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3,240,121

SELF-LOADING GUNS

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2 Sheets-Sheet 1

FIG. 1

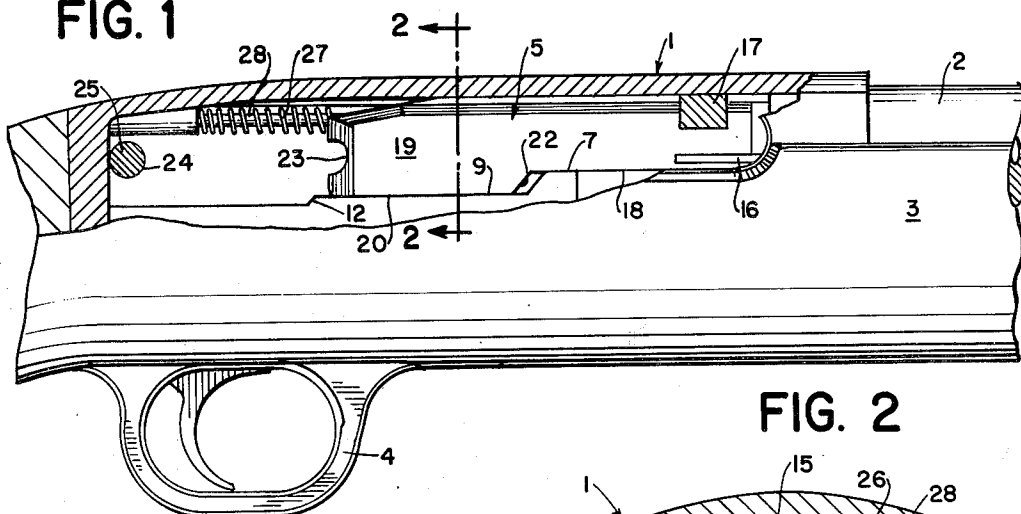


FIG. 8

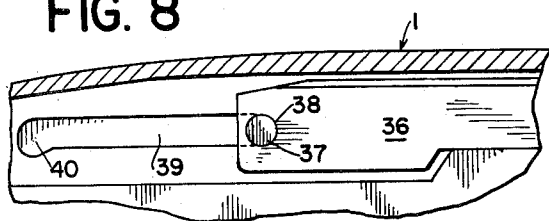


FIG. 2

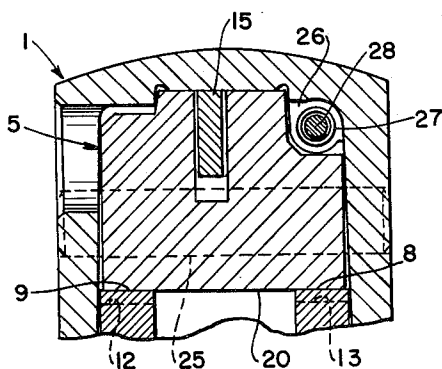
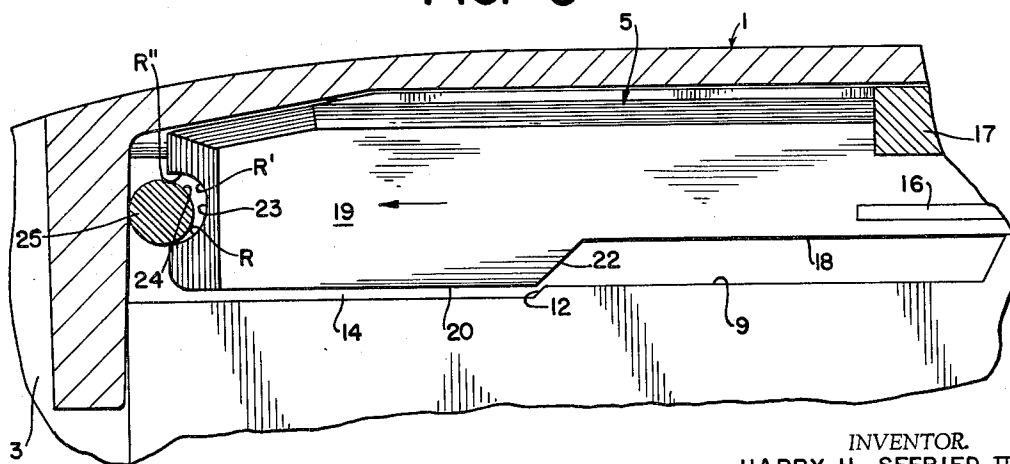


FIG. 3



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1

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SELF-LOADING GUNS

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This invention relates to self-loading automatic or semi-automatic guns of the blow back type including rifles, machine guns and pistols, and has for its object the provision of an improved means for arresting the rearward motion of the breechblock.

The breechblock of an automatic blow back gun can go rearward and return at such a rate as to fire too rapidly, or it may be too rapid for the reliable feeding of cartridges from the magazine into the barrel chamber. The invention provides a simple deflector or cam means for imparting a transverse thrust of the rear end of the breechblock at the end of its rearward travel followed by a comparable opposite thrust or lift on the forward travel.

This transverse movement decelerates the longitudinal motion of the breechblock at the end of its rearward travel, the cam means for imparting this transverse thrust being so contoured that the longitudinal motion of the breechblock is stopped smoothly and completely. There is no tendency for the breechblock to bounce forward (at the completion of its rearward movement) as there would be if the breechblock were stopped by a resilient buffer or by striking against a fixed stop member while traveling at the velocity typical in self loading firearms mechanisms.

By eliminating the bounce effect the present invention secures the advantage of having the breechblock move forward under the influence of the return spring only. Accordingly, the breechblock will begin its forward stroke with a gradually accelerated motion, the cyclic rate of the firearm will be reduced, and reliability of feed will be increased when spring-actuated magazines are used because the reduced forward velocity of the breechblock gives the magazine more time in which to position the next cartridge for insertion into the firing chamber.

In the embodiments of the invention to be described, the transverse motion or thrust is imparted only to the rear end of the breechblock. However, this transverse thrust could be imparted to the entire breechblock if this were advantageous in an alternative firearms structure. Moreover, it should be noted that the amount of transverse thrust may be varied, but will be small in proportion to the longitudinal movement of the breechblock. As the breechblock moves to the rear from its battery position, it is guided by the frame or receiver structure, and held to a straight path until near the end of its stroke, when cam means effect the transverse thrust. After the forward stroke has begun, the rear end of the breechblock is given a reverse transverse movement or thrust by simple cam means so that it will again be engaged by the same guiding surfaces which control its rearward movement.

These and other novel features of the invention will be better understood after considering the accompanying drawings and the following discussion:

FIG. 1 is a side elevation of the receiver portion of a rifle, when the breechblock is closed, with parts in section;

2

FIG. 2 is a sectional view at 2-2 of FIG. 1;

FIG. 3 is a fragmentary enlarged view similar to FIG. 1 showing the breechblock in its initial rearward position;

FIG. 4 is a view similar to FIG. 3 showing the breechblock at the end of its rearward travel and its depressed position;

FIG. 5 is a view similar to FIG. 3 showing the breechblock in an initial returning position;

FIG. 6 illustrates a modification of breechblock and cross pin;

FIG. 7 is a fragmentary enlargement of FIG. 6 showing the rearward position of the breechblock;

FIG. 8 illustrates another modification, and

FIG. 9 illustrates still another modification.

For convenience, the gun of the invention will be described as a rifle for use with .22 caliber rimfire cartridges. The receiver 1 and barrel 2 are mounted in a stock 3. The trigger guard 4 may be integral with the receiver or a detachable member. The receiver may be constructed to be operated with any suitable magazine such as a tubular, box or rotary magazine and the breechblock 5 may be of any suitable shape, for example, rectangular in cross-section.

For convenience, and to avoid unnecessary repetition, the invention will be described to illustrate the preferred embodiment in which the transverse thrust at the rear of the receiver is first downward and then upward. However, it is intended to cover a reversal of the transverse thrust in which the thrust is first upward on the rearward travel of the breechblock and then downward on the return travel of the breechblock.

The breechblock illustrated in FIGS. 1 to 5 is generally rectangular in cross-section and makes a fairly close but freely sliding fit in the generally rectangular opening of the receiver. The receiver has two spaced forward support surfaces 7, one on each side of the center, and two rearward but lower spaced support surfaces 8 and 9. Rearward of the support surfaces 8 and 9 are cam surfaces 12 and 13 and a long shallow recess 14 below the breechblock 5 as shown in FIG. 3. The breechblock has a forward part having mounted therein a firing pin 15, an extractor 16 and a handle 17 for operating the breechblock manually. The forward part of the breechblock has an under bearing surface 18 which travels on the support surfaces 7 and a depending rearward part 19 having a bearing surface 20 which travels on the support surfaces 8 and 9. The breechblock has a cam surface 22 which engages the cam surfaces 12 and 13 when the breechblock travels forward.

The rear end of the breechblock has a transverse arcuate cam surface 23 for engaging a deflector, advantageously cylindrical surface 24 of the cross pin 25. When the pin has a diameter, for example of 0.250 inch, the surface 23 has a lower curve part R on a radius of 0.1562 inch and upper curved part R' having a radius of 0.109 inch, and a flat top part R''. The radius of the pin is smaller than the radius of R but larger than the radius of R'. One side of the breechblock has a longitudinal recess 26 in which a coil spring 27 and a follower rod 28 are mounted. The coil spring yieldably urges the breechblock to a forward position and is guided by the follower rod.

The operation of the gun of FIGS. 1 to 5 is as follows: Assuming that the breechblock 5 is in the firing position of FIG. 1 and a hammer or striker of any conventional type strikes the firing pin and ignites the cartridge, the breechblock travels rearward until cam surface 22 clears cam surface 12, then lowermost surface R of the cam surface 23 engages the pin 25 as shown in FIG. 3, and due to the curves R and R' the end 19 is thrust downward with accelerated velocity until the flat surface R'' strikes the top of pin 25. The end 19 is thus moved downward into space 14 as shown in FIG. 4. This transverse motion decelerates the rearward movement of the breechblock. As shown in FIGS. 3 and 5, the breechblock moves forward only a short distance pressed by spring 27 when the cam surface 22 engages the cam surfaces 12 and 13 and the end 19 is thrust upwardly sufficiently to permit the surface 20 to travel on the surfaces 8 and 9 of the receiver.

FIGS. 1 and 2 show that the top of the breechblock can make contact with the roof of the receiver after the breechblock has moved forward of the engagement of surface 22 with surface 12. This insures a smooth operation of the breechblock without vibration.

FIGS. 6 and 7 illustrates a modification in which the deflector cross-pin 30 is mounted in the receiver 1 forward of the rear and the breechblock 31 has a longitudinal slot 32 which makes a close sliding fit on the pin 30. The forward part of the slot enters a recess 33 which has cam surfaces R, R' and R'' as in FIG. 1 for imparting a transverse downward thrust to the rearward end 34 of the breechblock as in FIG. 7. In addition, the recess 33 has a cam surface 35 which engages the pin 30 shortly after the breechblock starts to return to deflect the end 34 upward. As the breechblock travels forward the surfaces of slot 32 bear on the pin 30 and accordingly guide the rearward end. The forward part travels on surfaces as shown in FIGS. 1 and 3.

FIG. 8 illustrates a modification of receiver 1 and breechblock 36 in which a cross-pin 37 is inserted in a hole in the rearward end of the breechblock to provide side lugs 38. These lugs extend a short distance, say, one-eighth inch, on each side and travel in side grooves 39 in the side walls of the receiver. These grooves lead to recesses 40 in the receiver similar to recess 33 of FIG. 7. The lugs 38 guide the rear end 36 of the breechblock in traveling in the grooves 39 and the recess effects a rapid downward thrust at the end of the travel of the breechblock and a rapid upward thrust shortly after the breechblock starts forward.

The modification shown in FIG. 9 comprises a receiver 45 having a breechblock 46, generally rectangular in cross-section having a forward under surface 47 on each side which travels on support surfaces 48, one on each side of the receiver. The forward part of the receiver and breechblock may be as shown in FIGS. 1 to 5.

The receiver has a recess 49 for the entrance of the depending part 50 which has a bearing surface 51 on each side which travels on the surface 52 in its forward position. The bearing surface 51 joins surface 47 with an inclined or cam surface 53 which engages inclined surface 54 on the receiver as the breechblock moves forward.

The rearward end 56 has a curved cam surface 57 which engages the curved cam surface 58 of the receiver near the end of the travel of the breechblock. These coating deflector surfaces effect a rapid downward thrust to the end 56 in the manner described with reference to FIGS. 1 to 5.

This rapid thrust carries the depending part 50 into the recess 49 and retards the rearward travel of the breechblock. The return spring (not shown) starts the return of the breechblock and after traveling only a short distance the inclined surface 53 strikes the inclined surface 54 and this raises the end 56 so that the breechblock can travel forward with the surfaces 51 bearing on the surfaces 52.

As a result of the downward and upward transverse thrust movements of the end of the breechblock the rate of travel rearward and forward is materially retarded. The retardation is sufficient to permit reliable feeding of cartridges from magazines having a relatively slow rate of feed of the cartridges to loading position such as rotary magazines.

I claim:

1. The improvement in self-loading guns which comprises a receiver having a breechblock reciprocable therein, a bearing surface on the breechblock which engages a support surface on the receiver to guide the breechblock in its rearward and forward travel, clearance for the movement of the rear end of the breechblock at the rearward end of its travel, a deflector surface at the rear of the receiver, a deflector surface at the rear end of the breechblock which engages the deflector surface at the rear end of the receiver to impart a transverse thrust to the rear end of the breechblock and decelerate its rearward travel, and means on the breechblock coacting with means on the receiver to move the rear end of the breechblock in the opposite direction as it moves forward.

2. The improvement in guns as defined in claim 1 in which the deflector surface in the rear of the receiver is a transverse pin, and the deflector surface in the breechblock has a cam surface coacting with the pin.

3. The improvement in self-loading guns which comprises a receiver having a breechblock reciprocable therein, coating surfaces on the breechblock and the receiver which guide the breechblock, a recess in the rearward part to the rearward end of the breechblock a transverse part which can enter the recess and move transversely therein, a cam surface on the rear of the breechblock and a coating cam surface at the rear of the receiver to impart to the rearward end of breechblock a transverse thrust as the breechblock moves rearward which retards the rate of travel of the breechblock, means to return the breechblock from the end of its rearward travel, and coating means on the breechblock and receiver which impart an opposite transverse thrust to the rear end of the breechblock as it moves forward.

4. The improvement in self-loading guns having a blowback breechblock reciprocable in a receiver which comprises a clearance in which the rearward end of the breechblock can be moved downward at the end of its rearward travel, a deflector surface on the rearward end of the breechblock, a coating deflector surface in the rearward part of the receiver which is engaged by the deflector surface on the breechblock to impart a short downward thrust to the breechblock as it moves rearward to retard the rate of travel, and a cam surface forward of the end of the breechblock which engages a coating cam surface on the receiver to lift the rear end of the breechblock as it moves forward.

5. The improvement in self-loading guns which comprises a receiver, a reciprocable breechblock in the receiver, upwardly facing support surfaces in the receiver, a bearing surface on the breechblock which engages the support surfaces in the receiver and on which the breechblock travels, a cam surface in the receiver forward of the rear, a cam surface on the breechblock forward of its rear end, a recess in the rearward part of the receiver into which the rearward end of the breechblock can move transversely, a cam surface on the rear end of the breechblock, a cam surface in the rear of the receiver which is engaged by the cam surface on the end of the breechblock to effect a transverse downward thrust to the rear end of the breechblock into the recess at the end of its rearward travel which decelerates the breechblock, and means to return the breechblock to firing position, said cam surface on the breechblock forward of its rear end engages the cam surface in the receiver forward of the rear as the breechblock moves forward to lift the rear end of the breechblock to its forward position.

5

6. An improved self-loading gun as defined in claim 5 in which the cam surface on the rear end of the breechblock is inclined downwardly, and the cam surface in the rear of the receiver is integral with the receiver.

7. An improved self-loading gun as defined in claim 5 in which the cam surface in the rear of the receiver is a transverse pin having a curved surface, and the cam surface in the rear of the breechblock has a curved surface which coacts with the curved surface of the pin.

6

8. An improved self-loading gun as defined in claim 5 in which the cam surface in the receiver forward of its rear is integral with the support surface and the cam surface on the breechblock forward of its rear end is integral with the bearing surface on the breechblock.

No references cited.

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