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AUTOMATIC HIGH-SPEED FIRE-ARM

Filed Nov. 16, 1959

4 Sheets-Sheet 1

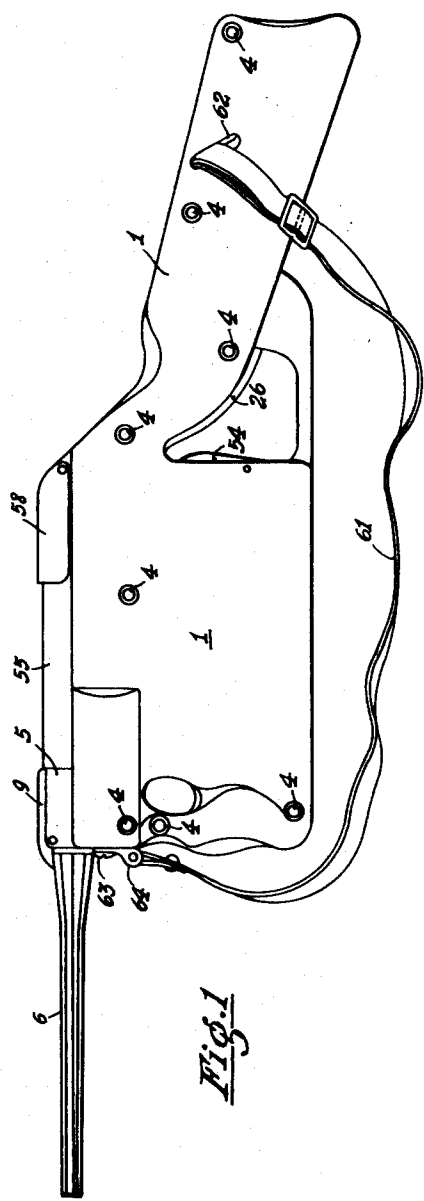


Fig. 1

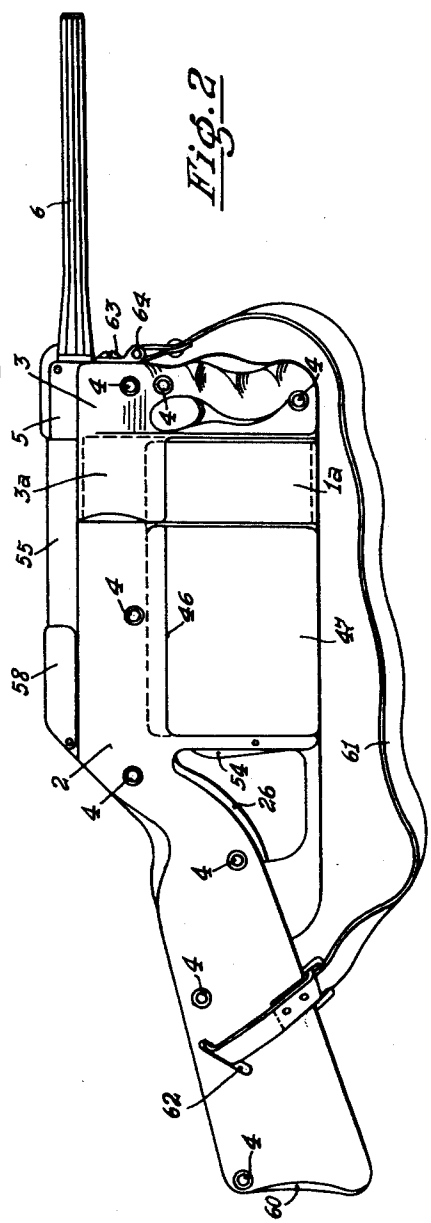


Fig. 2

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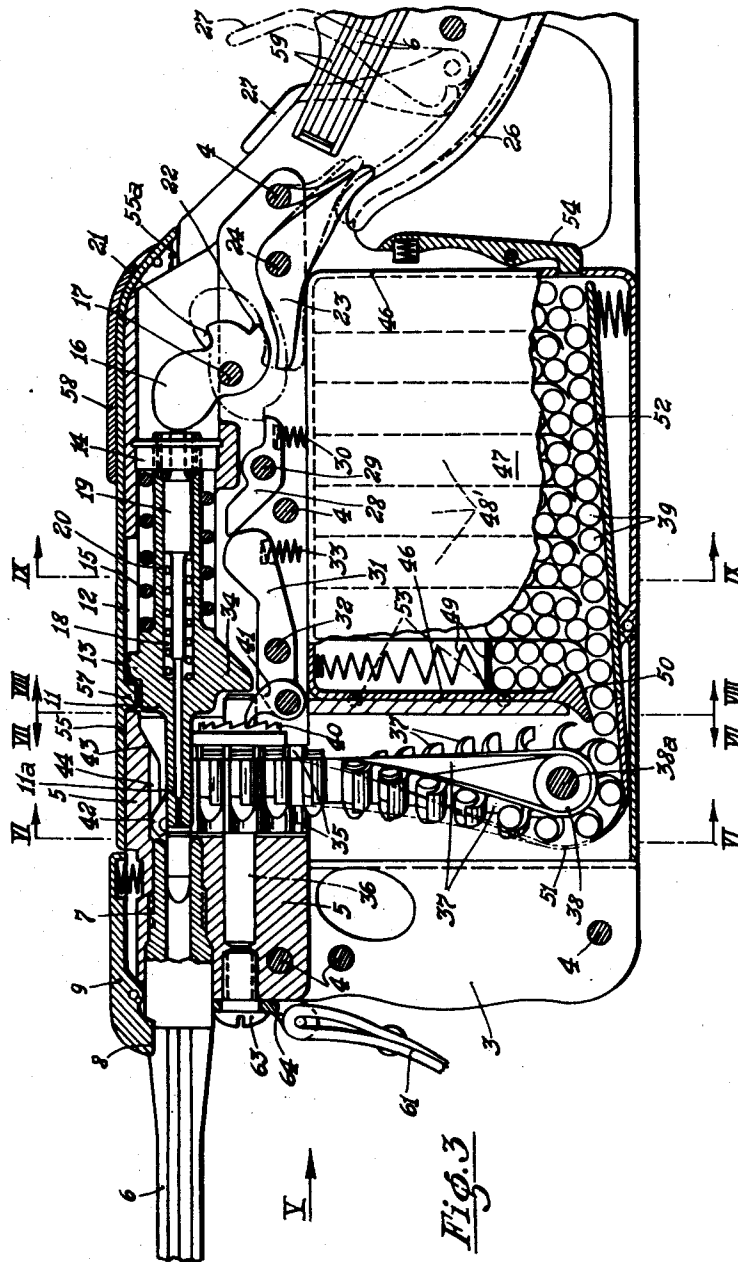
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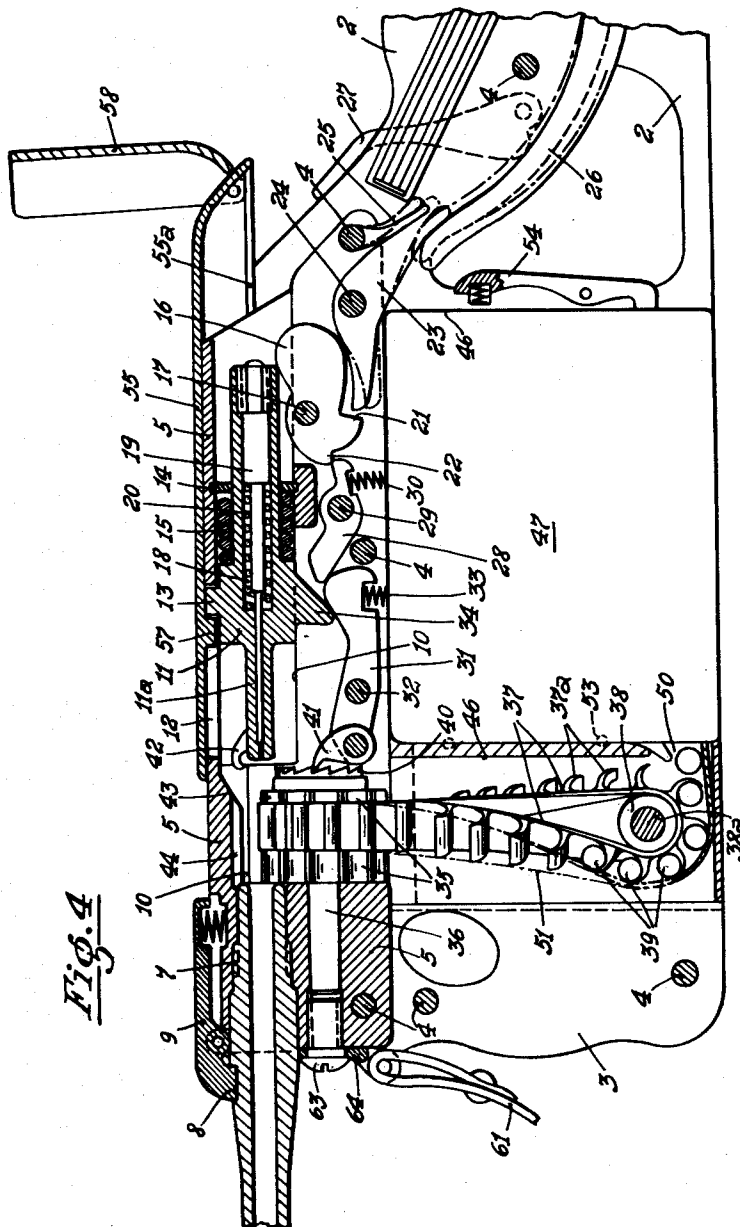
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Fig. 4



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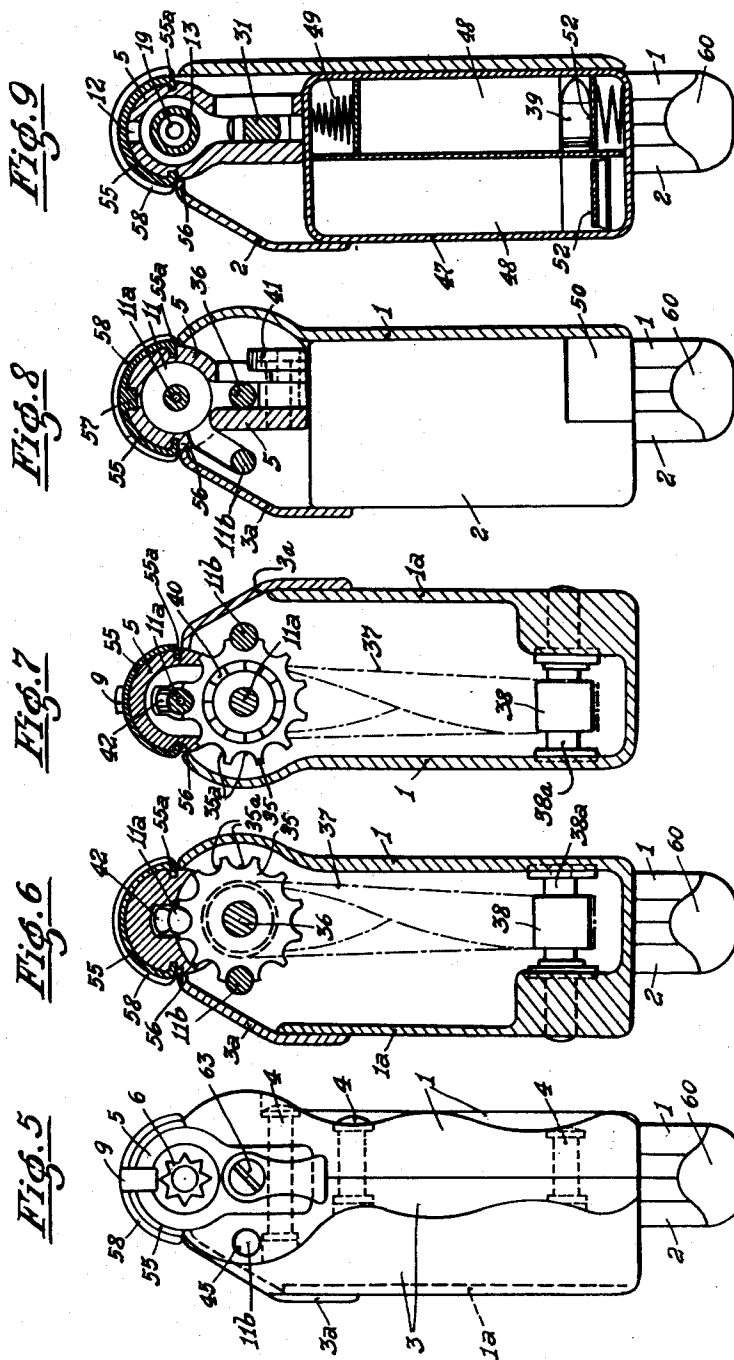
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AUTOMATIC HIGH-SPEED FIRE-ARM

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4 Claims. (Cl. 89—33)

This invention relates to an automatic fire-arm for military purposes operated by hand from the shoulder or the hip.

It is an object of the invention to provide a repeating fire-arm with a great capacity for its supply of ammunition.

Another object of the invention is to provide the fire-arm for semi-automatic firing and fully automatic firing, notably without the use of hand control for the change over from semi-automatic to automatic firing or vice-versa.

The fire-arm comprises a multipart gun stock, a magazine for the cartridges, provided in a recess of the stock, transport means for the cartridges to place the cartridges in a chamber in position registering with the barrel and a breech bolt cooperating with said transport means, to move the cartridges from said chamber into the barrel and the empty cartridges or shells to the outside, trigger means comprising a hand-trigger and a hammer cooperating with said lock means and said lock means operating said transport means, said hand-trigger operable for firing the cartridges semi-automatically or automatically, and said transport means comprising an endless cartridge transport belt, said transport belt being loaded automatically with cartridges discharged from said magazine.

By means of a retarding lever, the automatic firing is for example at a rate of 150 shots per minute.

An embodiment illustrating the invention is shown in the accompanying drawings:

FIGS. 1 and 2 each show a side elevational view of the right and left hand side of the gun.

FIG. 3 is a longitudinal section through the essential parts of the gun.

FIG. 4 is a longitudinal section through the essential parts of the gun in condition to operate the ammunition belt to load the gun.

FIG. 5 is a front view of the gun in direction of the arrow V in FIG. 3.

FIG. 6 is a cross-section according to VI—VI of FIG. 3.

FIG. 7 is a cross-section according to VII—VII of FIG. 3.

FIG. 8 is a cross-section according to VIII—VIII of FIG. 3.

FIG. 9 is a cross-section according to IX—IX of FIG. 3.

The automatic gun has a gun stock made up of three parts 1, 2, 3 consisting preferably of pressed synthetic resin reinforced with fabric for high mechanical strength. These parts are assembled by means of bolts 4. The part 3 is formed as hand-piece with a thumb-hole. The bolts 4 provide also for fastening of the lock mounting 5 to the parts 1 to 3. In the front part of the mounting 5, a barrel 6 is removably mounted by means of bayonet-joint 7 and additionally secured by means of a catch and notch-joint 8 of the lever 9 as shown in FIGURES 3 and 4. The barrel may be removed by loosening both the catch-joint 8 and the bayonet-joint 7. The barrel has cooling ribs. Its rifling groove may be uniform or progressively greater. In a guide 10 of the lock mounting 5 coaxial with the barrel a breech bolt 11 is movably disposed axially, its movement is limited by a slit 12 in the mounting 5 and the therein moving cam 13. A spring 15 tends to maintain the breech bolt 11 in its working position; the spring 15 is positioned between the abutment

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14 and an annular shoulder of the breech bolt 11, as shown in FIG. 3. The rear end of smaller diameter of the breech bolt 11 is guided in the abutment 14 and serves to tension the hammer 16 fulcrumed on the pin 17. A spring of conventional design (not shown) urges the hammer 16 to the firing position shown in solid lines in FIG. 3. In the bore 18 of the breech bolt 11 coaxial with the barrel is disposed the firing pin 19. The firing pin 19 is axially movable and by means of the pressure spring 20 biased towards the rear of the breech bolt 11. The hammer 16 has two retarding cams 21 and 22. A sear 23 cooperates with the cam 21. The sear 23 is fulcrumed on a pin 24 and biased by a spring 25 to abut the cam 21. By means of hand-trigger 26 the sear 23 is rotated to disengage the cam 21. An inadvertent operation of the trigger 26 is prevented by a safety lever 27. The hand-trigger 26 is free to function when the safety lever 27 is rotated behind the thumb of the right hand and the right hand is grasping the part 2, as shown in FIG. 4. 28 is a two armed retarding lever which serves to increase the time period between shots. The two armed lever 28 is pivotally mounted on the pin 29 and engages with one arm the cam 22 of the hammer 16; a spring 30 biases the other arm of the lever 28 against a cartridge transporting two-armed lever 31. The lever 31 is pivotally mounted on pin 32 and by a spring 33 urged into the firing position of FIG. 3. The lever 31 cooperates with the nose 34 of the breech bolt 11. 35 is a drum for ammunition transport and is mounted on the axle 36 extending parallel to the barrel. An endless ammunition belt 37 is located for transportation in a recessed middle portion of the drum 35. Below the drum 35 is located a roll 38 related to the drum at an angle of 90° for guidance of the ammunition belt 37, and the latter is provided on the outside with shovels or buckets 37a for the transport of cartridges 39. The shovels or buckets 37a are spaced from each other so as to correspond with the spacings of ammunition supports 35a (FIG. 6) on the drum 35 which takes over the cartridges from the buckets of the belt 37. 40 is a toothed ring attached to the drum, facing the lever 31 and cooperating with a pawl 41 pivotally attached on the lever 31, and this arrangement provides for the transport of the cartridges in the manner of a ratchet wheel and pawl. Insertion of the cartridges into the barrel is accomplished by the tapered end 11a of the breech bolt 11. 42 is a claw resiliently attached to the tapered end 11a, 43 is a curvature and 44 is a guide slit which corresponds with the curve 43. When the breech bolt 11 is pushed forward the claw 42 is biased so that it will engage the cartridge placed in the barrel as shown in FIG. 3. While a cartridge is pushed into the barrel the claw 42 engages it due to the curvature 43 and the slit 44, and remains engaged with the shell of the cartridge after the firing. At repulsion of the breech bolt 11 by the exhaust gas the shell of the cartridge is drawn back and placed into a support 35a of the drum 35. The claw out of contact with the curvature 43, releases its hold on the shell, and the latter is brought to the discharge opening or passage 45. On the level with the drum axle 36 the breech bolt 11 is provided with a discharge piston 11b which in firing position of the lock is inserted in the discharge opening 45. The opening 45 is on the line of the cartridge supports 35a of the drum 35. At the instant of firing a support 35a with a shell ready to be expelled registers with the discharge opening 45. The tapered part 11a registering with the barrel pushes a cartridge in the chamber 10 into the barrel and simultaneously a cartridge shell before the discharge opening 45 is expelled by the piston 11b.

The belt mechanism is enclosed by the parts 1, 1a the end of the part 1a overlaps the part 3a, extending backwards. In the part 1a the axle 38a of the belt pulley 38

is supported. In a recess 46 of the part 2 the magazine 47 for the ammunition is disposed. The magazine 47 is subdivided in two chambers 48 (FIG. 9) for 150 cartridges. In each chamber there are partitions for two rows of cartridges, the cartridges in a partition are loaded by a spring 49 by which they are forced towards the discharge opening or mouth 50 of the magazine; from there on they are transported to the revolving cartridge drum 35 by means of the ammunition belt 37. To prevent the cartridges from falling out of the buckets 35a a band 51 is provided, extending up to the revolving drum 35. 52 is a resiliently mounted rail plate, preventing stoppage at the mouth 50 of the moving cartridges 39. By changing the position of one magazine 48 for the other all cartridges in both magazines are subjected to be conveyed into firing position in the barrel. The magazines are firmly held in the recess 46 by means of a resiliently mounted latch 54. By pressure upon the latch 54, the magazine can be removed.

55 is a slide cooperating with the breech bolt 11 and is slidingly and resiliently connected to the lock mounting 5 and surrounds the latter. 56 is a guide slot for the resilient edges 55a of the slide 55. 57 is a projection on the inner side of the slide and occupies the slot 12 in the mounting 5. The projection 57 abuts the front side of the shoulder 13 of the breech bolt 11. 58 is a handle pivotally mounted on the rear end of the slide 55. The handle 58 when not needed is flapped forward down upon the slide. In the use of the handle 58 the slide 55 can be pulled backward or forward. The described mechanism can be used as a means to fill up the ammunition belt 37 with cartridges, for instance in case the flow of cartridges should become jammed at the mouth 50 or one magazine must be exchanged for the other. By pulling the slide backwards on the handle 58, the lock is actuated as by means of the exhaust gas at firing a shot, whereby the transport lever 31 with its pawl 41 is operated by the nose 34, hence the transport drum 35 is rotated until the ammunition belt 37 is fully loaded with cartridges. This is accomplished when a cartridge is expelled from the discharge opening or the first shot is fired, in case at actuation of the slide the trigger 26 is also actuated.

If all cartridges in a magazine are actually fired, the ammunition belt 37 is empty, and in order to prevent that the exchange of the empty magazine causes an operating lapse by refilling of the empty ammunition belt 37 a stop device is provided to prevent operation of the cartridge drum when the last cartridge from the magazine passes the mouth 50. Such device has a feeler extending to the mouth 50 causing to interrupt rotation of the drum 35 by suitable action on the transport pawl ratchet mechanism.

If however the weapon is to be used to the last cartridge a button control is provided to make the stop device inoperative, permitting thereby to fire the entire supply of cartridges in the magazine.

In the butt of the gun stock 1, 2 there is made provision for a spare barrel 6. The barrel can be withdrawn from its housing 59 by a hinged cover 60. 61 is the belt to carry the gun on the shoulder. The belt is fastened to the gun by means of a lug fastened by a screw-bolt 63 on the thumb-piece 3 of the shaft and a belt lug 62 on the gun stock 1, 2.

The described gun is usable without change-over means for single or continuous fire. By instantaneous actuation of the hand-trigger 26, firing of single cartridges is accomplished during a desired period of time and of number of cartridges. By continuously pressing the hand-trigger 26 continuous firing of succeeding cartridges is automatically accomplished; in this case the shots follow each other automatically in the sequence of $\frac{2}{5}$ seconds, while the hand-trigger is pressed, so that 150 shots leave the barrel in 1 minute. By this automatic firing there is co-action of the retarding lever 28 with the cam 22 of the hammer 16. The hammer 16 is tensioned by the impulse of the breech bolt 11, when the breech bolt 11 is thrown

back by the exhaust gas of the cartridge. At tensioning of the hammer 16 the transport lever 31 is moved by the slide-nose 34 from the firing position of FIG. 3 to the tilted position of FIG. 4, whereby the transport belt 37 and the revolving drum 35 is moved for one pitch of the support teeth 40. The retarding lever 28 at the end of the tensioning movement of the hammer 16 is tilted by its spring 30 into its hammer engaging position, as the transport lever 31 in the tilted position shown in FIG. 4 releases the lever 28 for such hammer engagement. In that position (FIG. 4), the lever 28 engages the cam 22 of the hammer 16.

In a fraction of one second after firing the cartridge in the barrel, the breech bolt 11 is moved towards the barrel pushing another cartridge into the barrel and both the transport lever 31 and the retarding lever 28 under the influence of the springs 30, 33 return to their firing position shown in FIG. 3 and the hammer is instantaneously released to fire the cartridge. FIG. 3 shows the described mechanism at instantaneous actuation of the hand-trigger 26. When the breech bolt 11 is moved forwardly by the spring 15, however, the lever 28 still engages the cam 22 of the hammer 16 and will release the hammer for its return swing only after having been tilted about the pin 29 against the power of the weak spring 30; this tilting of the lever 28 is carried out by the tension of the hammer 16 and the force of the spring 33 applied to the lever 31 returning the lever 31 to the firing position (FIG. 3). The inertia momenta of the levers 28 and 31 and the force of the spring 30 cause the retardation of the hammer return swing and thereby of the firing rate during automatic firing.

I claim:

1. In a repeating firearm, for semi-automatic and respectively automatic firing, a gun stock, a barrel mounted on said gun stock and having a rifled bore, said stock defining a shell discharge passage parallel to said bore, a cartridge magazine releasably disposed entirely within said gun stock and containing a series of cartridges having their longitudinal axes in the magazine disposed at an angle to said bore, said magazine having a discharge opening for the discharge of single cartridges, transport means operable to be driven for the feeding of cartridges from said opening to a point in axial registry with said barrel and for conveying empty cartridge shells from said point to said passage, a breech bolt reciprocably movable to and from a forward position adjacent said bore and operable to push during forward movement a cartridge at said point from said transport means into said bore, a firing pin slidable in said breech bolt for detonating a cartridge disposed in said bore, resilient means urging said breech bolt into the forward position, actuating means for said transport means including a tiltable transport lever in driving connection with said transport means, a hammer movable between a firing position, wherein it actuates said firing pin for cartridge detonation, and a tensioned position spaced from said firing position, said breech bolt being retracted by the detonating gasses of the cartridge and during retraction moving said hammer from the firing to the tensioned position and releasing said hammer subsequently when urged by said resilient means to the forward position, a tiltable retarding lever engaging an arm of said transport lever and biased towards being tilted to a position of engaging releasably said hammer in the tensioned position thereof after each shot for retarding the return swing of the hammer and thereby decreasing the firing rate during automatic firing.

2. In a repeating firearm, as claimed in claim 1, said breech bolt being operable to engage near its rearwardmost position said arm of said transport lever, thereby aiding in controlling the tilting position of said retarding lever.

3. In a repeating firearm, as claimed in claim 1, said transport means including a rotatable drum and a conveyor belt driven by said drum, said actuating means

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comprising a toothed ring mounted on said drum, a pawl connected to said transport lever and operable to engage said toothed ring for rotating the drum for a fraction of a full turn upon each tilting in one direction of said transport lever, said fraction corresponding to the peripheral distance between the axes of two cartridges transported by said drum.

4. In a repeating firearm, as claimed in claim 1, said hammer having two surfaces, said retarding lever releasably engaging one of said surfaces in the tensioned position of said hammer after each shot during automatic

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firing, a sear, a trigger operable to trip said sear, said sear positively engaging the other of said surfaces in the tensioned position of said hammer after each shot during semi-automatic firing.

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