O. V. PAYNE.

GUN.

APPLICATION FILED DEC. 19, 1919.

1,403,623.

Patented Jan. 17, 1922.

3 SHEETS—SHEET 1.

Fig. 1.

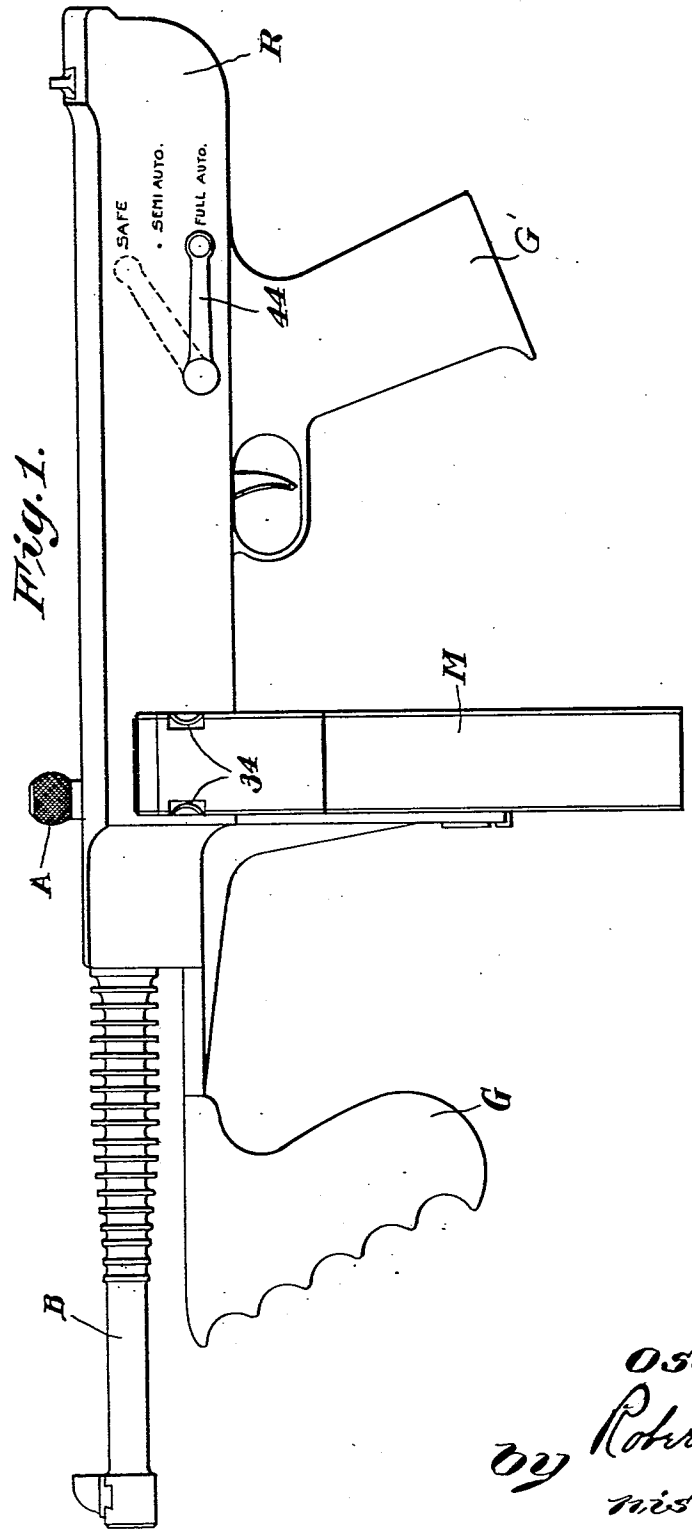
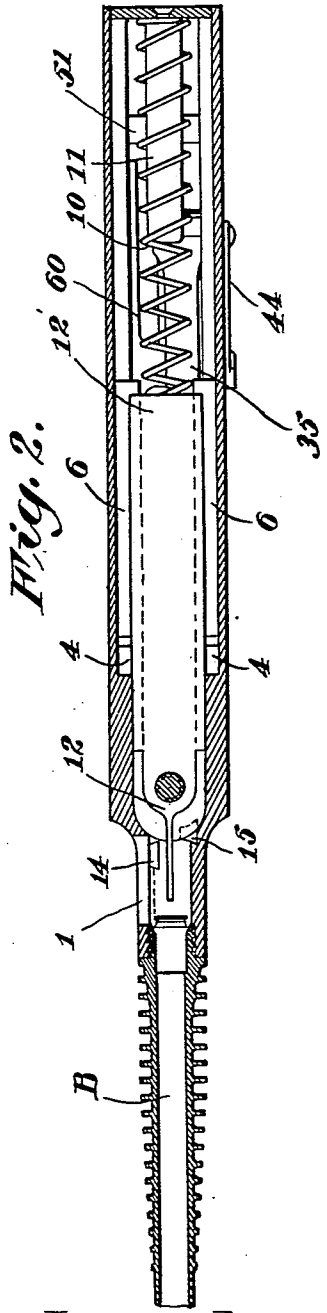


Fig. 2.



Inventor
Oscar V. Payne
by Roberts Roberts & Cushman
his Attorneys

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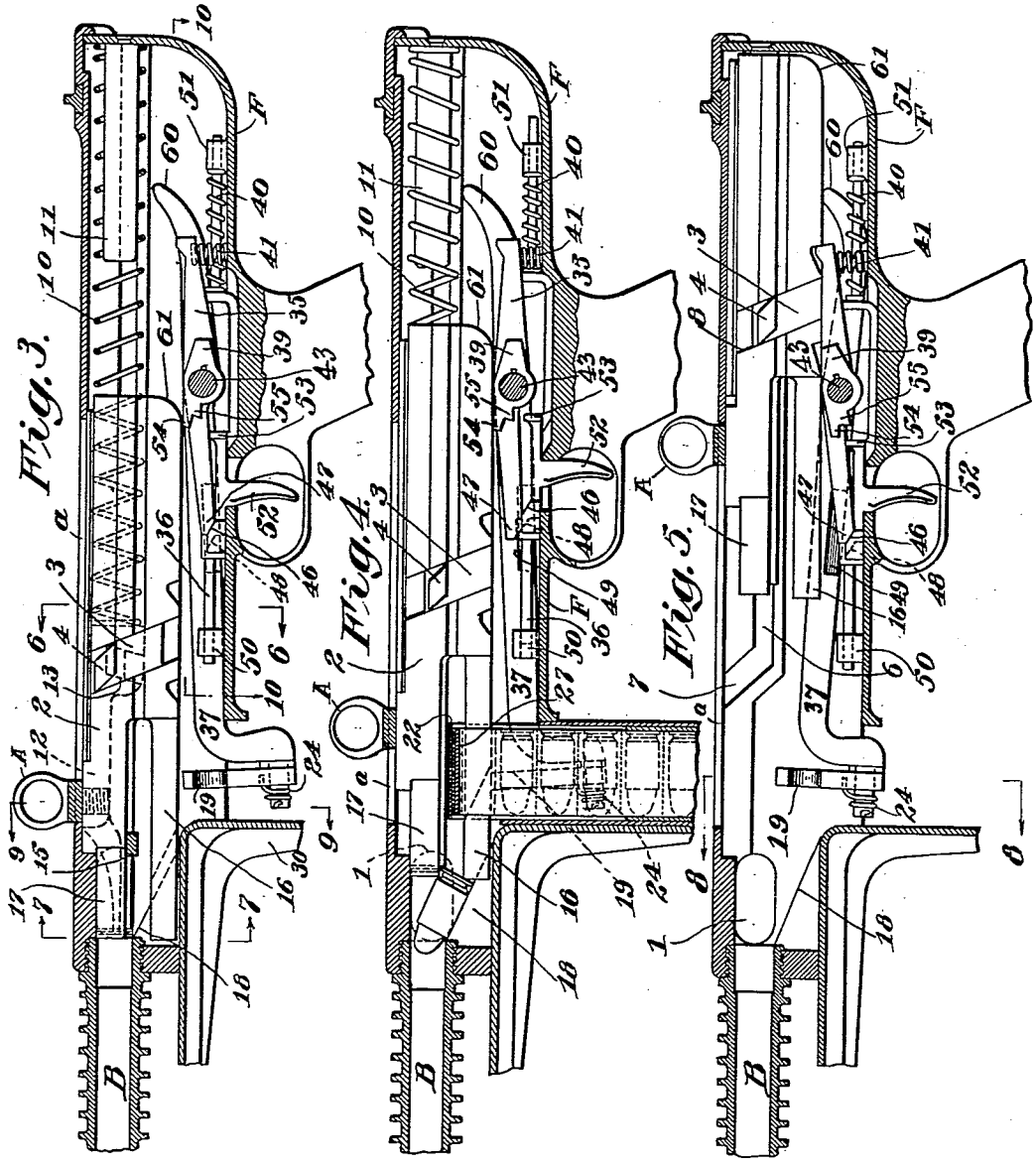

Fig. 3.

Fig. 4.

Fig. 5.

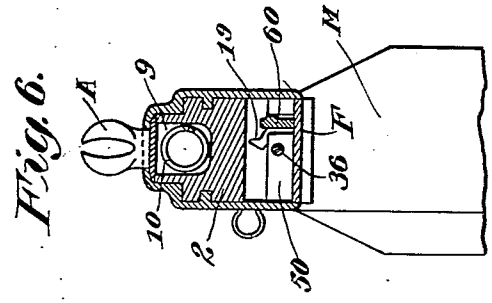

Fig. 6.

Inventor
Oscar V. Payne
by Roberts Roberts & Cushman
his Attorneys

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3 SHEETS—SHEET 3.

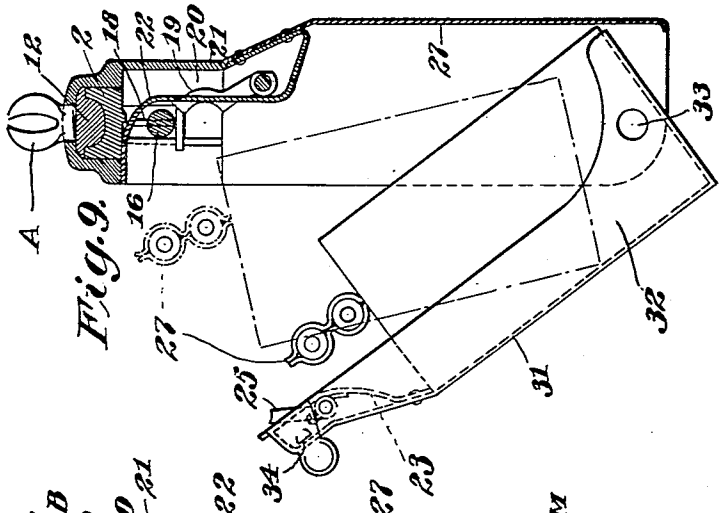

Fig. 9.

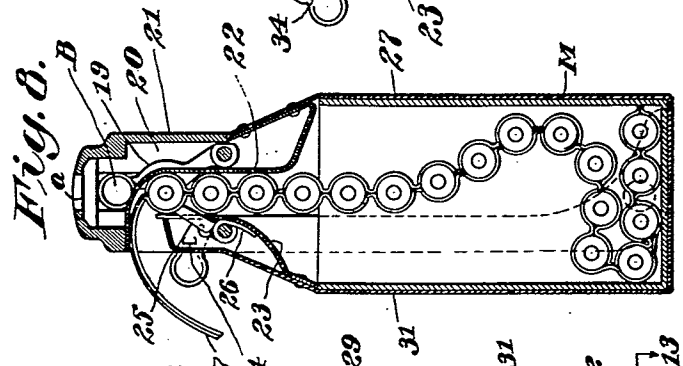

Fig. 8.

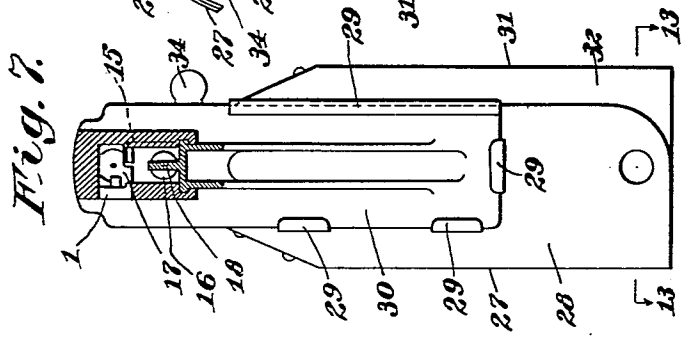

Fig. 7.

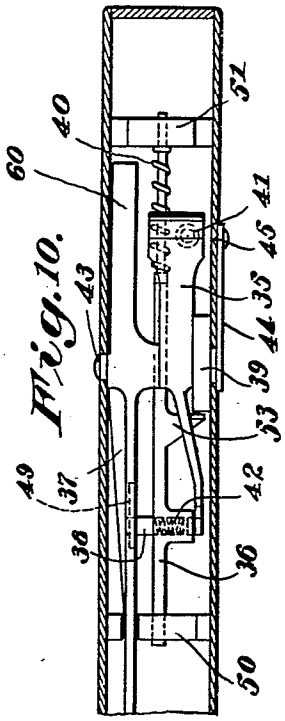

Fig. 10.

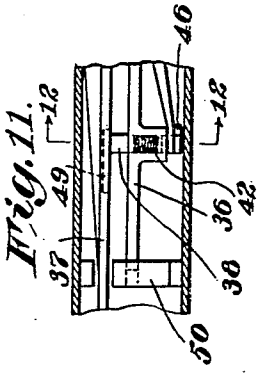

Fig. 11.

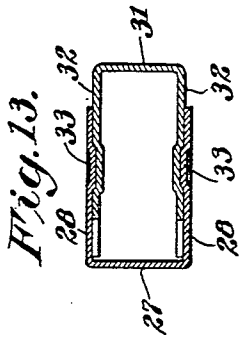

Fig. 13.

Fig. 12.

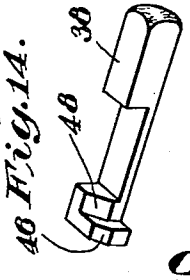

Fig. 14.

Inventor
Oscar V. Payne
by Roberts Roberts & Cushman
his Attorneys

UNITED STATES PATENT OFFICE.

OSCAR V. PAYNE, OF CLEVELAND, OHIO, ASSIGNOR TO AUTO-ORDNANCE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

GUN.

1,403,623. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed December 19, 1919. Serial No. 346,040.

To all whom it may concern:

Be it known that I, OSCAR V. PAYNE, a citizen of the United States, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Guns, of which the following is a specification.

This invention relates to guns and more particularly to the breech mechanism of automatic firearms, i. e., full automatic or semi-automatic firearms, such as pistols, rifles, machine guns and the like, although the invention in most, if not all, aspects is applicable to heavy guns.

The objects of the invention are to provide a gun having improved means for feeding cartridges to the firing chamber, for rendering the action full automatic or semi-automatic or safe at will, and to correlate the feeding and controlling means in a simple and effective manner, whereby the construction of the gun is simplified and its action is unified.

Other objects of the invention will appear from the illustrative disclosure of the concrete embodiment described hereinafter and shown in the accompanying drawings in which—

Fig. 1 is a left side elevation;

Fig. 2 is a horizontal axial section;

Fig. 3 is a vertical axial section, showing the operative mechanism in elevation and set for full automatic operation, and showing the breech closed, the trigger in normal position, and the magazine removed;

Fig. 4 is a similar section, showing the mechanism set for full automatic operation, the breech almost closed, the trigger fully retracted, and the magazine attached;

Fig. 5 is a similar section, showing the mechanism set for semi-automatic operation, the breech closure fully retracted, the trigger in normal position, and the magazine removed;

Fig. 6 is a vertical transverse section on line 6—6 of Fig. 3;

Fig. 7 is a vertical transverse section, looking rearwardly on line 7—7, of Fig. 3;

Fig. 8 is a vertical transverse section, looking forwardly, on line 8—8 of Fig. 5, showing the breech open;

Fig. 9 is a similar section on line 9—9 of Fig. 3, showing the magazine open and partly in elevation, and showing the breech closed;

Fig. 10 is a horizontal section on line 10—10 of Fig. 3, showing the control mechanism in the position occupied when the breech closure is held open by the sear and the trigger is in normal position;

Fig. 11 is a similar partial section showing the parts in the positions occupied when the breech is closed and the trigger is retracted;

Fig. 12 is a vertical transverse section on line 12—12 of Fig. 11;

Fig. 13 is a horizontal section of the magazine on line 13—13 of Fig. 7; and

Fig. 14 is a perspective of the disconnector.

The particular embodiment of the invention chosen for the purpose of illustration comprises a hand machine gun having a receiver R, a barrel B threaded into the forward end of the receiver, a foregrip G disposed beneath the barrel and connected to the forward end of the receiver, a rear grip G′ attached to the frame member F and a magazine M. The receiver R is open on the bottom and at the rear, and this opening is adapted to be closed by the frame F which is detachably connected to the receiver by lugs (not shown) this construction being described and claimed in my copending application Ser. No. 342,698, filed December 5, 1919. The receiver R is provided with an opening on its lower and left-hand sides near the forward end to receive the magazine and on the right-hand side with an ejection opening 1 (Figs. 5 and 7).

The breech closure is automatic, and preferably of the general type described and claimed in prior applications Sr. No. 203,873 filed November 26, 1917; and Sr. No. 203,887 filed November 26, 1917; and Sr. No. 282,642, filed March 14, 1919, comprising a reciprocating breech member 2 arranged to slide longitudinally in receiver R, and a lock 3 arranged to slide transversely of the breech member into and out of locking position, and to move longitudinally with the breech member when in unlocked position, the lock comprising a U-shaped member fitting over the breech member and sliding in oblique grooves 8 on the opposite sides of the breech member. The lock is provided on its opposite sides with lugs 4 adapted to slide in guides in the receiver, the receiver guides comprising longitudinal por-

tions 6 and oblique forward portions 7. When the lock is in the lower position shown in Figs. 4 and 5, the lugs 4 slide in the longitudinal portions 6, and when the breech closure is advanced into closed position the lugs 4 slide upwardly into the oblique portion 7 of the guides. The oblique abutting surfaces 8 between the lock and the breech member and the oblique surfaces between the locking lugs 4 and the oblique forward portion 7 of the receiver guideways are inclined to the axis of the gun at angles differing from each other to such extent that the lock remains in locked position under high breech pressure, but is moved into unlocked position when the breech pressure has decreased to a relatively low value, according to the discovery disclosed in the patent to Blish, 1,131,319, granted March 9, 1915. Inasmuch as this method of automatically locking and unlocking the breech closure is fully set forth in the prior applications above referred to, and inasmuch as the breech closure may be provided with any suitable automatic locking mechanism in so far as the present invention is concerned, this part of the disclosure requires no further description.

As shown in Fig. 6, the rear portion of the breech member 2 is provided on its upper side with a U-shaped opening 9 adapted to receive the recoil spring 10, the spring 10 abutting against a portion of the breech closure at its forward end of the opening 9 and against the rear end of the frame F at its rearward end. A rod 11 is secured to the rear end of the frame F to serve both as a guide for the spring 10 and also as a buffer to absorb the excess recoil in case the breech closure recoils an abnormal distance. A firing member 12, shown in full lines in Fig. 2 and in dotted lines in Fig. 3, and in section in Fig. 9, is arranged to slide in a groove in the upper side of the breech member 2, the firing member being provided with an oblique groove 13, (Fig. 3) adapted to fit over the central portion of the lock 3, to cause the firing member to move into firing position as the bolt moves into locking position and to retract the firing member relatively to the bolt as the lock moves out of locking position. The firing member 12 is provided with an actuator A projecting upwardly through a slot *a* in the receiver for manually retracting the breech closure if desired. The firing member is also provided with a flat tail 12′ covering the recoil spring opening in the breech closure. Inasmuch as firing mechanism of this character is fully described in the aforesaid application Sr. No. 282,642, and inasmuch as this particular type of mechanism may be replaced by any suitable firing mechanism in so far as the present invention is concerned, it will not be further described.

The extractor 14 may be of any suitable construction, but is illustrated as constructed in accordance with the disclosure in my former application Sr. No. 297,284, filed May 15, 1919. The ejector 15 comprises a flat lug set into a groove in the receiver in position to extend into a recess on the lower left-hand corner of the bolt (Figs. 2, 3 and 7).

One of the characteristic features of the present invention is embodied in the illustration in the form of a plunger 16 extending forwardly from the body of the breech closure immediately below and in parallelism with the bolt portion 17 of the breech closure. This plunger is intended to engage cartridges when delivered to a position on the lower side of the path of the bolt and advance them into the path of the bolt 17 to be inserted into the firing chamber in the forward movement of the breech closure. I therefore provide a guide in the form of a rib 18 whose upper edge slopes upwardly from the magazine mouth to the firing chamber (Figs. 3 and 4) the plunger 16 being slotted so as to straddle the rib 18 (Figs. 3, 4 and 7). In the forward movement of the breech closure, plunger 16 engages the cartridge and pushes it forwardly causing it to ride upwardly over the inclined guide 18 into the path of the bolt 17, as illustrated in Fig. 4. In order to cause the cartridge to clear the forward face of the bolt the plunger 16 projects forwardly somewhat beyond the forward face of the bolt.

In the case of belt feeding by means of a cartridge belt having pockets adapted to carry the cartridges, the present invention is especially applicable inasmuch as it is possible, by making the plunger 16 of such cross-sectional contour as to pass through the pockets in the belt, to push the cartridges forwardly out of the pockets and thence move them upwardly into the path of the breech bolt, all in the forward movement of the breech closure and without separating or detaching the parts of the belt from each other. Consequently I have illustrated in the drawings a belt feed, the plunger 16 being made circular in cross-section and somewhat smaller in diameter than the cartridges (Figs. 4 and 7).

Associated with the aforesaid means for advancing cartridges from a position at one side of the path of the bolt into a position in advance of the bolt, I have provided improved means for advancing the cartridges into the first named position. The illustrated embodiment of this improved means comprises ratchet pawl 19 adapted to oscillate up and down in the space 20 (Fig. 8) between the wall 21 of the receiver and the wall 22 of the magazine. While this pawl may be oscillated along a rectilinear path it is preferably oscillated about a pivot as

hereinafter described. The pawl 19 is arranged to extend through a slot in the wall 22 into the channel formed between the wall 22 and the opposite wall 23 of the magazine. The pawl 19 is yieldingly urged in a counterclockwise direction (Fig. 8) by means of a spring 24 (Figs. 3 to 5) into engagement with the cartridge belt as shown most clearly in Fig. 8. As the pawl moves downwardly it rides over one cartridge and engages behind the next cartridge, so that when the pawl is moved upwardly the next cartridge is advanced into the position occupied by the uppermost cartridge in Fig. 8. In order to hold the cartridge in this position a second pawl 25 is preferably mounted on the outside of the wall 23 so as to be yieldingly urged by means of a spring 26 through a slot in the wall 23 into engagement with the foremost cartridge as illustrated in Fig. 8.

While the cartridges may be supplied to the channel between the walls 22 and 23 in various ways, I have illustrated the cartridges as being carried in pockets in a belt 27, in which case the pawls may engage the cartridges directly at one side of the belt, but they preferably engage the cartridges indirectly through the belt. The wall 22 bends to the left through the space between the plunger 16 and the bolt 17 (Figs. 4 and 8) so as to guide the free end of the belt outwardly to the left-hand side of the gun. The wall 22 is secured at its lower end to the rear wall 27 of the magazine M, the rear wall 27 being integral with the side walls 28, one of which is provided with slips 29 adapted to fit over the downwardly extending portion 30 of the receiver to hold the magazine in place (Fig. 7). The wall 23 is secured to the forward wall 31 of the magazine, the wall 31 being provided with side portions 32 having the general shape illustrated in Fig. 9. The portion of the magazine comprising the walls 31 and 32 is pivotally connected to the other portion by means of interfitting indentations 33, so that this portion (Figs. 8 and 9) may be swung outwardly into the position shown in Fig. 9, spring catches 34 being provided normally to hold the magazine closed. This construction of the magazine permits the use of cartons of cartridges, the belts of cartridges being folded back and forth in the cartons as illustrated in Fig. 8. To fill the magazine, the magazine is opened, a carton is set bodily into the magazine, the top of the carton being removed either before or after the carton is inserted, and the upper end of the belt is pulled outwardly until the first cartridge rests in front of the pawl 25, after which the magazine is closed in condition for firing. In this way the cartridges may be packed in cartons at the factory or arsenal and kept in the cartons until actually fired, it being unnecessary to remove them from the cartons to place them in the magazines, the only requirement being that the tops of the cartons be removed and the end of the belt pulled somewhat out of the carton before the carton is placed in the magazine. This not only prevents the cartridges from accumulating dust and dirt prior to and at the time of being placed in the magazines, but it greatly facilitates and expedites the loading of the magazine.

The control mechanism for the breech action comprises a sear 35, a trigger 36, an oscillatory arm or lever 37, a disconnector 38, a safety catch 39, a trigger spring 40, a sear spring 41, a disconnector spring 42 and a pivot pin 43 upon which the sear 35 and lever 37 and safety catch 39 are mounted. The pin 43 is journaled in the opposite sides of the receiver 3, and has an arm 44 integrally or otherwise fixedly attached to the left-hand end thereof, the arm 44 having a catch 45 adapted to seat in indentations in the receiver in the various positions of adjustment and being sufficiently elastic to spring outwardly in moving between the indentations. The safety catch 39 is keyed to the pin or shaft 43 as shown in Figs. 3 to 5, whereas the sear 35 and lever 37 are pivotally mounted on the pin or shaft. The sear 35 is adapted to retain the breech closure open in the position shown in Fig. 5 and to free the breech closure in the position shown in Fig. 4.

The lever 37 is provided with an upturned extension 60 at its rearward end adapted to be engaged by the curved rearward end 61 of the breech closure in the rearward movement of the breech closure to oscillate the lever from the position shown in Figs. 3, 4 and 9, to the position shown in Figs. 5 and 8. The aforesaid cartridge advancing pawl 19 is pivotally mounted on the forward end of this lever so as to be oscillated upwardly in the rearward movement of the bolt. As the bolt moves forward, it rides over the forward end of the lever 37, thereby moving it in a counter-clockwise direction into the position shown in Figs. 3, 4 and 9, thereby ratcheting the pawl 19 downwardly over the next cartridge.

The disconnector 38 comprises a pin movable transversely in a transverse opening in the trigger 36 as shown in Fig. 12, a spring being provided to yieldingly urge the disconnector to the right of the gun (to the left in Fig. 12). The disconnector is provided at its left-hand end with a beveled shoulder 46 adapted to engage the beveled forward end 47 of the sear when the trigger is retracted, to move the sear in a clockwise direction to disengage the breech closure. Inwardly of the shoulder 46 is a second beveled shoulder 48 disposed slightly in advance of the shoulder 47, the shoulder 48 being formed by cutting a beveled recess in

the top of the disconnector, and the shoulder 46 being formed on a flange extending rearwardly from the end of the disconnector. The right-hand end of the disconnector 38 extends into the path of the lever 37, and the lever 37 is provided with a beveled surface 49 (Figs. 5, 10 and 12) adapted to engage the end of the disconnector and move it to the left against the action of the spring 42. In the normal position of the disconnector, the beveled surface 46 is in alignment with the beveled end of the sear, whereas when the disconnector is moved to the left by the lever 37 the beveled surface 48 is brought into alignment with the beveled end of the sear.

The trigger 36 is slidably mounted in guides 50 and 51 at its ends, and is normally urged in a forward direction by the spring 40. The finger piece 52 is preferably formed integrally with the trigger 36, and extends downwardly through an opening in the frame F, which opening serves to limit the forward and rearward movement of the trigger as illustrated in Figs. 3 to 5. The trigger 36 is provided with a shoulder 53 which is adapted to engage shoulders 54 and 55 on the safety catch 39 in certain adjustments of the safety catch, in order to limit the rearward movement of the trigger. When the arm 44 of the safety catch is in the dotted line position marked "Safe" in Fig. 1, the shoulder 54 of the safety catch is positioned immediately behind the lug 53 so that the trigger can not be moved at all. When the arm 44 is in the intermediate position marked "Semi-auto" in Fig. 1, the shoulder 55 is disposed in the path of the lug 53 so that the trigger may be moved rearwardly only approximately half way. When the arm 44 is in the full line position marked "Full auto" in Fig. 1, the trigger and trigger bar may be retracted to the full extent, as shown in Fig. 4.

During substantially the first half of the rearward movement of the trigger, the beveled shoulder 46 of the disconnector, which is carried rearwardly with the trigger, actuates the sear sufficiently to free the breech closure. Upon the forward movement of the breech closure, the lever 37 is moved from the position shown in Fig. 5 to the position shown in Fig. 4. This movement of the lever 37 moves the disconnector to the left until the shoulder 47 of the sear is in alinement with the shoulder 48 instead of the shoulder 46 of the disconnector. The distance between the shoulders 46 and 48, lengthwise of the gun, is such that when the trigger is half-way retracted, the shoulder 48 will not engage the shoulder 47 of the sear to disengage the sear from the breech closure, only when the sear is in counter-clockwise position, that is, in the position shown in Fig. 5, wherein it engages the bolt. Consequently, when the disconnector is moved to the left by the lever 37, the sear is freed from the disconnector (assuming that the trigger is only half-way back), and is therefore free to be moved into engagement with the breech closure by means of the spring 41 when the breech closure recoils. However, if the trigger is retracted to the full extent, the shoulder 48 maintains the sear in the inoperative position as shown in Fig. 4, so that it cannot catch the breech closure upon the recoil. Thus, when the trigger is held in full retracted position, the operation of the gun continues automatically. And from the foregoing it will be apparent that if the safety catch is set in semi-automatic position so that the trigger can be retracted only half-way, the sear will catch the breech closure upon each recoil, and that in order to fire another shot it is necessary to release the trigger and then again retract it. Upon the release of the trigger, the disconnector is moved forwardly until the shoulder or flange 46 clears the end 47 of the sear, whereupon the spring 42 moves the disconnector to the right until the shoulder 46 is brought beneath the shoulder 47, as shown in Figs. 3 and 5.

From the foregoing it will be apparent that the lever 37 functions both to advance the cartridges into position to be picked up by the breech closure and also as a disconnector actuator to produce either full automatic or semi-automatic firing.

I claim:

1. A gun comprising a firing chamber, a breech bolt movable to and from the firing chamber, means including a belt carrying cartridges in pockets substantially surrounding the cartridges for positioning cartridges at one side of the path of said bolt, and means including a plunger movable with the bolt through said pockets for pushing the cartridges forwardly out of the pockets into the path of the bolt.

2. A gun comprising a firing chamber, a breech bolt movable to and from the firing chamber, means including a belt carrying cartridges in pockets substantially surrounding the cartridges at one side of the path of said bolt, and means including a plunger movable through said pockets for pushing the cartridge forwardly out of the pockets into the path of the bolt, said plunger being advanced by said bolt.

3. A gun comprising a firing chamber, a breech bolt movable to and from the firing chamber, means for positioning cartridges at one side of the path of said bolt, a guideway extending forwardly from said position and inclining inwardly toward said path, and a plunger attached to said bolt and extending slightly in advance of the bolt to push cartridges from said position along said guideway into said path to be

inserted into the firing chamber in the closing movement of the bolt.

4. A gun comprising a firing chamber, a breech bolt movable to and from the firing chamber, means for positioning cartridges at one side of the path of said bolt, a rib extending forwardly from said position and inclining toward said path, and a plunger movable forwardly on said side of the path of said bolt to push cartridges from said position along said inclined rib into said path to be inserted into the firing chamber in the closing movement of the bolt, said plunger having parts movable along opposite sides of said rib.

5. A gun comprising a firing chamber, a breech bolt, means for feeding cartridges into a position beneath the path of said bolt, a vertical rib having its upper edge sloping upwardly from said position toward the firing chamber, and a plunger disposed beneath said bolt and extending slightly in advance thereof, the plunger being bifurcated to straddle said rib, and the parts being so coordinated that upon the forward movement of the bolt a cartridge will be moved by said plunger from said position forwardly over said rib into the path of the bolt and thence advanced by the bolt into the firing chamber.

6. A gun comprising a firing chamber, a breech closure, means for feeding cartridges into a position to be inserted into the firing chamber by said closure, said means comprising spaced walls forming a cartridge channel therebetween, one of said walls being movable away from the other wall to permit the insertion of cartridges, and a pawl pivoted on said movable wall to hold cartridges in said position.

7. A gun comprising a firing chamber, a breech closure, means for feeding cartridges into a position to be inserted into the firing chamber by said closure, said means comprising spaced walls forming a cartridge channel therebetween, one of said walls being movable away from the other wall to permit the insertion of cartridges, and an oscillatory pawl extending through a slot in the other wall to advance the cartridges along said channel into said position.

8. A gun comprising a firing chamber, an automatic breech closure, a pivoted arm arranged to be oscillated by the breech closure, a trigger, a sear, means on said arm for feeding cartridges to said breech closure, and means actuated by the said arm for operatively dissociating the sear from the trigger at each shot.

9. A gun comprising an automatic breech closure, a sear for holding said closure open, a trigger for disengaging said sear from said closure, a disconnector movably interposed between the trigger and sear, said disconnector having one position in which the sear can be actuated by the trigger for semi-automatic firing and another position in which the sear cannot be actuated by the trigger for semi-automatic firing, and means for automatically moving the disconnector into the latter position after the trigger is actuated and before the breech closure has recoiled.

10. A gun comprising an automatic breech closure, a sear for holding said closure open, a trigger for disengaging said sear from said closure, a disconnector movably interposed between said sear and trigger, said disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the sear may not be actuated by the trigger, and means associated with said closure for moving the disconnector into inoperative position in the closing movement of the closure and into operative position in the opening movement of the closure.

11. A gun comprising an automatic breech closure, a sear for holding said closure open, a trigger for disengaging said sear from said closure, a disconnector movably interposed between said sear and trigger, said disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the sear may not be actuated by the trigger, and means associated with said closure for moving the disconnector into inoperative position in the closing movement of the closure.

12. A gun comprising an automatic breech closure, a sear member for holding said closure open, a trigger member for disengaging said sear from said closure, a disconnector movably interposed between said sear and trigger, said disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the sear may not be actuated by the trigger, and means associated with said closure for moving the disconnector into inoperative position in the closing movement of the closure, the parts being correlated to maintain the disconnector in inoperative position until one of said members has been restored to normal position.

13. A gun comprising an automatic breech closure, a sear member for holding said closure open, a trigger member for disengaging said sear from said closure, a disconnector movably interposed between said sear and trigger, said disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the sear may not be actuated by the trigger, and means associated with said closure for moving the disconnector into inoperative position in the closing movement of the closure, the parts

being correlated to maintain the disconnector in inoperative position until said trigger member has been restored to normal position.

14. A gun comprising an automatic breech closure, a sear member for holding said closure open, a trigger member for disengaging said sear from said closure, a disconnector movably interposed between said sear and trigger, said disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the sear may not be actuated by the trigger, and means associated with said closure for moving the disconnector into inoperative position in the closing movement of the closure and into operative position in the opening movement of the closure, the parts being correlated to maintain the disconnector in inoperative position until one of said members has been restored to normal position.

15. A gun comprising a sear, a trigger, a disconnector interposed between the sear and trigger, a member for moving the disconnector into inoperative position, a safety catch, and a common pivot for said sear and member and catch.

16. A gun comprising an automatic breech closure, a sear for holding said closure open, a trigger for actuating the sear, and means conjointly to advance cartridges into position to be inserted into the firing chamber by the breech closure and operatively to dissociate said trigger from said sear at each shot.

17. A gun comprising an automatic breech closure, a sear for holding said closure open, a trigger for actuating the sear, a disconnector interposed between the sear and trigger operatively to dissociate the sear from the trigger, and means actuated by the breech closure for moving said disconnector into inoperative position and also feeding cartridges into position to be inserted into the firing chamber by the breech closure.

18. A gun comprising an automatic breech closure, means for feeding cartridges including a pivoted arm arranged to be oscillated by the breech closure and mechanism for controlling the breech closure including means controlled by said arm for rendering the action either full automatic or semi-automatic.

19. A gun comprising a firing chamber, a breech closure, and means for feeding cartridges into a position to be inserted into the firing chamber of said closure, said means comprising a pivoted lever, a cartridge advancing pawl thereon, and means on said lever to affect the rate of fire of the gun.

Signed by me at Cleveland, Ohio, this 11th day of December, 1919.

OSCAR V. PAYNE.