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(71) Applicant: BIC CORPORATION [US/US]; 500 Bic Drive, Milford, CT 06460 (US).

(72) Inventors: DOUCET, Michel; La Crois Verte, F–35600 Bains Sur Oust (FR). AMOROS NOLLAS, Enrique; Avenida Sant Jordi, 29, E–43201 Reus (ES). FRIGIERE, René; La Plessis Rivault, F–56350 Allaire (FR).

(74) Agents: MARSHALL, Jonathan, A. et al.; Pennie & Edmonds LLP, 1155 Avenue of the Americas, New York, NY 10036 (US).

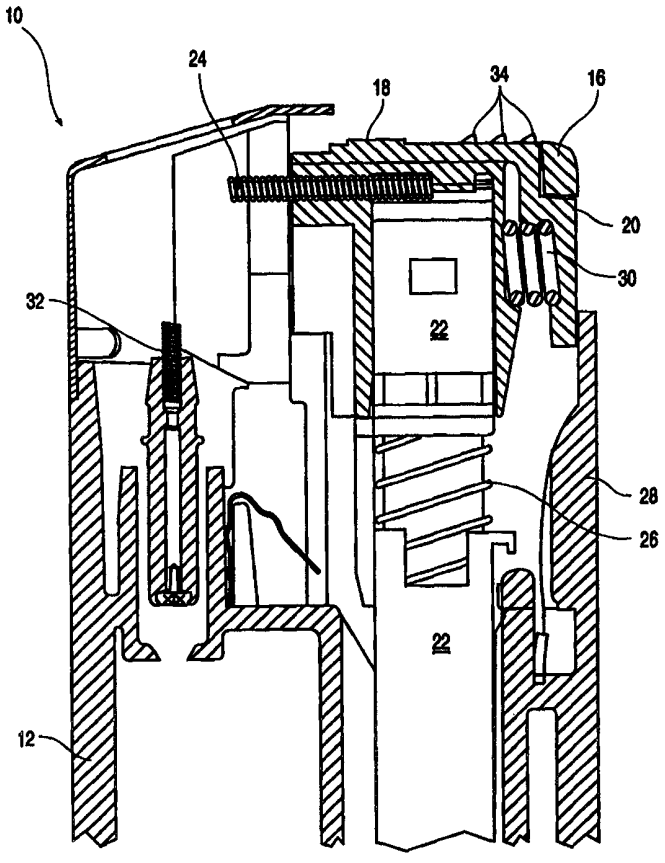
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(54) Title: CHILD RESISTANT LIGHTER

(57) Abstract

A lighter (10) of the disposable type, ignition of which requires depression of an actuator (16) that is resistant to the manipulations of unintended users. The lighter (10) is normally maintained in a position (figure 2) that prevents depression of the actuator (10) through the incorporation of a mechanism (18, 20, 52, 56) that increases the difficulty of operation. The safety mechanism (18, 20, 52, 56) requires displacement in two directions in order to allow full depression of the actuator and activation of an ignition means (22). When the mechanism is so displaced through the application of force by a user, it cannot remain displaced without continuous application of such force and will return to the normal, blocking, position when the force is removed.



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CHILD RESISTANT LIGHTER

Michel Doucet
Enrique Amoros Nollas
Rene Frigiere

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates to a lighter employing an ignition system which presents increased difficulty of operation by unintended users and, more particularly, a piezoelectric lighter with such system.

Discussion of the Related Art

Disposable gas lighters are available in a variety of forms. One common element of disposable lighters, though, is an actuator pad or lever used to initiate the flow of fuel. An actuator pad is operated in conjunction with a spark producing mechanism so that the flow of fuel is ignited soon after it commences. For example, lighters employing conventional spark wheels require a user to rotate a toothed spark wheel against a flint in order to generate a spark. The user then depresses the actuator pad, releasing gas and producing a flame.

Another means of ignition for disposable lighters employs a piezoelectric mechanism. In this type of ignition mechanism, a piezoelectric element, such as a crystal, is struck by a hammer in order to produce an electric spark. The spark is conducted to the opening of the fuel valve to ignite the gaseous fuel. The actuator pad, upon forced depression by a user, commences both the flow of the fuel and the ignition process. An example of such a piezoelectric ignition mechanism is disclosed in U.S. Patent No. 5,262,697, entitled "Piezoelectric Mechanism for Gas Lighters."

As with spark wheel ignition mechanisms, measures have been introduced to prevent activation of piezoelectric mechanisms by unintended users such as children 5 years old and younger. One typical method employed is to incorporate a latch member under the actuator pad that inhibits depression

of the actuator pad. Examples of such mechanisms are shown in U.S. Patent Nos. 5,435,719, 5,584,682, and 5,636,979.

There remains, however, a need in the art for mechanisms which increase the difficulty of operation by unintended users and at the same time are user-friendly for the intended user.

SUMMARY OF THE INVENTION

It is thus an object of this invention to provide a lighter that is easily operated by an adult, but which is resistant to operation by young children.

This and other objectives are met by a piezoelectric lighter with an elongated body defining a fuel reservoir and including a valve for dispensing such fuel. The lighter further includes an actuator that, upon depression, activates the ignition system, which requires the release of fuel from the reservoir and activation of a piezoelectric mechanism which makes a spark. Depression of the actuator is normally barred, however, by a blocking mechanism. Displacement of the blocking mechanism in the specified manner allows the actuator to be depressed. The blocking mechanism, which is incorporated into the actuator, is displaced through pressure by a user. Upon removal of the displacing force the blocking mechanism returns to its initial blocked position, once again preventing the actuator from being depressed sufficiently to activate the ignition system.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features, and advantages of the invention will become more readily apparent from the following detailed description which should be read in conjunction with the accompanying drawings, in which like elements are labeled similarly, and in which:

FIG. 1 is a partial perspective view of one embodiment of a lighter according to the present invention in its idle configuration;

FIG. 2 is a partial cross-sectional view of the lighter depicted in FIG. 1;

FIG. 3 is a partial cross-sectional view of the lighter depicted in FIG. 1, in an ignition position;

FIG. 4 is a top view of a second embodiment of the present invention in an idle configuration;

FIG. 5 is a partial cross-sectional view of the lighter depicted in FIG. 4;

FIG. 6 is a partial cross-sectional view of the lighter depicted in FIG. 4, in a locked position;

FIG. 7 is a partial cross-sectional view of the lighter depicted in FIG. 4, with the security tab displaced to allow depression of the actuator;

FIG. 8 is a partial cross-sectional view of the lighter depicted in FIG. 4, in an ignition position;

FIG. 9 is a partial cross-sectional view of still another embodiment of the present invention in an idle configuration;

FIG. 10 is a partial cross-sectional view of the lighter depicted in FIG. 9, with the security tab displaced to allow depression of the actuator;

FIG. 11 is a partial cross-sectional view of the lighter depicted in FIG. 9, in an ignition position; and

FIG. 12 is a partial cross-sectional view of the lighter depicted in FIG. 9, employing a modified actuator.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, a partial cross-sectional view of a first illustrative embodiment of the present invention is provided, in which lighter 10 is comprised of body portion 12, wind guard 14, and depressible valve actuator 16. Actuator 16 includes slide member 18. Slide member 18 is substantially encircled at the top surface of lighter 10 by actuator 16, but vertical extension 20 of slide member 18 projects downward when at rest to form an extension of rear wall 28 of lighter 10. Slide member 18 is biased toward its

normal rearward position, as shown in FIG. 2, by slide spring 30.

With reference now to FIG. 2, further details of the ignition system and safety feature of lighter 10 are depicted. An upper portion of piezoelectric ignition mechanism 22 is connected to actuator 16. Spark conductor 24 is electrically connected to ignition mechanism 22 in a known manner. A lower portion of ignition mechanism 22 is connected to body portion 12. Depression of actuator 16 commences the flow of fuel through fuel nozzle 32, to be ignited by a spark conducted by spark conductor 24.

Coil spring 26 is positioned between the upper and lower portions of ignition mechanism 22. Spring 26 imparts an upward bias to resist depression of actuator 16 and compression of ignition mechanism 22. Spring 26 is illustrated as a coil spring, but any other suitable biasing element may be employed, such as a separate leaf spring or integrally molded plastic spring.

In its normal position, depicted in FIGs. 1 and 2, actuator 16 cannot be depressed to activate the ignition system due to the obstructing alignment of vertical extension 20 with rear wall 28. To enable ignition, the user must apply a horizontal force upon slide member 18 in order to inwardly displace vertical extension 20 from alignment with rear wall 28. After slide member 18 is displaced inwardly, actuator 16 may then be depressed, as depicted in FIG. 3, thus compressing ignition mechanism 22 and causing ignition. Depression of actuator 16 also serves to bring spark conductor 24 into proximity with fuel nozzle 32, thus facilitating generation of an ignition spark. In this embodiment, ridges 34 are incorporated into slide member 18 to assist the user in applying sufficient inward force to overcome the biasing effect of slide spring 30.

After lighter 10 has been used, spring 26 assists in forcing actuator 16 to return to its normal elevation and slide spring 30 forces slide member 18 to its normal rearward position.

Another embodiment of the invention is depicted in FIGs. 4-8. With reference now to FIGs. 4 and 5, lighter 50 is shown in its normal position. Actuator 16 includes tab 52, separated from the main portion of actuator 16 by gap 54. Tab 52 includes one or more steps 56 and is connected to actuator 16 at the lower end of actuator 16, thus allowing the tab to operate as a lever. The lower portion of actuator 16, where tab 52 is joined, must be of sufficient strength and dimension to withstand repeated pivotal displacements of tab 52.

An attempt to operate lighter 50 as it appears in FIGs. 4 and 5, without displacing tab 52 as described below, results in the configuration depicted in FIG. 6. Step 56 catches upon rear wall 28 of body 12 of lighter 50, thus preventing activation of the ignition system. Alternatively, lighter 50 may be constructed such that step 56 catches upon a portion (not shown) of lighter 50 internal and integral to body 12 when actuator 16 is depressed from the normal position.

It will be apparent from FIGs. 4-6 that an inward force must be applied to the upper end of tab 52 to displace step 56 and prevent it from engaging rear wall 28, thereby allowing actuator 16 to be fully depressed. It will also be apparent to one of ordinary skill in the art that in normal, downward depression of actuator 16, such inward force is not applied.

FIG. 7 illustrates lighter 50 with tab 52 displaced inward, to a degree sufficient to enable actuator 16 to be depressed. Advantageously, a user need merely press downward on tab 52 and actuator 16, after forcing tab 52 inward, in order to trigger the ignition system. He or she need not relocate his or her digit to apply the necessary triggering force after thrusting tab 52 inward.

Referring now to FIG. 8, actuator 16 has been depressed far enough to advance step 56 past the upper edge of rear wall 28 and activate the ignition system. Spark conductor 24 is lowered in conjunction with actuator 16 and is now in

proximity with nozzle 32, thus promoting generation of an ignition spark. The resistance of spring 26 forces actuator 16 to return to its normal position when the downward activation pressure upon actuator 16 is removed, thus restoring tab 52 and step 56 to their blocking positions.

It will be understood by one of skill in the art that actuator 16 and tab 52 are constructed such that tab 52 resists inward pressure. It will also be apparent that the tab could, in another embodiment of the invention, be constructed such that it is connected at its top end to actuator 16. In such an embodiment, depicted in FIGs. 9-11, gap 54 separates the lower end of tab 52 from the actuator. One or more steps 56 are included on tab 52 for the purpose of engaging rear wall 28 when actuator 16 is depressed from its normal position, thus again preventing activation of lighter 50 prior to displacement of tab 52.

The lower end of tab 52 must be forced inward, as shown in FIG. 10, in order to allow depression of actuator 16 and activation of the ignition system. Additionally, if desired, a separate biasing element, such as spring 58, could be incorporated into gap 54.

To operate the lighter depicted in FIGs. 9-11, a user first applies a rearward force to ridge 34, thus asserting a lever-like action against tab 52 to move step 56 out of the way of rear wall 28. The user can then depress actuator 16 by applying a downward pressure to ridge 34 and actuator 16. With tab 52 deflected inward, the upper and lower portions of ignition mechanism 22 can be compressed to initiate ignition, as shown in FIG. 11.

As an alternative to the preceding embodiment, ridge 34 may be foregone in favor of an angled plane joining tab 52 and actuator 16. With this option, depicted in FIG. 12, a user applies force similar to that used with ridge 34 in FIG. 11. By pressing inward on the lower portion of plane 60, tab 52 is displaced from its blocking alignment with rear wall 28 to allow depression of actuator 16 and activation of the ignition system.

Various embodiments of the invention have been described. The descriptions are intended to be illustrative, not limitative. Thus, it will be apparent to those skilled in the art that modifications may be made to the invention as described without departing from the scope of the claims set out below.

The ignition system described herein is not limited to use in a lighter. The ignition system can also be employed in other devices that require an enhanced child resistant mechanism, such as piezoelectric ignitions for gas grills, etc.

We claim:

1. A lighter resistant to undesired use, comprising:

an elongated housing having a fuel compartment;

means for supplying fuel from said fuel compartment;

ignition means for igniting said fuel;

an actuator operatively engaged with said ignition means, such that depression of said actuator from a first elevation to a second elevation actuates said ignition means; and

blocking means for preventing movement of said actuator from said first elevation to said second elevation, said blocking means being normally in a first position, wherein a first blocking part engages a second blocking part along an edge of said housing upon depression of the actuator;

wherein displacement of said blocking means from said first position to a second position allows said actuator to be depressed from said first elevation to said second elevation, said second position being maintained by user applied force.

2. The lighter of claim 1 in which said blocking means comprises a slide capable of horizontal movement independent of said actuator, said slide having a projection aligned with an edge of the elongated housing.

3. The lighter of claim 2 wherein alignment of said projection with the elongated housing prevents movement of said actuator from said first elevation to said second elevation when said blocking means is in said first position.

4. The lighter of claim 2 in which

said actuator is moved from said first elevation to said second elevation by the force of a user; and

wherein said actuator automatically returns to said first elevation from said second elevation when the force is removed.

5. A lighter resistant to operation by unintended users, comprising:

a body portion having a fuel compartment;

ignition means for igniting fuel from said fuel compartment; and

an actuator for actuating said ignition means, comprising:

a slide, normally in a first position, said slide comprising a vertical projection forming a portion of a rear wall of the body portion when said actuator is in a normal position; and

an elliptical cylinder substantially encircling said slide; and

means for resisting inward displacement of said slide from said first position to a second position.

6. The lighter of claim 5 wherein said vertical projection blocks depression of said actuator when said actuator is in said normal position.

7. The lighter of claim 5 wherein inward displacement of said slide from said first position to said second position enables the depression of said actuator.

8. The lighter of claim 5 wherein said actuator automatically returns to said normal position after actuation of said ignition means.

9. The lighter of claim 5 wherein:

said slide comprises an upper surface; and

said upper surface comprises at least one ridge.

10. The lighter of claim 5 wherein said slide is horizontally movable independent of said actuator.

11. The lighter of claim 1 in which:

said blocking means comprises a tab having a first end and a second end;

wherein said actuator is connected to said tab at said first end, said connection defining a notch between said actuator and said tab.

12. The lighter of claim 11 in which said tab further comprises a step for engaging the elongated housing.

13. The lighter of claim 12 in which the elongated housing comprises a projection for engaging said step.

14. The lighter of claim 12 in which engagement of said step with the elongated housing prevents depression of said actuator from said first elevation to said second elevation.

15. The lighter of claim 11 in which said second end of said tab is capable of horizontal movement independent of said actuator.

16. The lighter of claim 11 in which:

said blocking means is moved from said first position to said second position by the force of a user; and

wherein said blocking means automatically returns to said first position from said second position when the force is removed.

17. The lighter of claim 11 in which

said actuator is depressed from said first elevation to said second elevation by the force of a user; and

wherein said actuator automatically returns to said first elevation from said second elevation when the force is removed.

18. A lighter resistant to operation by unintended users, comprising:

a body portion having a fuel compartment;

ignition means for igniting fuel from said fuel compartment; and

an actuator for actuating said ignition means, said actuator comprising:

a front portion; and

a rear portion connected to said front portion to define a notch therebetween, said rear portion comprising one or more steps for preventing depression of said actuator when said actuator is in a normal position;

wherein said rear portion is movable relative to said front portion; and

blocking means integral to said body portion for engaging said one or more steps to block depression of said actuator.

wherein inward displacement of said rear portion allows depression of said actuator to actuate said ignition means.

19. The lighter of claim 18, further comprising means for resisting inward displacement of said rear portion.

20. The lighter of claim 19, wherein said resisting means comprises a spring, said spring being positioned in said notch.

21. The lighter of claim 18, wherein said blocking means comprises said body portion.

22. The lighter of claim 18 wherein said blocking means comprises a projection internal to said body portion.

23. The lighter of claim 18 in which said actuator automatically returns to said normal position after actuation of said ignition means.

24. The lighter of claim 18 in which said rear portion is displaced inwardly by the application of force by a user; and

wherein said rear portion remains inwardly displaced only for the duration of the application of the force.

AMENDED CLAIMS

[received by the International Bureau on 8 January 1999 (08.01.99);
original claims 1-24 replaced by amended claims 1-9
(2 pages)]

1. A lighter resistant to undesired used, comprising:

an elongated housing having a fuel compartment;

a fuel nozzle in fluid communication with the fuel compartment adapted to selectively release fuel;

an ignition device adapted to ignite the released fuel;

an actuator operatively engaged with said ignition device, such that depression of said actuator from a first elevation to a second elevation actuates said ignition device; and

a blocking tab adapted to prevent movement of said actuator from said first elevation to said second elevation, said blocking tab is connected to the actuator at a first end and is spaced from said actuator by a gap away from said first end, and said blocking tab is normally positioned in an interfering position, wherein a first blocking part on the blocking tab interferes with a second blocking part on said housing;

wherein displacement of said blocking tab across said gap to an noninterfering position allows said actuator to be depressed from said first elevation to said second elevation.

2. The lighter of claim 1 wherein said blocking tab is movable from said interfering position to said noninterfering position by a user applied force and is maintained in said noninterfering position by the user applied force; and

wherein said blocking tab automatically returns to said interfering position from said noninterfering position when the user applied force is removed.

3. The lighter as set forth in claim 1 wherein the blocking tab is spaced from the actuator by said gap at a second end.

4. The lighter as set forth in claim 3, wherein the actuator has an upper surface and the second end of said block tab is spaced from the actuator at the upper surface.

5. The lighter as set forth in claim 4, wherein a resilient member is disposed within said gap to bias the blocking tab to the interfering position.

6. The lighter as set forth in claim 3, wherein the actuator has an upper surface and the

7. The lighter as set forth in claim 6, wherein the block tab includes a ridge, such that when a user-applied force is applied against said ridge the block tab moves across said gap.

8. The lighter as set forth in claim 6, wherein the block tab includes an angled plane, such that when a user-applied force is applied against said angled plane the block tab moves across said gap.

9. The lighter as set forth in claim 6, wherein a resilient member is disposed within said gap to bias the blocking tab to the interfering position.

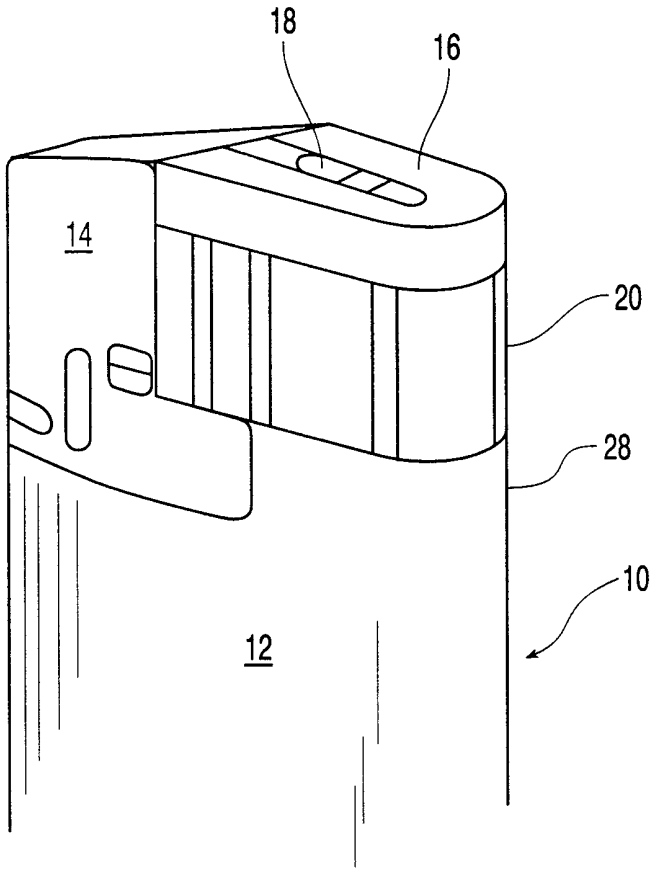


FIG. 1

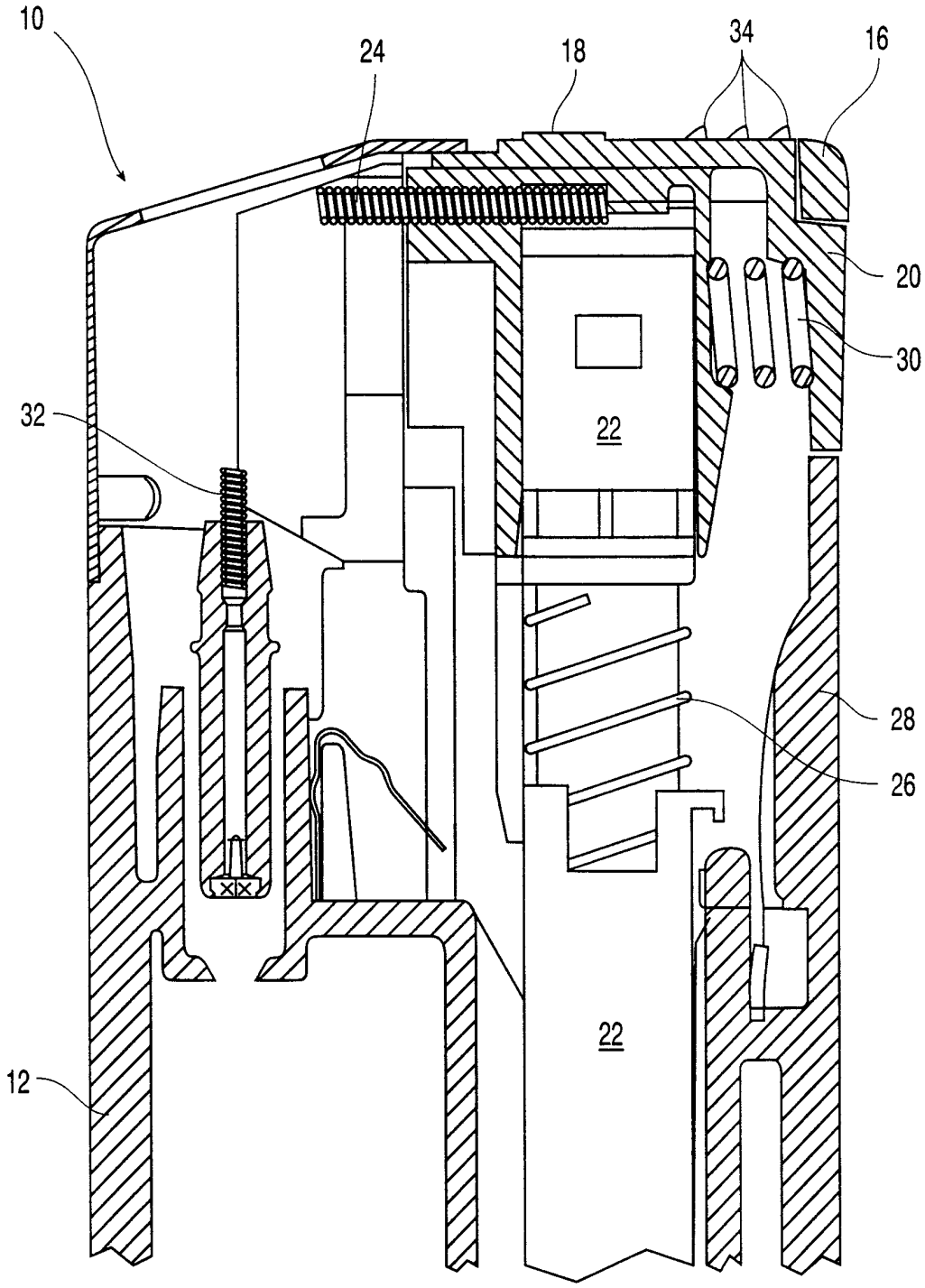


FIG. 2

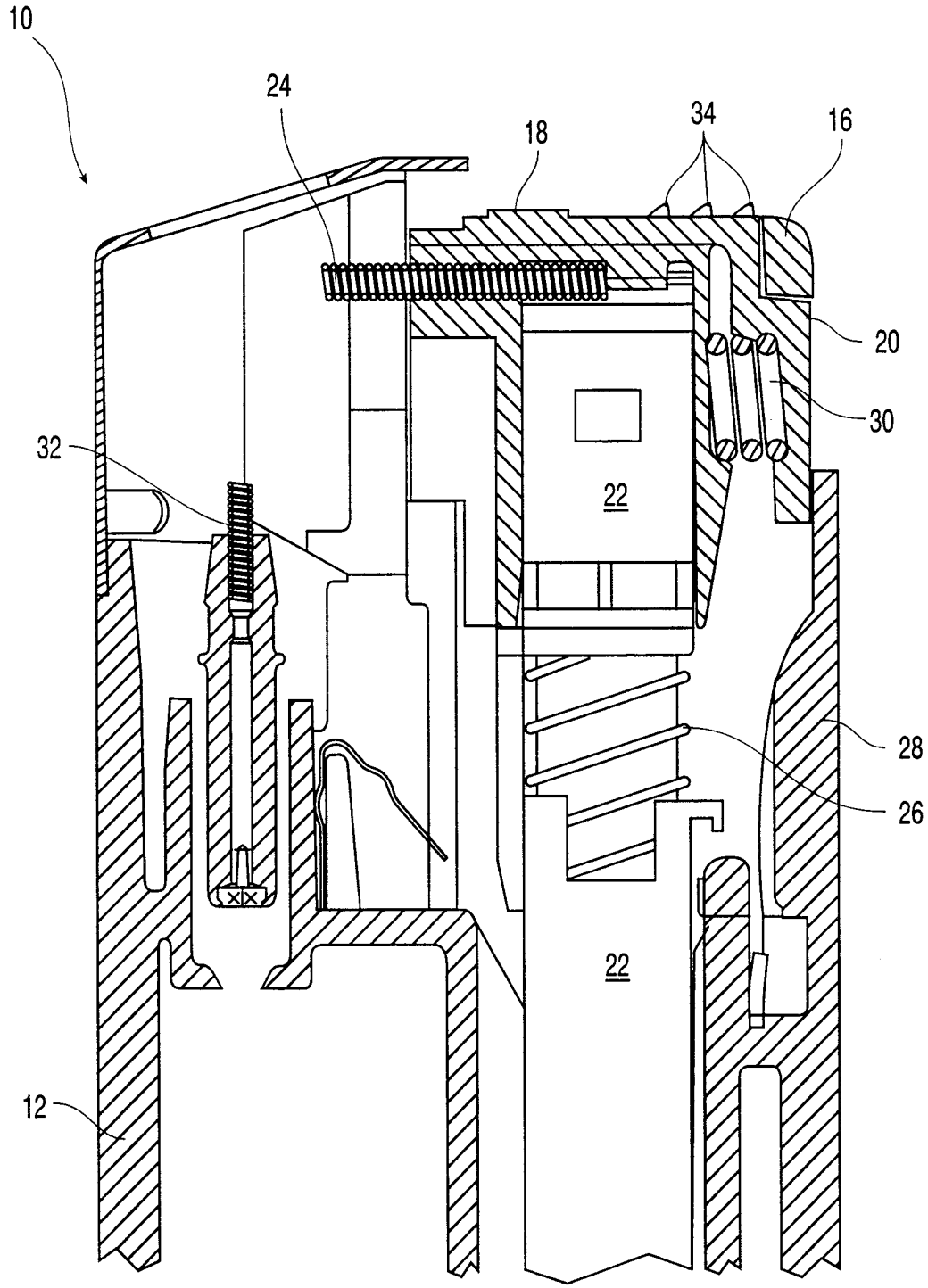


FIG. 3

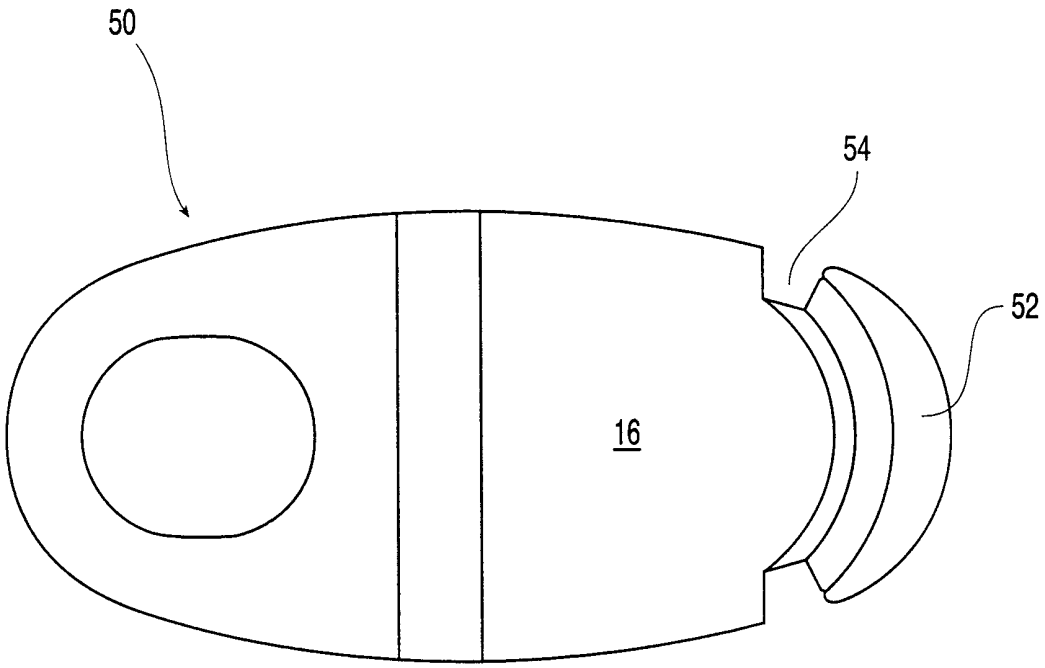


FIG. 4

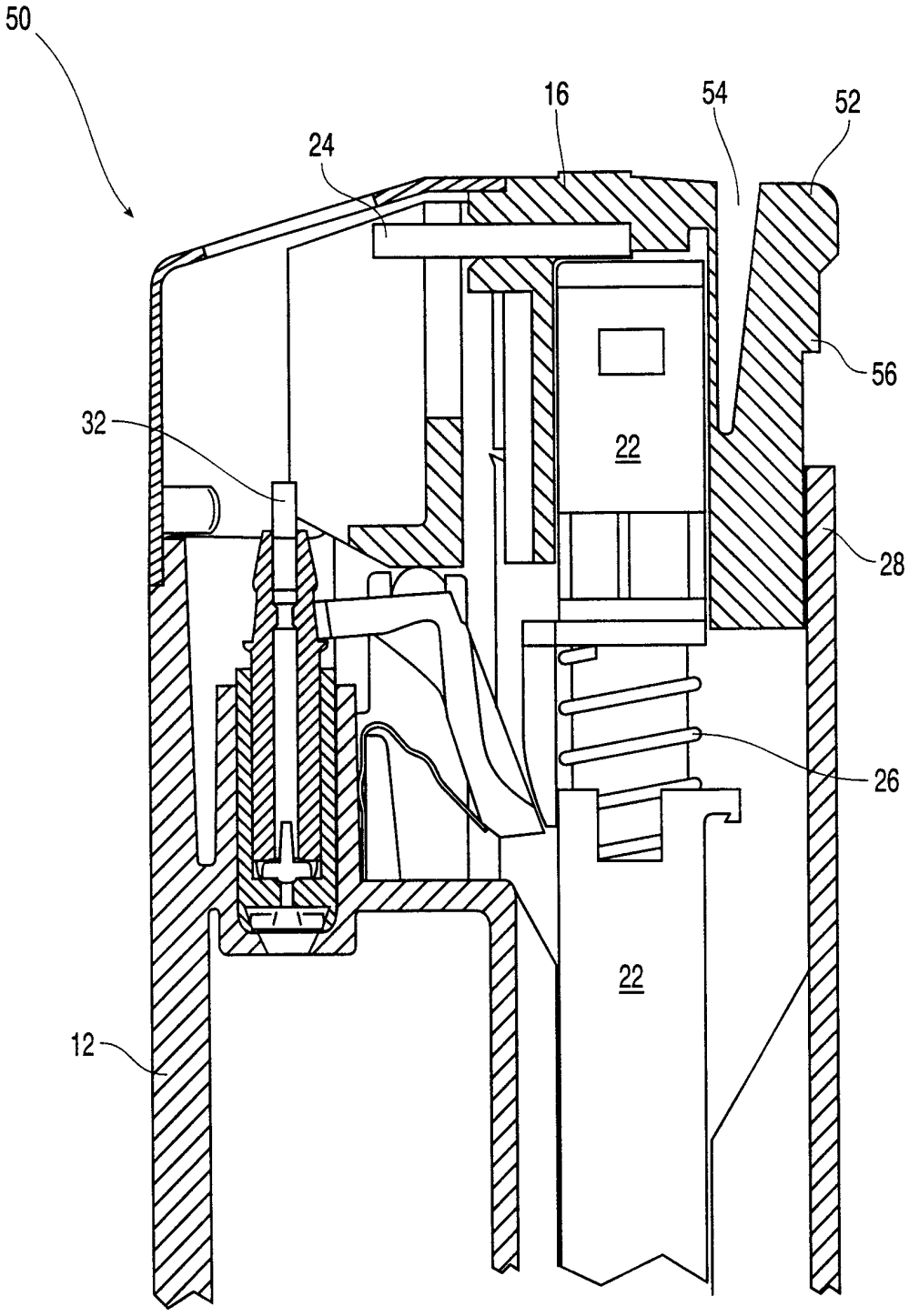


FIG. 5

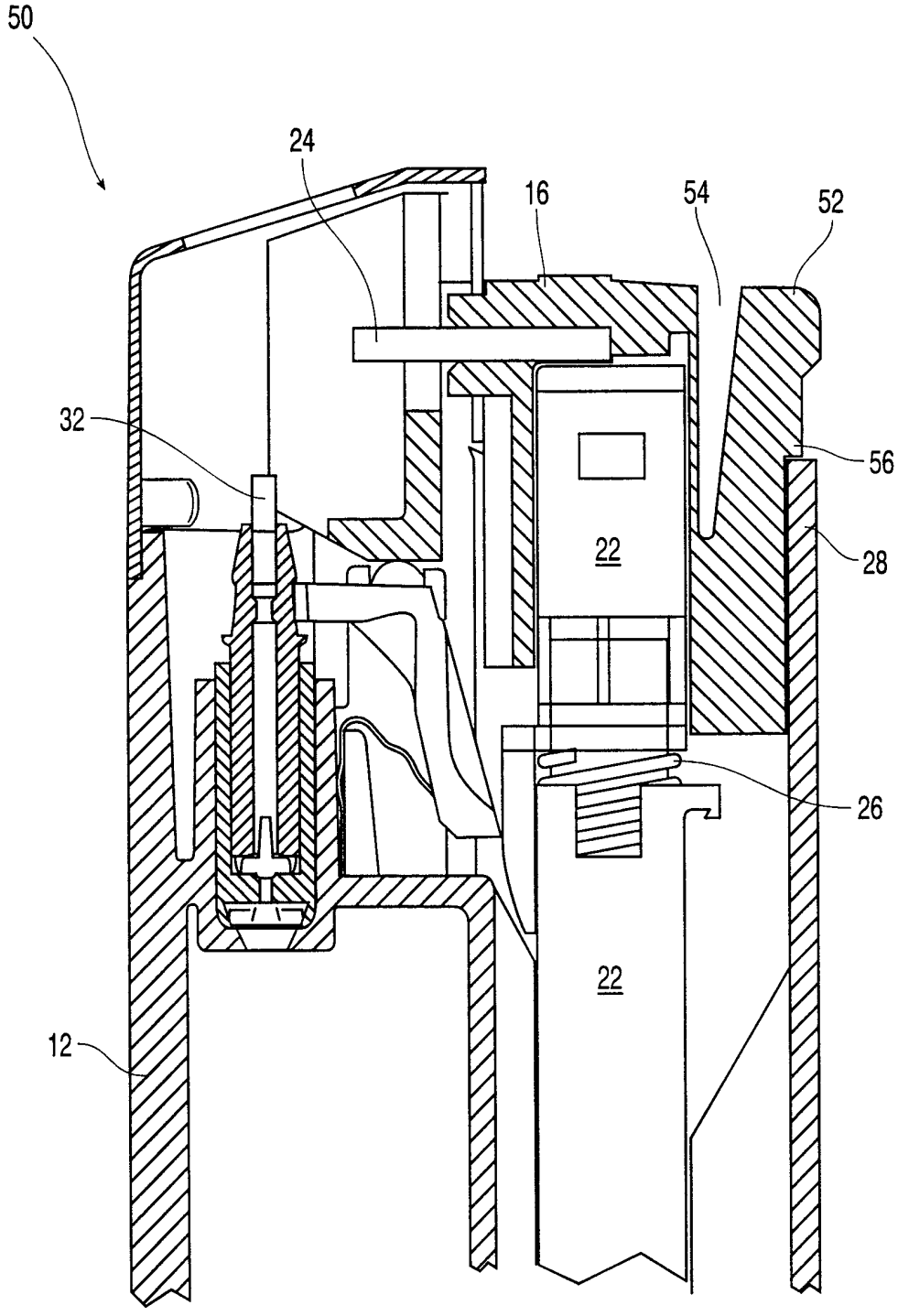


FIG. 6

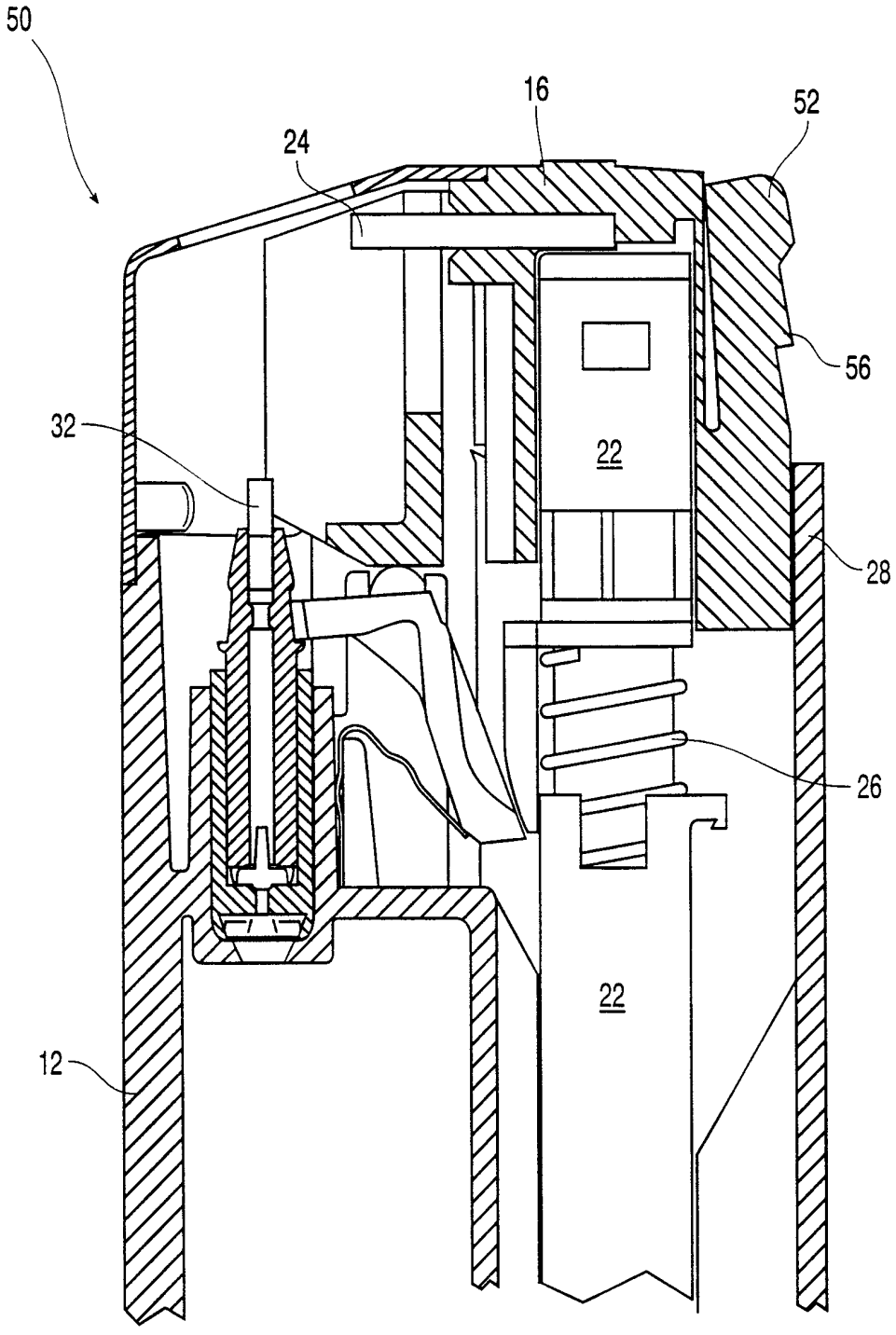


FIG. 7

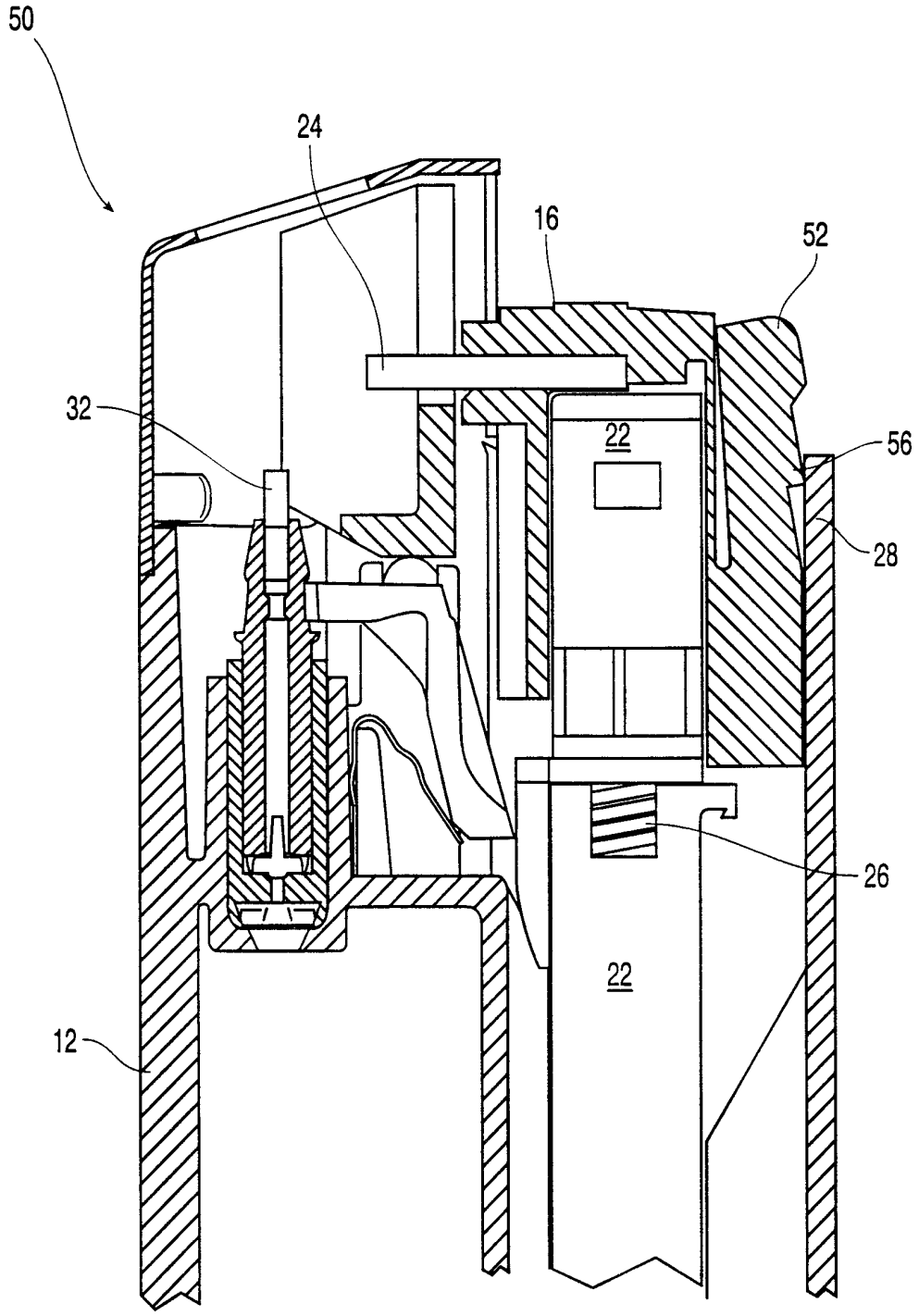


FIG. 8

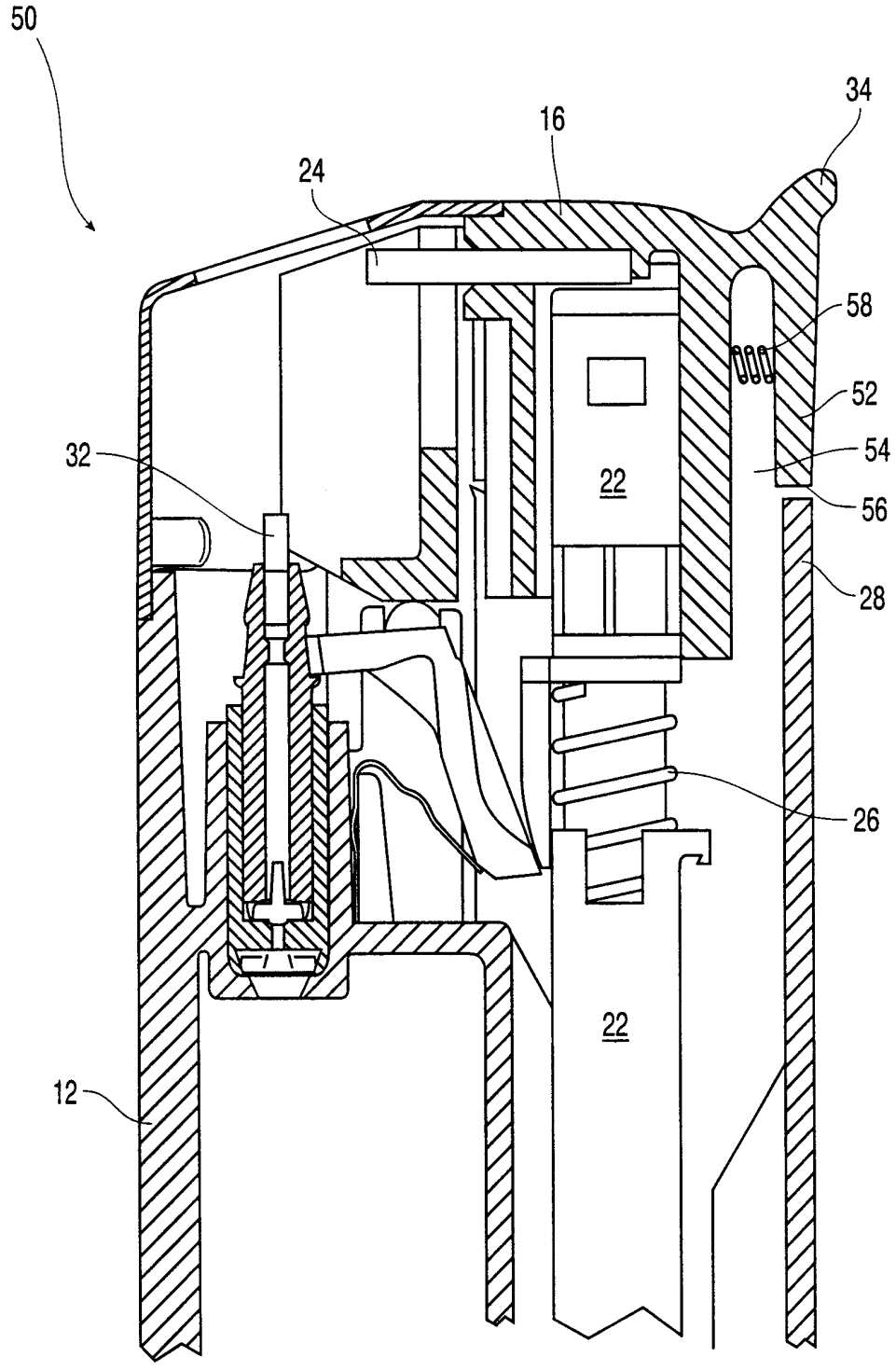


FIG. 9

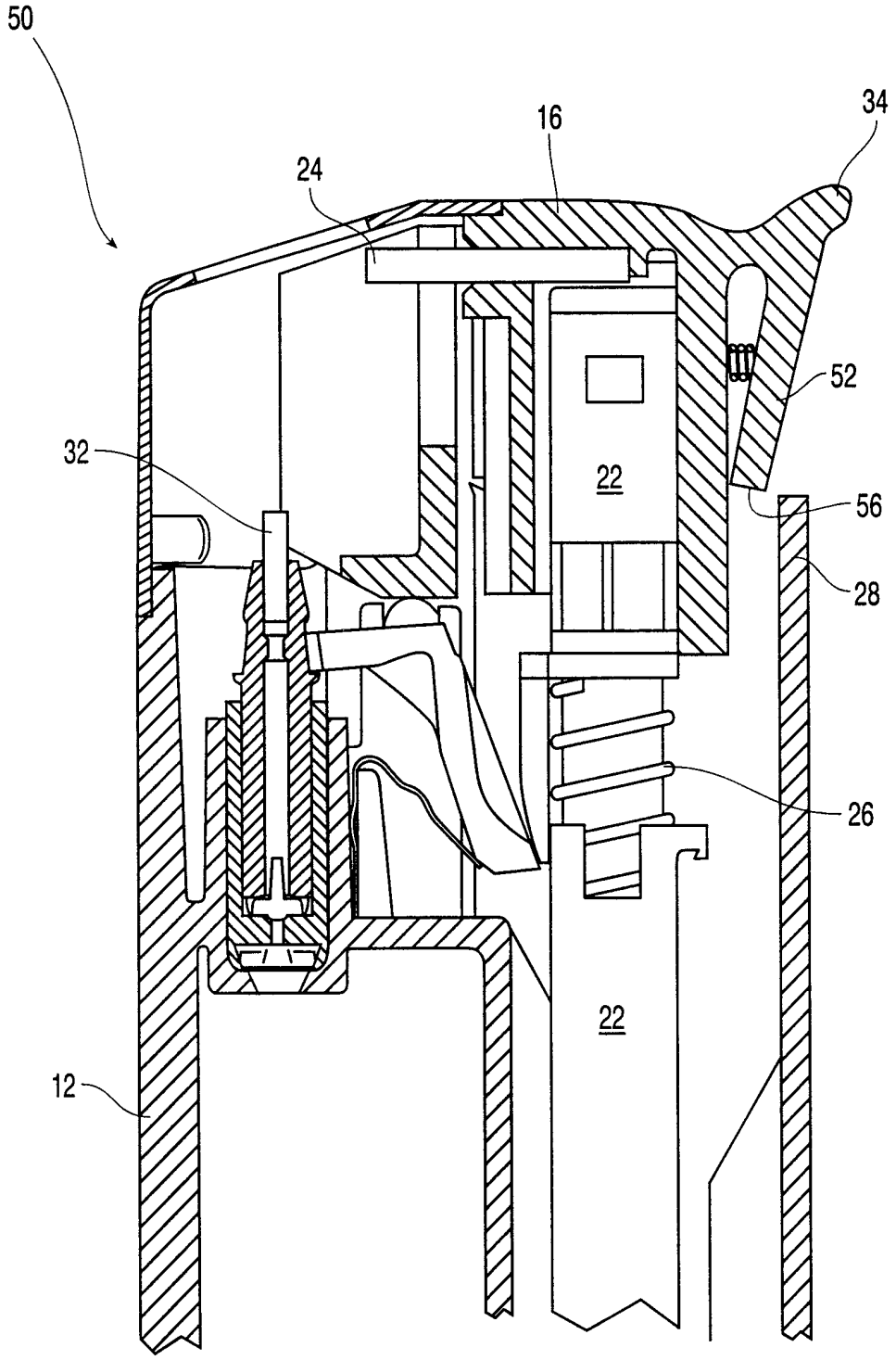


FIG. 10

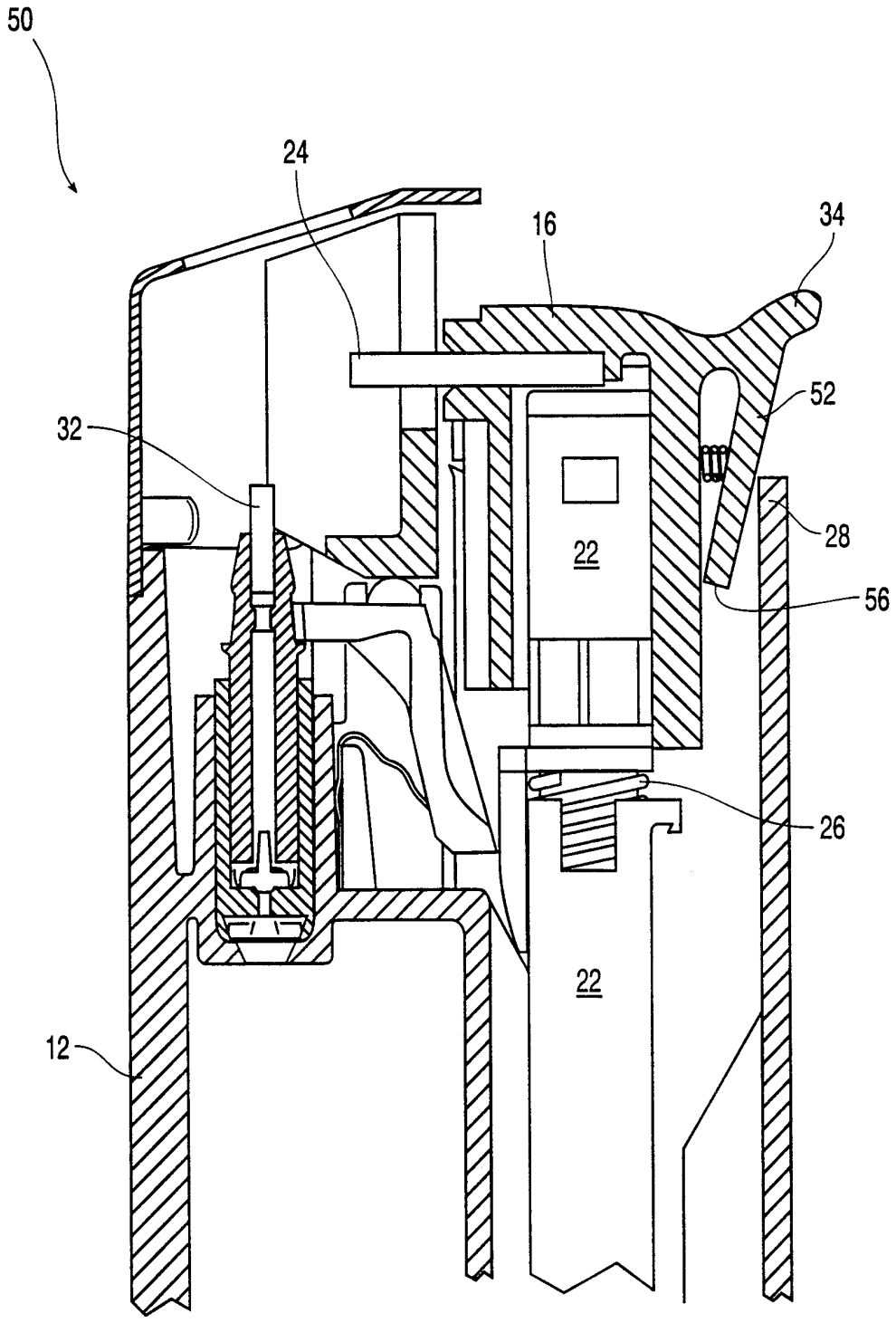


FIG. 11

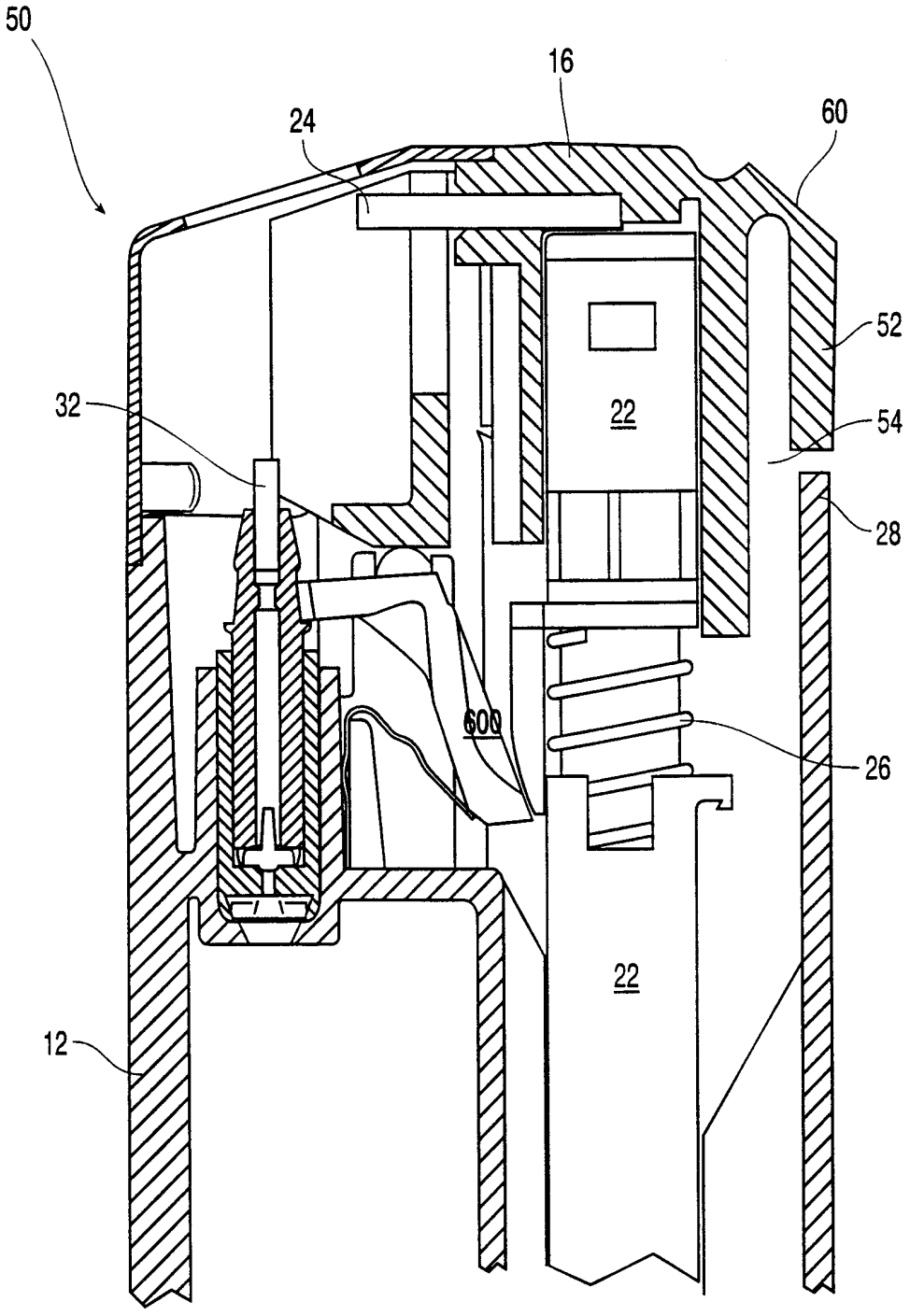


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/18140

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :F23D 11/36
US CL :431/153,255,277
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 431/153,255,277

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,462,432 A (KIM) 31 October 1995, see the entire document.	1-24
X	US 5,145,358 A (SHIKE ET AL) 08 September 1992, see the entire document.	1-4,11-24
X	US 5,228,849 A (FRIGIERE) 20 July 1993, see the entire document.	1-4,11-19, 21,23,24
A	US 4,752,020 A (GRUETER ET AL) 21 June 1988, see the entire document.	1-24
A	US 4,784,602 A (NITTA) 15 November 1988, see the entire document.	1-24
A	US 4,904,180 A (NITTA) 27 February 1990, see the entire document.	1-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer J. Hurley for CARL D. PRICE Telephone No. (703) 308-1953

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