T. F. HARTIGAN.

FIREARM.

APPLICATION FILED JUNE 30, 1914.

1,178,468.

Patented Apr. 4, 1916.

3 SHEETS—SHEET 1.

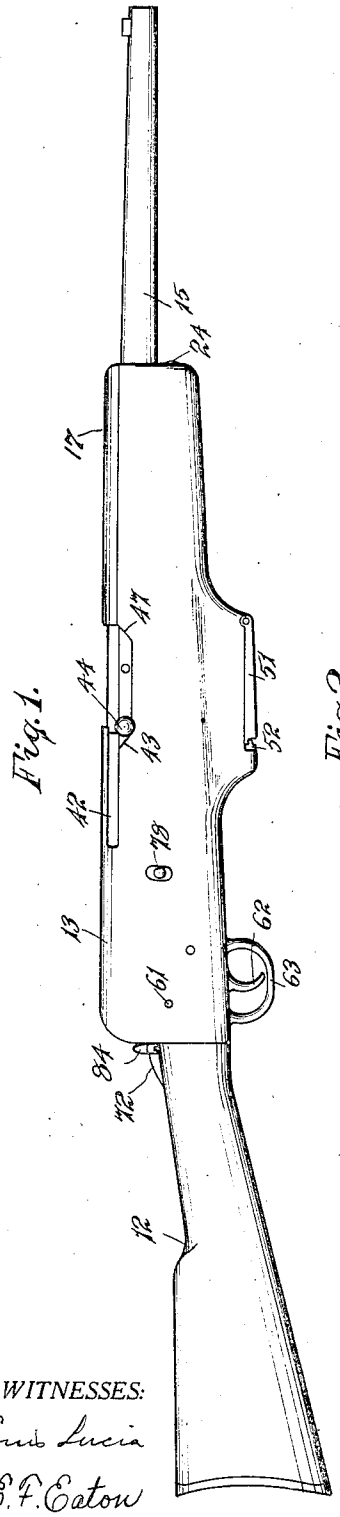


Fig. 1.

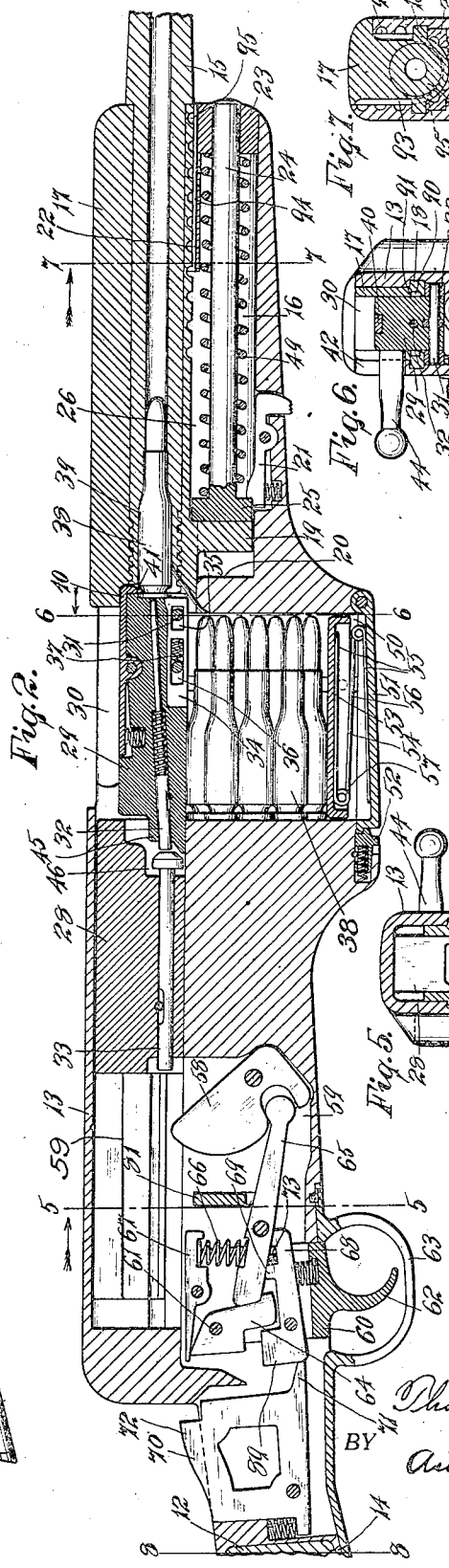


Fig. 2.

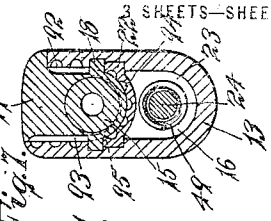


Fig. 7.

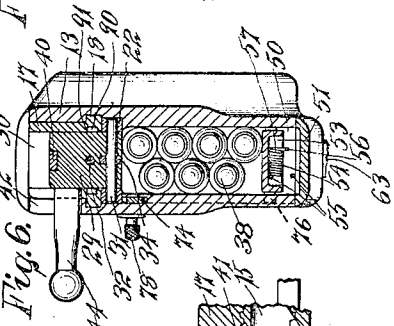


Fig. 6.

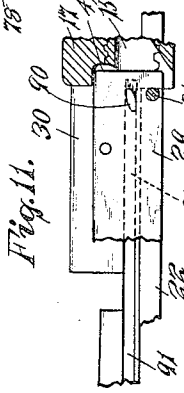


Fig. 11.

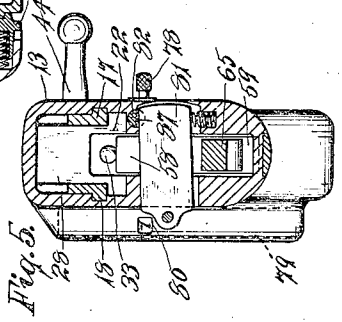


Fig. 5.

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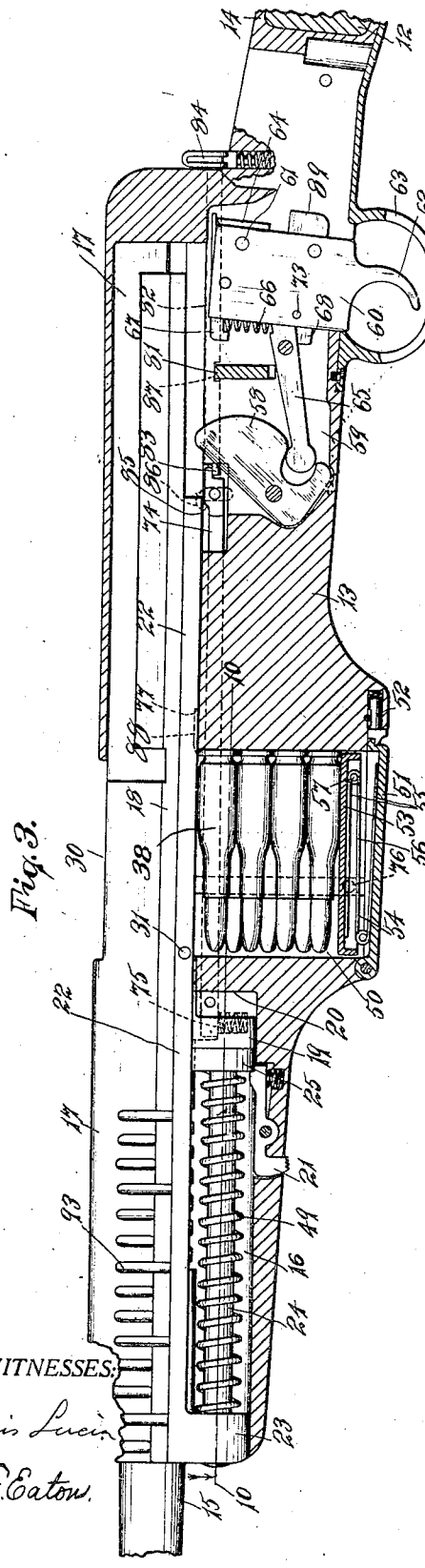


Fig. 3.

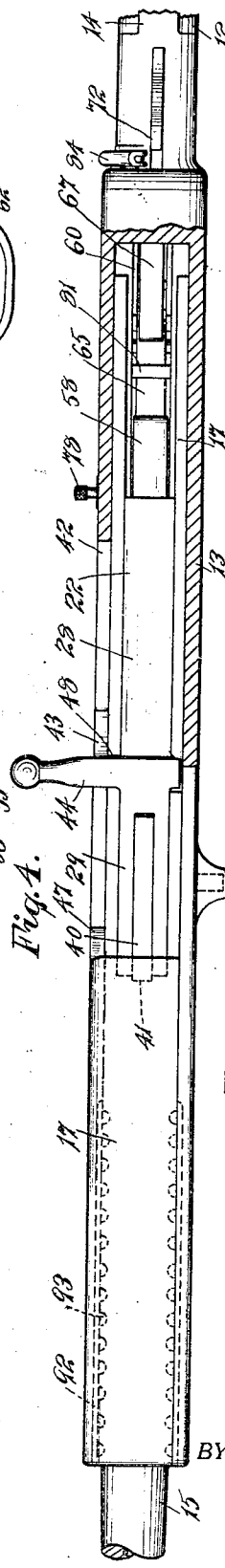


Fig. 4.

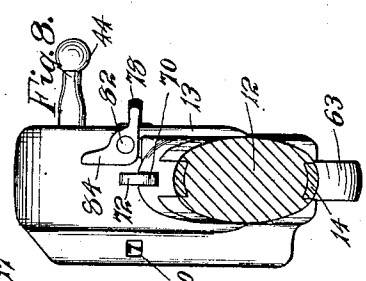


Fig. 8.

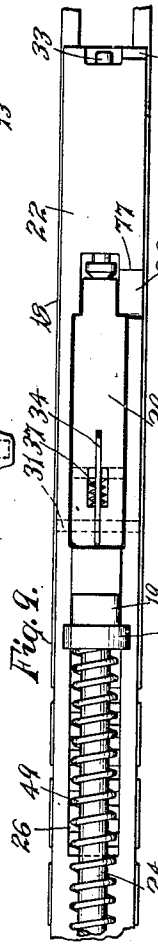


Fig. 9.

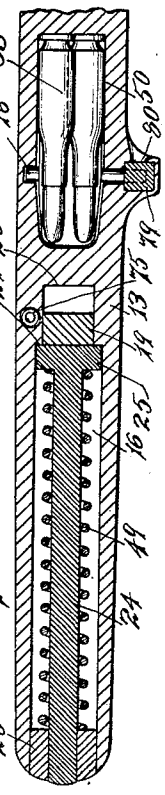


Fig. 10.

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3 SHEETS—SHEET 3.

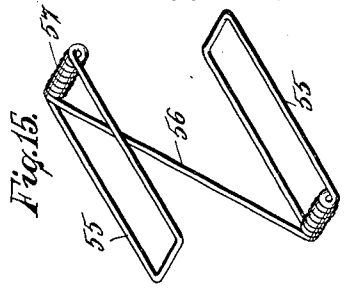


Fig. 15.

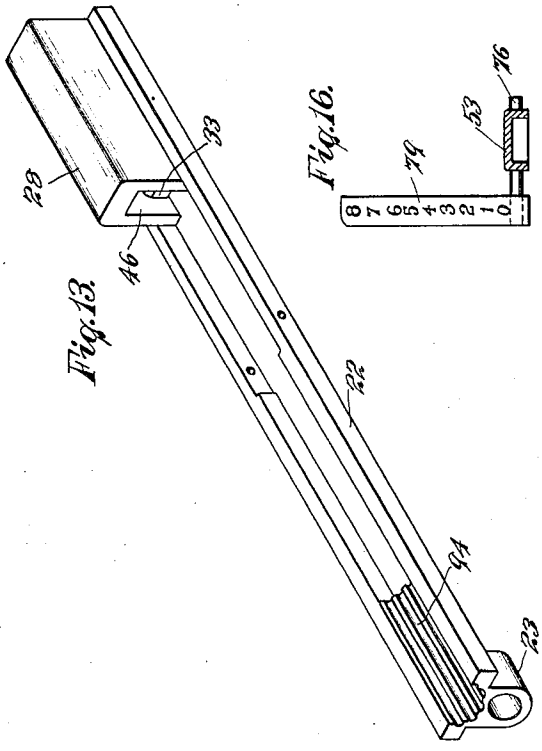


Fig. 13.

Fig. 16.

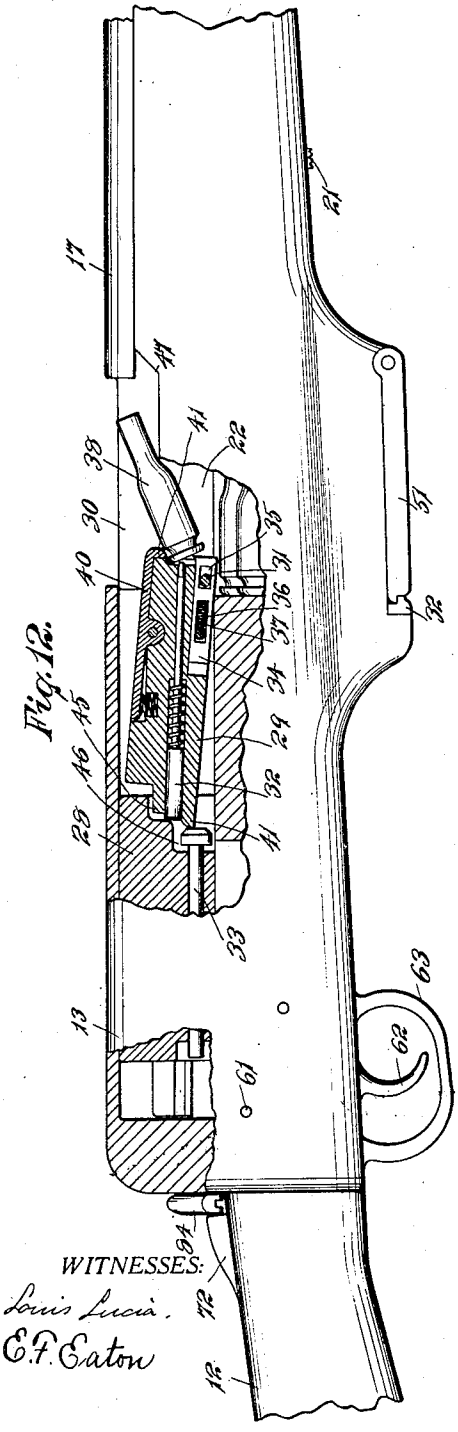


Fig. 12.

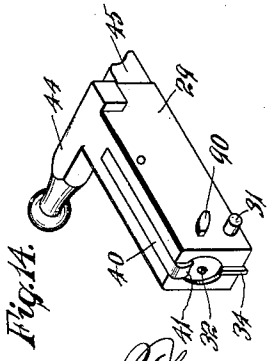


Fig. 14.

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UNITED STATES PATENT OFFICE.

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FIREARM.

1,178,468. Specification of Letters Patent. Patented Apr. 4, 1916.

Application filed June 30, 1914. Serial No. 848,179.

To all whom it may concern:

Be it known that I, THOMAS F. HARTIGAN, a citizen of the United States, residing at Ghent, in the county of Columbia and State of New York, have invented a new and Improved Firearm, of which the following is a specification.

My invention relates more especially to that class of firearms in which the cartridge is automatically placed in firing position and in which the shell is automatically ejected, and an object of my invention, among others, is to produce a fire arm of this class that shall be extremely durable and particularly efficient in its method of operation.

One form of firearm embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation of a firearm embodying my invention. Fig. 2 is view in lengthwise central section through a portion of the device (scale enlarged) and illustrating the operating mechanism. Fig. 3 is a view similar to Fig. 2, looking in the opposite direction, with some of the parts shown in section in that figure illustrated in full, and the automatic safety being removed. Fig. 4 is a top view of the firearm as illustrated in Figs. 2 and 3, with parts broken away to show construction. Fig. 5 is a view in cross section on plane denoted by dotted line 5—5 of Fig. 2. Fig. 6 is a similar view on plane denoted by dotted line 6—6 of Fig. 2. Fig. 7 is a similar view on plane denoted by dotted line 7—7 of Fig. 2. Fig. 8 is a similar view on plane denoted by dotted line 8—8 of Fig. 2. Fig. 9 is a detail bottom view of the breech-bolt carrier and barrel support. Fig. 10 is a view in longitudinal section on plane denoted by dotted line 10—10 of Fig. 3. Fig. 11 is a detail view showing the means for engaging the swinging member of the breech block with the barrel support. Fig. 12 is a side view of a portion of the gun with parts broken away to show construction, the breech-bolt being moved backwardly to nearly its rearward position. Fig. 13 is a detail perspective view showing the breech-bolt carrier and carrier bolt. Fig. 14 is a detail perspective view of the breech-bolt. Fig. 15 is a detail perspective view of the magazine spring. Fig. 16 is a detail view illustrating the magazine indicator slide.

While my invention may be embodied in firearms of numerous kinds and of varied constructions, as it is readily adapted to a gun arranged for support against the shoulder of the user, I have selected this form of firearm for the purpose of illustrating my invention herein, but I do not limit my invention to its presence in a firearm of the particular pattern herein shown.

In the accompanying drawings the numeral 12 denotes the stock and 13 the frame or receiver of my improved firearm or gun that may be secured together in any suitable manner, as by means of tangs 14, the end of the stock being located between the tangs and secured thereto as by screws or other fastening means. The frame or receiver 13, composed of any suitable metal, extends from the stock for a suitable distance to afford a support for the barrel 15 and other appurtenant parts of the gun, and a recess 16 extends lengthwise in the frame and from its top to a point near its under side at its forward end.

A barrel support 17 is located in the upper part of the recess 16 and is removably secured to the frame, ribs 18 extending lengthwise along the sides of said support and in grooves in the side walls of the recess 16. The barrel 15 is rigidly secured to its support in any suitable manner, as by means of interengaging screw threaded parts, or they may be formed of a single piece. A stop 19 projecting from the under side of the barrel support into a cavity in the recess 16, is located to engage an end wall 20 of said cavity, the stop being normally spaced a slight distance away from said end wall, thus permitting the barrel support to have a limited sliding movement upon the frame for a purpose to be hereinafter described. A holding catch 21, spring pressed in one direction, is pivotally mounted in the frame with one end normally located to secure the barrel support in place and prevent its unintentional removal from the frame.

A breech-bolt carrier 22 is supported by the frame, being removably secured within the side walls of said frame and located underneath the barrel support, which two parts rest preferably one against the other, and are nearly of the same length. A projection 23 from the bottom at the

front end of said carrier has a hole to receive a spring supporting rod 24 that is freely movable in said hole, said rod being secured to or forming an integral part of a base 25 extending into a slot 26 in the breech bolt carrier, the ends of this base resting against shoulders 27 formed at the inner end of the recess 16. A breech-bolt closing spring 49 is supported on the rod 24.

A breech-bolt 29 is pivotally secured near the rear end of the breech-bolt carrier, and a carrier bolt 28 is formed rigid and preferably integral with the carrier and is located back of the breech-bolt, said bolts being located in a breech-bolt chamber 30. This chamber extends through the barrel support and breech-bolt carrier, and a pin 31 forms the pivotal support for the breech-bolt. A firing pin 32, spring pressed backwardly, is located in the breech-bolt, and a striker 33 is movably mounted in the carrier bolt 28.

An ejector 34 is slidably mounted in the lower part of the breech-bolt, and has slots 35—36, the former receiving the pivot pin 31 of the breech-bolt and the latter a pin forming a support for the ejector against which an ejector spring 37 presses, the opposite end of said spring pressing against one end of the slot 36. This mechanism forces the ejector normally forward and against a cartridge 38 in the cartridge chamber 39. An extractor 40 is pivotally mounted at the top of the breech-bolt 29, a spring normally forcing the lip 41 of the extractor into contact with the flange on the cartridge shell.

An opening from the breech-bolt chamber 30 is formed through the top of the frame, extending preferably to the forward end thereof, a breech-bolt opening cam 43 being formed at the side of the frame on an edge of said opening to receive a breech-bolt opening stud 44 extending from the side of the breech-bolt, this stud being preferably extended, as shown in Fig. 4, slightly beyond the side of the frame to form a handle for the manual operation of the breech-bolt. A slot 42 extends from said opening to receive said stud in the backward movement of the breech-bolt. A stop 45 projects from the lower rear part of the breech-bolt into a breech-bolt recess 46 in the carrier bolt 28, the stop 45, striking against the upper wall of this recess, acting to limit the pivotal movement of the breech-bolt 29. A lip on the lower edge of this projection extends beyond the end of the firing pin in position to engage the beveled forward end of the striker and so position it that it cannot strike the firing pin by reason of the swinging movement of the breech-bolt and thus accidentally explode a cartridge.

The operation of the parts thus far described is as follows, it being noted that by pressing the thumb piece of the catch 21 inward, the barrel support and breech-bolt carrier may be removed from the frame, a cam 47 on the side of the frame causing the stud 44 to automatically rise and thus not obstruct the removal of said parts. A cartridge having been exploded by the action of the firing pin 32 and the bullet thus forced outward, the recoil will move the barrel support and the breech-bolt carrier simultaneously backward until the stop 19 strikes the end wall 20 of the cavity in the frame, when this movement is arrested. This movement causes the breech-bolt stud 44 to ride up the breech-bolt opening cam 43, the movement of the breech-bolt, during this time, having been retarded by reason of its having been securely locked against backward movement independently of the barrel support by reason of the stud 44 engaging the shoulders 48 constituting breech-bolt holders on said support. This operation unlocks the breech-bolt that is now free to be forced backwardly by the explosion of gases within the barrel. The breech-bolt and its carrier now move backwardly, compressing the breech-bolt closing spring, the breech-bolt stud 44 passing along the groove 42. The extractor 40 pulls the shell from the cartridge chamber, and as soon as the shell is out of the chamber the ejector spring 37 forces the ejector forward and snaps the shell out through the opening to the breech-bolt chamber. As soon as the backward movement of the parts is completed the spring 49 returns the breech-bolt carrier and breech-bolt to their forward position, the pivoted breech-bolt in this movement striking the barrel support and thus returning it to its normal position. It will be noted that in order to open the breech-bolt chamber the breech-bolt 29 must move upwardly, thus placing the firing pin out of line with the striker 33 so that it will be impossible for a cartridge to be exploded by a movement of said striker, as by accidental operation of the hammer or otherwise, when the breech-bolt chamber is open.

A magazine chamber 50 is formed in the frame 13 immediately underneath the breech-bolt chamber, this magazine chamber being of a size to receive the cartridges 38, preferably located in two rows, as shown in Fig. 6 of the drawings. A cover 51 (preferably pivoted) closes the lower end of the magazine chamber and may be held in place as by a spring catch 52. The movable follower 53 of the magazine chamber, upon which the cartridges rest, is pressed upwardly by a follower spring 54 of peculiar construction that causes the follower 53 to always maintain a position most favorable to accurate feed of the cartridges to the cartridge chamber, irrespective of the shape of the cartridges or the position they assume when in the magazine chamber. This spring consists of bottom and top supports 55 joined

by one or more spring arms 56. In the construction herein shown a single arm 56 is employed terminating at each end in a coil 57, the wires of which are extended to form the supports 55, these wires being bent into rectangular shape and their extremities being bent at angles and passed into the openings formed by the coils 57. When one or more arms are employed, the supports will be formed as above described and the several arms will be joined by coils in a manner that will be readily understood from the above description. The operation of these parts of the magazine will be readily understood by those skilled in the art.

An indicator to denote the number of cartridges in the magazine consists of an indicator slide 79 mounted in the side of the frame and having numerals arranged to show through an opening 80. An indicator pin projecting from the side of the follower of the magazine, in a manner similar to that shown and described with respect to the lever actuating pin 76 hereinafter mentioned, engages this slide moving it upwardly as the follower moves upward, thus displaying a numeral that will denote the number of cartridges in the magazine.

In the construction herein shown the magazine is illustrated as formed directly in the frame, but it will be understood that with slight modification the magazine chamber 50 may be constructed to receive a removable magazine in a manner common to guns of this class.

A hammer 58 is pivotally mounted in a chamber 59 formed in the frame, this hammer being located to strike the end of the striker 33 and force it against the firing pin. A hammer actuator 65, as herein shown in the form of a lever, is pivotally mounted in the chamber 59, one end engaging the hammer and its opposite end passing into an opening in a trigger frame 60 mounted upon a pivot 61 in the chamber 59, as clearly shown in Fig. 3 of the drawings, a trigger 62 extending from the lower end of the trigger frame and within a trigger guard 63.

A detent 64 is pivotally mounted in the trigger frame, its lower end having a nose adapted to underlie one end of the hammer actuator 65, the latter being forced in a direction to move the hammer into firing position by a hammer spring 66, one end of which rests against the lever 65 and the other end against a compressing lever 67 pivotally mounted in the trigger frame. The end of the lever 67, opposite the spring, presses against the detent 64 and causes it to be forced into contact with the hammer actuating lever 65. It will be noted from this construction that the spring 66 serves the double purpose of a hammer spring and of a spring to hold the detent in engagement with the hammer actuating lever. A trip lever 68 is pivotally mounted in the trigger frame, one end of the lever being pressed upwardly, as by a spring, into engagement with the actuator lever 65. This trip lever has a trip 69 positioned to engage the nose on the detent 64 and remove it from engagement with the lever 65, thereby allowing the latter to swing under the influence of the hammer spring 66.

An automatic safety 70 is pivotally mounted in the frame with a nose 71 located in the path of movement of the trip lever 68. A grip projection 72 from this safety extends above the stock in position to be engaged by the thumb of the user of the gun to operate the safety to permit the trigger to be moved. In the operation of this mechanism, the trigger frame being swung on the pivot 61, all the parts mounted on said frame are moved in a circular path with said pivot as a center. The hammer actuating lever 65 being engaged at one end with the detent 64, such movement of the compressing lever 67 and hammer spring 66 compresses said spring thus putting the lever 65 under tension, and the continued movement increases the tension of said spring. This movement carries the trip 69 against the nose of the detent 64 finally disengaging the latter from the lever 65 which at this moment has been placed under enough tension to cause the hammer to hit the striker with a force sufficient to explode a cartridge. Another function for the spring 66 is now seen, and that is, its pressure upon the compressing lever 67 secured to the trigger frame, causes said frame, and the trigger 62, to be moved back to their normal positions, in which movement a cocking pin 73 secured to the trigger frame engages the lever 65 and moves it and the hammer to their cocked positions. It will thus be seen that the spring 66 serves many purposes, not the least of which are its functions to throw the hammer forward and also, through the action of the trigger frame, to recock the hammer. It will be seen that the arrangement of this mechanism is such as to prevent a "repeat" or second immediate and unintentional discharge of the gun should the trigger not be instantaneously released. At the time the trip 69 disengages the nose of the detent 64 from the hammer actuating lever 65 a space has been created between said detent and lever. Upon such disengagement the action of the hammer spring 66, forcing the rear end of the lever downward, causes said lever to force the trip lever 68 downward and move the trip 69 below and out of engagement with the nose of the detent 64. The lower end of said detent now immediately swings forward under the influence of the compressing lever 67 and hammer

spring 66, over the top of the trip 69, that is thus held by the nose of the detent from moving in front of it. Should the trigger be held in this position, the movement of the breech-bolt will cause the hammer 58 to be thrown backward and the rear end of the lever 65 upward into position to permit the nose of the detent 64 to reëngage the lever and thus hold it in its cocked position.

A breech-bolt retaining and carrier locking lever 74 is pivotally mounted in the frame at its forward end, a spring 75 at this end of the lever forcing its rear end normally downward. A locking lever actuating pin 76 is secured to the follower 53 of the magazine chamber in position to engage the lever 74 upon the last cartridge in the magazine being placed in the cartridge chamber 39. This causes said locking lever to be forced upwardly at its rear end, to place it in the path of movement of a shoulder 77 on the breech-bolt carrier. As the breech-bolt carrier moves backward at this time under the force of the exploded cartridge the spring underneath the follower of the magazine chamber will permit the carrier locking lever to yield sufficiently to allow such movement, said spring 54, however, immediately returning the lever into the path of movement of the shoulder 77 on the breech-bolt carrier which is thus held at the backward limit of its play, and the breech-bolt chamber is thus opened. This enables one to instantly determine when the last cartridge has been removed from the magazine and whether or not it has been fired, as a glance at the locking lever operating pin 78 projecting through the side of the frame, and by means of which said cocking and locking lever may be manually operated, will show the position of the lever when the last cartridge has been removed from the magazine and the open or closed position of the magazine chamber will show whether the cartridge has or has not been exploded, the closed position of said chamber showing that the last cartridge has not been fired.

A safety mechanism includes a safety bar or locking and cocking lever 81 pivotally mounted in the side part of the frame and extending over the hammer actuating lever 65, that, when pressed down upon said lever, prevents the latter from rising to operate the hammer. A safety rod 82 projects lengthwise within the frame and has a cam 83 on its end adapted to operate against the end of the breech-bolt retaining and carrier locking lever 74 to raise it whenever the safety rod is rotated in one direction and to permit said lever to fall when the safety rod is rotated in the opposite direction. In the construction of cam herein shown the end of the safety rod, which is round, is cut-away forming a flat surface against which the carrier locking lever rests. A safety lock 84 is secured to the end of the safety rod, and when its end is swung downwardly it is interposed in the path of movement of the grip projection 72 on the safety 70, preventing the gun from being accidentally fired. It will be noted that this placing of the safety lock in front of said safety has caused the safety rod 82 to be rotated to raise the carrier locking lever, and thus lock the breech-bolt carrier against opening movement, this by reason of engagement of a shoulder 85 on the end of said lever with a locking shoulder 86 in the rear end of the breech-bolt carrier. The safety rod 82 is cut-away on one side as at 87 within which recess thus formed the cocking and locking lever 81 may rest to permit movement of the hammer actuating lever 65. As the safety rod is rotated however, to bring its full portion against the safety bar the latter is pressed downward against the hammer actuating lever, thus preventing its movement. The shoulder 85 and shoulder 86 at the end of the breech-bolt carrier are beveled sufficiently to permit such parts to disengage when they are held only under the force of the follower spring 54 of the magazine, the construction, however, being sufficient to lock the breech-bolt carrier against movement when said lever is locked. When the carrier locking lever 74 is forced upward by the follower spring 54, as the breech-bolt carrier is moved backward, the end of this lever is forced into a recess 88 in the breech-bolt carrier and thus into the path of movement of the shoulder 77 formed at one end of said recess.

A safety tail 89 upon the trip lever 68 is located back of the detent 64 to prevent its accidental disengagement from the hammer actuating lever 65. This tail is sufficiently long to be carried against an upper wall of the chamber 59 by the trigger frame in its pivotal movement, this engagement of the tail with the wall of the chamber insuring the disengagement of the trip from the detent to enable the latter to move over the top of the trip in position to instantly reengage the hammer actuating lever should this disengagement of the detent and trip not have been caused by the operation of said actuating lever.

In order to insure the retention of the breech-bolt in place and prevent its being forced out by the expanding gases, lugs 90 are formed on its opposite sides to engage grooves 91 formed in the side walls of the breech-bolt chamber in the barrel support, these lugs being properly curved on their upper and under surfaces to engage the upper and under walls of said grooves in any position in which the breech-bolt may be placed by movement upon its pivot.

My improved firearm has special advan-

tage in those features that enable it to be cocked without movement of the breech-bolt, and without direct movement of the hammer by manual operation, when such recocking may be required by reason of misfire or hang fire due to defective primers or other causes. It will be noted that this result may be accomplished in different ways. In one method of operation, the hammer being down and consequently held against forward movement action of the spring 66 upon the hammer actuating lever 65 will be in a reverse direction from its action in firing and this will move the hammer to its cocked position and in this operation the detent 64 performs an active part, its nose engaging the beveled lower rear end of said actuating lever to impart an initial accelerating movement thereto. The spring 66 thus acts in a double capacity in this operation; by pressing directly upon the actuating lever that resists this pressure, it imparts movement through the compressing lever 67 to the detent for the purpose described. It will be understood that this function of the detent, in the recocking operation, is in addition to that hereinbefore described with respect to the cocking pin 73 that is moved against the actuating lever in the swinging movement of the trigger. In another method of operation pressure of the locking and cocking lever 81 will recock the hammer, and this may be effected manually by direct pressure upon the lever 81 in different ways, one of which, as shown herein may be by actuating the safety lock 84 through the safety rod 82, when said safety lock is turned to the safety position, the rod pressing the safety bar downward, as hereinbefore described, and this movement forces the hammer actuating lever downwardly and recocks the hammer. These methods of cocking the hammer are of special advantage in that it is not necessary to open the breech by manual operation of the breech-bolt to accomplish the purpose.

It will be noted that the rotation of the safety rod to its safety position prevents accidental discharge of the firearm in several different ways. By pressing the locking and cocking lever 81 against the hammer actuating lever 65 said lever is pressed downward, recocking the hammer, as hereinbefore described, and said lever is held in this position and prevented from operation should the trigger be intentionally or accidentally moved. In addition to holding the locking and cocking lever, the operation of the safety lock 84 also presses the carrier locking lever 74 into the recess in the breech-bolt carrier thus locking the breech-bolt against movement, and this operation of the safety lock also moves the nose 71 on the locking lever 70 into engagement with the trip lever 68 thus preventing movement of the trigger frame and its component parts.

In order to obtain uniform expansion and contraction of the different parts, and especially as to the barrel support, breech-bolt carrier and frame, by guarding against an uneven heating of said parts, I provide for the circulation of air for the purpose of reducing the temperature and thus retard the heating of parts, and especially the barrel support and said carrier. In the construction herein shown a set of corrugations 92 are formed between the barrel support and the frame, extending lengthwise of the structure and another set of corrugations 93 are formed between said parts, extending crosswise, some of the corrugations of one set opening into some of the corrugations of the other set. Likewise a set of lengthwise corrugations 94 and a set of crosswise corrugations 95 are formed between the breech-bolt carrier and the barrel support, the corrugations of one set opening into the corrugations of another set and also the corrugations between the barrel support and frame, in some instances, communicating with those between the breech-bolt carrier and barrel support. These corrugations are also formed to open into that part of the recess 16 containing the breech-bolt returning spring. In the action of the parts this recess will be reduced in area as the projection 23 moves backwardly with the breech-bolt carrier, with a result that the heated air will be expelled from this recess, and as said projection moves forward the area of the recess will be increased and fresh air will be drawn in and circulated through the passages, around the parts, tending to preserve a uniform temperature therein.

While I have shown and described herein one form of mechanism embodying my invention, this may be departed from to a greater or lesser degree and yet be within the spirit and intent of the invention.

I claim—

1. A firearm including a frame, a pivotally mounted breech-bolt otherwise movably supported by the frame to be actuated by the explosive forces, means for retarding the movement of the breech-bolt during the early part of its backward movement, means for locking the breech-bolt to said retarding means, means for pivotally moving the breech-bolt to release it from said retarding means to permit it to complete its backward movement, and means for returning the breech-bolt to its closed position.

2. A firearm including a frame, a pivotally mounted breech-bolt otherwise movably supported by the frame to be actuated by the explosive forces, a member interposed directly in the path of backward movement of a part of the breech-bolt during the early

period of such movement, means for locking the breech-bolt to said interposed member, means for pivotally moving the breech-bolt to disengage it from said member to permit it to complete its backward movement, and means for returning the breech-bolt to its closed position.

3. A firearm including a frame, a member movably mounted on the frame to be actuated by the recoil forces, a pivotally mounted breech-bolt operatively connected with said member, means for locking the breech-bolt against backward movement independently of other parts of the firearm, means influenced by the backward movement of said movable member to pivotally operate the breech-bolt to unlock it, and means for returning the breech-bolt to its forward position.

4. A firearm including a frame, a member movably mounted on the frame, a carrier, a breech-bolt pivotally mounted on said carrier and operatively connected with said member, means for locking the breech-bolt against backward movement independently of said member, means influenced by the backward movement of said movable member to pivotally move the breech-bolt to unlock it, and means for returning the carrier and breech-bolt to its closed position.

5. A firearm including a frame, a member movably mounted on the frame, a pivotally mounted breech-bolt otherwise movably mounted with said member, the latter having a part interposed directly across the path of movement of a part of the breech-bolt to obstruct its backward movement, means influenced by said member in its backward movement to pivotally move the breech-bolt and thus remove said member as an obstruction to the backward movement of the breech-bolt, and means for returning the breech-bolt to its closed position.

6. A firearm including a frame, a movably mounted member on the frame, a pivotally mounted breech-bolt otherwise movably mounted with said member, the latter having a part interposed directly in the path of movement of a part of the breech-bolt to obstruct its backward movement independently of said member, means influenced by said member in its backward movement to pivotally move the breech-bolt to remove it from such obstruction and permit backward movement of the breech-bolt independently of said member, and means for returning the breech-bolt to its closed position.

7. A firearm including a frame, a pivotally mounted breech-bolt supported by the frame and otherwise movable thereon, an obstruction movably mounted on the frame and interposed in the path of backward movement of a part of the breech-bolt to prevent such movement independently of such obstruction, means to pivotally move the breech-bolt to pass said obstruction, and means for returning the breech-bolt to its closed position.

8. A firearm including a frame having a cam, a pivotally mounted breech-bolt supported by the frame and otherwise movable thereon by the forces of explosion, an obstruction interposed in the path of backward movement of the breech-bolt to prevent such movement independently of such obstruction, said bolt being constructed to engage said cam to swing it pivotally to pass said obstruction, and means for returning the breech-bolt to its closed position.

9. A firearm including a frame, a member movably mounted on the frame to be actuated by the recoil forces, a pivotally mounted breech-bolt supported by the frame and otherwise movable by the explosive forces, an obstruction interposed directly across the path of backward movement of the breech-bolt but movable therewith, means for pivotally swinging the breech-bolt to cause it to pass said obstruction, and means for returning the breech-bolt to its forward position.

10. A firearm including a frame, a member movably mounted on the frame to be actuated by the recoil forces, a breech-bolt pivotally mounted on said member to be actuated by the explosive forces, said member being interposed in the path of backward movement of the breech bolt and movable therewith, means to swing the breech-bolt on its pivot to remove it from engagement with said member, and means for returning the breech-bolt to its closed position.

11. A firearm including a frame, a member movably mounted on the frame to be operated by the recoil forces, a breech-bolt pivotally mounted on said member to be actuated by the explosive forces, means to limit the backward movement of said member, means to pivotally move said breech-bolt to disengage it from said member, and means for returning the breech-bolt to its closed position.

12. A firearm including a frame, a member movably mounted on the frame for movement by recoil forces, means for limiting the backward movement of said member, a breech-bolt pivotally mounted on said member, means for preventing backward movement of the breech-bolt independently of said member, said frame having a cam interposed in the path of movement of the breech-bolt to pivotally move it to release it from engagement with said member, and means for returning the breech-bolt to its closed position.

13. A firearm including a frame, a breech-bolt pivotally supported by the frame to be operated by the explosive forces, means actuated by the recoil forces to otherwise move the breech-bolt, holding means for the

breech-bolt, movably mounted means for swinging the breech-bolt on its pivot to disengage it from its holding means, means for limiting its opening swinging movement, means for pivotally returning it to its normal position, and means for returning it to its closed position.

14. A firearm including a frame, a barrel support movably mounted on the frame to be actuated by the recoil forces, a breech-bolt carrier movably mounted in the frame, a breech-bolt movably mounted on the carrier, said support having a part interposed as an obstruction to the path of backward movement of the breech-bolt, means for releasing the breech-bolt from said obstruction to permit its backward movement and that of the carrier, and means for returning the carrier and breech-bolt to their normal positions.

15. A firearm including a frame, a barrel support movably mounted on the frame to be actuated by the recoil forces, a breech-bolt carrier movably mounted on the frame, said support having a part interposed as an obstruction to the backward movement of the breech-bolt, means for releasing the breech-bolt from said obstruction, and a single means for returning the breech-bolt to its closed position and said support to its forward position.

16. A firearm including a frame, a barrel support removably secured to the frame and movable thereon by the recoil forces, a breech-bolt pivotally mounted and movable by said support, the latter having a part interposed as an obstruction to the backward movement of the breech-bolt independently thereof, means coöperating with the support in its backward movement to render said obstruction ineffective, and means for returning the breech-bolt to its closed position.

17. A firearm including a frame, a barrel support removably secured to the frame, a breech-bolt carrier movably mounted on said support and attached thereto, a breech-bolt movably mounted on the carrier, said support having an obstruction located in the path of movement of the breech-bolt to prevent its backward movement independently of the support, means to move the breech-bolt to permit it to pass said obstruction, and means for returning the breech-bolt to its closed position.

18. A firearm including a frame, a barrel support movably mounted on the frame to be actuated by the recoil forces, means for limiting the backward movement of said support, a breech-bolt carrier mounted on the frame and movable independently of the support, a breech-bolt pivotally mounted on the carrier, said support having an obstruction interposed in the path of backward movement of the breech-bolt independently of the support, means for moving the breech-bolt to permit it to pass said obstruction, and a single means for returning the breech-bolt to its closed position and the support to its forward position.

19. A firearm including a frame, a barrel support movably mounted on the frame to be actuated by the recoil forces, a breech-bolt pivotally mounted and movable by said support, the latter having an obstruction interposed in the path of backward movement of the breech-bolt independently thereof, means coöperating with said support in its backward movement to render said obstruction ineffective, means to return the breech-bolt to its closed position, and a member on the support to receive the force of the returning means to move the support to its forward position.

20. A firearm including a frame, a barrel support movably mounted on the frame, a breech-bolt carrier movably mounted on the frame, said barrel support having an obstruction to the backward movement of the breech-bolt independently of said support, means coöperating with said support in its backward movement to render said obstruction ineffective, a spring to return the carrier to its forward position, and means upon the barrel support to receive the thrust of said carrier to return said support to its forward position.

21. A firearm including a frame, a carrier bolt and a breech-bolt movably mounted on the frame and one movable independently of the other, means movable simultaneously with said movable bolt to retard the backward movement of the breech-bolt, means to move one bolt independently of the other to disengage it from said retarding means, and means for returning the breech-bolt to its closed position.

22. A firearm including a frame, a carrier bolt and a breech-bolt movably mounted on the frame, one of said bolts being also pivotally supported, means movable simultaneously with the breech bolt for retarding its movement, means for swinging the pivoted section to disengage it from said retarding means, and means for moving the bolt to its closed position.

23. A firearm including a frame, a breech-bolt carrier movably mounted on the frame, said carrier including a carrier bolt affixed thereto, a breech-bolt pivotally mounted on the carrier, means to retard the backward movement of the carrier, means to swing the breech-bolt to disengage it from said retarding means, and means for returning the carrier to its forward position.

24. A firearm including a frame, a barrel support movably mounted on the frame, a breech-bolt carrier movably mounted on the frame, a carrier bolt rigidly secured to the carrier, a breech-bolt section pivotally mounted on the carrier, said support having an obstruction to the backward movement of

the breech-bolt, means influenced by the backward movement of the barrel support to operate the pivoted breech-bolt to pass said obstruction, and means for returning the breech-bolt to its forward position.

25. A firearm including a frame having a cam, a barrel support movably mounted on the frame, a breech-bolt carrier movably mounted on the frame, a carrier bolt rigid with the carrier, a breech-bolt pivoted thereto and having a part to engage said cam, said support having an obstruction to backward movement of the breech-bolt, connections between the breech-bolt and said support to move the former into engagement with the cam to permit it to pass said obstruction, and means for returning the breech-bolt to its closed position.

26. A firearm including a frame, a carrier bolt and a breech-bolt mounted in the frame, one of said bolts being mounted for pivotal movement independently of the other, a firing pin mounted in the breech-bolt and a striker mounted in the carrier bolt, means influenced by the breech-bolt in its backward movement to swing it on its pivot, a hammer, and means for operating the hammer.

27. A firearm including a frame, a carrier bolt and a breech-bolt mounted in the frame, one of said bolts being mounted for pivotal movement independently of the other, a firing pin mounted in the breech-bolt, a hammer, means for operating the hammer, and means influenced by the backward movement of the breech bolt to swing it on its pivot.

28. A firearm including a frame, a striker supported for longitudinal movement by the frame, a breech-bolt movable transversely to said striker, and also constructed to be moved longitudinally in the frame under the forces of the explosive gases, a firing pin mounted in the breech-bolt, a hammer to engage said striker, means for operating the hammer, and means influenced by the backward movement of the breech-bolt to swing it on its pivot.

29. A frame, a carrier bolt mounted for longitudinal movement in the frame, a striker mounted in the carrier bolt, a breech-bolt mounted for longitudinal movement in the frame and also having a movement transverse to the longitudinal movement of the carrier bolt, a firing pin mounted in the breech-bolt, a hammer to operate the striker, means for operating the hammer, and means influenced by the backward movement of the breech-bolt to impart said transverse movement thereto.

30. A firearm including a frame, a breech-bolt pivotally mounted at its front end in the frame, means for raising the back end of the breech bolt during the early part of its backward movement, a firing pin mounted in the breech-bolt, a hammer to operate the firing pin, and means for operating the hammer.

31. A firearm including a frame, firing mechanism mounted in the frame and including a breech-bolt having a lengthwise slot opening from its outer surface, means for operating the breech-bolt, an ejector mounted in said slot with its end projecting from the forward end of the breech-bolt, said ejector having slots therein, pins projecting through said slots to hold the ejector in place, and a spring located in one of said slots and pressing against one of said pins and against the ejector to normally press its end out of the forward end of the breech-bolt.

32. A firearm including a frame, a barrel support removably mounted in the frame and having guide lugs engaging grooves in the side part of the frame, a breech-bolt carrier, a breech-bolt located on said carrier, means for operating the breech-bolt, and a manually operated latch accessible from outside of the frame with its end disposed to hold said support in place.

33. A firearm including a frame, a barrel support removably located in the frame and having lugs engaging grooves in the side of the frame, a breech-bolt carrier, a breech-bolt mounted on said carrier, a returning spring acting against the carrier, means for transmitting the force of said spring against said frame, and means for removably holding the barrel support in the frame.

34. A firearm including a frame, a barrel support movably mounted in the frame, a breech-bolt carrier, a breech-bolt mounted on the carrier in position to engage the support, a returning spring acting against the barrel support, means for transferring the force of said spring to said frame, and means for locking said support within the frame.

35. A firearm including a frame, a barrel support removably mounted in the frame, a breech-bolt carrier, a breech-bolt mounted on said carrier in position to engage the support, a stop projecting from the barrel support into a cavity in the frame to engage the end wall thereof, a base resting against said stop and adapted to engage shoulders on the frame, a spring pressing with one end against said base and with its opposite end against the carrier, and means for locking the carrier in place.

36. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, a member in engagement with said hammer, a spring in engagement with said member, a trigger, means coöperating with the trigger to place tension upon said spring as the trigger is moved, a detent to hold said member, and a trip connected with the detent to release said member to permit the hammer to operate under the influence of said spring.

37. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, a lever mounted in the frame with one end in engagement with the hammer, a spring engaging the opposite end of the lever, a trigger, means connected with the trigger to increase the tension of the spring as the trigger is pulled, a detent for holding said lever, and a trip operated by the trigger to release the detent and permit the lever to throw the hammer forward.

38. A firearm including a frame, a hammer mounted in the frame, a member engaging the hammer to operate it, a spring in engagement with said member, a trigger pivotally mounted in the frame, a compressing lever in engagement with said spring, said lever being pivotally mounted on the trigger to compress the spring as the trigger is moved, a detent for holding said member, and means connected with the trigger to release said detent and permit said member to operate the hammer.

39. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, an actuating member for said hammer, a spring compressed against said member, a trigger pivotally mounted in the frame, a compressing member operatively connected with the trigger to compress said spring in the movement of the trigger, a detent, and means connecting the detent with the trigger to operate the latter to release said actuating member to operate the hammer.

40. A firearm including a frame, a hammer movably mounted in the frame, an actuating member mounted in the frame, a spring for said actuating member, a compressing member, a trigger pivotally mounted in the frame, means connecting the trigger and compressing member to operate the latter to compress the spring, a detent to engage the actuating member to hold it against movement, and a trip pivotally mounted on the trigger to engage the detent to release it from said actuating member.

41. A firearm including a frame and a firing mechanism including a hammer movably mounted in the frame, an actuating member pivotally mounted in the frame, a trigger pivotally mounted in the frame, a spring in engagement with said actuating member, a compressing member pivotally mounted on the trigger to engage said spring, a detent pivotally mounted on the trigger to engage said actuating member, a trip, and a connection between the trip and trigger to operate the trip to release said detent.

42. A firearm including a frame and a firing mechanism including a hammer pivotally mounted in the frame, an actuating lever pivotally mounted in the frame with one end engaging the hammer and the other end projecting toward a trigger, the trigger pivotally mounted in the frame, a compressing member pivotally mounted on the trigger, a spring interposed between said actuating lever and compressing member, a detent pivotally mounted on the trigger to engage said lever, and a trip pivotally mounted on the trigger to engage said detent and release it from engagement with said lever.

43. A firearm including a frame, and a firing mechanism including a hammer, a hammer actuating member, a spring engaging said member, a pivotally mounted trigger, a compressing member pivotally mounted on the trigger, a detent pivotally mounted on the trigger to engage said compressing member to compress the spring as the trigger is moved, said detent also engaging said actuating member, and a trip operatively connected with the trigger to release said detent.

44. A firearm including a frame and firing mechanism mounted in the frame and including a pivotally mounted trigger, said firing mechanism also including operating parts pivotally mounted thereon and controlled in their operations by the pivotal movement of the trigger, a locking lever pivotally mounted in the frame to engage the pivotally mounted parts on the trigger and prevent its movement, and a projection from said locking lever extending beyond the outer surface of the frame.

45. A firearm including a frame and firing mechanism including a hammer mounted in the frame, a hammer actuating member, a locking and cocking lever pivotally supported at one end in the frame and projecting across said member, and means for pressing said lever into contact with said member to prevent its operation.

46. A firearm including a frame, a breech-bolt movably mounted in the frame to be automatically operated by the forces of explosion, a breech-bolt retaining lever, connections between said lever and breech-bolt to positively lock the latter in its closed position, and means for manually actuating said lever to unlock the breech-bolt.

47. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt lever pivotally mounted in the frame, a magazine, connections between the floor of the magazine and said lever for actuating the latter, said connections being rendered effective upon the removal of the last cartridge from the magazine, and means upon said lever to lock the breech-bolt in its closed position and to engage said bolt to hold it in its open position.

48. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt lever pivotally mounted in the frame, a magazine, connections between the

floor of the magazine and said lever for actuating the latter, said connections being rendered effective upon the removal of the last cartridge from the magazine, means upon said lever to lock the breech-bolt in its closed position and to engage said bolt to hold it in its open position, and means for manually operating said lever.

49. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt retaining lever, connections between said lever and breech-bolt to hold the latter in its closed position, a firing mechanism including a safety member, a safety lock to engage said safety member and prevent its movement, and connections between said lock and breech-bolt retaining lever to operate the latter.

50. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt retaining lever to lock said breech-bolt in its closed position, a hammer, an actuating member for the hammer, means for locking said actuating member, a safety member, a safety lock to prevent movement of said safety member, and connections between said lock and breech-bolt retaining lever to actuate the latter and also to prevent movement of the actuating member lock.

51. A firearm including a frame, a firing mechanism including a hammer mounted in the frame, an actuating member therefor, a spring for said actuating member, a detent to hold said actuating member, a trip to engage said detent to release it from the actuating member, means for pressing the detent in engagement with the actuating member, means for releasing said trip from the detent immediately upon release of the latter from said actuating member, and connections between said trip and trigger for operating the latter.

52. A firearm including a frame and firing mechanism mounted on the frame and including a hammer, an actuating member therefor, a spring for said actuating member, a compressing member for said spring, a detent engaging said compressing member to receive the force of said spring, said detent also engaging said actuator, a trip underlying the end of said actuating member to be moved thereby, a pivotally mounted trigger, and connections between the trigger and trip to move the latter to release the detent.

53. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, an actuating member for the hammer, a pivotally mounted trigger, a spring to engage said actuating member, a compressing member connected with the trigger to compress the spring, a detent operatively connected with the trigger to actuate said member, a trip operatively connected with the trigger to release said detent, and a recocking pin operatively connected with the trigger to recock the mechanism.

54. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, an actuating member for the hammer, a pivotally mounted trigger, a detent to hold said actuating member, a trip operatively connected with the trigger to disengage said detent from said actuating member, and a projection on said trip positioned back of said detent to prevent its accidental disengagement from said hammer actuating member.

55. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, an actuating member for the hammer, a pivotally mounted trigger, a detent to engage said hammer actuating member, and a trip pivotally mounted on the trigger and having a projection positioned to engage the frame to insure disengagement of the trip from the detent.

56. A firearm including a frame and a firing mechanism including a hammer mounted in the frame, an actuating member for the hammer, a pivotally mounted trigger, a detent to engage said hammer actuating member, and a trip pivotally mounted on the trigger and having a projection positioned to prevent accidental disengagement of the detent from the hammer actuating member and also to engage the frame to insure disengagement of the trip from the detent.

57. A firearm including a frame, a breech-bolt and a carrier bolt, one of said bolts being pivotally mounted, a firing pin mounted in the breech-bolt, a striker pin mounted in the carrier bolt, and a projection from the pivotally mounted bolt positioned to engage the pin in the other bolt to prevent engagement of the two pins in the pivotal movement of said pivoted bolt.

58. A firearm including a frame, a carrier bolt and a breech-bolt mounted in the frame, one of said bolts being pivotally mounted, a pin mounted in one of said bolts, a projection from said pivotally mounted bolt extending beyond the end of the pin therein, and a pin located in the other bolt and positioned to be engaged by said projection.

59. A firearm including a frame, a carrier bolt mounted therein, a breech-bolt pivotally supported by the frame, a firing pin mounted in the breech-bolt, a striker pin mounted in the carrier bolt, and a projection from the breech-bolt extending beyond the end of the firing pin in position to hit the striker pin in the pivotal movement of the breech-bolt and prevent contact of said pins.

60. A firearm including a frame. a barrel support movably inclosed within the frame

with intersecting lateral and longitudinal grooves formed in the meeting walls of said parts, said grooves opening at the surface of the frame to the atmosphere, and means for forcing a circulation of air through said grooves.

61. A firearm including a frame, a barrel support movably inclosed within the frame with a series of lateral grooves and a series of longitudinal grooves, each of said series being formed in one of the meeting walls of one of said parts, and means for forcing a circulation of air through said grooves.

62. A firearm including a frame, a barrel support movably inclosed within the frame, said frame having a chamber extending for a substantial distance lengthwise thereof, said barrel support forming one wall of said chamber, a series of lengthwise and a series of crosswise grooves intersecting one another and located in the meeting faces of the frame and barrel support and opening at the surface of the frame to the atmosphere, and means within said chamber for forcing a circulation of air through said grooves.

63. A frame, parts movably supported by the frame, passages located between said movable parts and opening to the outer surface of the structure to provide for a circulation of air, said frame having a chamber communicating with said passages, a member movably located in said chamber, a breech-bolt movably mounted on the frame, and operative connections between said movable member and breech-bolt.

64. A firearm including a frame having a chamber therein, parts movably supported on the frame and having passages located between them and opening to the atmosphere to provide for a circulation of air, a breech-bolt carrier, and a member connected with said carrier and located in said chamber to force a circulation of air through said passages.

65. A firearm including a frame having a groove formed in its upper surface, a barrel support movably mounted on the frame and forming the upper wall of said groove thereby constituting a chamber for the compression of air, said parts having passages opening to the atmosphere for the circulation of air, a breech-bolt movably mounted in the frame, a member constituting the end of said chamber, and means operatively connecting said member and the breech-bolt to cause a circulation of air through said passages.

66. A firearm including a frame having a groove in its upper surface, a barrel support movably mounted in the frame and forming the upper wall of said groove, constituting a compression chamber, said parts having passages between their meeting walls opening to the atmosphere and to said chamber for the circulation of air, a breech-bolt movably mounted in the frame, a member constituting one wall of said chamber, a spring located in said chamber and thrusting against said wall, and operative connections between the breech-bolt and said member to cause movement of the latter.

67. A firearm including a frame, a breech-bolt carrier movably mounted in the frame, said parts being arranged with passages for the circulation of air between said parts.

68. A firearm including a frame, a barrel support movably mounted in the frame, a breech-bolt carrier movably mounted in the frame, said parts being arranged with passages for the circulation of air therearound.

69. A firearm including a frame, a barrel support movably mounted in the frame, said parts having a recess and passages for the circulation of air into said recess, and means for increasing and decreasing the area of said recess.

70. A firearm including a frame, a barrel support movably mounted in the frame, a breech-bolt carrier movably mounted in the frame and independently of the barrel support, said parts being provided with passages for the circulation of air, said parts also providing a recess into which said air circulates, and means for increasing and decreasing the area of said recess.

71. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, an actuating member in engagement with said hammer, a detent to engage said actuating member to hold it against movement, means for forcing the detent toward said actuating member, and a cocking pin to move said actuating member to cocked position, said detent and actuating member being formed to impart initial accelerating movement to the actuating member by the detent.

72. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, a hammer actuating member, a pivotally mounted trigger frame, a detent mounted on said frame to engage said actuating member, the engaging surfaces of the detent and actuating member being formed to impart initial accelerating movement to said actuating member by the detent, means for forcing the actuating member into engagement with the detent, means for operating the trigger frame, and a cocking pin secured to said frame to engage said actuating member to cock the hammer.

73. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, an actuating member in engagement with said hammer, a trigger operatively engaged with said actuating member, means connected with the trigger to return it to its normal position, and a cocking pin connected with the trigger and

adapted to engage said actuating member to automatically place the hammer in cocked position.

74. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, an actuating member for said hammer, and means connected with said trigger and said actuating means to automatically place the hammer in cocked position.

75. A firearm including a frame, a firing mechanism mounted thereon and including a hammer, an actuating member for said hammer, a trigger for operating said actuating member, means actuated by the trigger for forcing the actuating member to place the hammer in cocked position, a bar to engage said actuating member to move it to place the hammer in cocked position, and means for actuating said bar.

76. A firearm including a frame, parts having a slidable bearing within the frame, and grooves formed in the slidable bearing surface to reduce the expansion in a direction laterally to that of the sliding movement of the parts.

77. A firearm including a frame, parts having a slidable bearing within the frame, grooves formed in a slidable surface to reduce the expansion in a direction laterally to that of sliding movement of the parts, and means for introducing air into said grooves.

78. A firearm including a frame, parts slidably mounted in the frame and having crosswise and lengthwise grooves formed in a sliding surface to reduce expansion in a direction laterally to that of sliding movement of the parts, said grooves opening to permit the entrance of air thereto and circulation therethrough.

79. A firearm including a frame and firing mechanism mounted therein and including a hammer, a spring to effect movement of the hammer, and self-acting means included in said firing mechanism to cause said spring to force the hammer into firing position and to recock it.

80. A firearm including a frame and firing mechanism mounted therein and including a hammer, a spring for effecting movement of the hammer, and self-acting means included in said firing mechanism for causing the spring to exert pressure at one end to force the hammer to firing position and at the other end to recock it.

81. A firearm including a frame and firing mechanism mounted therein and including a hammer, a spring to effect operation of the hammer, and a connection between the hammer and spring and including a movable trigger frame and members mounted upon the frame to cause the spring to force the hammer to firing position and also to recock it.

82. A firearm including a frame and firing mechanism mounted in the frame and including a hammer, an actuator for said hammer, a spring seated against said actuator, means for compressing the spring to force the hammer to firing position, and means for transmitting the force of the spring to move the hammer to cocked position.

83. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt retaining lever, connections between said lever and breech-bolt to lock the latter in its opened or in its closed positions, and means for manually actuating said lever to lock or unlock the breech-bolt.

84. A firearm including a frame, a breech-bolt movably mounted in the frame, a breech-bolt retaining lever, connections between said lever and breech-bolt to lock the latter in its open or in its closed positions, means for manually actuating said lever to lock or unlock the breech-bolt, a magazine including a movable follower, and connections between said follower and said lever for actuating the latter upon the removal from the magazine of the last cartridge.

THOMAS F. HARTIGAN.

Witnesses:
A. E. O'BRIEN,
ARTHUR B. JENKINS.