United States Patent [19]

Heinicke

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[54] **TUBULAR FIREARM**

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[21] Appl. No.: **49,366**

[52] **U.S. Cl.** ..... **42/17,** 42/1 R, 89/196

[51] **Int. Cl.** **F41c 13/00,** F41c 9/00, F41d 1/02

[58] **Field of Search** ..... 42/1 G, 1 H, 1 J, 42/1 R, 16, 17, 70 R; 89/196

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[57] **ABSTRACT**

A tubular firearm having a concentric bolt, barrel, main spring, receiver, recoil weight and cartridge carrier. The carrier houses a plurality of cartridges in a series of circumferentially spaced tubes, the carrier being rotatable to successively fire all the cartridges from consecutive tubes.

10 Claims, 17 Drawing Figures

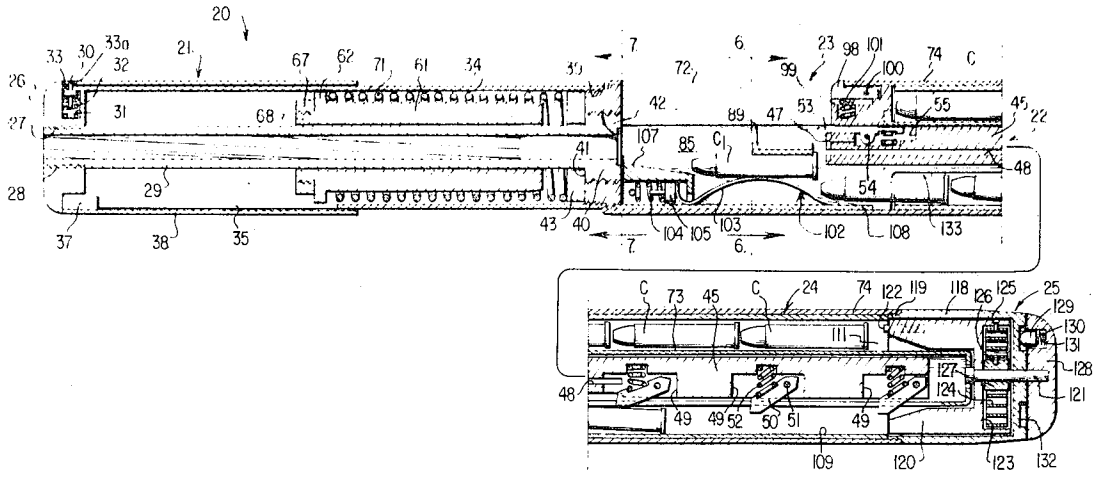


FIG. 1

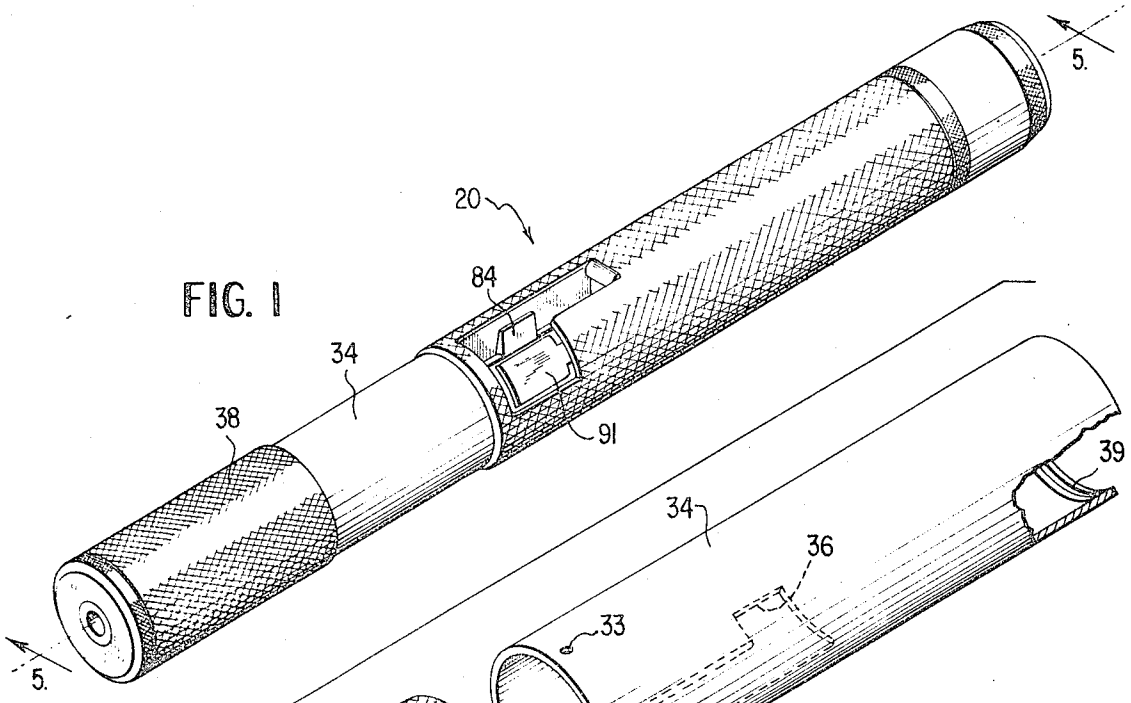


FIG. 2

FIG. 3

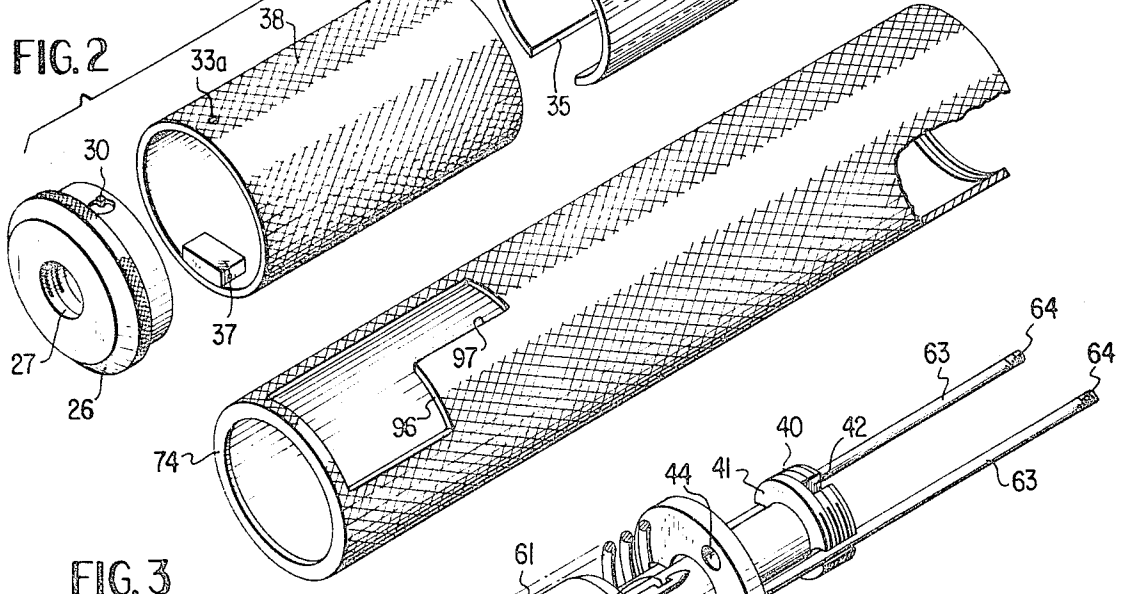
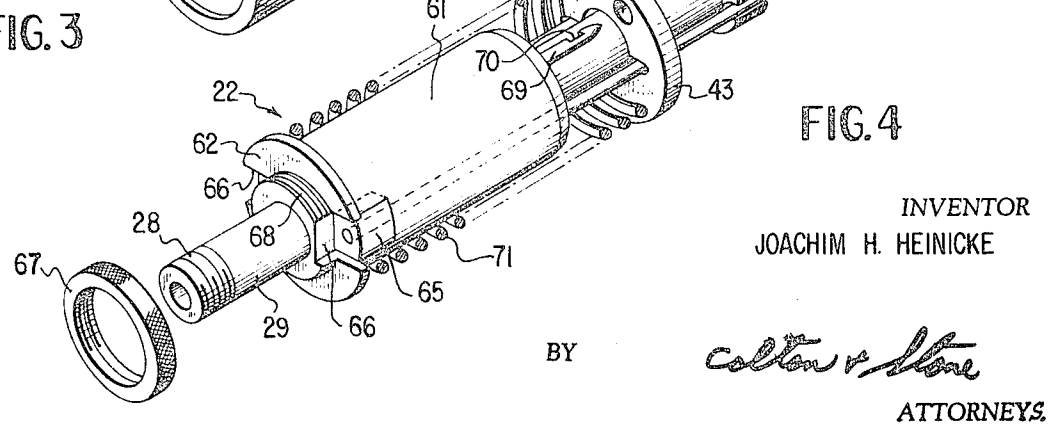


FIG. 4



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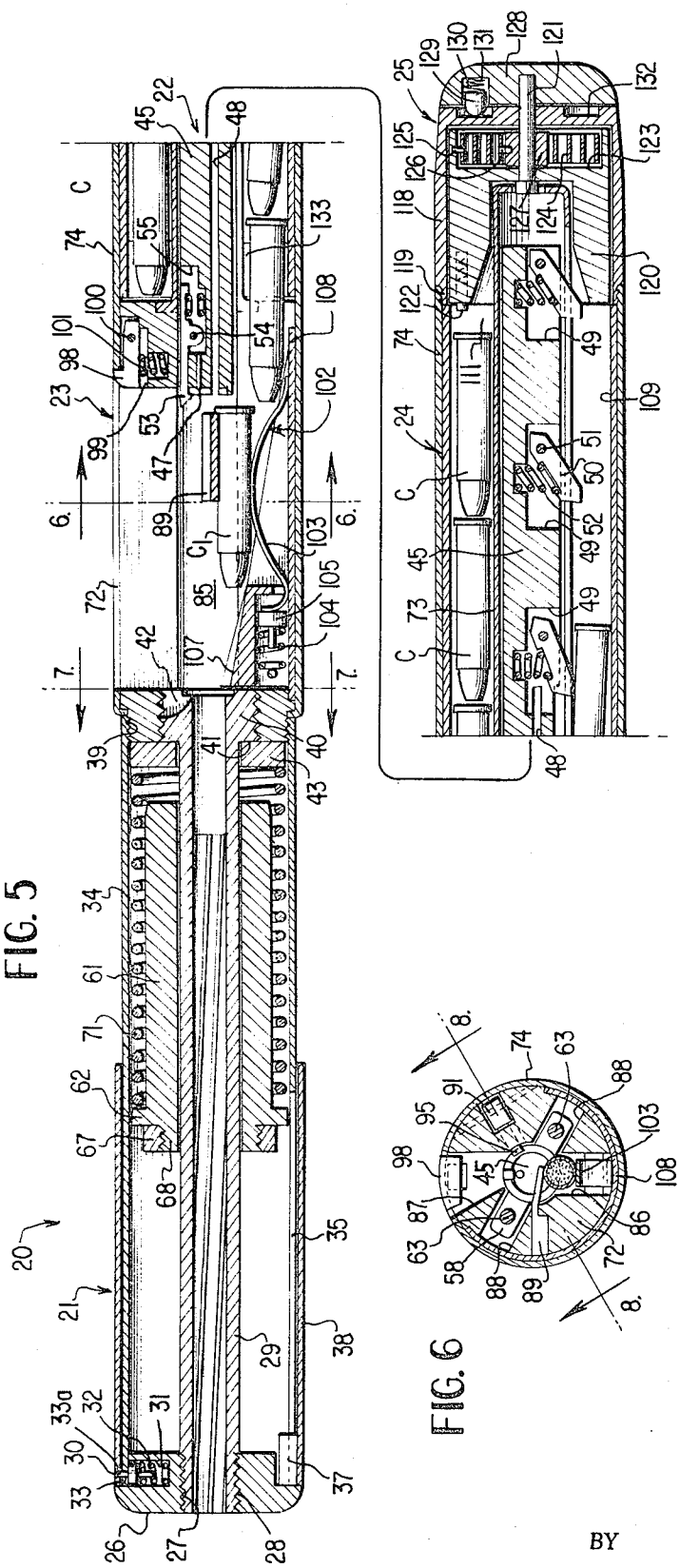


FIG. 5

FIG. 6

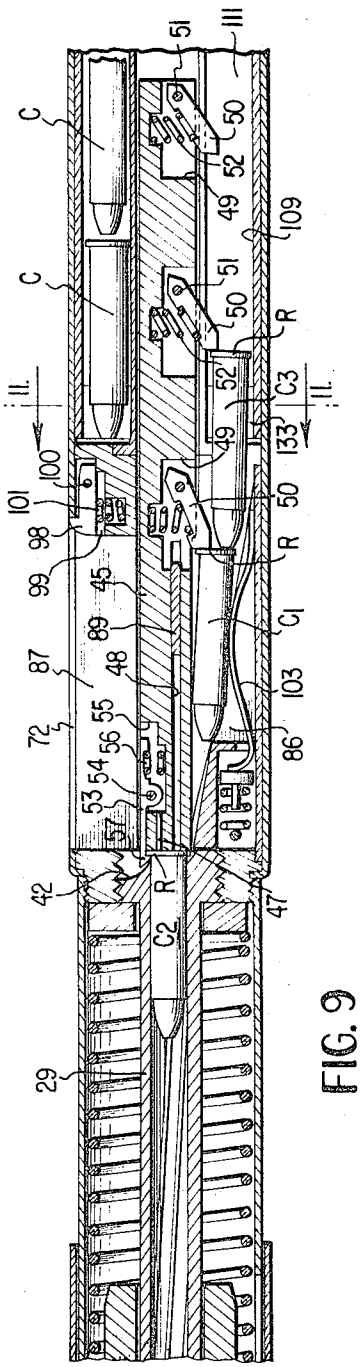


FIG. 9

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FIG 10

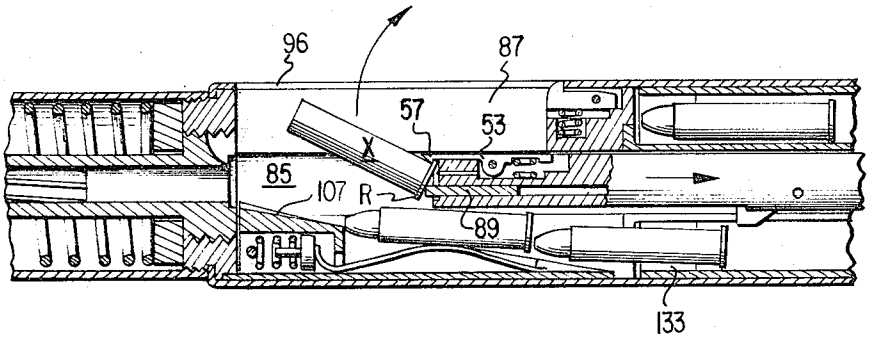


FIG. 8

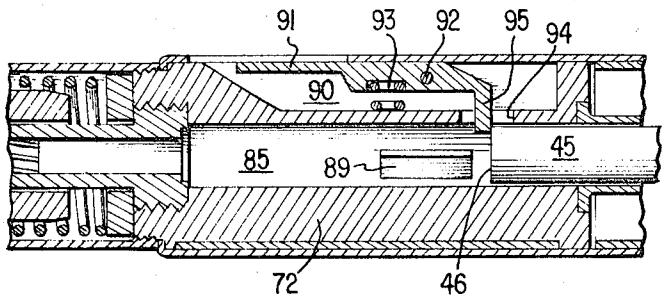
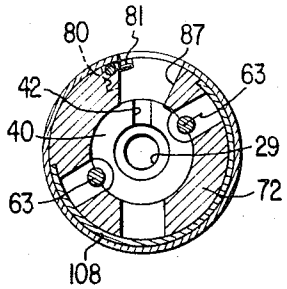


FIG. 7



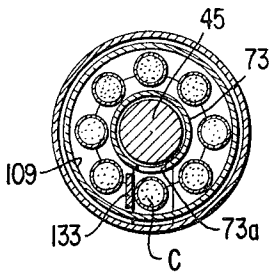


FIG. 11

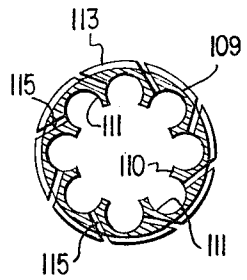


FIG. 17

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FIG. 13

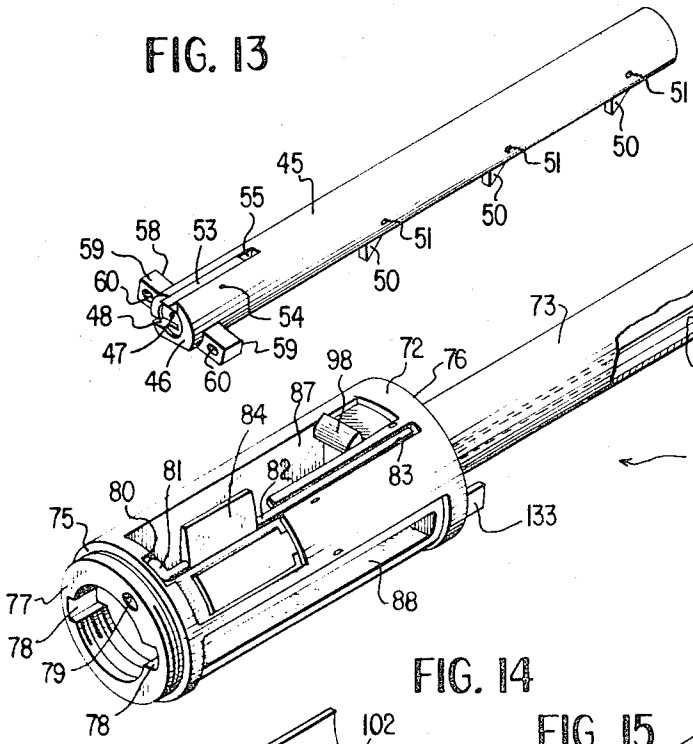


FIG. 12

FIG. 14

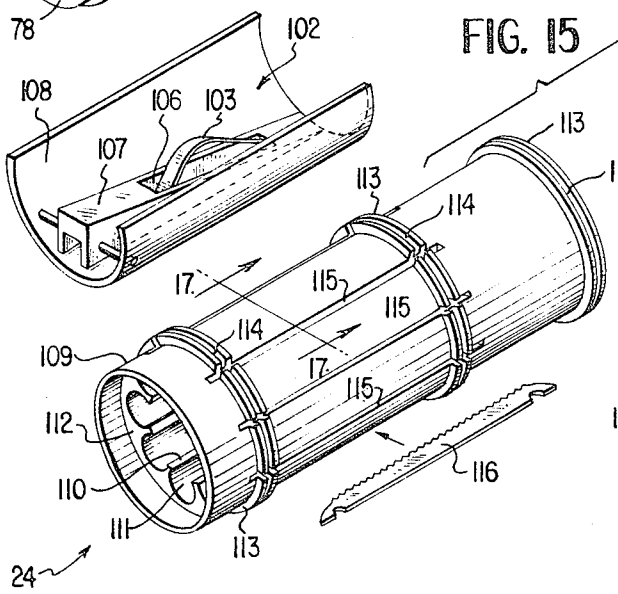


FIG. 15

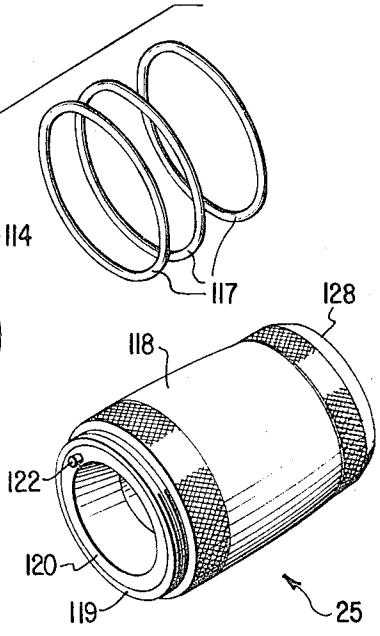


FIG. 16

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TUBULAR FIREARM

This invention relates generally to firearms, and more particularly to a tubular or rod-shaped, hand held, blow-back operated, mechanical feeding, fully automatic firearm.

The firearm of this invention is generally cylindrical in shape with no projections which facilitates its concealment in tubular housings such as flashlight cases or other tubular carrying cases. To this end, the invention is particularly useful to law enforcement officials in situations wherein concealment of a firearm is desirable to prevent alarming the general public or wherein secrecy is otherwise necessitated by the particular circumstances.

The firearm includes a novel concentric arrangement of parts which facilitates its outer tubular design. Specifically, it includes a concentric bolt, barrel, main spring, recoil weight and cartridge carrier. The cartridge carrier houses a plurality of cartridges, the specific number depending upon the caliber of the cartridges and the number of cartridge-carrying tubes circumferentially spaced about the carrier. In a preferred embodiment of a .22 caliber model described herein, the carrier carries 24 cartridges in eight tubes of three cartridges each. It is stressed, however, that this is merely a preferred embodiment and that other carriers may reasonably include anywhere from five to eight tubes with as many as 30 or more cartridges inclusive.

It is, therefore, an object of this invention to provide a firearm having a particular arrangement of parts which facilitate a generally tubular outer design.

More particularly, it is an object of this invention to provide a firearm including a concentric bolt, barrel, main spring, recoil weight and cartridge carrier.

Another object of this invention is to provide a firearm including a barrel, receiver and bolt assembly, and wherein the bolt assembly includes a main spring and recoil weight which overlay the barrel forwardly of the receiver.

A further object of this invention is to provide a firearm having a rotatable cartridge carrier, the carrier defining a plurality of circumferentially spaced axially extending tubes or channels each adapted to receive a plurality of aligned cartridges, and carrier rotating means engaging the carrier to rotate the same after each of the channels is emptied of cartridges to shift an adjacent channel in position from whence its cartridges may be fired.

Still another object of this invention is to provide a firearm including a bolt having a plurality of cartridge engaging means depending therefrom, and wherein reciprocating movements of the bolt due to firing of the firearm causes the cartridge engaging means to successively feed a plurality of axially aligned cartridges forward into firing position.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of the firearm of this invention illustrating its generally tubular or rod-shaped design;

FIG. 2 is an exploded perspective view of the front assembly illustrating the cocking tube which is grasped and pulled back by the operator to cock the firearm;

FIG. 3 is a perspective view of the main body tube of the firearm illustrating the radial opening therein whereby access may be had to the firing button and safety;

FIG. 4 is an exploded perspective view of the barrel and forward portion of the bolt assembly, including the recoil weight and main spring, which overlay the barrel and are slidable thereon;

FIG. 5 is an axial sectional view taken along line 5—5 of FIG. 1 depicting the bolt in its extreme rearward position and a cartridge in an in-between position between the carrier and receiver;

FIG. 6 is a transverse sectional view taken along line 6—6 of FIG. 5 showing the various openings through the receiver;

FIG. 7 is a transverse sectional view taken along line 7—7 of FIG. 5;

FIG. 8 is a fragmentary axial sectional view taken along line 8—8 of FIG. 6 illustrating details of the firing button;

FIGS. 9 and 10 are fragmentary axial sectional views illustrating the respective sequential movement of the bolt from its forwardmost or firing position in FIG. 9 to a point in its rearward travel in FIG. 10 where it ejects an expended cartridge case;

FIG. 11 is a transverse sectional view taken along line 11—11 of FIG. 9 showing cartridges positioned in eight axially extending circumferentially spaced rows around the carrier, and the feeler device which contacts a cartridge and prevents the carrier from rotating;

FIG. 12 is a perspective view of the receiver assembly including the tail tube which extends rearwardly therefrom;

FIG. 13 is a perspective view of the bolt and illustrates three cartridge-engaging hooks depending therefrom;

FIG. 14 is a perspective view of the cover plate which carries the follower and is intended to overlie the underside of the receiver;

FIG. 15 is an exploded perspective view of the carrier assembly and illustrates the sawtooth blades and O-rings by means of which the cartridges are resiliently secured in the carrier;

FIG. 16 is a perspective view of the back plug which provides torque to rotate the carrier; and

FIG. 17 is a transverse sectional view taken along line 17—17 of FIG. 15 and illustrates the eight channels or tubes in the carrier and the slots through which the sawtooth blades engage the cartridges.

Referring now to the drawings in detail, there is shown in FIG. 1 the firearm of this invention which is referred to generally by the numeral **20**. As is readily apparent, the firearm **20** has a generally tubular or rod-shaped design.

Referring now to FIG. 5, it can be seen that the firearm **20** consists of five main sections; a front assembly **21**, a bolt assembly **22**, a receiver assembly **23**, a carrier assembly **24** and a back plug assembly **25**.

DESCRIPTION OF THE FRONT ASSEMBLY

The front assembly **21** includes a nose piece **26** having a threaded hole **27** extending axially therethrough by means of which it is attached to a complementary threaded end **28** of a barrel **29**. The nose piece **26** fur-

ther includes a detent 30 biased outwardly in a radial hole 31 by a spring 32. The detent 30 is adapted to snap into a hole 33 in a guide tube 34 when the firearm 20 is fully assembled as seen in FIG. 5. The detent 30 extends through hole 33 to engage a hole 33a in the cocking tube 38, and serves to hold the cocking tube 38 in its forward position after the cocking function has been completed.

Referring now to FIG. 2, it can be seen that the guide tube 34 includes an axially extending guide slot 35 having a recessed portion 36 at its inner extremity. The guide slot 35 is adapted to slidingly receive a lug 37 carried on the inner surface of a cocking tube 38. The cocking tube 38 fits over the guide tube 34 and is slidable thereon to cock the firearm 20 in a manner to be hereinafter described. The guide tube 34 further includes internal threads 39 at its end opposite the guide slot 35 whereby it is attached to the receiver assembly 23.

As seen most clearly in FIG. 4, the barrel 29 includes an externally threaded enlarged end portion 40 having an annular shoulder 41 at one side and an arcuate slot 42 formed in its other side. A buffer disk 43 having a hole 44 extending therethrough near its periphery is slidable on the barrel 29 and bears against the shoulder 41 of the enlarged end portion 40.

DESCRIPTION OF THE BOLT ASSEMBLY

The bolt assembly 22 includes the bolt 45 seen most clearly in FIG. 13. The bolt 45 has an end face 46 in which is set a firing pin 47. An axially extending slot 48 is formed in a side of the bolt 45 and extends rearward from the face 46 back into the bolt 45 for a distance approximately equal to the distance the bolt 45 travels from its rearmost position in FIG. 5 to its forwardmost position in FIG. 9.

The bolt 45 further includes three recesses 49 formed in its underside in which are set hooks 50 pivotally mounted on pins 51 and biased outwardly by coil springs 52. The hooks 50 serve as cartridge feeding means and detent means in a manner to be hereinafter described.

As seen most clearly in FIGS. 5, 9 and 10, an extractor mechanism 53 is pivotally mounted by means of a pin 54 in a slotted recess 55 formed near the front of the bolt 45. The extractor 53 is biased in the counterclockwise direction by means of a coil spring 56. The extractor 53 has a hooked end 57 which is adapted to grasp a rim R of a cartridge C and hold it against the face 46 of the bolt 45, as seen in FIG. 9, to be extracted and then ejected as will be hereinafter described.

The bolt 45 also carries a crossarm 58 comprising two radial extensions 59 each formed with a tapped hole 60 extending axially therethrough. The crossarm 58 provides means by which the bolt 45 is connected to the forward portion of the bolt assembly 22 shown most clearly in FIG. 4.

The forward portion of the bolt assembly 22 overlays the barrel 29 and is slidable thereon. It includes a recoil weight 61 having an annular shoulder 62 formed in its front end and two elongated connecting rods 63 extending axially from its other end. The connecting rods 63 are threaded at their ends 64 for threaded engagement with the tapped holes 60 of the crossarm 58. The connecting rods 63 extend completely through the weight 61 and are retained by means of nuts 65 which fit into recesses 66 in the weight 61. An internally threaded lock ring 67 fits on an externally threaded extension 68 of the weight 61.

The weight 61 also includes a pin 69 extending rearwardly therefrom and having a radial notch 70 formed therein. The pin 69 is adapted to pass through the hole 44 in the buffer disk 43 and is part of a safety mechanism to be hereinafter described.

The entire bolt assembly 22 is biased forward by means of a main spring 71 which encircles the weight 61 and is retained at one end by the shoulder 62 and at the other end by the buffer disk 43.

DESCRIPTION OF THE RECEIVER ASSEMBLY

The receiver assembly 23 as seen most clearly in FIG. 12 includes a receiver body 72 and a tail tube 73 extending rearwardly therefrom. The entire receiver assembly 23 is encased in a main body tube 74 shown most clearly in FIG. 3.

The receiver body 72 includes a front end 75 and a rear end 76. The front end 75 is formed with an annular projection 77 having both external and internal threads for engagement with the guide tube 34 and the barrel 29, respectively. Axial slots 78 are formed in the internal surface of the annular projection 77 to slidingly receive the connecting rods 63. An axial hole 79 extends through the annular projection 75 and communicates with a recess 80 formed in the receiver body 72. The hole 79 is aligned with the hole 44 in the buffer disk 43 and also permits passage of the pin 69 therethrough where its notch 70 may be engaged by a hooked end 81 of a safety device 82.

The safety device 82 is carried in a groove 83 formed in the outer surface of the receiver body 72. The safety device 82 includes a flag or projection 84 that indicates that the safety is "off" when in the raised position illustrated in FIG. 12. The safety may be placed "on" when the bolt assembly 22 is cocked and the pin 69 extends into the recess 80 by depressing the flag 84 to axially rotate the safety device 82 in the groove 83 until the hook 81 engages the notch 70 and thus prevents the bolt assembly 22 from moving forward.

The receiver body 72 is formed with an axially extending internal chamber 85 which is communicated with from the exterior of the receiver body 72 by a loading slot 86, an ejection slot 87, and two crossarm slots 88. As seen most clearly in FIG. 6, an ejector 89 extends radially through the receiver body into the chamber 85. The chamber 85 also communicates axially with the interior of the tail tube 73.

From the foregoing, it should be readily apparent that the bolt 45 will reciprocate through the tail tube 73 and the chamber 85 with its hooks 50 extending through an axial slot 73a in the tail tube 73. Moreover, the axial slot 48 formed in the side of the bolt 45 slidably engages the ejector 89 and thus permits the bolt 45 to traverse the chamber 85 without being obstructed by the protruding ejector 89.

The receiver body 72 further includes a firing button well 90 in which firing button 91 is pivotally mounted by means of a pin 92. The firing button 91 is biased by means of a coil spring 93. As seen in FIG. 8, the firing button well 90 communicates with the chamber 85 by means of a hole 94 through which a sear or detent portion 95 of the firing button 91 may extend to engage the face 46 of the bolt 45. Depression of the firing button 91 will, of course, raise the sear 95 and permit the bolt 45 to come forward under action of the main spring 71.

Access to the firing button 91 is had through an opening 96 formed in the main body tube 74. The opening 96 includes an axially extending recessed portion 97 which cooperates with the opening 96 to provide an outlet through which expanded cartridges may be ejected.

The main body tube 74 is properly positioned and locked on the receiver assembly 23 by means of a locator latch 98 which snaps into the recessed opening 97. The latch 98 is pivotally mounted in a recess 99 in the receiver body 72 by means of a pin 100 and is biased outwardly by a coil spring 101.

The receiver assembly 23 also includes a follower group 102 consisting of a follower leaf spring 103 and an auxiliary coil spring 104 which imparts a bias to the spring 103 by means of a plunger 105. The follower spring 103 extends upwardly through an opening 106 in a ramp 107. The entire follower group 102 is carried by a semi-circular cover plate 108 which fits into the underside of the receiver body 72.

It should thus be apparent that in the assembled condition of the firearm 20 the opening 96 may be sealed by first turning the flag 84 down until the safety 82 is "on" and then depressing the locator latch 98 and rotating the tubes 74 and 38 until the plate 108 comes around under the opening 96. In this position the entire internal mechanism of the firearm 20 is sealed.

DESCRIPTION OF THE CARRIER ASSEMBLY

The carrier assembly 24 includes a cylindrical carrier 109 having an inner annular wall portion 110 formed with eight axially extending channels or tubes 111 spaced circumferentially about the periphery thereof. The annular wall portion 110 extends the length of the carrier 109 and terminates in an annular shoulder 112 which is recessed back from the front end of the carrier 109. The tubes 111 run through the entire annular wall portion 110.

The carrier 109 is formed on its outer periphery with three annular flanges 113 spaced axially thereof. The flanges 113 are each formed with a circumferential groove 114.

The carrier 109 further includes axially extending chordal slots 115 which communicate from the exterior thereof into each of the tubes 111. Each of the slots 115 is adapted to receive a sawtooth blade 116 which extend into the tubes 111 and are secured by resilient O-rings 117 which snap into the grooves 114 to thus resiliently secure a plurality of cartridges in the tubes 111 against unintentional sliding movement.

DESCRIPTION OF THE BACK PLUG ASSEMBLY

The back plug assembly 25 as seen in FIGS. 5 and 16 includes a housing 118 having an externally threaded annular projection 119 at its forward end by means of which the back plug assembly 25 is secured to the main body tube 74. A rotator 120 is carried in the housing 118 by means of a retaining shaft 121 upon which it is freely rotatable. The rotator 120 carries a spring-biased pin 122 extending axially from its forward end which is adapted to engage the carrier 109 and transmit torque thereto from the back plug assembly 25 in a manner to be hereinafter described.

The rotator 120 defines a recess 123 in its rear face in which it receives a wound flat spring 124 having one end thereof secured thereto by means of a pin 125. The other end of the spring 125 is secured by means of another pin 126 to a bushing 127 which is in turn secured to the shaft 121.

The shaft 121 extends through the rear wall of the housing 118 and is secured in a torque knob 128. The torque knob 128 carries a ratchet button 129 in a hole 130. The button 129 is biased outwardly by a coil spring 131. A plurality of relieved holes 132 circularly spaced around the rear face of the housing 118 permit escape of the button 129 to allow rotation of the torque knob 128 in one direction, but retain the button 129 to prevent rotation of the torque knob 128 in the opposite direction.

It should be thus apparent that rotation of the torque knob 128 causes the spring 124 to wind thus imparting a rotary bias to the rotator 120. Tension on the spring 124 is maintained due to the holes 132 which retain the button 129 and thus prevent the spring 124 from unwinding. The torque is transmitted from the rotator 120 to the carrier 109 by the pin 122 which engages the surface of one of the tubes 111. The carrier 109 is, however, normally prevented from rotating by means of a stop or feeler 133 which extends from the rear end 76 of the receiver body 72 and bears against one of the cartridges C carried by the carrier 109 as seen most clearly in FIG. 11. When, however, the last of the cartridges C in the tube 111 immediately adjacent the feeler 133 is moved forward into the receiver body 72, as will be hereinafter described, the torque on the carrier 109 is no longer resisted and hence the carrier 109 will be rotated until the forwardmost cartridge C in the next adjacent tube 111 comes into engagement with the feeler 133. This operation will continue until all the cartridges in each of the tubes 111 is moved forward into the receiver body 72 and fired. At this point, the operator will feel the carrier 109 spin free as the spring 124 unwinds due to the lack of a remaining cartridge to bear against the feeler 133.

OPERATION OF THE FIREARM

The firearm 20 is loaded by unscrewing the back plug assembly 25 from the main body tube 74 and inserting a carrier assembly 24 whose tubes 111 each carry three cartridges C. The carrier assembly 24 slides down over the concentric tail tube 73 and bolt 45 which extend therethrough. The back plug assembly 25 is then screwed back on the main body tube 74 and torque is applied to the carrier 109 by turning the torque knob 128. Usually, the mere act of screwing on the back plug assembly 25 will provide sufficient torque to rotate the carrier 109 through a complete cycle. It is understood, of course, that individual cartridges C may be inserted into the tubes 111 instead of replacing the entire carrier assembly 24.

The firearm 20 is cocked by sliding the cocking tube 38 back along the guide tube 34. The lug 37 slides back in the guide slot 35 engaging the recoil weight 61 and compressing the main spring 71. The entire bolt assembly 22 is thereby moved back until, at the rearward limit of its travel, the sear 95 drops down against the face 46 of the bolt 45 as seen in FIG. 8. The firearm 20 is then cocked. At this point, the safety device 82 may be moved to its "on" position as explained above. An additional safety is provided by simply rotating the lug 37 of the cocking tube 38 into the recess 36. In either event, the bolt assembly 22 is prevented from moving forward under the force of the spring 71.

With both safety devices in their disengaged or "off" positions, however, depression of the firing button **91** permits the bolt assembly **22** to be moved forward as the compressed main spring **71** expands. This action causes the hooks **50** carried by the bolt **45** to engage the rims R of the three cartridges C in the lowermost of firing tube **111** and thus move them forward. The leading cartridge will be fed into the receiver body **72** and take the position of the cartridge C_1 in FIG. **9.** As the bolt assembly **22** is again cocked in the manner described above, the cartridge C_1 will be pushed up by the follower spring **103** through the loading slot **86** into the chamber **85** and assume the position illustrated in FIG. **5.** The firearm **20** is now ready to be fired.

Depression of the firing button **91** will now cause the bolt **45** to push the cartridge C up the ramp **107** through the chamber **85** and into the barrel **29.** The cartridge is now in the position of cartridge C_2 in FIG. **9** and is fired as the firing pin **47** strikes the rim R. It is understood that while a rimfire type device is specifically disclosed herein, centerfire or other type firing devices may also be used.

It should be understood that as the bolt **45** comes forward to fire the cartridge C_2, the second cartridge in the firing tube **111** will be moved forward by the hooks **50** into the receiver body **72** and assume the position of cartridge C_1 in FIG. **9.** The third cartridge C_3 is simultaneously moved forward to engage the feeler **133** and thus prevent rotation of the carrier **109** as explained above.

As the cartridge C_2 is fired, the expanding gases will cause the bolt assembly **22** to blowback or recoil in a conventional manner well known in the art. Inasmuch as the hooked end **57** of the extractor **53** holds the rim R of the cartridge C_2 against the face **46** of the bolt **45,** the expended case X of the cartridge C_2 and the bolt **45** will be pushed rearward as a unit under the force of the expanding gases. When the rim R of the expended case X strikes the ejector **89** as shown in FIG. **10,** it will be flipped up through the ejection slot **87** and opening **96** in the body tube **74** and thereby ejected from the firearm **20.**

When the last of the cartridges C in a given tube **111** has been moved forward into the receiver body **72,** the carrier **109** will be rotated until the next adjacent tube **111** containing cartridges C comes into firing position beneath the hooks **50** as explained above. It should be apparent that the firearm **20** may be fired automatically by holding the firing button **91** down while the bolt assembly **22** reciprocates under the action of the main spring **71** and blowback forces to fire a desired number of rounds. It is contemplated that a suitable mechanism may be provided which would facilitate single fire repeat or automatic operation.

Although only a preferred embodiment of the firearm **20** has been disclosed herein, it is to be understood that other modifications may be provided without departing from the spirit of the invention.

I claim:

1. A firearm comprising

a tubular housing having at least one selectively configured radial opening, said tubular housing containing

a barrel,

a cartridge carrier,

a receiver assembly including a receiver body having a selectively configured radial opening, a cylindrical portion selectively configured so as to be at least as large as said tubular housing radial opening and a trigger element accessible through said receiver body opening, and

means for displacing said receiver assembly relative to said tubular housing from a first position wherein said tubular housing opening and said receiver body opening are radially adjacent whereby said trigger element can be actuated to a second position wherein said receiver body cylindrical portion blocks said tubular housing opening whereby said trigger element cannot be actuated.

2. A firearm according to claim **1,** wherein said receiver body further comprises safety device means including a finger operable member

displaceable from a first, off, position wherein said finger operable member extends radially outwardly a predetermined distance substantially greater than the radius of the interior surface of said tubular housing to a second, on, position wherein said finger operable member extends radially outwardly a predetermined distance less than said radius and

selectively located and configured so that when said receiver assembly is located at said first position said finger operable member can be displaced into said radially adjacent openings whereby the firearm may be fired and when said receiver assembly is located at said second position said finger operable member will be maintained in said on position.

3. A firearm according to claim **1** wherein said receiver body further comprises

latch means displaceable from a first position wherein said latch means extends radially outwardly a predetermined distance substantially greater than the radius of the interior surface of said tubular housing to a second position wherein said latch means extends radially outwardly a predetermined distance less than said radius,

said latch means being selectively located and configured so that when said receiver assembly is located at said first position and said latch means is displaced from said second position to said first position said latch means will extend into said tubular portion opening thereby maintaining said receiver assembly at said second position and

means for urging the displacement of said latch means from said second position to said first position.

4. A firearm comprising a substantially tubular housing containing

a single barrel

a cartridge carrier including a plurality of axially extending circumferentially spaced cartridge tubes and a central axially extending bore,

a receiver interposed intermediate said barrel and said cartridge carrier,

a bolt assembly including a firing pin and a bolt selectively configured for slidable displacement within said bore from a first, forward, position whereat said firing pin is axially adjacent said barrel to a second, rearward, position whereat said firing pin is spaced therefrom, said bolt having a firing pin secured to the forward end thereof,

means for displacing said bolt from said first position to said second position and for subjecting said bolt to a predetermined force, and

means for releasing said cocked bolt whereby said firing pin will strike and fire a bullet which has been inserted into the rearward end of said barrel,

said bolt assembly comprising means for sequentially feeding cartridges from said tubes to said receiver and for inserting said cartridges into the rearward end of said barrel.

5. A firearm according to claim **4**, wherein said bolt assembly further comprises an annular recoil mass concentrically overlying said barrel and integrally connected to said bolt and adapted to be slidably displaced along said barrel and said subjecting means includes a spring concentrically surrounding said barrel and interposed intermediate said annular recoil mass and said receiver.

6. A firearm according to claim **5**, wherein said annular recoil mass includes a rearwardly axially extending hook means

and said firearm further comprises finger operable safety means displaceable for selective engagement with said hook means.

7. A firearm according to claim **4** wherein each of said tubes includes a plurality of cartridges and said sequentially feeding means comprises means for consecutively feeding all of the cartridges in one of said circumferentially spaced tubes to said receiver and means for rotating said cartridge carrier a selected degree after

8. A firearm according to claim **4** wherein said cartridge feeding means includes a plurality of aligned outwardly biased hook elements for engaging cartridges in said carrier.

9. A firearm according to claim **4** wherein said carrier provides detent means limiting axial movement of cartridges to a direction towards said receiver. said one tube has been emptied whereby all of the cartridges in a second one of said tubes may be consecutively fed to said receiver.

10. A firearm comprising a tubular housing containing

an axially extending receiver,

an axially extending barrel, and an axially extending cartridge carrier disposed axially adjacent opposite ends of said receiver, said cartridge carrier containing a plurality of cartridges, and

a bolt assembly mounted for axial movement,

said bolt assembly including an annular recoil mass having an interior diameter selected so that said recoil mass can be slidably displaced along said barrel and having an exterior diameter substantially less than the interior diameter of said tubular housing adjacent said recoil mass along its path of movement whereby an annular channel will be established selectively dimensioned to receive a spring, and

spring means for placement within said annular channel

said recoil mass including an outwardly projecting shoulder at the forward end thereof and said spring means being selectively interposed intermediate said shoulder and said receiver.

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