FIRE CONTROL MECHANISM FOR FIREARMS

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1 Claim. (Cl. 42—69)

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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 a caliber .30 rifle designed for semi-automatic fire and embodying certain novel features constituting marked improvements over the corresponding parts of the standard rifle now used. The particularly valuable novel features of the improved rifle are an operating rod catch for automatically holding the action open after the firing of the last one of the rounds which have been loaded in the magazine, a novel rocker between the rear and hammer of the firing action, the co-acting hammer and firing pin, a magazine and its associated mechanism for mounting and loading, means for assembling the stock to the action, and a safety slide for the action.

While one specific embodiment of the invention is illustrated in the drawings and is hereinafter described, it is to be distinctly understood that the invention is not considered to be limited to said specific embodiment, and that its scope is defined by the claim appended hereto.

In the drawings:

Figure 1 is a longitudinal vertical section of the rifle, stock and barrel being broken away, a partially loaded magazine being in the rifle, a round chambered and the hammer cocked with the safety slide in “on” position.

Figure 2 is a longitudinal vertical section of the rifle action, the trigger being squeezed and the hammer striking the firing pin which is projected to fire the chambered round.

Figure 3 is a view similar to Figure 2, the bolt being retracted, and rounds being fed from a clip into the magazine.

Figure 4 is a transverse vertical section, on the line 4—4 of Figure 3 in the direction of the arrows.

Figure 5 is a fragmentary top plan, parts being broken out of the stock, the receiver and the magazine.

Figure 6 is an enlarged side elevation, parts being broken away, of the operating rod and the catch therefor, the rod being retracted and the catch disengaged.

Figure 7 is a transverse, vertical section, on the line 7—7 of Figure 6, in the direction of the arrows.

Figure 8 is a view similar to Figure 6, the catch engaged.

Figure 9 is a transverse vertical section on the line 9—9 of Figure 8, in the direction of the arrows.

Figure 10 is a perspective view of the catch for the operating rod.

Figure 11 is a fragmentary bottom plan of the stock, the trigger housing and the magazine.

Figure 12 is a rear elevation of the bolt disposed as shown in Figures 1 and 2.

Figure 13 is a view similar to Figure 12, the bolt being disposed as shown in Figure 3.

Figure 14 is an enlarged, fragmentary, perspective view of the upper end of the hammer.

Figure 15 is a fragmentary side elevation of the hammer and the bolt related as shown in Figure 2.

Figure 16 is a view similar to Figure 15, the bolt being disposed as shown in Figure 13 and the hammer cammed rearwardly by rotation of the bolt.

As illustrated in the drawings, the rifle has a stock 1, a receiver 2, a barrel 3 threaded into the forward end of the receiver 2 and a trigger housing 4 depending from the receiver 2. The stock 1 has a suitable slot 5 in which the housing 4 is received and a magazine well 6 forward of the slot 5 (Fig. 11). The receiver 2 has an opening 7 in its top at the forward end co-axial with the well 6, and a transverse tie bar 8 immediately rearwardly of the opening 7. A cylindrical bolt 9 slidable axially of the receiver 2 has its forward end 10 seated in socket 11 on the rear face 12 of the barrel 3, and its rear end 13 seated in a concave upper face 14 of the tie bar 8 when the bolt 9 is in battery (Fig. 1). The bolt 9 is reciprocated and rocked by means of an operating rod 15 (Fig. 6) slidable axially of receiver 2 and provided on its rear end 16 with a depending lug 17 sliding in a groove 18 between wall 19 and rail 20 of the receiver 2. The rod 15 has an enlargement 21 adjacent its rear end 16 provided with a suitably configured cam slot 22 in which is disposed a radial lug 23 on the forward end 18 of the bolt 9 (Fig. 4). The lugs 23 and 24 co-act with lugs (not shown) on the inner surface of the receiver 2 to lock the bolt 9 in battery, in the well known manner. The rod 15 is provided at its forward end with suitable means (not shown) for retracting rod 15 on recoil by the force of the expanding gas of the propellant charge of the round.

The rod 15 has a housing 25 for the forward end of an operating spring 26 with its rear end seated in socket 27 in the forward end of receiver 2 and received about a guide rod 28 mounted in a socket 29 in receiver 2. The spring 26, compressed on recoil, expands to cause counter-recoil. The rod 15 is provided on its rear end 16 with a radial finger 30 for manual retraction of rod 15.

The receiver 2 has a rear wall 31 provided at its lower edge with a shoulder 32 seated on the top 33 of the stock 4 immediately rearwardly of its slot 5, and a central depending lug 34 received in a slot 35 in the upper edge of a transverse rear wall 36 of the trigger housing 4 which is
disposed against the face 31 of stock 1 at the rear end of slot 5. A pin 38 fixes lug 34 in slot 35.

The housing 4 has lateral walls 39 extending forwardly from its rear wall 36 to its transverse wall 40 which is substantially the height of wall 40. A wall 41 projects upwardly forward from wall 40 and is of lesser width than wall 40. The wall 41 has on its edges lugs 42 seated in slots 43 in flanges 44 extending inwardly from depending lateral walls 45 of the receiver 2 disposed in the magazine well 6 of the stock 1 (Fig. 4). The housing 4 has lateral walls 46 projecting forwardly from wall 40 in well 6 and connected by a transverse forward wall 47 having its upper edge 48 seated against the lower edge 49 of the forward end 50 of the receiver 2 (Fig. 1). The housing 4 has a bottom wall 51 extending between its rear wall 36 and its forward wall 40, in slot 5, and having a head portion 52 of greater width than wall 40 received in the rear end of the magazine well 6 (Fig. 11). Pivotedally mounted on the bottom of portion 52 there is a latch 53 having lever wings 54 to engage surface 55 of the stock 1 on either side of the slot 5. A bolt 56 is passed through latch 53 and threaded into wall 51, to draw latch 53 against stock 1 which is thereby confined between wings 54 on latch 53 and lateral lugs 57 on receiver 2 bearing on upper surface 58 of stock 1 on either side of well 6 (Fig. 4).

The bottom wall 51 of the trigger housing 4 is provided at its rear end with a slot 59 in which is disposed a trigger 60 pivoted on a pin 61 mounted in the lateral walls 39 of the housing 4. The trigger 60 is provided at its forward end with a slotted portion 62 having a bridge 63 at its forward bottom end. At its rear end, the trigger 60 has an upstanding lug 64. A sear 65 is pivoted on pin 61 passed through an ovate surface 66 in sear 65. The portion of the sear 65 forward of the pin 61 passes through the slotted portion 62 of trigger 60 and has a depending head 67 bearing on the bridge 63. The rear portion 69 of the sear 65 extends toward lug 64 on trigger 60. The sear 65 has a depending lug 69 against which bears a coil spring 70 seated in a socket 71 in the trigger 60 and tending to bias sear 65 forwardly, and its forward end 72 upwardly.

A rocker 73 is pivoted on a pin 74 mounted in wall of housing 4 and has the form of a bolt crank having arms 75 and 76. The arm 75 is provided on its outer end with a convex edge 77 concentric with pin 74 and a second convex edge 78 concentric with pin 74. The edges 77 and 78 are on different radii to provide a shoulder 79 therebetween, edge 77 on the superior radius being forward of edge 78. The arm 76 is provided on its outer end with a concave edge 80. The arm 75 has on its rear face a socket 81 in which is disposed a ball head 82 on a guide rod 83 slidable in a sleeve 84 projecting upwardly from the trigger 60. A coil spring 85 is confined between head 82 and sleeve 84 to bias the rocker 73 forwardly and the trigger 60 downwardly (Fig. 2).

A hammer 86 is pivoted on a pin 87 mounted in walls 39 of housing 4 and has the form of a bolt having arms 88 and a rectilinear edge 81 disposed nearer to pin 87 to form an oblique rectilinear shoulder 82. Arm 89, forming the head of the hammer 86, has in its rear face a concave socket 92 in which is disposed a cylindrical head 94 on a rod 95 slid-able in a sleeve 96 on wall 36 of housing 4. A hammer spring 97 about rod 95 is confined between a flange 98 on rod 95 and sleeve 96 to bias the hammer head 86 forwardly. A peripheral groove 99 is provided in socket 93 in which is slidably a lug 94a forwardly along lateral movement thereof in socket 93 and thereby maintain the relative coaxial positions of rod 95 and hammer 86 (Fig. 2).

The trigger housing 4 has the usual trigger guard bow 88 extending downwardly from its bottom wall 51 below the slot 50 and the trigger guard 60 therein. A "safety" slide 99 is disposed in a slot 98 in the forward end of the bow 88. The slide 99 has a tongue 100 disposed in a groove 101 in the lower face of bottom wall 51 with lateral ribs (not shown) in cooperating grooves in wall 51. The slide 99 has a head 102, received in a slot 103 in the wall 51, and an abutment 104 on head 102 projects into an opening 105 through the wall 51, to co-act with the bridge 63 of the trigger 60 to prevent squeezing of the trigger 60 when the slide 99 is moved forwardly to the "off" position (Fig. 2). The tongue 100 has two center depressed dent 105 slidable in wall 51 to retain the slide 99 in its adjusted positions, respectively.

A magazine 108, disposed in the well 6, comprises side walls 110 received against the walls 45 of the receiver 2 and the walls 46 of the trigger housing 4, a front wall 111 received against the forward wall 47 of the housing 4 and the end 50 of the receiver 2, and a rear wall 112 received against the wall 40 and the wall 41 of the housing 4.

It will be noted (Fig. 5) that the above-described parts of the magazine 108 are fabricated from a single piece of suitable material such as sheet metal. The rear wall 112 is formed by closely folding, in an interlocking engagement, the ends 113 and 114 of the single piece of material, forming an enlargement 115 projecting rearwardly from the magazine 108. The rear wall 112 is formed with a longitudinal enlargement 116 to provide a groove 117 in the inner face of the rear wall 112. This enlargement 116 has its upper portion faced below the groove 117 where it is planed to provide an opening in the rear wall 112. The wall 112 is provided with a suitable transverse slot 118 (Fig. 1) in which is engaged a bolt 119 slidable transversely in the wall 40 of the housing 4. The bolt 119 has a transverse slot 120 therein to admit the enlargements 115 and 116 of wall 112 therethrough (Fig. 4). The parts are so dimensioned and related that when the bolt 119 is positioned to register slot 120 with enlargements 115 and 116, the magazine 108 can be mounted and dismounted, and that when the bolt 119 is positioned to move slot 120 out of register with enlargements 115 and 116, the magazine 108 is bolted in operative position. When the magazine 108 is so disposed the aforesaid opening in its rear wall 112 registers with the space between the tie bar 8 of the receiver 2 and the top of the wall 41 of the housing 4. Arm 89 forming the foot of the hammer 86, has in its rear face a concave socket 92 in which is disposed a cylindrical head 94 on a rod 95 slid-
lower plate 125 pressed upwardly by a suitable spring 126 confined between the slide 123 and the plate 125. The plate 125 has on its rear end a finger 127 received in the groove 117. The plate 125 has a struck-up portion 128 serving to position the rounds 129 in the proper staggered relation in the magazine 130. The side walls 110 are provided on their upper edges with the usual ears (not shown) to properly position each round 129 relative to the bolt 9 as the round 129 is fed upwardly from the magazine 109.

A catch 130 (Figs. 5–10) for the operating rod 15 is actuated by the finger 127 on the plate 125. The catch 130 consists of a lever arm 131 having at its rear end an integral pivot pin 132 disposed in a socket 133 in the side wall 110 of the receiver 2, and at its forward end a depending arm 134 provided at its lower end with a trip lug 159 normal to arm 131 and projecting into the above mentioned space between the tie bar 8 of the receiver 2 and the upper end of the wall 41 of the housing 4, and into the path of travel of the finger 127 when it is raised into the opening in the rear wall 112 of the magazine 109.

It will be noted (Fig. 5) that the lever arm 131 is disposed adjacent that portion of the wall 19 of the receiver 2 in which is located the groove 18 for the lug 17 of the operating rod 15. Suitably disposed at the middle of the lever arm 131 there is an off-set portion 136 passing through an opening 137 in the wall 19 and rail 21 of the receiver 2. The portion 136 has a step 138 corresponding in width to the groove 18 and an upstanding lug 139 which is intruded into the cam slot 22 of the operating rod 15 when the rod 15 is retracted to register slot 22 with lug 139 and the lever arm 131 is raised by the finger 127 (Figs. 8 and 9). The portion 136 has an operating lug 140 projecting outwardly thereof for manual depression of lug 139 to disengage it from slot 22. The trip lug 135 has a return spring 141 attached to wall 19 to bias lug 135 and consequently arm 131 and the off-set portion 136 downwardly into inoperative position.

The receiver 2 is provided on its top immediately rearwardly of its opening 7 with a socket 142 to receive a suitable charger clip 143 (Fig. 3). The socket 142 has grooves 144 to receive therein the lugs 145 on the sides of clip 143. The parts are so designed that when a clip 143 loaded with rounds 129 is positioned in the socket 142, the lugs 145 being seated at the bottom of grooves 144, the lower end of the clip 143 rests on the upper face 14 of the tie bar 8 of receiver 2, and the rounds 129 are passed through the opening 7 of the receiver 2, their bases 129a being aligned vertically with the inner face of the rear wall 112 of the magazine 109. The clip 143 may be designed to eliminate therefrom the spring clamp of the standard charger clip, so that the rounds 129 may readily be fed downwardly from the clip 143 into the magazine 109, and the empty clip 145 removed from socket 142.

145. The forward end of the firing pin 145 is formed as a reduced portion 153 which is intruded through a bore 154 in the forward end 10 of the bolt 9 and into the socket 145 to impact the primer in the base 129a of the round 129 on firing. The bolt 9 has the usual extractor (not shown) and an ejector 155. The bolt 9 is provided on its rear face 151 with a lug 156 extending rearwardly from the forward edge of the bolt 9 equipped with a tapered, inclined cam surface 157 (Figs. 12 and 16). The head 89 of the hammer 86 is provided on its upper forward end with an inclined cam surface 158 co-acting with surface 157, and a detent cam surface 159 having a curvature corresponding with the cam surface with the cam surface of bolt 9, inclined rearwardly from the front face 160 of head 89.

The rifle is assembled as follows. The bolt 9, operating rod 15, catch 130 and barrel 3 are mounted in the receiver 2. The trigger 66, sear 65, rocker 73 and hammer 86 are mounted in the trigger housing 4. The receiver 2 and the trigger housing 4 are connected by sliding the housing 4 forwardly relative to the receiver 2 to seat lugs 42 on wall 41 in slots 43 on flanges 44, and dispose lug 34 of the receiver 2 in the slot 35 of the housing 4 and dispose the forward wall 41 of the housing 4 against the bottom of the forward end 50 of the receiver 2. The parts are then fastened in this relation by inserting the pin 38 through the position of rear wall 36 defining slot 35, and lug 34 in slot 35. The connected receiver 2 and trigger housing 4 are mounted in stock 1 by lowering them through slot 5 and well 6. To do this, latch 53 is swung downwardly so that its wings 55 lie below the head portion 52 of bottom wall 51 of the housing 4 in order for them to pass through the rear end of well 6. When shoulder 32 of receiver 2 is seated on top 33 of stock 1, the latch 53 is swung rearwardly and upwardly, and secured, to clamp the receiver 2 and housing 4 in the stock 1 as above described.

The magazine 109 can be loaded, before being mounted, or it can be loaded by using the loading clip 143 as above described after it is mounted by insertion upwardly in well 6.

If the latter method is followed, when the bolt 9 is retracted by manually retracting the operating rod 15, the follower 126 is forced upwardly by the spring 125 sufficiently to cause its finger 127 to engage the lug 139 of the latch 130, rocking lever 131 upwardly, and engage lug 139 in slot 22 to latch the operating rod 15 in retracted position. It will be noted (Figs. 5 and 8) that since the socket 133, in which is seated pivot pin 132, is of slightly greater diameter than the pin 132 of the catch 130 it is permitted slight forward movement, under impulse of spring 26, so that the forward edge of portion 136 bears against the wall 19 and rail 20 at the forward side of opening 137 thus relieving the lever 131 and its pin 132 from impact stresses.

After the magazine 109 has been loaded, the catch 130 can be released by manually depressing the lug 140 or by slightly retracting rod 15 to relieve the pressure on catch 130 which is then depressed by its spring 141. The rod 15 being moved forward by spring 26 drives the bolt 9 forward chambering the top round 129 (Fig. 1).

If a loaded magazine 109 is mounted, it is obvious that manual retraction of rod 15 and its permitted forward movement by spring 26 will chamber the first round 129.

When the bolt 9 is retracted (Fig. 3), it rocks the hammer 86 in a counterclockwise direction, its lower edge sliding on cam surface 159 of hammer 86. This causes arm 88 to move forward sufficiently for edge 80 of the rocker 73 to bear on edge 91. The spring 85 presses arm 75 forward and trigger 66 downward when trigger 66 is
The sear 66 is pressed forward by spring 70, so that its end 72 bears on edge 78.

When the bolt 9 is returned to battery, it passes off of the hammer 85 which is rocked by its spring 97 to cocked position (Fig. 1). This causes arm 70 to move rearwardly until shoulder 72 contacts the extreme forward end of rocker arm 78. Rearward movement of arm 70 rocks the rocker 73 so that shoulder 79 engages 79 with end 72 of sear 65 which is thereby retracted sufficiently for its port to close 68 to be disposed over lug 64 on trigger 66.

The "safety" slide 99 being in "off" position (Fig. 2), the trigger 66 can be squeezed to fire the chambered round 123. This causes lug 64 to raise the rear portion 68 of sear 65 and depress its end 72 which moves downwardly off of shoulder 73 releasing the rocker 73 which being rocked by pressure of arm 70 releases the hammer 86, the edge 60 moving along the edge 80 which, when the rocker 73 is so positioned, is concentric with edge 80.

When the hammer 86 is released, it is rocked by its spring 70 to strike the firing pin 148 which impacts the primer to fire the round.

It will be noted (Fig. 15) that the cam surfaces 157 and 158 on the bolt 9 and the hammer 86 are so related that the face 156 of the hammer 86 can strike the firing pin 148. This precise relation is effected by rocking of bolt 5 to lock it in battery. It is obvious, therefore, that should the hammer 86 be rocked when the bolt 9 is properly locked, the lug 159 will prevent the hammer 86 from striking the firing pin 148, thereby preventing firing.

When the bolt 9 is rocked on recoil of rod 14, the cams 157 and 158 cause the hammer 86 to move rearwardly (Fig. 16) to allow retraction of the firing pin 148 by its spring 152 to withdraw its portion 153 from the base 125a of the round 129, before the bolt 9 is retracted.

It will be noted (Fig. 1) that, when the hammer 85 is cocked, the end of arm 76 of the rocker 73 bears against the oblique edge 92 of the foot 80 of the hammer 86, tending to force arm 75 downwardly to rock the rocker 73. Consequently the force exerted by the arm 75 of the rocker 73 on the end 72 of the sear 65 is determined by the angle of edge 92. By varying this angle the amount of pressure on the sear 65 can be varied and consequently the weight of trigger pull to release sear 65.

From the foregoing description of the construction and operation of the rifle, it will be understood that, when the magazine 169 is loaded and the first round 129 has been fired, the bolt 5 recoils, thereby extracting and ejecting the case of the fired round 129 and recocking the hammer 86. The bolt 9 is then projected by rod 16 and under impulse of its spring 26, in counter-recoil, thereby chambering the next round 129 fed from the magazine 169, and the hammer 86 is cocked. The rifle is thus conditioned for firing the next round 129. This cycle is repeated, so long as there are rounds 129 in the magazine 169. It is obvious from the foregoing description of the operation of the catch 130 that when the case of the last round 129 fed from the magazine 169 has been ejected, the finger 127 on the follower 125 engages the trip lug 135 of the catch 130 to cause lug 139 of the rod 138 to enter slot 130 of rod 14, thereby locking rod 14 and bolt 9 in retracted position to permit reloading either by charging the magazine 169 in the well 7 with rounds 129 from a clip 135, or by replacing the empty magazine 169 with a loaded one.

Having described my invention, what I claim is:

In a firearm, the combination of, a trigger, a pivotal sear, a pivotal rocker shaped to form a bell crank having a first and second arm, said first arm having a vertical shoulder at the free end thereof arranged to be engaged by the front end of said sear, said second arm terminating in an arcuate concave surface and adjacent angular surface, a pivotal hammer disposed forward of said rocker, said hammer shaped to form a bell crank having a head portion and a foot portion, a sidely mounted firing pin arranged to be actuated by impact with said hammer head portion, said hammer foot portion terminating in a first and second convex surface, said first convex surface being disposed closer to the pivot point of said hammer than said second convex surface and rearwardly thereof, an angular cam surface connecting said convex surfaces and arranged to mate with said angular surface on said second rocker arm when said hammer is in a cocked position, means on said trigger for actuating said sear to disengage from said shoulder on said first rocker arm when said trigger is pulled whereby said rocker is free to pivot rearwardly, first spring means for biasing said hammer head portion to actuate said firing pin, said angular surfaces on said hammer and said rocker arranged to disengage during the firing movement of said hammer with respect to said convex surface slidably engages with said arcuate concave surface on said rocker, means for pivoting said hammer rearwardly against the bias of said first spring means whereby said first convex surface on said hammer foot portion engages said arcuate concave surface on said second rocker arm, said hammer angular cam surface being thereby positioned in front of said second rocker angular surface, and said second spring means disposed between said trigger and said first rocker arm for biasing said rocker forward whereby said angular surfaces engage in mating relationship, said sear arranged to engage said shoulder on said first rocker arm when said trigger is released whereby said angular surfaces maintain said hammer in a cocked position until said trigger is pulled.

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