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FIRING MECHANISM FOR A SPOTTING RIFLE

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2 Sheets-Sheet 2

Fig. 4.

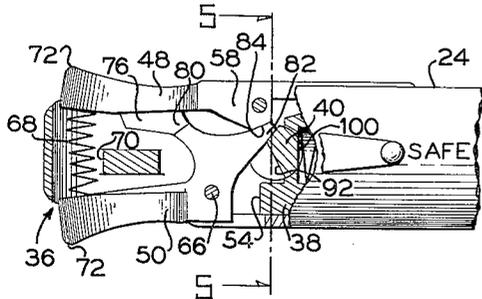


Fig. 5.

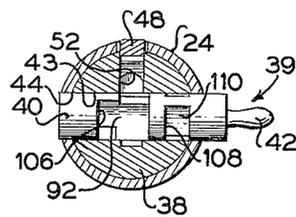


Fig. 6.

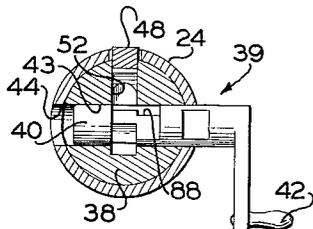


Fig. 7.

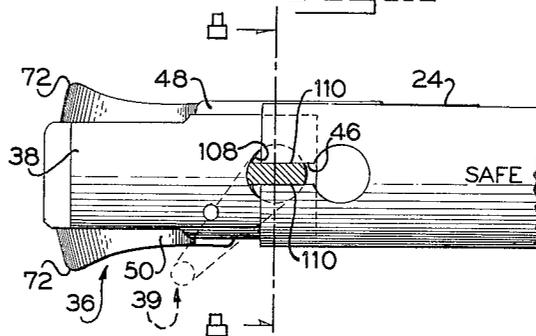


Fig. 8.

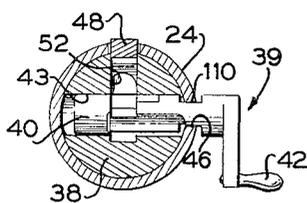
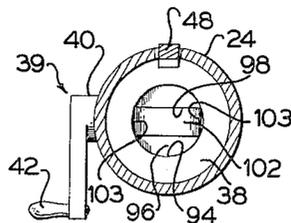


Fig. 9.



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FIRING MECHANISM FOR A SPOTTING RIFLE

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7 Claims. (Cl. 42-70)

(Granted under Title 35, U.S. Code (1952), sec. 266)

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

This invention relates to firearms and more particularly to trigger mechanisms therefor.

With those gun systems wherein a weapon of artillery capabilities is brought into aim by a spotting rifle of smaller bore, the system is operated by two men whose efforts are synchronized for loading and firing the guns. To prevent any chances of serious accidents, it is important that the guns be each provided with two safety devices with one on each gun being controlled by each of the operators. It is also important that the device for firing the spotting rifle unit be designed so that the aim thereof will not be disturbed when the trigger is actuated.

It is, therefore, an object of this invention to provide for the spotting rifle unit of such a weapon system a trigger mechanism which provides two safety devices one of which is under the control of each of two operators.

It is another object of this invention to provide such a trigger mechanism wherein the trigger and a trigger lock may be actuated simultaneously by squeezing them together between the thumb and index finger so that a minimum of stress will be transferred to the spotting rifle by actuation of the trigger.

It is a further object of this invention to provide such a firing mechanism wherein the firing pin spring acts as a detent to resiliently index a separate rotary safety in either the safe or fire position thereof.

It is still another object of this invention to provide a trigger mechanism which is held assembled to the breech mechanism of the spotting rifle by the rotary safety and which may be assembled and disassembled without the use of tools.

It is still another and further object of this invention to provide such a trigger mechanism which is simple in design with a minimum of parts, is rugged in construction and positive in operation.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

FIG. 1 is a partially cross-sectioned view of the breech mechanism of a spotting rifle shown in battery with the safety in the fire position and the trigger and trigger lock squeezed together for release of the firing pin;

FIG. 2 is a view similar to FIG. 1 but with the breech mechanism lowered to the loading position, the trigger and trigger lock in their normal positions and the firing pin held in an over-seared position by the breech cams;

FIG. 3 is a view taken along line 3-3 of FIG. 2;

FIG. 4 is a partially cross-sectioned view of the trigger mechanism with the safety shown in safe position;

FIG. 5 is a view taken along line 5-5 of FIG. 4;

FIG. 6 is a view similar to FIG. 5 but showing the safety rotated to the fire position and pulled outwardly for partial disengagement from the supporting tube;

FIG. 7 is a side view of the trigger mechanism with the safety cut away at the key section thereof and shows the safety in the disassembly position and the trigger device partially removed from the supporting tube;

FIG. 8 is a view taken along line 8-8 of FIG. 7; and

FIG. 9 is a view taken along line 9-9 of FIG. 1.

Shown in the figures is a spotting rifle 12 including a barrel 14 having a breech section 16 in which a breech mechanism 18 is slidably mounted for vertical reciprocity between a battery and a loading position. Breech mechanism 18 includes a breechblock 20 which supports the rear end of a cartridge 22 chambered in barrel 14 for discharge when the breech mechanism is in the battery position. Breech mechanism 18 also includes a tube 24 extending integrally rearward from the breechblock.

Tube 24 slidably receives a firing pin 26 which is biased forwardly to a firing position for discharge of chambered cartridge 22 by a spring 28. A bar 30 is mounted laterally through firing pin 26 so that the ends project therefrom and the projecting ends extend through accommodating slots 32 in tube 24 for sliding engagement with cooperating wiper cams 34 on the rear end of breech section 16. Thus, during downward displacement of breech mechanism 18 from the battery to the loading position, firing pin 26 is actuated from the firing to an overseared position.

Firing pin 26 is releasably held in a cocked position slightly forward of the overseared position by a trigger device 36 which includes a cylindrical housing 38 the outside diameter of which is the same as the inside diameter of tube 24 so that the front end of the housing is insertable into the rear end of the tube. Housing 38 is held installed to tube 24 by a safety 39 which includes a cylindrical shaft 40 that extends laterally through both the housing and the tube. Shaft 40 is rotatable by a crank-type handle 42 mounted on the right-hand end thereof, facing breech section 16. Shaft 40 is rotatably received by a bore 43 in housing 38. The left end of shaft 40 is rotatably received by a mating aperture 44 in tube 24 while the right end is rotatably received by a mating keyhole slot 46 which extends forwardly from the rear end of the tube.

Trigger device 36 also includes a trigger 48 and a trigger lock 50 which are longitudinally disposed in mating recesses 52 and 54, respectively, provided in the periphery of housing 38. Recesses 52 and 54 are diametrically opposed and vertically related so that trigger 48 is positioned above trigger lock 50. Trigger 48 is pivotally mounted on a transversely disposed pin 56 which extends through a flange 58 provided on the inside of the trigger between the front and rear ends thereof and which is located so that the trigger projects from recess 52 and is readily pivoted by manual pressure applied against the rear end. Pin 56 and, consequently, flange 58 are located adjacent to shaft 40 so that the flange is disposed for cooperation with the shaft and trigger lock 50 as hereinafter described. The front end of trigger 48 forms a sear 60 by providing on the inside of such front end a latch 62 which is engageable with a catch 64 on firing pin 26 for searing the firing pin in the cocked position.

Trigger lock 50 is pivotally mounted at the front end on a transversely disposed pin 66 which is disposed so that the trigger lock projects partially from the associated recess 54 whereby the rear end is manually actuatable for pivotal displacement. A coil spring 68 is received by a vertical bore 70 extending between the recesses 52 and 54 so that the opposite ends of the spring contact trigger 48 and trigger lock 50 to press the rear ends thereof outwardly to normally extended positions. The outside surfaces of both trigger 48 and trigger lock 50 flare outwardly at the rear ends thereof, as noted at 72, to comfortably accommodate the thumb and index finger, respectively, of an operator's hand, so that the rear ends of the trigger and trigger lock may be simultaneously squeezed together thereby. Thus, the pressure applied by the thumb to trigger 48 is opposed by the pressure of the index finger against trigger lock 50, and vice versa,

so that the manual force required to trigger firearm 12 is not transferred thereto to disturb the aim thereof.

Trigger lock 50 assures that trigger 48 cannot be accidentally actuated separately by providing on such trigger lock a tang 74 which extends inwardly for cooperation, as hereinafter described, with a lug 76 on the inside of the trigger. Tang 74 includes a substantially triangular projection 78 which extends rearwardly and inwardly towards lug 76 for contact with a nub 80 on the front end thereof, when trigger 48 and trigger lock 50 are in their normally extended positions. Projection 78 and nub 80 are so related, as noted in FIG. 2, that, when trigger 48 and trigger lock 50 are in their normally extended positions, the force applied by the trigger to the trigger lock, through such projection and lug, is linear. Thereby, trigger lock 50 blocks pivotal displacement of trigger 48. However, the force applied by projection 78 to nub 80, when trigger lock 50 is pressed inwardly, is angular, therefore, when trigger lock 50 and trigger 48 are squeezed together, projection 78 is displaced out of contact with nub 80 through the pivotal displacement of tang 74 and the angular force cammingly applied between the projection and nub. Thus, trigger 48 is freed automatically when trigger lock 50 is squeezed therewith to fire firearm 12.

Tang 74 also includes a finger 82 which extends forwardly and inwardly for extension between flange 58 and shaft 40 so as to be cooperable therewith as hereinafter described. The top side of finger 82 is pressed by spring 68 against a planar surface 84 on flange 58 when trigger lock 50 is in the normally extended position thereof. Shaft 40 of safety 39 is recessed to form a chordal flat 88 and a chordal flat 92 disposed at right angles thereto. Chordal flat 88 is disposed so as to be positioned parallel to the underside of finger 82 when safety 39 is in a safe position and chordal flat 92 is disposed so as to be positioned parallel to the underside of such finger when the safety is rotated 90° to a fire position. Chordal flat 88 is disposed farther from the longitudinal axis of shaft 40 than is chordal flat 92 and is so related to finger 82 that, when safety 39 is in the safe position, pivotal displacement of trigger lock 50 is blocked by contact of the finger with such chordal flat 88. Chordal flat 92 is so related to finger 82 that, when safety 39 is in the fire position, sufficient space is provided between such chordal flat and finger for pivotal displacement of trigger lock 50.

The front end of housing 38 is concentrically bored inwardly, as noted at 94, to a wall 96. Wall 96 is positioned sufficiently inward so that the periphery of bore 43 is interrupted and thereby provides in such wall a rectangular opening 98 through which a portion of shaft 40 would normally extend therethrough. However, that portion of shaft 40, which is exposed in opening 98 when safety 39 is in the safe position, is slabbed to form a planar surface 100 which is even with wall 96. Also, that portion of shaft 40, which is exposed in opening 98 when safety 39 is in the fire position, is similarly slabbed to form a planar surface 102 and end walls 103. The rear end of firing pin spring 28 is received by bore 94 to press resiliently against wall 96 and the planar surfaces 100 or 102 which might be exposed in opening 98. Thereby, firing pin spring 28 acts as a detent to resiliently hold safety 39 in the safe or fire positions.

To remove housing 38 from tube 24, safety 39 is pulled to the right by handle 42 until the free end of shaft 40 is clear of its accommodating aperture 44. This is possible by flat 92 being extended to the left, as noted at 106. Thus, when safety 39 is in the fire position, it is free to be pulled to the right for disengaging shaft 40 from aperture 44. Safety 39 is normally held against lateral displacement by the resilient contact of the end of spring 28 with end walls 103. Housing 38 may be removed rearwardly from tube 24, after safety 39 is pulled

outwardly, through the cooperation of a key section 108 in shaft 40 with keyhole slot 46.

Key section 108 is formed by a pair of diametrically opposed segmental recesses 110 which have the same width as the thickness of tube 24 and such key section has the same thickness as the width of the entrance portion of the keyhole slot. Key section 108 is disposed so that, when safety 39 is rotated clockwise from the fire position to a disassembly position, the key section aligns with the entrance portion of keyhole slot 46 and, therefore, may be moved rearwardly therealong when housing 38 is pulled from tube 24 as noted in FIG. 7. Installation of housing 38 to tube 24 is made by reversing the sequence of the above recited steps.

Thus, when firearm 12 is to be fired after breech mechanism 18 is actuated to the battery position, safety 39 is rotated by one of two operators to the fire position. Thereby, chordal flat 92 is rotated into association with finger 82 to provide a clearance for pivotal displacement of trigger lock 50. Firearm 12 is fired by trigger lock 50 and trigger 48 being squeezed together by the other operator's thumb and index finger. During initial displacement of trigger lock 50 and trigger 48, projection 78 is moved away from contact with nub 80 and then continued, uninterrupted displacement of the trigger disengages latch 62 on sear 60 from catch 64 for release of firing pin 26 to discharge cartridge 22 chambered in barrel 14. After discharge of the chambered cartridge 22, breech mechanism 18 is actuated to the loading position and, during such displacement, the ends of bar 30 slide along wiper cams 34 to actuate firing pin 26 to the over-seared position with latch 62 positioned for re-engagement with catch 64 through the bias of spring 68 against trigger 48. With firing pin 26 in the over-seared position and latch 62 disengaged from catch 64, safety 39 may be readily actuated to the safe position by the operator performing the loading operation before chambering a cartridge 22 in barrel 14.

From the foregoing it is clearly apparent that there is provided herein a firing mechanism which provides two convenient safety devices so that one may be actuated by each of the two operators and in which, by having the trigger and trigger lock squeezed between the thumb and index finger, there is little, if any, force transferred to the firearm to disturb the aim thereof. Moreover, the trigger device is distinguished for its simplicity of design and minimum number of parts by having the safety act as the means for releasably holding the trigger device to the breech mechanism, the firing pin spring act as a detent for the safety, and the sear incorporated on the trigger.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

We claim:

1. In a firearm, the combination including a breech mechanism provided with a breechblock and a tube extending integrally rearward therefrom, a firing pin slidably mounted in said tube for longitudinal reciprocation, a trigger device mounted in the end of said tube for releasable engagement with said firing pin when in a cocked position, and a rotatable safety mounted through said trigger device for selectively preventing actuation thereof and also through said tube for releasably securing said trigger device thereto.

2. In a firearm, the combination including a breech mechanism provided with a breechblock and a tube extending integrally rearward therefrom, a firing pin slidably mounted in said tube for longitudinal reciprocation, a trigger device supported by the rear end of said tube and disposed for releasably holding said firing pin in a cocked position, a safety rotatably mounted through said trigger device and tube for releasably securing said trigger device to said tube and so as to be rotatable between

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a safe and a fire position, cooperating means on said safety and trigger device for preventing release of said firing pin when said safety is in the safe position, and a spring disposed in said tube for biasing said firing pin to a firing position and for operational cooperation with said safety to provide a detent for releasably holding the safety in either the safe or fire position thereof.

3. The combination as defined in claim 2 wherein said safety is laterally disposed through said tube and trigger device, and including end walls formed in said safety for engagement by said spring for securing said safety against lateral displacement when in the safe position, and cooperating means in said tube and safety for permitting limited lateral displacement of said safety to partially disengage said safety from said tube when said safety is in the fire position and for permitting complete disengagement of said safety from said tube when said safety is in a disassembled position.

4. The combination as defined in claim 2 wherein said trigger device includes a cylindrical housing partially receivable by the rear end of said tube, a trigger pivotally mounted in said housing intermediate the front and rear ends of said trigger for displacement between a normally extended position relative to said housing and an inwardly pressed position, a sear formed at the front end of said trigger, said sear being disposed for releasably engaging said firing pin when in the cocked position, a trigger lock pivotally mounted in said housing diametrically opposite said trigger for pivotal displacement in the same plane as said trigger between a normally extended position and an inner trigger release position, cooperating means on said trigger and trigger lock for preventing displacement of said trigger from the normally extended position thereof when said trigger lock is in the normally extended position relative thereto, and similar arcuate sections formed on the rear ends of said trigger and trigger lock to provide means for manually squeezing the trigger and trigger lock

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together so as to be simultaneously displaced from the normally extended positions.

5. The combination as defined in claim 4 and including a spring disposed between said trigger and trigger lock for biasing both thereof to the normally extended positions.

6. The combination as defined in claim 4 and including cooperating means in said safety and on said trigger lock for preventing pivotal displacement thereof from the normally extended position when said safety is in the safe position thereof.

7. The combination as defined in claim 4 wherein said cooperating means on said trigger and trigger lock for preventing displacement of said trigger from the normally extended position thereof when said trigger lock is in the normally extended position relative thereto includes a tang disposed on said trigger lock so as to extend therefrom towards said trigger, said tang including a projection having contact with a nub on said trigger when said trigger and trigger lock are in the normally extended positions, said projection and nub being disposed so that when said trigger and trigger lock are in the normally extended positions and pressure is applied to said trigger such pressure is transmitted linearly from said nub to said projection to block pivotal displacement of said trigger and when pressure is applied to said trigger lock such pressure is transmitted angularly from said projection to said nub to permit disengagement therebetween, and pivotal displacement of said trigger to release said firing pin.

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