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EUROPEAN PATENT APPLICATION

(21) Application number: 85630153.6

(51) Int. Cl.⁴: **F 41 C 17/04**
F 41 C 21/22, F 41 C 11/06
F 41 C 5/00

(22) Date of filing: 05.09.85

(30) Priority: 10.09.84 US 649219

(43) Date of publication of application:
19.03.86 Bulletin 86/12

(84) Designated Contracting States:
BE DE FR GB IT

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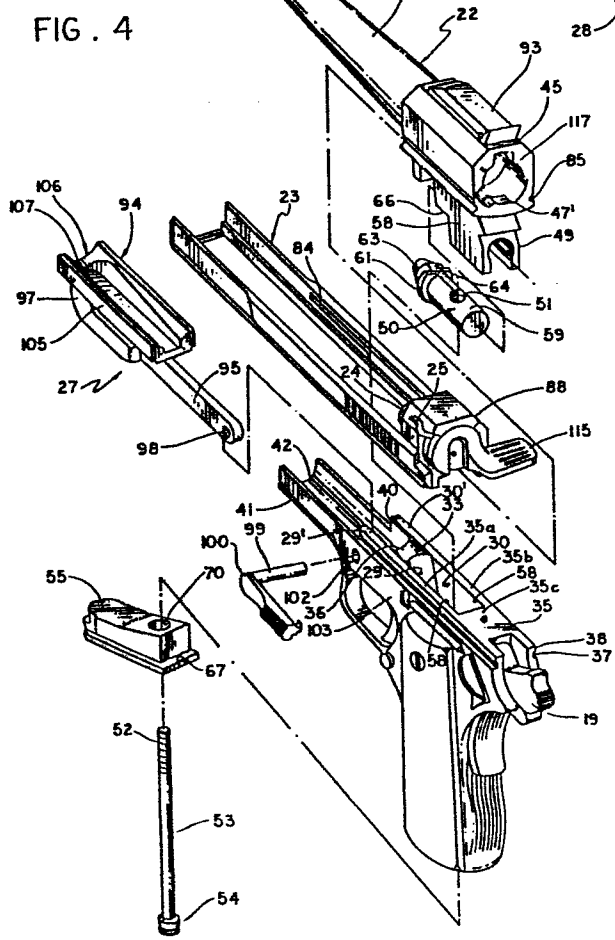
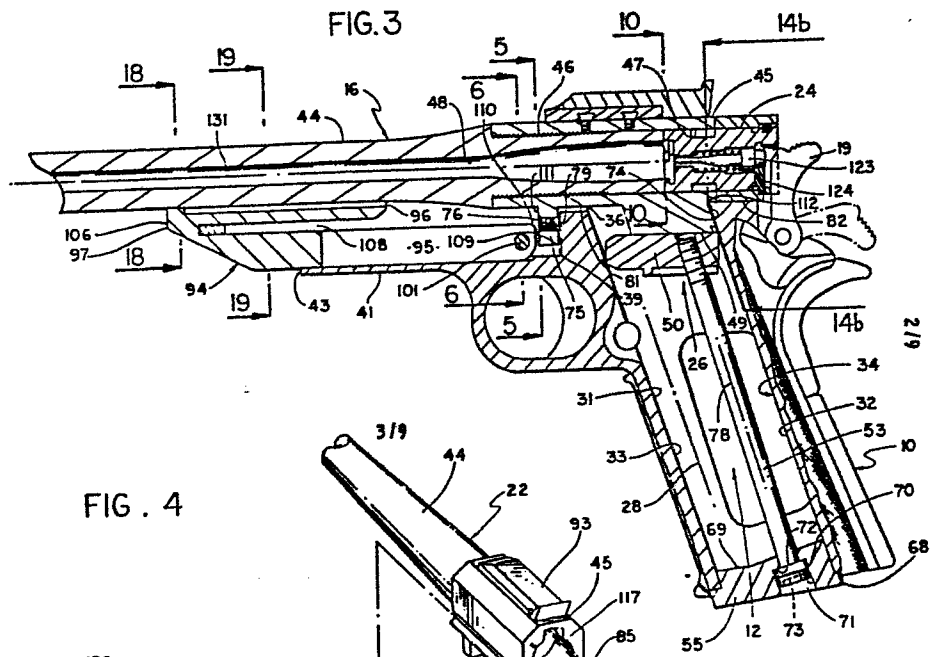
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(54) **Pistol assembly.**

(57) An assembly for converting an automatic pistol to a single shot gun, including a barrel structure (22) which is adapted to be detachably connected to the receiver (10) of the automatic pistol and which movably carries a slide (23) mounting a bolt (24) for front to rear movement relative to the barrel (16). The barrel structure (22) has two rearwardly facing recoil shoulders (74, 79) engageable with spaced forwardly facing shoulders (34, 39) of the receiver (10) to transmit recoil forces from the barrel (22) to the receiver (10), with one of the four shoulders being formed by an element which is threadably adjustable to a condition assuring simultaneous engagement of both sets of shoulders. A safety element (25) is operable to control actuation of the firing pin by the hammer (19) of the gun, to prevent unintentional actuation of the firing pin by the hammer (19), with the safety element (25) preferably being connected to the bolt (24) for swinging movement about an axis extending longitudinally of the barrel (16), and with the safety element (25) also desirable being actuated automatically to a condition preventing firing of the gun upon pivotal movement of the bolt (24) from a condition of locked engagement with the barrel structure (22) to a released condition in which the bolt (24) can be retracted to open the rear of the barrel (16). The bolt (24) may be constructed in a manner enabling a round to be slidably connected thereto in a retracted position of the bolt (24), so that the bolt (24) can positively advance the

round forwardly into the barrel (22) and positively withdraw the spent shell therefrom.

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This invention relates to certain improvements in the structure of pistols.

In copending European Patent Application
5 Number 83 63 0176.2 filed October 27, 1983 on "Pistol
Structure" , inventor George Hoenig, there has been disclosed
a unique conversion kit adapted to be utilized for
converting an automatic pistol to a fixed barrel preferably
single shot gun having greater accuracy for target shooting
10 or the like than did the automatic pistol prior to conver-
sion. The converting parts used in that application include
a barrel structure which is adapted to be rigidly detachably
connected to the receiver of the automatic pistol, by a
connecting structure projecting downwardly from the rear
15 portion of the barrel assembly into the recess of the
automatic pistol which normally contains a magazine holding
a series of rounds of ammunition. This connecting mechanism
is anchored to the receiver, preferably by an element which
extends across the bottom of the magazine recess and bears
20 upwardly against the lower end of the handle of the
pistol at that location. The apparatus of the prior
application includes a slide which engages guideways on
the upper portion of the receiver and which carries a bolt
and mounts the bolt for front to rear sliding movement
25 relative to the receiver and barrel. An element received
at the underside of the barrel may be secured to the
receiver by the transverse pin of the usual slide stop
element of the automatic gun.

The present invention provides improvements in gun
30 construction which are in some respects especially intended
for use in a conversion kit of the above discussed type,
but some of which features may also be applicable to other
types of guns or gun sub-assemblies. A major purpose of
the present invention is to provide an improved safety
35 mechanism which can positively prevent accidental actuation
of the firing pin by the hammer of the gun. This safety
device is desirably mounted to swing about an axis
extending longitudinally of the barrel between a condition

in which the hammer is prevented from actuating the firing pin and a condition in which the hammer can operate the firing pin. The safety may be operated automatically by the bolt in one direction but not the reverse direction, so that when the bolt is turned from a locked firing position to a released position in which it can be retracted rearwardly from the barrel, this movement of the bolt acts to displace the safety structure to an active position in which it prevents the hammer from driving the firing pin forwardly and thus prevents accidental firing of the gun, but upon reverse movement of the bolt toward its locked condition the safety is not returned automatically to its inactive condition. Instead, the safety must be intentionally manually turned to that inactive condition to maximize the protection offered by the safety.

Certain additional features of the invention are intended to enhance the rigidity and reliability of the connection between the barrel and receiver in a converted gun of the above discussed type or other similar gun assembly, and to maximize the effectiveness with which recoil forces are transmitted from the barrel structure to the receiver on firing. To achieve these results, the barrel structure or assembly is provided with two rearwardly facing recoil surfaces or shoulders which are spaced apart in a front to rear direction and are engageable with two spaced forwardly facing recoil surfaces formed on the receiver. One of these four surfaces may be formed on a threaded element which is threadably adjustable relative to the other recoil surface of the same part, in a manner enabling the spacing between two of the surfaces to be adjusted precisely to a condition in which both pairs of surfaces engage simultaneously and thereby assure effective transmission of recoil forces through both of those sets of surfaces. The recoil surfaces of the barrel structure are desirably carried by two lugs which project downwardly from a rear portion of the barrel assembly, with the adjustable threaded element preferably being carried by one of those lugs. Additionally, one of the two lugs may be engageable forwardly against an element of the conversion

kit in a manner preventing that lug and the forward portion of the barrel from swinging upwardly under the influence of the recoil forces.

5 In the arrangement of the above discussed prior application, the bolt carrying slide was connected slidably to the same guideways which are normally utilized for mounting the slide of the automatic pistol. In the present invention, the slide which carries the bolt preferably
10 engages guideways carried directly by the detachable barrel structure itself rather than by the receiver, to assure accurate alignment of the slide carried bolt with the barrel as it moves relative thereto.

15 The above and other features and objects of the invention will be better understood from the following detailed description of the typical embodiment illustrated in the accompanying drawings in which:

 Fig. 1 is a side elevational view of a conventional automatic hand gun as it appears before conversion to a
20 single shot gun in accordance with the present invention ;

 Fig. 2 is a side elevational view of the gun after conversion;

 Fig. 3 is an enlarged vertical front to rear section through the converted gun of Fig. 2;

25 Fig. 4 is an exploded perspective view showing the converted gun;

 Figs. 5 and 6 are transverse vertical sections taken on lines 5-5 and 6-6 , respectively of Fig. 3;

 Fig. 7 is an exploded side elevational view of the
30 bolt and related parts;

 Fig. 8 is an exploded rear view taken on line 8-8 of Fig. 7;

 Fig. 9 is a right side elevational view of the gun, with the bolt in retracted position;

35 Fig. 10 is an enlarged fragmentary vertical section taken on line 10-10 of Fig. 3;

 Fig. 11 is a top plan view of the slide shown separately without most of the other parts of the gun;

 Fig. 12 is a vertical section through the slide
40 taken on line 12-12 of Fig. 11;

Fig. 13 is a side elevational view showing the manner in which the slide and barrel assembly are connected together before being attached to the receiver;

5 Fig. 14a, is an enlarged vertical section taken on line 14a-14a of Fig. 13;

Fig. 14b is a view similar to Fig. 14a and taken on line 14b-14b of Fig. 3;

10 Fig. 15 is an enlarged fragmentary left side elevational view of the rear portion of the barrel with the bolt in firing position;

Figs. 16a, 16b and 16c are vertical sections taken on line 16 of Fig. 15 and showing the bolt and safety in three different conditions;

15 Fig. 17 is in part a side elevational view and in part a vertical section taken on line 17-17 of Fig. 16c;

Figs. 18 and 19 are transverse vertical sections taken on lines 18-18 and 19-19 respectively of Fig. 3;

20 Fig. 20 is a front elevational view of the bolt, taken on line 20-20 of Fig. 9;

Fig. 21 is a section through the forward portion of the bolt taken on line 21-21 of Fig. 20;

Fig. 22 is a view taken on line 22-22 of Fig. 20;

25 Fig. 23 is a perspective view showing the manner in which a round of ammunition is connected to the bolt; and

Fig. 24 is an enlarged horizontal section taken on line 24-24 of Fig. 16c.

30 The conventional automatic pistol illustrated in Fig. 1 may be a Colt Model "0". 45 caliber automatic pistol, having a main receiver or frame 10 with a handle portion containing a magazine recess 12 within which a magazine 13 containing a series of rounds 14 of ammunition is received. The magazine recess 12 extends generally vertically within handle portion 11 of the receiver, and is open at its lower end to allow the magazine to be inserted upwardly into the recess from the broken line position of Fig. 1. A slide 15 is mounted to the upper side of receiver 10 for front to rear recoiling movement when
40 a round is fired within barrel 16. A user fires the gun

by actuation of a trigger 17 within a trigger guard portion 18 of the receiver, with the trigger acting to release the hammer 19 to swing forwardly about its axis 20 under the influence of the hammer spring represented at 21. When the automatic gun of Fig. 1 is fired, the barrel recoils rearwardly and downwardly.

In Fig. 2, the receiver 10 of the Fig. 1 automatic pistol is shown with its slide 15, barrel 16, magazine 13, ejector, and related parts removed from the receiver, and with the various components of a conversion kit embodying the present invention attached to the receiver to form a highly accurate single shot pistol. As will be understood best by reference to the exploded perspective view of Fig. 4, the parts forming the conversion kit include a barrel assembly or barrel structure 22, a slide 23 carrying a bolt 24 and safety 25, a connector structure 26 (including a number of elements 49, 50, 53 and 55) for detachably securing the barrel assembly and carried parts rigidly to the receiver, and a unit 27 which is received between a forward portion of the receiver and the underside of the barrel.

The recess 12 in handle 11 of the receiver 10 which contains magazine 13 when the gun is in its Fig. 1 condition extends along an axis 28 which is inclined to advance forwardly as it advances upwardly. This recess is of essentially uniform cross section transversely of axis 28, being defined at its opposite sides by two parallel side walls 29 and 30 extending parallel to axis 28 and to axis 131 of barrel 16. The front and rear of the recess are defined by transverse forward and rear walls 31 and 32 of the receiver. Forward wall 31 has a curving wall surface 33 at the rear of the recess, and rear wall 32 has a planar inclined surface 34 defining the back of the recess.

At its upper end, receiver 10 has a planar horizontal upper surface 35, with portions 35a and 35b of that surface extending in a front to rear direction along opposite sides of the magazine recess, and with a transverse portion 35c of the upper horizontal surface extending across the back of the recess. The front wall 31 of the recess has an

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upper surface 36 which is curved concavely downwardly beneath the level of surface 36 with a partial cylindrical configuration. At their outer sides, the upper portions
5 of side walls 29 and 30 form horizontally extending grooves 37 and ribs 38 (see Fig. 4) which extend parallel to axis 131 of the barrel and function in the Fig. 1 condition of the automatic gun to guide slide 15 for front to rear reciprocating movement relative to the receiver.
10 At it's forward side, the front wall 31 of recess 12 has a forwardly facing vertical recoil surface 39 disposed transversely of axis 131 of the barrel. The upper portion of the previously mentioned forward surface 34 of rear wall 32 of the recess forms a second forwardly facing recoil
15 surface coacting with surface 39 to prevent rearward movement of the barrel relative to the receiver upon firing of the gun.

Forwardly of the plane of recoil surface 39, the receiver has forward continuations 29' and 30' of the two
20 side walls 29 and 30 of the magazine recess, with grooves 37, ribs 38 and portions 35a and 35b of upper surface 35 continuing forwardly to the location 40, beyond which the receiver has a forward portion 41 containing an upwardly facing approximately semicylindrical recess 42 of the cross-
25 sectional configuration illustrated in Fig. 19 terminating at the forward extremity 43 of the receiver.

Barrel assembly 22 of the conversion kit is desirably formed of two parts, including a barrel proper 44 and an essentially tubular part 45 attached rigidly to the rear
30 end of barrel 44 by a threaded connection 46. It will of course be understood that if desired the two parts 44 and 45 may be formed integrally of a single piece of metal. A round of ammunition to be fired in the gun is attached to the bolt and moved forwardly by the bolt into bore 47
35 in part 45 through it's open rear end to a firing position in part 45.

Connector structure 26 which secures the barrel assembly to the receiver projects downwardly from the barrel

assembly into and through magazine recess 12 in the receiver and functions to clamp the rear element 45 of the barrel assembly tightly downwardly against the top of the receiver. This connector structure includes a projection 49 which is attached rigidly to part 45 and is preferably formed integrally therewith and extends downwardly into the upper end of the magazine recess. A connecting element 50 engages projection 49 and contains a threaded bore 51 into which the upper threaded end 52 of a screw 53 is threadedly connectable, with that screw having an enlarged head 54 at the underside of the handle of the receiver bearing upwardly against a bottom plate 55 extending across the lower end of the magazine recess in the receiver. Projection 49 of the barrel assembly is bifurcated (Figs. 4, 14a and 14b) to form two spaced downwardly projecting walls 56 having outer parallel planar vertical surfaces which engage and are adapted to bear tightly against the inner parallel vertical surfaces 58 of side walls 29 and 30 of magazine recess 12 in the receiver. Element 50 is received between the two walls 56, and is shaped to exert downward force on the walls and at the same time cam them laterally apart and against the surfaces 58. For this purpose, element 50 has an externally cylindrical surface 59 engaging cylindrically curved surfaces 60 formed on the inner sides of walls 56 of projection 49 to apply both downward and lateral spreading force to walls 56 upon exertion of downward force by screw 53. At the forward end of cylindrical surface 57, element 50 has a flange 61 engageable with vertical front surface 62 formed on walls 56 to limit rearward movement of element 50 between those walls. Forwardly of flange 61, element 50 has a conically tapering forward portion 63. During assembly of the gun, element 50 is insertible rearwardly into the space between the walls 56 of projection 49, with the opposite sides of the cylindrical portion of element 50 being received within guideway recesses or grooves formed by surfaces 60. The upper portion of the otherwise annular flange 61 of element 50 is truncated to form an upper horizontal flat

surface 64 on the flange engageable with a flat horizontal undersurface 65 formed on an upper non-bifurcated portion 66 of projection 49 in a relation retaining element 50
5 against rotation from a position in which the axis of it's threads 51 lies in a proper vertical plane for connection to screw 53. As will be understood, unless element 50 is turned about its longitudinal axis to a position in which
upper surface 64 of flange 61 is horizontal during insertion
10 of element 50 between walls 56 of projection 49, the element 50 cannot move to it's fully inserted position.

Bottom plate 55 extends across and closes the lower end of magazine recess 12 in receiver 10, and has flanges 67 extending along its periphery at the front, rear and
15 opposite sides of plate 55, to engage upwardly against the bottom edge surfaces 68 of the receiver about recess 12 and apply upward force to the receiver in a manner limiting upward movement of bottom plate 55 relative to the receiver. The upper portion 69 of bottom plate
20 55 above the level of flanges 67 projects upwardly into recess 12 in the receiver and is shaped and dimensioned to fit closely therein to locate the bottom plate against horizontal movement relative to the receiver handle.
The shank of screw 53 extends upwardly through an
25 inclined passage 70 in bottom plate 55, having an enlarged lower counterbore portion 71 forming an annular downwardly facing shoulder 72 centered about the inclined axis 78 of the screw for engagement with enlarged
head 54 of the screw so that upon rotation of the screw
30 the threaded connection between it's upper end and element 50 acts to exert downward force on element 50 and the connected barrel assembly and upward force on bottom plate 55 in a manner maintaining the parts in tightly and rigidly assembled condition. The screw
35 may be turned by insertion of an allen wrench into a hexagonal or twelve point allen wrench recess 73 formed in head 54 of screw 53.

As the barrel assembly 22 is pulled downwardly by tightening of screw 53, the rear part 45 of that assembly
40 is tightened downwardly against the upper edge surfaces

of the receiver, and at the same time part 45 is pulled rearwardly to force an inclined planar rearwardly facing recoil surface 74 tightly against the abutting forwardly facing inclined recoil surface 34 formed by the receiver at the back of recess 12. Rearward force is also exerted against the forward recoil surface 39 of the receiver through a recoil lug 75 formed integrally with and projecting downwardly from part 45 and containing a threaded bore 76 extending within which an externally threaded adjusting screw 77 is received. This screw has an allen wrench recess 78 at it's forward side adapted to be engaged by an allen wrench and adjusted threadedly relative to lug 75 to bring the transverse rear end surface 79 of the screw into engagement with the vertical forward recoil surface 39 of the receiver to apply recoiling forces thereto. The axis 80 of adjusting screw 77 extends parallel to the axis 131 of the gun barrel, so that the rear recoil surface 79 of the screw may be disposed directly vertically for effective engagement with surface 39. The screw is adjusted relative to lug 75 to a position in which it's rear end surface 79 and the second recoil surface 74 of the barrel assembly will engage surfaces 39 and 34 simultaneously to function in unison for transmission of recoil forces from the barrel to the receiver. The downward forces applied by the barrel assembly to the receiver upon tightening of screw 53 may be transmitted from part 45 of the barrel assembly to the receiver by engagement of a downwardly facing horizontal surface 82 on part 45 with the transverse rear portion 35c of top surface 35 of the receiver, and by simultaneous engagement of a downwardly facing horizontal planar surface 81 formed on a forward portion of part 45 with forward portions of upper surface areas 35a and 35b of the receiver.

The bolt carrying slide 23 may be formed integrally of a single piece of metal having two parallel side rail portions 83 received at opposite sides of and slidably engaging and guided by the lower portion of part 45 of the barrel assembly. At their inner sides, these two portions 83 of slide 23 have ribs 84 extending parallel

to the axis 131 of barrel 44 and received slidably within elongated grooves 85 formed in the outer sides of the lower portion of part 45 above bottom ribs 86 of part 45. Like ribs 84, the grooves 85 and ribs 86 of part 45 extend parallel to the axis of the barrel, with grooves 85 and ribs 86 preferably extending along the entire front to rear length of part 45, to effectively locate slide 23 and to guide it for front to rear movement between the firing position of Fig. 2 and the broken line retracted or loading position of Fig. 9. Side rails 83 of slide 23 may be interconnected at their forward ends by a transverse connector portion 87 of the slide, and are joined together at their rear end by an upwardly projecting portion 88 of the slide which movably carries bolt 24 and safety 25.

Ribs 84 of the slide extend between the locations 89 and 90 of Fig. 11, but are interrupted forwardly of the location 89 and between that point and the crosspiece 87. This interruption in the ribs between the locations 87 and 89 has a length dimension in a front to rear direction slightly greater than the front to rear length of part 45 and the grooves 85 and ribs 86 thereof, to enable the lower portion of part 45 to be inserted downwardly between the side rail portions 83 of slide 23 just rearwardly of crosspiece 87 (from the broken line position of Fig. 13 to the full line position of that figure) during assembly of the slide to the barrel structure. After the part 45 and slide have been moved vertically together in this manner to the full line position of Fig. 13 with the part 45 received between the forward portions of side rails 83 of the slide, the slide may then be moved forwardly relative to part 45 to bring ribs 84 of the slide into interfitting engagement with grooves 85 of part 45 and thereafter guide the slide for movement precisely parallel to axis 131 relative to the barrel. Preferably, the ribs 84 have forward portions 84a between the locations 89 and 91 of Fig. 11 which are relatively shallow or thin horizontally to project only partially into grooves 85 as illustrated in Fig. 6, and have rear portions 84b between

the locations 90 and 91 which are thicker horizontally to project farther into grooves 85 and occupy more of the cross sectional area of those grooves (Figs. 5 , 10 and 14b).

5 In the rear position of the slide represented in Fig. 9, the forward portions 84a of ribs 84 of the slide engage grooves 85 of part 45 of the barrel assembly in a relation locating the slide and carried bolt effectively enough for loading purposes but not as rigidly as in the forward firing
10 position of fig. 2 in which the deeper portions 84b of ribs 84 project farther into grooves 85 to much more positively locate the slide in precise alignment with the barrel as the bolt moves into engagement therewith. The portions 84a of the ribs have a vertical dimension which
15 is substantially the same as that of portions 84b so that the slide is effectively located and guided even in the rear retracted position of Fig. 9. The retracting movement of the slide is limited in that Fig. 9 position by engagement of the transverse forward portion 87 of the slide with
20 vertical surfaces 40 formed on the receiver at the forward ends of the guide ribs 38 and grooves 37 of the receiver (Fig. 4). In the Fig. 9 position of the slide, forward portions 84a of ribs 84 of the slide are received within rear portions of grooves 85 of part 45 to maintain the
25 guided relationship of the slide and to hold it in proper orientation with respect to the barrel assembly.

The sights for aiming the gun may be of any known type, and are typically represented as including a forward sight 92 attached to the front of the barrel, and a rear
30 sight 93 attached to the top of part 45 of the barrel assembly.

A member 94 is received at the underside of the barrel and is partially received within the forward hollow semi-circular portion 41 of the receiver. This element 94 has a
35 lower connecting portion 95 by which it is attached to the receiver and an upper portion 96 spaced above portion 95, with these two portions being joined together at their forward ends by a front portion 97 of element 94. The connecting portion 95 contains a circular opening 98 near
40 it's rear end through which the mounting pin 99 of the

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usual slide stop element 100 of the automatic pistol extends. This pin extends along an axis 101 disposed transversely of the barrel of the gun and extends through
5 circular openings 102 in two spaced vertical side walls 103 of the receiver to connect element 94 to the receiver in the relative position illustrated in the drawings. The upper portion 96 has a horizontal bottom wall 104 and two side walls 105 projecting upwardly therefrom to define
10 together an upwardly facing recess partially receiving the lower portion of the gun barrel. At it's forward end, portion 96 may have an upwardly projecting wall portion 106 having an upper edge 107 curved arcuately in correspondence with the curvature of the engaged portion of the barrel
15 to embrace the underside of the barrel and fit it closely. In the forward-most position of bolt carrying slide 23, the two side rail portions 83 of the slide are received at the outer sides of and closely adjacent the upwardly projecting side walls 105 of portion 96 of part 94, and the
20 transversely extending forward connector portion 84 of slide 23 is received within the space 108 vertically between lower portion 95 and upper portion 96 of part 94.

At it's rear end, the connector arm or lower portion 95 of part 94 has a rear surface 109 which may extend
25 directly vertically downwardly from the top edge of portion 95 and then curve forwardly at 110, with the vertical portion 109 being in engagement with or very closely proximate to the forward vertical surface 111 of forward recoil lug 75 of the barrel assembly. This engagement of the surfaces
30 109 and 111 acts to prevent upward swinging movement of part 45 and the carried barrel 44 about the location 112 at which inclined surfaces 34 and 74 meet the plane of the upper surface 35c of the barrel and the engaging downwardly facing surface 82 of part 45. If the recoil forces tend to
35 cause such upward swinging movement of the forward end of the barrel about the location 112 as an axis or center, that swinging movement tends to move the front vertical surface 111 of lug 75 slightly forwardly against vertical surface 109 of portion 95 of part 94, with the result that

the part 94 effectively prevents the discussed type of swinging movement and supplements the effect of screw 53 and the described recoil surfaces in assuring maintenance of proper orientation of the barrel with respect to the receiver upon firing of the gun.

The bolt 24 is mounted to the rear portion 88 of slide 23 for rotary movement relative to the slide about the axis 131 of the barrel. To mount the bolt for such rotary movement, portion 88 of the slide contains a cylindrical bore 113 within which a correspondingly cylindrical portion 114 of bolt 24 is received and journalled. The usual actuating arm or handle 115 projects laterally from the bolt to enable the bolt to be turned manually between the locked firing position of Figs. 2, 15 and 16a and the unlocked or released position of Figs. 9 and 16b in which the bolt and slide are free for retraction to open the barrel for reloading. At its forward end, the bolt carries three circularly spaced locking lugs 116 which are engageable with three coacting circularly spaced lugs 117 projecting radially inwardly from the rear portion of part 45 to lock the bolt in firing condition. When the bolt is in the position of Fig. 9, lugs 116 of the bolt can move forwardly between lugs 117 of part 45, and then by clockwise rotary movement of the bolt actuating arm 115 to the position of Figs. 2, 15 and 16a the lugs 116 can be turned to locking positions in front of lugs 117, with camming surfaces 118 on the bolt lugs engaging lugs 117 in a relation pulling the bolt tightly forwardly against the round as the bolt turns. The bolt is retained against axial movement relative to portion 88 of the slide by a pin 119 which is a pressed fit within a passage 120 in part 88 and is received within an annular groove 121 formed in the periphery of the bolt. The pin 119 is so located as to extend tangentially with respect to the groove, and thus not interfere with the rotary movement of the bolt while at the same time effectively locating the bolt against axial movement relative to part 88.

A round 14 of ammunition contained within the rear portion of the barrel assembly is fired by forward movement

of a firing pin 119 actuated by hammer 19 of the gun. This firing pin is contained within a central passage 120 in the bolt and is guided thereby for sliding movement along axis 131 of the barrel. The pin is yieldingly urged rearwardly by a spring 221, bearing at it's forward end against a shoulder 122 in the bolt and at its rear end against an annular flange 123 of the firing pin. A part 124 may be slidably inserted transversely into a guideway 125 in the bolt and contain an opening through which a portion 126 of the firing pin projects, so that flange 123 may engage rearwardly against the part 124 about it's opening to maintain the pin and spring in assembled position within the bolt. In the position to which pin 119 is urged by spring 221, the rear portion 126 of the bolt projects rearwardly beyond a planar back surface 127 of part 124, for engagement by the hammer. The back surface 127 may be located within a recess 128 in the rear of the bolt shaped to allow reception of the hammer within the recess when the bolt is in locked condition but to block movement of the hammer to the firing pin when the bolt is turned to a position allowing retraction of the bolt from the barrel. The forward end of the firing pin may be substantially flush with a forward surface 129 of the bolt in the position to which spring 221 normally urges the firing pin, and is actuated forwardly beyond that surface to engage the primer of a round of ammunition and fire the round when the hammer strikes the rear end of the firing pin.

The bolt is yieldingly retained in it's locked and unlocked positions by a detent element 132 contained within a tubular housing 133 and yieldingly urged radially outwardly away from the barrel axis by a spring 134. This detent assembly is inserted radially inwardly into a cylindrical bore or recess 135 formed in the periphery of the bolt, and is suitably secured therein by adhesive. The detent element 132 engages two detent notches 136 and 137 formed in the interior of portion 88 of slide 23.

Safety element 25 is received within a groove 138 formed in the periphery of the bolt and extending arcuately about axis 131 of the barrel and bolt. At one of it's ends 238

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(Fig. 16a), this groove opens into the hammer receiving recess 128 at the back of the bolt, and near its other end groove 138 intersects the bore 135 within which detent assembly 132-133-134 is received, with the result that the housing 133 of this detent assembly extends across the groove at that location and functions as a stop for the safety 25. Except as interrupted by recess 128 and the detent assembly, groove 138 may be circularly continuous.

10 The wall 139 forming the front of groove 138 may be disposed directly transversely of axis 131 and lie in the same plane as and form in effect a continuation of the previously mentioned surface 127 within recess 128. The opposite or rear wall 140 of groove 138 may also be

15 disposed directly transversely of axis 131 and parallel to wall 139, while the inner wall 141 of the groove may be cylindrical about axis 131.

Safety 25 is essentially arcuate about axis 131, and dimensioned to be received and confined within groove 38 in a manner locating and guiding the safety for limited rotary movement about axis 131 relative to the bolt by which it is carried. The safety is retained within the groove by engagement with the cylindrical internal surface 131 of portion 88 of slide 23, with that surface and portion

20 88 being interrupted at the location at which an actuating arm 143 of the safety element projects laterally outwardly for engagement and actuation by a user's thumb. The interruption 144 through which arm 143 projects has a circular extent allowing rotary movement of the safety

25 between the active position of Figs. 16b and 16c and the firing position of Fig. 16a. At one of its ends, the safety has a detent lug 145 which is engageable with two coating detent notches 146 and 147 formed in portion 88 of the slide to releasably retain the safety in its two

30 extreme positions. The radial dimension of the arm 148 of the safety which carries lug 145 may be slightly less than the radial dimension of the other portion 149 of the safety to allow sufficient radial movement of portion 148 and lug 145 to attain the detenting action. The safety 25

is formed of an essentially stiff but slightly resiliently deformable material such as spring steel acting to yieldingly urge the detent lug 145 radially outwardly far enough to coact effectively with notches 146 and 147. When the bolt is in it's locked position and safety 25 is in it's active position (Fig. 16c) , the extremity 149 of the safety extends across recess 128 at the back of the bolt in a relation blocking forward movement of the bolt far enough to strike and actuate the firing pin (see Fig. 17).

In order to attain a highly effective insertion of a round into the barrel assembly and removal of the spent shell from the barrel assembly after firing, and to avoid the complexity of the usual extractor and ejector mechanisms, the present gun is preferably designed for mechanically connecting a round to the bolt in it's retracted position in a manner enabling the bolt to very positively feed the round into the barrel assembly during firing and positively and reliably retract the spent shell therefrom after firing. For this purpose, the front of the bolt 24 is provided with a guideway or recess 150 (Figs. 20 through 23) which faces forwardly to receive and hold a forwardly projecting round 151, and which opens laterally for slidable insertion of the round into a condition of connected engagement with the bolt. As seen in Fig. 22, the rear portion of the round has an annular flange 152 which slidably interfits with the guideway 150 to connect the round thereto. More particularly, guideway or recess 150 has two parallel opposite side walls 153, spaced equal distances from axis 131 of the barrel and bolt, and containing two parallel grooves 154 spaced apart a distance corresponding to the diameter of flange 152 of the shell to enable the flange to be moved from the broken line position of Fig. 20 to the full line position of that figure in a manner causing diametrically opposite portions of flange 152 to engage the two grooves 154 respectively and slide thereinto far enough to bring the shell into a centered position of alignment with axis 131. The inner ends of the two parallel guideway grooves 154 are joined by a similar groove 155 which extends semicircularly about axis

131 , and which receives and engages and retains one half of the flange 152 in the fully inserted position of the round represented in full lines in Fig. 20. Forwardly
5 of the undercut grooves 154 and 155, the walls 156 of the guideway or recess 150 are shaped in conformance to the configuration of the portion of the shell just forwardly of it's flange 152 as seen in Fig. 21. When the bolt is turned to it's loading position in which it can be retracted
10 to the Fig. 9 position, the open side of the recess 150 at the front of the bolt which receives and holds the round is directed to advance slightly upwardly as it advances laterally outwardly, so that once a round has been inserted laterally inwardly and downwardly into that recess, the
15 round will remain by gravity in that position of connection to the bolt, in precise alignment therewith and with the barrel, as the bolt and connector round are pushed forwardly from the Fig. 9 position to the forward firing position of the slide. Similarly, upon subsequent retraction of the
20 bolt, the slightly upwardly inclined orientation of recess 150 within which the spent round is received assures retention of the round effectively in it's condition of connection to the bolt as the bolt is retracted and until a user forcibly displaces the spent round laterally from the
25 bolt.

When it is desired to convert the automatic gun of Fig. 1 to the single shot condition of Fig. 2 and the other figures, the first step is to remove the slide, barrel, etc. of the original gun from receiver 10. Connector
30 element 50 may then be inserted rearwardly between the two side walls 56 of the lower portion of projection 49 of part 45 of the barrel assembly, after which the barrel assembly may be moved downwardly relative to the slide, from the broken line position of Fig. 13 to the full line
35 position, after which the barrel assembly can be moved rearwardly a short distance relative to the slide to bring their guide ribs and grooves into interfitting relation. The slidably interconnected barrel assembly and slide may then be moved downwardly relative to the receiver to move

projection 49 and element 50 into the upper end of recess 12 of the receiver, with recoil surface 74 at the back of projection 49 engaging forwardly facing surface 34 of the receiver. Screw 53 may then be advanced upwardly through bottom plate 55 and into the threaded bore 51 in element 50, to tighten part 45 of the barrel assembly downwardly against the upper end of the receiver, and simultaneously tighten bottom plate 55 upwardly against the lower end of the receiver, in a manner maintaining the barrel assembly in rigidly fixed position relative to the receiver. After the parts have been assembled to this condition, an allen wrench can be inserted rearwardly into engagement with adjusting screw 77, to turn that screw until it's rear end surface 79 engages the forward recoil surface 39 of the receiver while the two rear recoil surfaces 74 and 34 remain in engagement, so that recoil may be transmitted from the barrel to the receiver simultaneously at both of these spaced locations. The part 94 is then inserted rearwardly into the front of the barrel and to the assembled position of Fig. 3, and is retained in that position by insertion of the pin portion 99 of slide stop 100 transversely through openings 102 in the side walls of the forward portion of the receiver and opening 98 in portion 95 of part 94. In this condition, the rear vertical surface 109 of part 94 is in direct engagement with the front surface of lug 75 of the barrel assembly, or at least is in such close proximity thereto as to prevent upward swinging movement of the barrel about the location 112 as an axis as previously discussed.

In loading the gun for firing, hammer 19 is pulled rearwardly to the cocked position shown in Fig. 9 and in broken lines in Fig. 16, and handle 115 of the bolt is swung in a counterclockwise direction from the locked position of Fig. 16a to the released or unlocked position of Fig. 16b, after which the bolt can be retracted rearwardly to the position of Fig. 9 for removal of a spent shell from the bolt and loading of a fresh round thereinto.

The spent shell is pushed laterally from the bolt to fall downwardly at the right side of the gun, and a new round is connected to the bolt by sliding the rear flange of the round laterally into guideway 150 of the bolt and from the position of Fig. 23 to the position of Fig. 20. The bolt carrying the round is then pushed forwardly, to move the round into part 45 of the barrel assembly, and the bolt is turned from the position of Fig. 16b to that of Fig. 16c in which it's lugs 116 engage the lugs within the rear of part 45 of the barrel assembly to lock the bolt closed for firing.

The arcuate length of the portions 148 and 149 of safety 25 is such as to cause automatic actuation of the safety in a counterclockwise direction from it's inactive position of Fig. 16a to it's active hammer blocking position of Figs. 16b and 16c when the bolt is turned manually from it's locked position of Fig. 16a to its position of Fig. 16b in which it can be retracted for reloading. During such automatic actuation of the safety, the housing 133 of detent element 132 engages extremity 157 of portion 148 of the safety to positively turn the safety with the bolt to the Fig. 16b position, in which lug 145 of the safety engages notch 147 to releasably retain the safety against unintended circular movement. Counterclockwise movement of the safety element 25 beyond the position of Fig. 16b is prevented by engagement of the actuating arm or handle 143 of the safety with a shoulder 244 formed at an end of the interruption 144 through which the arm projects outwardly.

After the bolt has been retracted, the spent shell has been ejected, a new round has been inserted slidably into the bolt, and the bolt and round have been moved forwardly to engage part 45 of the barrel assembly, but before the bolt has been turned in a clockwise direction to lock it to the bolt for firing, the parts are in the rotary positions represented in Fig. 16b in which a portion 151 of the bolt adjacent it's rear recess 128 is so located as to block forward movement of the hammer far enough to engage the firing pin and drive it forwardly.

When the bolt is then turned to it's locked position of Fig. 16c, the recess 128 is aligned with the hammer to allow forward movement of the hammer within the recess 5 and toward the firing pin. However, such clockwise rotary movement of the bolt from the position of Fig. 16b to the locked firing position of Fig. 16c does not automatically return safety 25 to its firing position of Fig. 16a, but leaves the safety in the Fig. 16c position 10 in which its portion 149 extends across recess 128 in front of the hammer in a manner preventing forward movement of the hammer far enough to engage the firing pin and thereby avoiding unintentional firing of the gun. Fig. 17 shows the hammer in engagement with portion 149 in that 15 condition of the gun, with portion 149 holding the hammer against forward movement far enough to strike and actuate the firing pin. If the gun in this condition were dropped onto a floor surface in a manner causing the hammer to engage that surface, portion 149 would positively prevent 20 the hammer under any circumstances from moving into engagement with and actuating the firing pin to fire the round in the gun. If, however, actuating arm 143 of the safety is then turned from the position of Fig. 16c to the position of Fig. 16a, portion 149 of the safety moves in 25 a clockwise direction into the portion of groove 138 adjacent recess 128 at the back of the bolt, leaving that recess completely open for forward movement of the hammer into engagement with the firing pin, and consequently the gun can in this condition be fired.

30 It will thus be apparent that the bolt actuates the safety 25 automatically in one direction, but not in the reverse direction, so that each time the bolt is turned in a counterclockwise direction to it's unlocked position allowing retraction of the bolt for reloading, the safety 35 is automatically set to a position in which it will prevent unintentional movement of the hammer into engagement with the firing pin, and the safety remains in that condition even after the bolt has been moved forwardly to close the barrel and then turned in a clockwise direction to 40 it's locked firing condition, and until the safety is

purposely turned by hand to it's inactive position allowing firing of the gun.

While a certain specific embodiment of the present
5 invention has been disclosed as typical, the invention is of
course not limited to this particular form, but rather is
applicable broadly to all such variations as fall within
the scope of the appended claims.

CLAIMS:

1. Apparatus for use in a gun having a trigger controlled hammer, said apparatus comprising a barrel structure, a firing pin at the rear of said barrel structure positioned to be driven forwardly by said hammer to fire a round of ammunition, and a safety structure for controlling actuation of the firing pin by said hammer and movable between a first position in which the hammer can drive the firing pin forwardly to fire a round and a second position in which the hammer is prevented from driving the firing pin forwardly to fire the round; characterized by said safety structure being movable between said first and second positions by swinging movement of the safety structure about an axis extending longitudinally of the barrel structure.
2. Apparatus as claimed in claim 1, including a bolt movable along said axis between a forward barrel closing position and a rear open position and mounted to swing about said axis between locked and released positions, said safety structure being mounted to said bolt for axial movement therewith and for swinging movement about said axis with and relative to the bolt.
3. Apparatus as claimed in claim 2, including means carried by said bolt and engageable with said safety structure in a relation swinging the safety structure with the bolt upon movement of the latter to said released position but permitting swinging movement of the bolt to its locked position without corresponding swinging movement of the safety structure.
4. Apparatus as claimed in claim 2 or claim 3, in which said safety structure includes an element having an arcuate portion received within an arcuate groove in said bolt and located thereby for said swinging movement about said axis between said first and second positions of the safety structure.
5. Apparatus comprising a gun barrel, a bolt mounted to move relative to the barrel between a rear open position and a forward closed position and to swing about

an axis extending longitudinally of the barrel between a locked firing position and a released position, a firing pin, a safety structure movable between a first position
5 in which a hammer can drive the pin forwardly and fire a round of ammunition and a second position in which the hammer upon forward movement cannot drive the pin forwardly and fire the round; characterized by one way automatic actuating means operable upon swinging movement of said
10 bolt from said locked position to said released position to automatically move said safety structure from said first position thereof to said second position thereof, but not operable to return the safety structure to said first position thereof upon reverse swinging movement of
15 the bolt to its locked position, and an actuator for manually moving said safety structure from said second position thereof to said first position when the bolt is in its locked position.

6. Apparatus as claimed in claim 5, in which said
20 safety structure is carried by said bolt for axial movement therewith and for swinging movement therewith and relative thereto about said axis.

7. Apparatus comprising a gun barrel structure adapted to be detachably connected to a receiver structure and to
25 apply recoil forces thereto; characterized by said barrel structure having two rearwardly facing recoil surfaces spaced apart in a front to rear direction and adapted to simultaneously engage two spaced forwardly facing recoil surfaces carried by the receiver structure to
30 transmit recoil forces thereto.

8. Apparatus as claimed in claim 7, including a connection mounting one recoil surface of one of said structures for adjusting movement relative to the other recoil surface of said one structure to assure simultaneous engagement
35 of both of said surfaces of said one structure with said surfaces of the other structure.

9. Apparatus as claimed in claim 7, in which said barrel structure has two spaced downwardly projecting lugs carrying said two rearwardly facing recoil surfaces, and
40 one of which carries a screw forming one of said rearwardly

facing surfaces and threadedly connected to said one lug for adjusting movement.

10. Apparatus as claimed in claim 7 or claim 8, in which
5 said barrel structure has a lug carrying a first of said rearwardly facing recoil surfaces at a location spaced forwardly of the second rearwardly facing surface, said apparatus including an element at the underside of the barrel structure having an arm projecting rearwardly
10 toward said lug adapted to be connected to the receiver structure by a pin extending through an opening in said arm, said arm having a rear surface engageable with a front surface carried by said lug to prevent the lug from swinging upwardly upon firing of the gun.
- 15 11. Apparatus for use with a gun receiver, comprising a barrel structure, a connection for detachably securing said barrel structure to said receiver, a bolt, and a slide carrying said bolt for rotary movement relative to the slide and movable along an axis longitudinally of
20 the barrel structure between a forward position closing the barrel structure and a rear open position, characterized by two guideways carried by said barrel structure and detachable therewith from the receiver and which guide the slide and carried bolt for said movement along said
25 axis.
12. Apparatus as claimed in claim 11, in which said receiver has a handle portion containing a recess adapted to receive a magazine containing ammunition, said connection having a portion adapted to project downwardly from said
30 barrel structure into said recess for anchoring the barrel structure to the receiver.
13. Apparatus for use with a gun receiver and a pin adapted to extend transversely through an upper portion of said receiver and through openings in two opposite side
35 walls thereof, said apparatus comprising a barrel structure to be detachably connected to said receiver, a bolt, a slide carrying said bolt and slidably movable therewith parallel to the barrel structure between a forward position closing the barrel structure and a rear open position, and
40 a member having an arm adapted to project rearwardly between

said side walls of the receiver and containing an opening through which said pin can extend to secure said member to the receiver; characterized by said member having an upper
5 portion connected to a forward end of said arm and projecting rearwardly therefrom at the underside of said barrel and spaced above said arm, with said slide having a forward portion received vertically between said arm and said upper portion of said member and movable forwardly
10 and rearwardly relative thereto.

14. Apparatus comprising a gun barrel structure, and a bolt mounted for movement between a forward position closing the barrel and a rearwardly retracted open position, characterized by said bolt containing a guideway near its
15 forward end into which a flange of a shell of a round of ammunition is slidably insertible transversely of the axis of the barrel structure in said rearwardly retracted open position of the bolt in an interfitting relation connecting the round to the bolt for forward movement
20 therewith into the barrel and for positive retraction of the spent shell from the barrel structure by the bolt.

15. Apparatus as claimed in claim 14, in which said guideway has two spaced walls at opposite sides of said axis containing undercut essentially parallel grooves for retain-
25 ing said flange of the shell at diametrically opposite locations and guiding the shell to and from a centered position of alignment with said axis, said guideway having an inner wall containing an undercut essentially semicircular groove joining inner ends of said parallel grooves and
30 receiving an inner half of said flange in said centered position thereof.

16. Apparatus as claimed in claim 14, in which said bolt is mounted for rotary movement between a position in which it can interfit with the barrel structure in a relation locking
35 the bolt thereto for firing and a released rotary position said guideway being oriented to face laterally and slightly upwardly when the bolt is in said retracted position and in said released rotary position.

17. Apparatus as claimed in any of the preceding claims,
40 including a receiver connected to said barrel structure.

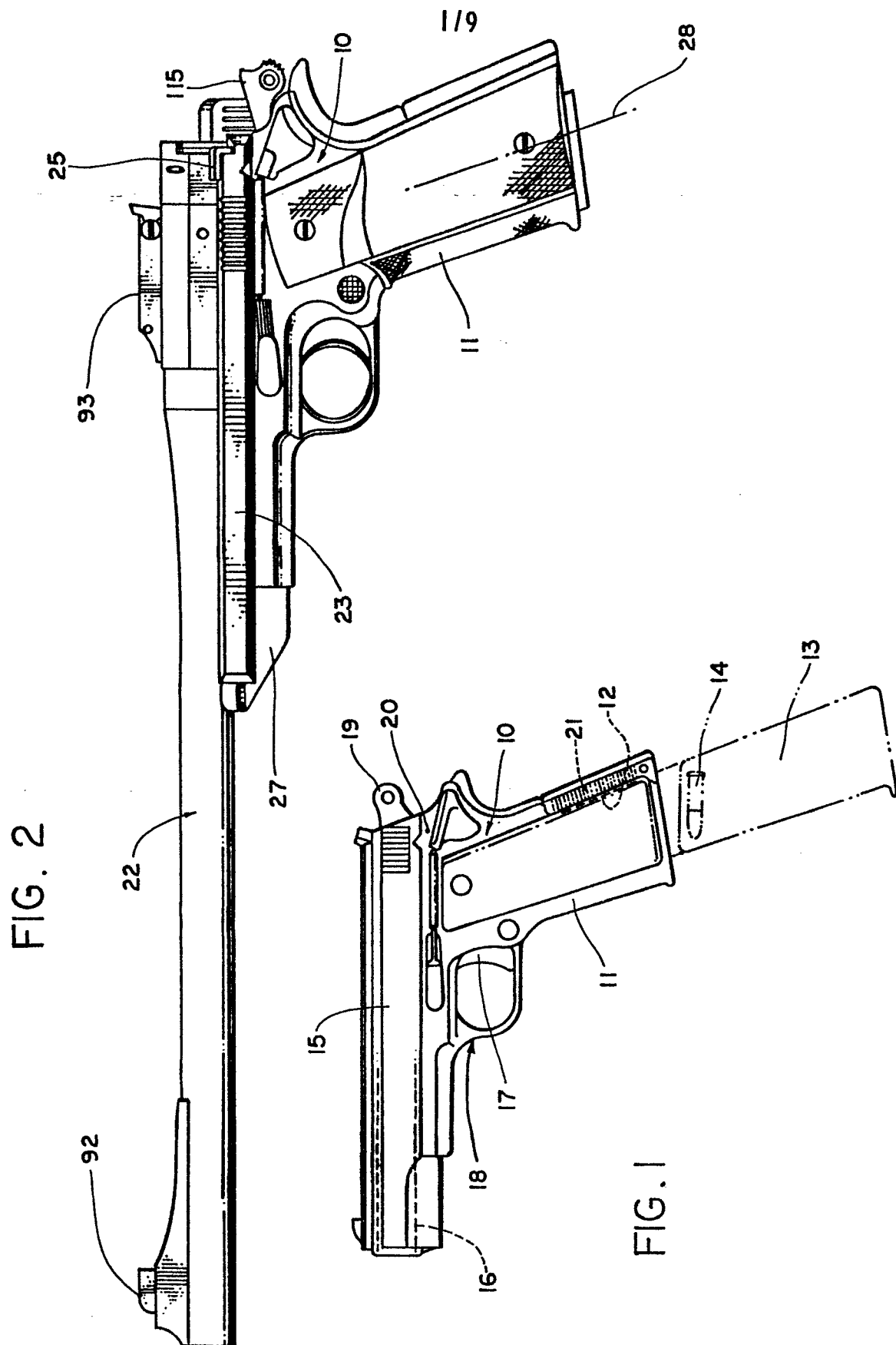


FIG. 3

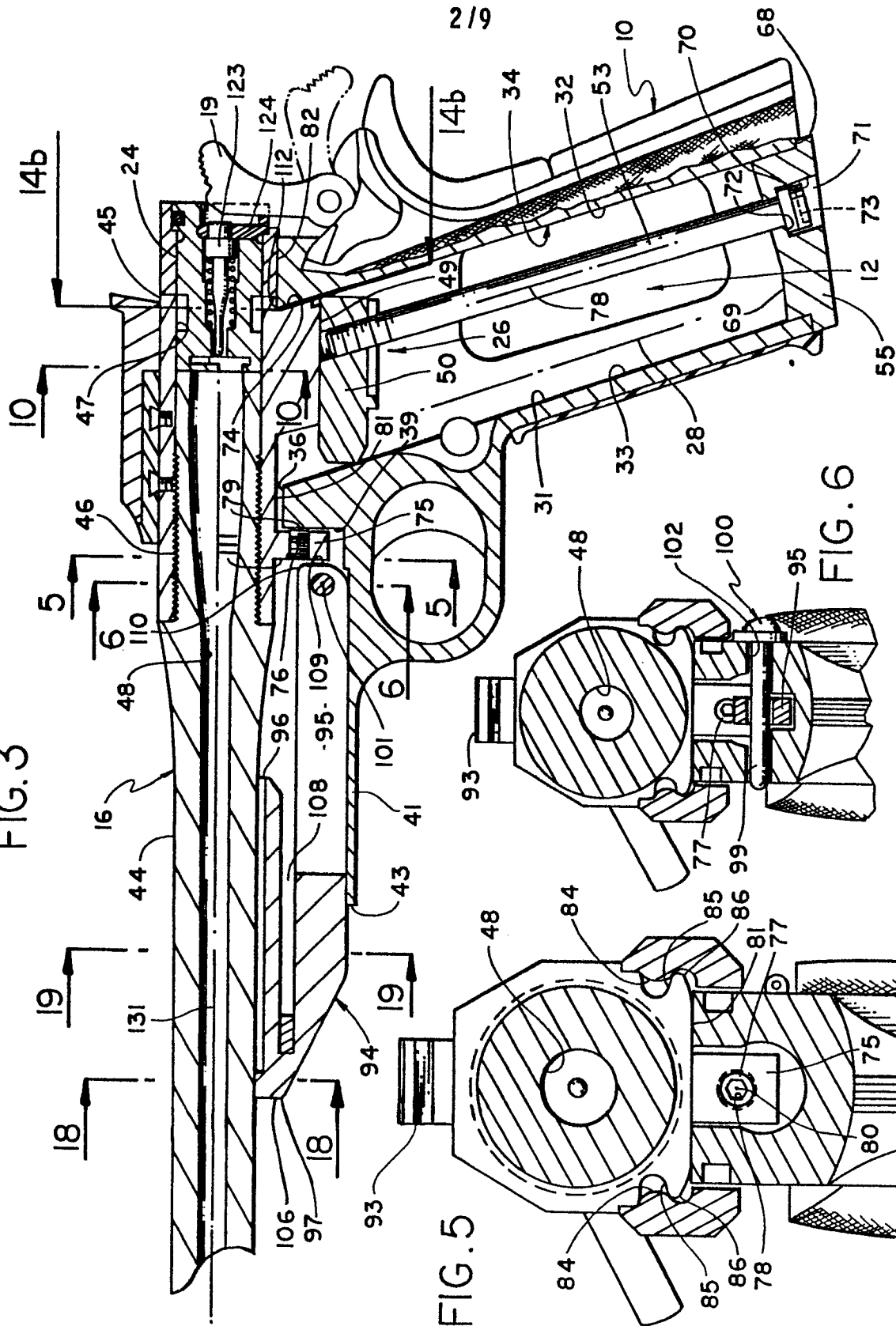
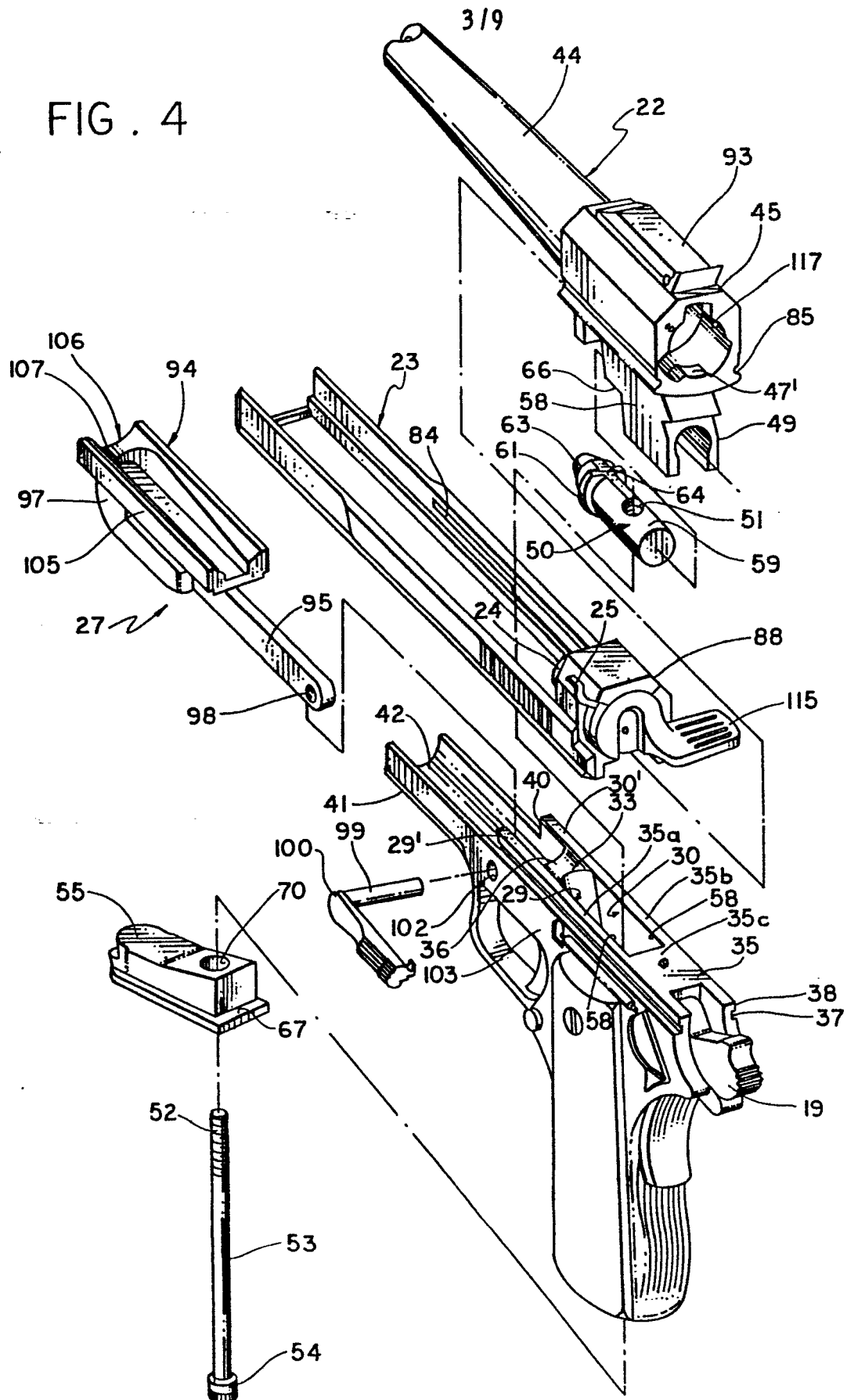


FIG. 5

FIG. 6

FIG. 4



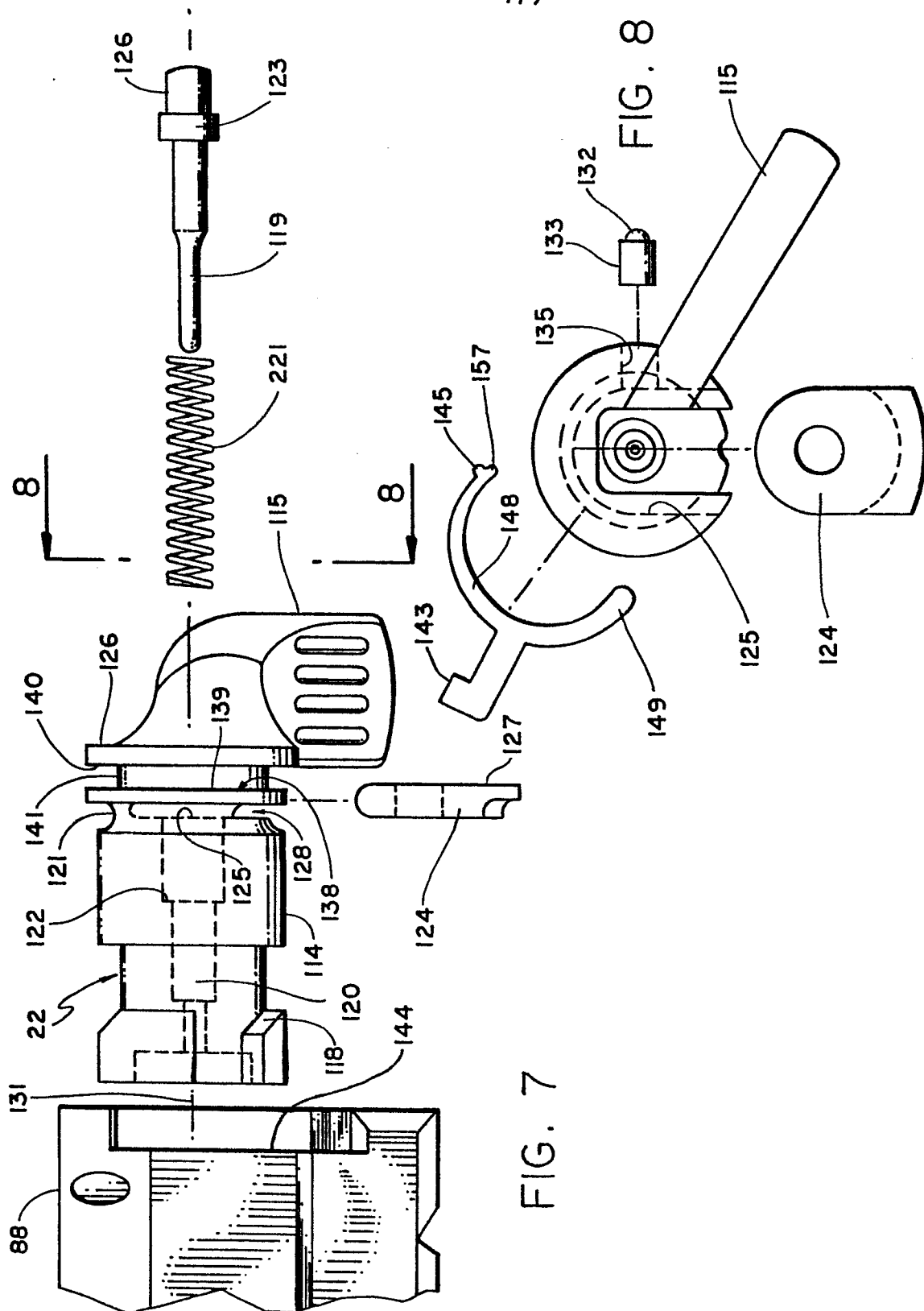


FIG. 9

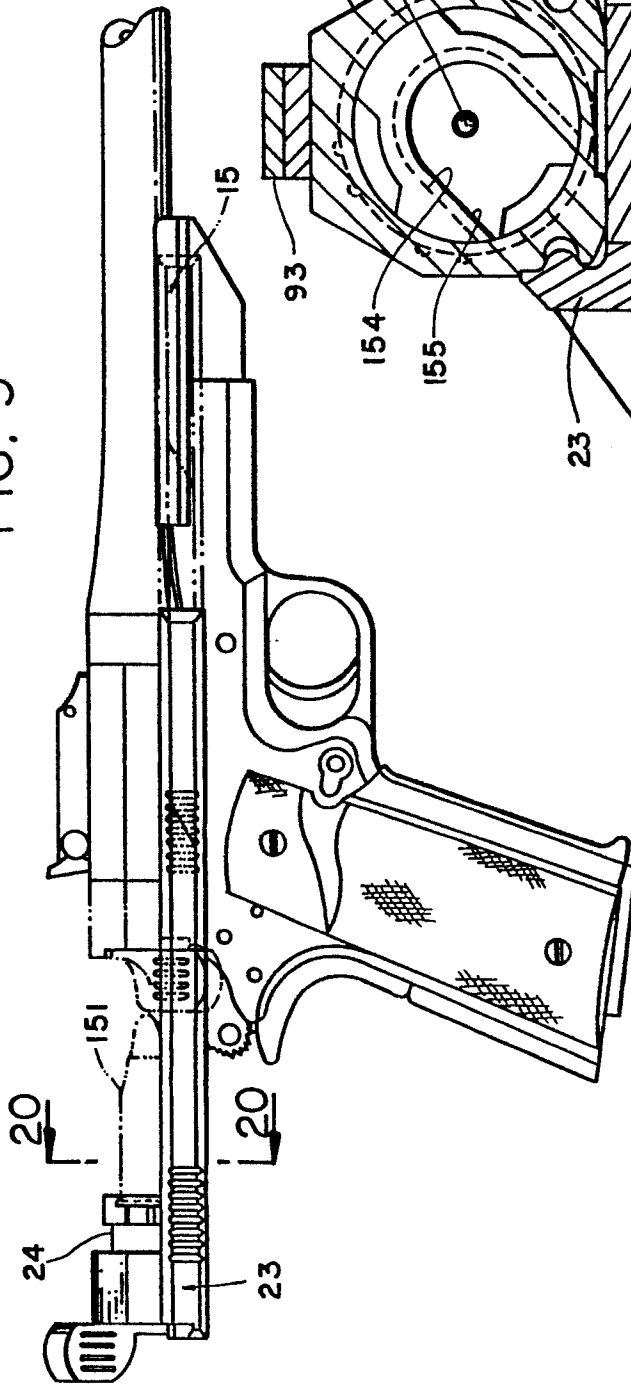


FIG 10
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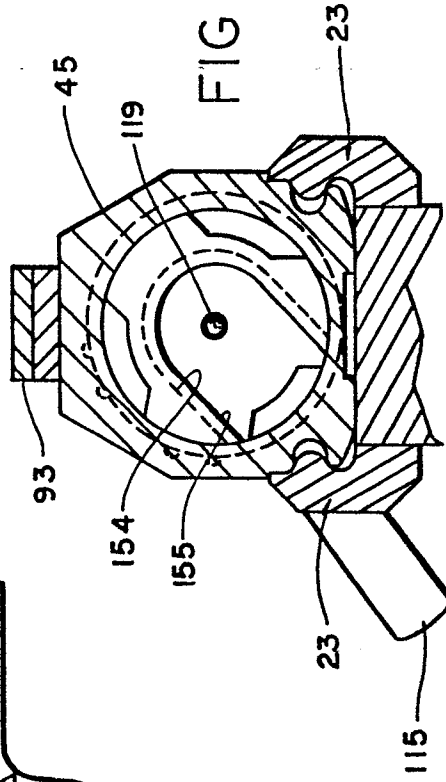
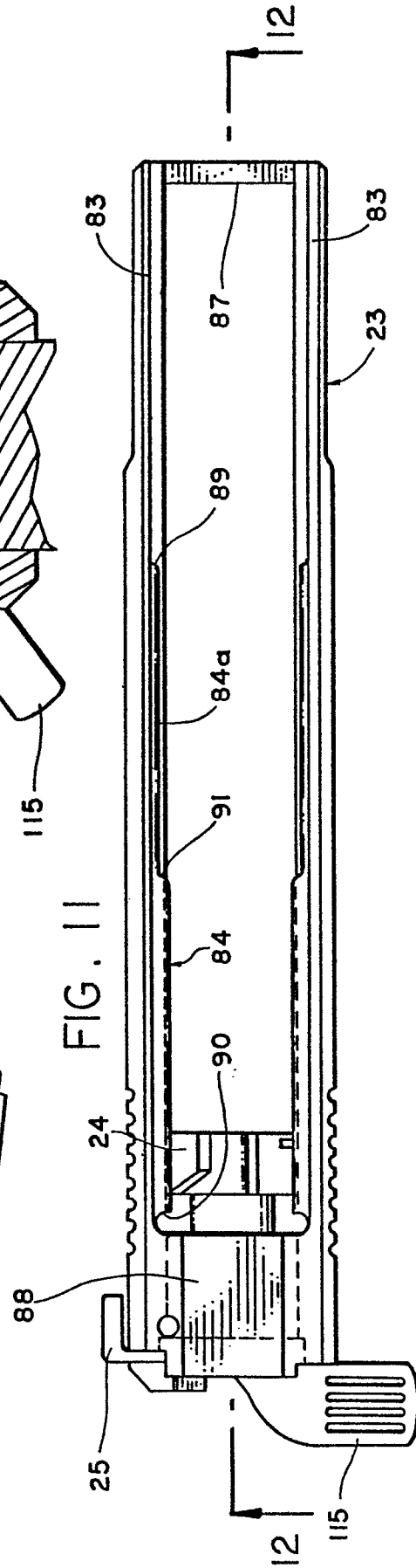


FIG. 11



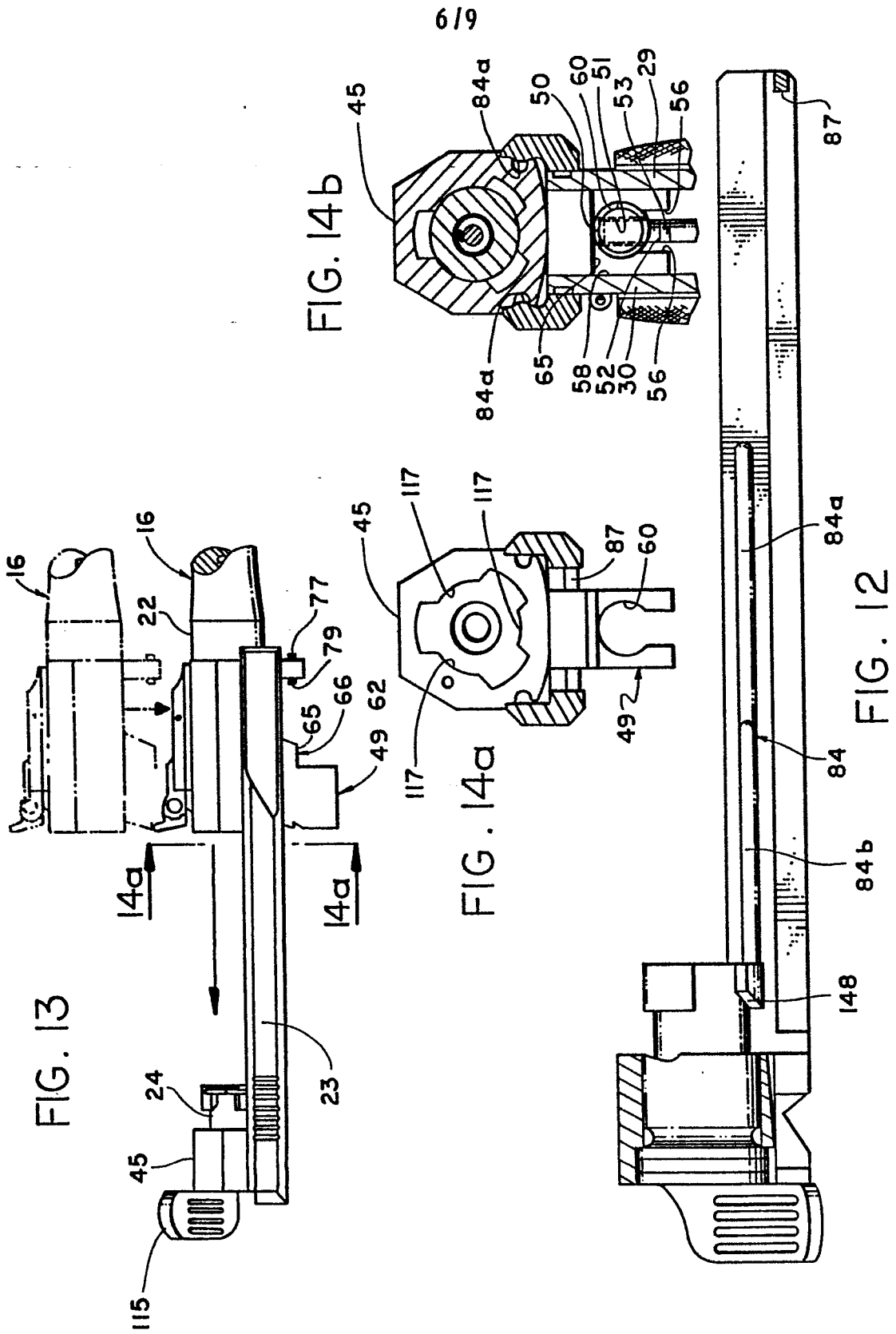


FIG. 15

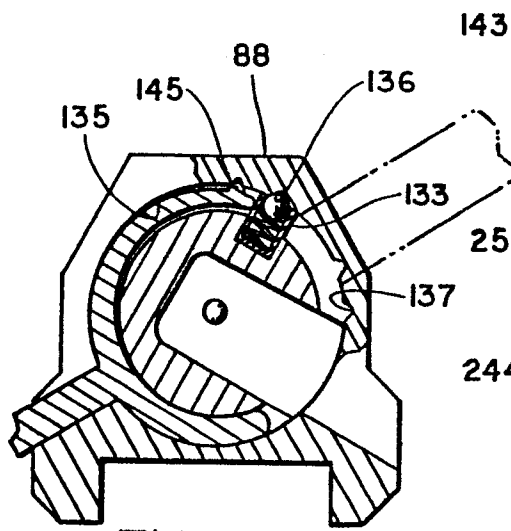
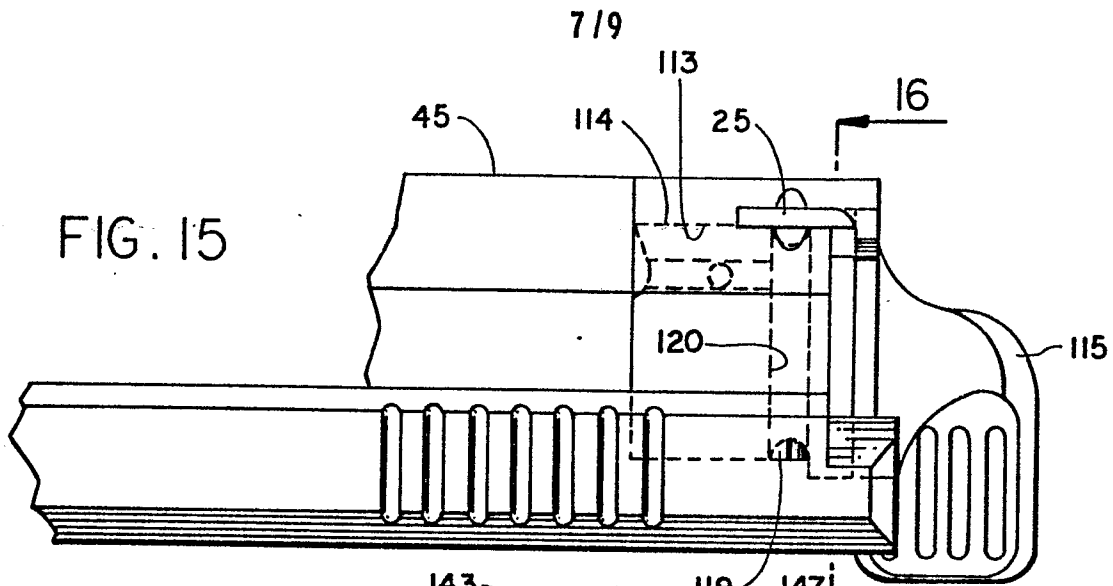


FIG. 16b

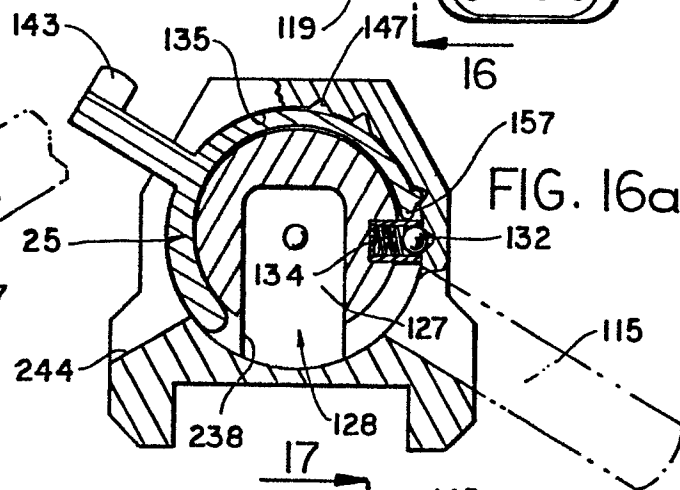


FIG. 16a

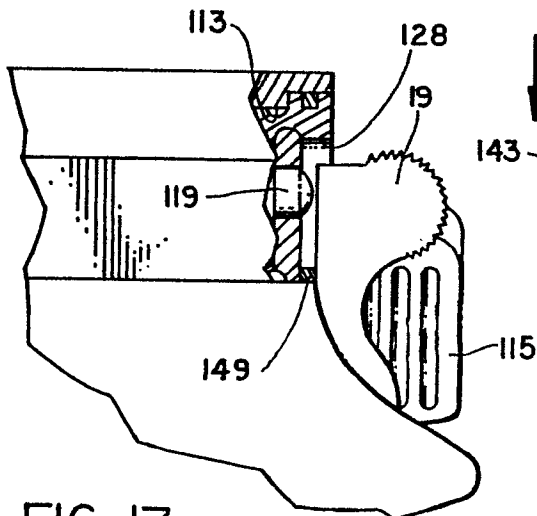


FIG. 17

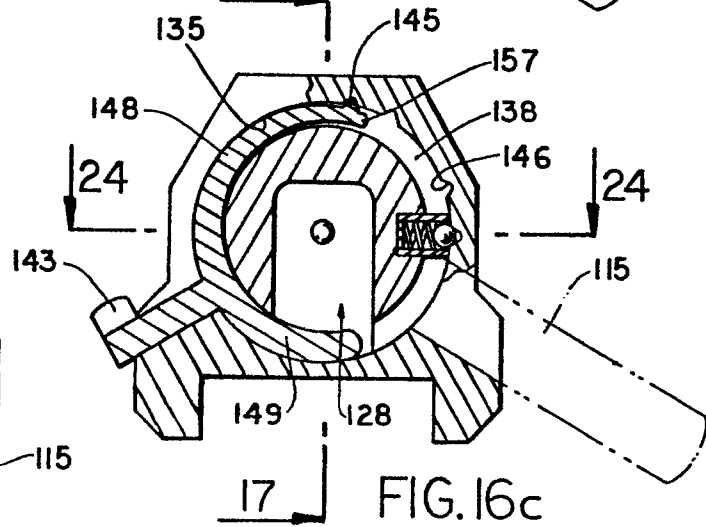


FIG. 16c

FIG. 18

FIG. 19

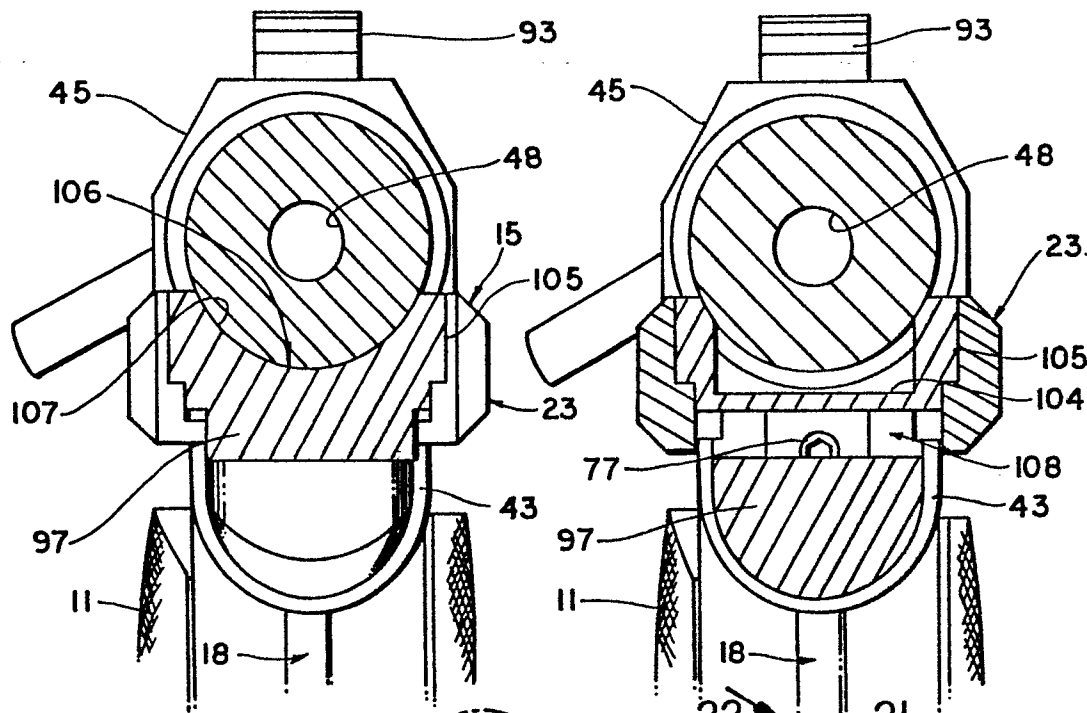


FIG. 20

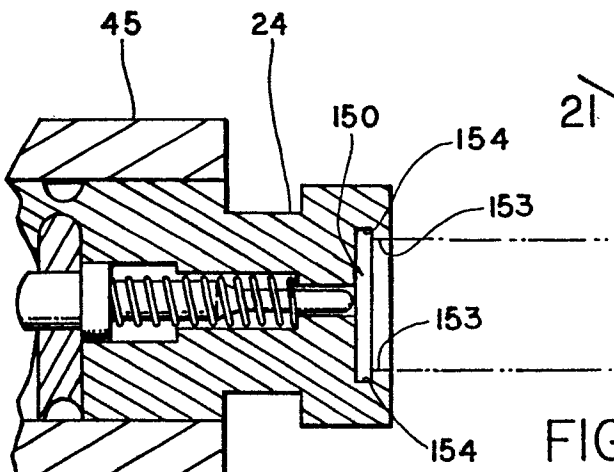
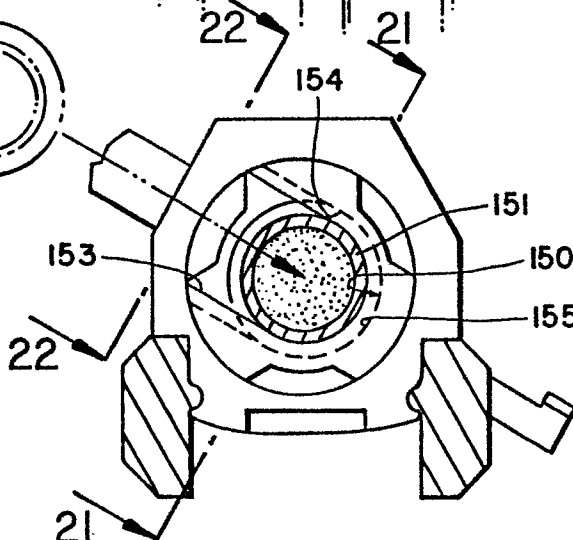


FIG. 21

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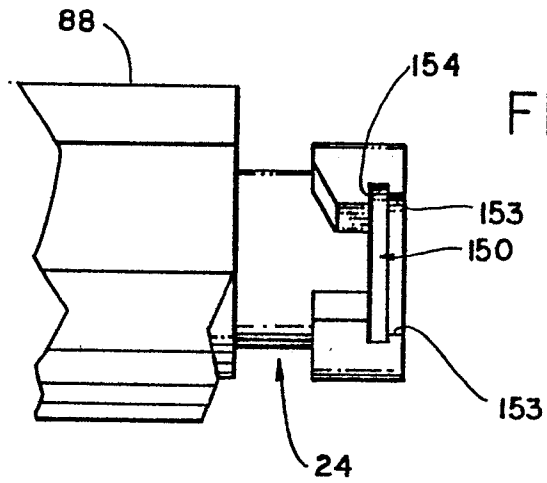


FIG. 22

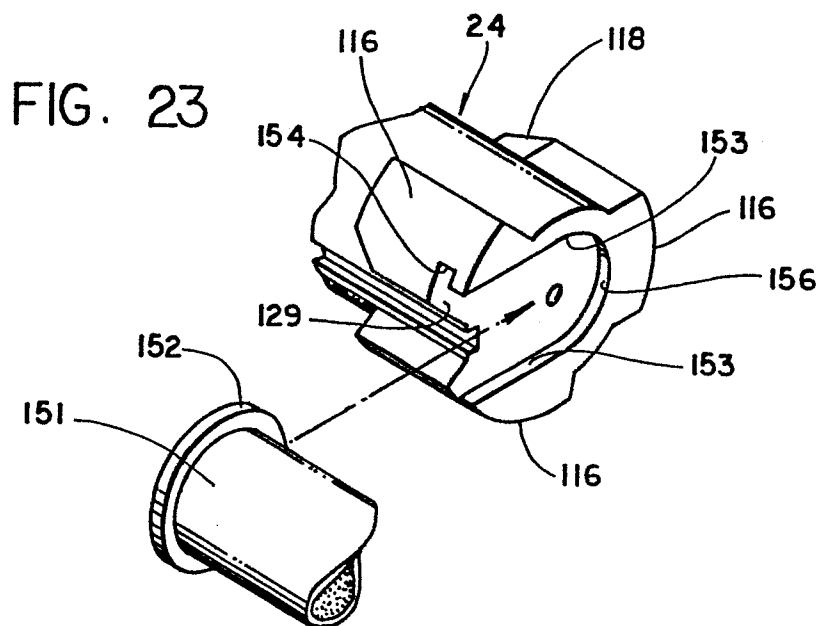


FIG. 23

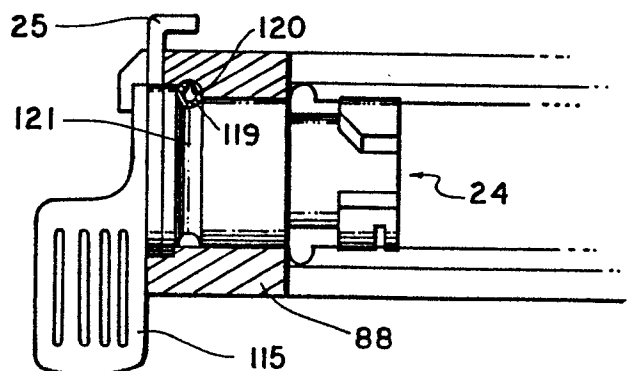


FIG. 24