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FLUID TRANSFER RATE CONTROL FOR A FIRING MECHANISM

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Fig. 1.

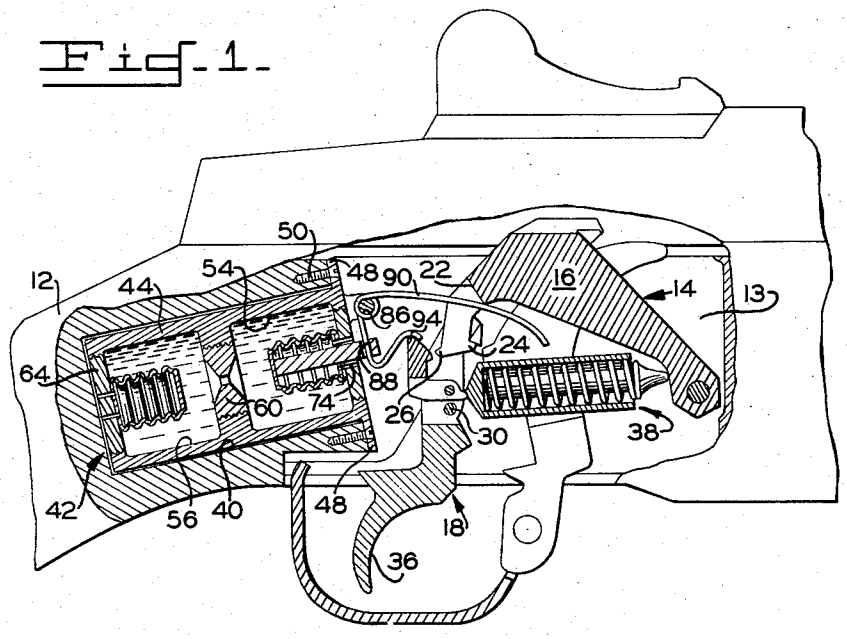
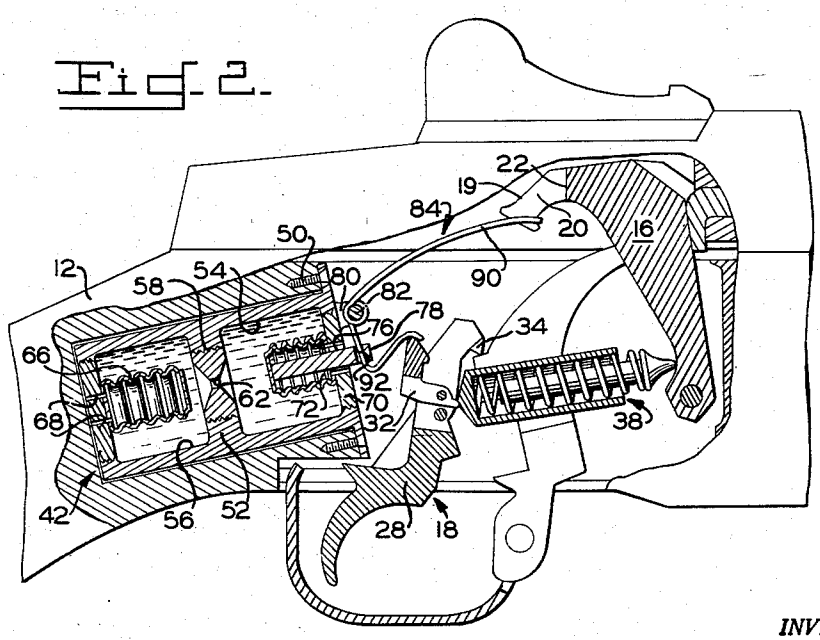


Fig. 2.



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FLUID TRANSFER RATE CONTROL FOR A FIRING MECHANISM

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3 Claims. (Cl. 89—131)

This invention relates to firearms and more particularly to firing mechanisms therefor which produce automatic fire at a retarded rate.

Many means have been devised for converting to automatic operation firearms, such as the U. S. Rifle, Cal. .30, M1, which were originally designed to fire only one round each time the trigger is pulled. These means are generally complex in design and add to the operating mechanism of the weapon a system of linkages whereby the operating rod or bolt mechanism of the firearm actuates the sear.

Further, with shoulder arms of automatic type, it has been found that the unrestricted rate of fire achieved thereby is faster than is necessary and, consequently, wastes ammunition. This rapid rate, too, produces other undesirable effects as it causes the weapon to heat up too rapidly and also makes it difficult for the shooter to maintain the aim of the weapon.

It is, therefore, one of the objects of this invention to provide for firearms a simple device for effecting automatic fire at a controlled repetitive rate.

It is another object of this invention to provide a device for effecting a controlled repetitive firing rate which is lower than that normal to the gun.

It is a further object of this invention to provide such an aforementioned device which is compact in size.

It is a still further object of this invention to provide a device for producing cyclic actuation of the firearm sear and includes a resilient sear actuating member opposed by a dampening fluid transferring device.

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 longitudinal cross-sectional side view of the firing mechanism of a rifle of the type of the U. S. Rifle, Cal. .30, M1, with the device of this invention installed therein and shows the secondary sear actuated to the hammer release position by the device; and

Fig. 2 is a view similar to Fig. 1 but shows the arrangement of the parts with the hammer in firing position.

Shown in the figures is a rifle having a stock 12 with a vertical hole 13 therethrough for receiving a firing mechanism 14. Firing mechanism 14 includes a hammer 16 pivotable by the firearm bolt (not shown) from a firing to a cocked position and a trigger mechanism 18. Hammer 16 is provided with a tail portion 19 which is bifurcated by a slot 20 to form a shoulder 22 at the front end thereof and such tail portion is provided with a front and rear sear engaging lug, noted at 24 and 26, respectively, referring to Fig. 1. Trigger mechanism 18 is comprised of a trigger member 28, which is mounted for pivotal movement by a transverse pin 30, and a secondary sear 32 pivotally mounted to such trigger member above such pin. Provided on trigger member 28 above pin 30 is an integral primary sear 34 which is engageable with front lug 24 to releasably latch hammer 16 in the cocked

position when the depending finger piece of the trigger member, noted at 36, is in a forward position and releases such hammer when such finger piece is pulled rearwardly. Secondary sear 32 is arranged so as to engage rear lug 26 and releasably latch hammer 16 in the cocked position when finger piece 36 is pulled rearwardly and delivers such hammer to primary sear 34 when such finger piece is released. Mounted between hammer 16 and trigger mechanism 18 is a spring device 38 which resiliently biases such hammer to the firing position, finger piece 36 forwardly and secondary sear 32 to a forward hammer latching position. This firing mechanism is conventional and is not a part of this invention.

Provided in stock 12 is a cylindrical well 40 which extends rearwardly from hole 13. Received by well 40 is a dampening device 42 including a cylindrical case 44 having a pair of diametrically opposed and radially extending ears 48 which are bored to receive screws 50 which fix such case to stock 12. Provided intermediate the front and rear ends of case 44 is an integral, diametrically disposed partition 52 which divides such case into a front chamber 54 and a rear chamber 56. Extending axially through partition 54 is a cylindrical hole 58 which threadably receives an aperture member 60 provided with an axial bore 62 therethrough of selected diameter.

Threadably mounted to the rear end of case 44 so as to seal such end, fluid-tight, is a plug 64 and mounted to the front face of such plug so as to extend into rear chamber 56 is a rear bellows 66 which is completely inclosed except for a pair of vents 68 which extend through the rear end of such bellows and such plug. A bearing member 70 is threadably mounted to the front end of case 44 so as to seal, fluid-tight, the front end thereof and mounted to such bearing member is a front bellows 72 which extends into front chamber 54. Front bellows 72 is also inclosed except for a pair of vents 74 and an axial bore 76 which extends through the front end of such bellows and such bearing member.

Slidably received by bore 76 is a rod 78 which is attached at the rear end to the rear end of front bellows 72, whereby movement of such rod expands and collapses such bellows. Chambers 54 and 56 are filled with suitable fluid whereby, when rod 78 is pushed rearwardly to expand front bellows 72, the fluid in such front chamber, which is displaced by such expansion, is forced through bore 62 of aperture member 60 to collapse rear bellows 66.

Extending forwardly from the front end of case 44 is a pair of laterally-spaced lugs 80 which are positioned at the topmost portion of such case. Mounted between lugs 80 is a pin 82 upon which there is rotatably mounted a resilient member 84. Resilient member 84 includes an eye portion 86, an arm 88 and another arm 90. Resilient member 84 is rotatably mounted on pin 82 by such pin being received by eye portion 86 so that arm 88 passes through a diametrical bore 92 in rod 78. Arm 88 is arranged to extend beyond rod 78 and such extending portion is bent to form a hook portion 94 which catches secondary sear 32 so that such secondary sear and arm 88 are in mutual movement transmitting engagement.

Arm 90 is arranged to extend forwardly from eye 86 so as to be received by slot 20 in hammer 16 and be contactable by shoulder 22. Whereby, when hammer 16 is rotated to cocked position, shoulder 22 presses second arm 90 downwardly, spring-loading such arm and moving first arm 88 resiliently rearwardly. Arm 90 remains in slot 20 during the cyclic rotation of hammer 16 and eye portion 86 is so formed that when such hammer is in the firing position, the spring load in arm 90 is relieved.

The device of this invention operates as follows: Hammer **16** is actuated to cocked position during the normal charging of the firearm and, thereby, shoulder **22** presses downwardly on arm **90** of resilient member **84**. Such pressure spring loads arm **90** and causes rotation of resilient member **84** around pin **82** whereby arm **88** presses inwardly on rod **78** to expand front bellows **72**. Through the expansion of front bellows **72**, the fluid in front chamber **54** is transferred through bore **62** of aperture member **60** to rear chamber **56** thereby compressing bellows **66**.

When finger piece **36** is pulled rearwardly to fire the weapon, hammer **16** is released from primary sear **34** and pivoted through the bias of spring device **38** to the firing position. Thereby, the spring load in resilient member **84** is relieved and secondary sear **32** is permitted to move to hammer-engaging position by the bias of spring device **38**. As secondary sear **32** is biased forwardly to the hammer-engaging position, rod **78** is withdrawn through the engagement thereof with arm **88** to compress front bellows **72**. Such compression of front bellows **72** draws fluid from rear chamber **56** through bore **62** of aperture member **60** and thereby causes such rear bellows to expand in proportion to the contraction of such front bellows.

When the weapon is fired, hammer **16** is retracted to cocked position by the recoil of the firearm bolt (not shown). If finger piece **36** is still held back by the shooter to continue the firing of the weapon, primary sear **34** is held forwardly out of engagement with hammer **16** which is, consequently, engaged by secondary sear **32**. As hammer **16** was pivoted to cocked position for engagement by secondary sear **32**, shoulder **22** therein pressed arm **90** downwardly and so was consequentially spring loaded and such resilient force causes resilient member **84** to rotate around pin **82** and transfer the load to arm **88**. Such force causes rod **78** to be moved inwardly expanding front bellows **72**, but such front bellows is permitted to expand only as fast as the fluid in front chamber **54** can flow through bore **62** of aperture member **60** into rear chamber **56**. As rod **78** enters front chamber **54** through the displacement of the fluid therefrom the resilient force in arm **90** causes arm **88** to pull rearwardly on secondary sear **32** which, when the fluid in front chamber **54** has been displaced sufficiently into rear chamber **56**, overcomes the force of spring **38** applied thereagainst and releases hammer **16** to fire another round.

The cyclic operation of the firearm can, of course, be varied by changing the size of bore **62** in aperture member **60** as this will vary the resistance to the flow of the fluid from front chamber **54**. Also, it should be noted, that the fluid which fills dampening device **42** might be gaseous or liquid.

From the foregoing it is clearly apparent that there is herein provided a simple and compact device for effecting automatic fire at a controlled repetitive rate.

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.

I claim:

1. For a firearm having a firing member reciprocable between a firing and a cocked position and a sear for releasably latching the firing member in the cocked position, a device for effecting automatic fire at a controlled repetitive rate including a resilient member, means actuable by the firing member for energizing said resilient member, hook means for converting the energy in the resilient member to actuation of the sear for releasing the firing member, and a fluid transfer device engaged for cooperation with said hook means for controlling the time interval between the actuation of said energizing means by the firing member and the actuation of the sear by said hook means to release the firing member.

2. For a firearm having a firing member reciprocable between a firing and a cocked position and a sear for releasably latching the firing member in the cocked position, a device for effecting automatic fire at a controlled repetitive rate including a resilient member having a first arm spring loadable by the firing member and a second arm having engagement with the sear, means for mounting said resilient member so that the spring load in said first arm is transferred to movement of said second arm for actuating the sear, a fluid filled cylinder having a partition for dividing said cylinder into two chambers, a bore through said partition to permit controlled transfer of the fluid between said chambers, an air filled bellows in each of said chambers, a slidably mounted rod fixed at one end to one of said bellows to produce expansion and contraction thereof for forcing the surrounding fluid to and from the opposite one of said chambers through said bore, and means for engaging said rod to said second arm so that the transfer of the fluid through said bore controls the transfer of the spring load in said first arm to actuation of the sear by said second arm.

3. For a firearm having a firing member reciprocable between a firing and a cocked position and a sear for releasably latching the firing member in the cocked position, a device for effecting automatic fire at a controlled repetitive rate including a resilient member comprising a resilient arm looped to form an eye portion, a pin receivable by said eye portion to mount said resilient member for rotatable movement, a first arm extending from said eye portion so as to be engageable by the firing member during movement to cocked position and resiliently bias said resilient member for rotation, a second arm extending from said eye portion, a hook portion terminating said second arm for engaging the sear to transfer the rotation of said resilient member to actuation of the sear for releasing the firing member, a fluid filled cylinder having a partition for dividing said cylinder into two chambers, a bore through said partition to permit controlled transfer of the fluid between said chambers, an air filled bellows in each of said chambers, a rod mounted for slidable movement in the plane of the movement of said sear and said second arm and being fixed to one of said bellows to provide expansion and contraction thereof for forcing the surrounding fluid to and from the opposite one of said chambers through said bore to expand and contract the bellows therein, and means for engaging said rod to said second arm so that the transfer of the fluid through said bore controls the transfer of the spring load in said first arm to actuation of the sear by said second arm.

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