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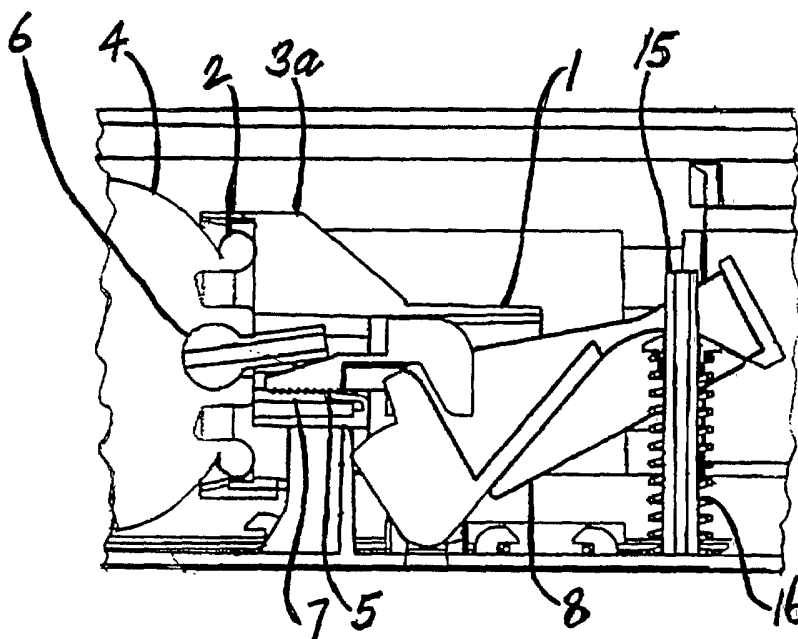
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(54) Title: A DEVICE FOR ACTUATING THE VALVE OF AN AEROSOL CONTAINER



(57) Abstract: A device which is attachable to an aerosol container (4), for actuating the valve (6) of the aerosol container (4), which, when combined with an electrically controllable actuator for the device, effects the discharge of gas from the aerosol container (4) by an electrical signal. The device and actuator are especially suitable for a pest trap using a gas to kill the pest.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A device for actuating the valve of an aerosol container

The invention relates to a device which is attachable
5 to an aerosol container for actuating the valve of the aerosol container.

The invention provides a device which is attachable to an aerosol container for actuating the valve of the aerosol container including:

10 a housing including a collar for gripping the aerosol container for effecting attachment of the device to the aerosol container, the housing being so shaped that, when the device is attached to the aerosol container, the housing encloses the valve of the aerosol container and
15 an operating member including a wedge-shaped end portion, in the housing, movable along guide means in the housing, the wedge-shaped end portion of the operating member being so positioned as to bear on the valve of the aerosol container when the operating member is moved along
20 the guide means in the housing, to actuate the valve.

Preferably, at least one surface of the housing and the operating member, which contact each other, includes formations which make the operating member more easily movable towards bearing on the valve of the aerosol
25 container than in the opposite direction.

Preferably, a surface of the housing which is in contact with a surface of the operating member includes sawtooth-shaped formations.

Preferably, the guide means in the housing includes
30 sawtooth-shaped formations.

Preferably, a surface of the operating member which is in contact with a surface of the housing includes sawtooth-shaped formations.

Preferably, the housing includes a rectangular tubular portion in which lie the operating member and the guide means.

Preferably, the rectangular tubular portion is so shaped as to include an opening through which the operating member is visible when it occupies a position, in the rectangular tubular portion, where it actuates the valve of a container to which the device is attached.

In one arrangement, the rectangular tubular portion is tapered, being larger within the collar than outside the collar.

Preferably, the operating member includes a linear portion to which the wedge-shaped end portion forms an extension.

The invention also provides a mechanism including the device and a controllable actuator for moving the operating member along the guide means in the housing of the device.

In one arrangement of the mechanism, the controllable actuator includes:

a resilient member for providing motive power for the mechanism,

an intermediate member, so mounted on a pivotal support as to be movable under motive power from the resilient member, for moving the operating member along the guide means in the housing under motive power from the resilient member,

a latch arrangement for holding the intermediate member in a first position at which the intermediate member is restrained from moving the operating member and

electrical control means for releasing the hold of the latch arrangement, permitting the intermediate member to move from the first position to move the operating member along the guide means in the housing under motive power
5 from the resilient member.

The invention also provides a pest trap including the mechanism and:

an enclosure capable of accommodating the pest,
an entry port permitting the entry of the pest into
10 the enclosure,
detector means capable of detecting the presence of the pest in the enclosure,
signalling means for signalling the detection of the presence of the pest in the enclosure and
15 closure means capable of closing the entry port in response to signalling by the signalling means,
the mechanism being located in the enclosure and the closure means being so connected to the controllable actuator as to effect closure of the entry
20 port when the controllable actuator moves the operating member along the guide means in the housing of the device.

The pest trap may include a second port in which case the closure means is capable of closing both ports in response to signalling by the signalling means.

25 A device in accordance with the invention, a mechanism including the device and a pest trap including the mechanism will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 represents a perspective view of a mechanism
30 including the device attached to a cylindrical aerosol container, the device being in its ready-to-operate condition,

Fig. 2 represents a perspective view of the mechanism of Fig. 1 in which the device is in its operated condition,

Fig. 3 represents a view of the mechanism of Fig. 1 in a pest trap enclosure, cut along the axis of the
5 cylindrical aerosol container, with the device in its operated condition,

Fig. 4 represents an enlarged view of a part of Fig. 3 showing the device and components in the immediate vicinity of the device,

10 Fig. 5 represents an end-on view of the device,

Fig. 6 represents a side view of the device,

Fig. 7 represents a side view of the device from a direction orthogonal to the viewing direction of Fig. 6 and

Fig. 8 is a perspective view of a pest trap enclosure
15 in which the mechanism of Fig. 1 may be installed.

Referring to Fig. 1 of the accompanying drawings, the device for actuating the valve of an aerosol container includes a housing which encloses the valve of the aerosol container 4 when, as shown, the device is attached to the
20 aerosol container 4. The housing includes a tubular portion 1 attached to a cylindrical collar 2 by a plurality of webs 3a, 3b and 3c extending radially between the outer periphery of the tubular portion 1 and the inner periphery of the cylindrical collar 2, the tubular portion 1 being in
25 longitudinal alignment with the axis of the cylindrical collar 2. The cylindrical collar 2 grips the aerosol container 4, for effecting attachment of the device to the aerosol container 4, by engaging a ring (not shown) which surrounds the valve of the aerosol container 4 and
30 protrudes from the surface of the aerosol container 4 in the vicinity of the valve.

Referring to Fig. 3 of the accompanying drawings, the device includes, further, an operating member 5 which lies within the housing. The operating member 5 has a wedge-shaped end portion so positioned as to bear on the valve 6 of the aerosol container 4 when the operating member 5 is pushed into the housing. The operating member 5 has, also, a linear portion to which the wedge-shaped end portion forms an extension, the linear portion serving as a means of pushing on the wedge-shaped end portion. The housing includes internal guide means 7 supporting the operating member 5. A force for pushing the operating member 5 is applied to the end of the linear portion of the operating member 5 which is movable along the guide means 7.

The device as shown in Fig. 3 is in the operated condition in which the aerosol container 4 is discharged, the valve 6, which is a tilt valve, being in the tilted condition as a result of forces exerted on it by the wedge-shaped end portion of the operating member 5. Movement of the operating member 5 to the left as viewed, into the housing, has effected the deflection of the valve 6 of the aerosol container 4 upwards as viewed, opening the valve 6 and leaving the device in the operated condition.

The guide means 7 in the housing and the surface of the operating member 5, which is in contact with the guide means 7, include sawtooth-shaped formations which so engage with each other that the operating member 5 is more easily movable towards bearing on the tilt valve 6 than in the opposite direction. In practice, the operating member 5 is easily movable towards bearing on the tilt valve 6 and is hardly movable in the opposite direction, a result of which is that, in the operated condition, the device and the aerosol container 4 are more or less inseparable.

The arrangement whereby the actuated device and the aerosol container 4 are more or less inseparable serves to identify an exhausted aerosol container.

Fig. 4 of the accompanying drawings is an enlarged
5 representation of a part of Fig. 3 in which the device is in the operated condition and shows the tubular portion 1, the cylindrical collar 2, the web 3a and the guide means 7 of the housing of the device which is attached to the aerosol container 4. Also shown are the operating member 5
10 of the device and the tilt valve 6 of the aerosol container 4.

Although both the operating member 5 and the guide means 7 include sawtooth-shaped formations, satisfactory results are obtainable when either the operating member 5
15 or the guide means 7 includes the sawtooth-shaped formations. Also, alternative formations including part-spherical or rectangular formations are suitable. Parts of the housing, other than the guide means 7, which come into contact with the operating member 5 may include formations
20 allowing easier movement in one direction than in another. Further, the housing of the device may be such as to grip the body of the aerosol container 4 rather than the ring surrounding the valve 6 of the aerosol container 4 although such an arrangement is likely to be bulkier than the
25 present arrangement.

Referring to Fig. 5 of the accompanying drawings, an end-on view of the device shows the tubular portion 1 as being rectangular in form. A wall of the rectangular tubular portion 1 is attached directly to the cylindrical
30 collar 2 and the other walls are attached to the cylindrical collar 2 by the webs 3a, 3b and 3c. The guide means 7 lies on the wall of the rectangular tubular portion

1 which is attached directly to the cylindrical collar 2 and the operating member 5 lies in contact with the guide means 7 and the walls of the rectangular tubular portion 1 to which are attached the webs 3a, 3b and 3c.

5 Referring to Fig. 6 of the accompanying drawings, the rectangular tubular portion 1 is deeper within the cylindrical collar 2 than it is outside the cylindrical collar 2, the change in depth being uniform. The reduced depth of the rectangular tubular portion 1 outside the
10 cylindrical collar 2 is not essential but serves to reduce congestion in a pest trap, say, which includes the device.

Referring to Fig. 7 of the accompanying drawings, the wall of the rectangular tubular portion 1 which is attached directly to the cylindrical collar 2 and the guide means 7
15 is shorter than the other walls of the rectangular tubular portion 1, in order to facilitate access to the operating member 5 within the device.

The rectangular tubular portion 1 is so shaped as to include an opening through which the operating member 5 is
20 visible when it occupies a position, in the rectangular tubular portion 1, where it actuates the valve of a container to which the device is attached. The inclusion of the opening permits a serviceman to determine, by inspection, if a device has been actuated, reducing the
25 chances of an unserviceable device being mistaken for a serviceable one.

Fig. 1 shows, in addition to the device for actuating the valve of the aerosol container 4, a controllable actuator for actuating the device by moving the operating
30 member 5 (Fig. 3) along the guide means 7 (Fig. 3) in the housing, from the ready-to-operate position to the operated

position, effecting the operation of the tilt valve 6 (Fig. 3) of the aerosol container 4.

The controllable actuator is shown in its set condition in Fig. 1 and includes an intermediate member 8 which is mounted on a pivotal support, a latch arrangement including members 9 and 11 for holding the intermediate member 8 in a first position, as shown, at which the intermediate member 8 is restrained from moving as a result of the member 9 of the latch arrangement lying over (as viewed) the intermediate member 8. The controllable actuator includes an electrical control means for controlling the member 11 of the latch arrangement and, thereby, the intermediate member 8.

The electrical control means includes a solenoid 10 mechanically linked to the member 11 of the latch arrangement. The member 11 is U-shaped and is so mounted as to be pivotable about the ends of the U-shape. The solenoid 10 controls the pivotal position of the U-shaped member 11. The member 9 of the latch arrangement includes a projection which engages the U-shaped member 11 for holding the member 9 of the latch arrangement over the intermediate member 8. The intermediate member 8 is held in a first position when so held by the holding member 9.

Figs. 1 and 2 show, in addition to the device for actuating the valve 6 of the aerosol container 4 and the controllable actuator for the device, a cylindrical shaft 12 which is so mounted as to be pivotable about its axis. The member 9 of the latch arrangement is attached to and moves with the cylindrical shaft 12 which carries a first disc member 13 at one end and a second disc member 14 at the other end, the disc members being shown, in Fig. 1, at

a first position and moving from the first to a second position, shown in Fig. 2, as the shaft 12 rotates.

Fig. 2 shows the controllable actuator in its actuated condition in which the member 9 of the latch arrangement
5 has been pushed away by the intermediate member 8, the U-shaped member 11 of the latch arrangement having been pulled to the right, as viewed, by the solenoid 10 to release the member 9 of the latch arrangement. The resilience of a helical spring 16, shown in Fig. 3,
10 provides the force required by the intermediate member 8 to push away the member 9 of the latch arrangement.

Referring to Fig. 3, the helical spring 16 is so positioned that it is compressed by the intermediate member 8 when the controllable actuator is in the set condition in
15 which the member 9 of the latch arrangement lies over the intermediate member 8 and is held by the U-shaped member 11 of the latch arrangement (Fig. 1). The helical spring 16 lies around a support pillar 15 which serves as a guide for the helical spring 16. The pivotal mounting of the
20 intermediate member 8 lies to the left, as viewed in Fig. 3, of the helical spring 16 which acts to lift a part of the intermediate member 8 which lies directly above, as viewed in Fig. 3, the helical spring 16.

Referring to Figs. 3 and 4, when the helical spring 16
25 is freed, it lifts the part of the intermediate member 8 directly above it, causing the intermediate member 8 to swing about its pivot and push the operating member 5 from its ready-to-operate position to its operated position, corresponding to the controllable actuator moving from the
30 set to the actuated condition. The movement of the intermediate member 8 results in the tilt valve of the

aerosol container 4 being operated by the device attached to the aerosol container 4 as described above.

The movement of the intermediate member 8 also results in the member 9 of the latch arrangement being pushed
5 upwards, as viewed, rotating the cylindrical shaft 12 shown in Figs. 1 and 2. The cylindrical shaft 12 takes the first and second disc members 13 and 14 with it as it rotates. The first and second disc members 13 and 14 serve as closure members in a pest trap enclosure as shown in Fig. 8
10 of the accompanying drawings.

Referring to Fig. 8, the pest trap enclosure includes a lower part 80 and an upper part 81, the enclosure accommodating the mechanism shown in Fig. 1 including the aerosol container 4, the device for actuating the tilt
15 valve of the aerosol container 4, the controllable actuator and the rotatable shaft 12 carrying the first and second disc members 13 and 14. The pest trap enclosure includes an entry port 82 which is visible on the left side of the lower part 80 of the enclosure, as viewed, and a second
20 port opposite the entry port. The second port is not visible in the view shown in Fig. 8. There is an indicator port 83 in the top of the upper part 81 of the enclosure.

In a pest trap including the enclosure shown in Fig. 8, the first and second disc members 13 and 14 shown in
25 Fig. 1 serve as closure members for the entry port 82 and the second port. The second port, also, may serve as an entry port to the enclosure for a pest approaching from a direction from which the second port permits access to the enclosure.

30 The disc members 13 and 14 may be circular, elliptical or rectangular in shape. Also, the rotatable shaft 12 may be of a rectangular transverse cross-section.

The pest trap further includes detector means for detecting the presence of a pest in the enclosure and signalling means for signalling the detection of the pest in the enclosure, the controllable actuator, in operation, closing the ports by moving the first and second disc members 13 and 14 to cover the ports in response to signalling by the signalling means and, at that time, moving the operating member 5 along the guide means in the housing of the device for actuating the tilt valve 16 of the aerosol container 4.

A detector and signalling means suitable for the pest trap is disclosed in International Application No. PCT/GB01/04585.

The detector and signalling means referred to above includes a pressure pad for detecting the presence of a pest in the enclosure and an electrical circuit for signalling the activation of the pressure pad. The detector and signalling means referred to also includes an indicator lamp which is positioned adjacent to the indicator port 83 of Fig. 8 and visible from outside the pest trap enclosure, for indicating whether the controllable actuator and, thereby, the pest trap, is set or actuated.

Fig. 3 shows the lower part 80, the upper part 81 and the indicator port 83 of the pest trap enclosure.

CLAIMS

1. A device which is attachable to an aerosol container
5 for actuating the valve of the aerosol container including:
a housing (1,2,3) including a collar (2) for gripping
the aerosol container (4) for effecting attachment of the
device to the aerosol container (4), the housing (1,2,3)
being so shaped that, when the device is attached to the
10 aerosol container (4), the housing encloses the valve (6)
of the aerosol container and
an operating member (5) including a wedge-shaped end
portion, in the housing (1,2,3), movable along guide means
(7) in the housing (1,2,3), the wedge-shaped end portion of
15 the operating member (5) being so positioned as to bear on
the valve (6) of the aerosol container (4) when the
operating member (5) is moved along the guide means (7) in
the housing (1,2,3), to actuate the valve.
- 20 2. A device as claimed in claim 1, wherein at least one
surface of the housing and the operating member, which
contact each other, includes formations which make the
operating member more easily movable towards bearing on the
valve of the of the aerosol container than in the opposite
25 direction.
3. A device as claimed in claim 2, wherein a surface of
the housing which is in contact with a surface of the
operating member includes sawtooth-shaped formations.

4. A device as claimed in claim 2 or claim 3, wherein the guide means in the housing includes sawtooth-shaped formations.

5 5. A device as claimed in any one of claims 2 to 4, wherein a surface of the operating member which is in contact with a surface of the housing includes sawtooth-shaped formations.

10 6. A device as claimed in any one of claims 1 to 5, wherein the housing includes a rectangular tubular portion in which lie the operating member and the guide means.

7. A device as claimed in claim 6, wherein the
15 rectangular tubular portion is so shaped as to include an opening through which the operating member is visible when it occupies a position, in the rectangular tubular portion, where it actuates the valve of a container to which the device is attached.

20

8. A device as claimed in claim 6 or claim 7, wherein the rectangular tubular portion is tapered, being larger within the collar than outside the collar.

25 9. A device as claimed in any one of claims 6 to 8, wherein the operating member includes a linear portion to which the wedge-shaped end portion forms an extension.

10. A mechanism including a device, as claimed in any one
30 of claims 1 to 9, and a controllable actuator for moving the operating member along the guide means in the housing of the device.

11. A mechanism as claimed in claim 10, wherein the controllable actuator includes:

5 a resilient member (16) for providing motive power for the mechanism,

an intermediate member (8), so mounted on a pivotal support as to be movable under motive power from the resilient member (16), for moving the operating member (5) along the guide means (7) in the housing (1,2,3) under
10 motive power from the resilient member (16),

a latch arrangement (9,11) for holding the intermediate member (8) in a first position at which the intermediate member (8) is restrained from moving the operating member (5) and

15 electrical control means for releasing the hold of the latch arrangement (9,11), permitting the intermediate member (8) to move the operating member (5) along the guide means (7) in the housing (1,2,3) under motive power from the resilient member (16).

20

12. A pest trap including a mechanism as claimed in claim 10 or claim 11 and:

an enclosure (80,81) capable of accommodating the pest,

25 an entry port (82) permitting the entry of the pest into the enclosure (80,81),

detector means capable of detecting the presence of the pest in the enclosure (80,81),

30 signalling means for signalling the detection of the presence of the pest in the enclosure (80,81) and

closure means (12,13) capable of closing the entry
port (82) in response to signalling by the signalling
means,

the mechanism being located in the enclosure (80,81)
5 and

the closure means (12,13) being so connected to the
controllable actuator as to effect closure of the entry
port (82) when the controllable actuator moves the
operating member (5) along the guide means (7) in the
10 housing (1,2,3) of the device.

13. A pest trap as claimed in claim 12, including a second
port and closure means (12, 13, 14) capable of closing both
ports in response to signalling by the signalling means.

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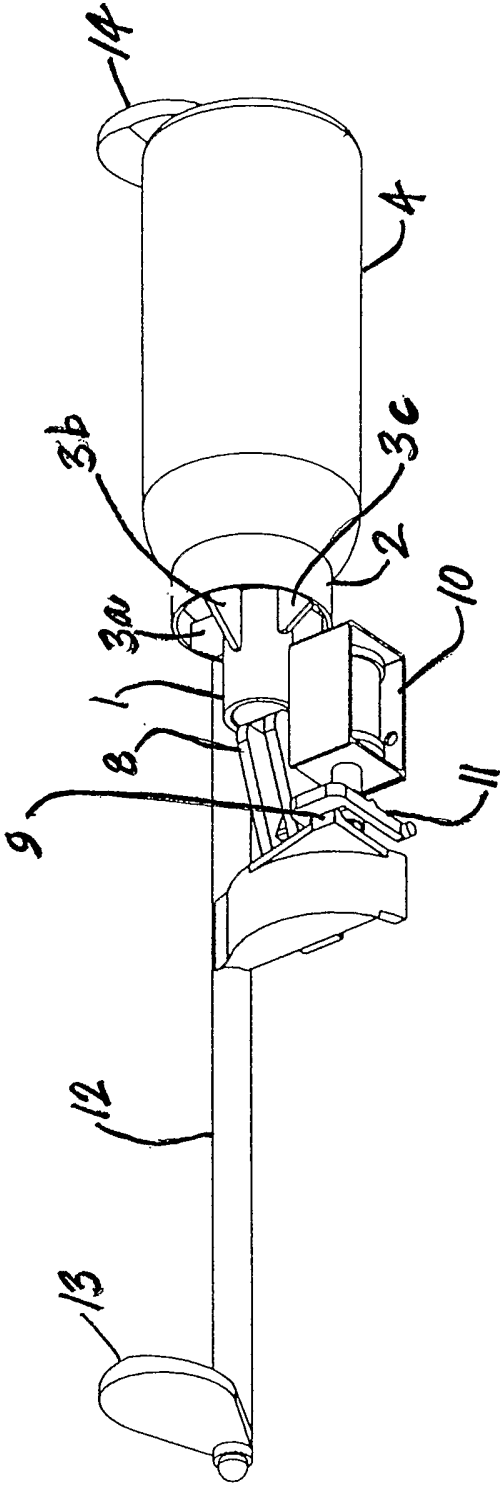


Fig 1

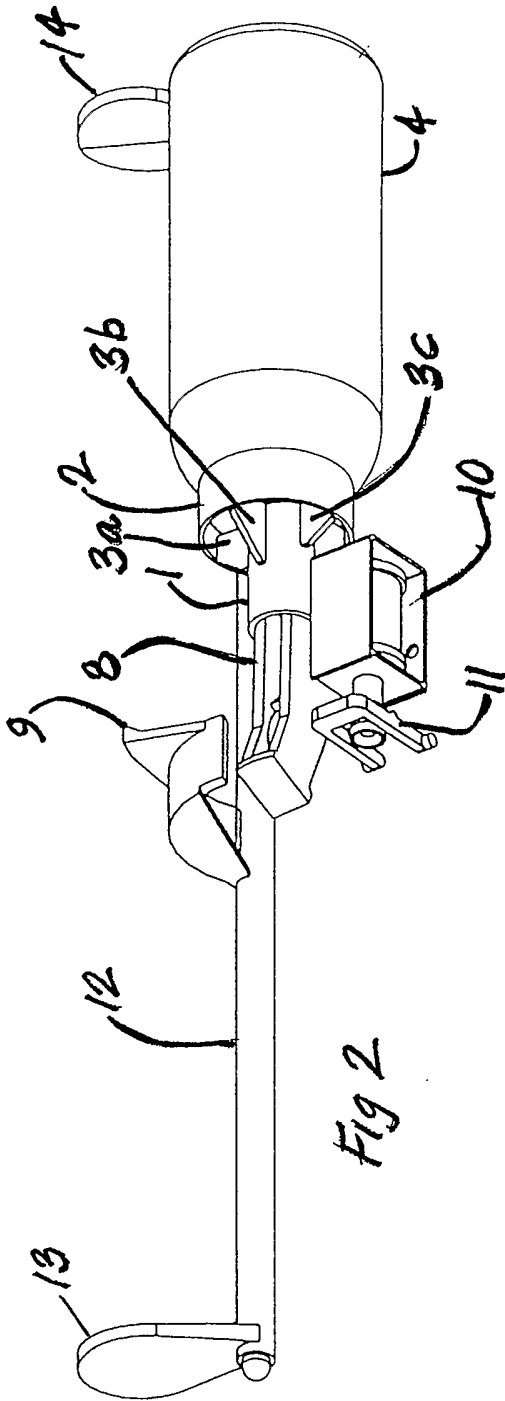
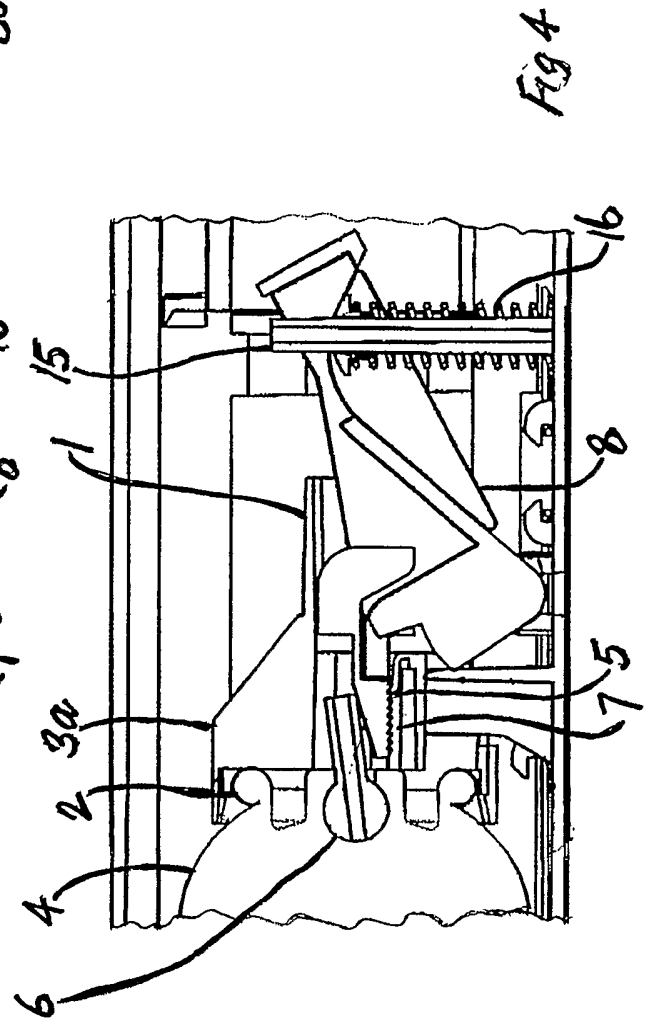
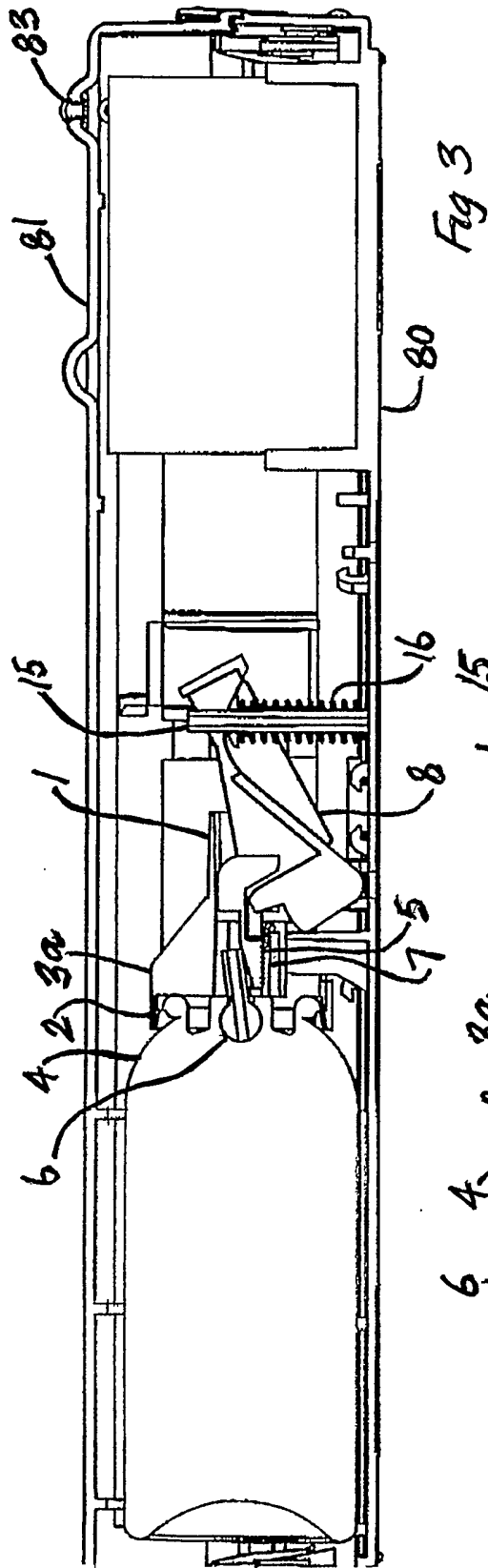
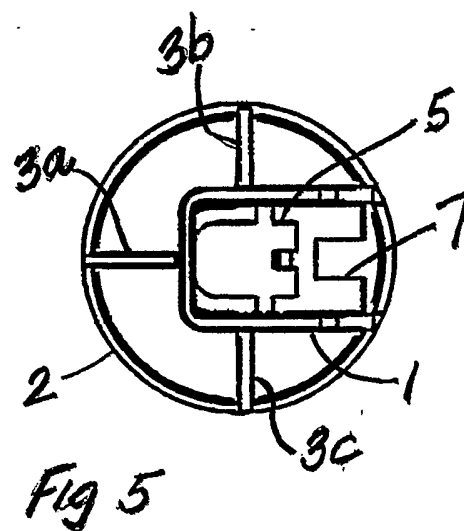
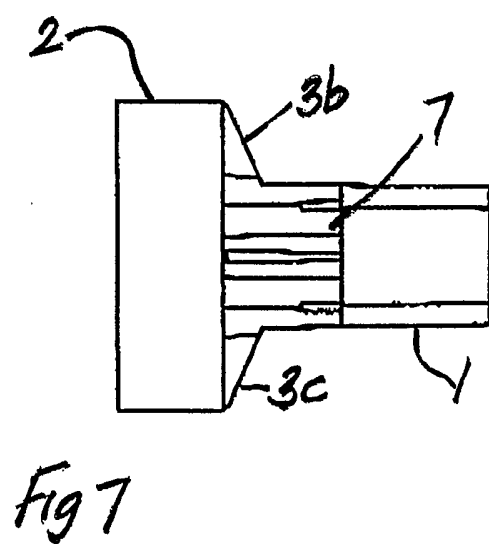
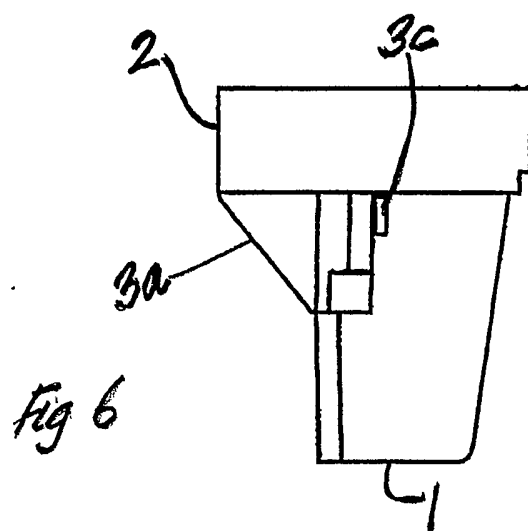


Fig 2

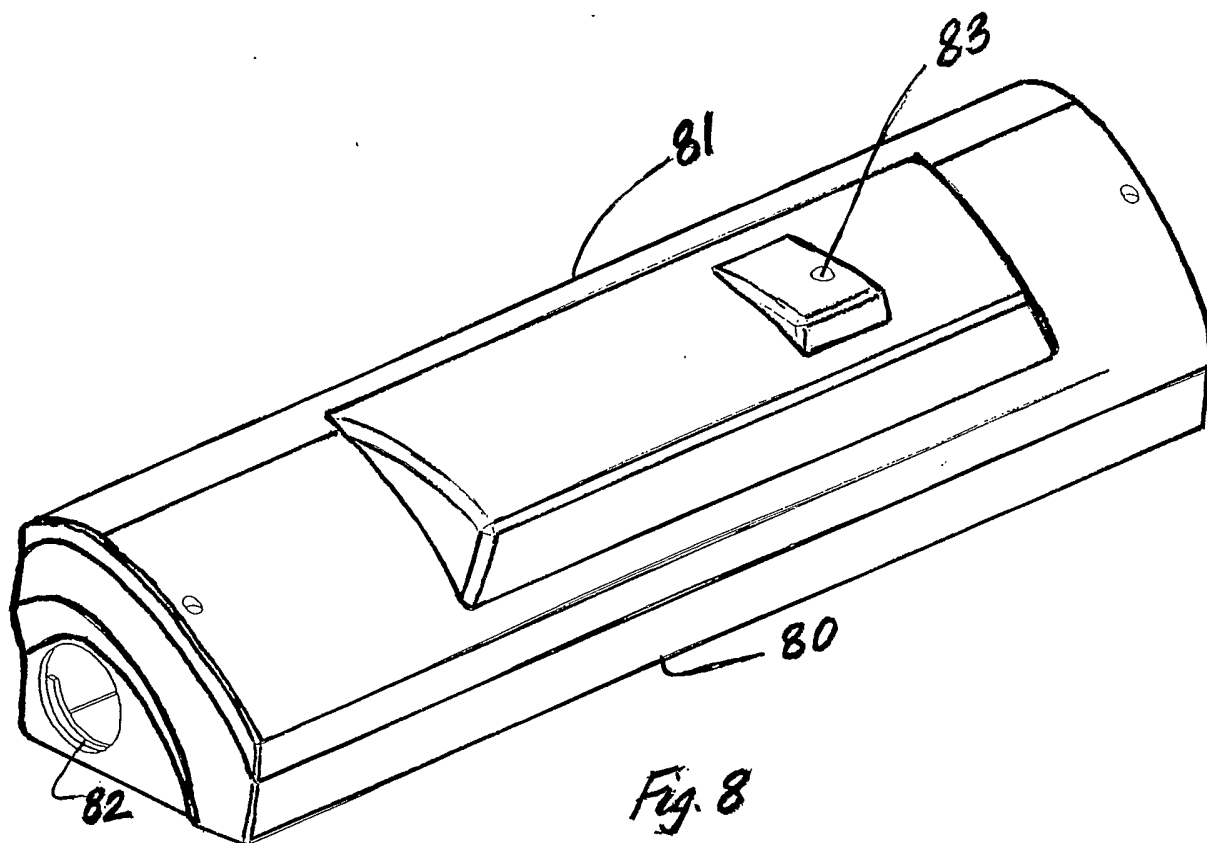
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/01118

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D83/16

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)

IPC 7 B65D

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

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

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 426 026 A (KNICKERBOCKER MICHAEL G) 17 January 1984 (1984-01-17) column 5, line 15 - line 21; figures 6,7 column 5, line 28 - line 33 figures 6,8,16 -----	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4426026	A	17-01-1984	NONE