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(11) **EP 1 367 326 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.12.2003 Bulletin 2003/49

(51) Int Cl.7: **F23Q 2/16**

(21) Application number: **03253046.1**

(22) Date of filing: **15.05.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

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(30) Priority: **27.05.2002 CN 02115306**
25.09.2002 CN 02134839

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(54) **A lighter**

(57) A lighter is disclosed as including a flame generator, a body with a fuel reservoir, and a fuel outlet associated with the fuel reservoir, in which the fuel outlet is movable between a first configuration in which exit of the fuel from the reservoir is prevented, and a second configuration in which exit of the fuel from the reservoir is allowed, further including an operating lever with a first lever part and a second lever part which are movable relative to each other, in which the first lever part is operatively associated with the fuel outlet, and the second lever part is movable from a stable normal position to an operative position to move the first lever part to move the fuel outlet to its second configuration, and the second lever part extends generally upwardly when in the stable normal position. The lighter also includes a cavity for containing a flint, in which a closable aperture is provided on a side surface of the body to allow insertion or removal of the flint. All transverse cross sections of the fuel reservoir have a substantially circular periphery.

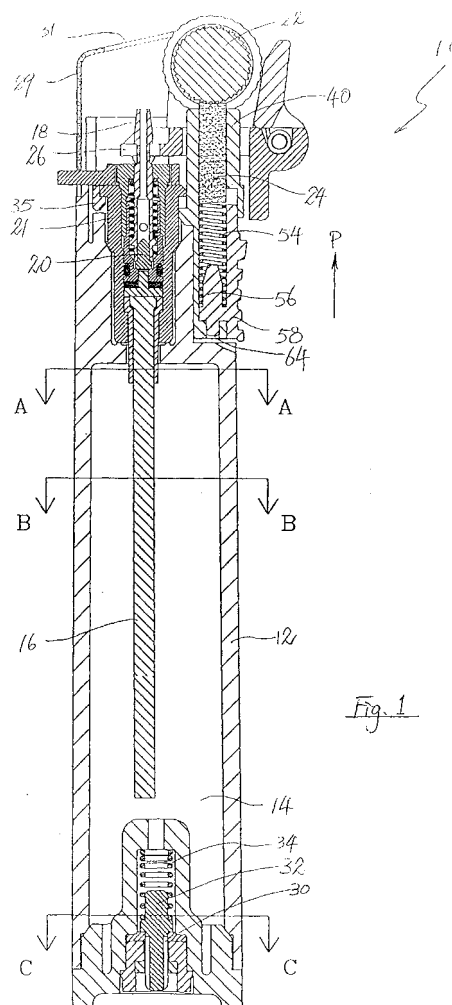


Fig. 1

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Description

[0001] The present invention relates to a lighter, and in particular a lighter which is safer to use, meets international standard and allows easy replacement of flint.

Background of the Invention

[0002] There are in existence a large number of conventional lighters. One such conventional lighter includes a body with a fuel reservoir for containing liquid fuel under pressure, a valve associated with the fuel reservoir for selectively allowing and preventing exit of the fuel from the reservoir, a lever operatively associated with the valve for controlling the opening and closing of the valve, a striking wheel and a flint. Sparks are produced after the striking wheel is caused to rotate against the flint. The lever is then depressed to open the valve, thus allowing the fuel to exit from the reservoir. The fuel will thus be ignited by the sparks to produce a flame.

[0003] In such conventional lighters, the lever has one end in engagement with a nozzle associated with the valve, and another end, which is operable by a finger, e.g. thumb, of a user, extending out of the body of the lighters. A shortcoming associated with such conventional lighters is that, as the lever is normally in a generally horizontal position, the lever is prone to be accidentally pressed down, thus releasing the pressurized fuel from the fuel reservoir. In addition to wasting fuel, such a situation is also very dangerous.

[0004] A second major disadvantage associated with conventional lighters is that it is difficult to replace flint. In some conventional lighters, it is even not possible to replace flint, thus forcing the user to change for a new lighter.

[0005] According to International Standard ISO 9994: 2002 (Third Edition), gas lighters, and fluid lighters with a sealed compartment filled with non-absorbed fuel, must be capable of withstanding a temperature of 65°C for 4 hours when tested according to the procedure set out in the aforesaid International Standard. In particular, according to the aforesaid International Standard, the temperature of an enclosure is stabilized at (65±2)°C. The specimen lighter to be tested is ignited briefly to ensure that it is not empty of fuel, and is then placed in the enclosure for at least 4 hours. After these 4 hours, the specimen is removed from the enclosure, and is stabilized at a temperature of (23±2)°C for at least 10 hours. For fluid lighters, rupture or fragmentation of the fuel reservoir constitutes a failure. For gas lighters, a gas loss of more than 15mg per minute constitutes a failure. A lighter empty of liquid fuel also constitutes a failure. As this standard is higher than earlier requirement, it is difficult for many conventional lighters to meet this new standard.

[0006] It is thus an object of the present invention to provide a lighter in which the aforesaid shortcomings are mitigated, or at least to provide a useful alternative to

the public.

Summary of the Invention

[0007] According to a first aspect of the invention, there is provided a lighter including a flame generator, a body with a fuel reservoir, and a fuel outlet associated with said fuel reservoir, wherein said fuel outlet is movable between a first configuration in which exit of said fuel from said reservoir is prevented, and a second configuration in which exit of said fuel from said reservoir is allowed, further including an operating lever with a first lever part and a second lever part which are movable relative to each other, wherein said first lever part is operatively associated with said fuel outlet, wherein said second lever part is movable from a stable normal position to an operative position to move said first lever part to move said fuel outlet to its said second configuration, and wherein said second lever part extends generally upwardly when in said stable normal position.

[0008] According to a second aspect of the invention, there is provided a lighter including a body with a fuel reservoir, a flame generator, and a cavity for containing a flint, wherein a closable aperture is provided on a side surface of said body allowing insertion or removal of said flint.

[0009] According to a third aspect of the invention, there is provided a lighter including a body with a fuel reservoir and a flame generator, wherein all transverse cross sections of said reservoir have a substantially circular periphery.

Brief Description of the Drawings

[0010] A preferred embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of a lighter according to the present invention;

Fig. 2 is an exploded perspective view of the body and mounting module of the lighter shown in Fig. 1; Fig. 3 is an exploded perspective view of the actuating lever of the lighter shown in Fig. 1;

Figs. 4 to 8 show the manner of assembling the actuating lever of the lighter shown in Fig. 1;

Fig. 9 is a partial front view of the lighter shown in Fig. 1, with the actuating lever in a normal stable position, with the thumb-engaging part shown in broken line;

Fig. 10 is a partial front view of the lighter shown in Fig. 9, with the actuating lever in an operating position, again with the thumb-engaging part shown in broken line;

Fig. 11 A is a partial perspective view of the lighter shown in Fig. 1, with an alternative type of actuating lever in a normal stable position;

Fig. 11B is a front view of the lighter shown in Fig.

11 A, with the thumb-engaging part shown in broken line;

Fig. 12A is a partial perspective view of the lighter shown in Fig. 1, with the alternative type of actuating lever in an operating position;

Fig. 12B is a front view of the lighter shown in Fig. 12A, with the thumb-engaging part shown in broken line;

Fig. 13 is a back perspective view of the flint chamber cover of the lighter shown in Fig. 1;

Fig. 14 is a back perspective view of the flint chamber cover shown in Fig. 13, engaged with a spring;

Fig. 15 is a bottom perspective view of the mounting module shown in Fig. 1;

Fig. 16 is a partial exploded perspective view of the lighter shown in Fig. 1;

Figs. 17 to 19 show the manner of installing a piece of flint in the lighter shown in Fig. 1;

Fig. 20 is a sectional view of the lighter taken along the line A-A in Fig. 1;

Fig. 21 is a sectional view of the lighter taken along the line B-B in Fig. 1; and

Fig. 22 is a sectional view of the lighter taken along the line C-C in Fig. 1.

Detailed Description of the Preferred Embodiment

[0011] A longitudinal cross sectional view of a lighter according to the present invention is shown in Fig. 1, generally designated as 10. The lighter 10 has an elongated body 12 with a fuel reservoir 14 for containing fuel under pressure, e.g. a liquefied hydrocarbon. As in the conventional manner, a fuel tube 16 leads from the fuel reservoir 14 to a nozzle 18 via a valve 20. The nozzle 18 is biased downwardly by a spring 21 to close the valve 20, so that the valve 20 is normally in a closed position to prevent exit of the pressurized fuel from the reservoir 14. When, on the other hand, the valve 20 is open, the pressurized fuel can exit the fuel reservoir 14 via the nozzle 18.

[0012] At the top end of the lighter 10 is mounted a striking wheel 22 for rotational movement against a flint 24 for producing sparks. A lever 26 has a nozzle-engaging end 28 which engages with a neck portion of the nozzle 18. When, therefore, the nozzle-engaging end 28 of the lever 26 is pivoted upwardly to raise the nozzle 18, the valve 20 is open, thus allowing the fuel to exit the reservoir 14 via the valve 20, and subsequently the nozzle 18. Sparks generated by the striking wheel 22 may thus ignite the released fuel to produce a flame. Disposed adjacent to the striking wheel 22 is a windshield 29, with an opening 31, as in a conventional lighter.

[0013] At the bottom end of the lighter is an orifice 30 normally closed by a valve 32 which is biased by a spring 34 towards the orifice-closing position. Fuel in the form of liquefied combustible gas may be injected into the reservoir 14 upon opening of the orifice 30 against the biasing action of the valve 32, in the conventional man-

ner.

[0014] As shown in Fig. 2, a mounting module 34 engageable with the body 12 of the lighter 10 has two ears 36, each with a hole 38 (of which only one can be seen in Fig. 2). The striking wheel 22 may thus be mounted for rotational movement about an axle (not shown) received by and between the holes 38. The mounting module 34 also has a tube 40 for receiving the flint 24 (not shown in Fig. 2).

[0015] As can be seen in Fig. 3, the lever 26 consists of a thumb-engaging part 26a, a spring 28b and a nozzle-engaging part 26c. The thumb-engaging part 26a has two depending circular parts 42, each with an elongated recess 44 on its respective inner side. The two recesses 44 are parallel to each other. On an under side 46 of the thumb-engaging part 26a is a narrow trough 48 for receiving part of the spring 26b.

[0016] The nozzle-engaging part 26c includes at one end the nozzle-engaging end 28 for engagement with the nozzle 18, as discussed above. Near to another end of the nozzle-engaging part 26c are two round protrusions 50, each to be received within a respective elongated recess 44 of the circular part 42 of the thumb-engaging part 26a.

[0017] As shown in Figs. 4 to 8, the lever 26 is assembled by slidingly moving the thumb-engaging part 26a relative to the nozzle-engaging part 26c, so that the protrusions 50 of the nozzle-engaging part 26c are received within the respective elongated recess 44 of the thumb-engaging part 26a. The spring 26b is then disposed between the thumb-engaging part 26a and the nozzle-engaging part 26c. By way of such an arrangement, while the thumb-engaging part 26a is swivelable relative to the nozzle-engaging part 26c about an axis which is orthogonal to the longitudinal axis of the body 12 of the lighter 10, the spring 26b pivotally biases the thumb-engaging part 26a away from the nozzle-engaging part 26c, to the normal stable position as shown in Fig. 8.

[0018] As can be seen in Fig. 9, in the normal stable position, the thumb-engaging part 26a (shown in broken line) extends generally upwardly, i.e. away from the body 12 of the lighter 10. The thumb-engaging part 26a may be moved downwardly by a digit, e.g. a thumb, of a user to swivel relative to the nozzle-engaging part 26c in the direction indicated by the arrow M in Fig. 10, until it brings the nozzle-engaging part 26c into pivoting movement in the same direction, which will pivot the nozzle-engaging end 28 upwardly. As discussed above, when the nozzle-engaging end 28 of the lever 26 is pivoted upwardly, it will raise the nozzle 18, thus opening the valve 20, in turn allowing the fuel to exit the reservoir 14 via the valve 20, and subsequently the nozzle 18.

[0019] When the downward pressing force acting on the thumb-engaging part 26a of the lever 26 is released, the thumb-engaging part 26a will return to its normal stable position as shown in Fig. 9, upon the upward biasing force of the spring 26b.

[0020] Another construction of the engagement be-

tween the thumb-engaging part and the nozzle-engaging part of the lever 26 is shown in Figs. 11A to 12B. In this arrangement, there are provided near an end of the nozzle-engaging part 26c' with two toes 52 (of which only one can be seen in Fig. 11B). On the inside surface of each of the two circular depending parts 42' of the thumb-engaging part 26a' are two shallow recesses. When the thumb-engaging part 26a' is in the stable position as shown in Figs. 11A and 11B, the toes 52 are received within a first shallow recess of each of the depending parts 42' of the thumb-engaging part 26a'. The thumb-engaging part 26a' is frictionally retained in this position until it is pressed downwardly to the position as shown in Figs. 12A and 12B, to move the nozzle-engaging part 26c', to pivot the nozzle-engaging end (not shown here) to open the valve 20, as discussed above. When the thumb-engaging part 26a' is in the position as shown in Figs. 12A and 12B, the toes 52 are received within a second shallow recess of each of the depending parts 42' of the thumb-engaging part 26a'. The thumb-engaging part 26a' is frictionally retained in this position until it is pushed upwardly to the position as shown in Figs. 11 A and 11B. It can be seen that no spring is required in this latter arrangement.

[0021] Returning to Fig. 1, it can be seen that the flint 24 is biased upwardly against the striking wheel 22 by a spring 54, which sits around a post 56 integrally formed with a cover 58. The cover 58, together with the post 56, is shown more clearly in Fig. 13. Fig. 14 shows the engagement between the spring 54 and the post 56 of the cover 58.

[0022] Fig. 15 shows more clearly the structure of the mounting module 34 with the ears 36. In particular, for further enhancing the structural integrity of the lighter 10, the mounting module 34 has a number of hooks 35 (of which only one is shown in Fig. 15) which engages with an under-side of the nozzle assembly, for better securing the mounting module 34 to the body 12 of the lighter 10.

[0023] Figs. 16 to 19 show the way in which the flint 24 may be inserted into the lighter 10. In particular, the flint 24 is inserted into a closable opening 60 on a side surface of the body 12 of the lighter 10. The opening 60 is in the form of a partly cylindrical trough which assists in the sliding of the flint 24 into the tube 40 of the mounting module 34. The spring 54, already mounted onto the post 56 of the cover 60, is inserted into the opening 60, urging the flint 24 into the interior of the tube 40 of the mounting module 34, until the cover 58 covers and is retained in the opening 60, as shown in Fig. 19. Opposite to the post 56 of the cover 58 is a stud 62. As can be seen more clearly in Fig. 1, to assist retaining the cover 58 over the opening 60, the stud 62 is received within a recess 64 in the opening 60.

[0024] To open the cover 58, say for replacement of a new flint, the cover 58 is pushed upward in the direction indicated by the arrow P in Fig. 1 until the stud 62 is clear of the recess 64. The lower part of the cover 58

is then pivoted outwardly, thus allowing the cover 58 to be removed from the opening 60, and any unused flint removed from the tube 40 of the mounting module 34.

[0025] As discussed above, in order to meet the requirements set down in International Standard ISO 9994:2002 (Third Edition), gas lighters, and fluid lighters with a sealed compartment filled with non-absorbed fuel, must be capable of withstanding a temperature of 65°C for 4 hours when tested according to the procedure set out in this International Standard. In order to meet this standard, the fuel reservoir 14 of the lighter 10 is generally cylindrical in shape. In particular, all transverse cross sections of the fuel reservoir 14 have a circular outer periphery. As can be seen in Figs. 20 to 22, all the outer peripheries 68a, 68b, 68c of the fuel reservoir 14 are circular in shape. It is found in practice that a lighter thus constructed can withstand significantly higher internal pressure than conventional lighters.

[0026] It should be understood that the above only illustrates examples whereby the present invention may be carried out, and that various modifications and/or alterations may be made thereto without departing from the spirit of the invention.

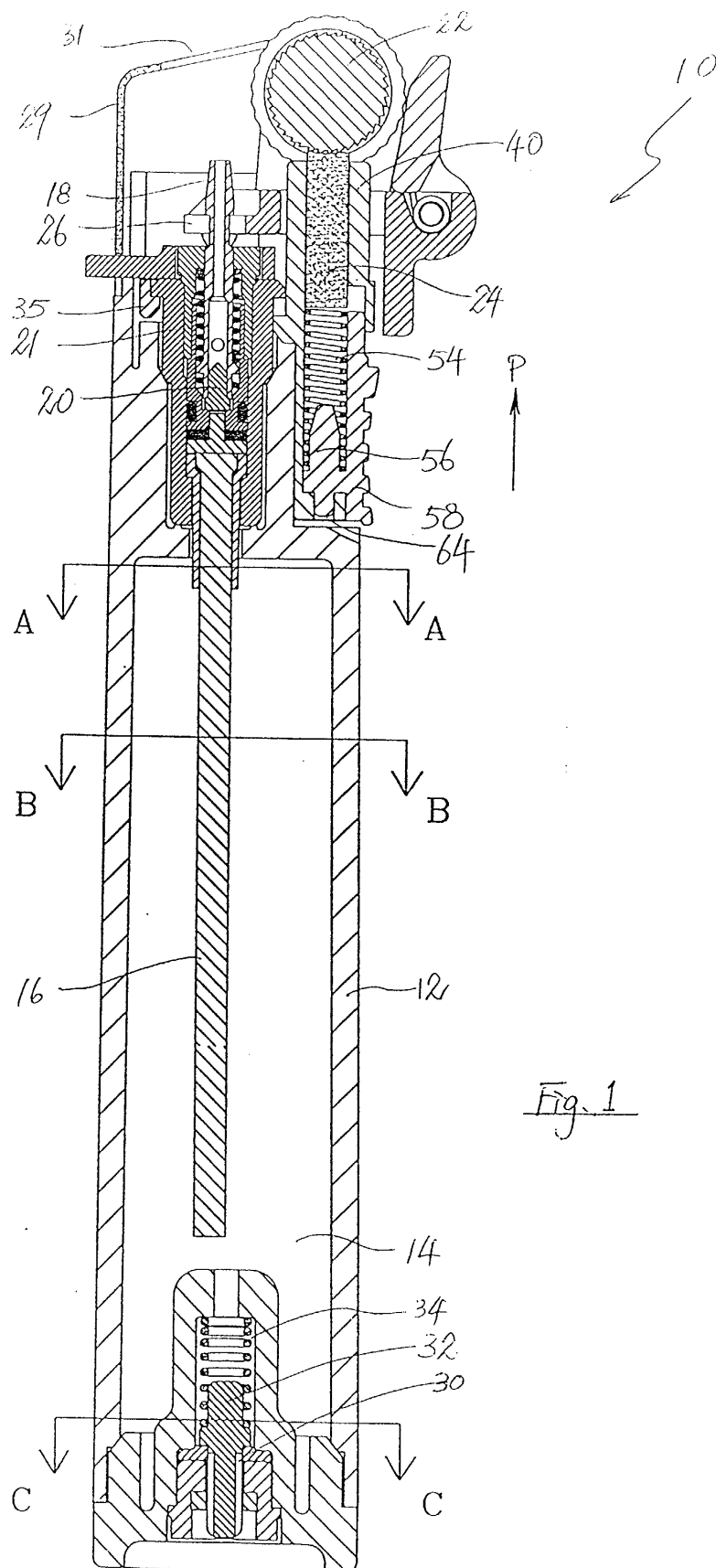
[0027] It should also be understood that various features of the invention which are, for brevity, described in the context of a single embodiment, may be provided separately or in any appropriate sub-combinations.

Claims

1. A lighter including a flame generator, a body with a fuel reservoir, and a fuel outlet associated with said fuel reservoir, wherein said fuel outlet is movable between a first configuration in which exit of said fuel from said reservoir is prevented, and a second configuration in which exit of said fuel from said reservoir is allowed, further including an operating lever with a first lever part and a second lever part which are movable relative to each other, wherein said first lever part is operatively associated with said fuel outlet, wherein said second lever part is movable from a stable normal position to an operative position to move said first lever part to move said fuel outlet to its said second configuration, and wherein said second lever part extends generally upwardly when in said stable normal position.
2. A lighter according to Claim 1 wherein said second lever part is adapted to be operable by a digit of a user.
3. A lighter according to Claim 1 wherein said second lever part is biased towards said stable normal position by at least a spring.
4. A lighter according to Claim 1 wherein said second lever part is swivellable relative to said first lever

part.

5. A lighter according to Claim 4 wherein said second lever part includes two recesses each for receiving a protrusion of said first lever part to allow relative swivelling movement between said first and second lever parts. 5
6. A lighter according to Claim 4 wherein said second lever part is swivellable relative to said first lever part about an axis which is substantially perpendicular to a longitudinal axis of said first lever part. 10
7. A lighter according to Claim 1 wherein said first lever part includes a first end for engagement with a nozzle associated with said fuel outlet and a second end for engagement with said second lever part. 15
8. A lighter including a body with a fuel reservoir, a flame generator, and a cavity for containing a flint, wherein a closable aperture is provided on a side surface of said body allowing insertion or removal of said flint. 20
9. A lighter according to Claim 8 wherein said closable aperture leads to a flint-holding cavity in said body which leads to a striking wheel of said lighter. 25
10. A lighter according to Claim 8 wherein said closable aperture is releasably closable by a cover member. 30
11. A lighter according to Claim 10 wherein said cover member is operatively associated with a spring member adapted to bias said flint towards said striking wheel. 35
12. A lighter according to Claim 11 wherein said spring member is engaged with a post member of said cover member. 40
13. A lighter according to Claim 10 wherein said cover member includes a male member for releasable engagement with a female member of said body of said lighter. 45
14. A lighter including a body with a fuel reservoir and a flame generator, wherein all transverse cross sections of said reservoir have a substantially circular outer periphery. 50
15. A lighter according to Claim 14 wherein said reservoir is generally cylindrical in shape. 55



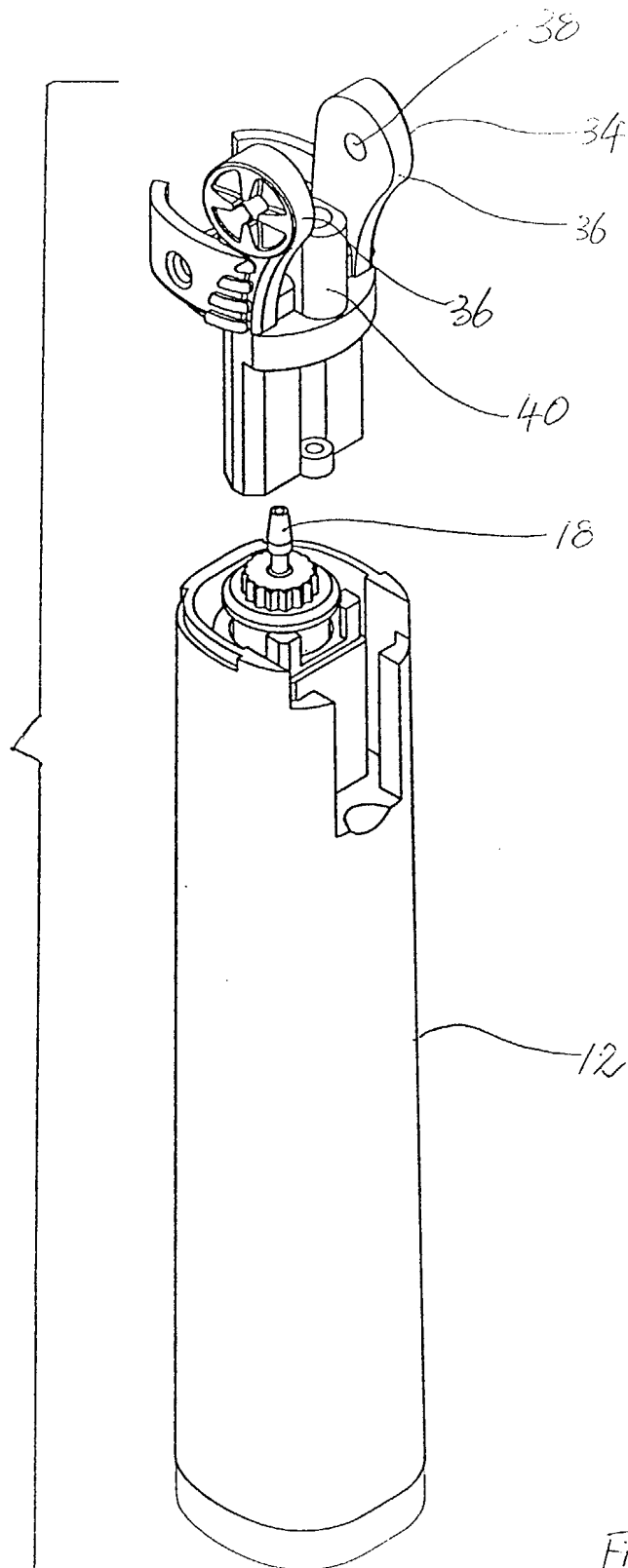


Fig. 2.

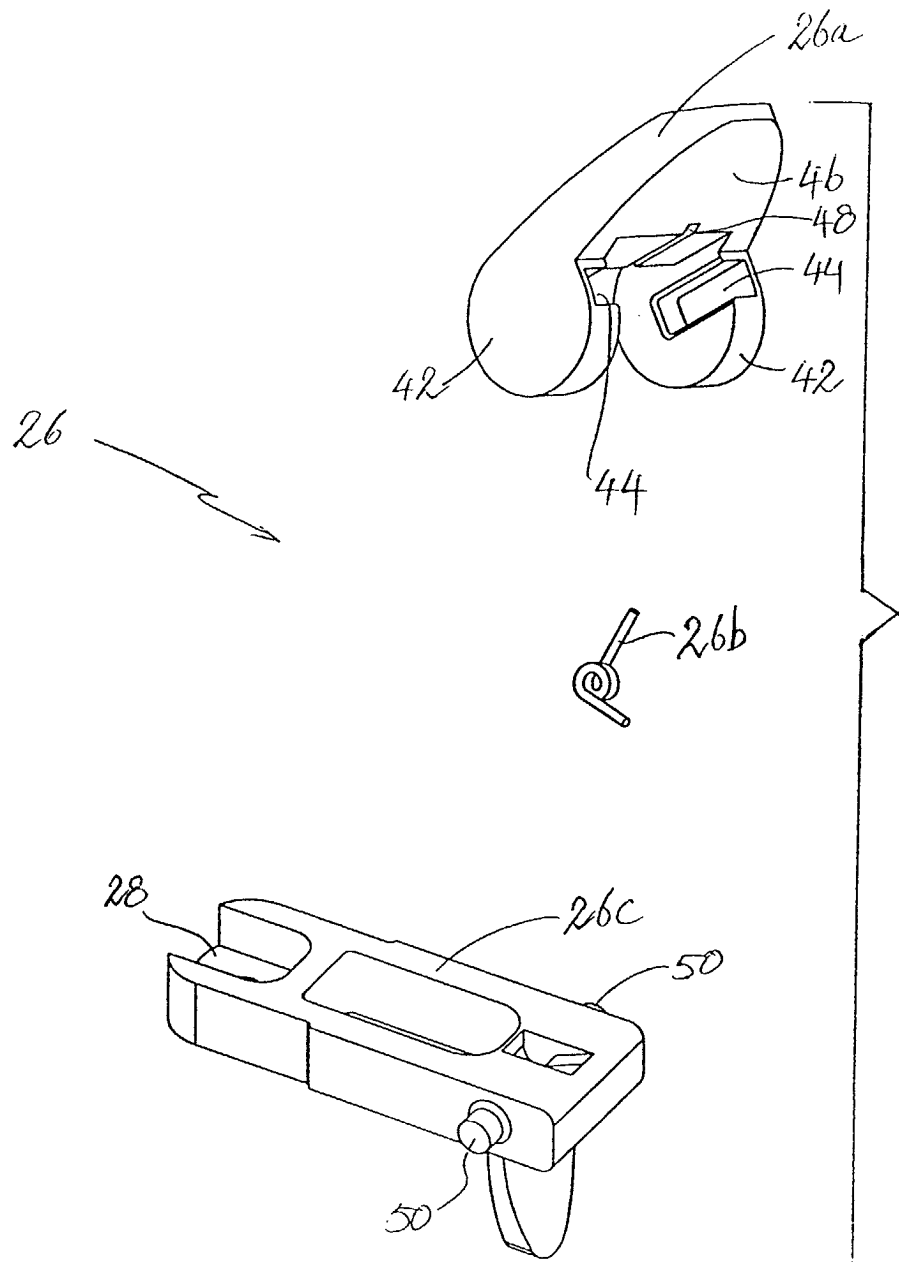
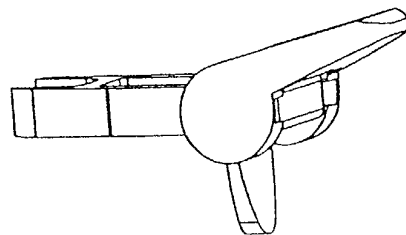
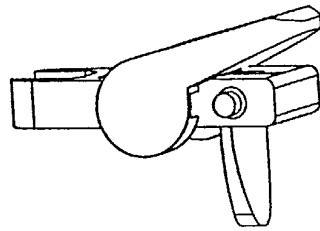
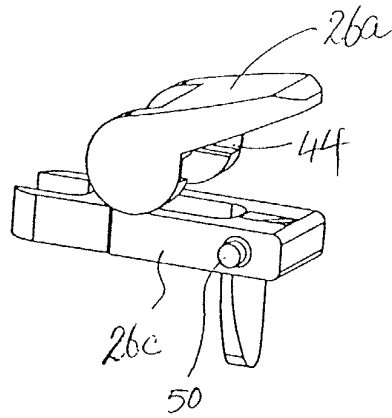


Fig. 3



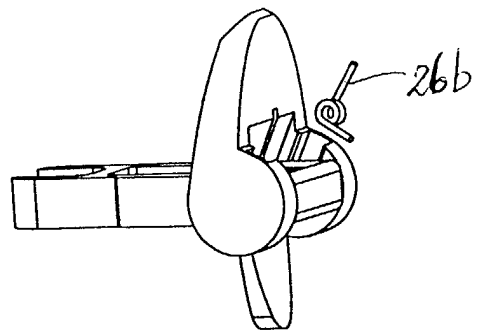


Fig. 7

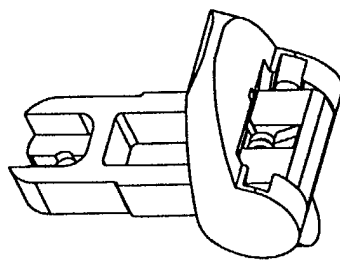


Fig. 8

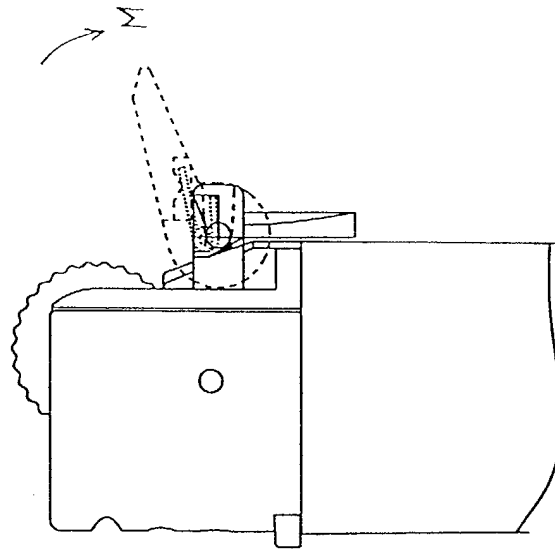


Fig. 10

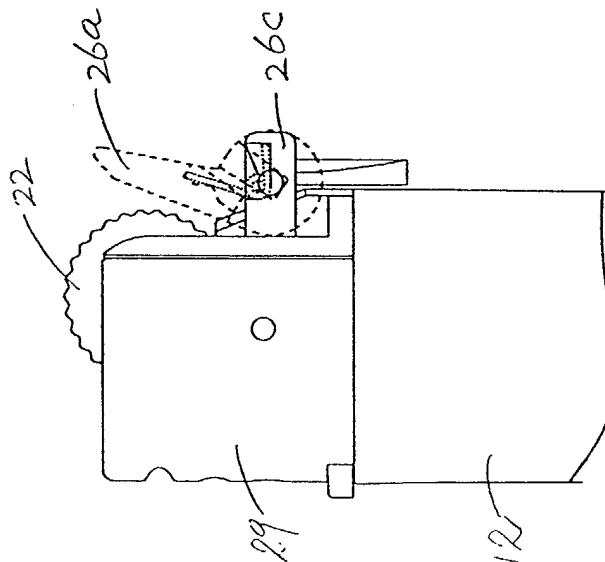
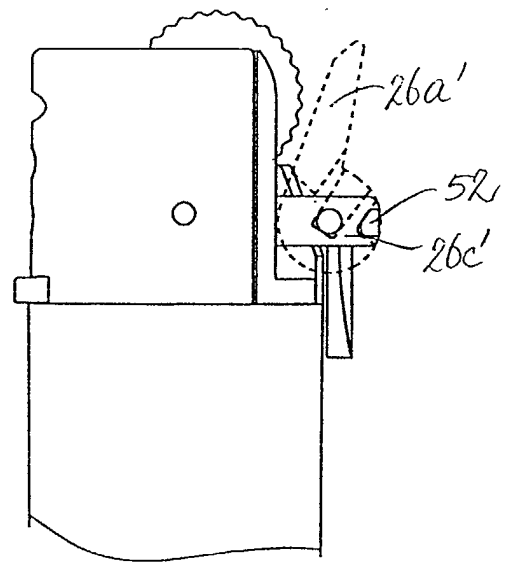
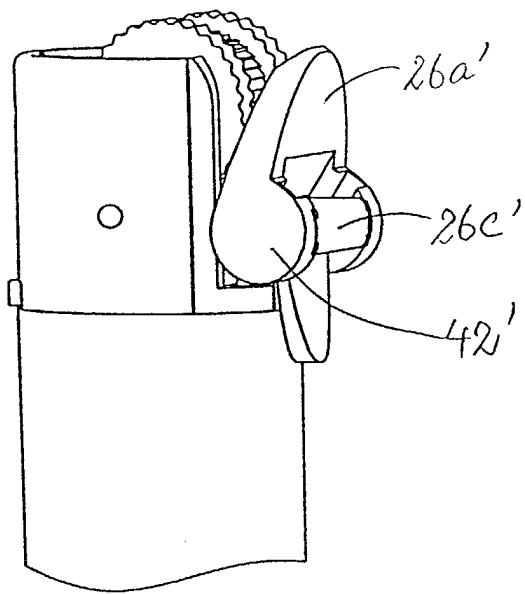


Fig. 9



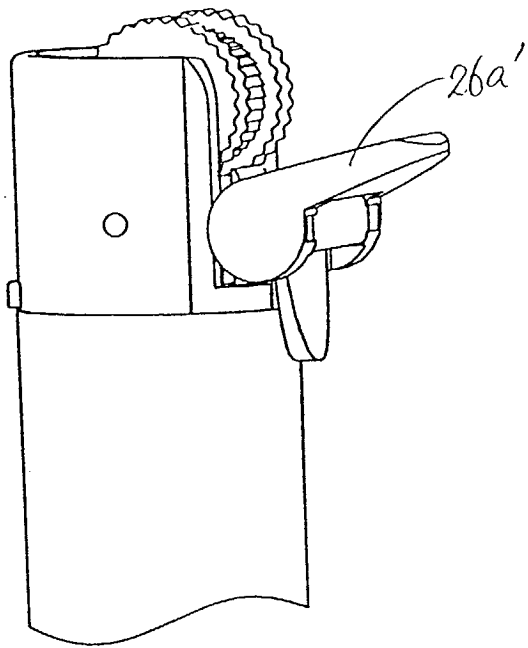


Fig. 12A

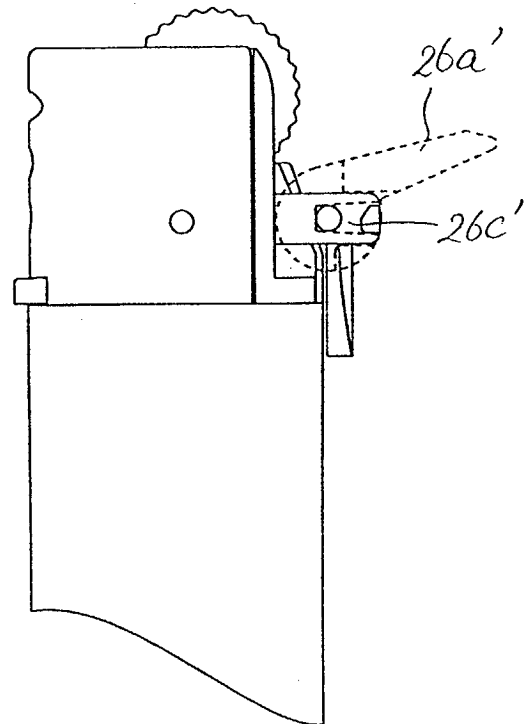


Fig. 12B

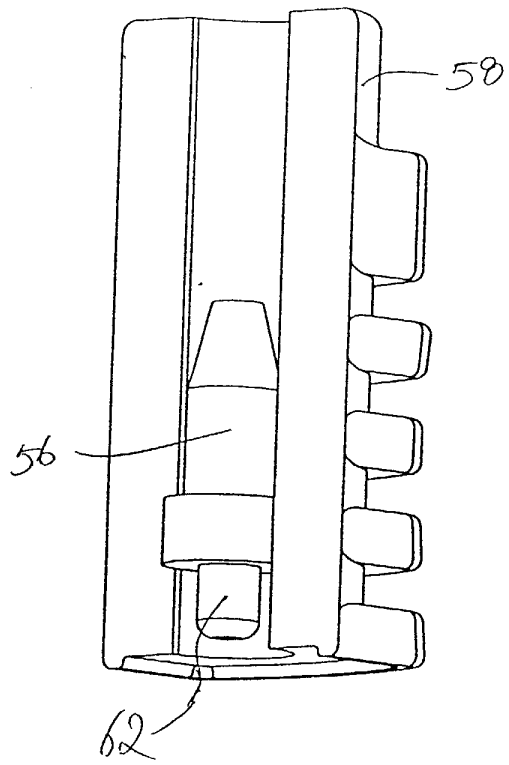


Fig. 13

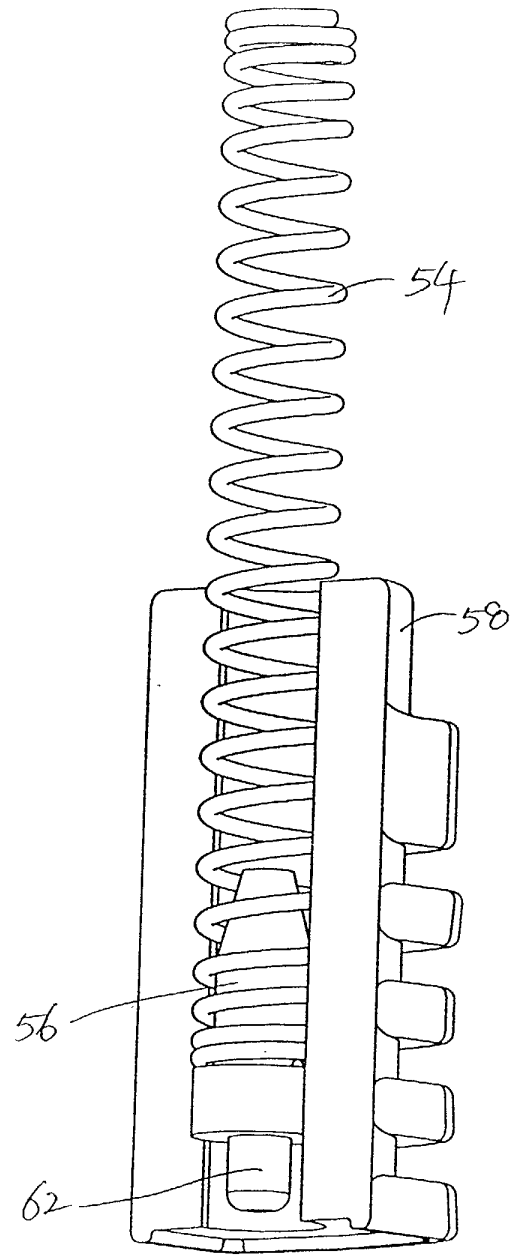


Fig. 14

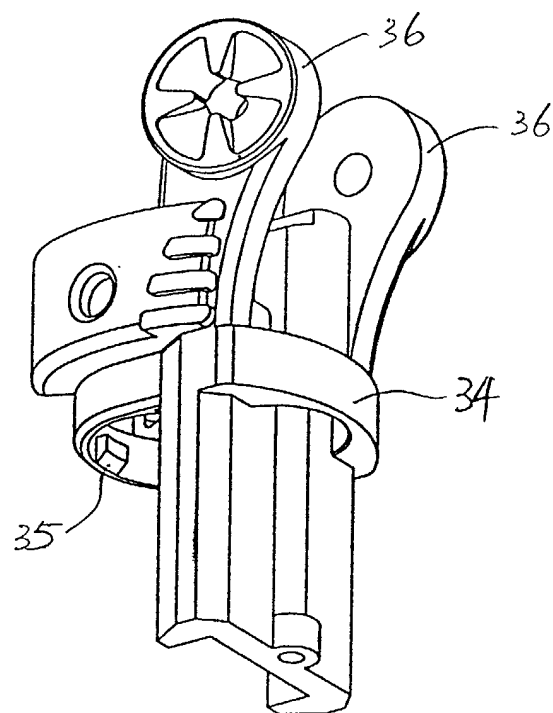


Fig. 15

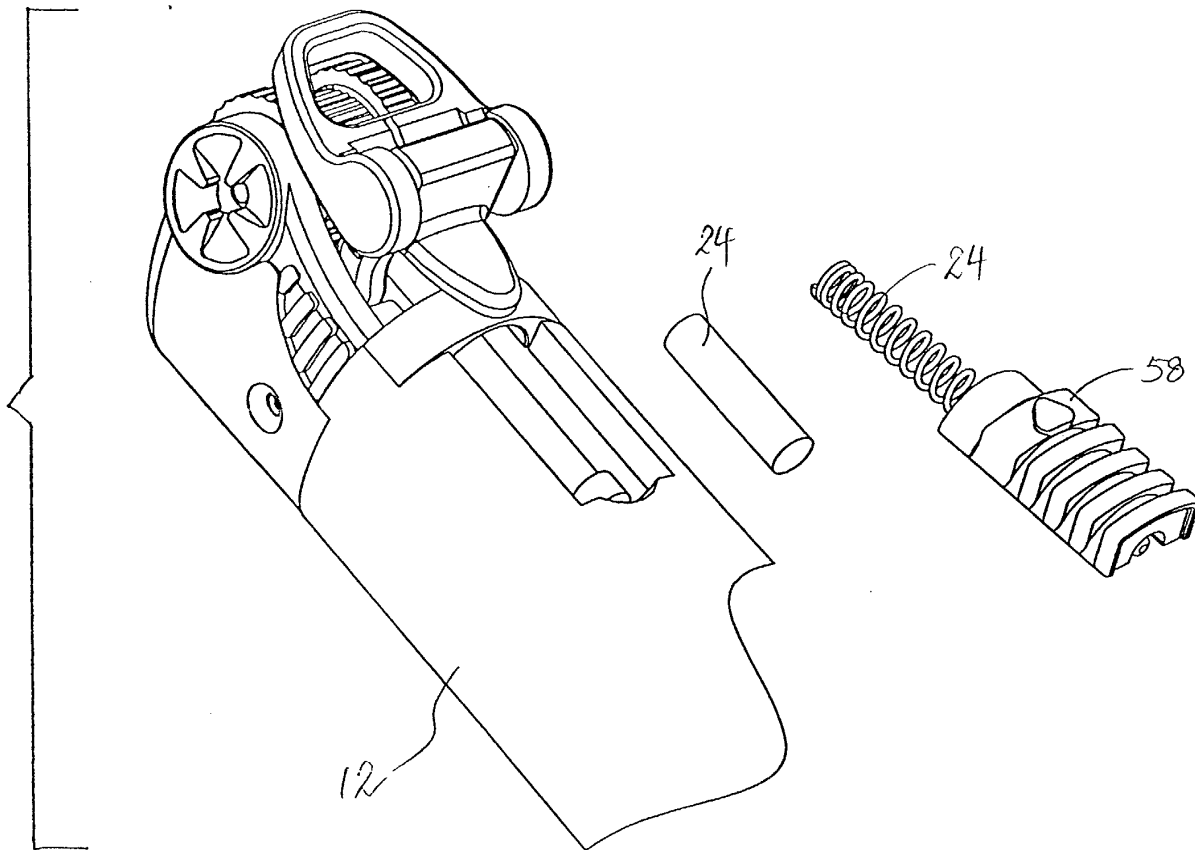
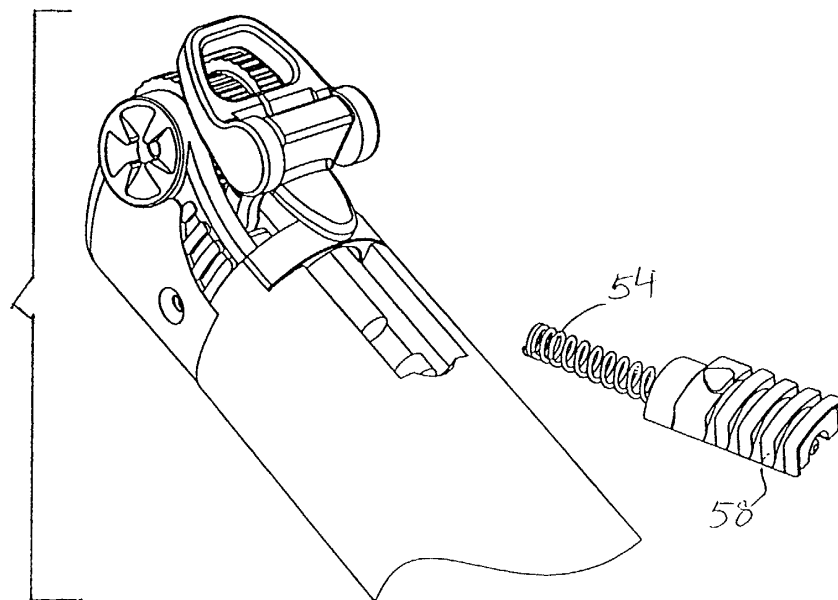
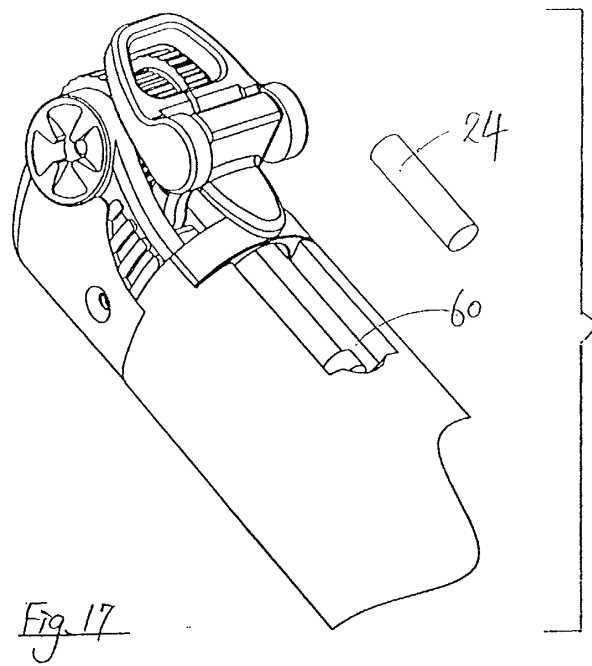


Fig. 16



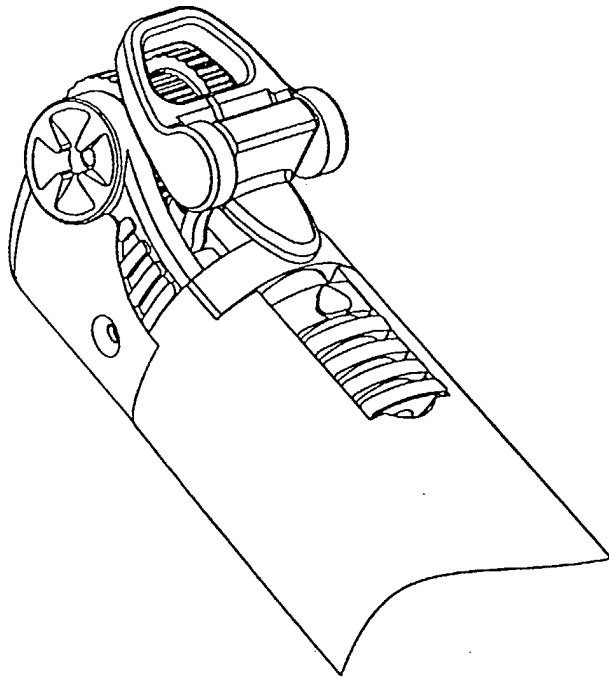


Fig. 19

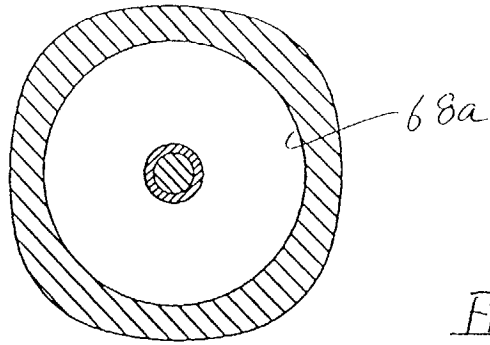


Fig. 20

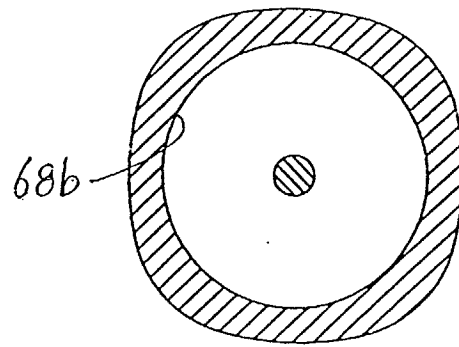


Fig. 21

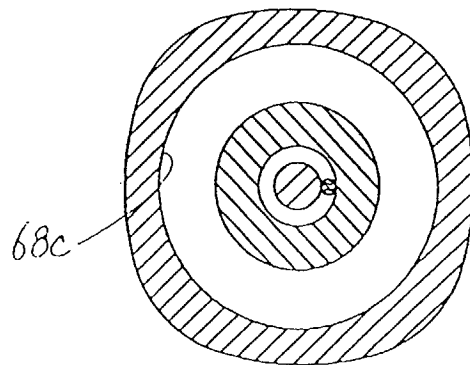


Fig. 22