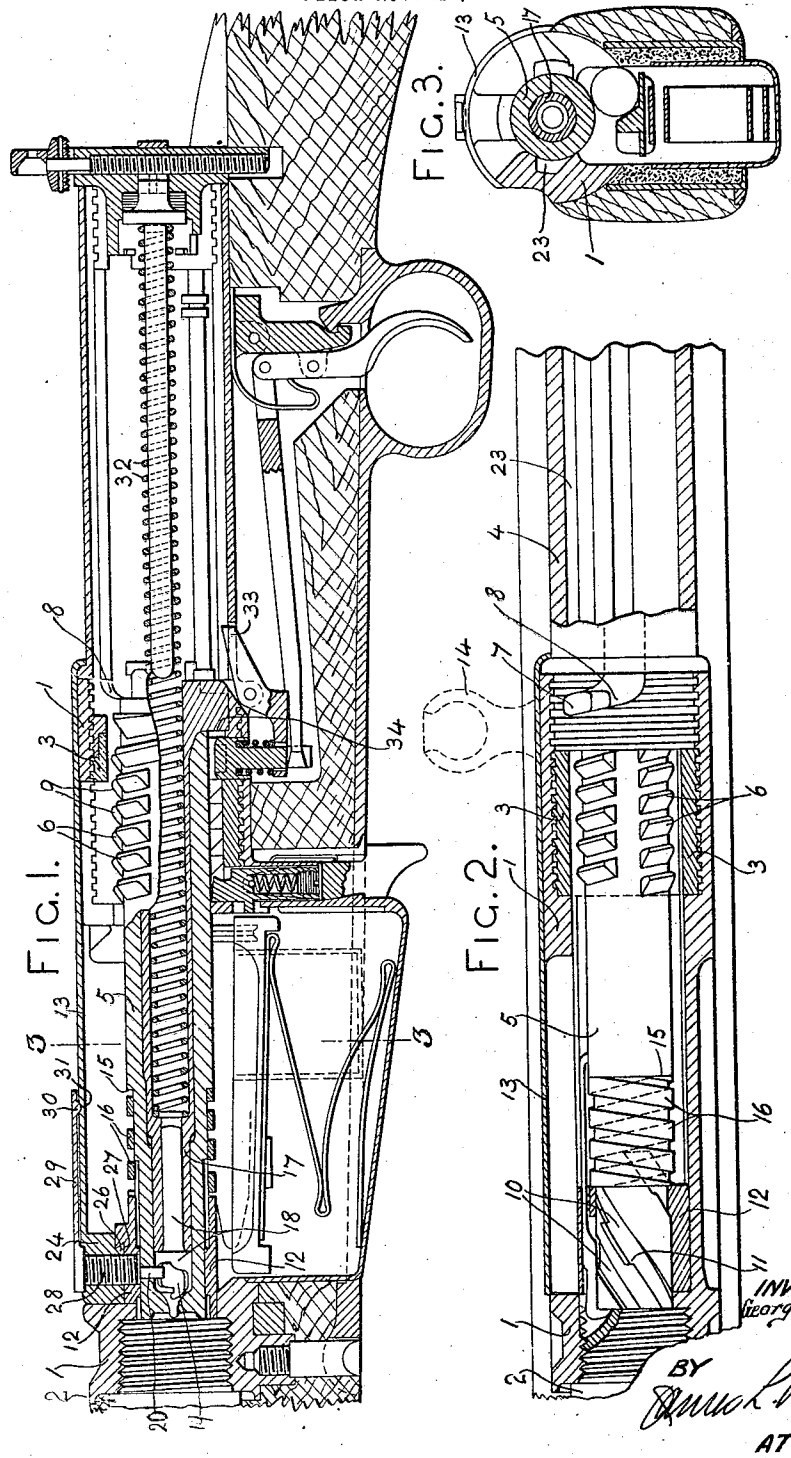
July 26, 1927. 1,637,233

G. NORMAN

SMALL ARM

Filed Nov. 17, 1926 2 Sheets-Sheet 1



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SMALL ARM

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FIG. 4a.

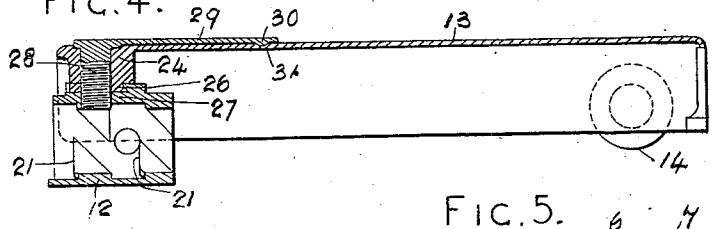


FIG. 5.

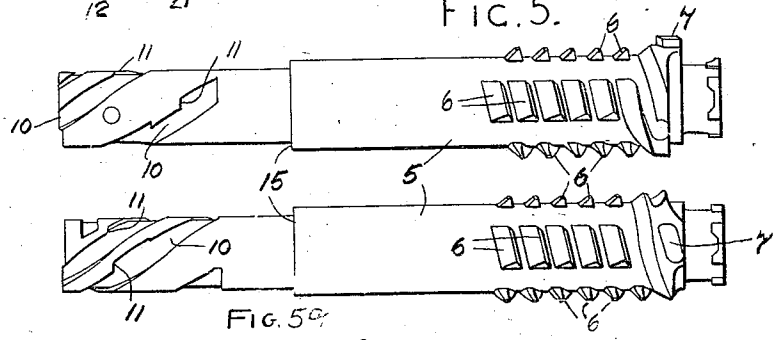


FIG. 5a.

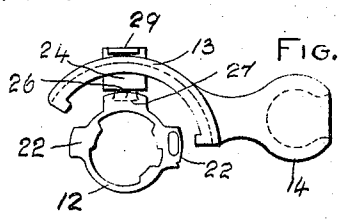


FIG. 4.

FIG. 6.

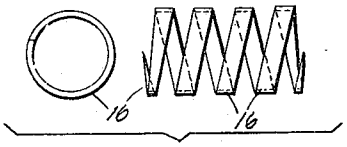
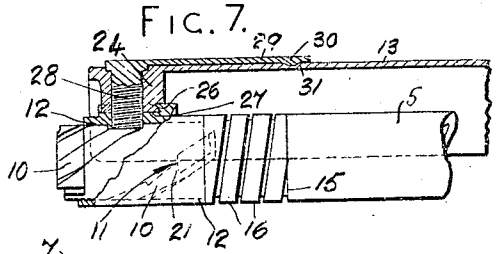


FIG. 7.



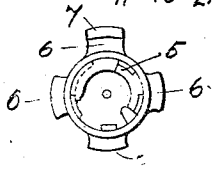


FIG. 5b.

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Patented July 26, 1927. 1,637,233

UNITED STATES PATENT OFFICE.

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SMALL ARM.

Application filed November 17, 1926, Serial No. 148,953, and in Great Britain July 9, 1925.

This invention relates to improvements in small arms, whether of the automatic or semi-automatic types, embodying bolts or breech closures which have a combined rotary and reciprocating movement, and wherein the receiver and bolt are provided with locking abutments inclined at such an angle to the line of breech pressure as to offer sufficient resistance during the explosion to maintain the closure of the breech but at the same time permit the partial rotation of the bolt to release the locking abutments thereon from engagement with locking abutments in the receiver.

An object of the invention is to provide improved means for effecting the rotary locking movement of the breech bolt. A further object is to provide means whereby the opening in the receiver is covered when the bolt is in its forward or closed position, the said means being further adapted to permit of the manual operation of the gun. Another object is to dispense with the open slots or gaps in the receiver or breech body which are usually employed to control reciprocating movement and to effect rotary movement of the breech bolt, and thereby exclude dust and foreign matter from the breech mechanism.

According to the invention the initial rotary movement of the breech bolt or closure to bring the locking abutments thereon into engagement with locking abutments in the receiver is effected by means of the engagement of a projection on the bolt with a cam groove in the receiver when the bolt reaches the inner end of its longitudinal reciprocating movement, and the final rotary locking movement is effected by the engagement of helical cam grooves on the inner or forward end of the breech bolt with a nut or threaded sleeve attached to the under side of a longitudinally slidable cover plate mounted on the upper side of the receiver, said cover plate being adapted to completely overspread the mouth of the receiver when the breech mechanism is in its closed position.

The invention also provides means for assisting the rotary locking movement of the breech bolt, comprising a compression spring interposed between the threaded sleeve or nut which engages the forward end of the breech bolt, and a shoulder formed on the said bolt.

The invention further provides means whereby the bolt locking spring is held in compression and the locking abutments on the breech bolt are held in alignment with guide lugs on the nut or threaded sleeve attached to the sliding cover plate during their engagement with slots or splines in the receiver, during the longitudinal travel of the breech bolt, the said means comprising steps formed in the helical grooves on the end of the breech bolt which are arranged to move into engagement with circumferentially disposed faces formed in the screw thread of the aforesaid sleeve, in the rotary opening movement of the bolt.

The invention further contemplates the provision of means to effect the opening movement of the breech mechanism by hand.

In order that the invention may be clearly understood and readily carried into practical effect, I will describe same more fully with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal vertical section of an automatic small arm constructed in accordance with and embodying the features of this invention.

Figure 2 is a part sectional plan view.

Figure 3 is a transverse section taken on line 3—3, Figure 1.

Figure 4 is an end view of the cover plate and the nut or threaded sleeve associated therewith.

Figure 4[a] is a longitudinal sectional view of the parts shown in Figure 4.

Figure 5 is a side and an end elevation of the breech bolt.

Figure 5[a] is a view similar to Figure 5 at a right angle to the latter.

Figure 5[b] is an end view of the breech bolt.

Figure 6 is an end view and a side elevation of the breech bolt locking spring.

Figure 7 is a view partly in section and partly in elevation, of the cover plate and breech bolt, the locking spring of the latter being shown as moved to and held in its compressed position.

The invention is illustrated in the drawings as embodied in an automatic gun of which the receiver or body is formed in two parts, the forward part 1 being attached at its front end to the gun barrel 2, and having its rear end provided with internal screw threads to receive a locking sleeve 3 and the rearward portion 4 of the receiver. The

breech bolt 5 is provided rearwardly of the locking abutments 6, and preferably on its upper side, with a lug or projection 7 which is movable in a slot 8 extending longitudinally of the front end of the rear portion 4 of the receiver and having its forward end extending at an angle to its longitudinal portion, so that when the breech bolt 5 is nearing the end of its forward longitudinal travel in the closing movement of same, the angular part of the said cam slot 8 will impart an initial rotary movement to the breech bolt 5 in order to bring its locking abutments 6 into engagement with abutments 9 in the locking sleeve 3 fixed in the forward part 1 of the receiver. Said angular portion of the said cam slot 8 is parallel to the inclined faces of the locking abutments 6 and 9, and is adapted to control the final rotary locking movement of the breech bolt.

The forward end of the breech bolt 5 is provided with screw threads or helical cam grooves 10 in which are formed circumferentially disposed flat faces or steps 11, the said screwed end engaging with a nut or internally screw-threaded sleeve 12 attached in the manner hereafter described to the underside front end of a cover plate 13 for the mouth of the receiver, which is slidably mounted on the upper side of the receiver and provided with a suitable handle 14 for moving it to effect the opening of the breech mechanism by hand. Between the rear end of the threaded sleeve 12 mounted on the front end of the breech bolt 5 and a shoulder 15 formed on the latter, is interposed a flat section spiral spring 16.

The breech bolt 5 is of hollow or tubular formation and within said hollow portion is mounted a striker 17 carrying at its forward end a firing pin 18 in which is formed a cam groove or slot 19 engaged by a pin 20 mounted in the breech bolt 5 and adapted to limit and control, in known manner, the movement of the said firing pin 18. In the present construction the said cam pin or wiper 20 is adapted to be held and retained in position by the threaded sleeve 12 on the end of the breech bolt 5 when the said parts are assembled in operative position.

Before assembling the breech bolt 5 in the breech body or receiver, the nut or threaded sleeve 12 is mounted thereon, and the bolt is partially rotated to bring its circumferentially disposed flat faces or steps 11 into engagement with corresponding steps or flat faces 21, formed by cutting circular grooves in the interior of said sleeve 12 to intersect the screw threads thereof. Thus the spring 16 on the breech bolt 5 is held in its compressed position, and the locking abutments 6 on the bolt 5 are retained in alignment with guide lugs 22 on the said sleeve 12. The cover plate 13 is then slid into its forward position over the mouth of the receiver. The assembled breech bolt 5 and its return spring 32 are then passed into the breech body or receiver with the guide lugs 22 on the threaded sleeve 12 and the locking abutments 6 on the bolt 5 engaging with longitudinal guide grooves or splines 23 (Fig. 3) in the breech body. The cover plate 13 is then withdrawn a short distance by means of its handle 14, in order to bring a lug 24 depending from its under side at its front end into alignment with a flat face formed on the upper side of the nut or threaded sleeve 12 mounted on the front end of the breech bolt 5, and the said parts are then locked by any suitable means. Such locking may be effected by means of an undercut rib 26 formed on the depending lug 24 of the cover plate 13, and adapted to engage with a corresponding groove 27 formed in the upper side of the threaded sleeve 12, together with a screw-threaded pin 28 extending through the lug 24 of the said cover plate and adapted to enter a radial hole in the sleeve 12. The pin 28 may be provided at its outer end with a handle or lever 29 whereby it may be rotated to cause its inner end to engage with or disengage from the sleeve 12. The handle or lever 29 of the said attachment pin is preferably of a springy character and provided with a nib or projection 30 adapted to engage with a recess 31 in the outer face of the cover plate 13 for retaining the pin on the cover plate in either the engaged or disengaged position.

The operation is as follows:—When the gun is fired the inclination of the abutting surfaces of the locking abutments 6 and 9 is such as to offer sufficient resistance during the explosion to maintain the closure of the bolt, yet, in known manner permitting the rotation of the bolt 5 by the breech pressure, so that the locking abutments 6 on said bolt are moved into alignment with the longitudinal guide grooves or splines 23 in the receiver. But at or near the end of the said movement the engagement of the lug or projection 7 on the rear end of the breech bolt 5 with the angular part front end of the cam groove 8 in the receiver causes the flat faces or steps 11 in the helical cam grooves 10 of the breech bolt 5 to engage with the flat faces 21 formed by the internal grooves in the nut or sleeve 12 carried by the sliding cover plate 13, the latter having been moved to the required position by the rotation of the breech bolt 5 and consequent rearward movement of the sleeve 12. At the same time the locking spring 16 has been compressed, as shown in Figure 7. The continued breech pressure causes the bolt 5 to travel rearwardly, during which movement the extraction and ejection of the spent cartridge is effected and the bolt return spring 32 is compressed to effect the return or closing movement of the breech mechanism.

During the return movement of the breech bolt 5, under the action of its spring 32, the sear 33 of the trigger mechanism engages the lug or bent 34 of the striker 17, and the action of the said spring is thus arrested, but due to its momentum the breech bolt 5 continues its closing movement, and, when it is near the end of its travel and its locking abutments 6 have reached the end of the longitudinal guide grooves 23 in the receiver the lug or projection 7 in the rear end of the bolt 5 engages with the curved part of its cam groove 8 in the receiver, and imparts a rotating movement to the bolt 5 which brings its locking abutments 6 into alignment or first engagement with locking abutments 9 in the receiver, and also moves the flat faces or steps 11 in the helical cam grooves 10 on the bolt 5 out of engagement with the flat faces 21 in the screw thread of the nut or sleeve 12 on the sliding cover plate 13, thus releasing the bolt locking spring 16 which then, through the nut or sleeve 12 and pin 28, exerts its pressure on the sliding cover plate 13 and effects the final turning movement, thus locking the breech bolt.

Having fully described my invention, what I desire to claim and secure by Letters Patent is:—

1. In a firearm, a receiver having internal locking abutments, a locking bolt movable longitudinally in said receiver and having peripheral locking abutments, said locking bolt being also rotatable to cause engagement of its locking abutments with the locking abutments of the receiver, said bolt also having a peripheral projection and said receiver having a cam groove cooperative with said projection to cause rotary movement of the bolt during a part of the longitudinal movement of the latter, means tending to move said locking bolt forwardly, a member longitudinally movable in said receiver and associated with said bolt, a spring associated with said member and said bolt and tending to move said member and bolt in opposite directions, said member and said bolt having interengaging means adapted, during the rearward movement of the bolt under the influence of a firing recoil and consequent rotary movement of the bolt by engagement of its projection with said cam groove, to move said member toward the rear end of said bolt and compress said spring and lock said member to said bolt and, when said bolt is moved forwardly, to unlock said member from said bolt and permit said spring to expand.

2. In a firearm, a receiver having internal locking abutments, a locking bolt rotatable and longitudinally movable in said receiver, said locking bolt having peripheral locking abutments and a peripheral projection, said receiver having a cam groove in which said peripheral projection moves and adapted, when said bolt is moved longitudinally, to impart rotary motion thereto and cause its locking abutments to engage with the locking abutments of the receiver, a spring tending to move said locking bolt forwardly, a sleeve surrounding said locking bolt and longitudinally slidable in the receiver, a second spring associated with said sleeve and said bolt and tending to move said sleeve and said bolt in opposite directions, said sleeve and said bolt having interengaging helical means adapted, when said bolt is moved rearwardly by a firing recoil and is caused to rotate by movement of its projection in said cam groove, to move said sleeve toward the rear end of said bolt to compress said second spring and, when said bolt is moved forwardly by said first spring, to permit said second spring to move said sleeve toward the forward end of the receiver and impart a final forward or closing movement to the bolt.

3. A firearm according to claim 1 wherein the receiver has a mouth and a cover plate is associated with the member which is longitudinally movable in the receiver and is movable into position to close said mouth during the forward or closing movement of the breech bolt.

4. A firearm according to claim 1 wherein the longitudinally movable member has peripheral guide lugs and the receiver has internal longitudinally extending guideways in which said guide lugs are movable and in which the locking abutments of the bolt are held out of engagement with the locking abutments of the receiver during part of the longitudinal movement of the bolt.

5. In a firearm, a receiver having a mouth and internal locking abutments, a locking bolt rotatable and longitudinally movable in said receiver, said locking bolt having locking abutments and a projection on its periphery and said receiver having a cam groove in which said projection moves and which is adapted, at the end of the forward longitudinal movement of the bolt, to impart rotary movement to the bolt and cause its locking abutments to engage with the locking abutments of the receiver and, at the beginning of the rearward longitudinal movement of the bolt, to impart a reverse rotary movement to said bolt and cause the disengagement of said locking abutments, a sleeve on said bolt and longitudinally movable relatively to said receiver and said bolt but locked against rotation, means for moving said bolt forwardly, a spring associated with said bolt and sleeve and tending to move the same longitudinally of said receiver in opposite directions, said bolt and said sleeve having interengaging means adapted, when said bolt is moved longitudinally in one direction, to move said sleeve in the same direction and compress said spring and hold it in compression, and, when said bolt is moved longitudi-

nally in the opposite direction, to release said spring for imparting a forward movement to said sleeve and a final forward closing movement to said bolt, a cover plate movable over the mouth of the receiver, and means connecting said cover plate to said sleeve.

6. A firearm according to claim 5 wherein the means for connecting the cover plate to the sleeve comprises a lug carried by the underside of the cover plate and having an undercut rib engaging a complemental rib carried by the sleeve and a screw working in a vertical threaded opening through said cover plate and lug engages the sleeve.

7. A firearm according to claim 5 wherein the means for connecting the cover plate to the sleeve comprises a lug carried by the underside of the cover plate and having an undercut rib engaging a complemental rib carried by the sleeve and a screw having a spring lever at its upper end and working in a vertical threaded opening through the cover plate and lug engages the sleeve, the end of said spring lever being engageable with a depression in the receiver for holding said screw against rotation.

8. In a firearm, a receiver having a mouth and provided with a cam groove inclined at its forward end at an angle to its length and also with internal locking abutments, a locking bolt rotatably and longitudinally movable in said receiver, said locking bolt having a projection movable in said cam groove and also having locking abutments caused by the movement of said projection in the inclined portion of the cam groove during the longitudinal movement of the bolt to engage with and disengage from the locking abutments of the receiver, a cover plate for said mouth longitudinally movable on said receiver, means longitudinally slidable in said receiver and associated with said cover plate, said slidable means and said bolt having interengaging means adapted, when said bolt is moved in one direction, to move said cover plate over said mouth and lock said slidable means to the bolt, and, when said bolt is moved in the opposite direction by a firing recoil and is given a rotary movement by engagement of its projection in the inclined portion of the cam groove, to release said sleeve from the bolt and move said cover plate away from said mouth.

In testimony whereof I have hereunto set my hand.

GEORGE NORMAN.