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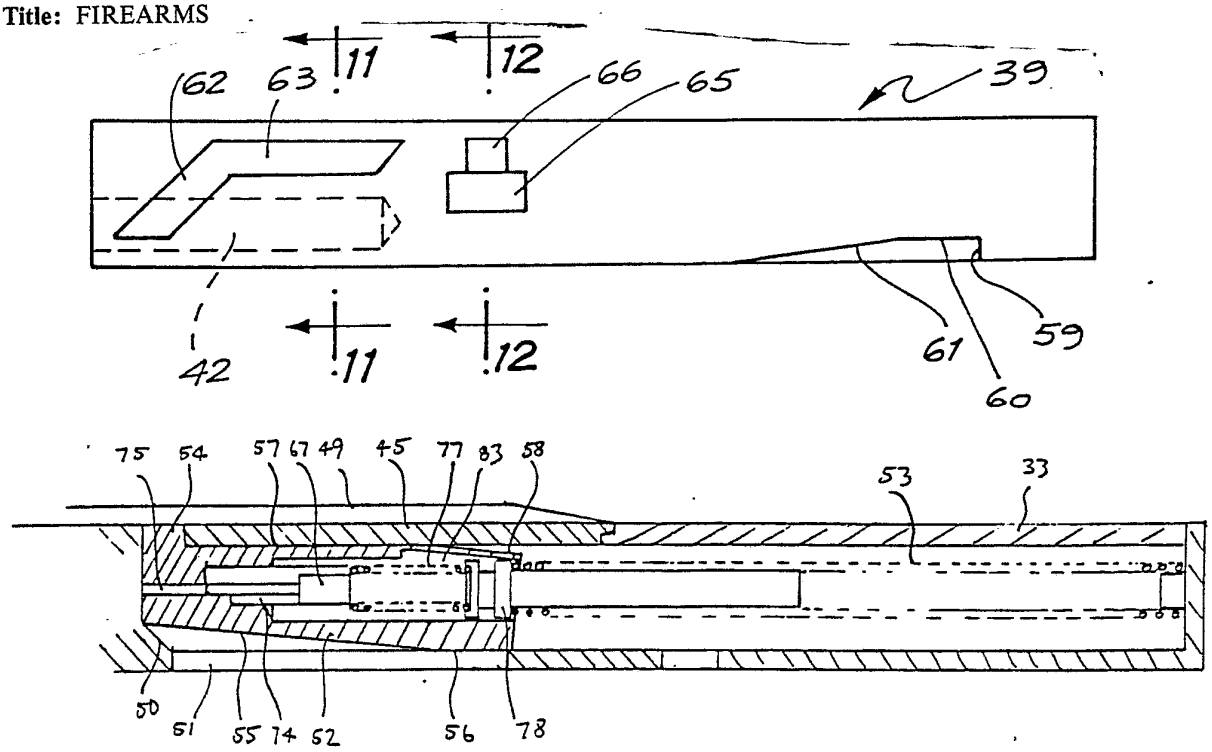
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(54) Title: FIREARMS



(57) Abstract

A firearm of the type in which rounds are fired successively from a magazine by the reciprocation of a firing mechanism under the action of propellant gas pressure and a return spring (53), in which the bolt (52) is located between a pair of parallel slides (39, 40), lateral locking and unlocking movement of the bolt (52) being controlled by guides (62, 63) provided on the slides (39, 40).

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FIREARMS

FIELD OF THE INVENTION

This invention relates to small arms such as light machine guns and automatic rifles, capable of firing in bursts or single shots, and using a system in which the operating mechanism is powered by barrel gases.

THE PRIOR ART

Automatic weapons of the type to which the invention relates are well known in many forms, and generally employ a bolt which reciprocates under the action of gas pressure derived from the barrel and driving a piston, against the action of a return spring, or alternatively by the direct action of the rearward ejection of the casing of a spent round.

DISCLOSURE OF THE INVENTION

Among the objects of the present invention are the provision of a weapon of this general type, offering simplicity of operation and a small number of components, so that it may be manufactured economically and operate reliably in adverse conditions. The gun according to the present invention employs a bolt which moves under the control of a pair of bolt carrying slides upon which the return spring acts, a firing pin being fixed relative to the slides, the bolt being capable of limited axial movement relative to the slides. Incorporated in one of the slides is a gas chamber which intermittently engages with a gas tube connected with the barrel. Features of the invention will be revealed by the following description, given by way of example only, of an embodiment thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Fig. 1 is a side elevation of an automatic weapon incorporating the present invention;

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Fig. 2 is a fragmentary longitudinal cross-section of the gun, showing the construction in the region of the breech, and showing salient parts of the trigger mechanism;

Fig. 3 is a fragmentary bottom plan view of the gun in the region of the breech and trigger mechanism;

Fig. 4 is a side elevation of the bolt of the gun;

Fig. 5 is a plan view of the bolt of Fig. 4;

Fig. 6 is a rear elevation of the bolt;

Fig. 7 is a cross-section taken on the line 7-7 of Fig. 4;

Fig. 8 is a cross-section taken on the line 8-8 of Fig. 1;

Fig. 9 is an inner side elevation of the right-hand slide of the gun;

Fig. 10 is a bottom plan of the right-hand slide of Fig. 9;

Fig. 11 is a section taken on the line 11-11 of Fig. 9;

Fig. 12 is a section taken on the line 12-12 of Fig. 9;

Fig. 13 is an outer side elevation of the left-hand slide;

Fig. 14 is a front end elevation of the left-hand slide;

Fig. 15 is a cross-section taken on the line 15-15 of Fig. 13;

Fig. 16 is a plan view of the left-hand slide;

Fig. 17 is a detail view in plan showing the mounting of the firing pin;

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Fig. 18 is a cross-section taken on the line 18-18 of Fig. 17;

Fig. 19 is a fragmentary longitudinal section showing the bolt and firing mechanism in cocked condition; and

Fig. 20 is a fragmentary longitudinal section showing the bolt in a partially recoiled position.

DETAILED DESCRIPTION OF THE EMBODIMENT

Throughout the description which follows, a knowledge of conventional practices in prior art automatic weapons will be assumed, and no attempt is made in the accompanying drawings to illustrate those features of the gun which are commonplace or which will be readily provided and understood by those skilled in the art.

The weapon illustrated is an automatic rifle capable of firing single shots or continuous bursts. As illustrated in Fig. 1 and elsewhere, the stock is not shown as this is of no consequence. The gun externally comprises a body 30, grip 31, barrel 32, rear cover 33, magazine guide 34, trigger 35, trigger guard 36, trigger mechanism cover 37 which is constructed integrally with the magazine guide 34, and a gas tube 38. Described in detail below are a right-hand slide 39 (visible in Fig. 1) and a left-hand slide 40.

The gas tube 38 communicates with the barrel at a point (not shown) chosen to provide correct timing of the operation of the gun, and extends rearwardly of the barrel with a free end 41 which is located to enter, for a short distance, a gas chamber 42 provided in the right-hand slide 39. The gas tube 38 is supported near its free end by a lug 43.

Referring now to Fig. 2 it will be seen that the barrel 32, at the rear end of which is provided a chamber 44, is force-fitted to the end of the body 30. The latter extends rearwardly to provide an upper wall 45 and a lower wall 46, and ends at a rear wall 47 visible in Fig. 19.

In the upper wall 45 immediately behind the chamber there is provided a

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rectangular aperture 48 for the reception of the locking lug of the bolt 52 described below. To strengthen the upper wall 45 in this region, ribs 49 are provided, extending longitudinally on either side of the aperture 48.

From the rear of the chamber a sloping surface 50, provided with formations guiding rounds to the chamber, leads to a magazine aperture 51, dimensioned to receive a magazine of standard size. Located to the rear of the magazine aperture is the trigger mechanism, which will be described below.

The bolt 52, illustrated in Figs. 4-7, is adapted to reciprocate within the body 30. The bolt 52 is urged forwardly by the return spring 53, visible in Fig. 19, and is locked in its forwardmost position by the engagement within the aperture 48 of a lug 54 provided at the forward end of its upper surface.

It will be appreciated that in order to take up, or be removed from, its locked position, the bolt 52 must rotate about a horizontal axis. For this reason the top and bottom surfaces of the bolt 52 each comprise two portions. The bottom surface comprises a front portion 55, which is in contact with the body lower wall 45 when the bolt is unlocked, and a rear portion 56 which is in contact with lower wall 45 when the bolt is locked. The upper surface of the bolt 52 comprises a forward surface 57 and a rear portion 58. Before proceeding with further description of the bolt 52, it will be useful to describe the slides and the firing pin mounting arrangements.

As shown in Figs. 9-12, the right-hand slide 39 is provided with a gas chamber 42 for communication with the gas tube 38. Also provided on the slide 39 is a trigger sear abutment 59 and sear recess 60 with a sloping forward surface 61, to which reference will be made below.

At the forward end of the slide 39, on its inner side, there is provided a groove comprising an upwardly and rearwardly sloping portion 62 and a horizontal portion 63. As will be further described below, this groove, and the corresponding groove of the left-hand slide, co-operate with ears 64 on the bolt 52 to control the locking and unlocking thereof.

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Penetrating the right-hand slide 39 is a rectangular aperture 65, surmounted by a recess 66. The aperture 65 receives a transfer bar 67 which extends laterally from the left-hand slide 40, to which reference should now be made.

Like the right-hand slide 39, the left-hand slide 40 is provided with a trigger sear abutment 68, sear recess 69 and sloping end 70, but it may be observed that the sear abutment 68 is located somewhat rearwardly of the abutment 59. At its forward end, the slide 40 has grooves 62 and 63 corresponding to the grooves of the right-hand slide. The left-hand slide is also provided with a cocking grip 71.

Extending from the inner surface of the slide 40 is a transfer bar 67, which provides the means for mounting the firing pin 72, and ensures that the slides 39 and 40 move together. As shown in Figs. 17 and 18, the free end of the transfer bar enters the aperture 65 in the slide 39, and the slides are retained in assembly by a spring 73, which functions also to retain the firing pin 72 in a groove 74 in the transfer bar.

The slides 39 and 40 are assembled with the bolt 52, the transfer bar 67 passing through a slot 74 in the bolt, and the ears 64 being located in the grooves 62 or 63 of each slide. The forward portion of the bolt is provided with a hole 75 for the passage of the firing pin 72.

Centrally on the rear surface of the transfer bar there is provided a locating formation 76 for the location of the forward end of a firing spring 77, the rear end of which is located in a recess in the forward end of the head 78 of a pin 79 on which the return spring 53 is located. This head is retained in the rear of the bolt 52 by means of a spring 80 engaged in slots 81 in the bolt, and groove 82 in the head 78. This fixing arrangement is chosen to allow a small degree of relative rotation between the bolt 52 and the pin 79, as the bolt moves from between its locked and unlocked positions.

The components last described are accommodated within the bolt 52 by an axial passage 83, while movement of the transfer bar 67 is constrained

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at the sides of the bolt, by lateral slot 84. Both the passage 83 and the slot 84 are shaped in longitudinal section, to accommodate the combination of relative axial and rotational movement between the bolt and the components.

The trigger mechanism is illustrated in Figs 2 and 3. Two trigger sears are provided, a right-hand sear 85 and a left-hand sear 86. The sears extend through apertures 87 and 88 to engage their respective slides 39 and 40, and are mounted on a frame 89. The frame 89 is engaged beneath a lug 90 at its forward end, and is provided with a lateral bar 91 which rests against a fulcrum member 92, attached to the body wall 46. The trigger 35 is pivotally mounted on a shaft 93 which is journalled in grooves provided in the end of respective posts 94. At each side of the mechanism, a trigger lever arm 95 co-operates with a sear detent member 96, which is pulled downwardly upon actuation of the trigger 35. The left-hand sear 86, in the rest position of the trigger, projects within the body of the gun, while in this position of the trigger the right-hand sear 85 is not in an operative position.

The trigger mechanism is completed by components mounted on the removable unitary trigger guard and cover, and magazine guide. On the inner surface of the wall 97 respective leaf springs 98 and 99 are located to bear against the respective sear detent members 96, urging them towards their respective slides, and biasing the trigger to its non-firing position. The spring 98, associated with the right-hand slide 39, is stiffer than the spring 99, so the latter moves first on application of pressure to the trigger. On the initial movement of the trigger therefore, the right-hand sear will move upwardly under the rocking action of the frame. As will be appreciated, a clearance is provided between the right-hand trigger lever arm 95 and the right-hand sear detent member 96, so that lost motion occurs on that side as the trigger is moved to its first actuated position. The lateral bar 91 pivots on the fulcrum member 92 to allow the left-hand sear to disengage. Upon further trigger movement, the right-hand sear will also be moved away from its operative position.

Turning now to Fig. 19 it will be observed that the lug 54 is located within the locking aperture 48, and the face of the bolt is against

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the rear of the chamber.

Cocking of the gun is achieved by rearward movement of the slides 39 and 40, then forward movement during which a round will be stripped from the magazine by the rib 100 on the lower surface of the bolt, and driven home in the chamber 44.

In the cocked position illustrated in Fig. 19, the bolt ears 64 are located at the forward end of the upper, horizontal groove position 63 of each slide, so the bolt is locked against movement, but the slides 39 and 40 can move freely forwardly. The firing spring 77 is compressed, and by virtue of its force and the residual force of the return spring 53, urges the transfer bar and therefore the slides and the firing pin, forwardly. The left-hand trigger sear 86 is engaged with the sear abutment 68. As the sear abutment 59 of the right-hand slide is, in this position of the slides and bolt, located forwardly of the right-hand sear, the latter is inoperative.

If the trigger is now moved rearwardly to the first position of its movement, the left-hand sear will release, allowing the slides to move forwardly, and in turn the round in the chamber will be fired by the firing pin 72.

With the forward movement of the slides, the gas tube 38, which in the cocked position of the slides just entered the chamber 42, is engaged more deeply within the chamber. As the bullet passes the gas tube port in the barrel, gas pressure developed in the chamber 42 will drive the slides 39 and 40 rearwardly.

As the slides 39 and 40 move rearwardly past their cocked position, the sloping groove protions 62 will engage the bolt ears 64, driving the front of the bolt downwardly to release the lug 54 from the aperture 48. The bolt will now be drawn rearwardly. Also as the slides move rearwardly of their cocked position, the chamber 42 will be released from the gas tube end 41 removing the driving force of the gas pressure. The bolt and slide assembly will continue rearwardly until arrested by the return spring 53.

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As will have been observed, no casing extraction and ejection mechanism has been illustrated. While such an arrangement will be necessary, it may be of conventional type and needs no description here. Preferably, such an arrangement is recessed into the face of the bolt 52.

In its rearward movement, the right-hand sear abutment 59 will pass the right-hand sear 85, which will momentarily enter the recess 60. This motion of the sear will not be transmitted to the trigger, however, as it will merely depress the sear detent member 96.

The bolt and carrier assembly, after its arrest by the return spring 53, will return under the action of that spring, the bolt stripping another round from the magazine and moving towards the cocked position. Before the slides can return to the position of the mechanism represented in Fig. 19 however, the right-hand sear abutment 59 will engage the right-hand sear, stopping further movement. It will be noted that the right-hand sear 85 is of substnatially greater width than the left-hand sear 86, in view of the greater load and impact imposed on this sear.

This condition will be maintained until the trigger is released, whereupon the right-hand sear 85 will release the right-hand slide 39, and the left-hand sear 86 will be engaged by the left-hand sear abutment 68 as the slides move forward. The weapon will now be cocked and ready for another single shot action, or for the firing of a continuous burst which, it will by now be appreciated, is achieved by fully depressing the trigger so that both left and right-hand sears are inoperative, and firing occurs automatically upon return of the bolt to the locked and firing position.

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CLAIMS

1. A firearm of the type in which rounds are fired successively from a magazine by the reciprocation of a firing mechanism under the action of propellant gas pressure and a return spring, said mechanism comprising a bolt which is moved from a retracted position to a locked firing position by said return spring, and driven after unlocking from said locked position towards said retracted position by gas pressure from the barrel of the firearm, characterised in that said firing mechanism further comprises a pair of parallel spaced slides, said bolt being located between said slides, motion guide means on said slides engaged with location means on said bolt thereby to control lateral movement of said bolt between locked and unlocked positions by longitudinal movement of said slides.

2. A firearm according to claim 1 further characterised in that said firing mechanism further comprises a firing pin mounted within said bolt and fixed relatively to said slides.

3. A firearm according to claim 2 further characterised in that said firing pin is mounted on a member passing laterally through said bolt and connecting said slides.

4. A firearm according to claim 3 further characterised in that said return spring acts on said member.

5. A firearm according to claim 4 further characterised in that a firing spring is interposed between said return spring and said member.

6. A firearm according to any preceding claim further characterised in that a gas chamber is provided in one of said slides, said chamber being open at the forward end of said one slide to receive the end of a gas tube communicating with said barrel.

7. A firearm according to any one of claims 1 to 5 further characterised in that firing operation is controlled by two trigger sears respectively engaging said slides to control forward travel thereof.

8. A firearm according to claim 7 further characterised in that said sears are controlled by a trigger mechanism actuated by a single trigger, movement of said trigger from rest to a first position moving a first sear from an operative position to an inoperative position and moving the second sear from an inoperative condition to an operative condition, movement of said trigger to a second position placing both said sears in inoperative condition.

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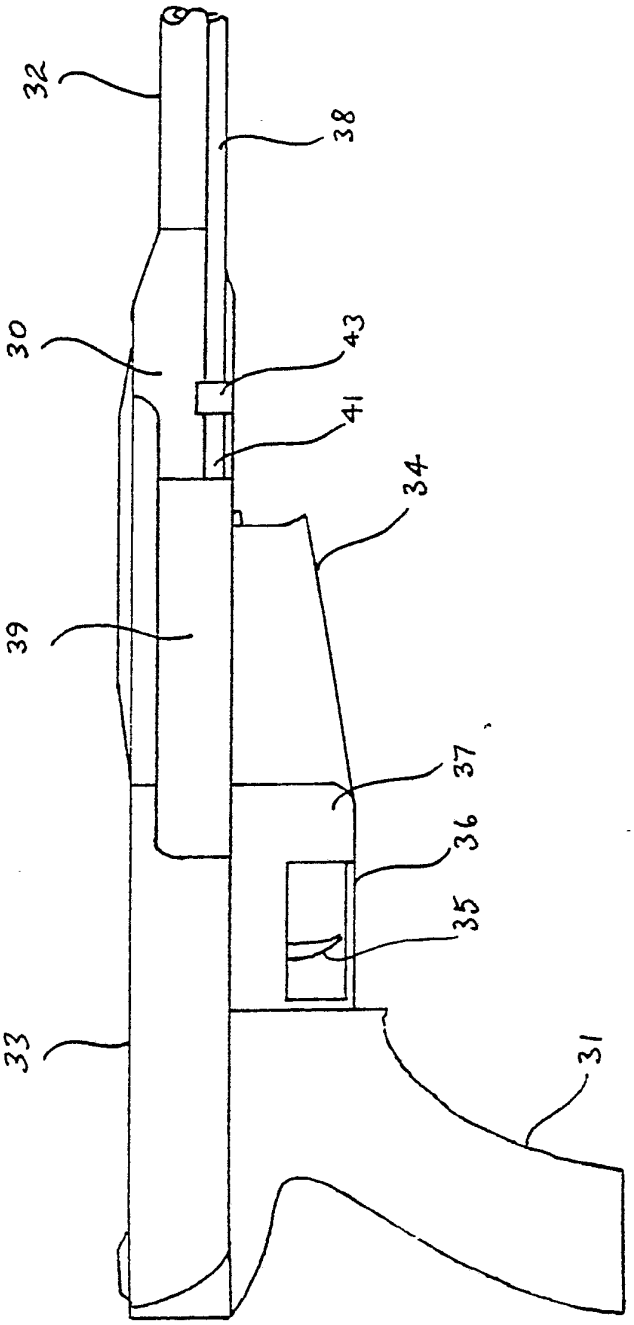


Fig. 1

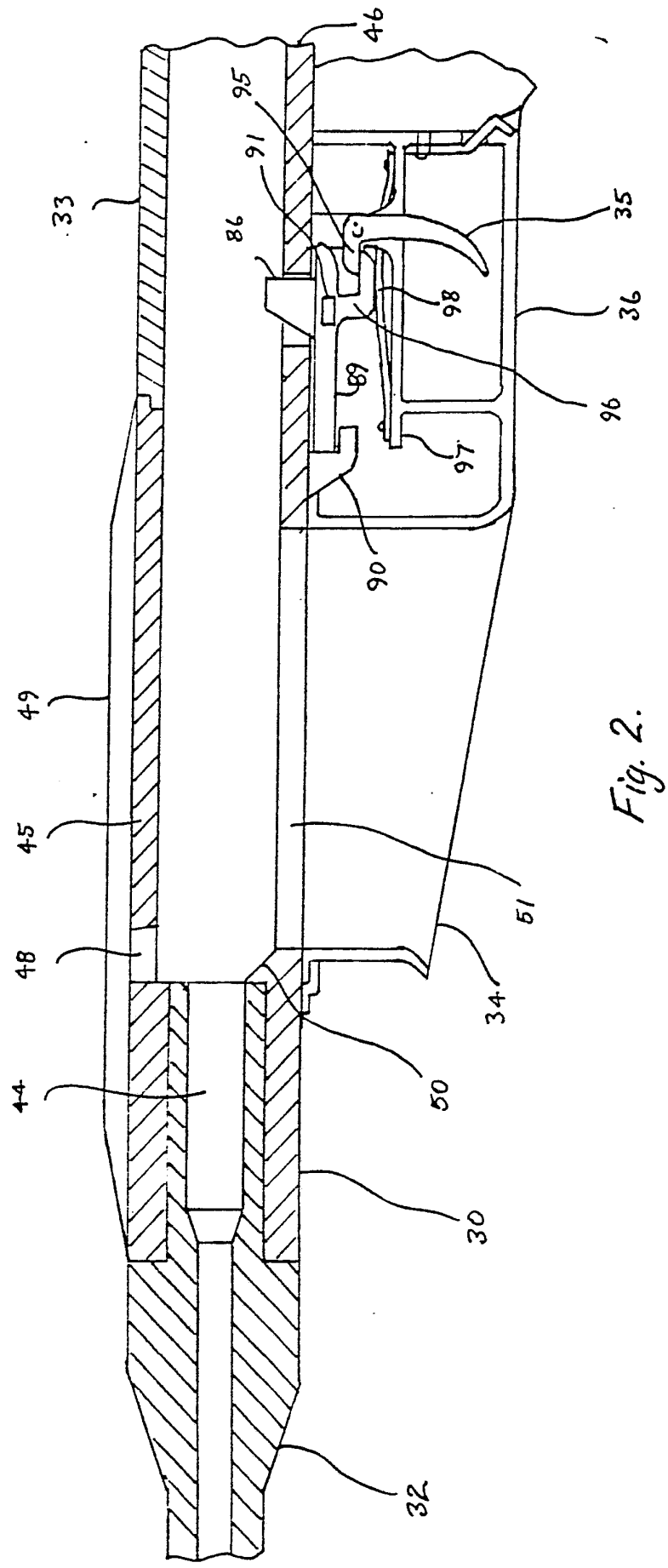


Fig. 2.

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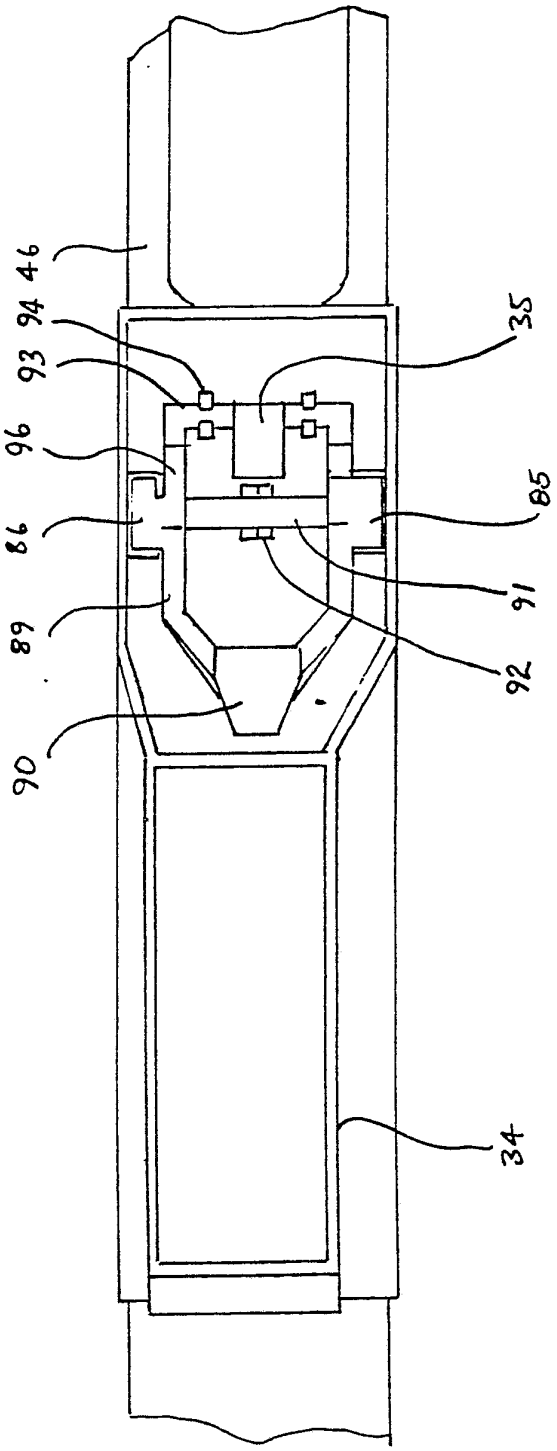


Fig. 3

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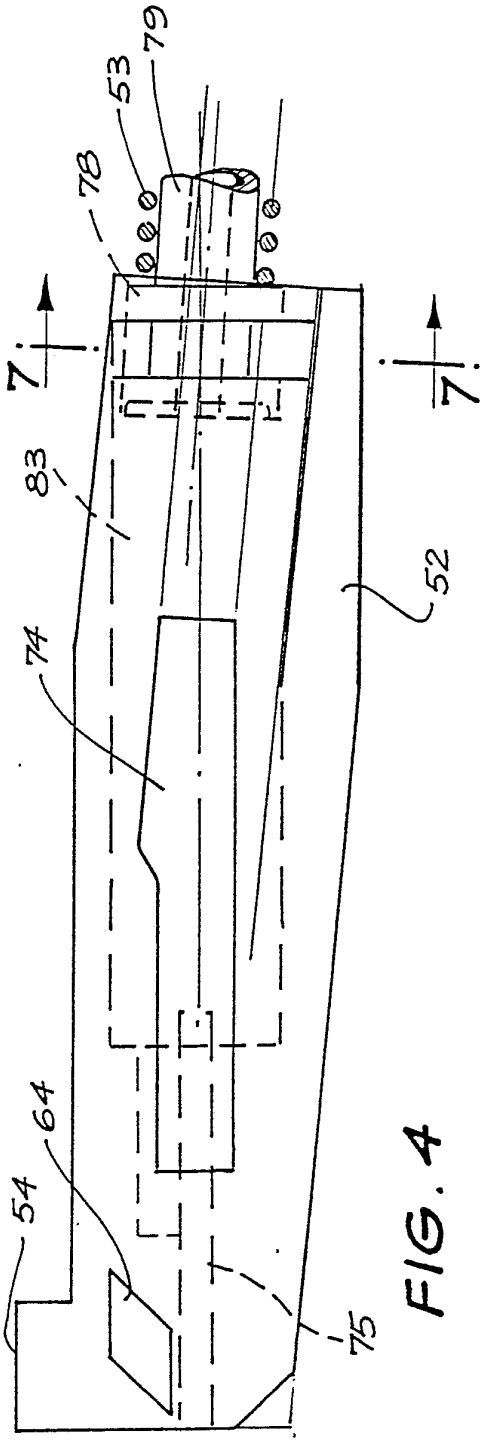


FIG. 4

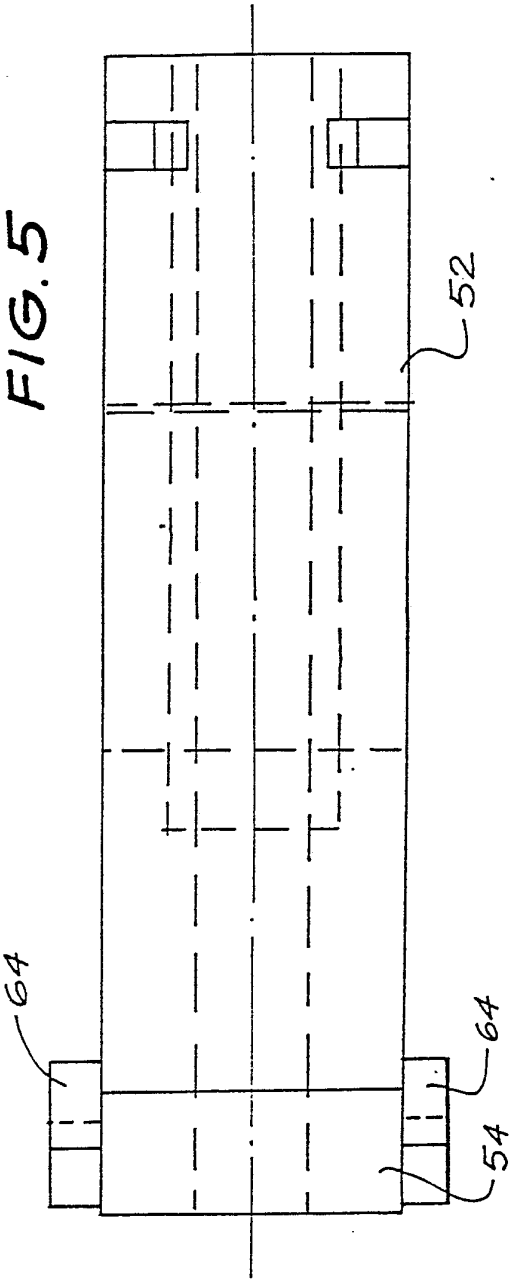


FIG. 5

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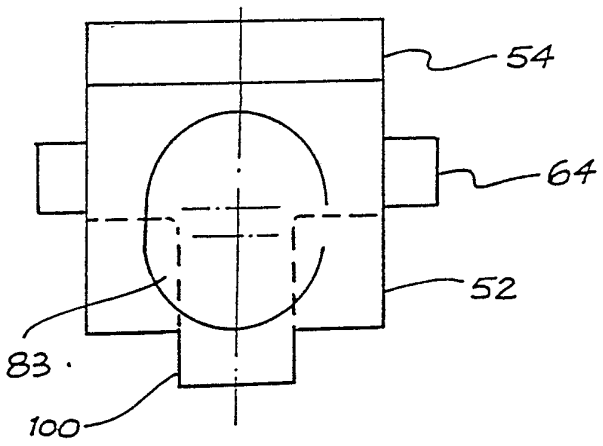


FIG. 6

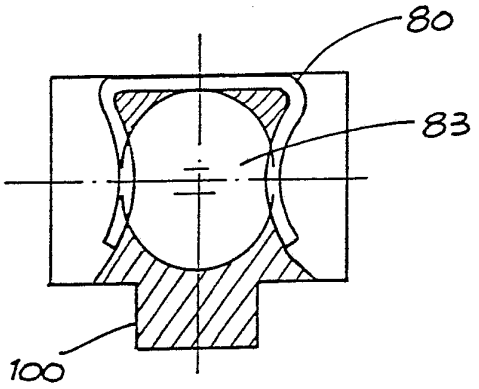


FIG. 7

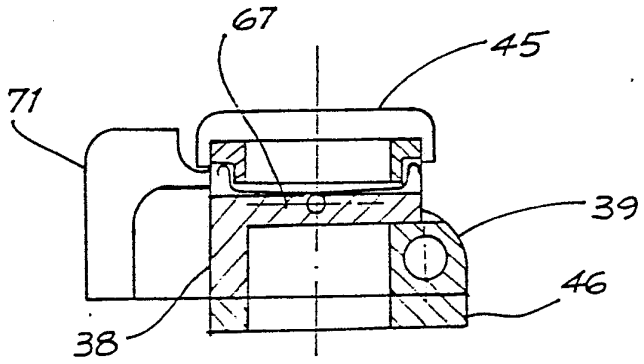


FIG. 8

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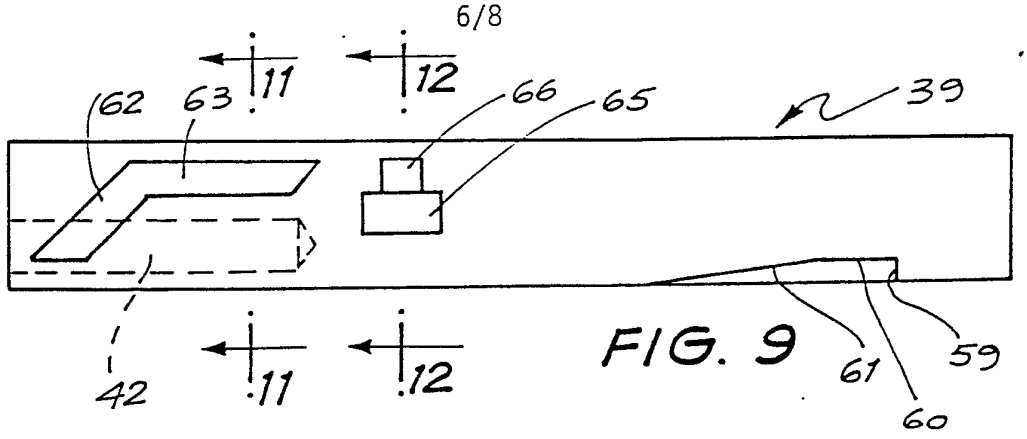


FIG. 9

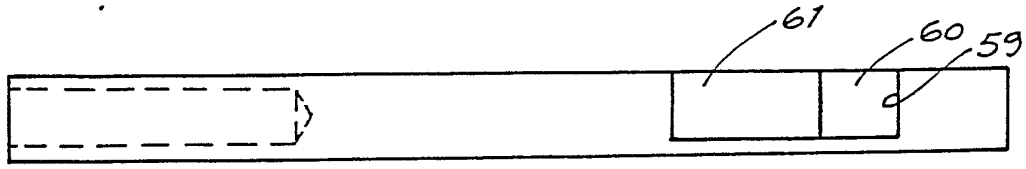


FIG. 10

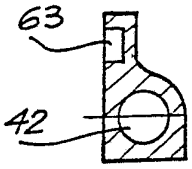


FIG. 11

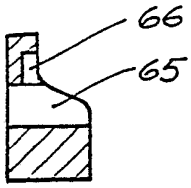


FIG. 12

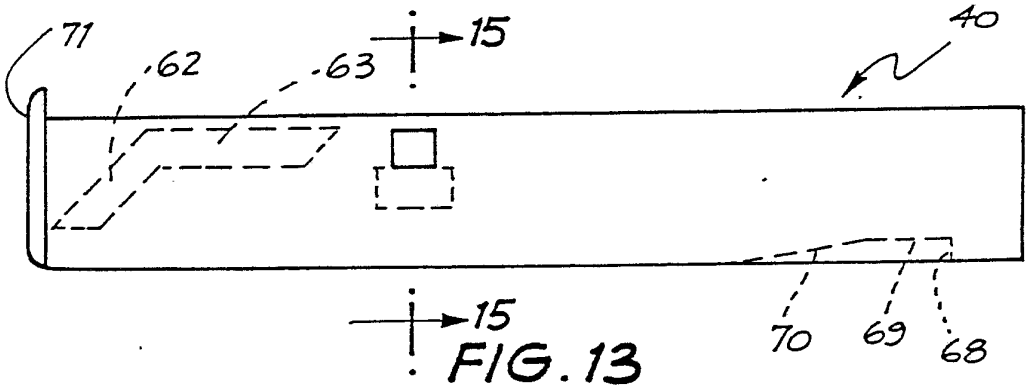


FIG. 13

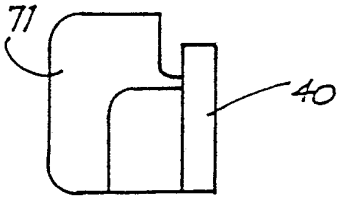


FIG. 14

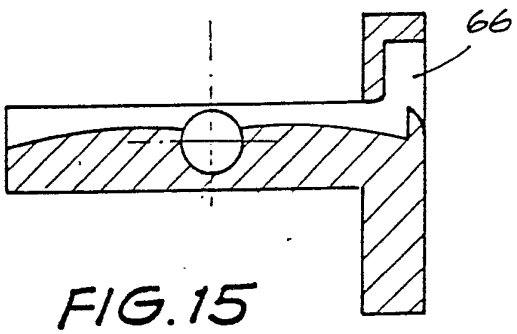


FIG. 15

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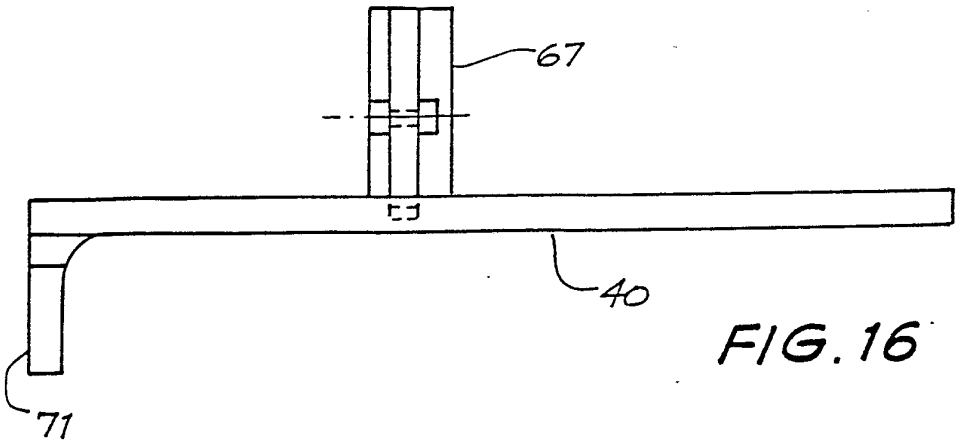


FIG. 16

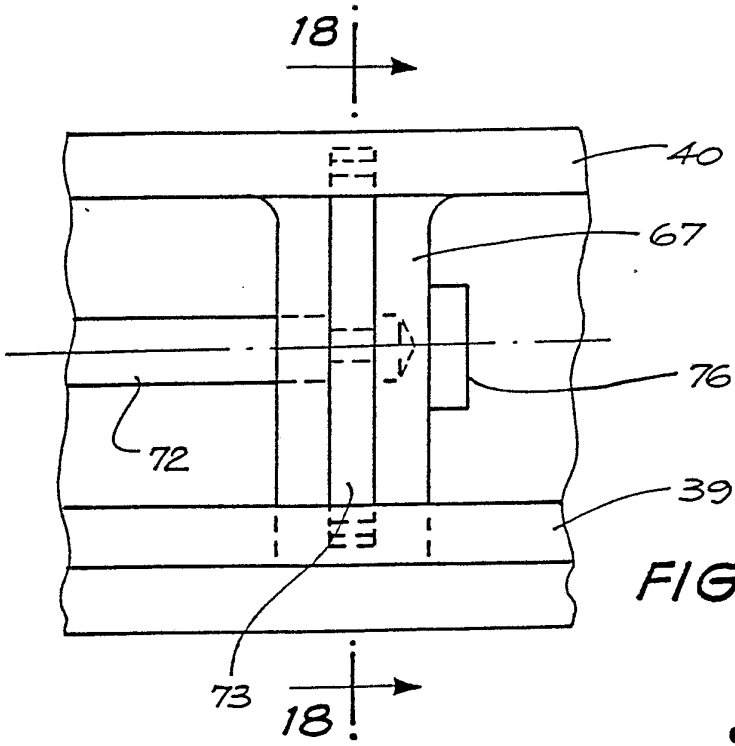


FIG. 17

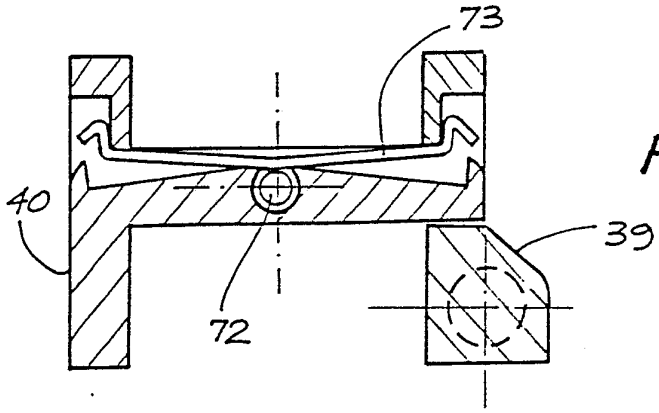


FIG. 18

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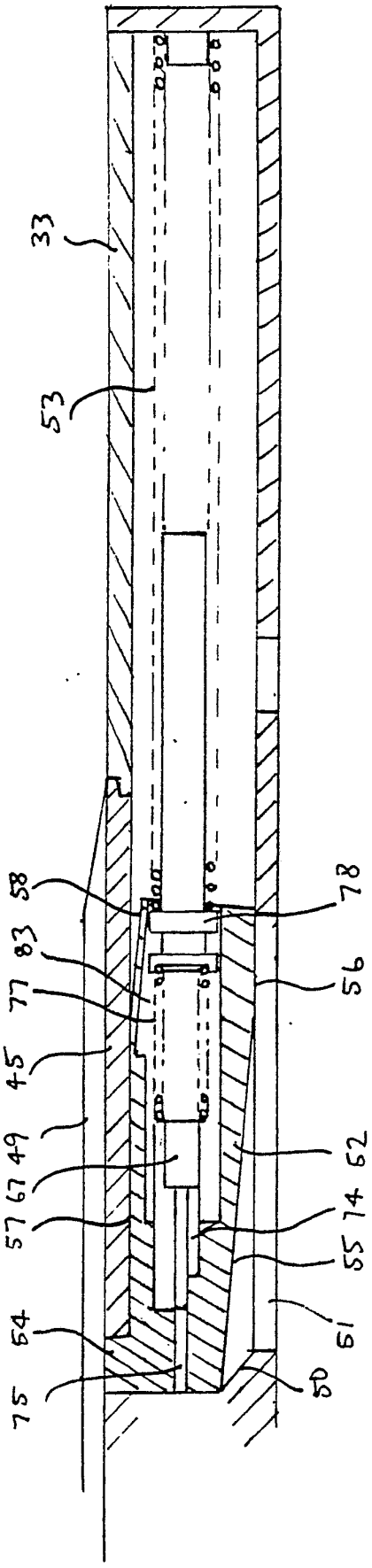
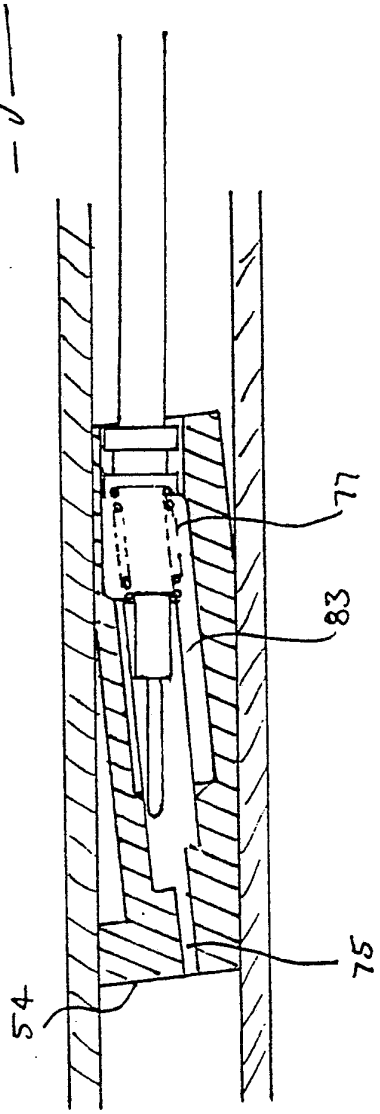


Fig. 19

Fig. 20



INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 82/00072

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] F41D 3/06 // F41D 5/04

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC	F41D 5/04, 3/06, 1/04

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

AU : IPC as above.

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	GB,A, 376316 (WHITE AUTOMATIC GUN CORPORATION) 4 July 1932 (04.07.32)	(1,2)
A	GB,A, 461365 (MARC BIRKIGT) 16 February 1937 (16.02.37)	(1,2)
X	GB,A, 619413 (BREVETS AERO-MECANIQUES S.A.) 9 March 1949 (09.03.49)	(1,2)
A	GB,A, 624286 (BREVETS AERO-MECANIQUES S.A.) 1 June 1949 (1.6.49)	(1,2)

* Special categories of cited documents: [15]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
23 June 1982 (23.07.82)	29 July 1982 (29.7.82)
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