Jan. 10, 1950 D. M. WILLIAMS 2,494,220

EJECTOR PIN AND BREECHBLOCK ASSEMBLY FOR FIREARMS

Filed Oct. 4, 1947

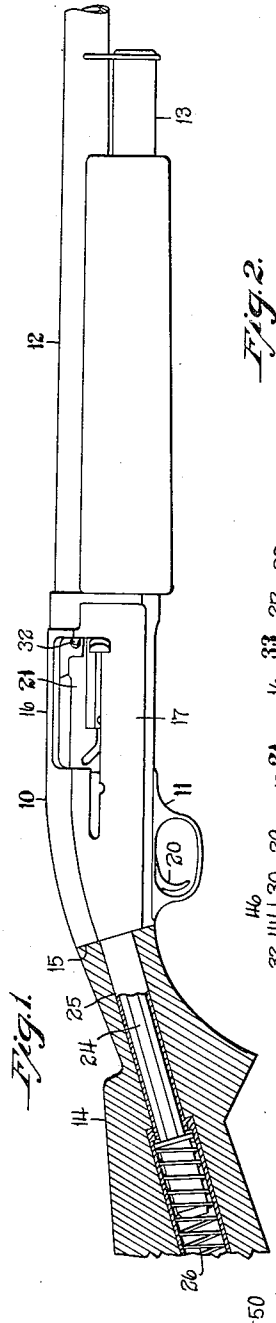


Fig. 1.

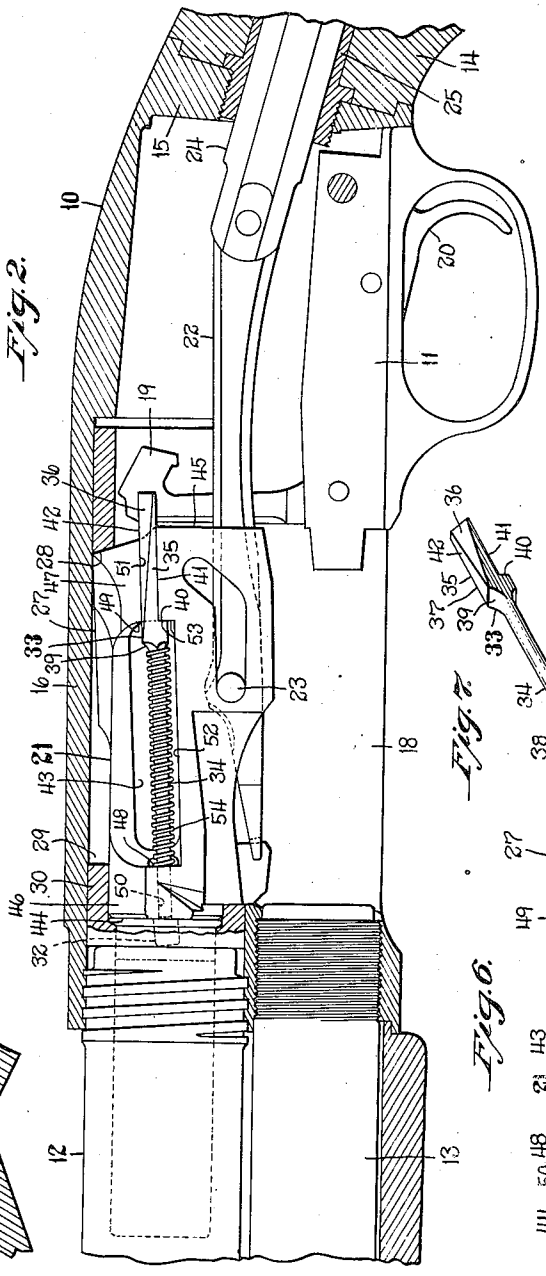


Fig. 2.

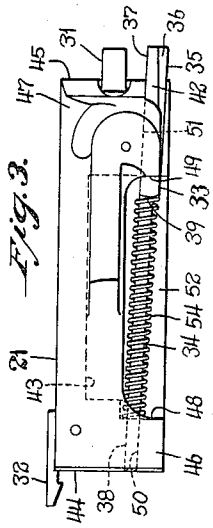


Fig. 3.

Fig. 7.

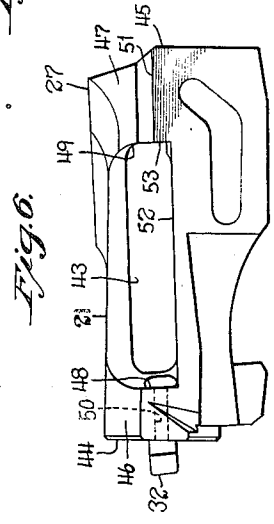


Fig. 6.

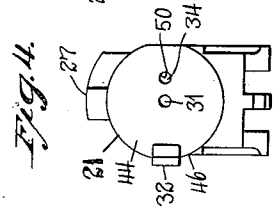


Fig. 4.

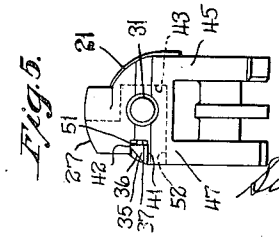


Fig. 5.

Inventor
David M. Williams
By
Seymour Earle Nichols
Attorneys

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EJECTOR PIN AND BREECHBLOCK ASSEMBLY FOR FIREARMS

David M. Williams, New Haven, Conn., assignor to Olin Industries, Inc., New Haven, Conn., a corporation of Delaware

Application October 4, 1947, Serial No. 777,944

4 Claims. (Cl. 42—25)

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The present invention relates in general to firearms and more especially to the ejector-and-breechblock assembly of an automatic self-loading firearm of the type disclosed in my co-pending application Serial No. 733,617 filed March 10, 1947.

An object of the invention is to provide an ejector-and-breechblock assembly of superior construction.

A further object of the invention is to provide superior means for mounting and retaining an ejector-pin in a breechblock so that the ejector-pin may be assembled in and disassembled from the breechblock with dispatch and without the necessity of removing fastening-means or other elements of the breechblock.

A still further object of the invention is to provide superior construction embodying a minimum number of elements for mounting and retaining an ejector-pin in a breechblock and wherein the elements are durable, economical to manufacture and reliable in operation.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art, and which are not claimed in any separate application.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken side elevation partly in section of an automatic self-loading firearm embodying the improved ejector-and-breechblock assembly of this invention;

Fig. 2 is an enlarged fragmentary sectional elevation in a longitudinal vertical plane of the firearm of Fig. 1 showing the breechblock in breech-closing position and the ejector-pin supported therein in its normally retracted position;

Fig. 3 is a top plan view of the breechblock showing the ejector-pin mounted in one side thereof;

Fig. 4 is a front view of the breechblock showing the aperture in the front face thereof through which the ejector-pin is adapted to project;

Fig. 5 is a rear end elevation of the breechblock showing the rear end of the ejector-pin;

Fig. 6 is an elevation of the left side of the breechblock showing the vertical relief-recess formed in the top and side thereof and the guideways of the ejector-pin; and

Fig. 7 is a perspective view of the ejector-pin.

For the purpose of illustrating the invention,

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the latter is described as used in conjunction with an automatic self-loading firearm of the typed disclosed in the aforementioned application, but it is to be understood that the improved ejector-pin-and-breechblock assembly of this invention is applicable to other types of firearms.

In brief, the firearm includes a receiver 10, a trigger-plate 11 removably mounted on the underside of said receiver adjacent the rear end thereof, a barrel indicated by the reference character 12 secured at its rear end by a threaded connection or the like in the front wall of the receiver, a tubular magazine indicated by the reference character 13 secured at its rear end in the front wall of the receiver and at its forward end to the barrel and a buttstock indicated generally at 14 secured to the rear wall 15 of the receiver.

The receiver 10 has a top wall 16 and side walls 17 and 18 depending therefrom to form a substantialy-inverted-U-shaped chamber for accommodating the breechblock and the fire-control mechanism. The latter is mounted in the trigger-plate 11 and embodies a pivoted hammer 19 and a trigger indicated generally at 20 for locking and releasing the hammer. Since the fire-control mechanism is not essential to a full disclosure of the invention, further details of this mechanism are omitted.

The breechblock or action of the firearm is indicated generally at 21, as shown particularly well in Figs. 3, 4, 5 and 6, and is adapted to be supported in the receiver for both longitudinal and pivotal movement therein. The longitudinal and pivotal movements of the breechblock are controlled in part by means of an operating-link 22, the forward end of which is pivotally connected to the breechblock by a transverse pivot-pin 23. The rear end of the operating-link 22 is pivotally connected to the forward end of an inertia-bar 24 which is supported for longitudinal sliding movement in a sleeve 25 secured to the rear wall 15 of the receiver, the sleeve extending rearwardly through a longitudinal aperture of the buttstock 14. An action-spring 26 is supported in an axially-aligned aperture of the buttstock rearwardly of the inertia-bar 24 and is adapted to abut the rear end of the latter to resist rearward displacement thereof and to return the latter, including the operating-link 22 and breechblock 21, to their respective forward positions in the receiver following the discharge of the firearm.

As pointed out in the application referred to above, the breechblock 21 is adapted to be locked in breech-closing position by engagement of the rear end of its locking-lug 27 with the forwardly-

facing shoulder 28 of a longitudinal aperture 29 formed in the top wall of a chamber-extension 30. The latter constitutes one element of a chamber-unit which is supported for limited longitudinal movement in the barrel and receiver of the firearm, the operation and functions of which are described more fully in my second co-pending application Serial No. 777,943 filed October 4, 1947.

In addition to the usual axially-mounted spring-loaded firing-pin 31 and the extractor 32, the breechblock is characterized by superior construction for assembling and disassembling its ejector-pin. The latter is indicated generally at 33 and, in brief, is adapted to be mounted in the breech-bolt for longitudinal sliding movement therein, as hereinafter described, the rear end of the ejector-pin being resiliently held normally rearwardly of the rear end of the breech-bolt, as shown clearly in Figs. 2 and 3, so as to strike against the rear wall 15 of the receiver when the breech-bolt arrives at the end of its rearward excursion to thrust the forward end of the ejector-pin forwardly beyond the front face of the breech-bolt and hence forcibly eject a fired cartridge out of the ejection-port in the side 17 of the receiver.

More particularly, the ejector-pin 33 is a substantially straight length of steel or other suitable material which is yieldable or flexible in a direction transverse to its longitudinal axis and comprises a cylindrical stem-portion 34 and an integral shank-portion 35, the latter being substantially one-third the length of the pin and formed at the rear end thereof, which is the end that is adapted to strike against the rear wall 15 of the receiver.

The shank 35 is provided with a longitudinal substantially-triangular-shaped clearance-cut 36, the apex of which is at the forward upper outside corner of the shank and extends rearwardly and inwardly intersecting both the top and outside wall of the shank so as to conform the latter to the profile of the breechblock and, hence, provide clearance between the shank-portion of the ejector-pin and the top wall of the chamber-extension.

The shank-portion of the ejector-pin is substantially square in cross section at its junction with the rear end of the stem 34, the width and height of this portion of the shank being substantially one-half again as great as the diameter of the stem. As indicated especially well in Fig. 3, the shank is offset laterally outwardly with respect to the stem, whereby the inside walls 37 and 38 of the shank and stem respectively are in alignment, the forward-and-outwardly-projecting end of the shank being joined to the rear end of the stem by an upper filleted shoulder 39. A major portion of the underside of the shank is provided with a longitudinal relief-recess which forms a depending transverse rearwardly-facing shoulder 40 adjacent the forward end of the shank and a stepped substantially-flat supporting-surface 41 on the underside thereof which intersects the rear end of the shank, the depth of the relief-recess being such that the height of the stepped-portion 42 of the shank is substantially one-half of the height of the forward shouldered portion thereof and substantially equal to the height of the guide-recess for the stepped-portion 42 of the shank as described below.

Heretofore, it has been the practice to provide a longitudinal aperture extending throughout substantially the entire length of the breechblock

for slidably supporting an ejector-pin. The method and means for forming this relatively-long aperture has been tedious, time-consuming and expensive, and it is an important contribution of the present invention to provide improved construction which insures superior means for supporting and retaining the ejector-pin in the breechblock.

To these ends, the breechblock is provided with a vertical relief-recess 43 which intersects the top and left-hand side thereof, the clearance-recess 43 being substantially-L-shaped in cross section, as indicated clearly in Fig. 5, and formed intermediate the front and rear ends 44 and 45 respectively of the breechblock so as to provide a breechblock head-portion 46 and a breechblock heel-portion 47, the former having a substantially-vertical rearwardly-facing wall 48 corresponding to the forward wall of the recess 43 and the latter having a substantially-vertical forwardly-facing wall 49 corresponding to the rear wall of the recess 43. In the present embodiment, the length of the relief-recess 43 is slightly more than one-half the length of the ejector-pin, but it will be understood that these proportions may vary.

Formed in the head-portion 46 of the breechblock is a longitudinal guide-aperture 50, the opposite ends of which intersect the front end or face 44 of the breechblock and the rearwardly-facing wall 48 of its head-portion 46, the longitudinal aperture 50 lying substantially in the horizontal plane of the firing-pin which, in the present embodiment, slopes upwardly and rearwardly from its point of intersection with the front face of the breechblock. Moreover, the longitudinal guide-aperture 50 slopes outwardly and rearwardly at a slight angle to the longitudinal axis of the breechblock, as indicated clearly in Fig. 3, the diameter of the aperture being only slightly greater than the diameter of the stem 34 of the ejector-pin, whereby the latter is adapted to make a smooth sliding fit therein.

The heel-portion 47 of the breechblock is provided with a guide-recess 51 which, in the present embodiment, is substantially-U-shaped in cross section with its open side intersecting the left-hand side of the breechblock and its front and rear ends intersecting the forwardly-facing wall 49 of the recess 43 and the rear end 45 of the breechblock respectively. The longitudinal axis of the guide-recess 51 is in axial alignment with the longitudinal guide-aperture 50, while the width and height of the guide-recess 51 are only slightly greater than the corresponding dimensions of the stepped-portion 42 of the ejector-pin shank 35, whereby the stepped-portion 42 is adapted to make a close sliding fit in the guide-recess 51. In this connection, it will be noted on reference to Fig. 5 that the bottom of the recess 51 is wider than its top, the width of the latter being reduced by slabbing off the front face of the heel-portion of the breechblock above the upper edge of the recess 51 so as to facilitate removing the shank-portion of the ejector-pin therefrom, as hereinafter described. Referring particularly to Fig. 6, it will be seen that the bottom 52 of the L-shaped relief-recess 43 of the breechblock is below the bottom wall of the guide-recess 51, as a consequence of which the forward end of the latter forms a substantially-square shoulder 53 with the rear wall 49 of the relief-recess 43.

The ejector-pin is adapted to be mounted in the breechblock by inserting the forward end of

its stem-portion 34 in the guide-aperture 50 in the head-portion 46 of the breechblock, and thereafter sliding the stepped shank-portion 42 of the pin into the open-sided guide-recess 51. The ejector-pin is adapted to be resiliently held in the guide-aperture 50 and guide-recess 51 hereinafter referred to as guideways 50 and 51 of the breech-bolt, by yieldable-means comprising a coil-spring 54 which is mounted on the stem-portion 34 of the ejector-pin within the relief-recess 43 of the breechblock and is engaged at its forward end against the rearwardly-facing wall 48 of the breechblock and at its rear end against the upper filleted shoulder 39 of the ejector-pin, the compression force of the spring acting rearwardly thereon to resiliently hold its depending-shoulder 40 in engagement with the shoulder 53 at the rear end of the relief-recess 43. This position of the ejector-pin in the breechblock is its normal position in which, as shown in Figs. 2 and 3, the forward end of the pin is substantially flush with or slightly to the rear of the front face 44 of the breech-block, the rear end of the shank-portion of the pin projecting rearwardly beyond the rear end of the breechblock. Hence, when the breechblock approaches the end of its rearward excursion in the receiver, the rear end of the ejector-pin will strike the rear wall 15 of the receiver thereby driving the ejector-pin forwardly so as to compress its spring 54 and thrust the forward end of the pin beyond the front face of the breechblock so as to positively kick an extracted shell out of the ejection opening in the side of the receiver. As soon as the breechblock starts forwardly in the receiver, the force of the compressed spring returns the ejector-pin rearwardly in the breechblock to its normal position.

Since the shoulder 40 of the ejector-pin engages normally against the shoulder 53 of the recess 43, the pin is positively held from moving rearwardly out of the guideways 50 and 51 of the breechblock. Moreover, since the forward end of the ejector-pin is engaged in the guide-aperture 50 of the head-portion 46 throughout substantially the entire length thereof, it is impossible for the stepped shank-portion 42 of the pin to be inadvertently deflected outwardly from the guide-recess 51 so as to disengage the coacting shoulders 40 and 45 of the pin and relief-recess 43 respectively and hence release the pin.

However, since the ejector-pin is formed of a relatively-stiff but flexible material, the pin may be disassembled from the guideways 50 and 51 of the breech block by gripping the rearwardly-projecting shank-portion of the pin and positively flexing the latter outwardly laterally sufficiently to free it of the top edge of the guide-recess 51 and then flexing the pin upwardly by the slabbed-off front face of the breechblock-heel to raise the depending shoulder 40 of the pin up out of engagement with the shoulder 53 of the relief-recess 43. The pin may then be withdrawn rearwardly out of the guide-aperture 50 of the breechblock-head. To assemble the ejector-pin and breechblock, the coil-spring 54 is first mounted on the stem-portion 34 of the ejector-pin, whereupon the forward end of the latter is inserted into the rear end of the guide-aperture 50. The pin is then pushed forwardly in the guide-aperture 50 to compress the spring 54, the pin being simultaneously flexed outwardly and upwardly so that its shoulder 40 may be moved forwardly to a point substantially opposite the shoulder 53 of

the relief-recess 43, whereupon the ejector-pin is released, the force of the flexed pin swinging the stepped shank-portion 42 thereof back into the guide-recess 51.

By supporting the ejector-pin at its opposite ends in widely-spaced guideways of the breechblock, the necessity for drilling an aperture through the entire length of the breech-bolt is obviated, thereby effecting important savings in the length of time and number of tools heretofore required for forming the ejector-pin guide-aperture. Moreover, by providing an open-sided recess and coacting shoulders on the ejector-pin and breechblock, the pin is securely held in its normal operative position in the bolt without requiring the use of pins or other auxiliary fastening-means and yet the ejector-pin may be readily disassembled from or assembled in the breechblock with facility and dispatch.

Although an ejector-pin having a substantially-rectangular shank-portion is wholly satisfactory from a standpoint of reliability and efficiency of operation, it is also within the purview of the invention to form the ejector-pin with an enlarged cylindrical shank-portion adapted to snap into a longitudinal recess of substantially-semicylindrical cross section in the heel-portion of the breechblock, the upper and lower shoulders of the ejector-pin comprising a substantially-disk-shaped flange formed integrally on the ejector-pin at the junction of its stem-portion and cylindrical shank-portion.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. An ejector-and-breechblock assembly for firearms, including in combination: a breechblock having a substantially-vertical relief-recess intersecting the top and one side thereof, said relief-recess being formed intermediate the front and rear ends of said breechblock so as to provide a breechblock head-portion and a breechblock heel-portion, the said head- and heel-portions of said breechblock having longitudinal axially-aligned guideways therethrough; a flexible ejector-pin constructed and arranged to be mounted at its opposite ends in the respective guideways of the head- and heel-portions of said breechblock; and means to slidably retain said flexible ejector-pin therein comprising a shoulder on said ejector-pin arranged to engage the front wall of said breechblock heel-portion when said pin is in its normal unflexed position in said guideways and to disengage the said front wall when said pin is flexed outwardly and upwardly, thereby to permit said pin to be removed rearwardly out of said guideways, resilient means mounted in the relief-recess of said breechblock and arranged normally to resiliently hold the shoulder of said pin against the said front wall of said breechblock-heel, and a shank-portion at the rear end of said ejector-pin arranged normally to seat in the guideway of said breechblock-heel and to be withdrawn from the said guideway by flexing said pin outwardly and upwardly.

2. An ejector-and-breechblock assembly for firearms, including in combination: a breechblock having a substantially-vertical relief-recess

intersecting the top and one side thereof, said relief-recess being formed intermediate the front and rear ends of said breechblock so as to provide a breechblock head-portion and a breechblock heel-portion, said breechblock head-portion having a guide-aperture extending longitudinally therethrough; a guide-recess in the heel-portion of said breechblock extending longitudinally therethrough and in axial alignment with the longitudinal axis of said guide-aperture, said guide-recess being substantially-U-shaped in cross section and intersecting the said one side of said breechblock; a flexible ejector-pin constructed and arranged to be mounted at its opposite ends respectively in said guide-aperture and said guide-recess for longitudinal movement therein; and means to slidably retain said ejector-pin in the respective guide-aperture and guide-recess of said breechblock comprising a transverse shoulder on said ejector-pin arranged to engage the front wall of said breechblock heel-portion when said pin is in its normal unflexed position in said guide-aperture and said guide-recess and to disengage the said front wall when said pin is flexed outwardly and upwardly thereby to permit said pin to be moved rearwardly out of said guide-aperture and said guide-recess, resilient means mounted in the relief-recess of said breechblock and arranged normally to resiliently hold the shoulder of said pin against the said front wall of said breechblock-heel, and a shank-portion at the rear end of said pin, said shank-portion being substantially rectangular in cross-section and arranged to fit slidably in the U-shaped guide-recess of said breechblock heel-portion to hold said ejector-pin from rotating therein, said shank-portion being arranged to be withdrawn laterally from the said guide-recess in said breechblock-heel by flexing said pin outwardly, thereby to permit flexing of said pin upwardly and disassembly thereof from said breechblock.

3. An ejector-and-breechblock assembly for firearms, including in combination: a breechblock having a substantially-vertical relief-recess intersecting the top and one side thereof, said relief-recess being formed intermediate the front and rear ends of said breechblock so as to provide a breechblock head-portion and a breechblock heel-portion, said breechblock head-portion having a guide-aperture extending longitudinally therethrough; a guide-recess in the heel-portion of said breechblock extending longitudinally therethrough and in axial alignment with the longitudinal axis of said guide-aperture, said guide-recess being substantially-U-shaped in cross-section and intersecting the said one side of said breechblock; a flexible ejector-pin having an upper shoulder, said ejector-pin being mounted at its opposite ends respectively in said guide-aperture and said guide-recess for longitudinal movement therein; and means to slidably retain said ejector-pin in the respective guide-aperture and guide-recess of said breechblock comprising a depending shoulder on said ejector-pin arranged to engage the front wall of said breechblock heel-portion when said pin is in its normal unflexed position in said guide-aperture and said guide-recess and to disengage the said front wall when said pin is flexed outwardly and upwardly thereby to permit said pin to be moved rearwardly out of said guide-aperture and said guide-recess, a coil-spring mounted on said ejector-pin in the relief-recess of said breechblock, one end of said coil-spring being engaged against the said upper shoulder of said pin and the opposite end of said spring being engaged against the rear wall of said breechblock-head to exert normally a rearwardly-directed thrust against said upper shoulder to resiliently hold the depending transverse shoulder against the front wall of said breechblock-heel, and a shank-portion at the rear end of said ejector-pin, said shank-portion being substantially rectangular in cross section and arranged to fit slidably in the U-shaped guide-recess of said breechblock heel-portion to hold said ejector-pin from rotating therein, said shank-portion being arranged to be withdrawn laterally from the said guide-recess in said breechblock-heel by flexing said pin outwardly thereby to permit flexing of said pin upwardly and disassembly thereof from said breechblock.

4. An ejector-and-breechblock assembly for firearms, including in combination: a breechblock having a substantially-vertical relief-recess intersecting the top and one side thereof, said relief-recess being formed intermediate the front and rear ends of said breechblock so as to provide a breechblock head-portion and a breechblock heel-portion, said breechblock head-portion having a guide-aperture extending longitudinally therethrough; a guide-recess in the heel-portion of said breechblock extending longitudinally therethrough and in axial alignment with the longitudinal axis of said guide-aperture, said guide-recess being substantially-U-shaped in cross section and intersecting the said one side of said breechblock; a flexible ejector-pin having an upper shoulder, said ejector-pin being mounted at its opposite ends respectively in said guide-aperture and said guide-recess for longitudinal movement therein; and means to slidably retain said ejector-pin in the respective guide-aperture and guide-recess of said breechblock comprising a depending transverse shoulder on said ejector-pin arranged to engage the front wall of said breechblock heel-portion when said pin is in its normal unflexed position in said guide-aperture and said guide-recess and to disengage the said front wall when said pin is flexed outwardly and upwardly thereby to permit said pin to be moved rearwardly out of said guide-aperture and said guide-recess, a coil-spring mounted on said ejector-pin in the relief-recess of said breechblock, one end of said coil-spring being engaged against the said upper shoulder of said pin and the opposite end of said spring being engaged against the rear wall of said breechblock-head to exert normally a rearwardly-directed thrust against said upper shoulder to resiliently hold the depending transverse shoulder against the front wall of said breechblock-heel, a shank-portion at the rear end of said ejector-pin, said shank-portion being substantially rectangular in cross section and arranged to fit slidably in the U-shaped guide-recess of said breechblock heel-portion to hold said ejector-pin from rotating therein, said shank-portion being arranged to be withdrawn laterally from the said guide-recess in said breechblock-heel by flexing said pin outwardly thereby to permit flexing of said pin upwardly and disassembly thereof from said breechblock, and a clearance-cut on the outer face of the shank-portion of the said ejector-pin to conform said shank-portion to the profile of the corresponding side of said breechblock.

DAVID M. WILLIAMS.

No references cited.