Dec. 28, 1965 G. R. KRUZELL 3,225,657

CLOSED BREECH GUN

Filed July 15, 1964 2 Sheets-Sheet 1

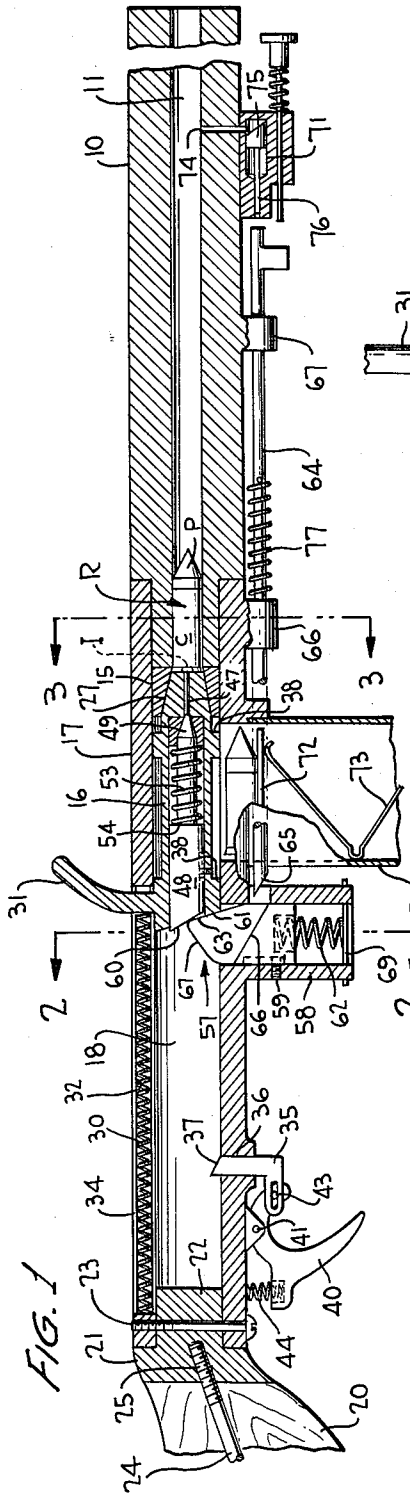

FIG. 1

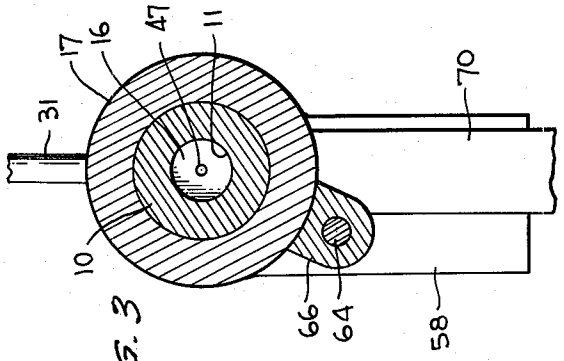

FIG. 3

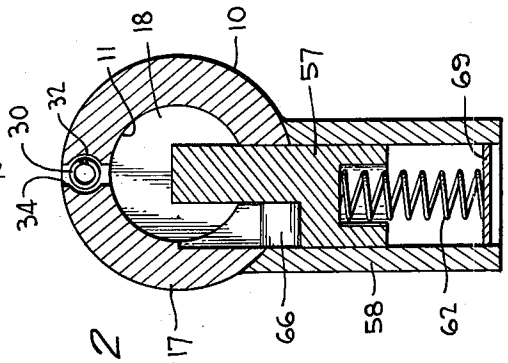

FIG. 2

INVENTOR,
GEORGE R. KRUZELL

BY Watson, Cole, Grindle & Watson
ATTORNEYS

Dec. 28, 1965 G. R. KRUZELL 3,225,657

CLOSED BREECH GUN

Filed July 15, 1964 2 Sheets-Sheet 2

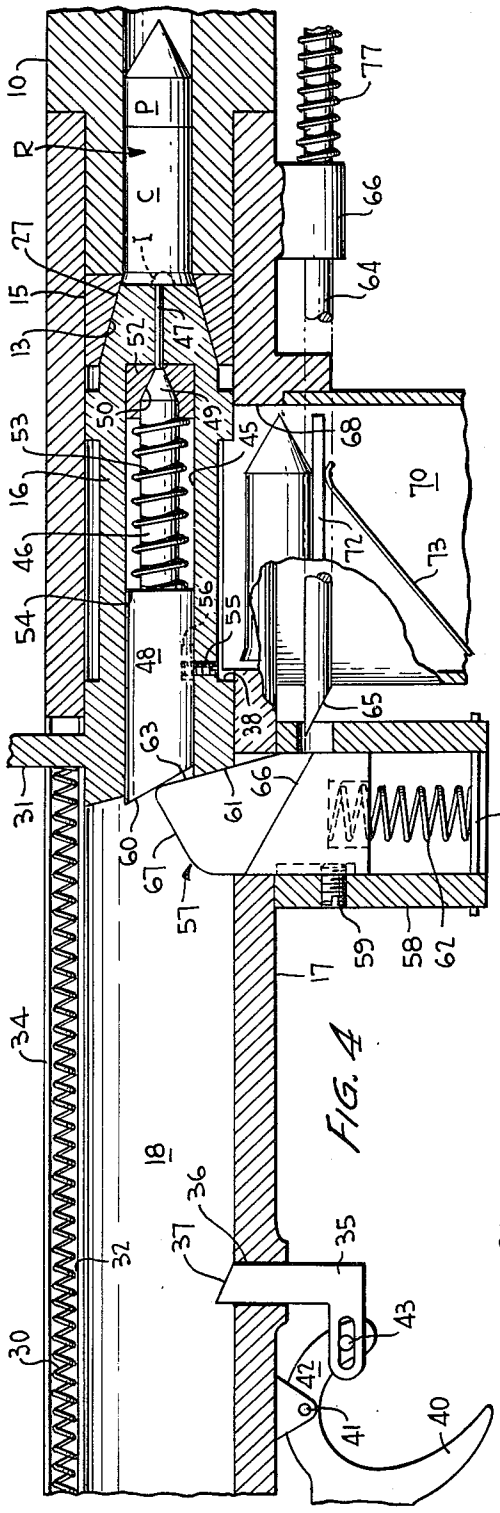

FIG. 4

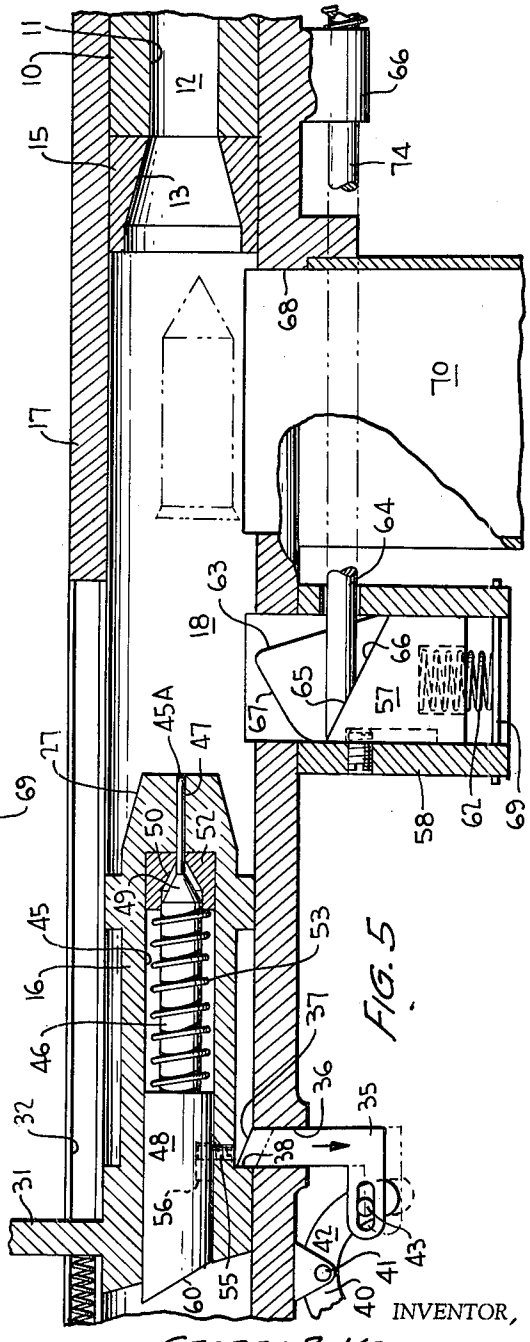

FIG. 5

INVENTOR,
GEORGE R. KRUZELL

BY Watson, Cole, Grindle & Watson
ATTORNEYS

United States Patent Office 3,225,657 Patented Dec. 28, 1965

3,225,657

CLOSED BREECH GUN

George R. Kruzell, 4301 Hotchkiss, Bay City, Mich.

Filed July 15, 1964, Ser. No. 382,864
9 Claims. (Cl. 89—187)

This invention relates to improvements in a firearm of the type provided with a closed breech.

It is an important object of the invention to provide such a firearm which is particularly adapted for use in the firing of either rocket type missiles or projectiles, in which the booster or propellant charge need not be housed within a cartridge case, but may be in the form of solid self sustaining material preferably bonded or secured to the missile to therewith constitute a single complete ammunition round or unit. In either such use, it will be apparent that the breech closing mechanism of the gun constitutes the sole means for preventing rearward discharge of a gas blast which, if permitted, would seriously endanger the gunner, and would involve serious risk of premature ignition of ammunition in the magazine of the gun.

With these considerations in mind, the present invention utilizes as its breech closure mechanism a sliding bolt having the firing pin guided therein for operative projection and includes mechanism for positively locking both the bolt and firing pin in their forwardly projecting position in gas tight sealing relation with respect to the breech opening.

It is a further important object of the invention to provide such a gun which is incapable of firing unless the bolt has first been locked in its forwardly projected position so that, in the event of failure of the bolt locking member or mechanism, there is provided a fail-safe factor.

It is a still further object to prevent actuation of the firing pin until it also is blocked from premature rearward movement by gas pressures created by the firing of the weapon.

In order to achieve these ends, the invention incorporates a novel mode of operation in accordance with which a locking and actuating member common to both the bolt and the firing pin is automatically projected transversely to and rearwardly of both the bolt and the firing pin, or portions thereof, as the bolt is seated in its fully projected position. The arrangement is such that the said member arrives first in locking or obstructing position with respect to the bolt, and subsequently actuates the firing pin by quick forward projection thereof, while simultaneously entering into locking engagement therewith to prevent retraction of the firing pin before the firing is substantially completed.

The locking and actuating member and the firing pin have mutually cooperating cam means, through which the firing pin is both projected and locked against retraction. In the preferred embodiment of the invention, the locking engagement between the bolt and the locking and actuating member also is achieved by mutually cooperating cam means which serve additionally to urge the bolt firmly forwardly into sealing relation with respect to the breech opening. The cam means may thus assist the bolt actuating spring in firmly and fully projecting the bolt to its operative sealing position, whereby to provide increased force for urging oversize or misshaped ammunition into the firing chamber.

It is a still further object of the invention to provide such a gun which is capable of fully automatic firing in the manner of a machine gun, and which at the same time requires a greatly reduced number of parts having a simplified mode of assembly and operation.

It is a further feature of the invention that such a weapon is also capable of firing either as a semiautomatic gun or as a single shot gun.

In this application there is shown and described only the preferred embodiment of the invention together with minor modifications of certain of its details, and specific language is used in describing same. However, it will be understood that the drawings and description are merely by way of exemplification rather than limitation of the invention.

In the accompanying drawings:

FIGURE 1 is a vertical medial section through the firing mechanism of a shoulder type firearm embodying the invention, with the parts in the operative positions which they assume in firing a round of ammunition.

FIGURES 2 and 3 are sections on the lines 2—2 and 3—3 respectively of FIGURE 1.

FIGURE 4 is an enlarged section, taken in the same plane as FIGURE 1, through the receiver and the adjacent portion of the gun barrel.

FIGURE 5 is a fragmentary view generally similar to FIGURE 4, but with the bolt retracted, and with a fresh round of ammunition positioned in the receiver for delivery into the firing chamber by the return or projection movement of the bolt.

Referring now in detail to the preferred embodiment of the invention, as specifically illustrated in the accompanying drawings:

The firearm there illustrated comprises a generally conventional gun barrel **10** formed with a bore **11** therethrough which defines a firing chamber **12** at its rear end and terminates rearwardly in a breech opening defined by a rearwardly presented conical sealing surface **13**. The bore **11** may, if desired, be rifled in conventional manner (not shown) for imparting spinning stabilizing movement to a projectile *p* of a round of ammunition R loaded into the firing chamber through the breech opening **13**. The round of ammunition here illustrated also includes a propellant charge of explosive *c* which may consist of conventional gun powder in which the grains are bonded together by a suitable adhesive and also are adhesively or otherwise secured to the projectile *p*. It is contemplated that the charge *c* will have sufficient strength and shape maintaining qualities as to permit elimination of the usual metal cartridge or shell casing. By eliminating the shell casing or cartridge, with its associated expense, it is also possible to eliminate from the gun structure the usual means or mechanisms for extracting and ejecting the casings or expended cartridges after firing, though such mechanism or means may, if desired, be included, as hereinafter more specifically described.

The rounds of ammunition R may also represent rocket type or reaction missiles, in which event the barrel **10** may be provided with suitable pressure release ports and passages, in accordance with known practice, as exemplified in U.S. Patents Nos. 2,802,399 and 2,515,180.

Means defining the breech opening **13** are exemplified by the bushing **15** functioning in effect as a rearward extension or portion of the barrel, but in the present instance formed of a somewhat softer metal such as bronze whereby to effect an improved and substantially conforming sealing engagement with the bolt **16**. A hollow receiver **17** is rigidly connected to the barrel with its interior bolt well **18** aligned with the bore **11**. In the present embodiment the forwardly opening end of the receiver **17** snugly receives and is shrink fitted, threaded on or otherwise suitably secured to the barrel. With this arrangement, the bushing **15** at the rear end of the barrel also is housed within the receiver.

The weapon of the preferred embodiment is of a sufficiently small size that it may be employed as a shoulder gun, and for this purpose it includes a supporting stock **20** having at its forward end an adapter piece **21** received within and closing the rear end of the receiver as at **22**

and so firmly secured therein as by the attaching means or cross pin 23. If desired, the stock may be firmly anchored to the adapter 21 by means of the reinforcing rod 24 extending lengthwise through the stock and having its forward end 25 threaded into a bore within the adapter.

The bolt 16, which exemplifies the breech closing mechanism of the present embodiment, is guided in the bolt well 18 of the receiver for movement in alignment with the bore 11 and its breech opening 13. Preferably the bolt 16 is of a generally cylindrical cross sectional shape proportioned and arranged for free sliding movement within the bolt well 18 between its rearwardly retracted position, as shown in FIGURE 5 and its forwardly projected position, as shown in full lines in FIGURES 1 and 4. At its forwardly directed end, the bolt 16 is provided with a reduced diameter tapered nose 27 defining a generally forwardly converging sealing surface for operative flush sealing engagement with the sealing surface 13 around the breech opening. Preferably the sealing surfaces 13 and 27 are conically tapered in a forwardly converging manner and at identical angles, whereby to achieve efficient sealing action over a wide area of engagement.

For urging the bolt 16 from its retracted position toward its projected operative sealing position there is provided a usual bolt return spring 30, here exemplified as a coil spring axially compressed between the bolt operating handle 31 and the blind end of a bore 32 in the receiver within which one end of the spring is guided and housed. The other end of the spring may be supported on and located by a guide pin 33 affixed to the bolt handle 31. The bolt handle will be seen to project externally of the receiver through a longitudinal slot 34 so that its external end may be grasped and pulled rearwardly to manually retract the bolt 16 to substantially the position shown in FIGURE 5.

For releasably retaining or latching the bolt in this retracted position, there is provided a sear 35 which is guided for movement into and from engagement with the bolt through an opening 36 in the receiver. The inner end of the sear 35 is formed to present an inclined cam surface 37 presented for operative engagement by the bolt during its retraction movement to automatically urge the sear transversely outwardly through its guide opening 36 and thus out of obstruction relation with respect to the rearwardly moving bolt.

The bolt is formed with a forwardly presented locking face 38 for holding or cocking engagement by the sear incident to retraction of the bolt. By abutting engagement with the forwardly presented locking face 38 of the bolt, the sear will then releasably latch the bolt in its retracted and cocked position. Selective disengagement of the sear 35 from the bolt for firing of the weapon, is under the control of a conventional trigger 40, pivoted at 41 to the receiver and having a depending lever arm 42 operatively connected to the sear 35 through the pin and slot connection 43. The trigger 40 is normally urged to its inoperative position by means of a conventional coil spring 44 (shown in FIGURE 1), under compression between the trigger 40 and the receiver. It will be apparent that the spring 44 also acts through the trigger and its connection to the sear 35 to resiliently urge the latter into the bolt well 18 for operative latching engagement with the bolt.

The bolt 16 is formed with a firing pin guide passage 45 having a preferably reduced diameter portion or section 45A opening through its forward end toward the breech opening 13 and firing chamber 12. A firing pin 46 is guided for movement in the passage 45 with its striker 47 snugly slidably received and guided through the reduced diameter passage section 45A for projection forwardly into operative engagement with the primer or ignitor I of a round of ammunition R in the firing chamber 12, whereby to ignite same by percussion in known manner.

Sealing means 49 and 50 respectively, in the form of interengaging conical sealing surfaces, are provided respectively on the firing pin 46 and within the bolt 16, for operative sealing engagement in the operative firing position of the firing pin. These provide an efficient gas tight seal preventing rearward discharge of gases through the passage 45 so long as the firing pin 46 is held forwardly in its projected position. As shown in FIGURES 4 and 5, the sealing surface 49 in the present embodiment is provided by the conically tapered transition portion of the firing pin 46 between its reduced diameter striker 47 and its relatively larger diameter midportion 51. The conically tapered sealing surface 50 within the bolt preferably is defined by a bushing of bronze or other soft metal 52 inserted in the firing pin guide passage 45 as shown. The firing pin 46 is guided in the guide passage by a generally cylindrical pilot portion 48 snugly slidable in said passage.

Normally the firing pin 46 is resiliently urged toward its retracted position by a spring 53 disposed under compression on the midsection 51 of the firing pin in endwise abutment with the bushing 51 and with the firing pin shoulder 54 at the forward end of the pilot portion 48 of the firing pin. The rearward projection movement of the firing pin 46 is accurately predetermined and limited in extent by suitable means such as illustrated in FIGURE 4, comprising a set screw 55 threaded through the bolt with its inner end slidably received within a slot 56 in the firing pin to limit the retraction of the latter by abutting engagement with the forward end of the slot 56. The length of the slot 56 will obviously be such as to permit operative projection movement of the firing pin to the full extent desired.

The mechanism for locking both the bolt 16 and the firing pin 46 in their forwardly projected sealing positions during firing, as well as for actuating the firing pin to drive it forward into its projected position, includes a locking and actuating member 57 common to and cooperating with both elements 16 and 46. The member 57 is guided in a bearing sleeve 58 for linear movement into and from the receiver transversely to and across the paths of movement of the firing pin 46 and bolt 16 to engage behind rearwardly presented portions 60 and 61 respectively of these members whereby to prevent their retraction movement. A set screw 59, as shown in FIGURES 4 and 5, limits the projection movement of the member 57, the inner end of the set screw being received in a slot in member 57 as shown. The locking and actuating member 57 is constantly urged inwardly into operative engagement with the bolt 16 and firing pin 46 by means of its actuating spring 62 which is compressed between the member 57 and a suitable spring seat 65 at the lower end of bearing sleeve 58. It will be understood that the bearing sleeve is suitably fixed to and functions as a stationary part of the receiver 17.

The rearwardly presented portion 60 of the firing pin is exemplified by an inclined or sloping cam surface which is adapted for camming engagement by the upwardly projected member 57. The slope of the cam surface 60 is sufficient to produce rapid projection of the firing pin into detonating engagement with the primer or ignitor I of an ammunition round within the firing chamber 12, and thus is normally greater than that of the cam surfaces 61 and 63.

Because of the location of the firing pin 46 within and surrounded by the bolt, it will be apparent that before the member 57 can engage and commence the actuation of the firing pin, it will have had to extend at least partially across the path of rearward retraction movement of the bolt to obstruct or block such movement. After the locking and actuating member 57 as advanced far enough to project the firing pin forwardly into firing position, it will also be disposed in obstructing and blocking or locking relation rearwardly of the firing pin to prevent retraction thereof.

In the preferred embodiment, the rearwardly presented portion **61** of the bolt is in the form of an inclined cam face or surface for cooperative engagement with the similarly inclined cam surface **63** on the member **57**. This one surface **63** in the present embodiment, is relied upon both for its camming function with respect to the bolt as well as for locking engagement with the bolt.

It will be seen that the portions **60** and **61** of the firing pin and bolt respectively, together with the inclined surface **63** of the locking and actuating member **57**, exemplify cooperating cam means on the several such elements for successively urging and locking the bolt against retraction from its projected position, and for then operatively projecting or actuating the firing pin. In addition, the cam surface **63** serves to augment the action of the bolt spring **30** in firmly urging the bolt toward its fully seated position in sealing engagement with the sealing surface **13** which defines the breech opening. In the event the forward projection of the bolt is arrested before the latter is substantially in fully projected breech closing position, the bolt in turn will arrest the upward projection movement of the member **57** before the latter can actuate the firing pin **16**. Similarly, in the event of malfunctioning or failure of the member **57** or its spring **62**, the firing pin will not be actuated and the weapon will thus not be fired.

In order to permit retraction of the bolt **16** for loading or reloading of the weapon it is necessary to retract the member **57** from its locking position. Where the gun is to be employed as a single shot weapon, the locking and actuating member **57** may be manually retracted by suitable actuation of its release rod **64**, hereinafter more fully described.

In order that the locking and actuating member **57** may not arrest or unduly obstruct the projection movement of the bolt **16** as same travels from its retracted and cocked position shown in FIGURE 5, to its forwardly projected breech closing position shown in full lines in FIGURES 1 and 4, the locking and actuating member is provided with a rearwardly and upwardly presented gently inclined cam surface **67** for camming engagement with the forwardly presented tapered nose **27** of the bolt. The engagement between these two cam surfaces obviously effects retraction of the member **57** to an inoperative and nonobstructing position at one end of the bolt, incident to the forward movement of the latter past member **57**.

The release rod **64** for member **58** is provided at its rear end with a cam face **65** for operative engagement with a cam face **66** on the member **57**, to retract same. Thus rearward movement of the rod **64** through its slide bearings **66** and **67**, retracts or disengages the locking and actuating member from the firing pin and bolt.

It will be apparent that the structure as described up to this point will suffice for operation of the gun as a single shot weapon. To cock the gun, it is necessary first to manually retract the locking and actuating member **57** in any suitable manner, for instance by manually actuating its release rod **64**, while the bolt **16** is retracted and cocked by manual actuation of its handle **31**. Single rounds of ammunition may be manually inserted into the receiver **17** through its loading port **68** to thereafter be moved into the firing chamber and fired by actuation of the trigger **40** which disengages the sear **35** from the bolt, with ensuing forward projection of the bolt.

An important aspect of the invention consists in its adaptation for either fully automatic or semi-automatic firing, by the addition thereto of a conventional ammunition magazine **70**, together with means shown in FIGURE 1, exemplified by the gas cylinder and piston unit **71** operatively connected to the locking member **57** through a suitable linkage, preferably including release rod **64**, to automatically retract or disengage the member **57** from both the bolt and the firing pin **16** and **46** respectively, in properly timed relation to the firing of each round of

ammunition. The timing is such as to permit automatic retraction of the bolt **16** by residual gas pressure within the barrel **11** and the automatic loading or delivery of a fresh round of ammunition from the magazine **70** in advance of the bolt during each retraction thereof, in readiness for movement into the firing chamber and firing on the next ensuing forward projection of the bolt.

As above mentioned, the magazine **70** is of usual type adapted to contain a plurality of rounds R of ammunition (though but one such round is shown) and having a follower **72** urged upwardly by a spring **73** for conveying the rounds of ammunition successively upwardly into the receiver.

The gas cylinder and piston unit **71** has its cylinder in communication with the bore **11** of the barrel by means of a passage **74** appropriately located along the length of the barrel to admit gas to the cylinder just before the projectile P leaves the barrel, and at a time when the residual gas pressure within the bore will be ample to automatically retract the bolt **16**, but insufficient to produce a dangerous rearward blast through the breech opening **13**.

The piston **75** of the unit **71** normally is located within its cylinder rearwardly of the gas passage **74**, to be forced rearwardly by the gases admitted into the cylinder. Its rearwardly projecting piston rod **76** is supported by the piston for endwise abutment with the release rod **64**. The rearwardly presented end of the release rod **64** is adapted for projection into the bearing sleeve **58** through a suitable located opening so that its inclined cam surface **65** may coact with cam surface **66** of the member **57** to depress or retract the latter completely out of the path of the bolt **16**. A spring **77** normally urges the release rod to its released position.

A plunger **80** guided through the housing of the piston and cylinder unit **71**, may be manually thrust into endwise abutment with a projecting lug **81** on the release rod, to facilitate manual actuation of the latter, though this is not essential.

In the operation of the invention, where it is desired to fire the gun automatically, the gun is loaded and cocked, after placing a loaded magazine **70** in operative relation with respect to the loading port **68**. Upon retraction of the bolt, the magazine spring **73** automatically feeds a round of ammunition into the receiver in the path of projection movement of the bolt **16**. The trigger **40** may then be suitably actuated to disengage the retracted bolt, whereby same may move forwardly under the influence of its spring **30**, ramming the round of ammunition into the firing chamber **12** and also thrusting the locking member **57** aside by the camming engagement between said member and its tapered nose **27**.

The ensuing spring projection of the locking and actuating member **57** serves to cam the bolt forwardly into fully seated sealing position with respect to the breech opening **13** and actuates the firing pin **46** to fire the round. Just before the fired round leaves the barrel, pressurized gas from the rear of the projectile P is admitted to the gas piston and cylinder unit **71** through the passage **74**, thereby actuating the said unit and its linkage means **76**, **77** to automatically retract the member **57** to inoperative position. This permits automatic recoil or retraction of the bolt **16** by residual gas pressure within the barrel, to effect an automatic reloading from the magazine **70**. In the event the trigger **40** is released immediately after firing a given round, the rearwardly projected bolt will be engaged by the sear **35** and held in cocked position to be released by a subsequent actuation of the trigger **40** for semi-automatic firing. However, fully automatic firing may be achieved simply by maintaining the actuating pull on the trigger **40**, thereby maintaining the sear **35** retracted to permit free reciprocation of the bolt and repeated automatic firing, either until the trigger is released or until the ammunition is exhausted from the magazine **70**.

In the preferred embodiment of the invention, the locking and actuating member 57 is disclosed as having but a single cam face 63, for cooperation with both the firing pin 46 and the bolt 16.

However, it will be understood by reference to the modified arrangement of the locking and actuating member 57' as shown in FIGURE 6, that the member 57' may readily be formed with separate cam surfaces 63A and 63B respectively, having different slopes for separate engagement with the firing pin 46 and bolt 16' respectively, the slopes of these surfaces being selected to project the firing pin forwardly at a greater speed than the bolt. It will be appreciated that the bolt 16' in this modification is provided at its rear end with a vertical slot, for reception of the cam surface 63A which, in this instance constitutes one face of a projecting rib of the member 57'.

It will further be apparent that a weapon in accordance with the invention may be adapted for automatic firing of ammunition utilizing conventional cartridge casings for housing the propellant charge. In such event, it will be necessary only to provide an ejection port in one side of the receiver, and a conventional medially fulcrumed ejector of the type actuated by retraction of the bolt, to eject expended cartridge casings through such port. The casings will obviously be moved rearwardly by the same gas pressure which automatically retracts the bolt.

I claim:

1. A firearm comprising a barrel formed with a bore therethrough defining a firing chamber at its rear end and terminating rearwardly in a breech opening, means defining a rearwardly presented sealing surface around said breech opening, a receiver operatively connected to said barrel, a bolt guided in said receiver for movement in a predetermined path between a rearwardly retracted position and a forwardly projected position in which a forwardly presented sealing surface on said bolt operatively engages said sealing surface around the breech opening, resilient means for urging said bolt toward its projected position, selectively releasable means for maintaining said bolt in its retracted position, said bolt being formed with a firing pin guide passage therethrough opening forwardly toward said breech opening, a firing pin guided in said passage for forward projection and retraction movement, resilient means normally urging the firing pin toward its retracted position, sealing means on the firing pin and bolt respectively for engagement with each other to seal said passage in the projected position of the firing pin, a locking and actuating member guided on said firearm for operative movement across the paths of movement of said bolt and said firing pin, spring means for operatively moving said member, cooperating cam means on said member and on said bolt and firing pin respectively, for successively urging said bolt toward its projected position and locking it against retraction and for operatively projecting said firing pin and locking it against retraction, means for retracting said locking and actuating member to permit retraction and cocking of the bolt, and cooperating means on the bolt and the locking and actuating member respectively, for moving the said member out of the path of the bolt during forward projection of the bolt from its retracted position.

2. A firearm comprising a barrel formed with a bore therethrough defining a firing chamber adjacent its rear end and terminating rearwardly in a breech opening, a receiver operatively connected to said barrel, a bolt guided in said receiver for movement in a predetermined path between a rearwardly retracted position and a forwardly projected position, cooperating means associated with said bolt and said barrel respectively for sealing said breech opening in the projected position of the bolt, resilient means urging said bolt toward its projected position, sear mechanism for releasably latching said bolt in its retracted position, a trigger operatively associated with the sear mechanism for disengaging same from the bolt to permit projection of the latter by its said resilient means, said bolt being formed with a forwardly opening firing pin guide passage, a firing pin guided in said passage for forward projection and retraction, sealing means on the firing pin and bolt respectively for inter-engagement to seal said passage in the projected position of the firing pin, a locking and actuating member guided on said firearm for operative movement transversely to and into the paths of movement of said bolt and said firing pin, spring means normally urging said member into said paths, cooperating cam means on said member and on said bolt and firing pin respectively for successively locking said bolt in its projected position and then operatively projecting said firing pin and locking same in its projected position, means for retracting said locking and actuating member to permit retraction and cocking of the bolt, and cooperating means on the bolt and the locking and actuating member respectively for moving the said member out of the path of the bolt during forward projection movement of the bolt.

3. A firearm comprising a barrel formed with a bore therethrough defining a firing chamber at its rear end and terminating rearwardly in a breech opening, a receiver operatively connected to said barrel, a bolt guided in the receiver for movement in a predetermined path between a rearwardly retracted position and a forwardly projected position, resilient means urging said bolt toward its projected position, selectively releasable means for retaining the bolt in its retracted position, a firing pin carried by said bolt for operative projection forwardly of the bolt, resilient means carried by the bolt for urging said firing pin toward its retracted position, a locking and actuating member guided on said firearm for operative movement transversely across the paths of movement of said bolt and said firing pin, spring means for urging said member in the direction of its operative movement, cooperating cam means on said member and said bolt and firing pin respectively for successively moving said bolt and then said firing pin to their fully projected positions, means for retracting said locking and actuating member to permit retraction of the bolt, and means defining an operative connection between the bolt and the locking and actuating member for moving the latter out of the path of the bolt during forward projection movement of the bolt from its retracted position.

4. A firearm as defined in claim 3, in which said operative connection is defined by cooperating cam surfaces on the bolt and the locking and actuating member respectively.

5. A firearm comprising a barrel formed with a bore therethrough terminating rearwardly in a breech opening, a receiver operatively connected to said barrel, a bolt guided in the receiver for movement in a predetermined path between a rearwardly retracted position and a forwardly projected position in which the said bolt closes said breech opening, resilient means urging the bolt toward its said projected position, selectively releasable means for latching the bolt in its retracted position, a firing pin carried by said bolt for forward projection, means for locking the bolt in its forwardly projected position and for thereafter projecting said firing pin, said last mentioned means including a cam member guided in said receiver for operative movement transversely of and in camming engagement with both said bolt and said firing pin and for subsequent retraction from the path of movement of said bolt and firing pin, spring means for producing said operative movement of said member, and means carried by the bolt for retracting said member from its path during projection movement of the bolt.

6. The combination of claim 5, in which said member includes means movable across the path of retraction of said bolt before said camming engagment with the firing pin.

7. In a firearm comprising a barrel formed with a bore therethrough defining a firing chamber at its rear end and

terminating rearwardly in a breech opening, a receiver operatively connected to said barrel, a bolt guided in the receiver for movement in a predetermined path between a rearwardly retracted position and a forwardly projected position, selectively releasable means for retaining the bolt in its retracted position, a firing pin carried by said bolt for operative projection forwardly of the bolt, a locking and actuating member guided on said firearm for operative movement transversely across the paths of movement of said bolt and said firing pin, spring means for urging said member in the direction of its operative movement, cooperating cam means on said member and said bolt, and cam means operatively connected to said firing pin for successively moving said bolt and then said firing pin to their fully projected positions by engagement of said cam means of the said member with the respective said cam means for the bolt and the firing pin.

8. In a firearm as defined in claim 7, the combination therewith of resilient means carried by the bolt for urging said firing pin toward its retracted position.

9. In a firearm as defined by claim 8, the further feature in accordance with which there are provided cooperating cam surfaces on said bolt and on said locking and actuating member respectively for retracting the latter member from the path of the bolt incident to forward projection movement of the bolt from its retracted position.

References Cited by the Examiner

UNITED STATES PATENTS

2,856,717	10/1958	Parke	42—69

FOREIGN PATENTS

577,642	9/1956	Canada.
156,541	1/1921	Great Britain.

BENJAMIN A. BORCHELT, *Primary Examiner.*

FRED C. MATTERN, JR., *Examiner.*