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FIREARM

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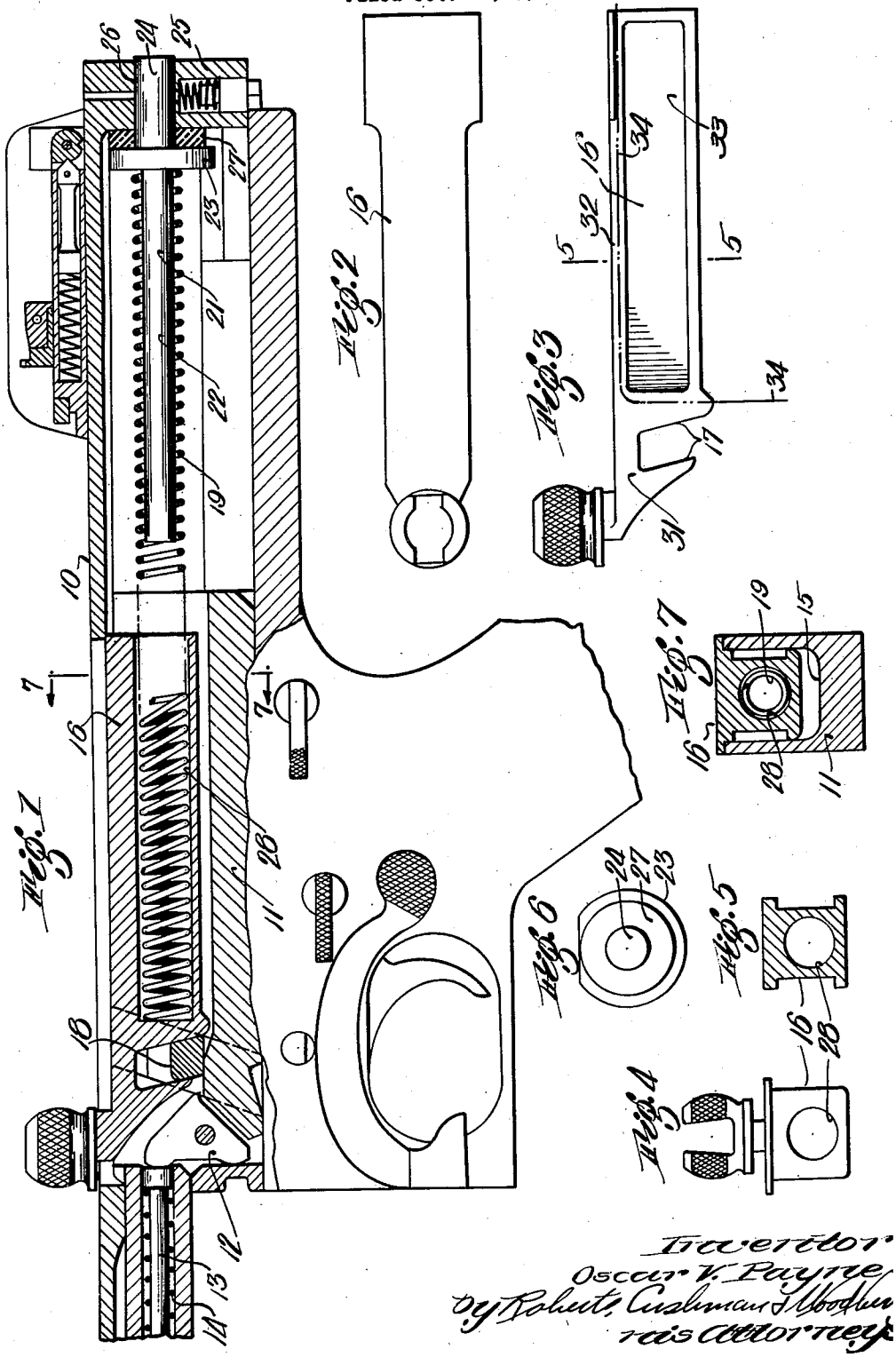

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FIREARM

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This invention relates to guns of the type having mechanism operable in response to breech pressure, such as automatic rifles, machine guns or submachine guns operating on the Blish principle as disclosed for example in the patents to Blish No. 1,131,319 and to Eickhoff No. 1,403,492. Firearms of this general class operate exceedingly fast, firing at the rate of eight or nine hundred or even more shots per minute. Moreover, these guns find their principal utility in military operations where, with the exception of guns for aircraft, such rapid operation is neither necessary nor desirable, principally because of the difficulty of maintaining an adequate supply of ammunition available for immediate use. A gun firing approximately five or six hundred shots per minute would be as effective for these purposes as guns operating much faster and would have the advantage of being more economical of ammunition.

The desirability of slowing down these guns to a reduced rate of fire has long been realized and in peace-time the military authorities have consistently refused to accept guns operating faster than approximately five or six hundred shots a minute. For many years attempts have been made to reduce the rate of firing, but without substantial success. For example, it has been proposed to increase the weight of the bolt, but the effect of this change is relatively slight, considering the weight which must be added, so that to obtain the desired reduction in speed, the weight must be increased beyond the permissible limits of size and total weight of the gun. This is particularly true of guns, such as the submachine gun, which must be restricted to a weight which a man can carry, while of course it will be understood that excessive weight is objectionable in most guns of the class described. The action may also be slowed down by making the locking angle more abrupt, but decrease of speed by this method has very definite limits for the reason that the angle can not be made much more abrupt without rendering the action uncertain and unreliable. Efforts have also been made to incorporate friction members to slow down the action, but this expedient has been found to be too uncertain and unreliable.

Objects of the present invention are to improve guns of the class described by providing means for slowing down the action thereof; to provide for accomplishing this without increasing the size or total weight of a gun to an objectionable extent; to slow down the action of such guns by adding weight to the actuator thereof; and to provide for incorporating these improvements in existing guns by providing an actuator of requisite weight and also adapted to be substituted for an actuator in an existing gun.

In accordance with the present invention the rate of firing of a gun of the class described is reduced by adding weight to the actuator so as to increase the inertia of this part. Preferably the added weight is distributed substantially equally longitudinally and transversely of an actuator of an existing type so that the latter may be useful in existing guns.

In the drawings:

Fig. 1 is a side elevation of a gun showing the recoil mechanism in section;

Figs. 2 and 3 are respectively top plan and side elevational views of the actuator shown in Fig. 1;

Fig. 4 is a rear end elevation of the actuator shown in Fig. 3;

Fig. 5 is any transverse section through the body of the actuator, as a section along the line 5—5 of Fig. 3;

Fig. 6 is a rear end elevation of the buffer shown in Fig. 1, showing the washer assembled thereon; and

Fig. 7 is a section on the line 7—7 of Fig. 1.

A submachine gun of the type disclosed in the patent to Eickhoff No. 1,403,492, dated January 17, 1922, has been selected for illus-

trating the features of this invention. This gun as shown comprises the receiver 10 having a bolt member 11 of channel section operable therein and carrying the hammer 12, the firing pin 13 and the firing pin spring 14. An actuator 16 is adapted to ride in the longitudinal channel 15 in the bolt and has a transverse slot 17 for engagement with the lock 18 in the usual manner. The recoil spring 19 seats upon the buffer 21, the latter being preferably in the form of an elongate rod 22 which serves as a guide for the recoil spring and carries the collar 23 which provides a seat for this spring. The buffer also has a rearward extension 24 which preferably is of a diameter to fit the hole 26 as provided in the breech wall 25 of standard guns. A washer 27 of fiber or other suitable material is interposed between the breech wall and the collar 23.

In order to provide for adding maximum weight of the actuator without increasing the transverse of vertical dimensions thereof, the latter is made in the form of an elongate body of rectangular cross section, and a hole or longitudinal bore 28 of relatively small diameter is formed in this body to receive the recoil spring which likewise is of correspondingly small diameter. In this way it becomes possible to add considerable weight to an actuator of an existing type and, by using a recoil spring of small diameter which will fit in the relatively small bore in the actuator, to provide an actuator which may be used in existing guns without other structural modification than that of substituting this improved actuator for the old one and inserting a recoil spring, such as the spring 19, and a buffer 21 to fit the spring.

For the purposes of illustration the actuator 16 may be regarded as an actuator of the well-known type, as shown in the aforementioned patent to Eickhoff, which has been modified to embody the features of the present invention. When so considered the actuator may be regarded as comprising a body portion 31 having a rearwardly extending tailpiece 32 to which weight has been added by welding or otherwise incorporating with the body portion 31 and tailpiece 32 an elongate block 33 joining said parts along the dotted line 34 in Fig. 3.

The amount of weight to be added to an actuator to attain these desirable results will vary under different conditions. It will be apparent that variations in weight of any part of the operating mechanism produce a certain amount of change of speed irrespective of the weight of the other parts, and that the weight of the actuator may also be increased with the size of the cartridge charge (maximum breech pressure). Ordinarily the locking angle is varied with the pressure, being made more abrupt (i. e., more nearly perpendicular to the line of breech pressure) with increase of maximum pressure, so that the residual pressure at the moment of unlocking is kept approximately the same for different guns designed to use cartridges of different sizes. Consequently, in some cases the same amount of weight may be applied to actuators of guns of different sizes and yet be effective for slowing down the rate of firing. However, if the breech pressure is to be largely increased, as for example in an army rifle, the weight of all parts including the actuator would, of course, be materially increased. It is believed that the question of the amount of weight to be added in each specific instance is largely a matter of applied mechanics and that once the principles of this invention are explained, the method of practicing the same will be understood readily by those skilled in this art. For this reason the actual weights of parts used in a specific embodiment of this invention are given below:

Name of part	Existing gun	Slowed down gun
Lock	542 grains	536 grains.
Bolt	16½ ounces	16½ ounces.
Actuator	2¾ ounces	6¾ ounces.
Force of recoil spring when breech is closed.	6 pounds	6 pounds.
Caliber of gun	.45	.45.
Maximum ballistic pressure when firing caliber .45, 230 grain bullet.	12,470 pounds	12,470 pounds.
Rate of fire	800–900	570–630.

From the above tabulation it will be apparent that in both guns the physical characteristics of the parts comprising the recoil mechanism remain substantially the same with the exception of the actuator and that by increasing the weight of this actuator by a few ounces, the rate of fire of the gun is brought within the desired limits.

A study of a gun having the same characteristics as given in the above table indicates that in order to be effective for slowing down the action, the actuator should weigh less than ten ounces and more than four ounces. If the actuator is made too heavy the gun will not operate at all and of course if it is not heavy enough the action will be too rapid. As previously explained these limits may vary with different guns as will be understood by those skilled in this art.

I claim:

1. In a firearm of the class described, the combination of a bolt and an actuator, the actuator weighing at least approximately one fourth of the total weight of the actuator and the bolt.

2. In a firearm of the class described, the combination of an actuator and a bolt, the actuator weighing more than approximately one-fourth the weight of the bolt.

3. In a firearm of the class described, the combination of a bolt member comprising a bolt proper and other parts carried thereby, a recoil spring, and an actuator which

bears approximately the same relation to the bolt member and to the recoil spring, having regard for the size of ammunition, inertia of parts and force of the recoil spring, as an actuator weighing more than five and less than ten ounces bears to a bolt member weighing approximately one pound and to a recoil spring having a force of approximately six pounds when the breech is closed in a caliber .45 firearm.

4. The combination as set forth in claim 3, wherein the second-named actuator weighs between six and seven ounces.

5. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, characterized in that the actuator carries at least substantially twice the weight required for strength and structural purposes, whereby the actuator may be effective for slowing down the action of the firing mechanism.

6. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator being adapted to slow down the action of the firing mechanism and being characterized by weighing more than five ounces.

7. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator being adapted to slow down the action of the firing mechanism and being characterized by being weighted so that it carries substantially more weight than that required for strength and for structural purposes.

8. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock, the bolt and the actuator having inclined surfaces cooperating with the lock for locking the bolt at explosion pressure and for releasing the bolt at lower pressures, characterized in that the actuator is weighted to carry a substantially greater weight than that required for strength and for structural purposes, whereby the actuator may be effective for slowing down the action of the firing mechanism.

9. In a rapid fire gun of the class described, the combination with firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, of means coacting directly with the actuator for slowing down the action of the gun substantially below the normal rate of firing.

10. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator comprising an elongate member having a centrally disposed longitudinal bore extending from the rear end thereof to receive the recoil spring, the actuator being adapted to slow down the action of the firing mechanism by the material forming the bore which serves to weigh down the actuator, whereby the latter may be effective for slowing down the action.

11. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator comprising a body having a rearwardly extending top portion characterized by means for substantially loading this rearwardly extending top portion to provide sufficient weight to be effective materially to slow down the action of the gun.

12. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator comprising an elongate body of rectangular cross section having a substantially cylindrical passage extending longitudinally therein to receive the recoil spring characterized by that the material of the body forming the cylindrical passage provides weight adapted to weigh down the actuator, whereby the latter may be effective for slowing down the action of the gun.

13. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator being movable relative to the bolt and being adapted to ride thereon, characterized by means carried by the actuator providing weight substantially greater than that required for mechanical functions and adapted to slow down the action of the gun.

14. In a rapid fire gun of the class described, firing mechanism comprising relatively movable parts including a bolt, an actuator, and a lock cooperating with the bolt and with the actuator for locking and releasing the firing mechanism, the actuator comprising a body portion having a seat for a recoil spring, the body portion of the actuator having surfaces extending rearward-

ly from the seat to enclose the recoil spring on a plurality of sides thereof, characterized by that the material forming these enclosing surfaces substantially increases the weight carried by the actuator to adapt the latter to slow down the action of the gun.

Signed by me at Worcester, Mass., this fourth day of October, 1929.

OSCAR V. PAYNE.