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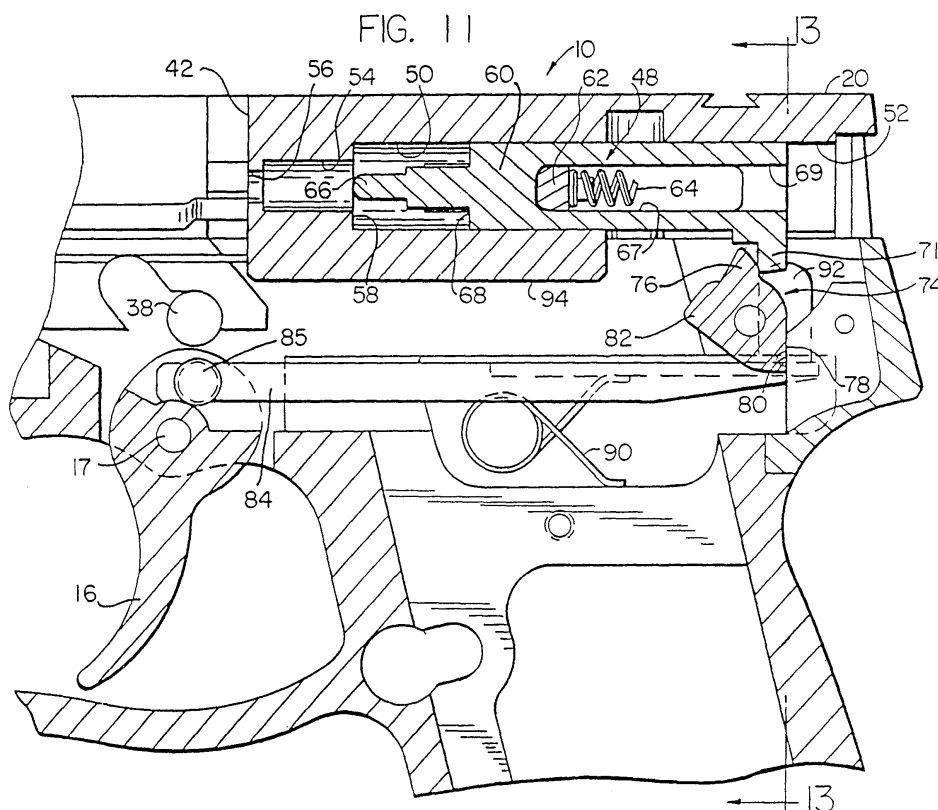
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(54) Firearm having inertia striker mechanism

(57) A firearm having an inertia striker assembly
(48) which comprises a part of the firing mechanism in-
cludes a striker (60) and a generally U-shaped spacer

(62) which straddles a portion of the striker and engages
an abutment surface (58) to nullify the biasing force up-
on the striker by an associated striker spring (64) as the
striker moves toward its striking position.



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Description

[0001] This invention relates in general to firearms and more particularly to improvements in semi-automatic firearms having an action operated by a reciprocally longitudinally moveable operating slide.

[0002] When the firing mechanism of such a firearm includes an inertia striker mechanism the striker mechanism usually includes several small parts. Taking apart such an assembly and reassembling it in normal cleaning and servicing is usually a time consuming operation requiring considerable dexterity.

[0003] Accordingly, it is the general aim of the present invention to provide an improved firearm having a striker mechanism which requires a reduced number of parts.

[0004] According to the invention there is provided, in a firearm including a longitudinally moveable slide having a forwardly facing breech face and a bore extending through a portion of said slide and opening through said breech face; an inertia striker mechanism supported for reciprocal sliding movement within said bore and including a striker having a tip at its forward end and supported for reciprocal axial movement between cocked and firing positions, said tip projecting through and forwardly beyond said breech face when said striker is in its firing position, a generally U-shaped spacer straddling an associated portion of said striker, a spring engaged with said spacer for urging said spacer and said striker in the direction of said firing position, and an abutment surface on said slide for halting movement of said spacer toward said firing position before said striker reaches said firing position, said striker being freely moveable relative to said slide and said spacer in response to inertia during the final portion of its travel from said cocked position to said firing position.

[0005] An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which-

Fig. 1 is a side elevational view of a semi-automatic pistol embodying the present invention;

Fig. 2 is a somewhat enlarged longitudinal sectional view through the pistol of Fig. 1;

Fig. 3 is an enlarged somewhat schematic fragmentary sectional view taken along the line 3-3 of Fig. 2;

Fig. 4 is a somewhat schematic fragmentary longitudinal sectional view through the gun of Fig. 1 shown with the barrel in locked position;

Fig. 5 is similar to Fig. 4 but shows the barrel in an unlocked position;

Fig. 6 is a somewhat schematic enlarged fragmentary longitudinal sectional view through the rear portion of the operating slide showing the striker assembly in cocked position;

Fig. 7 is similar to Fig. 6 but shows the striker in a striking position;

Fig. 8 is a sectional view taken along the line 7-7 of Fig. 6;

Fig. 9 is a fragmentary sectional view taken along the line 9-9 of Fig. 8;

Fig. 10 is a somewhat reduced fragmentary sectional view taken along the line 10-10 of Fig. 8;

Fig. 11 is an enlarged somewhat schematic fragmentary sectional view similar to Fig. 2 but shown with the firing mechanism in half-cocked position;

Fig. 12 is similar to Fig. 11 but shows the opposite side of the gun with the firing mechanism in fully-cocked position at the point of release;

Fig. 13 is an enlarged somewhat schematic fragmentary sectional view taken generally along the line 13-13 of Fig. 11; and

Fig. 14 is a perspective view of the U-shaped spacer.

[0006] In the drawings and in the description which follows the invention is illustrated and described with reference to a handgun or semiautomatic pistol indicated generally by the reference numeral 10. The illustrated pistol 10 has a frame or upwardly open receiver indicated generally at 12 including laterally spaced apart sidewalls 14, 14, best shown in Figs. 3 and 13, an operating trigger 16 pivotally supported on the receiver between the sidewalls by a trigger pivot pin 17, a breech locking barrel 18 supported on the receiver, and an operating slide 20 suitably supported on the receiver for limited reciprocal movement during manual cocking of the gun and during automatic recoil upon firing.

[0007] Illustration and detailed description of conventional features such as the extractor, ejector, ejection port and magazine feed mechanism have been omitted, since an understanding of these features is not essential to an understanding of the invention.

[0008] Considering the pistol 10 in further detail, the breech locking barrel 18, best shown in Figs. 2, 4 and 5, is supported for movement on the receiver 12 and has a bore 22 which extends coaxially through it. An integral barrel cam lug 24 defines a cam surface 26, depends from the rear or breech end portion of the barrel 18, and extends into the upwardly open receiver 12. In accordance with the present invention the barrel cam lug 24 is laterally offset from the axis of the barrel bore, as shown in Fig. 3 where the bore axis is indicated at 28 and the lateral offset is designated by the numeral 30. This lateral offset provides a space between one side of the cam lug 24 and the associated receiver sidewall 14, as shown in Fig. 3.

[0009] A barrel mounting or camming pin 38 supported in fixed position on the receiver by the sidewalls 14, 14 extends laterally across the receiver 12 and engages the cam surface 26 on the offset cam lug to support the barrel 18 for limited forward and rearward movement longitudinally of the receiver 12 and for pivotal movement about a laterally extending axis relative to the receiver. The operating slide 20 which moves the barrel between its locked and unlocked positions is supported on the receiver 12 for reciprocal sliding movement lon-

gitudinally of the receiver between a forward position shown in Figs. 2 and 4 and corresponding to the locked position of the barrel and a retracted position shown in Fig. 5 corresponding to an unlocked position of the barrel 18. In its forward position the operating slide 20 engages a forwardly facing abutment surface 40 on the barrel to retain the barrel in its locked position against a forwardly facing breech face 42 best shown in Fig. 2 and defined by a rear portion of the operating slide 20. A recoil spring 44 supported by a recoil spring guide 46 and mounted in the forward end of the receiver 12 acts between the receiver and the operating slide 20 to bias the operating slide toward its forward or barrel locking position of Fig. 4.

[0010] Referring now to Figs. 2 and 11-14, the firing mechanism, which includes the trigger 16, employs a spring propelled inertia striker assembly indicated generally at 48. The striker assembly is received within a stepped cylindrical bore 50 which extends through the rear portion of the operating slide 20. The bore 50 is coaxial aligned with the barrel bore axis 28 when the barrel 18 is in its locked position, as best shown in Fig. 2. The bore 50 has a generally cylindrical rear portion 52, a diametrically reduced intermediate portion 54, which communicates with the rear portion 52, and a further diametrically reduced forward end portion 56, which communicates with the intermediate portion 54 and opens through the breech face 42. A rearwardly facing annular abutment surface 58 is located at the juncture of the rear portion 52 and the intermediate portion 54.

[0011] The striker assembly 48 includes a striker 60, a generally U-shaped spacer 62, a striker spring 64 and a striker spring guide rod 65. The striker 60 is generally cylindrical, supported for coaxial sliding movement within the bore 50 and has a forwardly facing shoulder 68 for cooperative engagement with the abutment surface 58 to limit the forward travel of the striker within the bore 50. The forward end portion of the striker has a reduced diameter and is adapted to be freely received within the intermediate portion 54. At its forward or free end the striker 60 has a tip 66 sized for free passage through the forward portion 56 and to a striking position beyond the breech face 42. An axially extending slot 67 extends laterally through the striker 60 rearward of the shoulder 68 and intersects a bore 69 which extends coaxially through the rear part of the striker. An integral tongue 71 depends from the rear end of the striker 60 and projects downwardly through and beyond an associated slot 70 formed in the lower rear portion of the operating slide 20 and best shown in Fig. 13.

[0012] The spacer 62 which drives the striker 60 through a portion of its travel to its striking position comprises a generally U-shaped member which is disposed within the forward end of the slot 67 and straddles the forward portion of the striker 60. The spacer 62 has a pair of forwardly projecting legs 72, 72 which extend forwardly beyond the shoulder 68 when the spacer 62 is disposed in driving engagement with the striker 60. The

striker spring 64 is received on the striker guide rod 65, extends through the bore 69 and engages a spring retainer on the rear of the U-shaped spacer 62, substantially as shown. The striker assembly 48 is retained in assembly with the operating slide 20 by a back plate 73 releasably secured in the slots rear of the operating slide 20 by a spring biased detent (not shown). The striker spring 64 acts between the U-shaped spacer 62 and the back plate 73 to propel the striker 60 in a forward direction and toward its striking position as will be hereinafter further discussed. In the latter position the tip 66 projects through and beyond the breech face 42 to strike and detonate the primer of an associated cartridge in the barrel chamber when the gun 10 is fired.

[0013] Referring now particularly to Figs. 2 and 11-13, the firing mechanism includes a cocking and releasing element or cam indicated generally at 74 and supported by a pivot pin mounted in fixed position on and extending laterally across the receiver 12. The cam 74 has a first cam lobe 76 and is prevented from rotating in a counterclockwise direction from a first position, in which it appears in Fig. 11, by an abutment surface 78 on the cam which engages an arresting surface 80 on the receiver. A biasing spring 81 shown in Fig. 12 and connected between the cam 74 and the receiver 12 biases the cam 74 in a clockwise direction (Fig. 12) and toward its first position.

[0014] The cocking and releasing cam 74 further includes a second cam lobe 82 angularly offset in a counterclockwise direction from the first cam lobe 76 as shown in Fig. 11.

[0015] A trigger bar 84, which also comprises a part of the firing mechanism, is pivotally connected to the trigger 16 by a trigger bar pivot pin 85 for forward and rearward movement between the trigger pivot pin 17 and the barrel camming pin 38, substantially as shown in Figs. 11 and 12. A lateral projection 86 on the rear end of the trigger bar, best shown in Fig. 13, engages the cocking and releasing cam 74 within a recess 88 in the rear of the cam when the cam 74 is in its first position, as it appears in Fig. 11. When the trigger is pulled or drawn back to its firing position, as it appears in Fig. 12, the trigger bar 84 moves in a forward direction causing clockwise rotation of the cam 74 from its position of Fig. 11 to its position of Fig. 12. A spring 90 (Fig. 12) acts between the receiver 12 and the trigger bar to bias the trigger bar upwardly and to its position of engagement with the cam 74. An upwardly projecting cam 92 on the rear end of the trigger bar cooperates with a cam surface 94 on the under side of the operating slide 20 to disconnect the trigger bar 84 from the rotary cam 74 when the operating slide 20 moves' rearwardly toward its retracted position

[0016] When the gun is uncocked and in inactive condition, as it appears in Fig. 2 the striker tongue 71 is located forward of the first cam lobe 76. Preparatory to firing the pistol 10 the operating slide 20 is manually retracted, which locates the tongue 71 rearward of the first

cam lobe 76 as it appears in Fig. 11. The striker tongue 71 rests on the first cam lobe 76 which is prevented from rotating in a counterclockwise direction from its first position of Fig. 11 by engagement of the abutment surface 78 on the cam with the arresting surface 80 on the receiver. As the operating slide returns to its forward position in response to the biasing force of the recoil spring 44 the striker spring 64 is compressed placing the striker assembly 48 in its half-cocked position of Fig. 11.

[0017] In this half-cocked position the striker 60 lacks sufficient potential energy to detonate a cartridge primer if accidentally released.

[0018] The aforescribed elements which comprise the firing mechanism move as the trigger 16 is drawn back toward its firing position. The cocking and releasing cam 74 moves in a clockwise direction from its position in Fig. 11 to drive the striker rearwardly from its half-cocked position to its fully-cocked position before it is released by the first cam lobe 76 in the position generally shown in Fig. 12.

[0019] As the trigger is pulled beyond the position shown in Fig. 12 the first cam lobe 76 disengages from the striker tongue 71 thereby freeing the striker to move forward and toward its striking position in response to the propelling force imparted to the spacer 62 and the striker 60 by the striker spring 64. Forward movement of the spacer 62 is arrested by engagement of the forwardly extending legs 72, 27 with the rearwardly facing abutment surface 58. However, the striker 60 continues to move in a forward direction and to its striking position under its own inertia free of further influence by the striker spring 64.

[0020] The second cam lobe 82 is employed to elevate to a releasing position a blocking member 83 (Fig. 2) mounted in the operating slide 20 generally above the striker assembly 48 and spring biased downwardly and into a blocking position into the path of the striker 60 to prevent movement of the striker to its striking position when the trigger is in its inactive position. The angular offset of the second cam lobe 82 relative to the first cam lobe 76 times release of the striker block so that the striker remains in a blocked condition until the first cam lobe approaches its striker releasing position of Fig. 12 in response to movement of the trigger 16 to its firing position.

[0021] The trigger bar 84 remains in engagement with the cocking and releasing cam 74 until the striker tongue 71 has been released, a loaded cartridge has been detonated by the striker 60 and the operating slide 20 begins its rearward movement under recoil and toward its retracted position. During rearward movement of the operating slide the cam surface 94 on the under side of the operating slide 20 engages the trigger bar cam 92 to pivot the trigger bar 84 downwardly and move it out of engagement with the cam 74, thereby freeing the cocking and releasing cam 74 and allowing it to spring back to its first position in response to the biasing force of the spring. The spent shell casing is also extracted and

ejected in a convention manner during rearward movement of the operating slide 20.

[0022] As the operating slide 20 moves forwardly on its return stroke the striker tongue 71 catches the first cam lobe 76 which has returned to its first position. A round of ammunition is also fed from the magazine into the chamber during the return movement of the operating slide to its forward position. The gun is now ready to fire the next round in response to operation of the trigger.

[0023] It will now be apparent that the aforescribed gun 10 has a double-action and that pulling the trigger 16 both cocks the striker assembly and releases it from its cocked position. The cocking and releasing cam 74 also serves as a striker block when the striker 60 is in its half-cocked position so that the striker cannot escape from the latter position unless the trigger is pulled. It should be noted that the pivotal axis of the cocking and releasing cam 74 is located generally centrally of the cam. The first lobe 76 is centered generally vertically above the cam pivotal axis and the abutment surface 78 is located below the cam pivotal axis when the cam is in its first position. Thus, the abutment surface 78 on the cam and located below the cam axis and which cooperates with the arresting surface 80 on the receiver provides positive resistance to pivotal movement of the cam in a counterclockwise direction from its position of Fig. 11 so that the cam lobe 76 cooperates with the tongue 71 to block movement of the striker 60 toward its striking position. Vertical alignment of the first cam lobe 76 with the pivotal axis of the cam in its first position provides an important safety feature, because the angular movement of the cam (over 60 degrees) which is required to move the striker 60 to and release it in its fully-cocked position is too great a movement to result from dropping the gun. It will also be noted that the biasing force of the springs 64 and 81 which exert counterclockwise biasing force on the cam 74 cooperate with the arresting surface 80 on the receiver to retain the first cam lobe in vertically oriented or striker blocking position. The latter springs resist rotation of the cam 74 in the event that the gun is dropped or otherwise subjected to a sudden shock force. Further, since the pivotal axis of the cam is located generally centrally of the cam the weight and the cam is roughly evenly distributed about the cam axis so that dropping the gun is not likely to induce rotation of the cam due to its own inertia.

[0024] A long trigger pull is required to produce the angular displacement of the cocking and releasing cam (over 60 degrees) necessary to move the striker 60 from its half-cocked to its fully-cocked and releasing position. The first cam lobe 76 moves both vertically and horizontally as the cam 74 travels along its rotational arc to move the striker 60 from its half-cocked to its fully-cocked and releasing positions against the biasing force of the springs 64 and 81. The aforescribed features result in an inherently safe firearm.

[0025] The staggered or laterally offset barrel cam lug provides sufficient cam surface to support the barrel for

its movement while allowing sufficient space adjacent the cam lug for receiving portions of the trigger and the trigger bar when the barrel moves to its unlocked position and without increase in the width dimension of the gun. This arrangement also enables the barrel camming pin to be located above and in general vertical alignment with the trigger pivot pin while allowing for trigger bar movement between the latter pins. This close structural arrangement of parts relative to each other coupled with the lateral offset of the barrel cam lug enables construction of a compact breech loading handgun having an unusually low profile, which allows the barrel to be positioned close to the hand of the user to reduce what is commonly referred to in the industry as "muzzle flip" and recoil effects.

[0026] The U-shaped spacer which straddles the striker may be readily assembled with the striker with minimal dexterity so that the striker assembly may be rapidly taken apart and reassembled, when necessary, in cleaning and servicing the gun. The disclosed striker assembly performs its function with a minimal number of parts thereby reducing manufacturing and assembling cost.

Claims

1. In a firearm (10) including a longitudinally moveable slide (20) having a forwardly facing breech face (42) and a bore (50) extending through a portion of said slide and opening through said breech face; an inertia striker mechanism (48) supported for reciprocal sliding movement within said bore and including a striker (60) having a tip (66) at its forward end and supported for reciprocal axial movement between cocked and firing positions, said tip projecting through and forwardly beyond said breech face when said striker is in its firing position, a generally U-shaped spacer (62) straddling an associated portion of said striker, a spring (64) engaged with said spacer for urging said spacer and said striker in the direction of said firing position, and an abutment surface (58) on said slide for halting movement of said spacer toward said firing position before said striker reaches said firing position, said striker being freely moveable relative to said slide and said spacer in response to inertia during the final portion of its travel from said cocked position to said firing position.
2. A firearm as claimed in claim 1, wherein said striker (60) has an axially extending slot (67) therethrough and said spacer (62) extends through said slot.
3. A firearm as claimed in claim 1 or 2, wherein said abutment surface (58) is defined by a portion of said bore (50) and said spacer (62) has a pair of forwardly extending legs (72) straddling said striker (60) and engageable with said abutment surface.
4. A firearm as claimed in any of claims 1 to 3, wherein said bore (50) is a stepped bore and said abutment surface (58) comprises an annular radially disposed surface of said bore.
5. A firearm as claimed in any preceding claim, wherein said spring (64) acts between said slide (20) and said spacer (62).
6. A firearm as claimed in any preceding claim, further comprising a spring guide rod (65) supported in fixed position relative to said slide (20) and extending into said spring (64).
7. A firearm as claimed in any preceding claim, wherein said slide (20) includes a back plate (73) forming a closure for the rear end of said bore (50) and said spring (64) acts between said back plate and said spacer (62).
8. A firearm as claimed in claims 6 and 7, wherein said spring guide rod (65) extends from said back plate (73) into said spring (64).

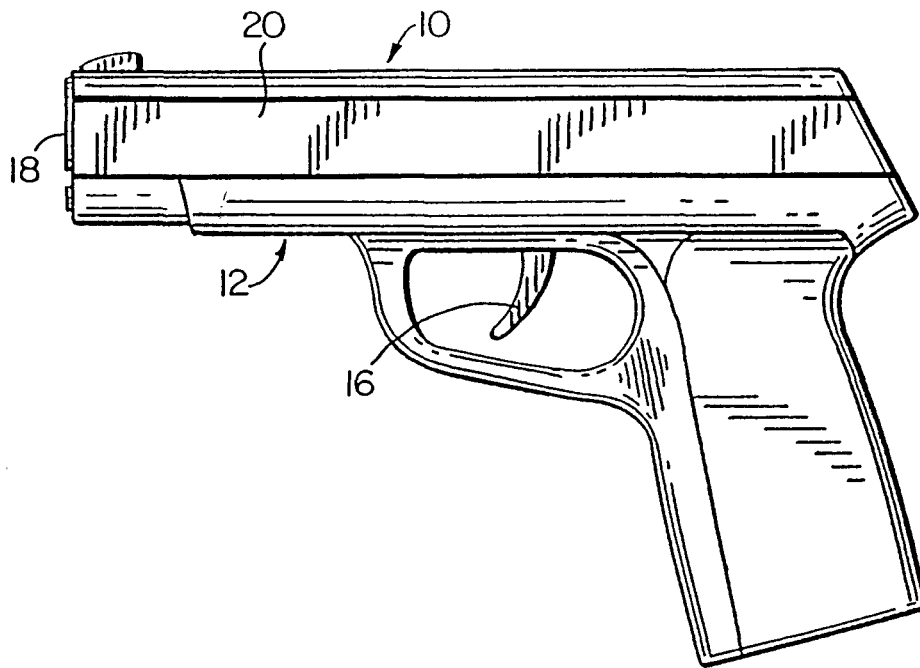


FIG. 1

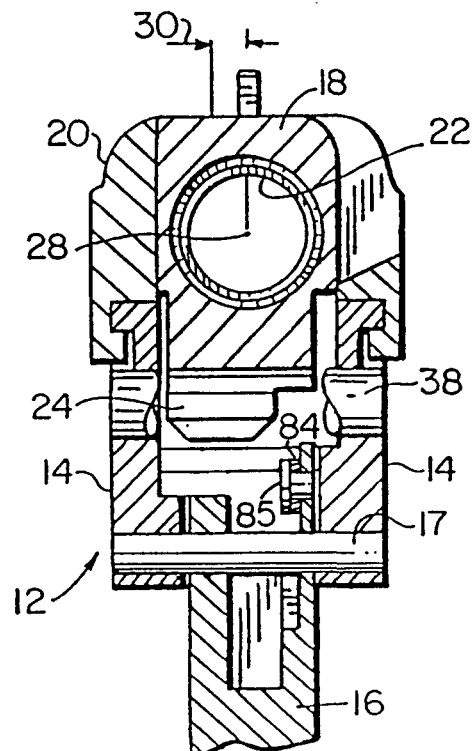


FIG. 3

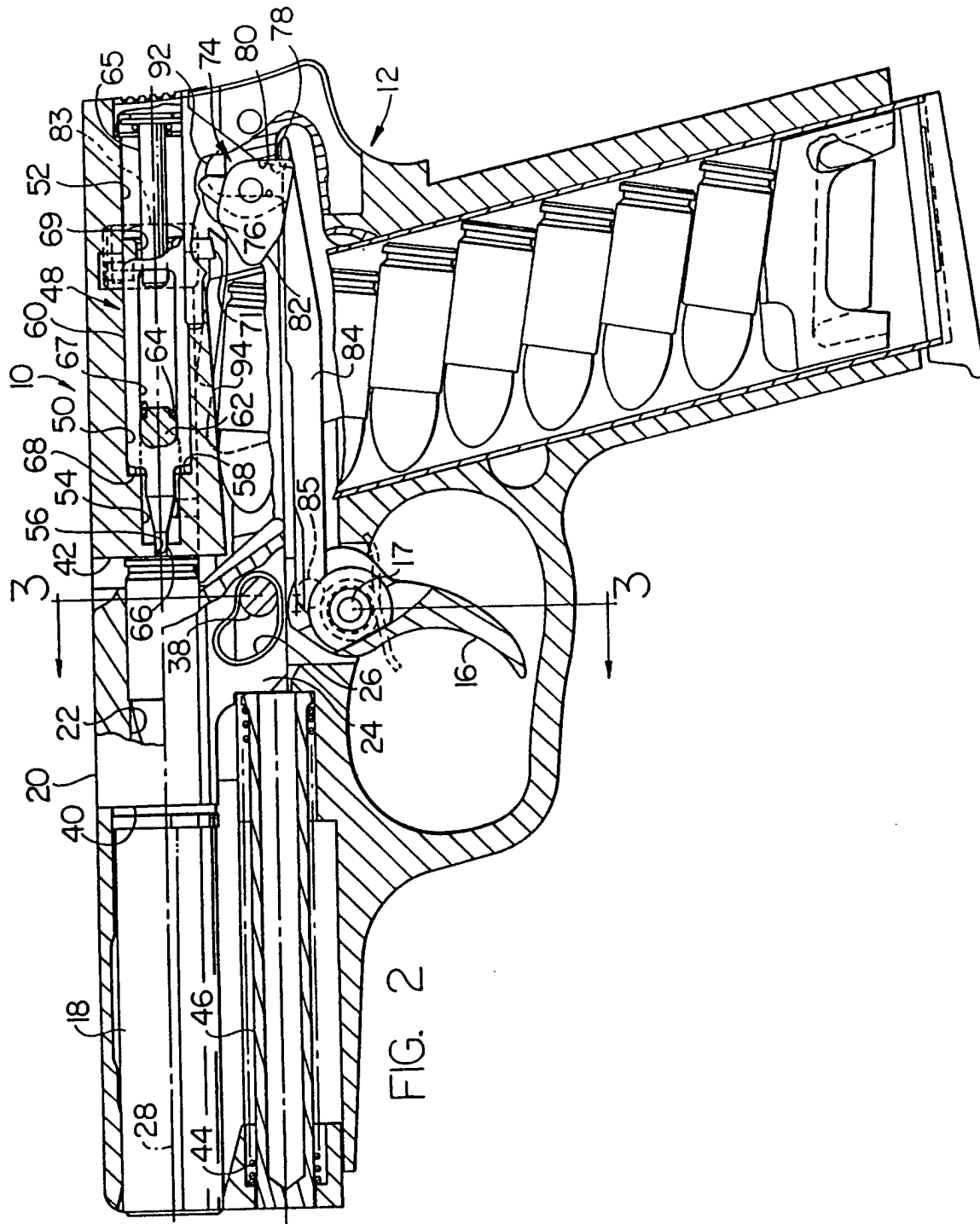
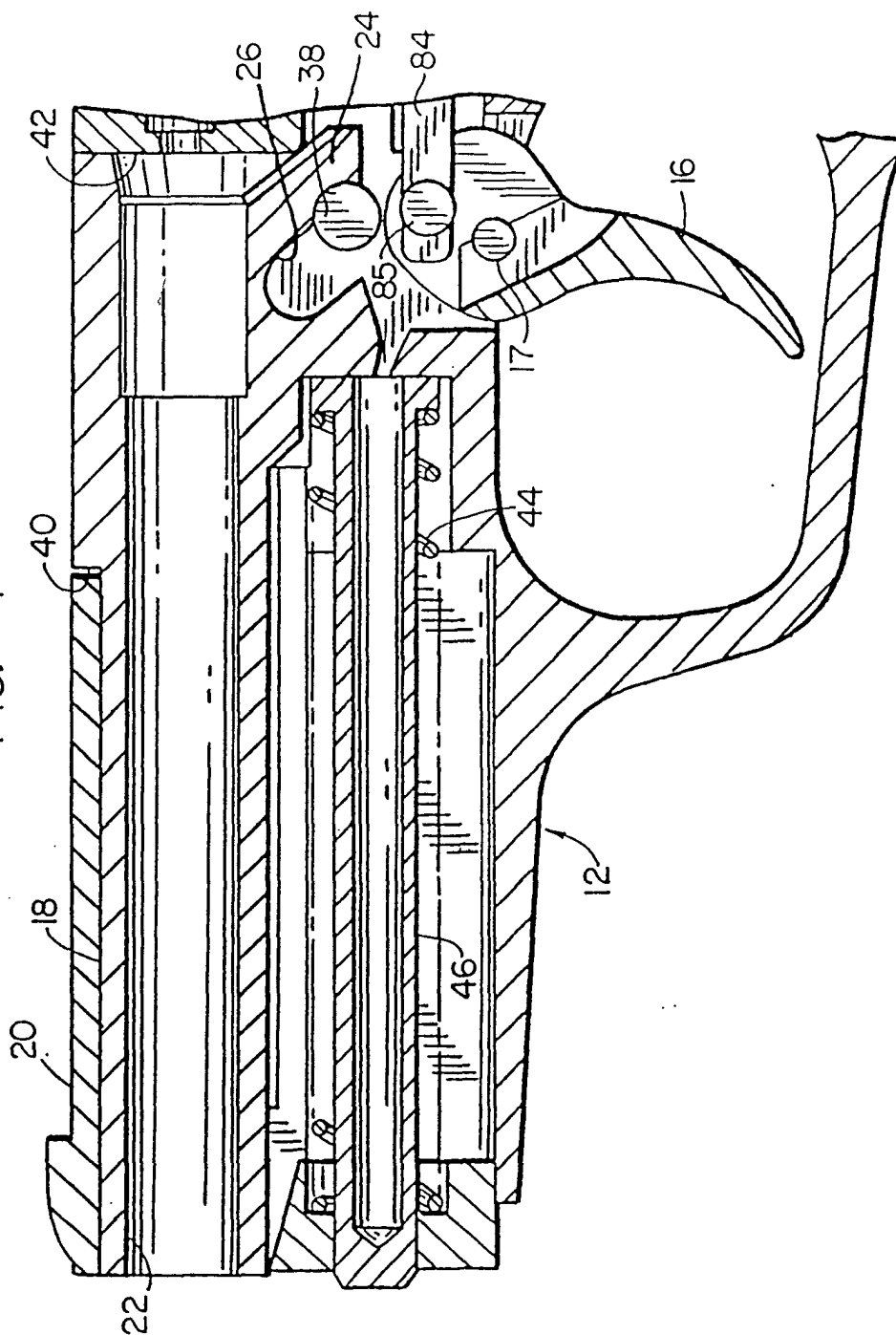
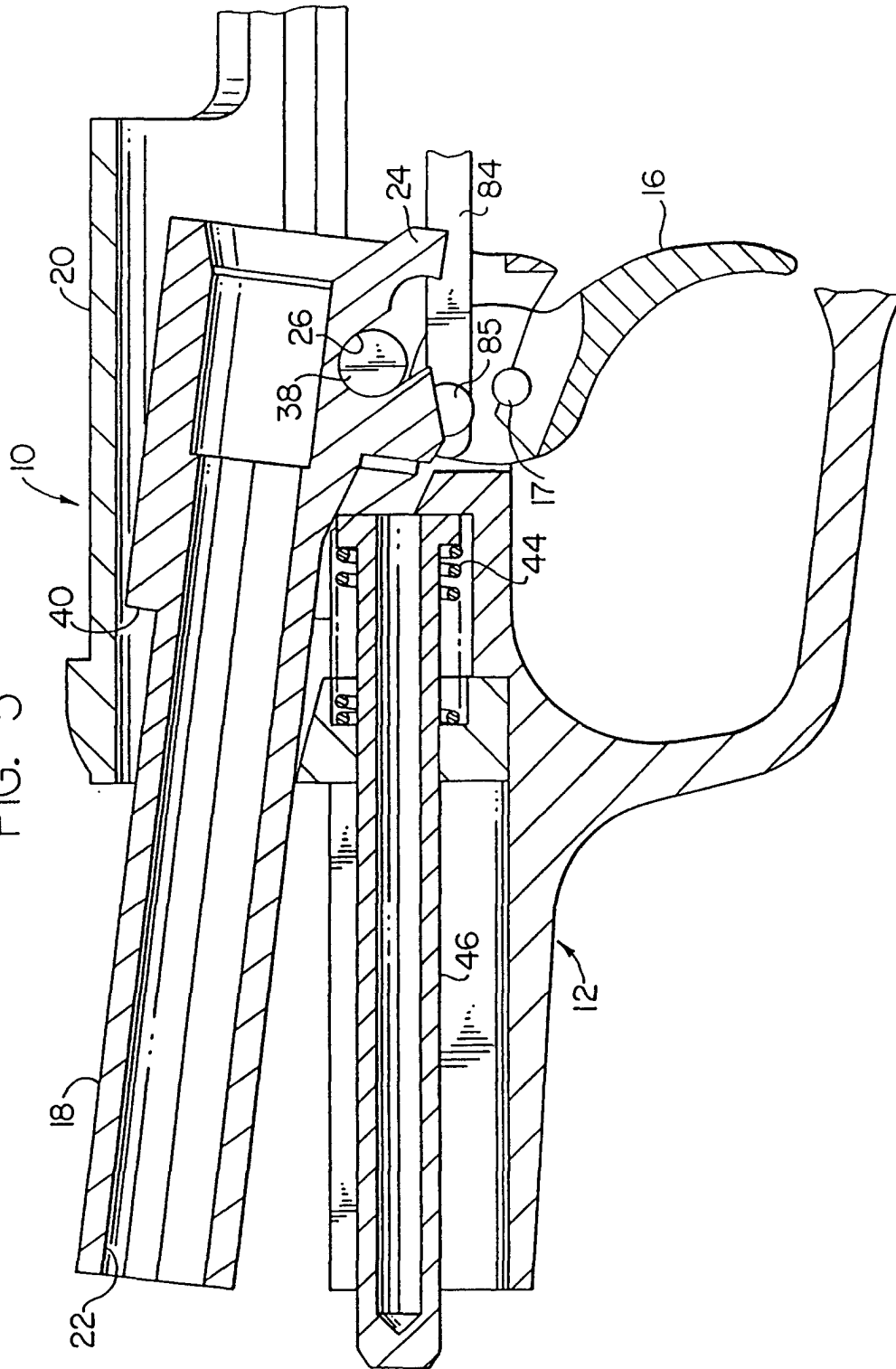


FIG. 4



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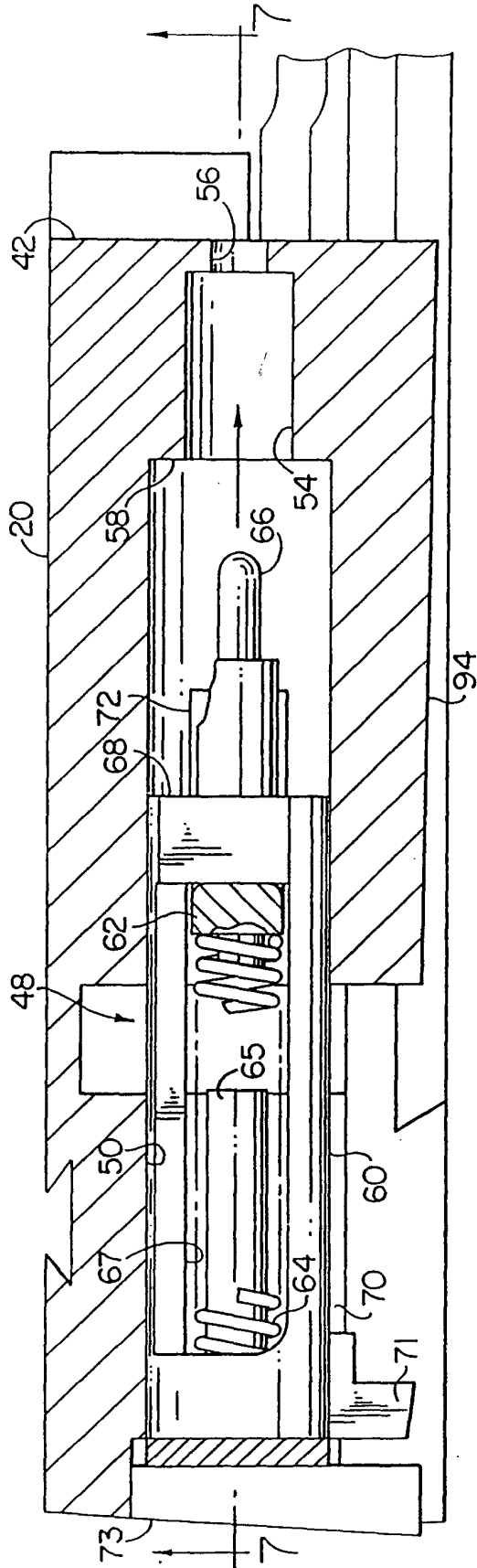
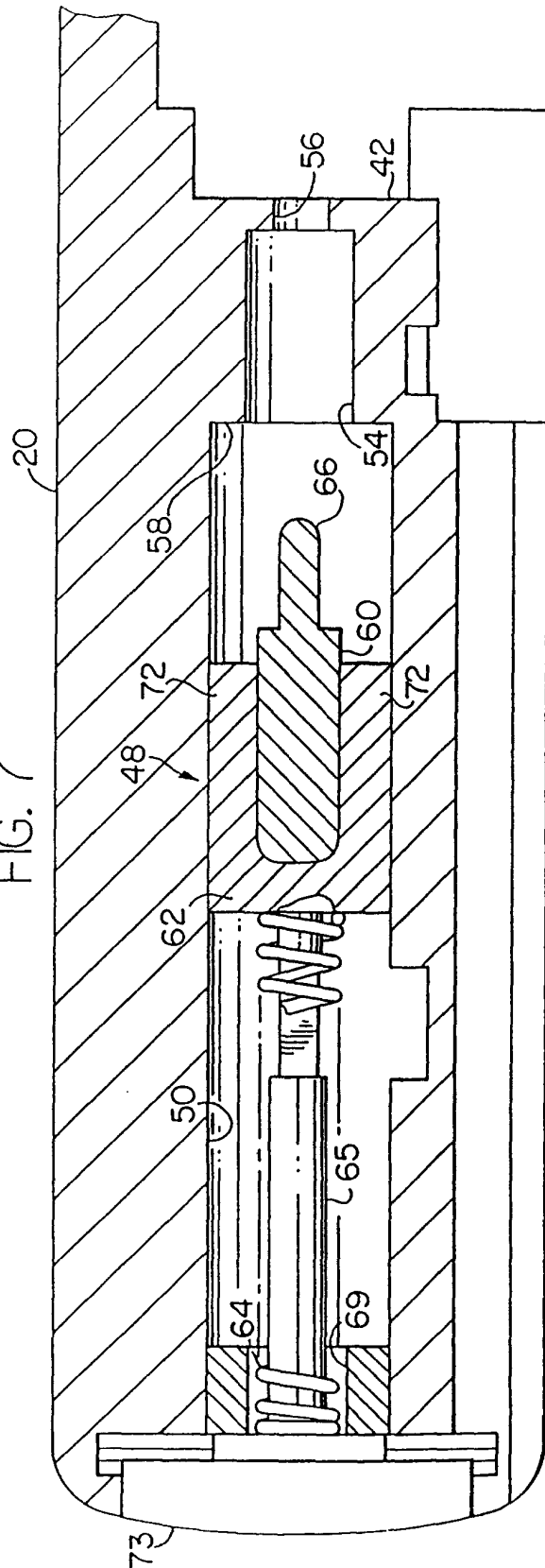


FIG. 7



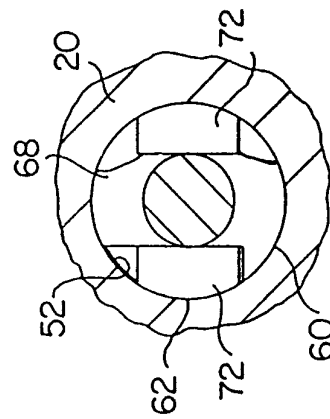
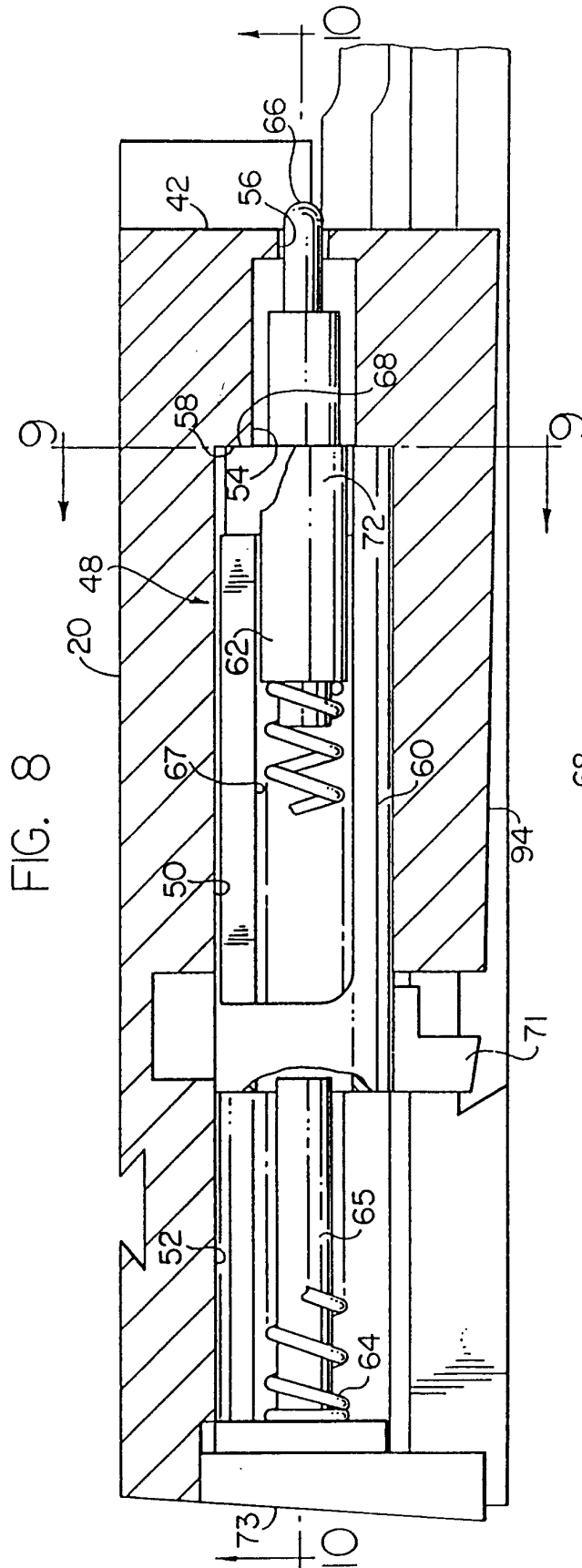
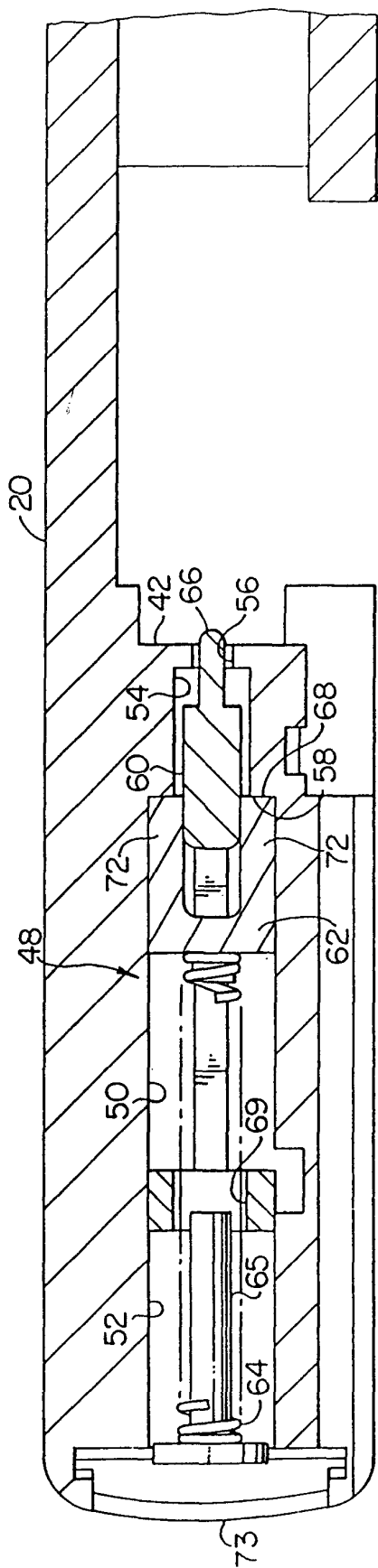
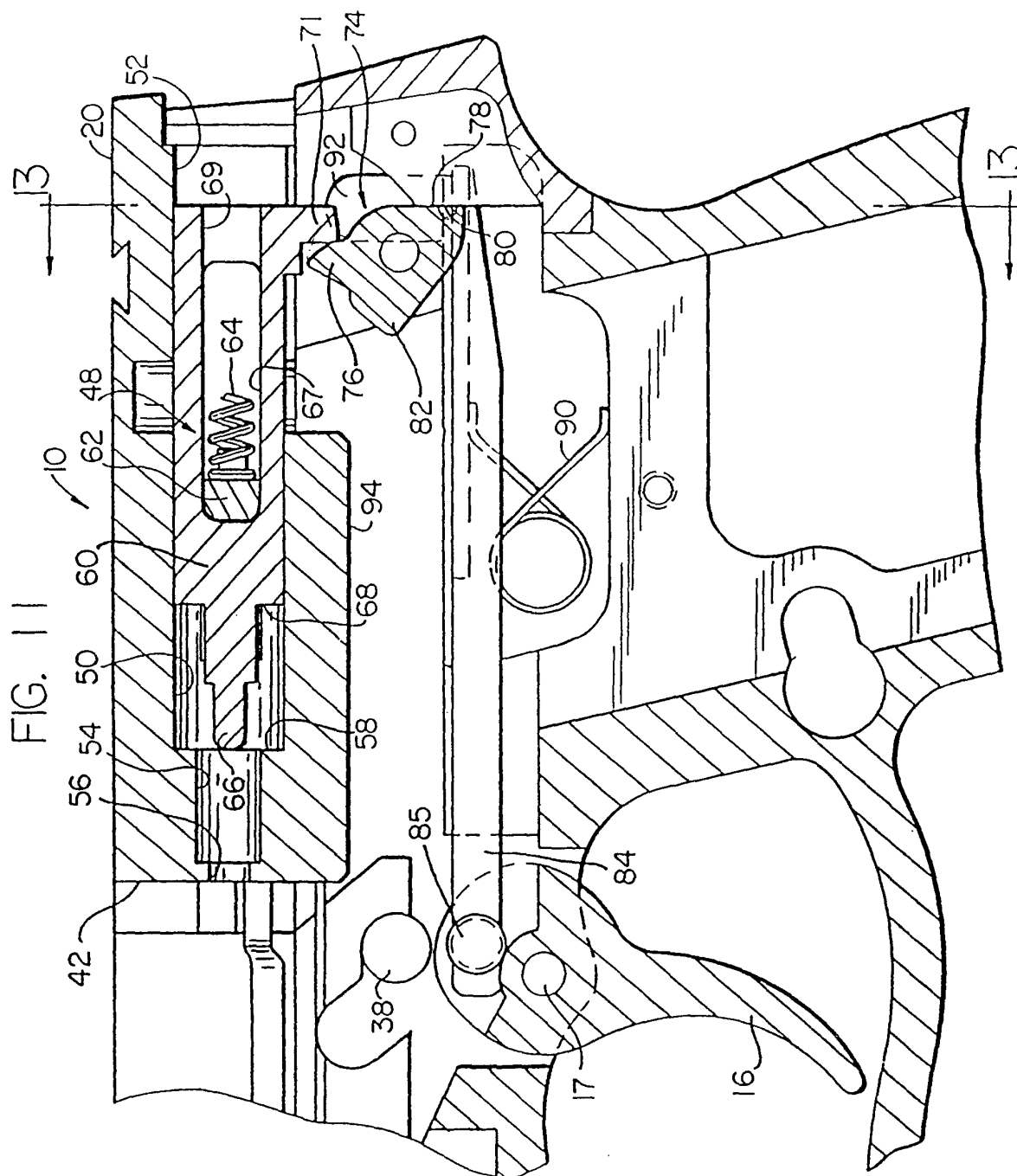
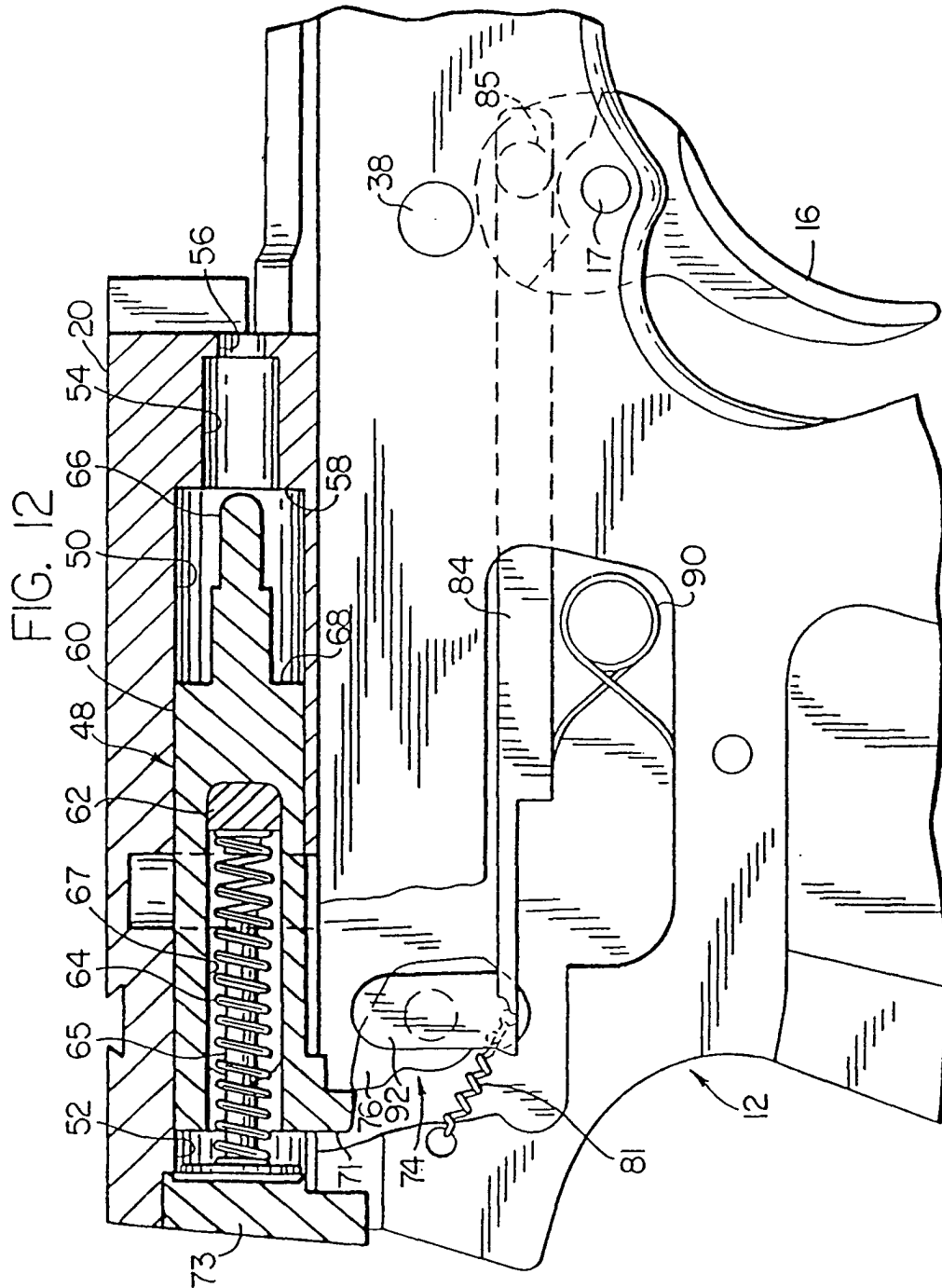


FIG. 10







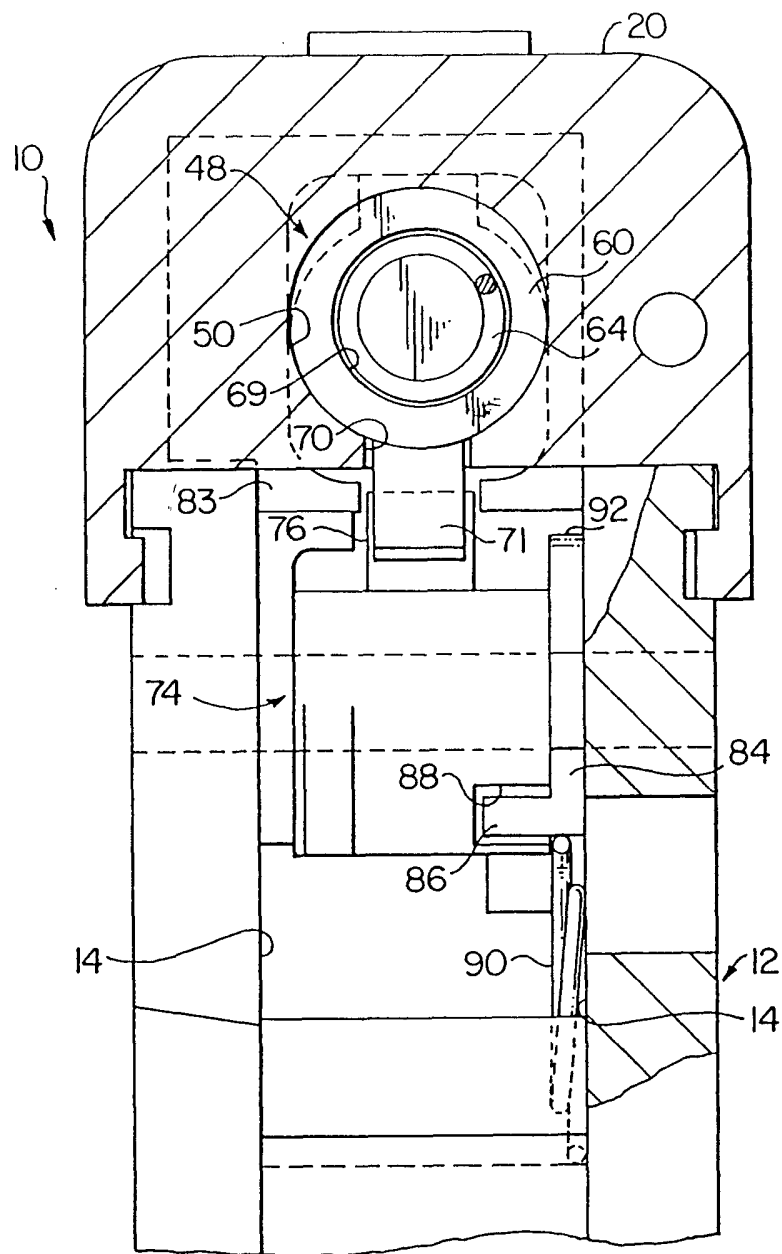


FIG. 13

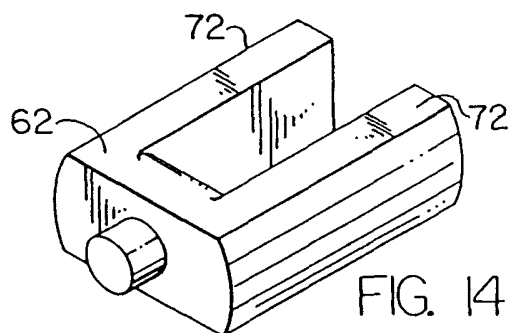


FIG. 14