Aug. 22, 1944. C. C. LOOMIS 2,356,256

FIREARM

Filed May 16, 1942

Fig. 1

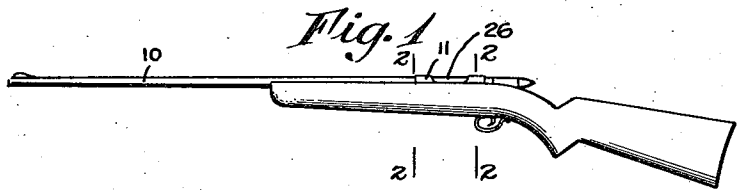


Fig. 2

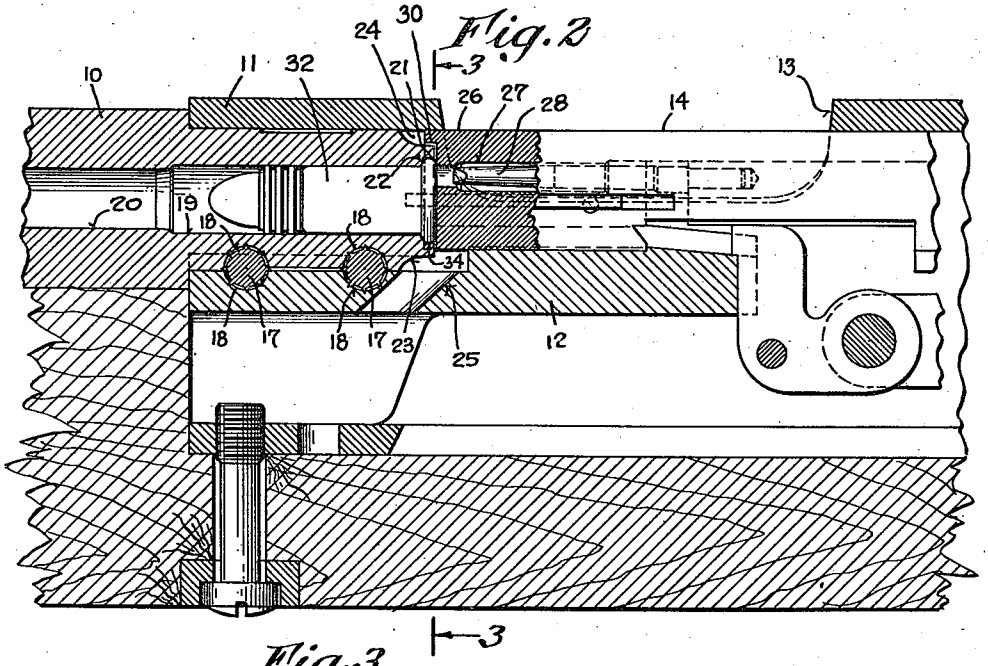


Fig. 3

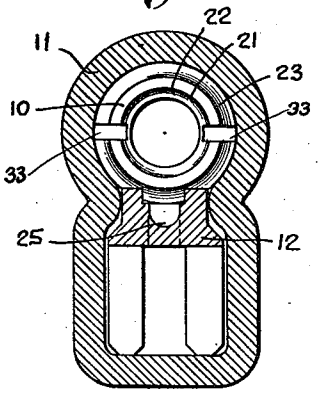
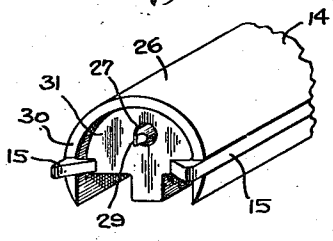


Fig. 4



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FIREARM

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Application May 16, 1942, Serial No. 443,272

4 Claims. (Cl. 42—16)

This invention relates in general to firearms, and, particularly to improvements in bolt-action firearms of the rimfire type.

It is an object of this invention to provide means for reducing burst cartridge heads in rimfire guns. A further object is to provide a gas escape port in the firearm receiver for preventing the hazards which normally accompany burst heads.

Other objects, features, and advantages of the invention will be discovered in the following detailed description and drawing of one form of apparatus for practicing the invention.

In the drawing:

Fig. 1 shows a side elevation of a bolt-action rimfire firearm adapted to use with the present invention.

Fig. 2 is a fragmentary sectional side elevation between lines 2—2 of Fig. 1.

Fig. 3 is an end elevation on line 3—3 of Fig. 2.

Fig. 4 is a perspective view of the head end of the bolt.

Referring to the drawing, the firearm shown is a rifle of the rimfire bolt-action type comprising a barrel 10, a receiver 11 having an insert 12 and a substantially cylindrical bolt-receiving portion apertured as at 13 to provide a shell ejection opening. The bolt 14 is reciprocated in the receiver 11 in the usual manner by operating the bolt handle (not shown) from its retracted or breech-open position to its forward breech-closing position and is provided with the usual cartridge extractors 15.

Other details in the construction and operation of the firearm including the breech bolt, firing mechanism and features of the receiver are more fully shown and described in the copending application of K. J. Lowe, Serial No. 306,457, filed November 28, 1939.

The barrel 10, as shown in more detail in Fig. 2, is secured at its chamber end in the end of the receiver 11 by a pair of pins 17 which are engaged in a set of oppositely disposed semicircular grooves 18 formed in the adjacent surfaces of the barrel 10 and receiver insert 12, the latter comprising, in this instance, a cartridge support and guide member for a single-shot type firearm.

The barrel chamber 19 is of well known construction and comprises a bore at the rear of the barrel of slightly greater diameter than the barrel bore 20 and adapted to chamber a cartridge shell.

A recess or counterbore 21 is provided in the end of the chamber, the recess being substantially equal in diameter to the diameter of a cartridge rim so as to form a supporting surface for the periphery of the rim of a cartridge when the latter is pushed into the chamber. The seat of the counterbore 21 is preferably characterized by sloping or curved shoulders 22, as shown in Fig. 2, adapted to conform to the profile of the cartridge rim and to form, thus, an annular firing anvil. 33 are the usual recesses formed in the end of the chamber for accommodating the cartridge extractors 15.

An annulus 24 is provided at the end of the assembled barrel and receiver and is formed by turning down the exterior of the barrel at its chamber end somewhat in the shape of a tapered nozzle so that the end portion of the barrel is of reduced external diameter as indicated at 23 in Figs. 2 and 3. Thus, when the chamber end of the barrel is assembled in the receiver 11 and receiver insert 12, as aforesaid, the reduced portion 23 of the barrel forms, in conjunction with the inside wall of the receiver, an annulus 24 circumscribing the end of the barrel.

A gas port or vent is formed substantially centrally in the receiver insert 12 and comprises a downwardly and forwardly directed drilled hole 25 which communicates at its upper end with the annulus 24 and is open at its lower end to permit gases or sparks to escape from the annulus at a point remote from the shooter's eyes.

It will be clear that the annulus 24 is open to the atmosphere whenever the bolt 14 is retracted from its breech-closing position. However, when the bolt is advanced and locked in chamber-closing position and the gun is ready for firing, the annulus 24 is closed by the proximity of the bolt head 26 and the only outlet for gases which may accumulate in the closed annulus 24 due to a burst cartridge head will be through the escape port 25.

It will be appreciated by those familiar with firearms that the danger of injuring the shooter's face and eyes, due to escaping gas or sparks occasioned by cartridge head bursts or other inadvertent explosions, is a real one and one which heretofore made the firing of many types of guns extremely hazardous.

The present embodiment provides a port 25 for the hot gases and sparks so that these dangerous elements are safely conducted away from the shooter's face. It will be evident, therefore, that the closed passage or annulus 24 and its gas escape port 25 constitute a safety feature which is a useful improvement over other types of firearms.

As shown in Fig. 4, the bolt 14 is of well known construction being substantially cylindrical and provided with a longitudinal firing pin passage 27 drilled in the upper part of the bolt eccentric to the longitudinal axis thereof. Through this passage is projectable the firing pin which comprises a plunger 28 provided with a substantially wedge-shaped firing pin point 29 and having capacity for reciprocation in the passage 27 so as to bring the firing pin point 29 in close relationship with the annular firing anvil 22. Details of the mechanism for operating the firing pin are fully described and disclosed in the above-identified copending application.

Means in addition to the head portion 26 of the breech bolt for closing the annulus 24 comprises an arcuate or substantially semicircular flange 30 which partially circumscribes the outer edge of the bolt and projects at substantially right angles to the face 31 thereof. This flange 30 is of a thickness, as seen in Fig. 2, substantially equal to the height of the annulus 24. Consequently, as the bolt is advanced to breech-closing position, the flange 30 will be thrust into the annulus 24 thereby substantially closing the annulus from the atmosphere. The annulus thus becomes a substantially closed passage bounded by the adjacent surfaces of the barrel, the receiver 11, the face of the flange 30 and the lower portion of the bolt head 26.

The cartridge 32 may be loaded into the barrel chamber in any well known manner, as for example, manually, as in a single-shot firearm, or automatically, as accomplished by the loading mechanisms of repeating firearms. The cartridge is forced into the barrel chamber 19 by the advancing bolt head 26 until the rim of the cartridge is firmly seated on the firing anvil 22 with the periphery 34 of the cartridge rim in contact with the substantially vertical walls 21 of the counterbore. At this time, the head of the cartridge is substantially flush with the rear end of the barrel chamber so that the face 31 of the bolt, which has been advanced and locked in breech-closing position, abuts thereon in the manner shown in Fig. 2.

The arcuate flange 30 of the bolt projects into the annulus 24 so as to form a substantially closed passage circumscribing a major portion of the barrel, the remaining or lower portion of the annulus being closed by the adjacent surface of the bolt head 26. The gun may be fired by pulling the trigger so as to release the firing pin plunger 28 and permit the firing pin point 29 to strike forcibly against the rim of the cartridge.

It is clear that the rim of the cartridge is not only supported, but is also enclosed substantially on all sides by the walls of the chamber counterbore, which construction has been found in actual practice to eliminate approximately 90% of the burst cartridge heads heretofore experienced.

Although the theory which accounts for the occurrence of burst heads in previous types of firearms is not exactly known, it seems probable that inasmuch as the rim of the cartridge was squeezed or crushed between the rear face of the barrel chamber and the face of the bolt and as there was no reinforcement of any kind provided for the periphery of the cartridge rim, the periphery became a point of relative weakness compared to other encased or supported parts of the cartridge head, and hence would rupture when subjected to the pressures developed incident to the explosion taking place in the cartridge.

It will be evident, however, that the embodiment of the present invention provides reinforcement and support for the walls of the cartridge rim, and particularly the periphery thereof so as to prevent a rupture of the rim, and hence any likelihood of burst heads when the cartridge is fired.

Infrequent instances may occur, however, when a cartridge head may burst due to an inherent defect in the metal of the rim such as a crack or strain. In such cases, the gases of explosion of the fired cartridge are prone to escape between the adjacent surfaces of the chamber and bolt and are often thrown back into the eyes of the shooter. However, by the construction shown, these gases will pass out into the closed annulus 24 which directs the gases down to the vent or port 25 from which they escape harmlessly at a point remote from the shooter's eyes.

Since the invention is believed to provide a novel and improved rimfire firearm, it is not limited to the particular construction shown and described herein, but is to be construed as covering all equivalent devices falling within the scope of the appended claims.

What is claimed is:

1. In a bolt-action firearm for rimfire cartridges, the combination comprising a receiver, a breech bolt reciprocably mounted in said receiver and a chambered barrel secured in said receiver, said barrel comprising an end portion of exteriorly reduced diameter adjacent the chamber mouth adapted with said receiver to form an annulus the upper half of which is closed from the atmosphere by said bolt when in chamber-closing position, said receiver having a port opening into the lower half of said annulus and constructed and arranged to exhaust gases therefrom, and a counterbore in the chamber mouth comprising a curvilinear shoulder for seating the cartridge rim when the bolt is in chamber-closing position.

2. In a bolt-action firearm for rimfire cartridges, the combination comprising a receiver, a breech bolt reciprocably mounted in said receiver, said bolt having a face provided on its upper edge with a semi-circular flange and a chambered barrel secured in said receiver, said barrel comprising an end portion of exteriorly reduced diameter adjacent the chamber mouth adapted with said receiver to form an annulus the upper half of which is closed from the atmosphere by said semicircular flange when said bolt is in chamber-closing position, said receiver having a port opening into the lower half of said annulus to exhaust sparks therefrom, a counterbore in the chamber mouth adapted to seat the cartridge rim when the bolt is in chamber-closing position, and a firing pin in said bolt adapted to pinch a portion of the cartridge rim against the seat.

3. In a bolt-action firearm for rimfire cartridges, the combination comprising a receiver, a breech bolt reciprocably mounted in said receiver, said bolt having a face provided in its upper edge with a semicircular flange and a chambered barrel secured in said receiver, said barrel comprising an end portion of exteriorly reduced diameter adjacent the chamber mouth adapted with said receiver to form an annulus, said semicircular flange being constructed and arranged to close the upper half of said annulus from the atmosphere when said bolt is in chamber-closing position, said receiver having a port opening into the lower half of said annulus and

constructed and arranged to exhaust gases from the annulus at a point remote from the shooter's eyes.

4. In a bolt-action firearm for rimfire cartridges, the combination comprising a receiver, a receiver insert, a breech bolt reciprocably mounted in said receiver and a chambered barrel secured in said receiver, said barrel comprising an end portion of exteriorly reduced diameter adjacent the chamber mouth adapted with said receiver to form an annulus, and a semicircular flange on the face of said bolt adapted to overlie the exteriorly reduced end portion of said barrel and to close the upper half of said annulus from the atmosphere when said bolt is in chamber-closing position, said receiver insert having a spark exhaust port opening at its upper end into the lower half of said annulus and exhausting at its lower end into said receiver, and a counterbore in the chamber mouth having a firing anvil adapted to seat the cartridge rim when the bolt is in chamber-closing position.

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