April 12, 1960 A. M. HUGHEL ET AL 2,932,108

BREECH BOLT MECHANISM FOR REPEATING RIFLES

Filed May 21, 1956 2 Sheets-Sheet 1

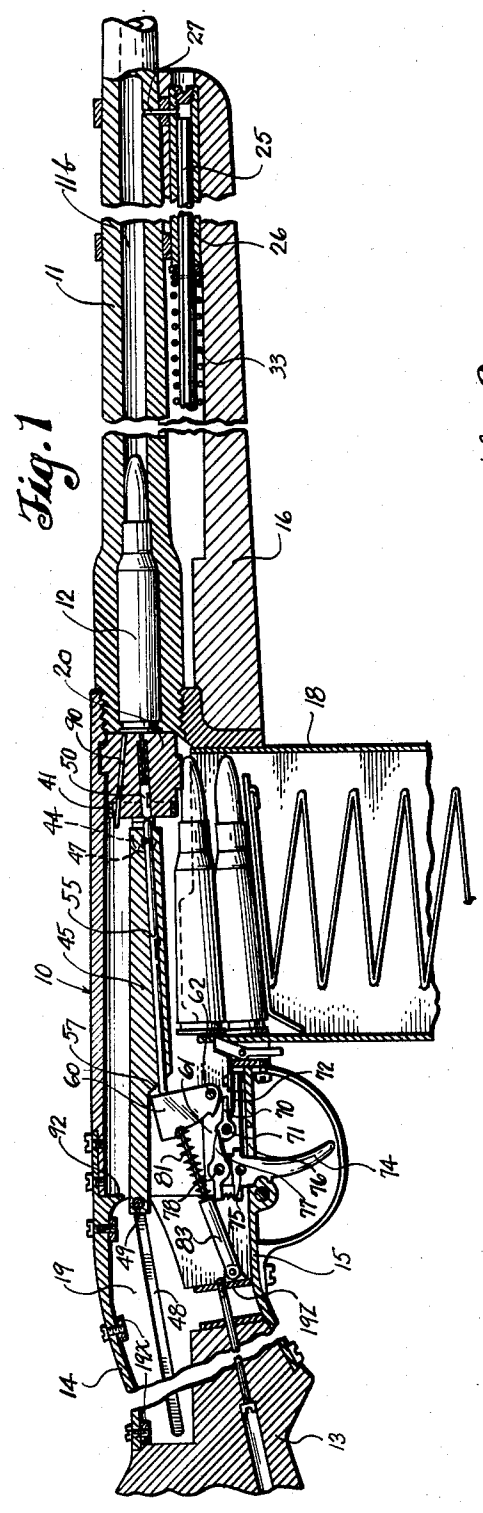


Fig. 1

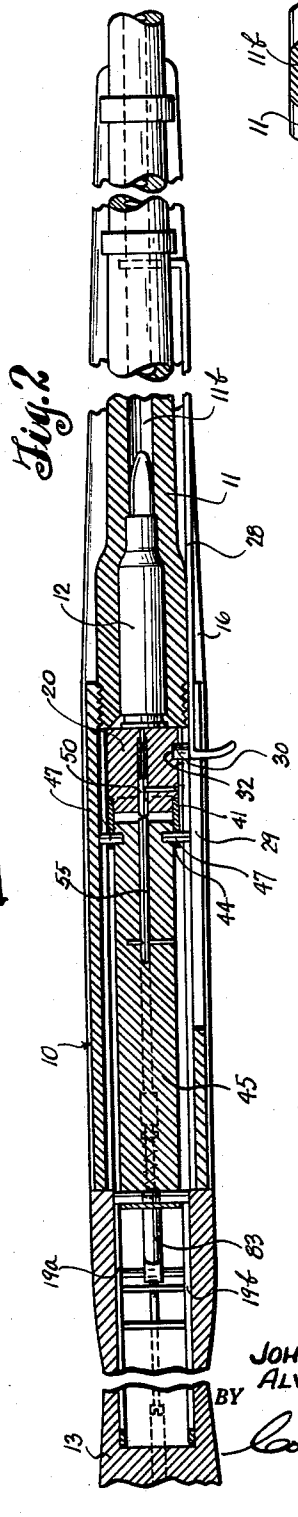


Fig. 2

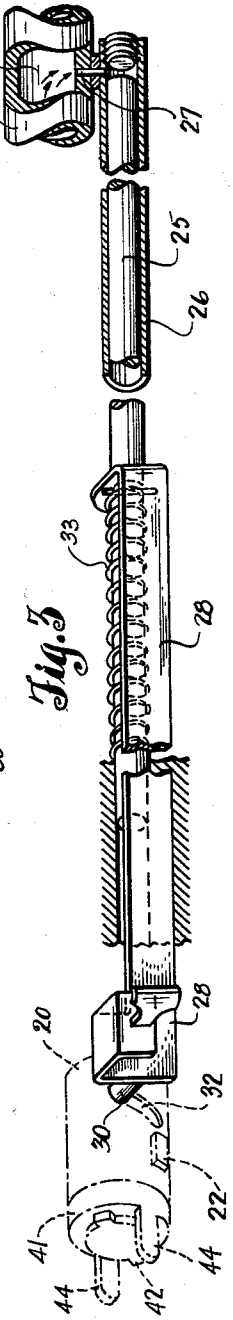


Fig. 3

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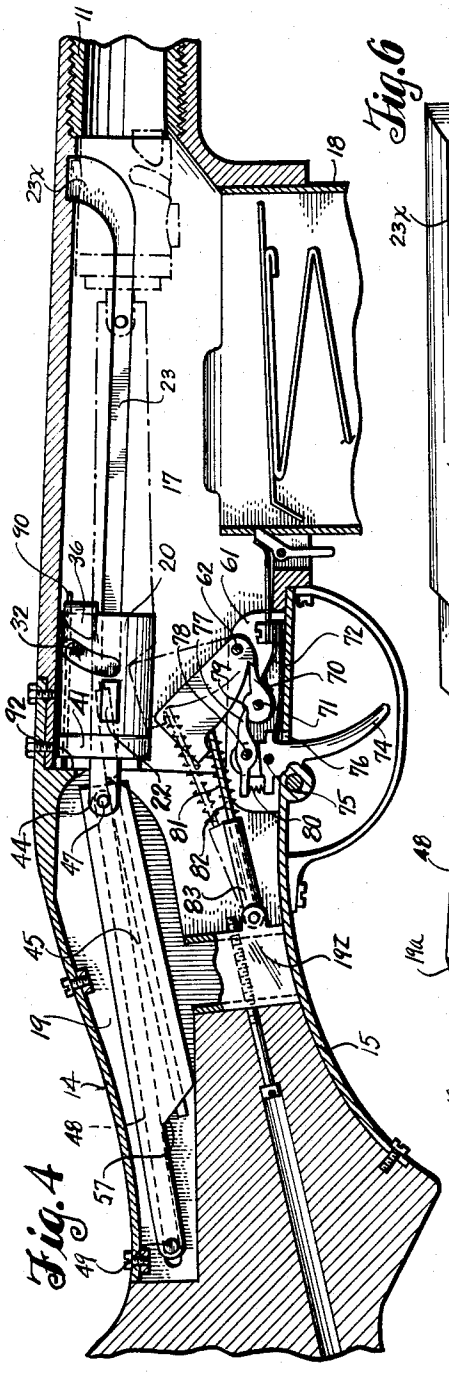


Fig. 4

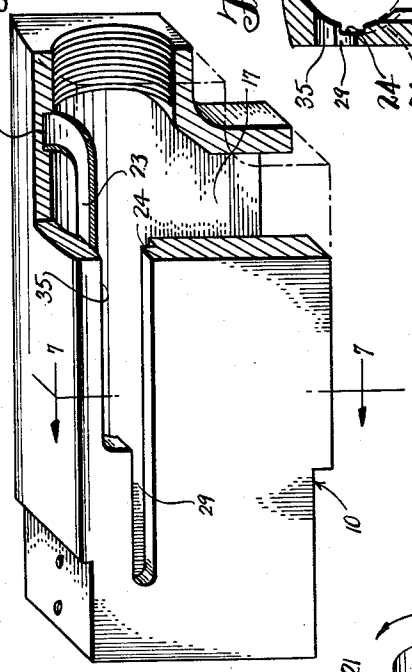


Fig. 6

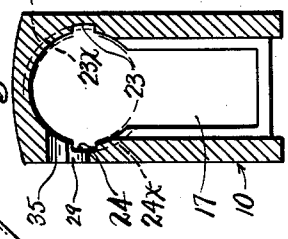


Fig. 7

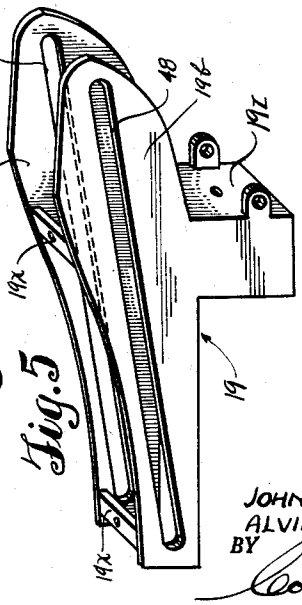


Fig. 5

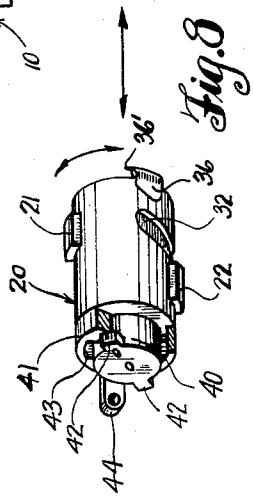


Fig. 8

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# BREECH BOLT MECHANISM FOR REPEATING RIFLES

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Application May 21, 1956, Serial No. 585,994

2 Claims. (Cl. 42—18)

This invention relates to repeating rifles and it has reference more particularly to an improved automatic reloading mechanism for repeating rifles with semi-automatic action; it being the primary object of the invention to provide a novel and improved automatic reloading action that is substantially shorter in comparison to actions now in use; that is powered for reloading by the force of expanding gases momentarily confined in the barrel upon firing; that operates to cock the hammer mechanism ready for firing incident to the ejection of the empty shell, and which embodies novel parts in the firing means that eliminates accidental firing of a shell while the breech block or bolt is not fully closed and locked.

It is also an object of the invention to provide an automatic reloading action that comprises relatively few parts; that is comparatively simple in construction and mode of operation, and free of parts that are apt to become out of working order after once being assembled.

Further objects and advantages of the invention reside in the details of construction and combination of the various parts and their mode of operation, as will hereinafter be fully described.

In accomplishing the above mentioned and other objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view of a portion of a repeating rifle showing it as equipped with the automatic reloading mechanism embodied by the present invention.

Fig. 2 is a substantially horizontal section of the rifle taken in the axial plane of the bore of the barrel and breech block.

Fig. 3 is a perspective view, showing the actuator rod and the means for its functional actuation.

Fig. 4 is a somewhat enlarged vertical section of the present action, showing the bolt fully retracted and the hammer latched in its cocked position.

Fig. 5 is a perspective view of the bolt actuator bar guide frame as removed from the stock.

Fig. 6 is a perspective of the block which constitutes the major part of the receiver, and which is herein referred to as the receiver block, with a part broken away for better illustration of inside detail.

Fig. 7 is a vertical cross-section of the receiver taken on line 7—7 in Fig. 6.

Fig. 8 is a perspective view of the breech bolt.

Referring more in detail to the drawings:

In Fig. 1, we have shown, in longitudinal section, a rifle which has been equipped with automatic reloading mechanism embodied by the present invention; parts being broken away to shorten the view.

In this view, the receiver is shown in the form of a single block, designated in its entirety by reference numeral **10**. Threaded into this block, at its forward end, is the gun barrel **11**, designed in the usual way to receive a cartridge, such as shown at **12**. Fixed to the receiver **10**, at its rear end, is the usual gun stock **13**; this being



attached to the receiver by means of upper and lower tangs, **14** and **15**. The stock also includes a forward hand grip portion **16**, as shown, which extends for substantial length forwardly along the barrel.

The receiver **10** is longitudinally bored, coaxial of the barrel as will be understood by reference to its showing apart from the rifle in Fig. 7; being formed below the bore with a chamber **17** that opens to the underside of the receiver to receive the discharge end portion of a shell clip **18** therein, as seen in Fig. 4, and is open at its rear end for direct communication with a stock chamber containing a guide frame designated in its entirety by numeral **19**, and the trigger mechanism, as will presently be fully explained; the guide frame being shown removed from the stock chamber in Fig. 5.

The bolt **20** is of the form and detailed construction shown best in Figs. 4 and 8. It comprises a relatively short cylindrical body slidably contained in the longitudinal bore of the receiver and adapted to be locked in its closed position with its forward end flatly against the inner end of the barrel and base end of the cartridge **12**, as seen in Fig. 1. When unlocked, it is reciprocally movable in the receiver bore. In order to lock it in its closed position, as in Fig. 1, it is formed on opposite sides with projecting lugs **21** and **22**, that are slidably contained in channels **23** and **24** that extend horizontally, and longitudinally along the inside wall surfaces of the bore in the receiver **10**, and which channels at their forward ends are directed circumferentially, as seen at **23***x* and **24***x* in Figs. 4 and 7. When the bolt **20** is moved forwardly and the lugs thereon are caused by the slight turning thereof to enter these circumferentially directed portions **23***x* and **24***x* of the channels, the bolt will be moved tightly against the barrel and the base of the shell **12** as in Fig. 1, and at the same time will be locked against retraction or recoil. To release the bolt for its retraction, it is rotated in a reverse direction, or counter-clockwise in reference to its showing in Fig. 7, about 30°, and moved rearwardly.

The means for automatically retracting the bolt **20** may be the conventional form of gas pressure means which is shown in Fig. 3 to comprise a piston rod **25** reciprocally fitted in a cylindrical tube **26** that is fixed to and which extends along the underside of the barrel **11**; being confined in the forward portion **16** of the gun stock, as in Fig. 1. At its forward end, the tube **26** is closed, but adjacent the closed end it has a gas passage **27** opening therefrom and into the barrel bore **11***b* as shown in Fig. 3. Gas under pressure confined momentarily in the barrel back of the fired bullet, will be applied through port **27** to the piston rod and will drive it rearwardly. The rod transmits rearward movement to an extension or actuator bar **28** that extends along the barrel to the breech bolt **20**. The rearward end portion of this bar is movable in a slot **29** in a wall of chamber **17** of the frame block, and at its end it mounts an inwardly directed stud **30** which at its inner end is contained in a spirally directed cam groove **32** in the adjacent side surface of the breech bolt **20**, as indicated in Fig. 3. When the parts are in normal position, ready for firing, they assume the relationship in which they are shown in Figs. 1, 2 and 3. However, when a cartridge is fired, the barrel gas pressure acts against the piston rod **25** to drive the actuator bar **28** rearwardly. This causes the stud **30** to so act on the sidewall of the cam slot as to rotate the bolt **20** in such direction and extend as to unlock it, and permit it then, under the driving force of the piston rod **25**, to be moved rearwardly, as to the retracted position in which it is shown in Fig. 4.

When the gas pressure acting against the piston rod is dissipated, the actuator rod and bar are returned to nor-

mal position by the force of a coiled spring **33** acting thereagainst.

The rearward movement of the breech bolt incidentally extracts the fired shell into the frame chamber **17** from which it is laterally discharged through the sidewall opening shown at **35** in Figs. 2, 6 and 7. The means for shell extraction comprises a spring clip **36** carried on the bolt **20** at one side at its forward end; this clip having an inturned flange **36'** thereof adapted to be disposed beneath the rim of the cartridge shell as it is seated for firing in the barrel bore. Thus, when the bolt is pulled rearwardly, the clip extracts the shell from the barrel.

By reference to Fig. 8, it will be observed that the rear end of the breech bolt **20** is formed with a coaxial cylindrical hub or extension **40** of reduced diameter, about which a collar **41** is fitted for relative rotation; the collar being locked against removal from the hub by lugs **42** and **42** that project radially from the extension portion. The collar is provided with key ways **43** through which the lugs may be passed for the assembly of these parts, then, by rotation of the collar to its normal position, the key ways are moved out of alignment with the lugs. These parts are assembled before being placed in the receiver, and after being functionally positioned therein they cannot rotate relative to each other to the extent necessary to become disconnected.

Projecting rearwardly from the collar **41**, at diametrically opposite sides thereof, are ears **44—44** and between these ears the forward end of a guide bar **45** is pivotally fixed by pins **47**. When the parts are in the normal position, as shown in Fig. 1, the bar **45** is contained almost in its entirety in the receiver bore, with its rear end portion extended into the forward end portion of the guide frame **19** which is set within the forward end of the gun stock **13**. The frame **19** is of the form of construction shown in Fig. 5. It comprises laterally spaced side plates **19*a*** and **19*b*** secured in spaced relationship across their top edges by cross-bars **19*x***, and at their lower edges by a box-like frame **19*z***. This guide frame is rigidly secured in the stock by its connection to the top tang **14** and an anchor bolt applied through the box frame and secured in the stock **13**.

The spaced plates of the guide are formed lengthwise with coextensive slots **48—48** in which the opposite end portions of a pin **49**, applied through the rear end of bar **45**, are contained. Thus, when the breech bolt **20** is unlocked and actuated rearwardly, the collar member **41**, moving therewith, is held against any relative rotary movement in the receiver.

A firing pin **50** is contained in the breech bolt **20** in a bore that is so directed longitudinally through the bolt that it places its striking end eccentric of the block axis. Thus, when the bolt is in closed and locked position, the striking end of the pin projects therefrom slightly below its axial center. A firing pin striker rod **55** is contained in a bore formed lengthwise in the bar **45** as noted in Fig. 1. In the normal position of these parts, as shown in Fig. 1, the striker rod **55** is aligned axially with the firing pin **50** and when it is struck at its outer end by the hammer, as presently explained, it functionally actuates the firing pin. However, whenever the breech bolt is not in its fully closed and locked position, the firing pin, as contained therein, will be out of line with the striker rod and the cartridge cannot be fired by any accidental hammer action.

It will be noted by reference to Fig. 1, that the bar **45** is recessed or cut away along the underside of its rear end portion, thus providing it with an inclined rearwardly facing shoulder **57** through which the rearward end of the striker pin extends from the bar. When the parts are in the normal position, as in Fig. 1, the striker pin **55** is in position to be struck by the hammer for firing the cartridge. The hammer mechanism will now be described.

The hammer mechanism, as shown in Fig. 4, is in its cocked, ready-to-fire position as set by the rearward actuation of the bolt and bar **45**. It comprises the hammer plate **60**, set in the vertical axial plane of the receiver with its lower end portion disposed between laterally spaced flanges **61—61** formed on and along the top side of the lower tang **15**. A pivot pin **62** through the flanges and lower end of the plate, permits the hammer to swing between its full line and dotted line positions as seen in Fig. 4.

In Fig. 1, the hammer is shown after being released by the trigger action and at the instant it is striking the striker rod **55** for firing the cartridge, it is then in a position of rest at which it will be acted on at its upper forward corner by the shoulder **57** of bar **45** as the breech bolt **20** and bar **45** are driven back by action of the ejector rod **25**. When the hammer reaches its rearward position, as in Fig. 4, it is latched there by a pawl **70** mounted on a pivot pin **71** between the flanges **61—61**. A leaf spring **72**, mounted on the tang **15**, bears upwardly against the pawl to urge it to hammer latching position.

The hammer is released for firing by the pulling of a trigger **74** that is pivotally mounted by pivot pin **75** between the tang flanges **61—61**. The trigger extends downwardly through tang opening **76** in the usual way. At its upper end, a pawl **77** is pivoted thereon by a pivot pin **78**. The pawl engages at its end with a notch **77** in the top edge of the hub portion of sear **70**; being yielding urged to that position by a small coil spring **80** carried on a rearward projection at the upper end of the trigger. When the trigger is pulled, the pawl **77** effects release of sear **70** from the hammer. The hammer is then driven forcibly against the striker rod **55** to fire the cartridge; being powered by a coiled spring **81** mounted under compression on a rod **82** that is telescopically mounted in a carrier **83**, pivoted on the guide frame part **19*z***. The rod moves in and out of the guide with the action of the hammer.

Assuming the parts to be so constructed, and assembled as described, the functioning of the present action is as follows:

Starting with the parts in position of Fig. 1 which shows the hammer released and at the instant it strikes the rear end of the striker rod **55**. This causes the rod **55** to transmit the hammer blow to the firing pin **50** to fire the cartridge. With the explosion of the cartridge, gas confined back of and driving the bullet, is forced through the passage **27** into cylinder **26** to drive the piston rod **25** and actuator bar rearwardly. The stud **30** on the bar, through its camming action on the side wall of the spiral channel **32** of the breech bolt, rotates the bolt in such manner as to release it for rearward action. Then the bolt is driven rearwardly, pushing the guide bar **45** back into the guideway **19**. As the bar moves rearward, its shoulder **47** acts on the hammer to move it back to its Fig. 2 position in which it is latched by the sear **70**. With the dissipation of the gas pressure in the barrel, the actuator bar is returned by the coiled spring to its normal forward position. In moving forward, the rod pulls the breech bolt back to its starting position, and then causes it to be turned and locked in closed position.

When the breech bolt **20** is driven rearwardly, the fired shell is automatically extracted from the barrel and ejected, being pulled from the barrel by the spring clip **65** attached to the bolt. As the bolt reaches its fully retracted position, as in Fig. 4, an ejector pin **90** mounted slidably therein and extending from the ends of the bolt, engages at its rear end with a forwardly facing shoulder **92** at the rear of the receiver, thus pushing the pin forwardly, causing its forward end to engage the edge of the shell base, opposite the part held by the extractor clip, thus to flip the empty shell laterally from the receiver chamber through the sidewall opening. With the ejection of the empty shell, a loaded cartridge is au-

tomatically fed from the clip 18 into the chamber 17, then as the breech bolt is actuated forward, it forces this cartridge into the barrel. As it moves into position, the rim flange of the base end is caught beneath the extractor flange and the block closes against the shell as in Fig. 1.

What we claim is:

1. In a rifle of the character described; a receiver formed with a longitudinal bore, a guide frame located immediately rearward of said bore, a breech bolt reciprocally mounted in said bore, means for effecting reciprocal movements of said bolt between open and closed position; said bolt having a length that is substantially less than its reciprocal travel in moving between open and closed positions and having lugs projecting from sides thereof; said bore having channels formed lengthwise thereof in which said lugs are slidably contained for the guided travel of the bolt and which channels have forward end terminal portions curved circumferentially of the bore and into which said lugs will move to lock the bolt when actuated to its closed position, a collar rotatably fixed about the rear end portion of the bolt, a guide bar connected at its forward end to said collar for reciprocal movement in said guide frame, a firing pin extended eccentrically from the rear end of said bolt and a pin striker rod contained in said bar with which



the firing pin is brought into coacting alignment by movement of the bolt to closed and locked position.

2. The combination recited in claim 1 wherein said guide bar has a swivel connection at its forward end with the rear end of said bolt and a non-rotating sliding connection at its rear end with said guide frame, and said striker rod extends from the rearward end portion of the guide bar for engagement by a hammer for firing when the bolt is closed.


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