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2,424,247

TRIGGER PULL FOR SMALL ARMS

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Fig. 1.

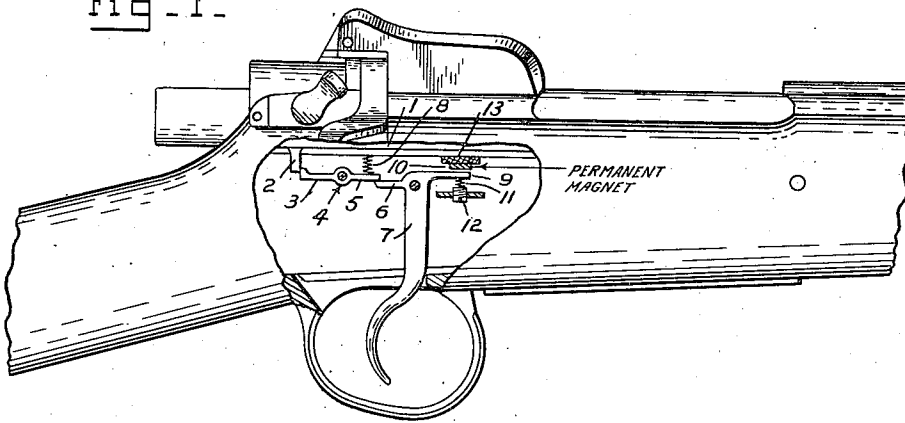


Fig. 2.

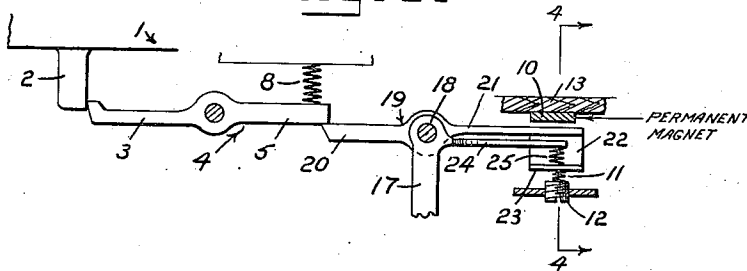


Fig. 4.

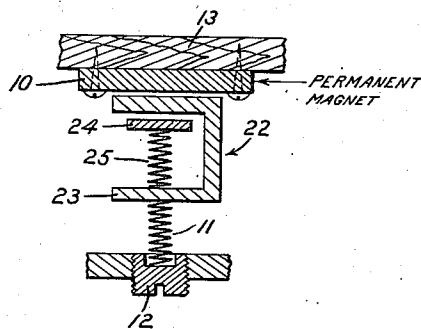


Fig. 3.

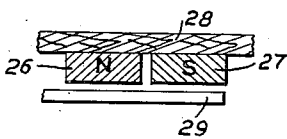
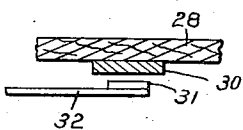


Fig. 5.



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TRIGGER PULL FOR SMALL ARMS

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5 Claims. (Cl. 42-69)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to trigger pull arrangements for small arms such as rifles, pistols, revolvers, shotguns and the like, and more particularly, to arrangements for securing a creepless trigger pull effect, similar to the effect obtained in breaking a brittle rod.

A main object of this invention, therefore, is to provide a method and means for obtaining a creepless trigger pull for small arms.

A further object of this invention is to provide a method and means for obtaining a creepless trigger pull for small arms by utilizing a magnetic field to produce the quick breakaway effect.

Further objects of this invention will appear from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is an elevational view with parts broken away of a portion of a rifle mechanism employing a trigger pull arrangement in accordance with this invention.

Figure 2 is a partial view similar to Figure 1 but showing a modification of the trigger pull arrangement adapted to provide slack in the trigger.

Figure 3 is a detail view partly in cross-section of a modified permanent magnet structure for a trigger pull arrangement according to this invention.

Figure 4 is an enlarged cross-sectional view taken on line 4-4 of Figure 2.

Figure 5 is a detail view partly in cross-section of a further modification of the invention.

It is very desirable in small arms such as rifles, pistols, revolvers, shotguns, and the like, to provide a trigger pull arrangement, where at the moment of trigger release, the force opposing the pull on the trigger is very rapidly reduced so as to result in a sharp clean breakaway of the trigger mechanism from its retaining structure. The desired effect is analogous to the result which would be obtained if the trigger was held back by a thin brittle rod such as a glass rod and the trigger pull resulted in the gradual building up of stress in the rod (considered to be acting as a beam) and the sudden rupture thereof, yielding complete release of the trigger. Such a trigger action would be considered substantially creepless and would be highly effective.

Since a glass rod construction is obviously impractical in a rifle or other firearm, it is proposed by this invention to obtain the same, or a closely

2

similar, effect by distorting the magnetic field surrounding a permanent magnet. Referring to the drawings, Fig. 1 discloses one arrangement where this method of trigger control is shown as applied to a bolt action rifle. In the other drawings, similar reference numerals refer to parts identified by reference numerals in Fig. 1.

In Fig. 1, the bolt of the rifle is designated by reference numeral 1. Bolt 1 is provided with a cocking lug 2 which is normally engaged, in cocking position by one arm 3 of a sear lever 4, pivotally supported in the cavity provided therefor in the rifle. Another arm 5 of sear lever 4 is engaged by a trip lug 6 formed on the trigger body 7. Upward movement of arm 5 is cushioned by a coiled pressure spring 8 connected between the upper surface of arm 5 and an adjacent stationary wall of the cavity. Spring 8 biases sear lever 4 to a cocking position. Upward movement of lug 6 forces arm 3 out of obstructing position with respect to lug 2 and releases bolt 1 to fire the weapon.

Trigger body 7 is provided with a forwardly projecting paramagnetic arm 9 which extends in normal close proximity to a permanent magnet 10 and is biased to this position by a pressure spring 11 retained in an adjustable cup member 12, threadedly engaged with an external wall of the trigger housing. Permanent magnet 10 preferably having a magnetomotive force in excess of that of ordinary permanent magnets is appropriately secured to a stationary support member 13 of non-magnetic material such as wood. Trigger body 7 is made of magnetic material such as soft steel.

When the trigger is pulled, arm 9 is moved away from magnet 10, and at a critical position where the air gap between arm 9 and magnet 10 reaches a value where the magnetic force on arm 9 cannot balance the pulling force on the trigger, the initial magnetic field is weakened and the magnetic flux pattern around permanent magnet 10 shifts to a new form. The sudden shift of the magnetic flux pattern leaves the pulling force on trigger 7 unopposed and provides the desired sudden breakaway release of the trigger.

The amount of pulling force required to produce the desired quick release may be regulated by adjusting cup member 12 to provide the optimum initial pressure of spring 11 on arm 9.

In the embodiment of Fig. 2 means is provided for introducing a certain amount of slack in the trigger action before the sharp breakaway release effect is obtained. In this embodiment the trigger body, designated as 17 is pivotally

3

mounted on a pin 18 coaxially with a sear actuating lever 19. Sear actuating lever 19 is provided with a trip lug 20 adapted to urge arm 5 of sear lever 4 upwardly to release bolt 1 when lever 19 is rotated in a clock-wise direction. Sear actuating lever 19 is further provided with paramagnetic arm 21 provided at its end with an integral open sleeve portion 22 having a lower flange 23. Trigger body 17 is provided with an arm 24 positioned within said open sleeve portion 22 and connected to lower flange 23 by a compression spring 25 so that the pull on the trigger is cushioned by spring 25 until said spring goes substantially solid, whereupon said pull is transmitted to arm 21. Arm 21 is normally positioned by adjustable cup member 12 and spring 11 so that it is closely adjacent to permanent magnet 10. As arm 21 is moved downwardly by the trigger pull, the sharp release action is obtained as described in connection with the embodiment of Fig. 1.

Fig. 3 discloses a modification of the permanent magnet employed in the trigger release arrangement according to this invention, said magnet comprising a horseshoe magnet having arms 26, 27 connected by magnetic yoke, the ends of the arms being of opposite polarity so that a very high flux density is normally obtained through the trigger arm element 29 positioned adjacent their end faces. By this arrangement, the break-away effect produced by the rapid decay of the initial magnetic field is considerably enhanced. This structure may be employed with either the embodiment of Fig. 1 or the embodiment of Fig. 2. The horseshoe magnet is secured by appropriate fastening means to an appropriate non-magnetic member 28 forming part of the wall structure of the trigger cavity.

Although, as disclosed in the foregoing embodiments the permanent magnet is stationary, the magnet may be instead mounted on the movable trigger arm element and may cooperate with a suitable stationary element of magnetic material to produce the desired quick release action. As shown in Fig. 5, the forwardly projecting trigger arm 32, preferably of non-magnetic material, has a permanent magnet 31 affixed to its upper surface. The stationary element 30 is formed of iron or soft steel and is secured by appropriate fastening means to the member 28 forming part of the wall structure of the trigger cavity. It will be understood that the modifications of Figs. 1 through 4 may be appropriately modified by placing the magnet on the movable trigger arm and providing a cooperating stationary magnetic element.

While certain specific embodiments of trigger pull arrangements for small arms have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention will occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention other than as defined by the scope of the appended claims.

What is claimed is:

4

1. In a device having a permanent magnet mounted in the body thereof and a paramagnetic element, adjustable means for maintaining the said paramagnetic element normally within the effective flux of said permanent magnet and trigger means for manually activating the said paramagnetic element and moving it to a weaker outer zone of the said flux.

2. In a firearm having a permanent magnet mounted in the body thereof and a trigger comprising a paramagnetic element, means of subjecting the said trigger to the effective magnetomotive forces of the said magnet in close proximity thereto, said trigger being arranged to manually activate the said paramagnetic element and move it to a point beyond the effective range of the said magnetomotive forces.

3. Means for obtaining quick release of a firearm trigger comprising a permanent magnet secured to the firearm, a manually operated trigger having a paramagnetic element forming a part thereof, said trigger being arranged to move the said paramagnetic element against the magnetomotive forces of the said magnet to a point beyond their effective range, and means for positioning the said paramagnetic element normally within the effective flux of the said magnet.

4. Means for obtaining a quick release of a firearm trigger comprising a permanent magnet secured to the firearm, a manually operated trigger having an outwardly extending arm forming a part thereof, a paramagnetic sear-operated lever mounted between said magnet and said arm, the said trigger being pivotally mounted on the firearm to move the said paramagnetic lever from a predetermined position within the strong inner zone of the magnetic field of the said magnet to its weaker outer zone upon activation of the said trigger, resilient cushioning means between the said trigger and the said lever whereby slack is provided in the trigger action, and means for predetermining the position of the said paramagnetic element within the inner zone of the magnetic field of the said magnet.

5. The structure of claim 4 wherein the paramagnetic sear actuating lever is provided with an open sleeve portion within which the arm of the said trigger may move.

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