FEEDING SYSTEM, CONTINUOUS CLIP TYPE

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

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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 multi-barrel firearms of the type generally fired from the shoulder of the user and more particularly to means for continuously feeding ammunition thereto.

In modern-day firearms the demand for firepower and accuracy are the dominating factors to be considered in the design thereof. Present automatic rifles or light machine guns fulfill the firepower requirements but fall short when it comes to accuracy. This is due to the forces encountered when firing such a gun; namely, the recoil force caused by the explosion of the cartridge in the firing chamber and the muzzle climb caused by the torque imparted to the projectile by the rifling in the firearm barrel. It is, therefore, apparent that during full automatic operation of shoulder-operated firearms only the first shot can be accurately aimed while the remaining shots will usually be high due to the existing forces mentioned above.

Accordingly, the development of a semiautomatic, multi-barrel shoulder weapon would seem to provide the required firepower and accuracy in that a plurality of projectiles may be discharged with each pull of the trigger, thereby allowing each successive shot to be aimed by the operator insuring greater accuracy while the firepower is governed only by the rapidity with which the firearm can be aimed and the trigger pulled.

However, extensive use of the shoulder type of multi-barrel firearms has heretofore been limited by the difficulties involved in continuously feeding ammunition thereto. Many systems exist for feeding these firearms but they all require special means for handling the cartridges in the gun prior to being chambered in the barrel, or special chambering is required as the cartridges are generally inclosed in clips and are chambered and fired while still retained in such clips. Also, special means must be provided for ejecting the empty clips from the gun.

It is, therefore, an object of this invention to provide a multi-barrel shoulder firearm with a simple, durable, yet inexpensive feeding system whereby the simultaneous chambering of a plurality of cartridges may be accomplished with a minimum of handling.

Another object of my invention is to provide such firearm with an integral open end magazine such that cartridges can be readily loaded therein from the bottom without requiring manual operation of the charging mechanism.

A further object of my invention is to provide suitable follower means for successively moving the cartridge-containing clips upwardly in the magazine well in synchronism with the firing operation of the firearm.

Still another object of my invention is to provide a multi-barrel shoulder firearm with a feeding system wherein the magazine followers are operated by direct contact with the bolt assembly to lift the cartridges from the magazine into the firearm.

It is a further object of my invention to utilize the recoil energy of the bolt assembly not only to extract and eject the fired cartridge cases but also, simultaneously therewith, to strip the empty cartridge clip from the top of the magazine and eject it from the firearm.

In some multi-barrel firearms of the shoulder type wherein the cartridges are retained and fired in clips or holders, these clips are usually made in two sections and, therefore, are very complicated in design. Furthermore, such two-piece clips usually require a special tool to enable disassembly thereof in order to permit removal of the fired cartridge case therefrom. Thus, these clips cannot be reused without a prior assembly operation.

It is, therefore, a further object of this invention to provide a unitary cartridge holding clip which eliminates the necessity of assembling or disassembling the clip, thus, facilitating its reuse.

It is a still further object of my invention to provide a lightweight cartridge clip for use in the multi-barrel firearm of the shoulder type, the clip being constructed to include means for connecting adjacent clips together to form a vertical stack, thus, facilitating the ease with which the magazine can be loaded.

Still another and further object of my invention is to provide an improved means for connecting successive cartridge clips into a single stack wherein the connecting structure also serves as the means by which the stack is incrementally lifted from the magazine well into the firearm receiver during firing.

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

Fig. 1 is a longitudinal elevational view of a firearm incorporating an embodiment of my invention and conveniently broken away to show the bolt assembly in the battery position immediately before firing with the bolt holding the followers in the magazine in the depressed position;

Fig. 2 is a view similar to Fig. 1 but showing the bolt assembly in the recoil position with a loaded clip or cartridges in position to be chambered by the counter-recoil of the bolt assembly while the empty clip from the previous firing cycle is shown about to be ejected from the gun;

Fig. 3 is a view similar to Figs. 1 and 2 but showing the arrangement of the elements as the cartridges are being chambered by the bolt assembly;

Fig. 4 is a cross-section taken along line 4-4 of Fig. 1 showing the clips interconnected to form the vertical stack and being retained in the magazine by the latches at the bottom thereof as they appear after the initial loading of the magazine;

Fig. 5 is a view similar to Fig. 4 but with the bolt assembly drawn to the rear to allow the stack of clips to be lifted by the ratchet members in the followers into the position wherein the cartridges will be chambered by the counter-recoil movement of the bolt assembly;

Fig. 6 is a fragmentary cross-sectional view similar to Fig. 5 but with the bolt assembly in the battery position to show the stack of clips being supported by the bolt assembly as the followers are depressed by the depressors;

Fig. 7 is a fragmentary cross-section taken along line 7-7 of Fig. 3 but with the clips removed to more clearly show the positioning stops in the receiver and the shoulders on said stops which prevent the forward movement of the clips as the cartridges are stripped therefrom by the bolt assembly;

Fig. 8 is a view taken along line 8-8 of Fig. 6 to show the arrangement of the ejection latches prior to
engagement with the clip when the bolt assembly begins its recoil stroke;

Fig. 9 is a view similar to Fig. 8 but showing the latches in the inoperative position just prior to ejecting the clip from the firearm;

Fig. 10 is a cross-section taken along line 10–10 of Fig. 7 to show the arrangement of the ratchet members in the magazine followers;

Fig. 11 is a front view of the bolt assembly to more clearly show the configuration of the depressors; and

Fig. 12 is a perspective view of one of the cartridge clips.

Referring now to the drawings and in particular to Figs. 1 and 2, there is shown a firearm having a receiver 12 in the forward end of which is securely mounted a plurality of barrels 14 having firing chambers 15. It will be noted that while three barrels are shown in the present embodiment, the number is not limited therefore to since more or less could be fed in the same manner as that described hereafter. The rear end of receiver 12 terminates, in a cylindrical stock 16.

Provided in the underside of receiver 12 and integral therewith, is a cartridge magazine 18 having its free end open, as shown at 20, for a purpose to be described later. A substantially rectangular port 22 is formed in the side of receiver 12 and is located above the upper end of magazine 18 in position to direct the fired cartridge case away from receiver 12.

Reciprocably mounted between barrels 14 for longitudinal movement in response to the discharge gases generated by the firing of cartridges 24 is a conventional operating rod 26 having a charging lever 28 for permitting manual operation thereof.

A bolt assembly 30 is slidably mounted in opposing grooves 32 in the sides of receiver 12 for reciprocation between battery and recoil positions. Bolt assembly 30 includes a carrier 34 and a plurality of cylindrical bolts 35 slidably disposed therein corresponding to the number of barrels 14 and in respective axial alignment therewith. Extending rearwardly from carrier 34 is a cylindrical guide rod 36 which supports the forward portion of a surrounding recoil spring 38 seated against the rear of carrier 34 to normally bias bolt assembly 30 to the battery position. The opposite end of recoil spring 38 extends beyond guide rod 36 into a bore 40 formed into stock 16. A longitudinal rib 42 is formed on either side of the carrier 34 for sliding engagement with grooves 32 of receiver 12. Ribs 42 project rearwardly of carrier 34 and each provided with a depressor 44 depending from the rear end thereof.

As best shown in Fig. 1, depressors 44 are of sufficient length to effect respective slidable contact of the bottom surfaces thereof with the upper surfaces of a spaced apart portion of followers 46 slidably disposed in magazine 18. The forward edges of depressors 44 are angularly formed, as at 50, for a purpose to be subsequently shown and extend upwardly and forwardly to terminate slightly forwardly of the rear end of bolt carrier 34.

Each depressor 44 is also provided with an integral, forwardly extending arm portion 54 disposed on either side of carrier 34. Arm portion 54 of each depressor 44 is spaced below the underside of rib 42 to form a longitudinal opening 56 therebetween and, consequently, depressors 44 are connected to ribs 42 only by a web portion 57.

The interior side walls of receiver 12 immediately above magazine 18 are provided with opposing inwardly directed rectangular ledges 58 provided with an angular stop surface 59 along the underside of the rear ends thereof. Ledges 58 are disposed so as to lie between the underside of carrier 34 and the top of depressor arms 54 when bolt assembly 30 is in the battery position as shown in Figs. 4 and 6. A V-slot 60 extends longitudinally along the upper surface of each of depressor arms 54 and is arranged to engage the top one of a stack of clips 62 in a manner to be described hereinafter.

Magazine 18 is rectangular in shape and the interior thereof is provided with an open central well 64 of sufficient width to slidingly receive a plurality of cartridge clips 62 either singly or in a vertical stack. Well 64 is formed by a pair of partitions 66 spaced apart from the outer longitudinal walls of magazine 18 to form rectangular compartments 70. Slidably disposed in each compartment 70 is a follower 46 which is normally biased upwardly by a rectangular spring 72. The sidewalls of magazine 18 are turned inwardly at the lower end thereof, as shown at 74, to respectively retain supports 76 similar in configuration to followers 46 which serve to seat the lower ends of springs 72 as shown in Figs. 4 and 5. A longitudinal recess 78 extends centrally and transversely into the inner side of each of followers 46 for slidingly receiving a substantially rectangular lifter member 80 which extends through an elongated slot 82 in each of partitions 66 to project slightly into magazine well 64. Located behind each lifter member 80 in recess 78 is a pair of springs 84 which serve to bias lifter member 80 into well 64 for engagement with clips 62 in a manner to be hereinafter shown.

Follower spring supports 76 are similarly provided with latches 86 which are biased into magazine well 64, immediately adjacent the open end 20, to retain the cartridge clips 62 in magazine 18 during the initial loading thereof.

Lifter members 80 are provided with forwardly and rearwardly projecting ears 83 which are arranged to bear against partitions 66 adjacent slot 82 to retain members 80 in recesses 78 as best shown in Fig. 10. A similar construction is provided on latches 86.

As best shown in Fig. 12, clips 62 include an arcurate cartridge retaining portion 90 formed by adjacent cartridge seating depressions 91 to resiliently hold a plurality of cartridges 24 corresponding to the number of barrels 14. Centrally provided on both sides of cartridge retaining portion 90 are substantially resilient rectangular leg portions 92 which extend downwardly and outwardly relative to portion 90 and terminate in upwardly curved hooks 94. Leg portions 92 are equal in length to the spring-biased ratchet members 80 of followers 46 to insure positive contact therewith. Located at the top of cartridge retaining portion 90 immediately above leg portions 92 are a pair of integral downwardly angled tabs 96 arranged to be releasably enganged by hooks 94 of the adjacent successive clip thereabove. The distance between the free ends of leg portions 92 is slightly less than the interior transverse dimension of magazine well 64 to allow hooks 94 to snap over tabs 96 as the clips are fed into magazine 18 from the bottom thereof to form a stack of clips 62. The stack of clips 62 is lifted by followers 46 into receiver 12, the tabs 96 of the uppermost clip engage the corresponding angular stop portions 59 on the underside of ledges 58. As bolt assembly 30 starts its counterrecoil stroke and depressor arms 54 pass over the top clip 62, tabs 96 slidably engage in the V-slot 60 in arms 54, thereby supporting the stack of clips 62 as followers 46 are cammed downwardly by angular surface 59 on depressors 44 as best shown in Fig. 3.

As best shown in Figs. 2, 3 and 12, the forward end of cartridge retaining portion 90 of each clip 62 is cut away as indicated at 98 to form a vertical shoulder 100. A pair of substantially S-shaped catches 102 are pivotally mounted by a pin 106 in a rectangular recess 104 extending transversely through depressor arms 54. A flat spring 108 is fixedly mounted in each arm 54 by suitable means and normally biases catch 102 into the position shown in Fig. 8 for releasable engagement with shoulder 100 of clip 62 for stripping the empty clip from the top of the stack in magazine 18 and ejecting.
It through a port 110 provided in the bottom of receiver 12 rearwardly of magazine 18. Immediately beneath receiver ledge 58 and adjacent depressor arms 54, when bolt assembly 30 is in the battery position, is a longitudinal undercut 112 in receiver 12 to allow catches 102 to be pivoted into engagement with shoulders 100 as mentioned above. The rear end of each undercut 112 forms a cam surface 114 to pivot catch 102 out of engagement with shoulder 100, as shown in Fig. 9, so that carrier 34 can continue to the rear to disengage V-slot 60 from beneath tabs 96 of the empty clip 62.

An upwardly projecting lug 116 is provided in the center of receiver 12 rearwardly of port 110, the purpose of which will be made clear in describing the operation of the gun.

During the counterrecoil movement of bolt assembly 30, bolts feed the cartridges 24 in the top clip 62 forwardly into the respective chambers 15 of barrels 14. Since the force of this stripping action has a tendency to simultaneously move top clip 62 forward, a shoulder 118 is provided on each of the ledges 58 immediately forward of angular stop portions 59 thereon to contact the front edge of tabs 96 and thereby prevent any forward movement of clip 62. The arrangement of stop portions 59 and shoulders 118 is clearly shown in Fig. 7.

Operation

In preparing the gun for the field, clips 62 loaded with cartridges 24 are inserted into the bottom of magazine well 64 one or more at a time. It will be noted that while inserting clips 62 into magazine well 64, latches 86 are cammed out of the way by clips 62. Likewise, lifter members 80 in followers 46 are also cammed out of the way by the upwardly moving clips 62, but in both instances members 86 and 80 are returned to their projecting positions shown in Figs. 4 and 5 by springs 88 and 84, respectively. When bolt assembly 30 is in the closed or battery position, depressors 44 force followers 46 downwardly. As the last clip 62 is inserted into magazine 18, the cartridges 24 in the uppermost clip will contact the underside of carrier 34. At such time, pressure applied to the bottom clip of the stack will cause the hooks 94 of leg portions 92 to snap over tabs 96 on the adjacent clips, thereby connecting all of the clips into a vertical stack. At least two of the clips 62 will lie above lifter members 80 in followers 46 although not in position to be supported thereby as shown in Fig. 4. Once the stack of clips 62 is formed, it is retained in magazine 18 by latches 86.

To charge the firearm, the bolt assembly 30 is drawn rearwardly by means of charging lever 28. As depressors 44 are withdrawn from contact with the top of followers 46, follower springs 74 urge such followers upwardly toward receiver 12. As the followers move upwardly, lifter members 80 engage leg portions 92 of the uppermost loaded clip 62 and thereby lift the entire stack into contact with the stop portions 59 on ledges 58, thus, positioning the cartridges 24 of the uppermost clip in front of the bolts 35. The charging lever 28 is then released, and bolt assembly 30 moves forwardly under the bias of recoil spring 38.

As bolt assembly 30 moves forwardly and the cartridges are stripped from the uppermost clip 62, V-slot 60 in depressor arms 54 slantly engages tabs 96 on the uppermost connecting the stack of interconnected clips as the angular surface 50 of depressors 44 cams the followers 46 downwardly against the bias of the follower springs 72. At the same time, the forward edge of tabs 96 contact shoulders 118, thereby holding the clip 62 against forward movement. When bolt assembly 30 has reached the battery position, depressors 44 have positioned followers 46 so that lifter members 80 will this time engage the leg portions 92 of the second loaded clip of cartridges in the magazine 18 as best shown in Fig. 5. The gun is now ready to fire which is accomplished by a conventional firing mechanism not a part of this invention.

As the bolt assembly 30 starts to recoil in response to the discharge of the cartridges 24 in barrel 14, springs 108 bias catches 102 on depressor arms 54 to contact shoulder 100 of the uppermost clip 62 thereby pushing the clip to the rear, whereby hooks 94 are slidably released from tabs 96 of the next clip 62 theretebeneath. During the recoil travel of clip 62, catches 102 engage cams 114 of undercut portions 112 and are forced out of contact with shoulders 100. However, clip 62 continues to recoil together with carrier 34 since tabs 96 are positioned in V-slots 60 on depressor arms 54. When bolt assembly 30 recoils to a point where the empty clip 62 is directly over port 110, and from rearward of the cartridge retaining portion 90 engages lug 116, thus, halting the rearward travel of the clip 62. Bolt assembly 30 continues its recoil movement whereby V-slot 60 of projection 54 is slidingly disengaged from beneath tab 96 of clip 62, thus, allowing the clip to drop through port 110 and out of the gun. From thereon, the end of its recoil stroke, again starts forward under the bias of recoil spring 38 and returns to battery position whereupon the firing cycle is then repeated.

As mentioned heretofore, the magazine is open at its free end thereby permitting the rapid loading of clips of cartridges into the magazine area by inserting the clips into the magazine area during the operation of the firearm without having to stop and hand operate the mechanism as is necessary with many of the firearms currently in use.

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. In a firearm having a receiver, a plurality of barrels, a carrier longitudinally reciprocating to and from the battery position, and a plurality of bolts slidably disposed in the forward end of the carrier for stripping a plurality of cartridges from a unitary clip to simultaneously chamber a cartridge in each of the barrels, means for feeding the cartridges into position to be stripped by the bolts, comprising a magazine secured to the underside of the receiver and open at the lower end thereof for receiving a plurality of the unitary clips loaded with cartridges and adapted to interconnect and form a vertical stack, a rectangular compartment within said magazine extending vertically along each side thereof, said compartment slidably disposed in the upper portion of each of said compartments for simultaneously engaging one of the unitary clips, spring means disposed in each of said compartments for normally urging said followers upwardly to lift the vertical stack for positioning the cartridges in the uppermost clip in stripping position, a latch disposed in the bottom of each of said compartments for retaining the vertical stack of clips, in said magazine prior to any depletion thereof through the firing operation of the firearm, and support means on said carrier engageable with the uppermost clip for holding the vertical stack in said magazine during the movement of said followers into lifting engagement with the next successive clip.

2. In a firearm having a receiver, a plurality of barrels, an equivalent number of bolts in respective axial alignment with the barrels, and a carrier slidably disposed in the receiver for longitudinally reciprocating the bolts to and from battery position to strip an equivalent number of cartridges from a unitary clip for simultaneous chambering thereof in each of the barrels, means for successively feeding the clips into the receiver for the stripping of cartridges therefrom, comprising a magazine secured to the underside of the receiver and open at the lower end thereof for successively receiving a plurality of the unitary clips loaded with cartridges and adapted
to interconnect and form a vertical stack, a pair of spaced-apart followers disposed in the upper portion of said magazine for simultaneously engaging beneath one of the clips therein, spring means normally urging said followers upwardly to lift the interconnected vertical stack for positioning the uppermost clip therein into stripping position, a pair of depressors depending from opposite sides of the carrier for camming said followers downwardly into engagement with the next successive clip in the vertical stack, and a pair of support arms extending forwardly from said depressors for engaging the uppermost clip during the downward camming of said followers to hold the vertical stack in said magazine until said followers engage the next successive clip.

3. In a firearm having a receiver, a plurality of barrels, a carrier longitudinally reciprocal to and from a battery position, and a plurality of bolts slidably disposed in the forward end of the carrier for stripping a plurality of cartridges from a unitary clip having adjacent depressions for seating each cartridge therein, each of the clips being formed to resiliently interconnect with the adjacent clip thereabove and therebelow to form a vertical stack, the combination of a magazine secured to the underside of the receiver and open at the lower end thereof for successively receiving a plurality of the unitary clips loaded with cartridges, a pair of spaced-apart followers slidably disposed for vertical movement in the upper portion of said magazine, a spring-biased lifter member transversely mounted in each of said followers for simultaneous engagement beneath the interconnected portions of one of the unitary clips, spring means normally urging said followers upwardly to lift the vertical stack of clips for positioning the cartridges therein into stripping position, a pair of depressors depending from opposite sides of the carrier adjacent the rear end thereof, an inclined cam surface on the front face of each of said depressors for moving said followers downwardly for a distance substantially equivalent to the height of a unitary clip during movement of the carrier to battery position, and a pair of support arms extending forwardly from said depressors and above said cam surfaces thereon for slidably engaging the uppermost clip during the downward travel of said followers to hold the vertical stack in said magazine until said followers engage beneath the interconnecting portions of the next successive clip.

4. In a firearm, a receiver having a cartridge feed opening extending transversely therethrough and an ejection port in the underside thereof, a carrier slidably mounted in said receiver for reciprocal movement to and from a battery position, a plurality of barrels, an equivalent number of bolts slidably disposed in the forward end of said carrier for stripping an equivalent number of cartridges from a unitary clip for subsequent simultaneous chambering in said barrels, stop means in the receiver for preventing forward movement of the clip during the stripping of the cartridges therefrom, a magazine secured to the underside of said receiver forwardly of said ejection port therein and open at the lower end thereof for successively receiving a plurality of unitary clips loaded with cartridges, each of the clips having outwardly projecting upper and lower portions for interconnecting adjacent clips into a single vertical stack when fully loaded into said magazine, a pair of spaced-apart followers slidably disposed for vertical movement in the upper portion of said magazine for simultaneous engagement beneath the interconnected portions of adjacent clips, spring means normally urging each of said followers upwardly to lift the vertical stack of clips for positioning the cartridges in the uppermost clip for respective stripping engagement with said bolts in said carrier, a pair of depressors depending from opposite sides of said carrier for camming said followers downwardly into lifting engagement with the next successive clip in the vertical stack, a support arm projecting forwardly from each of said depressors for engaging the uppermost clip until said followers are returned into position to engage the next successive uppermost clip, and means for imparting the recoil movement of said carrier to the empty uppermost clip until alignment thereof with said ejection port in said receiver.

5. The combination defined in claim 4 wherein said last-mentioned means comprises a pair of oppositely disposed catches respectively mounted in said support arms for transverse pivotal movement into and out of engagement with the empty uppermost clip, cam means in said receiver for pivoting said catches out of engagement with the clip immediately prior to alignment with said ejection port in said receiver, lug means in said receiver for halting the rearward movement of the empty clip in position to drop through said ejection port upon the subsequent withdrawal of said support arms therefrom as said carrier continues to move rearwardly out of battery position, and spring means for returning said catches to the unpivoted positions thereof during forward movement of said carrier into battery position.

6. In a firearm having a plurality of barrels, an equivalent number of bolts in respective axial alignment with the barrels, means for reciprocating the bolts to simultaneously chamber a cartridge in each of the barrels during forward movement, a depending magazine open at both ends thereof for guiding cartridges in front of the bolts for the subsequent chambering thereof in the barrels, and means for retaining the cartridges in the magazine in groups equivalent to the number of bolts and barrels, said cartridge retaining means including a plurality of unitary clips for holding individual groups of cartridges in a vertical stack, each of said clips comprising a body open at the upper end thereof and having a plurality of adjacent longitudinal cartridge seating depressions, a downwardly angled tab portion projecting from opposite sides of said body, and a resilient leg portion depending from opposite sides of said body from a point slightly below said tab portion, each of said leg portions terminating in an inwardly turned hook portion adapted to engage with said corresponding tab portion on said adjacent clip therebelow whereby all of said clips in the magazine are interconnected to form a single vertical stack.

References Cited in the file of this patent

UNITED STATES PATENTS

2,353,601 Tisdale ---------------- July 11, 1944