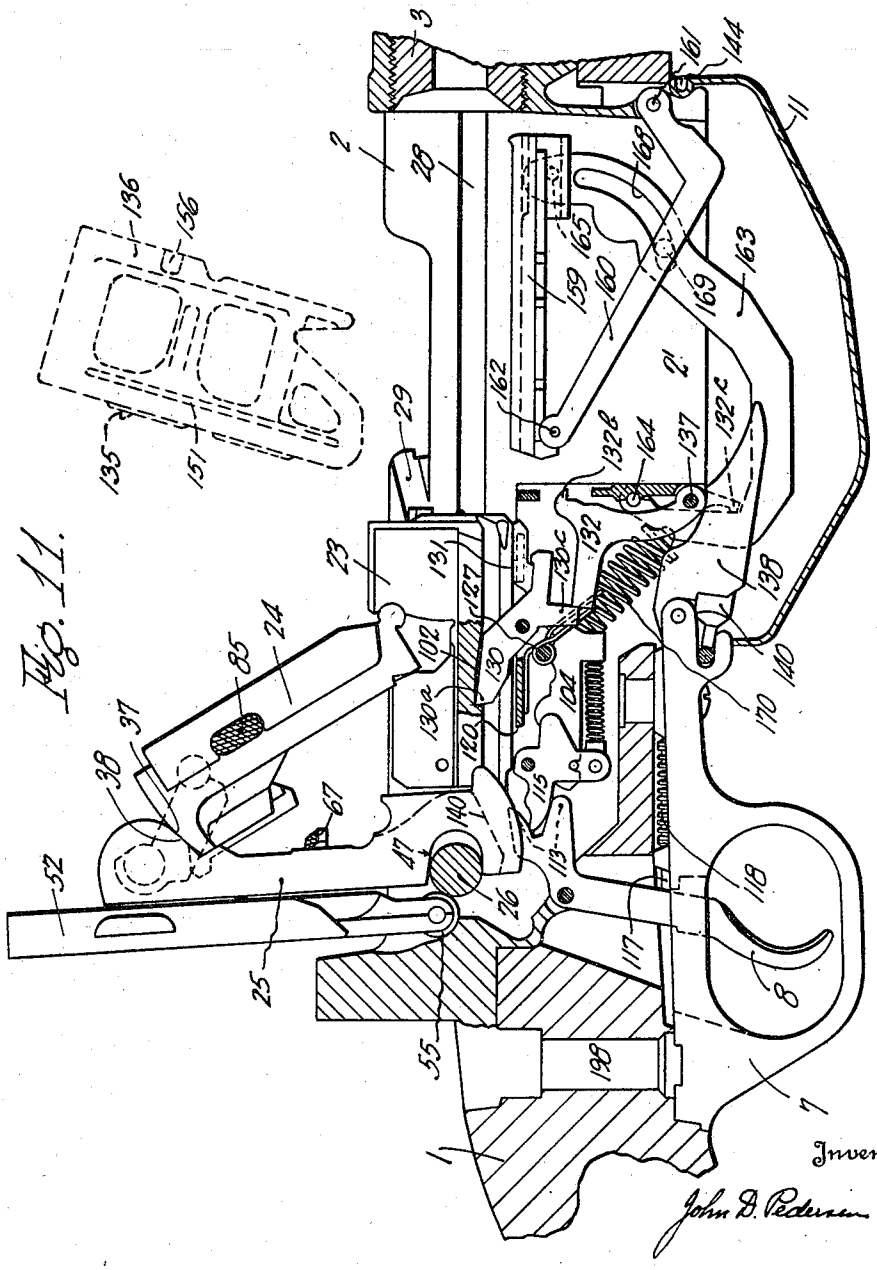

Fig. 11.

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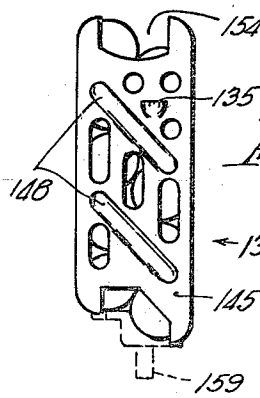
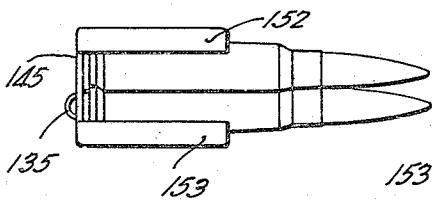


Fig. 12.

Fig. 14.



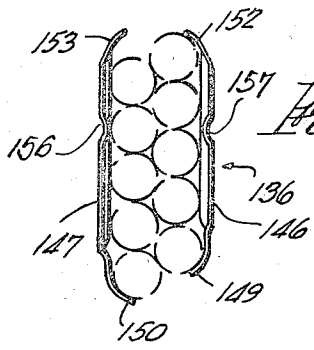


Fig. 13.

Fig. 15.

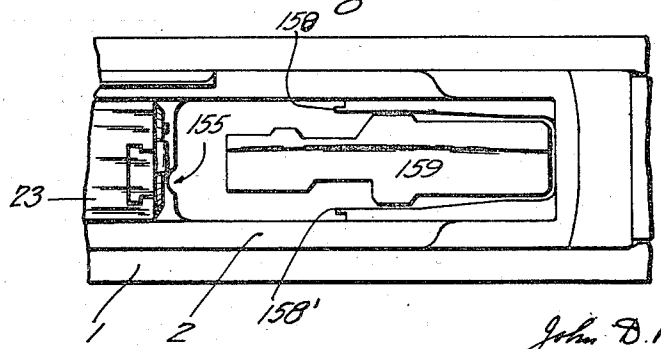


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Fig. 16.

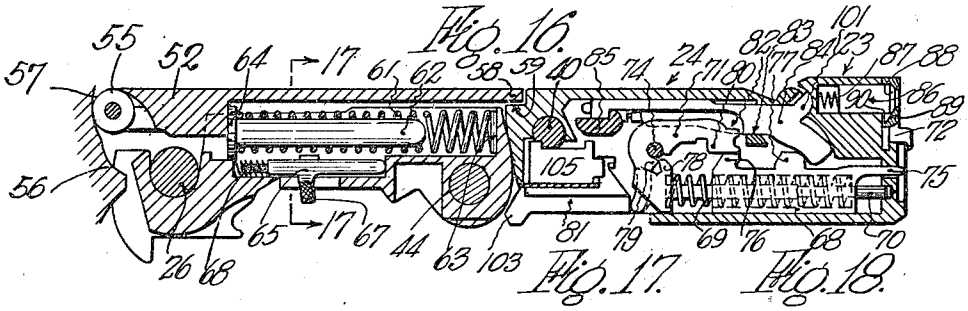


Fig. 17.

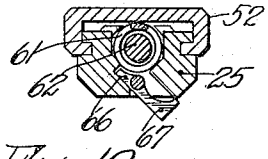


Fig. 18.

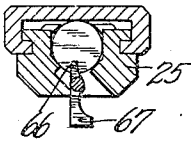


Fig. 20.

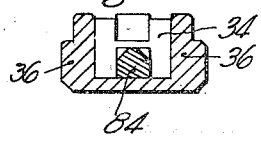


Fig. 19.

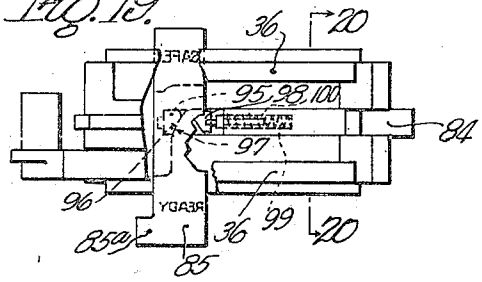


Fig. 21.

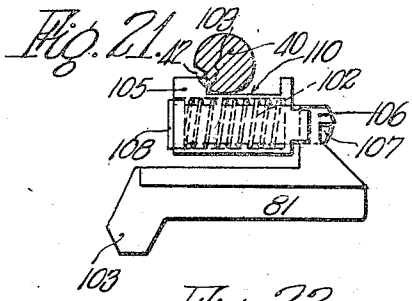


Fig. 22.

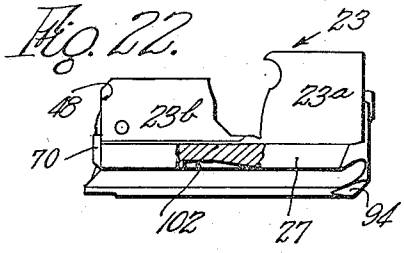
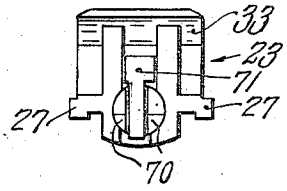


Fig. 23.



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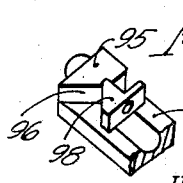
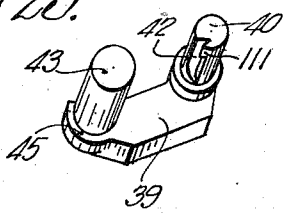


Fig. 25.



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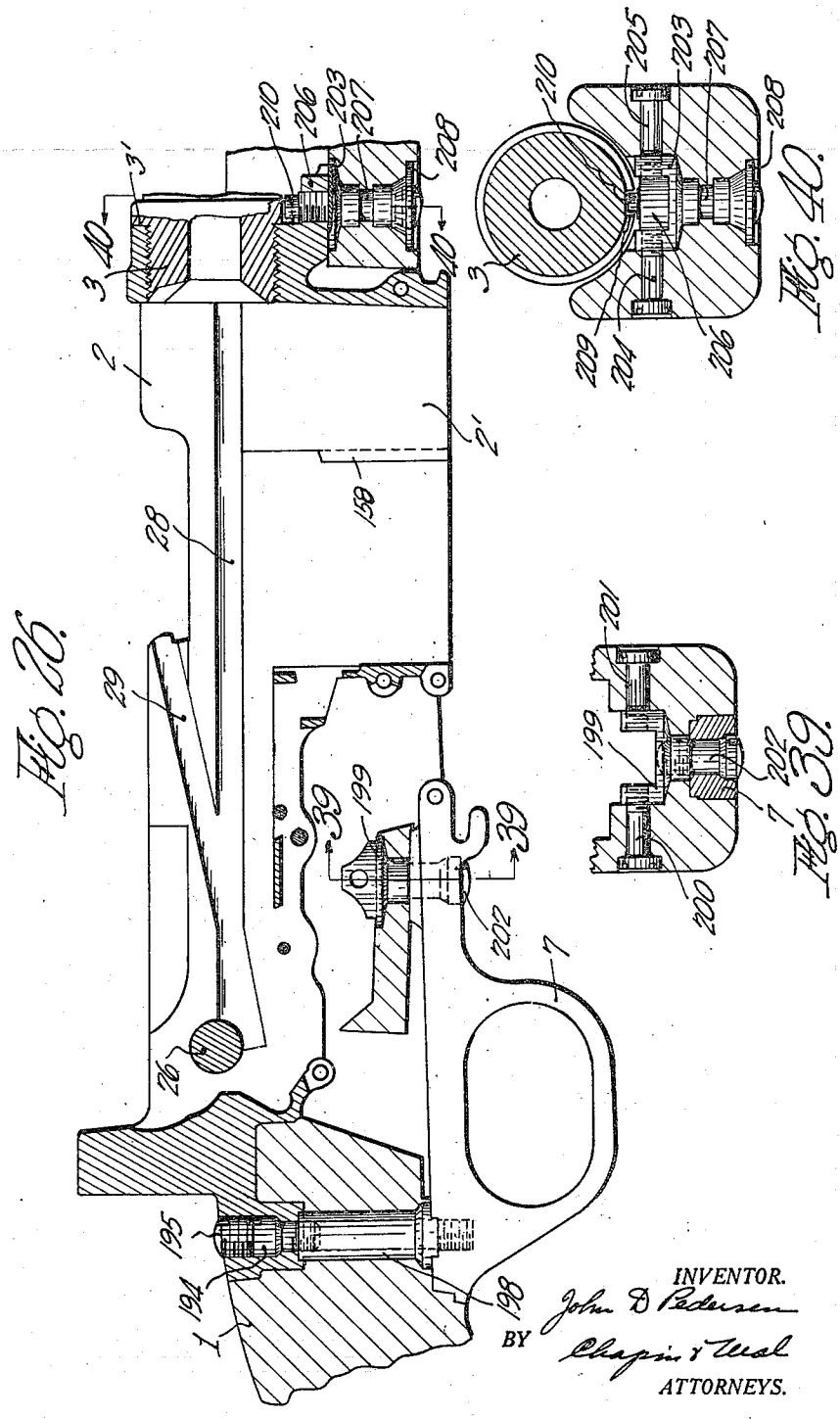

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Fig. 28.

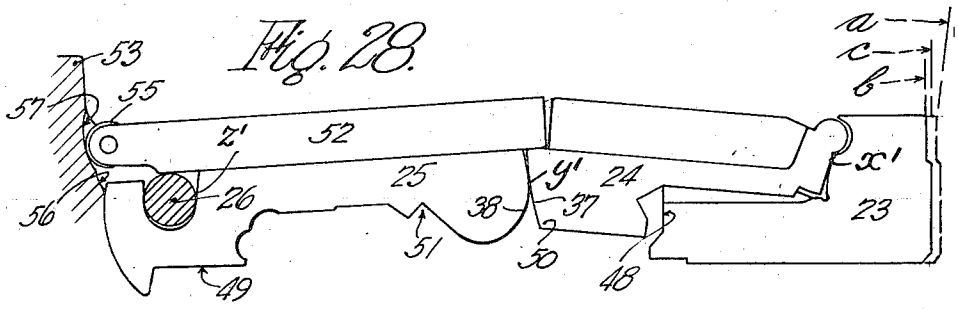


Fig. 30.

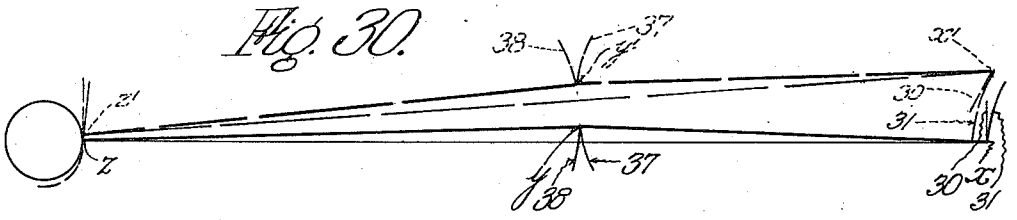


Fig. 27.

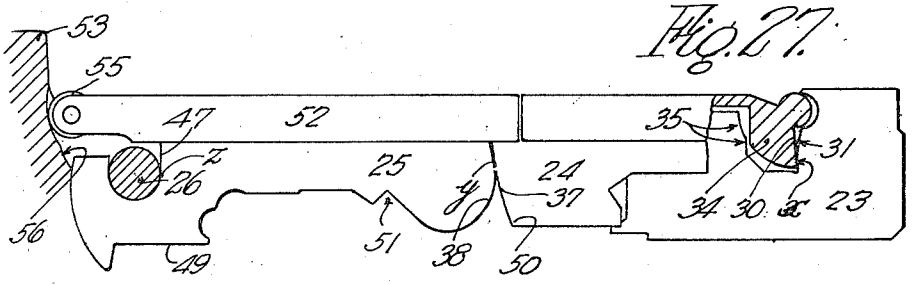


Fig. 29.

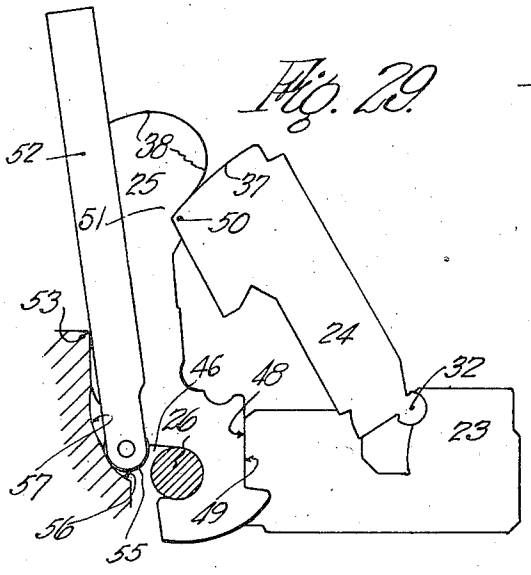
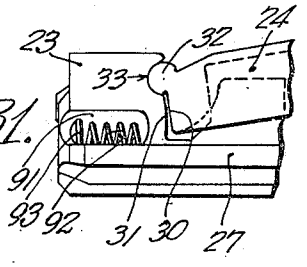


Fig. 31.



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MAGAZINE RIFLE

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Fig. 33.

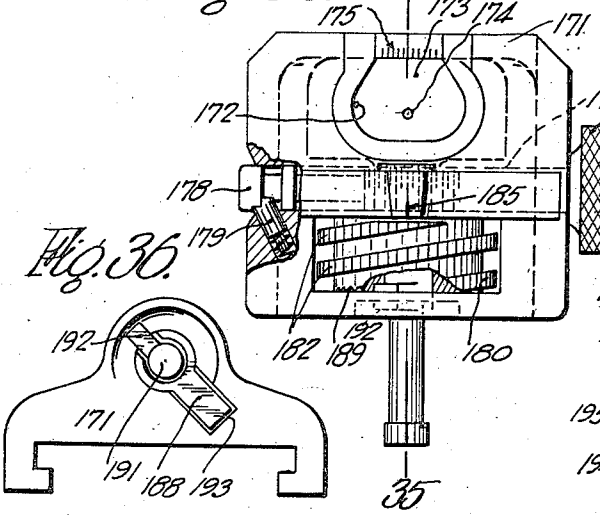


Fig. 36.

Fig. 34.

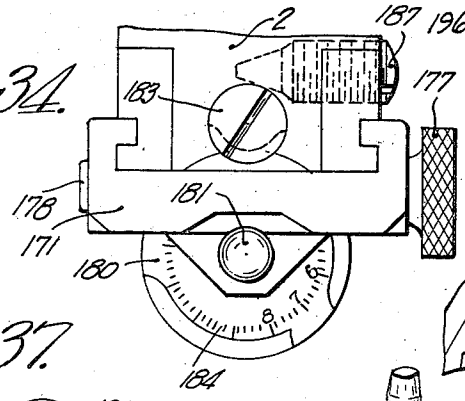


Fig. 37.

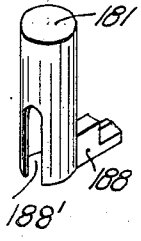


Fig. 38.

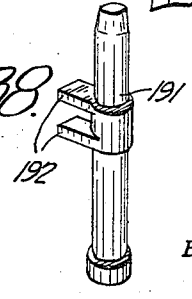
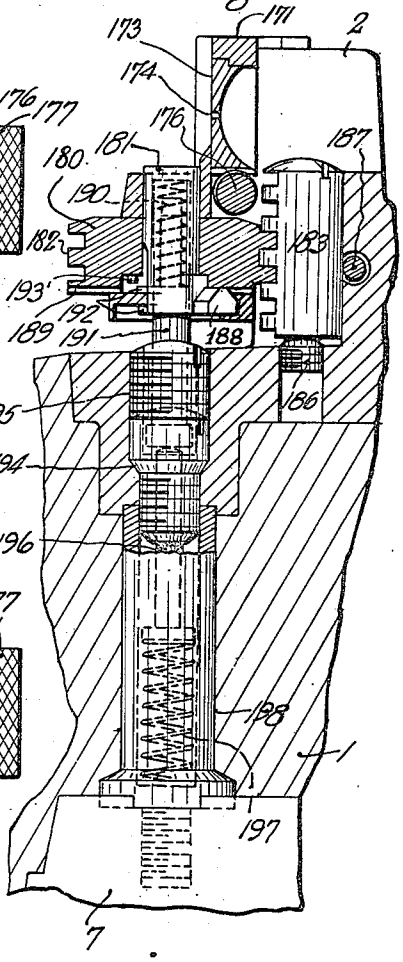


Fig. 35.



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Patented Dec. 3, 1929 1,737,974

UNITED STATES PATENT OFFICE

JOHN D. PEDERSEN, OF SPRINGFIELD, MASSACHUSETTS

MAGAZINE RIFLE

Application filed June 9, 1927. Serial No. 197,718.

This invention relates to improvements in firearms of the automatic type and has for its object a simplified form of construction and organization of parts to secure rapid fire efficiency in a light type of firearm such as a shoulder arm or pistol. The present embodiment of the invention is designed more particularly as an improved military service rifle which will have far greater firing efficiency but no greater weight than the magazine service rifles now standard in the principal armies of the world.

The principal features of the invention are applicable to machine guns in general, but for its adaptation to a shoulder rifle the present embodiment is preferably semi-automatic in its action—that is, a separate pull of the trigger is required for each shot, the loading and cocking being accomplished automatically. A further consequence of its use as a shoulder arm is the provision of a magazine for containing a supply of ammunition, preferably in clip en bloc form. Important features of novelty reside in the character of the clip employed, which combined with the cartridge feeding and loading mechanism and clip discharge mechanism makes possible an extremely rapid method of firing and recharging.

A feature of the present rifle which contributes in large degree to its lightness and simplicity of construction lies in the recoil method of operating the automatic mechanism in combination with a fixed barrel. The power for the automatic action is obtained from the rearward pressure of the fired cartridge in the chamber. The cumbersome and more complicated mechanism of a gas operated gun or one with a movable barrel is thus avoided.

A further feature of importance in the present invention resides in the breech action mechanism which employs the principle of inertia for keeping the breech closed or substantially closed against the explosive force from the fired cartridge, the parts being so designed and arranged that said force instigates a very slow opening of the breech so as to give sufficient time for the exploding charge to expend itself in discharging the bullet before the breech is open to any appreciable extent.

In other words, the bolt is not unyieldingly locked to the breech in the usual sense—that is, by any positively acting interengaging locking lugs, but it is in effect locked to the breech by means of inertia and the arrangement of the parts as hereinafter described. Briefly, the arrangement of the parts is such as to transmit directly to the receiver the greater portion of the rearward thrust of the cartridge being fired. Only a relatively small part of the rearward thrust of the cartridge being fired is employed to instigate and effect the opening cycle of the breech mechanism.

The breech mechanism preferably employed is of a construction somewhat similar to a toggle with one member connected to a longitudinally sliding bolt and the other member connected to the receiver. It is desirable for uniformity of action and consistency of performance in a breech mechanism of this kind that the variations of resistance in the moving parts imposed by frictionally sliding surfaces be minimized. To this end, the thrust bearing surfaces of the jointed portions of the toggle through which the rearward pressure is transmitted are designed to partake of a rolling action upon one another as distinguished from an intersliding movement.

One of the principal objects of the invention is to so modify the action of such a toggle breech mechanism by a suitable disposition of connections and shape of abutting surfaces that during a comparatively short distance in the rearward travel of the bolt, as it begins to open the breech, the resistance offered to the opening movement is substantially constant, after which the resistance may be decreased to facilitate full breech opening under the momentum gained by the moving parts.

Furthermore, as a factor of safety in the opening of the breech, it is desirable that this period of uniform resistance shall outlast the period during which the rearward pressure is exerted upon the face of the bolt, and the parts are so correlated as to accomplish this

result. The backward movement of the bolt during the application of this rearward pressure, which in extent is a very small fraction of an inch, may be termed the power stroke. It is during this power stroke that energy is stored up in the moving parts for effecting the complete operation of the automatic mechanism.

Having outlined somewhat generally some of the principles of operation and objects to be attained in the present invention, a more detailed description will now be given of a preferred embodiment of the same, from which description further advantages and objects of the invention will become apparent.

Referring briefly to the drawings:

Fig. 1 is a side elevation of the complete rifle at small scale;

Fig. 2 is a plan view of the gun shown in Fig. 1;

Fig. 3 is a partial sectional elevational view of the receiver taken on a line 3—3 of Fig. 7;

Fig. 3ª is a horizontal sectional view through the front end of the bolt taken along line 3—3 of Fig. 3;

Fig. 4 is a partial side elevational view of the barrel showing the cooling fins thereof;

Fig. 5 is a cross section of the barrel along the line 5—5 of Fig. 4 as it would appear when the cover or hand guard of Fig. 6 is assembled on the barrel;

Fig. 6 is a bottom plan view of the cover or hand guard;

Fig. 7 is a longitudinal section through the receiver with the parts in breech closed position and showing in the magazine chamber an en bloc clip of cartridges in dot-dash lines;

Fig. 8 is a perspective view of the clip latch;

Fig. 9 is a perspective view of the bolt stop;

Fig. 10 is a fragmentary perspective of the left side of the receiver adjacent the rear end of the conrod to show how the safety coacts with the receiver;

Fig. 11 is a view similar to Fig. 7 with the parts in position after the firing of the last shot, the clip being discharged and the bolt in retracted position held by the bolt stop;

Fig. 12 is a rear end view of the cartridge clip with the cartridges en bloc therein;

Fig. 13 is a front end view of the same;

Fig. 14 is a plan of the same;

Fig. 15 is a partial plan view of the magazine chamber of the receiver;

Fig. 16 is a longitudinal section through the toggle and bolt in breech closed position;

Fig. 17 is a cross sectional view of the crank and slide taken along line 17—17 of Fig. 16;

Fig. 18 is a similar view with the closing spring locked in compressed condition by the closing spring stop;

Fig. 19 is an inverted plan view of the conrod partly broken away to show the cocking hook and safety;

Fig. 20 is a cross sectional view of the conrod taken along line 20—20 of Fig. 19;

Fig. 21 is a detached side view of the sear trip;

Fig. 22 is a side view of the bolt detached;

Fig. 23 is a rear view of the bolt;

Fig. 24 is a detail of the cocking hook detent detached from its coacting safety;

Fig. 25 is a perspective of the link forming part of the articulation between the conrod and crank;

Fig. 26 is a sectional elevational view through the receiver showing the inner face of a side wall thereof;

Figs. 27, 28 and 29 are views somewhat diagrammatic of the toggle in the successive positions assumed during the opening of the breech;

Fig. 30 is a diagram in enlarged scale to illustrate the constant eccentricity of said toggle during the early part of the breech opening movement;

Fig. 31 is a detail of the articulating surfaces between the conrod and bolt in the position assumed when the breech is partly open;

Fig. 32 is a perspective view of the follower of said feeding mechanism;

Fig. 33 is a rear end view of the rear sight mechanism;

Fig. 34 is a top plan view of the same;

Fig. 35 is a vertical section of said rear sight mechanism on line 35—35 of Fig. 33 and showing additional parts of the receiver stock and trigger guard frame associated therewith;

Fig. 36 is a bottom plan view of a portion of the rear sight slide;

Fig. 37 is a detached view of the sight nut spindle;

Fig. 38 is a detached view of the sight nut key stem;

Fig. 39 is a detail cross section through line 39—39 of Fig. 26;

Fig. 40 is a cross section along line 40—40 of Fig. 26; and

Fig. 41 is an illustrative view to show the difference between the breeching space of the firing chamber and breeching length of a cartridge.

Referring to Fig. 1 of the drawings, the gun of my invention in outward appearance will be seen to resemble closely a standard service rifle and comprises the usual wooden frame or stock 1, a metal frame or receiver 2, barrel 3, front sight 4, upper band 6, lower band 5, trigger guard 7, and trigger 8. The rear sight mechanism is indicated generally at 9 and the breech action similarly indicated at 10. A cover 11 for the lower side of the magazine chamber is hinged at its rear end preferably to the trigger guard frame. The upper rear portion of the barrel is covered by the hand guard or cover 12.

The barrel 3 is fixed to the receiver 2 and is provided with special means for cooling. In

my preferred embodiment, this consists of a plurality of parallel helically disposed thin fins or flanges 13 which are integral with the barrel and project outwardly therefrom, as shown in Figs. 4 and 5. These helically disposed fins extend entirely around the circumference of the barrel from its rear end to a point adjacent the lower band 5. The advantages of employing such helically disposed fins for cooling purposes are that they impart stiffening strength to the barrel, permit free circulation of air entirely around the barrel and moreover may be cut out of the barrel stock by a comparatively simple tool operation.

The cover 12, preferably stamped out of sheet metal, is suitably ribbed for stiffness, with apertures 14 therein (as shown) for lightness and for air circulation. It has a flat unperforated top 15 running its full length to prevent heat waves from the barrel rising directly in the line of sight and to aid more quickly in catching the front sight of the rifle in aiming. It is mounted so as to be largely spaced from the barrel by the following arrangement. The front end of the cover at 16 (Fig. 6) is reduced in radius so as to seat against the barrel and extend into a counterbore of the lower band 5. The rear edge of the cover is turned down as at 17 so as to engage with an annular groove 17′ provided therefor in the barrel and thereby prevent any endwise movement of the cover. The two lateral stiffening ribs 18 and 19 of the cover have inward extensions 20 at the rear ends, 21 about midway of the length and 22 at the front ends thereof. The rear end extensions are arranged to snap with spring tension into mating grooves 20′ therefor at each side of the barrel, and thus lock the cover in place after its front end has been inserted beneath the lower band. The extensions 21 and 22 are adapted to bear against the cooling fins of the barrel so as to keep the cover suitably spaced therefrom.

Breech action

The breech action is illustrated in Figs. 7 and 11 with certain of the details in other views. It comprises a bolt 23 reciprocable horizontally in the receiver 2 and articulated to a connecting member or conrod 24 which in turn is articulated to a crank 25 having a swinging movement about a crank pin 26 fixed in the receiver. The term "conrod" is used in this specification as a shortened form of the term "connecting rod". The movement of the crank and conrod in opening and closing the breech is somewhat similar to well known toggle mechanism of prior firearms. The action of these parts, however, although they are for convenience termed a toggle, differs radically from that of prior structures in many important respects which will be presently pointed out.

The exterior shape of the bolt is shown more clearly in Fig. 22. It is provided on each side thereof with a laterally projecting rib 27 having a sliding fit in horizontally extending guiding grooves or tracks, one in each side wall of the receiver, as shown at 28 (see Figs. 11 and 26), to guide the bolt in its longitudinal movement to and from the breech. For the removal of the bolt from the receiver in disassembling, forwardly and upwardly inclined grooves or tracks 29 likewise in the side walls of the receiver communicate with the rear ends of the horizontal tracks 28. When the crank 25 is out of the way by being first removed from its crank pin 26, the bolt may slide far enough to the rear so that its ribs 27 can be tilted up into the inclined tracks 29 and permit the bolt to be slid forwardly out of the receiver.

The conrod 24 is articulated to the bolt in such a manner as to bring the two abutting surfaces 30 and 31 of said respective parts into rolling contact during the early part of the breech opening movement, after which a doll's head portion 32 of the conrod becomes seated in the socket 33 of the bolt for a pivotal engagement during the further opening movement of the breech (see Figs. 27 and 31). This loosely jointed connection between the conrod and the bolt is held from detachment by interengaging male and female portions, viz: a depending lug portion 34 of the conrod is confined in a recess of the bolt formed by the front wall or surface 31 and a rear wall 35 of the bolt, the upper part of the surface of said rear wall 35 being arcuate to clear a lower curved surface of lug 34 as the conrod swings upwardly. The over-hang of the doll's head socket 33 prevents detachment in a vertical direction and depending side walls 36 of the conrod prevent detachment in a lateral direction. When the conrod and bolt are dismounted from the receiver, the conrod may be swung toward a vertical position far enough to clear the side walls 36 from the wall 35 of the bolt so that a relative lateral movement will then detach the bolt from the conrod.

The articulation between the conrod 24 and the crank is designed to secure a rolling contact between the curved cam surface 37 of the conrod and the curved cam surface 38 of the crank. A connecting link 39 loosely joins these parts (see Fig. 25). It has a laterally projecting gudgeon 40 fitting loosely in a hole 41 of the conrod for limited rotative movement therein. The gudgeon 40 is notched as shown at 42 in Fig. 21 for the purpose of coacting with the sear trip assembly in mutually retaining one another detachably in their mounting, as will be later described. A gudgeon 43 is also integral with link 39 and fits for easy rotative movement in a hole 44 of the crank. It is detachably retained therein by an arcuate tenon 45 which takes into an

undercut curved slot (not shown) on the underside of the crank adjacent the entrance of hole 44. The tenon 45, which extends only part way around the gudgeon 43, projects into said undercut slot during all positions of the crank and conrod except when said parts are in a straightened out extension of one another. In this position, provided the crank and conrod are dismounted from the receiver, a lateral movement of the link 39 will withdraw the gudgeon 43 from its hole and disconnect the parts. When, however, the parts are mounted in the receiver and are in straightened out extended position, the side walls of the receiver prevent any lateral displacement between the crank and conrod or between the conrod and bolt.

The crank 25 is mounted on its crank pin 26 so as to have an initial rolling action, a subsequent pivotal action and a final sliding action thereon. The rear end of the crank has an open ended slot 46 for its bearing on the crank pin 26. The width of this slot 46 is approximately the diameter of the crank pin but its length is somewhat longer as shown. When the crank is down, in breech closed position as shown in Fig. 7, the crank pin 26 occupies the bottom of the slot 46 of the crank. As the crank swings upwardly, the front wall 47 of the slot first rolls and then turns on the crank pin, as shown in the successive positions of Figs. 27, 28 and 11, until the bottom of the slot 46 has moved perceptibly away from the crank pin, as shown in Fig. 11. This view shows the normal position of rest for the parts after the toggle has opened and while the bolt is prevented from closing by the bolt stop later to be described. The bolt, however, is permitted a further travel to the rear than the position shown in Fig. 11, which additional travel will take place during the recoil after firing. In such a case, the momentum of the bolt carries it back far enough for its rear wall 48 to abut the base 49 of the crank substantially in line with the center of the crank pin 26, a position slightly to the rear of that shown in Fig. 11. It will be noted also from this view that at the same time the rear lower corner 50 of the conrod will seat into a corner shoulder 51 of the crank and effectively prevent any further swinging tendency of the crank. Thus locked together against further relative movement and as a sort of triangular truss, the bolt, conrod and crank may move rearwardly together as a unit until the bottom of the crank slot 46 abuts against the crank pin 26, as shown in Fig. 29. Simultaneously the back of slide 52 will abut a rear sight support 53 projecting vertically from the receiver, which together with the crank pin serves as the back stop for finally arresting the rearward movement of the bolt and toggle. The back stop abutment at 53 is designed to lie approximately on a line with the center of the moving mass constituting the toggle and bolt so as to arrest their movement with a minimum of strain. A strong buffer action is provided to cushion the shock of this final arresting of the parts which will be made clear in connection with the description of the closing spring of the breech closing mechanism.

Slidably mounted on the back of the crank 25 by a T-slot engagement therewith (as shown in Fig. 17) is a slide 52. Its rear end is provided with a roll 55 which works in rolling contact upon the cam surfaces 56 and 57 of the receiver. The forward end 58 of the slide overhangs and fits a shoulder 59 at the rear of the conrod to stop the front end of the crank from swinging too low when closing the breech. A laterally extending finger grip or handle 60 is provided on the slide whereby the crank may be swung upwardly by hand in opening the breech.

Housed in a recess longitudinally of the crank 25 and just beneath the slide 52 is a closing spring 61 mounted on a spring guide 62. The front end of the spring bears against the front end wall 63 of the crank and the rear end of the spring bears through the base of the spring guide 62 against a shoulder 64 of the slide. The tension of the spring 61 thus thrusts the slide and its roll against the cam surfaces 56, 57 of the receiver with the resulting reaction of tending to rotate the crank in a clockwise direction. The force of the spring 61 is sufficient to straighten the toggle and close the breech with the proper speed of action desired. The slide roll 55 travels on the cam surface 56 during the first part of the breech closing movement and on the cam surface 57 during the finish of said closing movement. The cam surface 57 is slightly steeper than the surface 56 so as to increase the mechanical advantage of the closing spring 61 as it becomes extended and thus snap the toggle firmly to its final position in closing the breech.

The buffer action for the back stop of the bolt and toggle previously mentioned is afforded by this closing spring 61 in coaction with the slide 52 and cam surface 56. Upon firing, the opening movement of the toggle is resisted by the closing spring 61 which is gradually compressed by the slide roll 55 working down on the cam surfaces 57 and 56 until the bolt abuts the crank slightly to the rear of the position shown in Fig. 11. Thereupon the swinging of the crank ceases but the crank, bolt and conrod still travel rearwardly as the crank slidably shifts on its crank pin. This rearward displacement of the crank forces the slide roll 55 upwardly on the cam surface 56 to further compress the closing spring. It will be noted that the amount of further compression imparted to the closing spring by the rearward sliding of the crank and bolt is far greater relatively to the bolt travel than during the open-

ing of the toggle. This means that the resistance offered by the closing spring in its buffer action is at a far greater mechanical advantage than during the opening of the toggle. The effective resistance of the closing spring is thus quite abruptly augmented at the rearmost part of the bolt travel whereby the closing spring may serve as the equivalent of a very powerful buffer spring.

The closing spring tends to maintain the slide at all times with its rear end sufficiently over the crank pin 26 to prevent detachment of the crank. For dismounting the crank from the receiver, the slide is pulled upwardly on the crank (when in vertical position as shown in Fig. 11) so as to clear the crank pin. The operation is facilitated by locking the closing spring under compression within the crank so as not to act against the slide. A closing spring stop 65 (see Figs. 16, 17 and 18) is provided for this purpose and consists of a spindle rotatively mounted in the crank and having a projecting nose 66 at one side for engaging behind the base of the closing spring guide 62 and a finger piece 67 at the other side. The stop 65 has also a slight endwise movement in its bearings and is normally held forwardly by a spring 68 far enough to prevent any mischance engagement of its nose 66 behind the closing spring guide 62. The spring guide 62 is limited in its forward movement by having its front end abut against the front end wall 63 of the crank so that its base will not pass forwardly of the normal position of projecting nose 66. By pulling the slide 52 upwardly to compress the closing spring 61 and pushing the stop 65 downwardly against its spring 68 and at the same time rotating said stop slightly, its nose 66 may be engaged behind the guide 62 and thus chain up the closing spring (see Fig. 18). The slide may then be easily moved to uncover the crank pin and the crank detached therefrom. One advantage of this construction is that the crank is dismountable without removing the crank pin which may thus be permanently fixed to the receiver.

Having described somewhat in detail the construction of my preferred form of breech action mechanism, I desire now to point out some of the particular purposes of the construction and the functional effect thereof in the opening and closing of the breech.

The essential requirement of any firearm is that the breech shall be held closed or sufficiently closed for safety during the period of the high pressure in the chamber when fired. This high firing pressure practically disappears when the bullet leaves the muzzle and is therefore of relatively short duration. It is during this high pressure period that the opening of the breech in the present construction is instigated at first very slowly and against a substantially uniform and very high resistance, which uniform resistance outlasts the period of high pressure, after which the opening movement is rapidly completed.

Referring to Fig. 27, which is a view of the present toggle in breech closed position, the firing pressure is transmitted from the bolt 23 to the conrod 24 through the abutting contact at x, from the conrod to the crank 25 through the abutting contact at y, and from the crank to the crank pin 26 at the contact z. It will be noted that these contact points x, y and z are not in a straight line, as would be the case with a true toggle lock. The middle contact y is above the line of contact centers x and z. The distance of the contact y above said line of contact centers x—z is for convenience termed herein as the eccentricity of the toggle. Due to the eccentricity of the toggle, the firing pressure on the bolt tends to open the toggle. This eccentricity, however, is so small that the greater part of the rearward pressure is transmitted directly to the crank pin 26 and receiver 2 and only a small result of this force acts as a moment of force for opening the toggle. The toggle opens up very slowly under this moment of force and furthermore the parts are so designed that this initial eccentricity of the toggle shall remain substantially constant during the early part of the opening movement and until after the firing pressure has ceased. The bolt 23 of course begins its backward movement upon firing and its distance of movement during the period of high firing pressure may be termed the power stroke. The power stroke is necessarily very short so that no danger of a blow-out from an open breech can occur. It need only be long enough to instigate the opening of the toggle and store up sufficient energy in the moving parts so that the momentum thereof will complete the full opening. The initial eccentricity of the toggle above mentioned is maintained substantially the same during the aforesaid power stroke of the bolt and preferably for a short time thereafter so as to insure that the rearward movement of said bolt under the firing pressure shall work against a substantially uniform resistance or load.

The attainment of this result is accomplished by the design and arrangement of the abutting cam surfaces 30, 31, 37 38, 47 and crank pin 26 which serve as bearings for the bolt, conrod and crank. Figs. 27 and 28 show respectively the position of the toggle with the breech closed, and its position as it starts to open, which latter position is subsequent to the completion of the power stroke of the bolt. In Fig. 28, the bolt has moved rearwardly from the points a to b and the intermediate point c in the line a—b may be regarded as the rearward end of the power stroke of the bolt, at which point the firing pressure has ceased. It will be observed in Fig. 28 that the initial abutting contact x between surfaces 31 and

30 has rolled upwardly to x'; that the initial contact y (between surfaces 37 and 38) has rolled downwardly to y'; and that initial contact z (between the surface 47 and crank pin 26) has rolled upwardly to z'. Thus although the bolt has moved rearwardly to a point beyond its power stroke and the toggle has begun to fold upwardly, the distance of the contact y' above the line of contacts x'—z'—in other words, the eccentricity of the toggle is no greater than at the start (Fig. 27). This action is perhaps made clearer by reference to the diagrammatic view Fig. 30. Here the lower solid lines represent the relative location of the abutting contacts intended to be illustrated in Fig. 27, and the upper dotted lines the subsequent location of said contacts intended to be shown in Fig. 28. The lines connecting said contacts indicate clearly the toggle eccentricity and its substantial uniformity in the two positions. Of course, no attempt has been made on the drawings to plot any of the distances above mentioned in accurate scale.

During the power stroke of the bolt, the angular movement of the conrod and crank is such that the moment of inertia of the conrod and crank combined with the inertia of the bolt and resistance of the closing spring almost, but not quite, balance the rearward thrust of the cartridge on the bolt upon firing. Therefore it is not necessary in the present construction to lock the bolt closed unyieldingly as by the usual positively engaging lugs or shoulders. The present construction possesses the inherently safe closing characteristic of the dead-weight inertia type of breech action in a much more compact and practical form. Under the momentum gained from its start, the toggle continues in its opening movement through the retracted position of Fig. 11 and thereafter is bodily displaced rearwardly on the crank pin to its rearmost position against the back stop 53, as shown in Fig. 29, after which the closing spring serves to return the parts to breech closed position as previously described.

The rolling cam surfaces 31, 30, 37, 38 and 47 provide the additional advantage over true pivotal bearing surfaces of reducing friction, particularly at the start of the toggle opening movement when the firing pressure is being transmitted through said abutting surfaces. A pivot bearing which is in reality a sliding contact would present the problem of a variable resistance between the limits of a clean oiled surface and a dirty, dry or rusty surface, and thus offer greater difficulties in the adjustment of a nice balance between the rearward firing pressure and opening resistance of the toggle, so essential to uniform and consistent operation. After the completion of the power stroke, the avoidance of such frictional variation is not so essential and so the conrod may then swing its doll's head 32 into true pivotal engagement with the socket 33 and later still in the opening movement the crank pivots around the gudgeon 43 of the link 39 and around its crank pin 26.

The bolt and appurtenances

A side view of the bolt 23 appears in Fig. 22, a front view in Fig. 3 and a rear view in Fig. 23. Appurtenant to the bolt and mounted therein are the firing pin 68, firing spring 69, firing spring guide 70, sear 71, extractor 72, and ejector 73. The bolt is a reduced rectangular block with a head portion 23^a and tail portion 23^b, the latter being formed with spaced vertical walls to receive therebetween the sear 71 which is pivoted on the sear pivot 74. The space between said vertical walls communicates with a longitudinal recess, circular in cross section, which extends along the bottom of the bolt from an open end at the rear to a closed front end or face of the bolt. Housed in this recess for easy sliding movement is the firing pin 68 of tubular section surrounding the firing spring 69 and spring guide 70. The firing pin has an offset striker 75 and at its rear upper side is a lug 76 forming a sear notch. A lug 77, also integral with upper side of the firing pin, serves as a cocking lug as will be described. The firing spring guide 70 has a head of special formation to fit the rear end of the firing pin recess, said head being bifurcated so as to straddle the tail portion of the bell crank shaped sear 71. The stem of said spring guide 70 extends within the firing spring and through a front end wall of the tubular firing pin so as to take into a recess in the back of the bolt face. The spring guide 70 is thus supported at both its front and rear ends to insure its alignment and avoid any jamming of the spring so that a free snappy movement of the firing pin can take place. The firing spring 69 has one end bearing against the base of the spring guide and its other end against the front wall of the tubular firing pin, thus tending to thrust the firing pin forwardly and the spring guide rearwardly (see Fig. 16 showing the parts in firing position). The spring guide base has an upper lug 78 which bears against a shoulder 79 on the tail of the sear 71 just below the sear pivot 74 which tends to rotate the sear clockwise and engage the sear nose 80 with the sear notch 76 when the firing pin is in cocked position. The spring 69 therefore performs the double function of a firing spring and a sear spring. The bifurcated base of the spring guide 70 also extends rearwardly slightly beyond the rear face 48 of the bolt 23 so as to abut the base 49 of the crank just prior to the contact of face 48 therewith in the breech opening movement and thereby move the spring guide out of contact with the sear shoulder 79 preparatory to the arresting of the bolt. This

will take the spring pressure off the sear and will relieve the lug 78 and shoulder 79 of the strain of any recoil impact from the weight of these parts when the bolt stops in its rear movement. The sear is tripped by a forward sliding movement of a sear trip 81 which is carried on the conrod and will be further described in connection therewith. The top of the sear is formed with safety lock shoulders 82 which (when the gun is cocked) are adapted to be overlapped by shoulders 83 of a cocking hook 84 to prevent release of the sear. This will occur when the safety 85 is manually operated to shift the cocking hook 84 rearwardly from the position shown in Fig. 16. Both the safety 85 and cocking hook 84 are mounted on the conrod and will be later described in detail in connection therewith.

The extractor 72 is a member slidably mounted for radial movement across the face of the bolt by a T-slot engagement therewith, as shown in Fig. 3. Its forward end is hooked in the usual way to take over the rim of the cartridge. It is yieldingly impelled to its inward position by a spring pressed hollow plunger 86 which encloses a spring 87 and is mounted for longitudinal sliding movement in the head of the bolt. The rear under face of the extractor 72 has a tapered recess to receive a conical front end 88 of the plunger 86. The coaction of the conical end 88 with the inclined wall 89 of this recess moves the extractor inwardly on the face of the bolt to its normal position. The outward sliding movement of the extractor is limited by a shoulder 90 of the wall 89 engaging the cylindrical body of the plunger 86. The extractor may be dismounted from the bolt by pressing the plunger 86 backwardly with the point of a cartridge or other tool far enough to clear the front end of the plunger from the shoulder 90 and at the same time pushing the extractor radially and outwardly of the bolt.

The ejector 73, which tilts the extracted shell and causes its ejection from the gun, comprises a spring pressed plunger which protrudes through the face of the bolt, as shown in Figs. 3, 3ª and 31. It is mounted in a recess 91 at one side of the bolt slightly inclined to the horizontal axis of the bolt and with a bearing hole at its rear end to receive the rear end of the plunger 73. The recess 91 is shorter in length than the ejector plunger 73 and the rear end of the plunger is tapered to permit of its inclined insertion into said recess. The impelling spring 92 surrounds the plunger and bears against a front collar or shoulder 93 on the plunger, which shoulder lies in the recess 91 and limits the forward movement of the ejector plunger.

Beneath the front end of the bolt at each side of its axis are curved tapering cut-outs or clearances 94. These clearances are deepest at the front and as they extend rearwardly gradually merge or disappear in the cylindrically shaped bottom of the bolt. They are for the purpose of facilitating the feeding of the cartridges into position for being loaded. As the bolt moves backwardly over the stack of cartridges in the magazine chamber, which stack is in a double row as hereinafter described, the topmost cartridges being under a feeding pressure from below, is permitted to tilt its point upwardly sooner by reason of the clearances 94 and when the bolt finally clears the base of the cartridge the latter has already begun its upward movement toward loading position. In other words, the clearances 94 allow a longer time for the final feeding of each cartridge into position for loading, which is important when the extremely rapid opening and closing movements of the bolt are considered.

On the under side of the bolt, about midway of its length is a pair of notches 102, one at each side of its central axis, which are adapted to be engaged by the prongs of the bolt stop for holding the bolt in open position under certain circumstances as will be hereinafter described.

The conrod and appurtenances

The conrod 24 serves as the connecting rod between the rotating crank and sliding bolt. Mounted within the conrod are the sear trip 81, cocking hook 84 and safety 85. Its front end, as previously described, is confined within an articulating recess of the bolt and integral depending side walls 36 partially embrace the rear end of the bolt when the conrod is folded down over the same in toggle closed position, as shown in Fig. 7. The cocking hook 84 is formed with a rear extension slidably mounted beneath the top of the conrod as shown in Figs. 19 and 20. The rear end of the cocking hook passes between the safety 85 and the top of the conrod and its front end passes through a rectangular hole in the depending lug 34 and doll's head 32 of the conrod, whereby it is guided for a limited movement lengthwise of the conrod. The safety 85 is a flat bar mounted transversely of the conrod and extending through bearing holes in each side wall of the conrod. The ends of the safety bar are marked "Safe" and "Ready" and either end may be exposed by a transverse shifting of the bar. The upper side of the safety is recessed (as shown in Fig. 19) to receive a downturned lug 95 at the rear end of the cocking hook 84, which lug has an inclined face 96 coacting with an inclined face of a wall 97 of the safety recess for causing a longitudinal shifting of the cocking hook upon a manual transverse shifting of the safety 85. The front face of the wall 97 is formed with positioning notches in which a detent 98 of the cocking hook is adapted to seat and thus locate both the safety 85 and the cocking hook 84 in different positions of adjustment. The detent 98 is abutted by a detent spring guide

100 slidable in the cocking hook 84 and is impelled by a detent spring 99 housed in the rear end of the cocking hook. The cocking hook also has a limited movement relative to the conrod independently of its adjustment by the safety, and may retract slightly within the conrod against the spring 99 during the cocking operation, as will be described.

The cocking hook 84 performs two functions—one of cocking the firing pin, and one of locking the sear. This latter function, which has been previously mentioned, is performed by a transverse shift of the safety 85 which moves the cocking hook rearwardly and locates the shoulders 83 thereof above the shoulders 82 of the sear 71. The sear nose 80 can then not be released from the sear notch 76 and the gun cannot be fired.

When the toggle is down and the breech is closed, the transverse movement of the safety 85 into safe position carries a rearwardly extended portion 85[a] of said safety beneath an overhang or shoulder 85[b] in the side of the receiver wall which will lock the toggle in its down position (see Fig. 10). This insures that when the gun is locked safe, the toggle cannot be raised to lift the hook shoulders 83 off the locking shoulders 82 of the sear.

A still further feature of safety is provided by the fact that when the cocking hook 84 is shifted to its rear position by the safety 85, the front end of the hook will lie in front of the cocking lug 77 of the firing pin and would thus prevent firing even in the remote contingency of the sear nose 80 or sear notch lug 76 breaking off.

The cocking operation starts with the parts in the position shown in Fig. 16 in which the breech is closed and the firing pin has just been released. The upward swing of the conrod 24 carrying the cocking hook 84 will swing the nose of the latter which is in contact with the cocking lug 77 and retract the firing pin until its sear notch 76 is engaged by the sear nose 80. It is desirable that the firing pin striker 75 be retracted from the face of the bolt promptly with the start of breech opening so that it cannot protrude for any accidental firing of a cartridge with the breech incompletely closed. Due to the special form of articulation between the conrod and the bolt which, as previously described, causes first a rolling action of surface 30 on surface 31 and a delayed pivotal action of the doll's head 32 in its socket 33, it has been considered expedient to provide a premature pivotal action for the cocking hook 84 coincidentally with the early rolling action of the conrod. The cocking hook is held yieldingly forward in the conrod by its spring 99 so that an upper curved horn 101 of the cocking hook will project forwardly of the doll's head 32 and will seat for pivotal action in the doll's head socket 33 of the bolt. By this means, the cocking hook will begin its pivotal movement and start withdrawing the firing pin as soon as the conrod begins to roll upwardly. When the doll's head 32 of the conrod swings into its socket 33, the cocking hook is pressed back into the conrod until its horn 101 coincides with the doll's head 32 and continues its pivotal movement in company with the conrod.

The sear trip 81 comprises a lengthwise bar slidably mounted by a T-slot engagement in the lower rear part of the conrod. When the breech is closed as shown in Fig. 16, the front end of the sear trip is in position to engage the tail of the sear 71 and its rear end with its beveled lower corner 103 is in alignment with a trigger bar 104 (see Fig. 7). The sear trip is moved forwardly to trip the sear by the trigger bar and is provided with a return spring 102 housed in a cylindrical plug 105. A stirrup 106 on the front of the sear trip engages behind the head of a spring stem 107 which extends through the plug 105 and has a base 108 for confining the spring 102 within the plug. The plug 105 fits in a cylindrical recess of the conrod directly above and parallel to the slot for the sear trip. The plug is locked in its recess by shoulder 109 of a flat 110 cut in the top of the plug, having engagement with the cut out notch 42 in the gudgeon 40, whose transverse hole in the conrod intersects the longitudinal recess of the plug as appears in Fig. 16. The notch 42 extends to the inner end of the gudgeon 40 but the inner end of the notch is made abruptly narrower to form a retaining corner 111 which normally prevents the withdrawal of the gudgeon 40 outwardly from its hole 41 in the conrod. The plug 105, if moved slightly to the rear by a sharp tool as by the point of a cartridge, will clear its shoulder 109 from the retaining corner 111 and permit the lateral withdrawal of the gudgeon 40. The gudgeon 40 and spring plug 105 mutually lock one another in position and the removal of the gudgeon allows the plug with its sear trip to be withdrawn forwardly from the conrod for the disassembly of these parts.

Firing train mechanism.

Referring more particularly to Fig. 7 and Fig. 16, the firing train mechanism will now be described. The trigger 8 is pivoted to the receiver on pin 112 and at its upper end is formed with an open jaw extension 113 which embraces the arm 114 of a rocker 115. The rocker 115 is pivoted to the receiver on pin 116 and it is through the swinging of this rocker that the trigger pull is transmitted eventually to the sear. The upper surface of the arm 114 is preferably contoured in such a way that the engagement of the trigger jaw 113 therewith will produce two distinct

trigger pulls, first a primary or warning pull at a relatively long leverage and then the secondary or final pull at a shorter, quicker acting leverage, and it is during this secondary pull that the sear will release the firing pin. The front of the trigger 8 normally rests against a spring pressed plunger 117, which is pressed rearwardly to the position shown in Fig. 7 by a spring 118 housed in the trigger guard 7. The trigger therefore, in addition to its firing stroke rearwardly, may also have a limited forward stroke from its normal position against the plunger 117. The forward stroke of the trigger is employed to release the clip latch in a manner to be described.

The rocker 115 has a forwardly projecting arm 119 adapted to abut a transverse web 120 of the receiver and limit the rocking movement thereof as well as the trigger pull. To a depending arm 121 is pivotally connected at 122 the rear end of the trigger bar 104. Below the pivot 122 on arm 121 is pivotally connected at 112′ one end of a trigger spring guide 124 which is slidably seated at its other end in a depending lug 126 of the trigger bar. The trigger bar extends forwardly beneath a cross rod 127 fixed in the receiver and upwardly to a beveled nose 104′ which normally stands in position to engage the rear beveled end of the sear trip 103. The trigger spring 125 surrounding the guide 124 tends to swing the trigger bar upwardly against the cross rod 127 and also to swing the rocker 115 clockwise, and thereby keep the trigger to its normal position against the plunger 117. In other words, the spring 125 serves as a trigger return spring as well as other functions in connection with the trigger bar 104.

A pull of the trigger 8 will swing the rocker 115 counterclockwise and thrust the trigger bar 104 forwardly to operate the sear trip 81, which in turn rocks the sear 71 to release the firing pin. Although the trigger may be held back by a continued pull, the gun will not continue firing automatically because of the escapement action between the beveled nose 104′ of the trigger bar 104 and the beveled rear end 103 of sear trip 81. If the nose 104′ is held forward, the subsequent closing of the toggle and breech will bring end 103 down on top of nose 104′ which will cause the trigger bar 104 to yield downwardly against the tension of its spring 125. As soon as the trigger is released, the parts will be restored to the position shown in Fig. 7 with nose 104′ ready for a new action. In this way a semi-automatic action for the arm is provided whereby a separate trigger pull is required for each shot.

The engaging lap between the nose 104′ of trigger bar 104 and the rear end 103 of the sear trip 81 necessary for firing is made small enough so that said parts will be out of firing coactive relation upon a very slight upward or opening movement of the toggle and preferably before the eccentricity of said toggle has changed.

Pivotally mounted on a pin 129 fixed in the receiver is the bolt stop 130 having rearwardly extending upper prongs 130ª (see Fig. 9) adapted to engage the bolt notches 102 (see Fig. 22) and hold the bolt in open position at certain times. Lower prongs 130ᵇ of the bolt stop straddle the trigger bar 104 without interference therewith and are adapted to abut a cross web 131 of the receiver to limit the anti-clockwise movement of the bolt stop. A lower tail portion 130ᶜ of the bolt stop stands behind a rearwardly projecting arm 132ª of the clip latch 132 for operation thereby. The bolt stop is normally held in the position shown in Fig. 7 by the leg 133 of a comparatively light spring coiled about the cross rod 127. Another leg 134 of said same spring presses upwardly against the arm 132ª of the clip latch to hold the same in the position shown with its hooked portion 132ᵇ in engagement with a nib 135 on the clip 136 and thus serve as a clip restraining means. It is by the clip latch 132 that the clip is retained in the magazine chamber against a force hereinafter described tending to discharge it. The clip latch 132 is pivotally mounted on a pin 137 fixed in the receiver and has a tail portion 132ᶜ adapted for engagement by the rear lever 163 of the follower mechanism (see Figs. 7 and 11). The arm 132ª of the clip latch has a laterally turned lug extending in a side facing recess of the trigger bar 104 so as to be pulled rearwardly thereby when the trigger bar is moved rearwardly from its normal position shown in Fig. 7.

The function of the forward stroke of the trigger 8 will now be evident. Such a forward stroke will, through the trigger bar 104 described, swing the latch 132 to withdraw its hook 132ᵇ from the clip 136. The clip, when thus released, will be discharged upwardly out of the magazine chamber by a clip discharge mechanism comprising a kicker 138 impelled by a powerful spring. It is desirable not to permit the release of the clip unless the bolt has fully uncovered the magazine chamber and has been withdrawn far enough to be engaged and held by the bolt stop 130. For this purpose, the crank 25 has a lower curved surface 139 overlying the top of the trigger jaw 113 which prevents any forward movement of the trigger until the crank has swung vertically far enough to bring a clearance surface 140 above the trigger jaw. When this occurs, the bolt is in position to be engaged by its stop 130 and it will be noted that simultaneously with any release movement of the clip latch 132 its rear arm 132ª will engage the tail 130ᶜ of the bolt stop 130 and rock it into stopping engagement with the notches 102 of the bolt.

This insures locking of the bolt in open position during any discharge of the clip and prevents possible jamming of a clip with a partially closed bolt. Due to the fact that the latch cannot be released without swinging the bolt stop prongs 130ª up into the engaging position in the notches 102, the accurate timing of the latch release is provided by the bolt itself which as it moves rearwardly overlies the bolt stop and holds down prongs 130ª until the bolt has moved far enough to the rear to bring its notches 102 above the bolt stop, in which position the bolt has fully uncovered the magazine chamber and clip.

The clip discharge mechanism comprises the kicker 138 pivoted on a pin 139′ fixed in the trigger guard frame. The kicker carries a plunger 140′ bearing against a pin 141 and backed up by a powerful spring 142 housed in the kicker and which tends to give the toe of the kicker pressing against the bottom of the clip a quick, powerful, upward thrust. It is sufficient to discharge the clip even full of loaded cartridges completely out of the top of the magazine chamber. The gun may be thus unloaded and rendered harmless at any time by manually withdrawing the bolt and pressing the trigger forward.

The pin 141 against which the plunger 140′ presses serves as a hinge pin for the bottom cover 11 of the magazine chamber. The forward edge of the cover has a latching engagement with the gun forward of the magazine by means of a lip 144 on the cover adapted to engage a recess in the receiver. The hinge pin 141 is seated in an open slotted portion of the trigger guard frame so as to permit an endwise movement of the cover against the force of the kicker spring 142. The cover is yieldingly retained in closed latched position by the tension of the kicker spring and may be unlatched by an endwise movement.

Cartridge clip

The cartridge clip 136, shown in plan Fig. 14, rear view Fig. 12, front view Fig. 13 and side view Fig. 7, is designed to hold a stack of ten cartridges in double row staggered arrangement. The cartridges are preferably of tapered form and as closely packed in the clip lie with the uppermost cartridge substantially horizontal and the underneath cartridges in positions of progressively greater inclination as they approach the bottom.

The clip is designed to be charged into the magazine chamber with the cartridges en bloc and to serve as a guide and holder of the cartridges during the feeding and loading of the same into the chamber of the barrel. The clip is preferably made of thin spring metal comprising a rigid back 145 and two spring tensioned sides 146, 147 cut out in places for lightness and suitably stiffened by upset depressions or ribs. It should be noted that the depressed ribs 148 on the back are inclined to the direction of feeding travel for the cartridges so that the base of the cartridges will not catch or foul therein when being fed upwardly by the follower.

The sides 146, 147 of the clip tend to converge from the back 145 to their front edges so as to furnish lateral spring tension against the stack of cartridges. The bottom of the clip is constituted by the lower front edge prongs 149, 150 which are spring tensioned to press upwardly against the lowermost cartridges of a full stack to furnish vertical tension in holding the same securely and compactly. The tapered form of the cartridges also contributes to this result. Adjacent the rear edge of each side wall is an inwardly projecting rib 151 adapted to engage in front of the extracting rim of the cartridges in each row and in conjunction with the wedging action of the tapered cartridges in the stack serve to prevent any forward throw of the cartridges under the recoil impulse of firing. The ribs 151 do not extend to the top of the clip so as to leave the top cartridge free for loading and said ribs do not extend vertically parallel with the back 145 of the clip but diverge therefrom slightly toward the bottom to allow for the increased inclination of the cartridges. The top of the clip is constituted by the upper inwardly curved edges 152, 153 of the side walls which are stiff vertically and serve to guide the uppermost cartridge as it is loaded into the gun chamber. The cut out portion 154 of the back allows the travel of the bolt therethrough in loading the cartridges. It will be observed that the bolt face will engage the topmost cartridge first from one row and then from the other in loading the same.

On the back of the clip is formed the outwardly offset locking nib 135 which is engageable by the latch 132, as previously described, for holding the clip in the magazine chamber. The nib 135 is located off center or at one side of the center line of the back, and a clearance groove 155 is formed in the rear wall of the magazine chamber (see Fig. 15) to receive this nib 135 when the clip is charged into the magazine. If any attempt is made to insert the clip upside down, the offset position of the nib will prevent its introduction. Each side of the clip is formed with an inwardly depressed bump 156, 157 which, when the clip is introduced into the magazine chamber, will engage behind ledges 158, 158′ provided on each side wall of the chamber, and thereby cause a spreading apart of the clip sides. In this way, the stack of cartridges, when in the chamber, is relieved from the lateral tension of the clip whereby the follower may feed the cartridges more easily. In considering the essential function

of the ledges 158, 158′ in conjunction with the depressed bumps 156, 157 of the clip, it should be understood that it is not necessary that the sides of the clip be actually spread apart when introduced into the magazine chamber. The limiting requirement in this respect is that the sides of the clip shall be prevented from moving closer together after one or more cartridges are removed from the clip in loading. Such a contraction of the spring tensioned clip sides would throw the double row stack into disorder and is to be avoided while the clip is in the gun in order to insure proper feeding of the cartridges.

Feeding means

The feeding of the stack of cartridges to bring the uppermost into position for loading is effected by the follower 159 working up through the clip. The follower travels with a definitely prescribed motion so as to conform to the changing positions of inclination of the lowermost cartridges as they are fed upwardly. Both the movement of translation and the movement of partial rotation of the follower are definitely controlled at all times by its actuating and supporting mechanism. In other words, the follower is not free to adjust itself to any inclination of the lowermost cartridges of the stack as is the more common practice. On the contrary, the follower determines its own movement which gives the proper position for the bottom of the stack at all times so that said stack will have no tendency to assume an incorrect position when thrust into the magazine. The follower is designed for contiguous contact with the bottom of the stack at all times and as shown in Fig. 12 is formed with a stepped surface to maintain the staggered arrangement of the two rows of cartridges.

The actuating means for the follower comprises a sort of pantograph arrangement of levers which cause it to sweep upwardly in substantially a straight path through the clip and also gradually change in inclination so as to continuously coincide with the lowermost cartridge as it moves eventually into its horizontal position for loading. The forward one of these levers 160 is pivoted at 161 upon the receiver and at 162 to the rear end of the follower. The rear lever 163 is pivoted at 164 on the receiver and has its forward end slidably and pivotally connected to the forward end of the follower 159 by means of a pivot pin 165 fixed to the lever 163 and extending into a slot 166 of the follower. An overhanging lip 167 of the follower overlies the end of the lever 163 to prevent lateral displacement thereof. Lever 163 is also cut with a curved slot 168 within which works the pin 169 carried on lever 160 to thereby connect these levers at their crossing points. The rear lever 163 is the actuating lever for the follower and as shown in Fig 11 is under the tension of a relatively heavy compression spring 170 which tends to move the follower upwardly at all times. The rear mounting of spring 170 (not shown) is on the cross rod 127 of the receiver.

After the last cartridge has been loaded from the clip and the bolt has moved back to uncover the magazine chamber, the follower 159 may then move to its highest position. As this final movement of the follower takes place, its actuating lever 163 engages the tail portion 132^c of the clip latch and rocks it to release the empty clip which is then discharged from the chamber by the kicker 138. The follower spring 170 is of course much stronger than the latch spring 134. The release movement of latch 132 also moves the bolt stop 130 into its bolt engaging position, as before described, and therefore the bolt is held back in its position (as shown in Fig. 11) with the magazine chamber open ready for recharging. In other words, the loading and firing of the last cartridge from the clip is automatically followed by the ejection of the empty clip and the stopping of the bolt in open position. When a new clip is inserted in the chamber it of course depresses the follower 159 and restores latch 132 to the force of its spring 134, whereby the new clip will be properly caught and held in the chamber. This recharging operation with a new clip, however, does not automatically release the bolt from its stop 130. Such a result would be undesirable for the person pressing in the new clip and with his fingers part way in the magazine chamber. The strength of the bolt stop restoring spring 133 is insufficient to release the bolt stop from its frictional engagement with the bolt 130. After the recharging of the clip has been completed, a slight rearward pull by hand on the crank handle 60 will release the bolt stop and the bolt can then be allowed to move forward to closed position under the force of its closing spring. The breech closing movement of the bolt will normally load the top cartridge of the clip into the barrel chamber.

As an additional precaution of safety for the fingers of the person charging the magazine with a new clip, the vertical pressure on a full stack of cartridges provided by the lower prong 149 of the clip is sufficient to prevent the loading of the topmost cartridge out of the clip by the closing movement of the bolt solely under the force of its closing spring. This vertical pressure on the stack is still sufficient for the purpose mentioned even after the sides of the clip have been spread slightly by the ledges 158, 158′ as previously described. For the loading of the first cartridge from a full clip, the force of the closing spring must be boosted by hand. After the first cartridge from a full clip has been loaded, the vertical spring pressure of prong 149 has no further effect and the force

of the closing spring is sufficient to automatically load the remaining cartridges.

If it is desired to close the bolt over a full clip and without loading a cartridge, the clip must be pressed downwardly in the magazine chamber, a distance slightly beyond its latching position and held down by one hand while carefully controlling with the other hand the closing movement of the bolt as it slides forwardly over the topmost cartridge. With the gun in this condition, a subsequent retraction and closing of the bolt will load the first cartridge.

The normal recharging operation, however, may be performed with great facility and speed due to the fact that the cartridges need not be stripped from the clip by hand but the whole stack and clip may be introduced as a unit into the chamber by a comparatively simple hand movement. In the entire operation, the clip may be forgotten for it is automatically ejected with the last shell and this final ejection leaves the bolt open for immediate recharging. It is believed that this method of handling the clip and recharging are important factors in making possible the unusually high rate of aimed firing of which the present rifle is capable. Employed in combination with the extremely quick action of the breech mechanism described, a light shoulder arm is presented capable of a higher rate of sustained and accurate firing than any shoulder arm of similar weight heretofore known.

Rear sight mechanism

The rear sight mechanism indicated generally as 9 is shown more particularly in Figs. 33 to 38, inclusive. The rear sight elevation slide 171 is a vertically slidable member almost square in outline mounted with a T-slot engagement (as shown in Fig. 34) upon an upstanding integral part of the receiver 2. The T-slot may be slightly inclined laterally from a true vertical line to compensate for the drift of the bullet. The slide is formed with an oval shaped window opening 172 in front of which is transversely slidable a windage slide 173 carrying the peep hole 174 and a zero mark in line therewith. A graduated windage scale 175 is marked on the upper ledge of the window 172 to register with said zero mark. The windage slide has a tongue and groove guiding engagement with the slide 171 and is adjustable transversely thereof by means of the windage screw 176 meshing with teeth in the lower edge of said windage slide, as shown in Fig. 35. The windage screw has a knurled finger knob 177 at one end, extends through suitable bearing holes in the slide 171 and has a head 178 at its other end for being held against transverse movement by a spring pressed retaining plunger 179 housed in the slide 171. By pressing the plunger 179 inwardly, the windage screw may be disengaged therefrom and unscrewed from the windage slide 173 to release the latter for disassembly.

The vertical adjustment or elevation of the slide 171 is effected by the sight nut 180 which is rotatably mounted in a lower opening through the slide upon a hollow spindle 181. The periphery of the sight nut is formed with a plurality of parallel helically disposed ribs 182 in the form of a multiple screw thread adapted to mesh with the teeth of a vertical rack 183 mounted in the receiver. The pitch of the screw threads 182 is sufficient to give the desired extreme elevation of the slide with something less than one complete revolution of the nut 180. The upper side of the sight nut is marked with radial lines of a scale 184 for registering with a zero line 185 on the slide and thus indicate the range to which the sight is adjusted. The top outer portion of the sight nut 180 is slightly beveled to receive the numbers corresponding to the graduations of scale 184, and thereby render said numbers more easily visible.

The rack 183 is preferably cylindrical with a reduced lower end 186 for threaded engagement with the receiver 2. The teeth of the rack are, of course, helically disposed to conform to the pitch of the threads 182, but extend only part way around the cylindrical body of the rack as shown in Fig. 34. The upper end of the rack has a screw driver slot by which it may be rotatively and vertically adjusted on its screw threaded base 186. A jam screw 187 screw threaded into the receiver bears against one side of the rack 183 for locking it in its adjusted position.

A rotatable adjustment of rack 183 will elevate or lower the sight nut 180 and slide 171 without disturbing the zero position of the sight nut. This is of advantage in modifying the relations between the front and rear sight for battle sight range or with the rear sight at zero elevation. Any rotation of rack 183 also moves itself vertically on its screwed base 186 and by making the screw threads at 186 of opposite or of the same "hand" as the pitch of threads 182 a relatively coarse or fine adjustment of the parts may be obtained.

The hollow spindle 181 for the sight nut 180 is shown in detail in Fig. 37 and has bearings at its upper and lower end in ledges of the slide 171. From the lower end of spindle 181 projects laterally a detent 188 which works through a key hole slot 193 in the lower ledge of the slide (as shown in Fig. 36) and is pressed into engagement with positioning notches 189 on the underside of the sight nut 180 by a spring 190. The spring 190 is housed in the hollow spindle and seated upon the shoulder of a key-like stem 191 which serves to lock the spindle and its spring in functioning position. The key stem 191 has projecting key lugs 192 spaced apart one of which

is adapted to be inserted in key hole slot 193. For locking the spindle 181 in functioning position, the key stem 191, surrounded by the spring 190, is mounted within the hollow spindle 181 with the key lugs 192 projecting laterally through a recess 188′ of said spindle. Then this assembly is pushed upwardly through the bearing holes of the ledges of slide 171 as well as through the bore of the sight nut 180, during which the key lugs 192 are registered with the key hole slot 193 so that the upper lug 192 may pass through the slot 193 and locate the lugs 192 in position for straddling the lower ledge of slide 171. Then by rotating the key stem and its assembly one half a turn, the key lugs will engage on opposite sides of the ledge of the slide 171 and fix the key relatively to the slide. As shown in Fig. 36, this brings the detent 188 into registry with key hole slot 193 so that it works therethrough for engagement with the teeth 189 of the sight nut 180 under tension of the spring 190. The positioning notches 189 beneath the nut 180 are made to correspond to the several graduation lines in the scale 184. Therefore the nut 180 is firmly held in each position of adjustment. A downward pressure on the top of spindle 181 will disengage the detent 188 for easy turning of the sight nut. The nut 188 is limited to slightly less than a full revolution by a stop pin 193′ thereon engageable by the shoulder of detent 188. In order to disassemble the slide 171 and sight nut 180 from the support, the spindle 181 is depressed far enough to carry the detent shoulder below the stop pin 193′ of the nut 188. Then said nut may be turned off the rack, carrying the slide with it.

The key stem 191 fixed to the sight slide extends downwardly into a well hole through the receiver screw 194, and its lock nut 195 and engages the upper end of a spring pressed plunger 196. This plunger 196 is backed up by a spring 197 housed in the trigger guard bushing 198 and extends partly through the receiver screw 194 to meet the lower end of the key stem 191. In this way, a constant upward tension from spring 197 is imposed on the key stem 191 and the sight slide to which it is fixed, thereby eliminating all loose play or slack in the sight slide bearings and connections. The screw 194 serves to fasten the rear end of the receiver 2 to the stock 1 by its threaded engagement with the bushing 198 of the trigger guard. The arrangement described provides the necessary tension on the movable parts of the rear sight and yet permits easy removal of the sight without disturbing the receiver fastening means.

Receiver, trigger guard and stock assembly

The method of mounting the receiver 2 and trigger guard 7 on the stock 1 is shown clearly in Fig. 26. At their rear ends the receiver and trigger guard are drawn firmly together upon the stock by the screw 194 threadedly engaged with the bushing 198 which extends through the stock as shown and is suitably anchored into the trigger guard. A lock nut 195 is provided for the screw 194.

The forward end of the trigger guard terminates at the rear of the magazine chamber. Above the forward end of the trigger guard is a transverse reinforcing member 199 for the stock specially constructed to serve as an anchor to which the forward end of the trigger guard may be fastened. This anchor consists of a central channel shaped portion seated in the wood of the stock with sides into which are permanently fastened studs 200, 201 extending laterally to the outside of the stock. A fastening screw 202 passing through the trigger guard, as shown, is threadedly engaged with the central portion of said anchor 199, thus firmly securing the front end of the trigger guard to the stock.

The receiver 2 is preferably formed at its forward end with integral depending side walls 2′ to provide the magazine chamber. Below the front end of the receiver, forward of said magazine chamber and seated in the wood of the stock, is another transverse stock reinforcing member or anchor 203 into the side portions of which are permanently fastened the studs 204, 205 extending laterally to the outside of the stock. The channel portion of said anchor 203 receives with interfitting engagement a depending portion 206 of the receiver. A fastening screw 207 extending from the bottom of the stock through an escutcheon 208 and the anchor 203 is threadedly engaged with the depending portion 206 of the receiver to firmly draw said parts together and thus fasten the front end of the receiver to the stock.

The barrel 3 has a shoulder 3′ and is screw threadedly engaged into the receiver 2. At one side of said barrel adjacent its shoulder 3′ is locking recess 209. When the barrel is screwed home against the receiver, its recess 209 is adapted to register with the upper end of screw 207. The upper end of the screw 207 is formed with a protruding end or pilot 210 adapted to take into said locking recess of the barrel and thus prevent any turning movement of the same after being screwed in place.

The above arrangement insures that the barrel shall be screwed home to its seat before the parts can be properly assembled. A failure to screw the barrel home by more than a full turn will reveal a perceptible gap at its shoulder 3′ and any failure less than a full turn will prevent the fastening screw 207 from being screwed into its seat. In any event, whether screwed home or not, the barrel, when once its locking recess is engaged

by the screw end 210, will not be unscrewed from the receiver by firing. The present gun is preferably adapted for the easy replacement of a barrel when worn out or damaged and the advantages of the arrangement described are readily apparent for such a purpose.

Head space arrangement

The means adopted in the present gun for dealing with the head space are planned with a view to the practical replacement of a barrel in the field and without the necessity of resorting to the factory for any final fitting or adjustments.

Referring to Fig. 41, the lower part of said view illustrates a partial section of the barrel longitudinally through the firing chamber with a cartridge indicated at C′ loaded therein and the bolt 23 in breech closed position. The normal condition of a cartridge prior to loading is illustrated at C in the upper part of said view and has a base or head 211 adapted to be abutted by the face of the bolt 23 and a tapered breech up shoulder 212 adapted to rest against a tapered breech up seat 213 at the forward end of the firing chamber. The distance D from the head of the cartridge to its breech up shoulder 212 is herein termed the breeching length of the cartridge and the distance D′ from the face of the closed bolt 23 to the breech up seat 213 in the firing chamber is herein termed the breeching space of the firing chamber. Head space may be defined as the distance between the head of the cartridge and face of the bolt when the latter is in breech closed position and when the cartridge is fully seated in the firing chamber. In practice, this head space should not exceed .006 of an inch.

The factors which determine head space in a gun comprise the several dimensions of the connecting parts of the breech action which make up its length, the relative position of the breech action on the receiver, the depth of the firing chamber, the relative position of the barrel on the receiver, and finally the breeching length of the cartridge itself. These gun dimensions, as well as that of the cartridge, are subject to slight variations due to the unavoidable necessities of manufacturing operations, and while each dimension singly may be held down to a very small tolerance by the use of suitable limit gauges, it will be obvious that the aggregate of such variations in a large number of dimensions may produce a resultant head space which would be too large. It has therefore been a practice heretofore either to provide means for adjusting head space after the finished parts of the gun are assembled or to finally finish the breech up seat of the barrel to limiting head space gauges after the assembly of the barrel into the gun. Such a final finishing of the barrel, however, requires a factory operation which cannot be conveniently accomplished in the field.

In the present invention, all of the several dimensions which affect head space are finally determined during the process of manufacture and each dimension is made within such practical limits or tolerance as can be measured by suitable limit gauges and they are so chosen that the maximum breeching space which may result from the aggregate of variations in the several gun dimensions will not be more than .006 of an inch greater than the minimum breeching length determined for a cartridge. In an extreme instance, the greatest head space that can occur will be .006 of an inch. In the majority of instances, the cartridge loaded into the firing chamber will have a breeching length slightly in excess of the breeching space of the chamber and the breech action, in order to close properly, must of necessity forcibly reform the cartridge to fit the breeching space. This reformation of the cartridge will be accomplished by a swaging action upon the breech up shoulder of the cartridge by the breech up seat of the firing chamber so as to shorten the breeching length of the cartridge and fit it to the breeching space of the firing chamber. An illustration of this action is given in Fig. 41 wherein it will be noted that the distance D is slightly greater than the distance D′, and that the breech up shoulder 212 of cartridge C′ has been displaced nearer to the head 211 than in cartridge C.

The breech action of the present invention is designed to supply the necessary power for accomplishing this swaging action during the final part of the breech closing movement. The force of the closing spring 61 supplemented by the mechanical advantage of its application as the toggle approaches its final closing position will be found sufficient for this purpose. It will be understood, of course, that the cartridge to which such a swaging operation is applied should be of the usual type having a case of ductile metal or similar substance which can be drawn or swaged. By the arrangement described, variations in dimensions of parts which usually cause a variation of head space here merely result in a greater or less swaging action on the breech up shoulder of the cartridge case when the gun is loaded.

The foregoing complete and detailed description of the preferred embodiment of my invention is not intended to limit the invention to any particular construction shown, as obviously many modifications thereof may be resorted to without departing from the spirit of my invention as hereinafter claimed.

What I claim is:

1. In a gun, a breech action comprising a toggle positioned with a slight eccentricity when the breech is closed and with articula-

tions so constructed and arranged that during a small initial opening of said breech action the eccentricity of said toggle does not substantially increase.

2. In a gun, a barrel, a breech action comprising a toggle and a breech closure movable with respect to the barrel upon firing for instigating the opening of the breech, the toggle being positioned with a slight eccentricity when the breech is closed and with articulations so constructed and arranged that during a small initial opening of said breech action the eccentricity of said toggle does not substantially increase.

3. In a gun, in combination, a barrel, a breech action comprising a toggle and a breech closure movable back and forth for opening and closing the breech, said breech closure being acted upon by the force of the firing pressure during the power stroke portion of its rearward movement with respect to said barrel, said toggle being positioned with an initial eccentricity when the breech is closed and so constructed and arranged that the initial eccentricity of said toggle shall not be substantially increased during the power stroke portion of the breech closure movement.

4. In a gun, the combination with a receiver and barrel fixed thereto of a breech action comprising a bolt movable back and forth in said receiver relatively to the barrel for opening and closing the breech and a toggle articulated between said receiver and bolt, the articulations of said receiver, toggle and bolt constructed and arranged to provide an initial eccentricity of said toggle for opening when the bolt is in breech closed position and to maintain said initial eccentricity substantially unincreased during a short travel of the bolt away from breech closed position.

5. In a gun, a breech action comprising a toggle having articulations with rolling abutting surfaces through which the firing pressure is transmitted.

6. In a gun, a barrel, a breech action comprising a toggle and a breech closure movable with respect to said barrel upon firing for instigating the opening of the breech, said toggle having articulations with rolling abutting surfaces through which the firing pressure is transmitted.

7. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle articulated between said receiver and bolt, the articulations of said receiver, toggle and bolt comprising abutting surfaces through which the firing pressure is transmitted, said abutting surfaces having a rolling contact during the early part of the breech opening movement.

8. In a gun, the combination with a receiver and barrel, of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle articulated between said receiver and bolt, the articulations of said receiver, toggle and bolt comprising abutting surfaces through which the firing pressure is transmitted, said abutting surfaces at the intermediate articulation of said toggle having a downwardly rolling contact and said abutting surfaces at one or both of the end articulations of said toggle having an upwardly rolling contact during the early part of the breech opening movement.

9. In a gun, a breech action comprising a toggle positioned with a slight eccentricity when the breech is closed, said toggle having articulations with rolling abutting surfaces through which the firing pressure is transmitted and which are so constructed and arranged that during a small initial opening of said breech action the eccentricity of said toggle does not substantially increase.

10. In a gun, a barrel, a breech action comprising a toggle and a breech closure movable with respect to the barrel upon firing for instigating the opening of the breech, the toggle being positioned with a slight eccentricity when the breech is closed, said toggle having articulations with rolling abutting surfaces through which the firing pressure is transmitted and which are so constructed and arranged that during a small initial opening of said breech action the eccentricity of said toggle does not substantially increase.

11. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle articulated between said receiver and bolt, the articulations of said receiver, toggle and bolt comprising abutting surfaces through which the firing pressure is transmitted, said abutting surfaces of the intermediate articulation of said toggle having a contact slightly above the contacts of the abutting surfaces at the end articulations of said toggle to provide an initial eccentricity of said toggle for opening when said bolt is in breech closed position, said intermediate abutting surfaces having a downwardly rolling contact and said abutting surfaces at one or both ends of said toggle having an upwardly rolling contact to maintain said initial eccentricity substantially unincreased during a short travel of the bolt away from breech closed position.

12. In a gun, the combination with a receiver and barrel fixed thereto of a breech action comprising a bolt movable back and forth in said receiver relatively to the barrel for opening and closing the breech and a toggle articulated between said receiver and bolt, the articulations of said receiver, toggle and bolt comprising abutting surfaces through which the firing pressure is trans-

mitted and arranged to provide an initial eccentricity of said toggle for opening when the bolt is in breech closed position and to maintain said initial eccentricity substantially unincreased during a short travel of the bolt away from breech closed position, the abutting surfaces of said articulations having a rolling contact during the early part of the breech opening movement.

13. In a gun, the combination with a receiver and barrel, of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, the articulation between said conrod and bolt comprising abutting surfaces for an initial rolling contact through which the firing pressure is transmitted and surfaces for subsequent pivotal action during the opening of the toggle.

14. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech, and a toggle comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, the articulation between said crank and conrod comprising abutting surfaces for an initial rolling contact through which the firing pressure is transmitted and surfaces for subsequent pivotal action during the opening of the toggle.

15. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, the articulation between crank and receiver comprising coacting surfaces for an initial rolling contact through which the firing pressure is transmitted and for a relative sliding action at the end of the toggle opening movement.

16. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, the several articulations between said receiver, crank, conrod and bolt comprising co-acting surfaces for an initial rolling contact through which the firing pressure is transmitted, and a subsequent pivotal action during the opening movement of the toggle, the coacting surfaces of said crank and receiver providing for a relative sliding action at the end of the toggle opening movement.

17. In a gun, the combination with a receiver and barrel of a breech action comprising a bolt reciprocable in said receiver, a crank articulated to said receiver by a crank pin and bearing portion, and a conrod articulated to said crank and bolt, the articulation between said conrod and crank comprising rolling abutting surfaces in conjunction with an interconnecting link, the articulation between said conrod and bolt comprising rolling abutting surfaces in conjunction with interconnecting male and female portions.

18. In a gun, the combination with a receiver and barrel, of a breech action comprising a bolt reciprocable in said receiver, a crank articulated to said receiver by a crank pin and bearing portion, and a conrod articulated to said crank and bolt, the articulation between said conrod and crank comprising rolling abutting surfaces in conjunction with an inter-connecting link, the articulation between said conrod and bolt comprising rolling abutting surfaces in conjunction with interconnecting male and female portions, a slide mounted on said crank for a thrust against a stationary part of said gun, and a closing spring acting between said crank and slide.

19. In a gun, in combination, a receiver, a barrel, a bolt movable back and forth in said receiver for opening and closing the breech, a spring for effecting the forward movement of said bolt and resisting the rearward movement thereof, and means coacting with said spring to enable it to act with an abruptly augmented mechanical advantage during the final part of the rearward movement of said bolt to serve as a buffer spring.

20. In a gun, the combination with a receiver of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle therefor comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, the articulation between said crank and receiver comprising a bearing for said crank adapted to permit a rearward displacement of said crank at the end of the toggle opening movement and a closing spring for said toggle acting to close said toggle and to resist the opening movement of said toggle, said spring being arranged to resist the rearward displacement of said crank at a greater mechanical advantage than in resisting the opening movement of said toggle so as to act as a buffer spring.

21. In a gun, the combination with a receiver of a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and a toggle therefor comprising a crank articulated to said receiver and a conrod articulated to said crank and bolt, a slide mounted on said crank for a thrust against a stationary part of said gun, and a closing spring acting between said slide and crank tending to move the toggle to its breech closing position and to resist the opening movement of said toggle, the ar-

ticulation between said crank and receiver comprising a crank pin and slot bearing to permit a rearward displacement of said crank at the end of the toggle opening movement, said closing spring acting in conjunction with said slide to resist the rearward displacement of said crank at a greater mechanical advantage than in resisting the opening movement of said toggle to thereby act as a buffer spring.

22. In a gun, in combination, a receiver, a breech action comprising a bolt movable back and forth in said receiver and a toggle adapted to fold upwardly when the bolt moves rearwardly, said receiver having an upstanding rigid portion to act as a rear stop for engaging the upper part of said toggle on the rearward movement of said bolt.

23. In a gun, in combination, a receiver, a breech action comprising a bolt movable back and forth in said receiver and a toggle adapted to fold upwardly when the bolt moves rearwardly, said receiver having an upstanding rigid portion to act as a rear stop for engaging the upper part of said toggle on the rearward movement of said bolt, said upstanding portion of said receiver also being arranged to serve as a rear sight support for said gun.

24. In combination, a gun having a bolt movable back and forth therein, a bolt stop operable for holding said bolt in its rearward position, a clip of cartridges, a latch for retaining said clip of cartridges in position for loading, cartridge feeding means mounted on said gun independently of said clip, said cartridge feeding means acting upon the exhaustion of cartridges in said clip to release said latch and also actuate said bolt stop into its bolt holding position.

25. In combination, a gun, a clip of cartridges, means for retaining said clip in position for loading, clip discharge mechanism tending to discharge said clip from said gun, and cartridge feeding means acting upon the exhaustion of the cartridges in said clip to permit the discharge of said clip by said clip discharge mechanism.

26. In combination, a gun having a magazine chamber adapted to contain therein a clip of cartridges, a feeding follower for the cartridges in said clip, and a kicker separate from said follower for discharging said clip out of said chamber.

27. In combination, a gun having a magazine chamber adapted to contain therein a clip of cartridges, a feeding follower for the cartridges in said clip, and a kicker separate from said follower for discharging said clip upwardly out of said chamber.

28. In combination, a gun having a magazine chamber adapted to contain therein a clip of cartridges, a feeding follower for the cartridges in said clip, and a kicker separate from said follower tending to discharge said clip out of said chamber, and a latch for retaining said clip in said chamber.

29. In combination, a gun having a magazine chamber adapted to contain therein a clip of cartridges, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of said clip, and cartridge feeding means acting upon the exhaustion of the cartridges in said clip to release the latch for the discharge of said clip by the clip discharge mechanism.

30. In combination, a gun having a magazine chamber adapted to contain a clip of cartridges, a breech action comprising a reciprocating bolt, a bolt stop operable in position to hold the bolt when in its rear position, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of said clip, and cartridge feeding means, separate from said clip discharge mechanism, acting upon the exhaustion of the cartridges in said clip to release the latch and also to actuate the bolt stop into its holding position.

31. In combination, a gun having a breech action for opening and closing the breech, a latch for retaining a clip of cartridges in position for loading, a trigger and mechanism actuated thereby for firing when the breech is closed, and means operable by said trigger when the breech is open to release said latch.

32. In combination, a gun having a breech action for opening and closing the breech, a magazine chamber adapted to contain therein a clip of cartridges, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of said clip, a trigger and mechanism actuated thereby for firing when the breech is closed, and means operable by said trigger when the breech is open to release the latch for the discharge of the clip.

33. In a gun, in combination, a receiver, a barrel, a breech action, a magazine chamber in said receiver located below said breech action, a clip of cartridges contained in said magazine chamber, means appurtenant to said breech action for loading a cartridge from said clip into said barrel, clip discharge mechanism in position and arranged to discharge said clip upwardly out of said magazine chamber and past said breech action, said clip discharge mechanism having an automatic operation in discharging said clip controlled by the exhaustion of cartridges in said clip.

34. In a gun, in combination, a receiver, a barrel, a breech action, a magazine chamber in said receiver located below said breech action, a clip of cartridges contained in said magazine chamber, said breech action comprising a bolt reciprocable in said receiver forwardly and rearwardly above said magazine chamber for loading a cartridge from

said clip into said barrel, clip discharge mechanism in position and arranged to discharge said clip upwardly out of said magazine chamber and past said breech action, said clip discharge mechanism having an automatic operation in discharging said clip controlled by the exhaustion of cartridges in said clip, and also controlled by a subsequent positioning of said bolt rearwardly in said receiver.

35. In a gun, in combination, a receiver, a barrel, a breech action, a magazine chamber in said receiver located below said breech action, a clip of cartridges contained in said magazine chamber, means appurtenant to said breech action for loading a cartridge from said clip into said barrel, clip discharge mechanism in position and arranged to discharge said clip upwardly out of said magazine chamber and past said breech action, said clip discharge mechanism having an automatic operation in discharging said clip controlled by the exhaustion of cartridges in said clip, and manually actuated means to render said clip discharge mechanism operative in discharging said clip prior to the exhaustion of the cartridges in said clip.

36. In a gun, in combination, a receiver, a barrel, a breech action, a magazine chamber in said receiver located below said breech action, a clip of cartridges contained in said magazine chamber, said breech action comprising a bolt reciprocable in said receiver forwardly and rearwardly above said magazine chamber for loading a cartridge from said clip into said barrel, clip discharge mechanism in position and arranged to discharge said clip upwardly out of said magazine chamber and past said breech action, said clip discharge mechanism having an automatic operation in discharging said clip controlled by the exhaustion of cartridges in said clip and also controlled by a subsequent positioning of said bolt rearwardly in said receiver, and manually actuated means to render said clip discharge mechanism operative in discharging said clip prior to the exhaustion of the cartridges in said clip, said manually actuated means being controlled by the positioning of said bolt so as to be operable only when said bolt is rearwardly in said receiver.

37. In a gun, in combination, a receiver, a barrel, a breech action, a magazine chamber in said receiver, a clip of cartridges contained in said magazine chamber, means appurtenant to said breech action for loading a cartridge from said clip into said barrel, feeding means operatively mounted on said gun and comprising a follower movable in said magazine in engagement with said cartridges to feed the same into position for loading, clip discharge mechanism operatively mounted on said gun and comprising a member in engagement with said clip and tending to discharge the same from said magazine chamber, restraining means for said clip, and manually operated means to release said restraining means and permit the discharge of said clip.

38. In a gun, in combination, a receiver, a barrel, a breach action, a magazine chamber in said receiver, a clip of cartridges contained in said magazine chamber, said breech action comprising a bolt reciprocable forwardly and rearwardly in said receiver for loading a cartridge from said clip into said barrel, feeding means operatively mounted on said gun and comprising a follower movable in said magazine in engagement with said cartridges to feed the same into position for loading, clip discharge mechanism operatively mounted on said gun and comprising a member in engagement with said clip and tending to discharge the same from said magazine chamber, restraining means for said clip, and manually actuated means to release said restraining means and permit the discharge of said clip, said manually actuated means being controlled by the positioning of said bolt so as to be operable only when said bolt is rearwardly in said receiver.

39. In a gun, in combination, a receiver having a magazine chamber, a clip of cartridges contained in said magazine chamber, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of the clip, feeding means for the cartridges in said clip operatively mounted on said gun independently of said clip and arranged to release the latch upon the exhaustion of the cartridges in said clip.

40. In a gun, in combination, a receiver having a magazine chamber, a clip of cartridges contained in said magazine chamber, a clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of the clip, a firing train comprising a trigger and its actuated mechanism, said trigger being operatively mounted for an intermediate position of rest, a rearward stroke for firing and a forward stroke for releasing said latch.

41. In a gun, in combination, a receiver, a barrel, a bolt movable back and forth in said receiver to open and close the breech, said receiver having a magazine chamber, a clip of cartridges contained in said magazine chamber, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of said clip, a firing train comprising a trigger and mechanism actuated thereby, said trigger and its actuated mechanism arranged to fire said gun when the bolt is in breech closed position and to release said latch when the bolt is in its rear position.

42. In a gun, in combination, a receiver having a magazine chamber, a barrel, a bolt movable back and forth in said receiver to

open and close the breech, a bolt stop operably mounted to hold the bolt when in its rear position, a clip of cartridges contained in said magazine chamber, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of the clip, a firing train comprising a trigger and its actuated mechanism operatively arranged to fire said gun when the bolt is in breech closed position and to release said latch and concurrently actuate said bolt stop to hold the bolt when said bolt is in its rear position.

43. In a gun, in combination, a receiver having a magazine chamber, a barrel, a bolt movable back and forth in said receiver to open and close the breech, a bolt stop operably mounted to hold the bolt when in its rear position, a clip of cartridges contained in said magazine chamber, clip discharge mechanism tending to discharge said clip from said chamber, a latch for restraining the discharge of the clip, a firing train comprising a trigger and its actuated mechanism, said trigger being operatively mounted for an intermediate position of rest, a rearward stroke for firing and a forward stroke for releasing said latch and concurrently actuating said bolt stop into its bolt holding position, and means appurtenant to said bolt to prevent the forward release stroke of said trigger until said bolt has moved to its rearward position for its holding engagement by said bolt stop.

44. In a gun, the combination with a receiver having a magazine chamber, of a cartridge clip arranged to hold a stock of cartridges in a double row and impart a lateral pressure upon said double row stack, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, and said magazine chamber having elements cooperative with said clip when in said chamber to relieve said stack of cartridges from the lateral pressure of said clip.

45. In a gun, the combination with a receiver having a magazine chamber, of a cartridge clip arranged to hold a stock of cartridges in a double row and impart both a lateral and a vertical pressure upon said double row stack, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, and said magazine chamber having elements co-operative with said clip when in said chamber to relieve said stack of cartridges from the lateral pressure of said clip.

46. In a gun, the combination with a receiver having a magazine chamber, of a cartridge clip arranged to hold a stack of cartridges in a double row and comprising spring tensioned sides to impart a lateral pressure on said stack, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, and said magazine chamber having spreading elements therein engageable with the sides of said clip to relieve said stack of cartridges from the lateral pressure of said clip.

47. In a gun, the combination with a receiver having a magazine chamber, a barrel and a breech action, of a cartridge clip arranged to hold a stack of cartridges in a double row, said clip comprising spring side portions to impart lateral pressure on said stack, and a spring bottom portion to impart vertical pressure on said stack, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, spreading elements located in said magazine chamber and engageable with the side portions of said clip to relieve said stack of cartridges from the lateral pressure of said clip, means appurtenant to said breech action for loading a cartridge from said clip into said barrel, and feeding means operatively mounted on said gun comprising a follower movable in said chamber to feed said cartridges into position for loading, said follower and said clip bottom portion being cooperatively arranged to permit the travel of said follower through the bottom of said clip.

48. In a gun, the combination with a receiver having a magazine chamber, a barrel and a breech action, of a cartridge clip arranged to hold a stack of cartridges in a double row, said clip comprising spring side portions to impart lateral pressure on said stack, a spring bottom portion to impart vertical pressure on said stack and a vertically rigid top portion, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, said breech action comprising a bolt reciprocable in said receiver for loading a cartridge from said clip into said barrel, the top portion of said clip and said receiver being cooperatively arranged for coacting with said bolt in guiding the cartridges into said barrel, and spreading elements located in said magazine chamber and engageable with the side portions of said clip to relieve said stack of cartridges from the lateral pressure of said clip.

49. In combination, a gun having a magazine chamber, a cartridge clip arranged to hold a stack of cartridges and adapted for insertion with said cartridges en bloc into said magazine chamber, said clip having side walls and an open bottom, feeding means for said cartridges comprising a follower having a travel stroke through the bottom of said clip, and supporting levers for said follower pivoted on said gun and arranged to positively control the position of said follower in its travel.

50. In a gun, the combination with a receiver having a magazine chamber, a barrel and a breech action, of a cartridge clip arranged to hold a stack of cartridges in a double row, said clip comprising spring side

portions to impart lateral pressure on said stack, a spring bottom portion to impart vertical pressure on said stack and a vertically rigid top portion, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, said breech action comprising a bolt reciprocable in said receiver for loading a cartridge from said clip into said barrel, the top portion of said clip and said receiver being cooperatively arranged for coacting with said bolt in guiding the cartridge into said barrel, spreading elements located in said magazine chamber and engageable with the side portions of said clip to relieve said stack of cartridges from the lateral pressure of said clip, and feeding means operatively mounted on said gun comprising a follower movable in said chamber to feed said cartridges into position for loading, said follower and said clip bottom portion being cooperatively arranged to permit the travel of said follower through the bottom of said clip.

51. In a gun, the combination with a receiver having a magazine chamber and a barrel, of a cartridge clip arranged to hold a stack of cartridges in a double row and adapted for insertion with said cartridges en bloc into said magazine chamber, means for loading a cartridge from the top of said stack into said barrel, feeding means comprising a follower movable upwardly against the bottom of said stack, said cartridge clip comprising a back portion with spring tensioned side portions to embrace said stack and impart a lateral pressure thereto, the top of said side portions having rigid extensions above said stack to prevent vertical displacement thereof and the bottom of said side portions having spring tensioned extensions beneath said stack to impart vertical pressure thereto.

52. In a gun, the combination with a receiver having a magazine chamber and a barrel of a cartridge clip arranged to hold a stack of cartridges in a double row and adapted for insertion with said cartridges en bloc into said magazine chamber, means for loading a cartridge from the top of said stack into said barrel, feeding means comprising a follower movable upwardly against the bottom of said stack, said cartridge clip comprising a back portion with spring tensioned side portions to embrace said stack and impart a lateral pressure thereto, the top of said side portions having rigid extensions above said stack to prevent vertical displacement thereof and the bottom of said side portions having spring tensioned extensions beneath said stack to impart vertical pressure thereto, each of said clip side portions having an inwardly extending ridge adjacent said back portion to engage in front of the extracting rim of said cartridges.

53. In a gun, the combination with a receiver having a magazine chamber and a barrel, of a cartridge clip arranged to hold a stack of cartridges in a double row and adapted for insertion with said cartridges en bloc into said magazine chamber, said breech action comprising a bolt reciprocable in said receiver for loading a cartridge from said clip into said barrel, feeding means operatively mounted on said gun and comprising a follower movable in said chamber to feed said cartridges into position for loading, said cartridge clip comprising a back portion with spring tensioned side portions to embrace said stack and impart a lateral pressure thereto, the top of said side portions having rigid extensions above said stack to prevent vertical displacement thereof, and the bottom of said side portions having spring tensioned extensions beneath said stack to impart a vertical pressure thereto, said clip serving as a holder and guide for said cartridges while in said magazine chamber during the feeding and loading movements thereof, the upper back portion of said clip being cut away to allow a travel of the bolt through the upper end of said clip in the loading of a cartridge.

54. In a gun, the combination with a receiver having a magazine chamber, of a cartridge clip adapted for insertion in said chamber, said clip comprising a single integral piece of sheet metal bent in the form of a back portion with spring tensioned side portions to partially embrace a stack of cartridges arranged in a double row and impart a lateral pressure thereto, the top of said side portions having rigid extensions above said stack to prevent a vertical displacement thereof, the bottom of said side portions having spring tensioned extensions beneath said stack to impart vertical pressure thereto, the upper back portion of said clip being cut away to expose the base of the topmost cartridge in said stack, and an inwardly projecting ridge in each side portion of said clip adjacent the back portion to engage cannelures of said cartridges.

55. In combination, a gun having a magazine chamber adapted to receive a stack of cartridges, feeding means for said cartridges comprising a follower for engaging the bottom of the stack, a pair of supporting levers for said follower pivoted to said gun and having a connection to each end of said follower, said levers being arranged in crossed relation and interconnected at their crossing portions by a pivot pin on one lever working in a curved guide slot of the other lever and all constructed and arranged so as to positively control the position of the follower for its engagement with said stack.

56. In combination, a gun having a magazine chamber adapted to receive a stack of cartridges, feeding means for said cartridges comprising a follower for engaging the bottom of the stack, a pair of supporting levers for said follower pivoted to said gun at spaced

points above said follower when the latter is in its lowermost position, one of said levers having a pivotal connection to one end of said follower and the other lever having a pivoting and sliding connection to the other end of said follower, so that said levers and connections act to positively control the position of said follower for its engagement with said stack.

57. In combination, a gun having a magazine chamber adapted to receive a stack of cartridges arranged in two rows in staggered relation, feeding means for said cartridges comprising a follower having a stepped surface for engaging both rows at the bottom of said stack, supporting levers for said follower pivoted to said gun and having a connection to each end of said follower so as to positively control the position of the follower for its engagement with said stack.

58. In a gun comprising a barrel and loading mechanism therefor, in combination, a receiver having a magazine chamber, a stack of cartridges in said chamber, a follower engaging the bottom of said stack for successively presenting the top cartridge thereof into position for loading, actuating means for said follower comprising a pair of supporting levers pivoted on said gun, one for each end of said follower, constructed and arranged to give said follower a definitely prescribed movement for positioning the bottom of said stack in its travel within the magaine chamber.

59. In a gun comprising a barrel and loading mechanism therefor, in combination, a receiver having a magazine chamber, a stack of cartridges arranged in two rows staggered with respect to one another in said chamber, a follower having a stepped surface engaging the bottom of said stack for successively presenting the top cartridge thereof into position for loading, actuating means for said follower comprising a pair of supporting levers pivoted on said gun, one for each end of said follower, constructed and arranged to give said follower a definitely prescribed movement for positioning the bottom of said stack in its travel within the magazine chamber.

60. In a gun comprising a barrel and loading mechanism therefor, a receiver having a magazine chamber, the combination with a cartridge clip arranged to hold a stack of cartridges in a double row, said cartridges being tapered and forming a forwardly converging stack, said clip being adapted for insertion with said cartridges en bloc into said magazine chamber, a follower engaging the bottom of said stack for successively presenting the top cartridge thereof into position for loading, actuating means for said follower comprising a pair of supporting levers pivoted on said gun, one for each end of said follower, constructed and arranged to give said follower a definitely prescribed movement and progressive change of inclination with respect to said loading position for positioning the bottom of said stack in its travel within the magazine chamber.

61. In a gun comprising a barrel and loading mechanism therefor, in combination, a receiver having a magazine chamber, a stack of cartridges in said chamber, a follower engaging the bottom of said stack for successively presenting the top cartridge thereof into position for loading, actuating means for said follower comprising a pair of levers, one of said levers pivoted to said gun forwardly of said magazine for supporting one end of said follower, the other of said levers pivoted to said gun rearwardly of said magazine for supporting the other end of said follower, said levers being constructed and arranged to give said follower a definitely prescribed movement for positioning the bottom of said stack in its travel within the magazine.

62. In a gun comprising a barrel and loading mechanism therefor, in combination, a receiver having a magazine chamber, a stack of cartridges in said chamber, said cartridges being tapered and forming a forwardly converging stack, a follower engaging the bottom of said stack for successively presenting the top cartridge thereof into position for loading, actuating means for said follower comprising a pair of crossed levers, one of said levers pivoted to said gun forwardly of said magazine for supporting one end of said follower, the other of said levers pivoted to said gun rearwardly of said magazine for supporting the other end of said follower, said levers being interconnected at their crossing portions by a pin and cam slot engagement and arranged to give said follower a definitely prescribed movement and progressive change of inclination with respect to said loading position for positioning the bottom of said stack in its travel within the magazine.

63. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin mounted in said bolt, a sear mounted wholly on said bolt and carried thereby, a sear trip mounted in said conrod, and trigger mechanism for actuating said sear trip, the breech opening movement of said toggle serving to carry said sear trip out of connecting relation in said firing train.

64. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing train comprising a firing pin and

a sear therefor mounted in said bolt, a cocking piece for said firing pin mounted in said conrod, a sear trip mounted in said conrod, and trigger mechanism for actuating said sear trip, the breech opening movement of said toggle serving to carry said sear trip out of connecting relation in said firing train and causing said cocking piece to cock said firing pin.

65. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a firing train comprising a firing pin, a sear and sear trip therefor, a trigger, pivoted rocker operated therefrom, and a longitudinally extending trigger bar carried by said rocker, a spring tensioned between said rocker and trigger bar tending to restore said trigger to ready-to-fire position and to yieldingly locate the forward end of said trigger bar in position for actuating said sear trip.

66. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin mounted in said bolt, a sear mounted wholly on said bolt and carried thereby, trigger mechanism mounted in said receiver and a sear trip mounted in said conrod for connecting said trigger mechanism and said sear when said breech is closed.

67. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin and sear therefor mounted in said bolt, trigger mechanism mounted in said receiver and a sear trip mounted in said conrod for connecting said trigger mechanism and said sear when said breech is closed, and a cocking piece carried in said conrod serving to cock said firing pin upon the opening of the breech.

68. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin and sear therefor mounted in said bolt, a sear trip mounted in said conrod, trigger mechanism mounted in said receiver comprising a trigger, a rocker operated therefrom and a trigger bar reciprocable longitudinally in said receiver and a spring interposed between said trigger bar and rocker tending to yieldingly hold said trigger bar in position to trip said sear bar and to restore said trigger to firing position.

69. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, the articulation between said conrod and bolt providing for a rolling engagement between said conrod and bolt during the early part of the breech opening movement, a firing pin mounted in said bolt and a cocking piece therefor movably mounted in said conrod for cocking said firing pin and arranged for a continuous pivotal engagement with said bolt during the breech opening movement of said toggle so as to be effective in cocking said firing pin from the start of the breech opening movement.

70. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin and a sear therefor mounted in said bolt, a cocking piece for said firing pin movably mounted in said conrod and adapted to be adjusted into position for locking said sear against release, and manually operated means for adjusting said cocking piece to sear locking position.

71. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin and a sear therefor mounted in said bolt, a cocking piece for said firing pin movably mounted in said conrod and adapted to be adjusted into position for locking said sear against release, and manually operated means for adjusting said cocking piece to sear locking position comprising a member on said conrod adjustable to engage beneath an overhang in said receiver when said bolt is in breech closing position to prevent the opening movement of said toggle.

72. In a gun, in combination, a receiver, a bolt, a firing pin slidably mounted in said bolt and having a cocking notch, a firing spring, a sear having a nose to engage said cocking notch and an actuating arm, a firing spring guide supported at each end in bearings in said bolt for slight rectilinear movement in said bolt and adapted to bear against the actuating arm of said sear, said firing spring interposed between said guide and said firing pin so as to exert its force both on the actuating arm of said sear lever and said firing pin and thus serve both as a firing spring and a sear spring.

73. In a gun, in combination, a receiver, a breech action comprising a bolt reciprocable in said receiver for opening and closing the breech, a toggle articulated between said receiver and bolt comprising a crank and conrod, a firing pin slidably mounted in said bolt having a striker projecting beyond the face of the bolt in firing, a sear for said firing pin mounted in said bolt, a cocking piece movably mounted in said conrod and adjustable in position to lock said sear and having a por-

tion coacting with the portion of said firing pin to cock the same during the breech opening movement of the toggle, said coacting portions being coactively arranged to prevent the said striker projecting beyond the face of the bolt when the toggle is closed and said cocking piece is adjusted to lock the sear.

74. In a gun, in combination, a breech action comprising a bolt, a firing pin mounted in said bolt, a sear for holding and releasing said firing pin, a cocking piece arranged to coact with said firing pin and cock the same during the operation of the breech action, said cocking piece being adjustable in position to lock said sear against release.

75. In a gun, in combination, a breech action comprising a bolt, a firing pin mounted in said bolt and having a striker projecting beyond the face of the bolt in firing, a sear for holding and releasing said firing pin, a cocking piece having a portion coacting with a portion of said firing pin to cock the same during the operation of the breech action, said cocking piece being adjustable in position to lock the sear against release, the coacting portions of said sear and firing pin acting to prevent the striker projecting beyond the face of the bolt when the cocking piece is adjusted to lock the sear.

76. In a gun, in combination, a receiver, a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech, a firing pin and sear therefor both mounted on said bolt, a combined firing spring and sear spring acting with a rearward pressure on said sear and a forward pressure on said firing pin, means for arresting the rear movement of said bolt, and means for relieving the sear from the rearward pressure of said spring just prior to the arresting action on said bolt to avoid the recoil impact of said sear spring upon said sear.

77. In a gun, a receiver, a bolt, a shell extracting device in said bolt comprising an extractor slidably mounted for movement across the face of said bolt and a spring impelled actuator therefor slidably mounted for movement lengthwise of said bolt.

78. In a gun, a receiver, a bolt, a shell ejecting device comprising a spring actuated plunger mounted in a recess in the side of the bolt and adapted to project through an orifice in the face of the bolt, said spring acting to thrust said plunger forwardly for its ejecting action on said shell.

79. In a gun, in combination, a receiver, a breech action comprising a breech closure, an operating crank therefor, means for articulating said crank to said receiver including a crank pin, an upstanding portion of said gun at the rear of said crank pin serving as an abutment, a slide on said crank extending above and to the rear of said crank pin for a thrust contact against said abutment, and a closing spring housed between said slide and crank.

80. In a gun, in combination, a receiver, a breech action comprising a breech closure, an operating crank therefor, means for articulating said crank to said receiver including a crank pin, an upstanding portion of said gun at the rear of said crank pin and having a cam surface serving as an abutment, a slide on said crank extending above and to the rear of said crank pin for a thrust contact against the cam surface of said abutment, and a closing spring housed between said slide and crank, the cam surface of said abutment being shaped to increase the mechanical advantage of said closing spring during the latter part of the breech closing movement.

81. In a gun, in combination, a barrel, a receiver having a magazine chamber containing a stack of cartridges therein, a breech action comprising a bolt movable back and forth in said receiver for opening and closing said breech, a closing spring for said bolt adapted to actuate the same to load cartridges successively from said stack into said barrel, and means acting only when a full stack is in said magazine chamber to prevent the loading of the first cartridge of said stack by the bolt under the sole force of its closing spring.

82. In a gun, in combination, a barrel, a receiver having a magazine chamber, a cartridge clip arranged to hold a stack of cartridges and adapted for insertion with said cartridges en bloc into said magazine chamber, a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and adapted to load cartridges successively from said stack into said barrel, a closing spring for said bolt, said clip comprising means for holding a full stack of cartridges under such pressure as to prevent the loading of the first cartridge therefrom by the bolt under the sole force of its closing spring, said means being inactive after the first cartridge from a full stack has been removed.

83. In a gun, in combination, a barrel, a receiver having a magazine chamber, a cartridge clip arranged to hold a stack of cartridges and adapted for insertion with said cartridges en bloc into said magazine chamber, a breech action comprising a bolt movable back and forth in said receiver for opening and closing the breech and adapted to load cartridges successively from said stack into said barrel, a closing spring for said bolt, means for feeding said cartridges into position for being loaded comprising a follower engaging the bottom of said stack, said clip having a vertically acting spring means for holding a full stack of cartridges under such pressure as to prevent the loading of the first cartridge therefrom by the bolt under the sole force of its closing spring, said spring means being inactive after the first cartridge from a full stack has been removed.

84. In a gun, in combination, a stock of

wood or the like substance, a receiver and trigger guard mounted thereon, said receiver having at its forward portion depending walls forming a magazine chamber, said trigger guard having its forward end terminating at the rear of said magazine chamber, rear fastening means extending through said stock between said receiver and trigger guard, a transverse reinforcing member for said stock extending from side to side thereof at the rear of said magazine chamber, a transverse reinforcing member for said stock extending from side to side thereof at the front of said magazine chamber, a fastening bolt between the front end of said trigger guard and said rear reinforcing member, and a fastening bolt between the front end of said receiver and said front reinforcing member.

85. In a gun, in combination, a stock of wood or like substance, a receiver, and a trigger guard mounted on said stock, means for fastening an end of said trigger guard to said stock comprising a transverse reinforcing member for said stock extending from side to side thereof, and a fastening bolt between said trigger guard and said reinforcing member.

86. In a gun, in combination, a stock, a receiver, a barrel screwed into said receiver by a screw threaded engagement therewith, a locking recess at one side of said barrel, and a fastening bolt between said receiver and stock having a protruding end adapted to engage in said locking recess to prevent turning of the barrel.

87. In a gun, in combination, a stock, a receiver, a barrel secured to said receiver by a screw threaded engagement therewith, a locking recess at one side of said barrel, a transverse reinforcing member for said stock extending from side to side thereof and having a channel portion for interfitting with a depending portion of said receiver, and a fastening bolt between said receiver and stock passing through said reinforcing member for drawing said parts together, said bolt having a protruding end adapted to engage in said locking recess to prevent turning of said barrel.

88. In a gun, in combination, a receiver having a magazine chamber, a clip of cartridges contained in said magazine chamber, a cover for said magazine hinged at one end to said gun by a pivotal bearing permitting endwise movement of said cover and at its other end having a portion coacting with said gun for an endwise latching and unlatching of said cover, clip discharge mechanism comprising a kicker and an actuating spring therefor, said actuating spring arranged to have an endwise thrust against said cover to yieldingly hold it in latched engagement when closed.

89. In a gun, the combination with a receiver having horizontal tracks therein, of a bolt with coacting portions retained and guided in said tracks for reciprocable movement in opening and closing the breech, forwardly and upwardly inclined tracks in said receiver communicating with said horizontal tracks at the rear part of said receiver whereby said bolt may be moved rearwardly and tilted into said inclined tracks for removal from said receiver in the disassembly thereof.

90. In a gun, the combination with a receiver, a barrel having a firing chamber and a breech action comprising a bolt movable back and forth in said receiver to open and close the breech, of a cartridge for introduction into said firing chamber, the breeching length of said cartridge being slightly in excess of the breeching space in said firing chamber, the breech closing movement of said bolt acting to forcibly shorten the breeching length of said cartridge to fit the breeching space of said firing chamber.

91. In a gun, the combination with a receiver, a barrel having a firing chamber with a tapered breech up seat, and a breech action comprising a bolt movable back and forth in said receiver to open and close the breech, of a cartridge for introduction into said firing chamber having a head and a tapered breech up shoulder spaced from said head, said shoulder adapted to abut the breech up seat of said firing chamber, the breeching length of said cartridge (i. e., distance between the head and breech up shoulder of the cartridge) being slightly in excess of the breeching space in said firing chamber (i. e., distance between the face of the closed bolt and the breech up seat in the firing chamber), the breech closing movement of said bolt acting to forcibly swage the breech up shoulder of said cartridge and reform the cartridge to fit the breeching space of said firing chamber.

In testimony whereof I have affixed my signature.

JOHN D. PEDERSEN.