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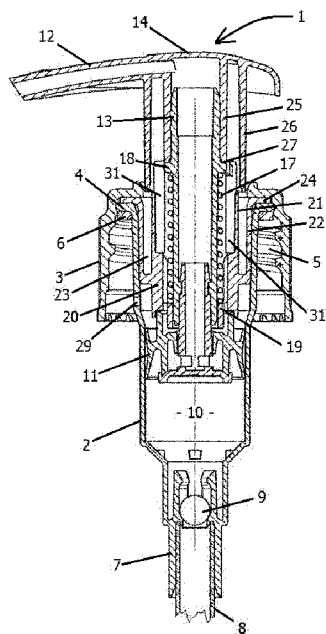


Fig. 2

(57) **Abstract:** A manual piston pump (1) is provided for attachment to a fluid container for dispensing fluids such as liquid soap, gels, lotions and the like. The pump (1) comprises a pump housing (2) adapted for securement to a neck of the fluid container within which housing (2) is located a piston (11). A movable, hollow stem (13) is connected to the piston (11) and is manually movable into the pump housing (2) against the bias of a compression spring (17). An actuator (14) is provided that is located over an outer end of the hollow stem (13) and defines a nozzle (12) through which fluid drawn from the container into the hollow stem (13) by the piston (11) is dispensed. The actuator (14) comprises an inner sleeve (25) that bears against the outer end of the hollow stem (13) and an outer sleeve (26). A collar (20) is secured to the pump housing (2) and surrounds the hollow stem (13). The collar (20) defines an annular guiding channel (23) into which the outer sleeve (26) is pushed when the actuator (14) is depressed to dispense fluid from the container. The outer sleeve (26) of the actuator (14) is preferably a snug fit within the guiding channel (23) in order to prevent any significant skewing of the hollow stem (13) as it moves into the pump housing (2). Advantageously, the actuator (14) is preferably rotatable by 90° between a first, unlocked position wherein it can be used to operate the piston (11) and a second, locked position wherein the movement of the actuator (14) is prevented.



A Manual Piston Pump for a Fluid Container

Description

The present invention relates to a manual piston pump for attachment to a fluid container for dispensing fluids such as liquid soap, gels, lotions and the like.

Background

Conventional manual piston pumps of this type comprise a dispensing head mounted on a movable stem of the pump that projects beyond the exterior of a main part of the pump. The lower end of the stem extends inside the main part and is biased outwards by a spring. A locking sleeve is provided that is connected to the main part of the pump and that by means of inter-engaging projections enables the dispensing head to be locked to the locking sleeve. The advantage of such a lockable dispensing head is that it protects the pumping mechanism against movement before the pump is brought into use. This is because the stem is liable to skew when it is manually pushed into the main body of the pump against the bias of the spring during use. Skewing of the stem results in a piston within the pump not acting correctly to dispense a sufficient quantity of fluid. Users therefore tend to perform multiple

depressions of the shaft which results in an excess of fluid being supplied, which is both wasteful and inefficient.

An object of the present invention is to provide a manual piston pump for attachment to a fluid container that overcomes or substantially mitigates the aforementioned skewing problem, in particular during use.

Summary

According to the present invention there is provided a manual piston pump for attachment to a fluid container for dispensing fluids comprising

- a pump housing adapted for securement to a neck of the fluid container;

- a piston located within a chamber defined by the pump housing;

- a movable, hollow stem connected to the piston and being manually movable into the pump housing against the bias of a compression spring;

- an actuator located over an outer end of the hollow stem and defining a nozzle through which fluid drawn from the container into the hollow stem by the piston is dispensed, the actuator comprising an inner sleeve that bears against the outer end of the hollow stem and an outer sleeve; and

- a collar secured to the pump housing and surrounding the hollow stem;

characterised in that

- the collar defines an annular guiding channel into which the outer sleeve is pushed when the actuator is depressed to dispense fluid from the container.

Preferably, the outer sleeve of the actuator is a snug fit within the guiding channel thereby preventing any significant skewing of the hollow stem as it moves into the pump housing during use.

Other preferred additional features of the various aspects of the present invention are described in the dependent claims appended hereto.

Description of the Drawings

- Fig. 1 is a perspective view of an embodiment of a manual piston pump for attachment to a fluid container in accordance with the present invention;
- Fig. 2 is a longitudinal sectional view of the piston pump shown in Fig. 1 but to an enlarged scale and showing an actuator thereof in a locked condition;
- Fig. 3 is a view similar to Fig. 2 but showing the actuator rotated through 90° into an unlocked condition;
- Fig. 4 is a perspective view from below of the actuator when detached from the rest of the piston pump;
- Fig. 5 is a perspective view from above of the piston pump after detachment of the actuator therefrom; and
- Fig. 6 is a view similar to Fig. 5 but after removal of a hollow stem forming a piston rod therefrom.

Detailed Description

The drawings and following description relate to an embodiment of the present invention by way of example only.

A manual piston pump 1 for attachment to a fluid container for dispensing fluids is shown in the drawings. In most embodiments, the various components of the piston pump 1 will be moulded from plastic materials.

The pump 1 comprises a pump housing 2 that is adapted for securement to a neck of the fluid container (not shown) by means of a cap or closure 3 secured thereto. The cap 3 is snap-fitted over an outwardly turned flange 4 at an upper end of the

housing 2 and, in this example, is provided with an internal screw-thread 5 so that it can be screwed over a complementary screw-threaded provided externally around the neck of the fluid container with which the piston pump 1 is to be used. However, other means of securement to a container may be provided, for example the two could be arranged to be snap fitted together. A gasket 6 may be provided adjacent the flange 4 on the inside of the cap 3 to provide a seal between the cap 3 and the container to which it is secured.

At a lower end of the housing 2, a portion 7 of reduced diameter is push fitted over the end of a dip tube 8 that in the present embodiment is separate from the piston pump 1 but which could form an integral part thereof. In use, the dip tube 8 is inserted into a container and thereby into its contents so that they can be dispensed by the piston pump 1. Within the portion 7 adjacent the end of the dip tube 8 is a one-way ball valve 9 that permits fluid to flow from the dip tube 8 into an adjacent chamber 10 defined by the housing 2 but which prevents fluid flow in the opposite direction. Reciprocable within the chamber 10 is a piston 11 that is used to pump fluid from the chamber 10 to a dispensing nozzle 12 by an arrangement that will now be described.

The piston 11 is connected to a piston rod in the form of a hollow stem 13 that may extend out of the pump housing 2. An actuator 14 is push-fitted over an outer end of the hollow stem 13 and the actuator 14 and stem 13 define complementary ribs and annular grooves 15 and 16, which snap-fit together to retain the actuator 14 in position. The actuator 14 is hollow and defines an outlet channel terminating in the dispensing nozzle 12 through which fluid drawn from the container into the hollow stem 13 by the piston 11 is dispensed. The stem 13 is movable into the pump housing 2 against the bias of a compression spring 17 that is located around the exterior of the stem 13. An upper end of the spring 17 bears against an outwardly extending projection 18 defined by the stem 13. This projection 18, which is preferably an annular ring, also provides a stop against which part of the actuator 14 bears as is further described below. The other end of the spring 17 bears against an inner ring 19 of a collar 20 of greater diameter. The inner ring 19 surrounds the lower end of the stem 13, which reciprocates relative to it when the pump 1 is operated. The collar

20, which is of greater diameter than the ring 19 and is located within the cap 3, extends upwardly of the inner ring 19 and surrounds the greater part of the spring 17, when extended, and the stem 13.

The collar 20 comprises inner and outer cylindrical parts 21 and 22 that surround the stem 13 and spring 17 and which between them define an annular guiding channel 23. The outer part 22 comprises an outwardly turned flange 24 at its upper end that is secured between the flange 4 and the cap 3 and thereby retains the collar 20 in position within the cap 3.

Turning now to the actuator 14, this comprises inner and outer sleeves 25 and 26. The inner sleeve 25 comprises the grooves 16 and is secured to the outer end of the stem 13 which comprises the ribs 15. Alternatively, the inner sleeve 25 could comprise ribs 15 while the outer end of the stem 13 comprises grooves 16. A lower rim 27 of the sleeve 25 bears against the projection 18, which, being annular, ensures that when the actuator 14 is operated pressure is evenly distributed around the hollow stem 13 making it less likely to skew. The dispensing nozzle 12 is in fluid communication with the interior of the sleeve 25, which it will be appreciated is also in fluid communication with the interior of the stem 13. In contrast, the outer sleeve 26 is longer than the inner sleeve and defines a rim 28 that penetrates through a central aperture of the cap 3 adjacent the upper part of the guiding channel 23. When the actuator 14 is depressed to operate the pump 1, the outer sleeve 26 is pushed downwards into the guiding channel 23, in which it is a snug fit. This also prevents the actuator 14 and thereby the stem 13 from significant skewing to the side and retains them both coaxial along their longitudinal axes as the stem 13 is pushed into the pump housing 2. This ensures that the piston 11 operates correctly to draw up an appropriate quantity of fluid from the container as it retains a seal around its periphery with the housing 2. Skewing of the stem 13 tends to break this seal and may result in fluid leaking through the piston 11 or past the piston 11 into the cap 3.

In use, therefore, when the pump 1 has been secured by the cap 3 to a container containing a fluid to be dispensed, a user manually depresses the actuator 14 to

pump the fluid out of the nozzle. It will be appreciated that depression of the actuator 14 depresses the stem 13 and thereby depresses the piston 11 against the force of the compression spring 17. The increase in pressure within the chamber 10 keeps the ball valve 9 closed so that fluid contained within the chamber 10 is pumped into the stem 13 and out through the nozzle 12 of the actuator 14. When the manual pressure on the actuator 14 is released, the spring 17 acts to return the stem 13 and thereby the actuator 14 and the piston 11 back to their initial positions. The resulting negative pressure within the chamber 10 opens the ball valve 9 and fluid is sucked up the dip tube 8 from the container and into the chamber 10 ready for the next actuation of the pump 1. During and after actuation air is drawn in and released from the housing 2 above the level of the piston 11 via a port 29.

Preferably, before the piston pump 1 is brought into use and even thereafter it is advantageous if the piston 11 and stem 13 can be locked in an inoperable position. This prevents fluid from being dispensed from an attached container inadvertently, for example during transportation. Locking of the stem 13 in position also protects it from being skewed out of position by knocks or shocks during packing and transportation. In order to provide unlocked and locked positions of the stem 13, the actuator 14 is rotatable between a first, unlocked position wherein it can be depressed against the force of the compression spring 17 to operate the piston 11 and a second, locked position wherein depression of the actuator 14 to operate the piston 11 is prevented. The actuator 14 can be rotatable around the outer end of the hollow stem 13 or together with the hollow stem 13. To this end the inner sleeve 25 of the actuator 14 comprises at least one and preferably two longitudinal ribs 30 that in the first, unlocked position of the actuator 14 respectively align with and can slide along longitudinal slots 31 defined by the inner cylindrical part 21 of the collar 20 when the piston 11 is the operated. However, when the actuator 14 is in its second, locked position the longitudinal rib or ribs 30 are out of alignment with their respective slots 31 and their ends 32 bear against respective ledges 33 defined by the inner cylindrical part 21 of the collar 20 adjacent the slots 31. This prevents depression of the actuator 14 into the collar 20. Preferably, where two longitudinal ribs 30 and two slots 31 are provided they are arranged on opposite sides of the inner cylindrical part 21. Also, the length of the ledges 33 annularly around the inner

cylindrical part 21 is such that the actuator 14 is capable of rotational movement through at least 90°. preferably 90°, between its locked and unlocked positions.

In order to provide a positive locked position, a side wall 34 of the inner cylindrical part 21 adjacent the ledges 33 is recessed as at 35 adjacent the ribs 30 when the actuator 14 is in its locked position. This enables the ribs 30 to seat within the recesses 35 and retain the actuator 14 in a locked position until a torque is applied to force the ribs 30 out of the recesses 35 and bear against the wall 34 until the ribs 30 locate into the slots 31 when the actuator 14 is in its unlocked position. The resilient nature of the ribs 30 and/or the wall 34 enables them to deform slightly to permit this manual rotation between locked and unlocked positions of the actuator 14, which is possible owing to the components of the piston pump 1 being primarily moulded from plastics materials.

Hence, the manual piston pump 1 of the invention prevents or at least substantially mitigates any skewing of the piston 11 and the hollow stem 13 during use as the outer sleeve part 26 of the actuator 14 is guided in its travel by the guiding channel 23, which prevents any significant skewing of the longitudinal axis of the stem 13. The provision of a locked condition of the actuator also protects the hollow stem 13 from skewing when the piston pump 1 is not in use and prevents inadvertent operation of the actuator 14, in particular after the piston pump 1 has been secured to a filled container but before the latter has been brought into use, for example during transportation.

Claims

1. A manual piston pump (1) for attachment to a fluid container for dispensing fluids comprising
 - a pump housing (2) adapted for securement to a neck of the fluid container;
 - a piston (11) located within a chamber (10) defined by the pump housing (2);
 - a movable, hollow stem (13) connected to the piston (11) and being manually movable into the pump housing (2) against the bias of a compression spring (17);
 - an actuator (14) located over an outer end of the hollow stem (13) and defining a nozzle (12) through which fluid drawn from the container into the hollow stem (13) by the piston (11) is dispensed, the actuator (14) comprising an inner sleeve (25) that bears against the outer end of the hollow stem (13) and an outer sleeve (26); and
 - a collar (20) secured to the pump housing (2) and surrounding the hollow stem (13);characterised in that
 - the collar (20) defines an annular guiding channel (23) into which the outer sleeve (26) is pushed when the actuator (14) is depressed to dispense fluid from the container.
2. A pump (1) as claimed in Claim 1, characterised in that the outer sleeve (26) of the actuator (14) is a snug fit within the guiding channel (23) thereby preventing any significant skewing of the hollow stem (13) as it moves into the pump housing (2).
3. A pump (1) as claimed in Claims 1 and 2, characterised in that the collar (20) comprises inner and outer cylindrical parts (21, 22) that between them define the annular guiding channel (23).

4. A pump (1) as claimed in any of Claims 1 to 3, characterised in that the collar (20) comprises an inner ring (19) through which an inner end of the hollow stem (13) moves and against which one end of the compression spring (17) bears.
5. A pump (1) as claimed in any of Claims 1 to 4, characterised in that the hollow stem (13) comprises an outwardly extending projection (18) against which another end of the compression spring (17) bears.
6. A pump (1) as claimed in Claim 5, characterised in that the outwardly extending projection (18) is an annular ring.
7. A pump (1) as claimed in any of Claims 1 to 6, characterised in that the actuator (14) is rotatable, preferably by 90°, between a first, unlocked position wherein it can be used to operate the piston (11) and a second, locked position wherein the actuator (14) cannot be used to operate the piston (11).
8. A pump (1) as claimed in Claim 7, characterised in that in the second, locked position of the actuator (14), a relative movement of the actuator (14) and the collar (20) is prevented.
9. A pump (1) as claimed in Claim 7 or 8, characterised in that the inner sleeve (25) of the actuator (14) comprises at least one longitudinal rib (30) that in the first, unlocked position of the actuator (14) aligns with and slides along at least one longitudinal slot (31) defined by the collar (20) when the actuator is depressed.
10. A pump (1) as claimed in Claim 9, characterised in that the inner sleeve (25) of the actuator (14) comprises at least two longitudinal ribs (30) that in the first, unlocked position of the actuator (14) respectively align with and slide along two slots (31) defined on opposite sides of the collar (20).

11. A pump (1) as claimed in any of Claims 8 to 10 when dependent on Claim 3, characterised in that the longitudinal slot or slots (31) are defined by the inner cylindrical part (21) of the collar (20).
12. A pump (1) as claimed in any of Claims 8 to 11, characterised in that when the actuator is in its second, locked position the longitudinal rib or ribs (30) are out of alignment with the longitudinal slot or slots (31) and respectively bear against a ledge or ledges (33), which prevent depression of the actuator (14) into the collar (20).
13. A pump (1) as claimed in Claim 12 when dependent on Claim 3, characterised in that the ledge or ledges (33) are defined by the inner cylindrical part (21) of the collar (20) adjacent the slot or slots (31).
14. A pump (1) as claimed in Claim 13, characterised in that a side wall (34) of the inner cylindrical part (21) adjacent the ledge or ledges (33) is recessed at a position or positions adjacent the rib or ribs (30) when the actuator (14) is in its locked position to enable the rib or ribs (30) to seat within the recess or recesses (35) and retain the actuator (14) in a locked position until a torque is applied to unlock the actuator (14).
15. A pump (1) as claimed in any of Claims 12 to 14, characterised in that the length of the ledge or ledges (33) annularly around the inner cylindrical part (21) is such that the actuator (14) is capable of rotational movement through at least 90° between its locked and unlocked positions.

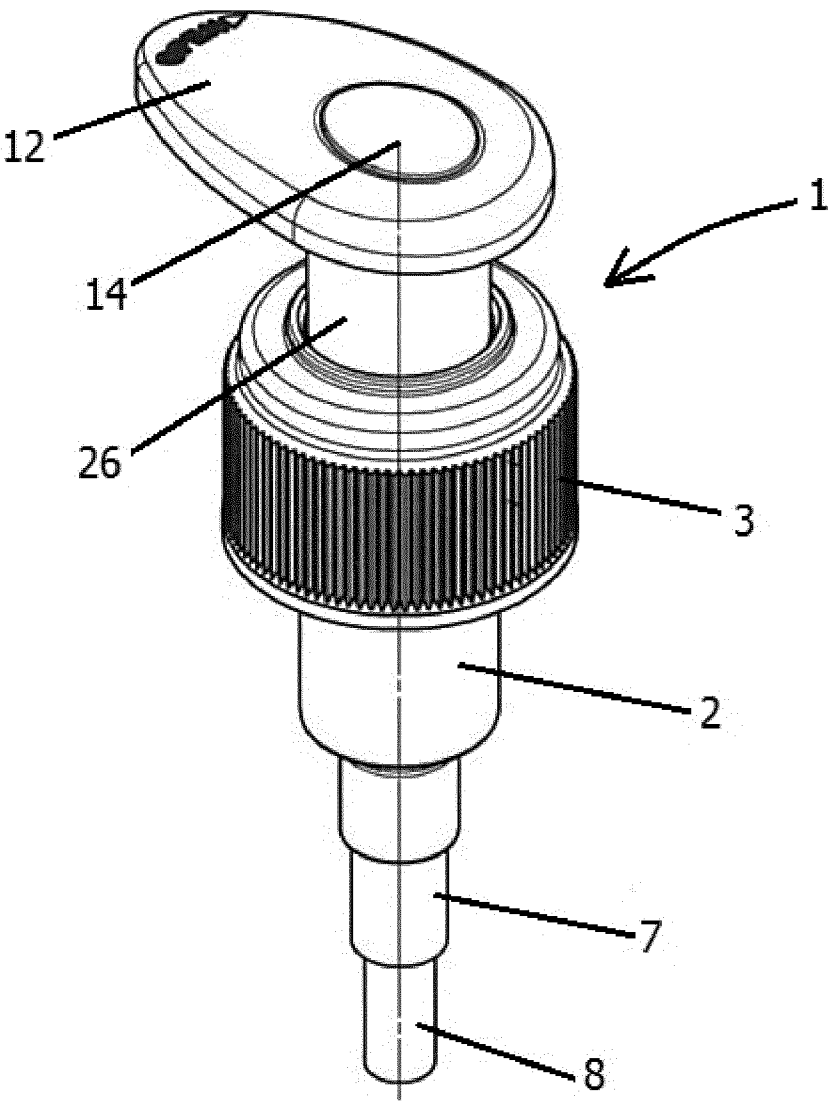


Fig. 1

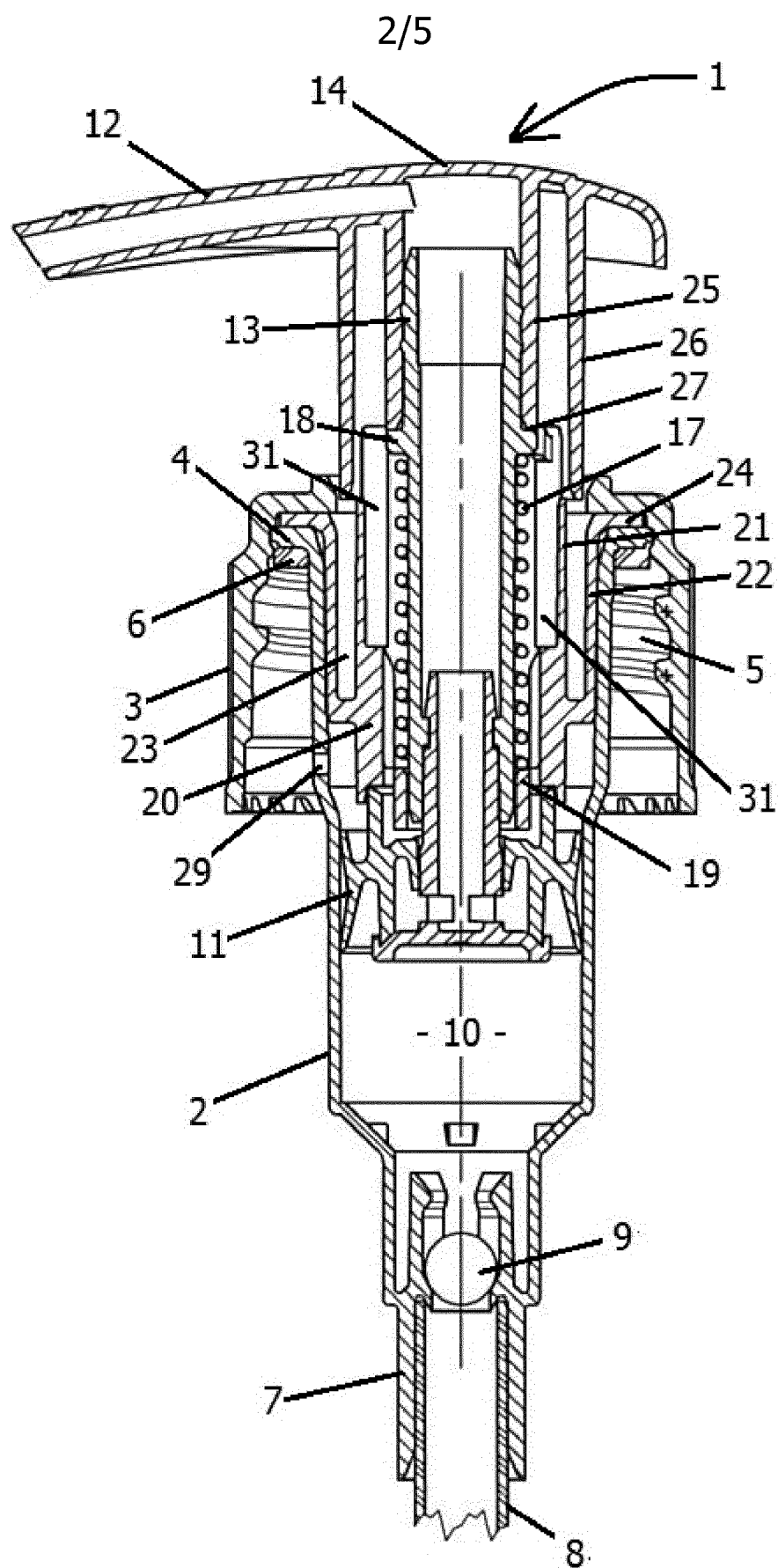


Fig. 2

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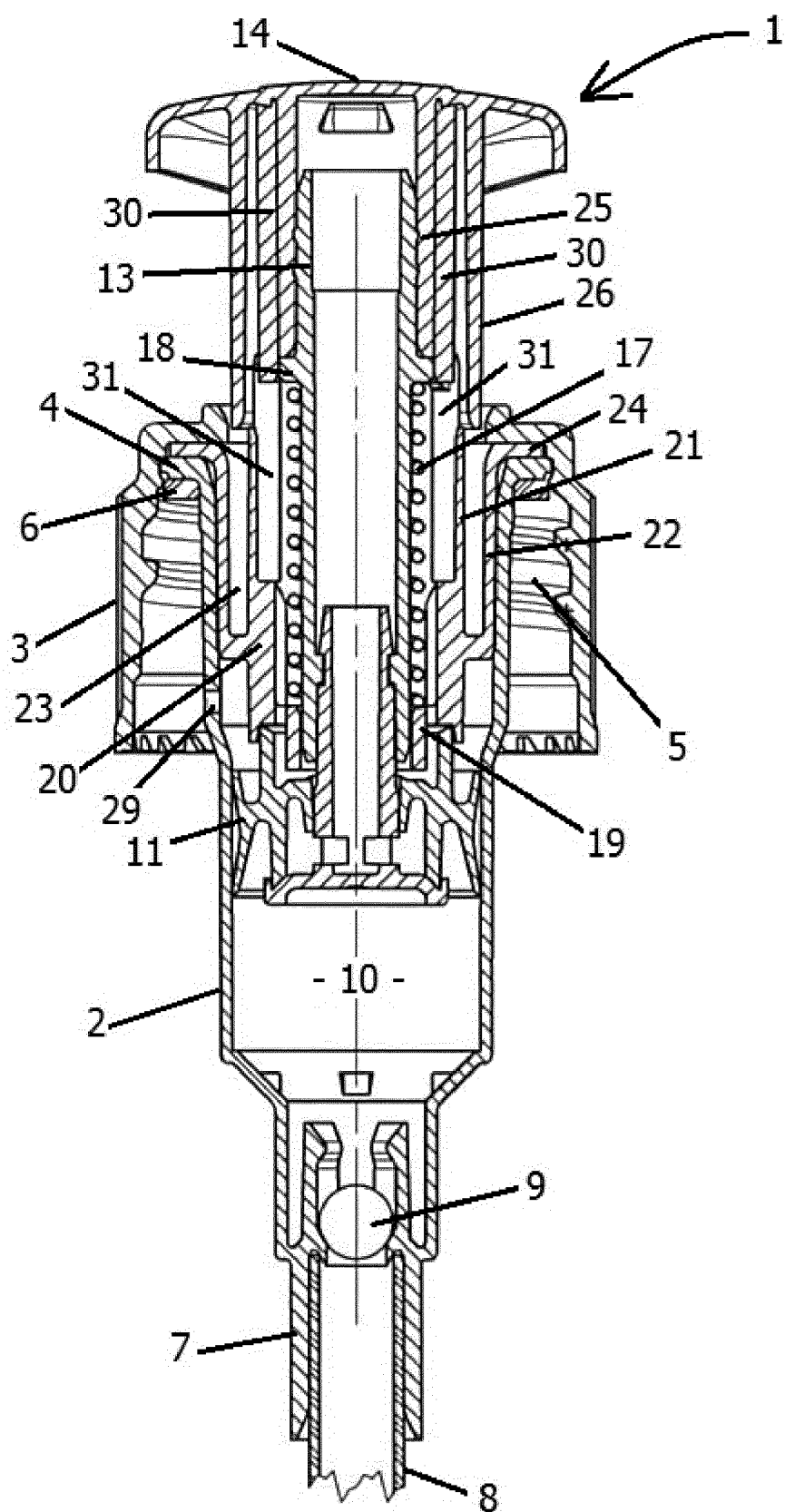


Fig. 3

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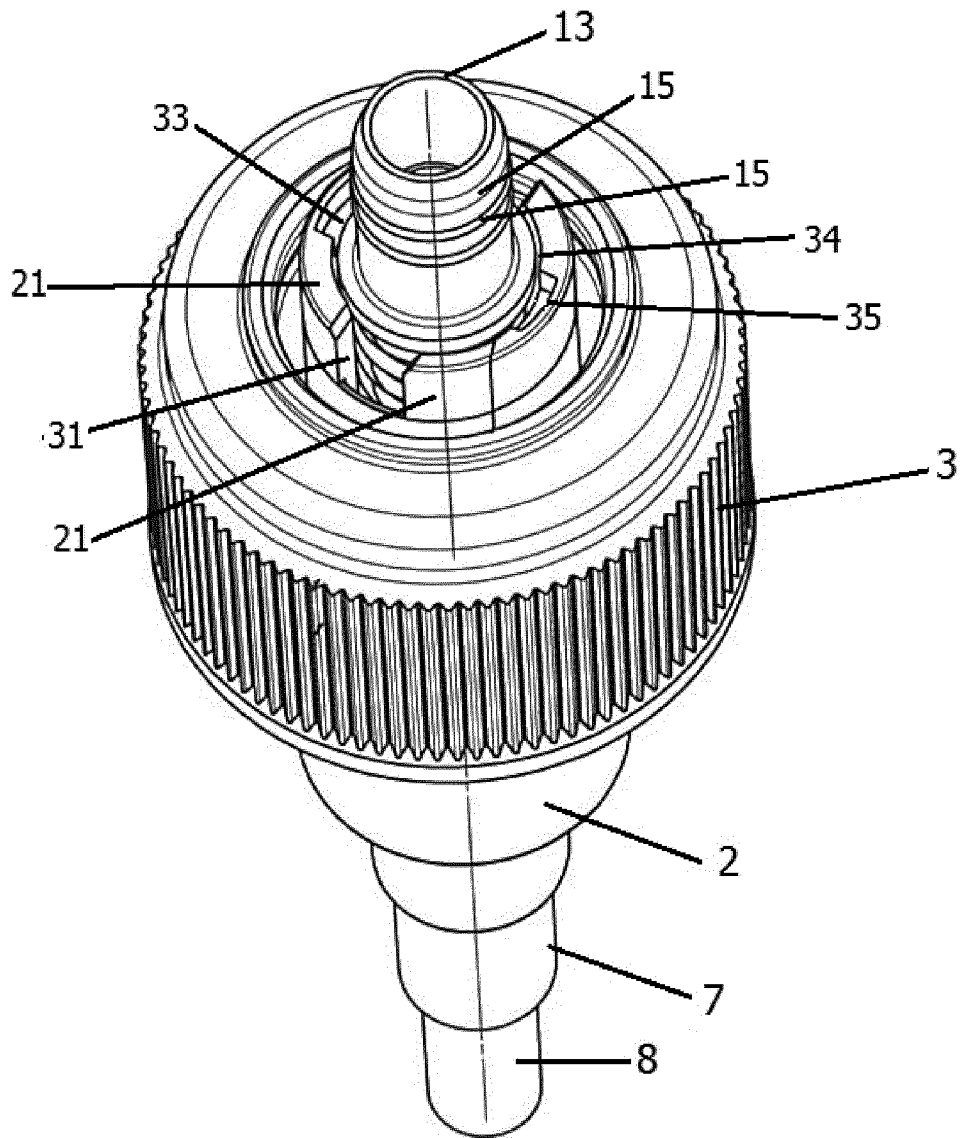


Fig. 5

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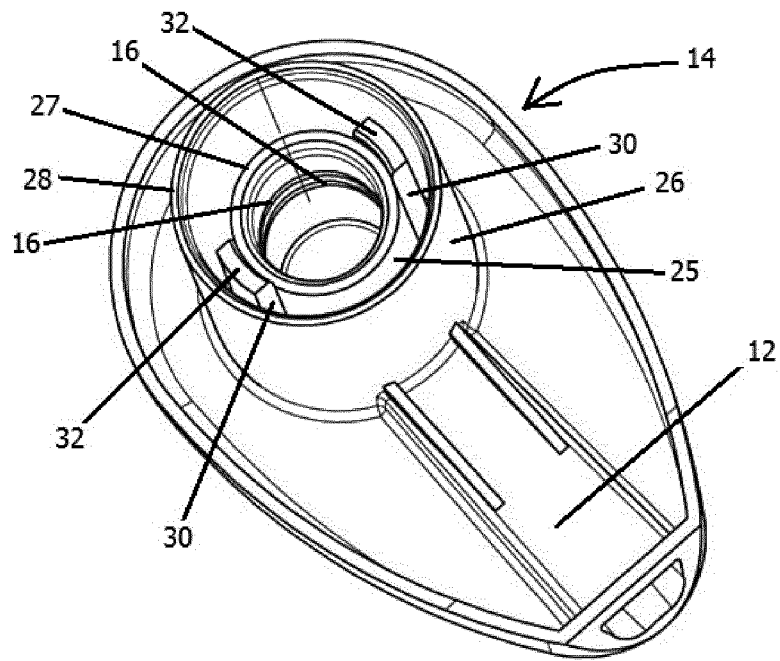


Fig. 4

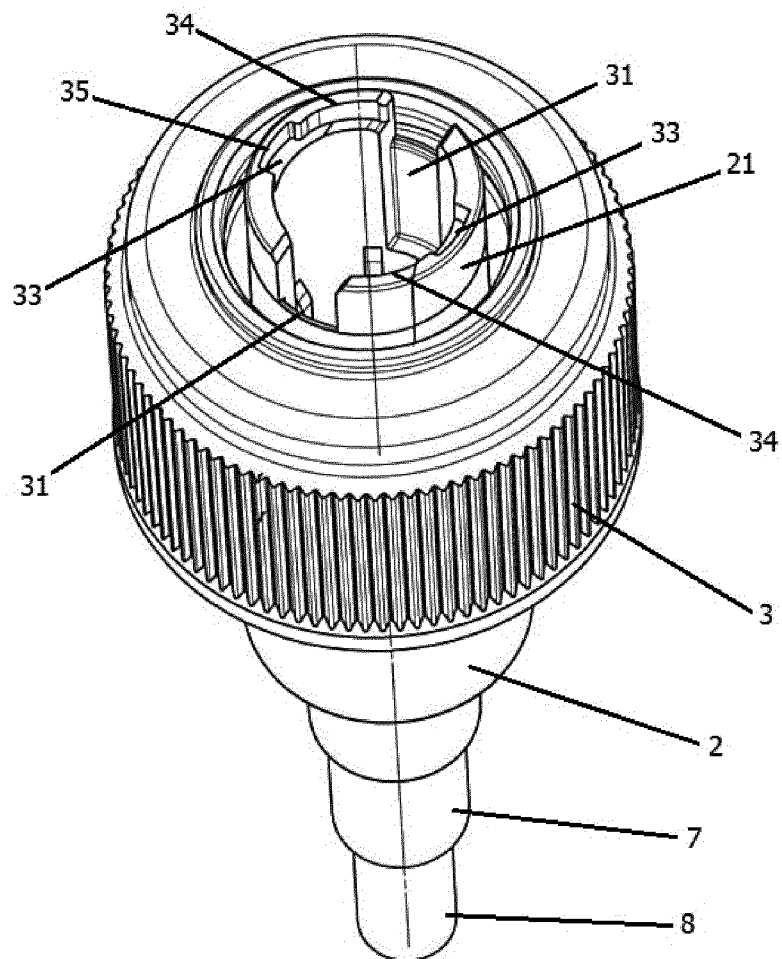


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/065865

A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

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)
B05B

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2005 013408 A1 (SAINT GOBAIN CALMAR GMBH [DE]) 28 September 2006 (2006-09-28)	1-8
Y	the whole document	9-15
Y	EP 3 162 450 A1 (ALBEA THOMASTON INC [US]) 3 May 2017 (2017-05-03) the whole document	7-15
X	WO 2008/088095 A1 (LEE YOUNG-JOO [KR]) 24 July 2008 (2008-07-24)	1-4
Y	paragraph [0035] - paragraph [0043]; figures 5,6	7-15
X	JP 2016 069052 A (YOSHINO KOGYOSHO CO LTD) 9 May 2016 (2016-05-09)	1-4
Y	abstract; figure 1	7-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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