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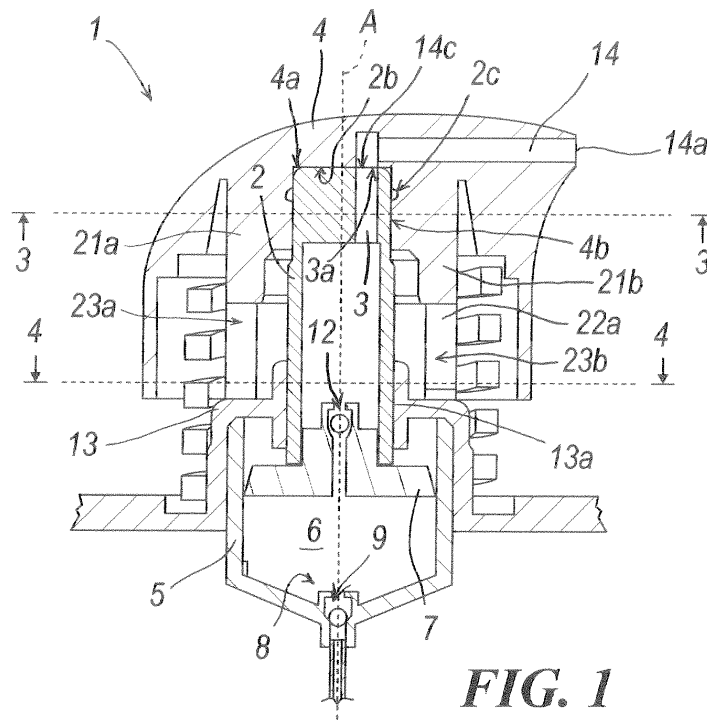
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(54) **Closable dispensing pump for fluid substances**

(57) A closable dispensing pump (1) for fluid substances comprising a chamber (6) in which a piston (7) is slidable, drivable by a stem (2), said stem (2) presenting in its interior at least one first passage (3) communicating with said compression chamber (6) and a dispensing pushbutton (4) presenting a second passage (14) opening towards the outside of said dispensing pushbutton (4). The first passage (3) presents a first aperture (3a) which opens onto a first contacting surface (2b) of

the stem (2), said second passage (14) presenting a second aperture (14c) which opens onto a second contacting surface (4a) of the pushbutton (4), said pushbutton (4) and said stem (2) being mutually rotatable about a longitudinal axis (A) between at least one open position in which said first (3a) and second (14c) aperture face each other and are in mutual communication, and a closed position in which they are mutually isolated and displaced.



**FIG. 1**

## Description

**[0001]** The present invention relates to a closable dispensing pump for fluid substances withdrawable from a container in accordance with the introduction to the main claim. The invention relates in particular to a dispensing pump for creams or the like.

**[0002]** Closable dispensing pumps are known. One such pump is described in US 3,216,625. The pump in question has a stem integral with a dispensing pushbutton. The stem is movable within a pump endpiece, the endpiece being fixed to the pump body. A thread is provided on the stem, with a corresponding counter-thread provided in the endpiece. When the pump is to be closed, the pushbutton is pressed to its limit, such that the stem thread engages that in the endpiece. The stem is then rotated to hence screw it into the endpiece. Further pressing on the pushbutton results in no further travel of the stem, the pump then being in its closed position, dispensing being prevented.

**[0003]** US 4,368,830 shows a pump with a stem on which an operating and dispensing pushbutton is mounted. The stem is slidable through an endpiece, the pushbutton presenting an elastic tooth which when the pushbutton is pressed into its end of stroke position snaps against an abutment provided in the endpiece, to act as a stop for maintaining the pushbutton in that position. Pushbutton movement is therefore prevented and the pump is closed.

**[0004]** The known art presents the drawback that, when the pump is in its closed position, the entire length of the dispensing conduit (i.e. from the dispensing aperture to the dispensing valve) remains in contact with the outside. Consequently the product inside this conduit, which is in contact with the outside atmosphere, can dry and obstruct the conduit.

**[0005]** In some cases this conduit obstruction can cause pump blockage.

**[0006]** If the product to be dispensed is alcohol based, it can evaporate completely, with considerable product wastage.

**[0007]** Moreover the product inside the conduit, being in contact with air, can undergo contamination and lose its properties.

**[0008]** An object of the present invention is therefore to provide a closable dispensing pump for substances withdrawable from a container, by which the technical problems of the known art are solved and in particular in which when the pump is closed the entire product inside the dispensing conduit is prevented from contact with the outside.

**[0009]** A further object of the present invention is to provide a closable pump which minimizes the risk of malfunction due to obstruction of the dispensing conduit.

**[0010]** Another object of the present invention is to provide a pump by which dispensing product wastage is prevented.

**[0011]** A further object of the invention is to prevent

the entire product inside the dispensing conduit from being able to be contaminated by atmospheric air.

**[0012]** These and other objects are attained by a closable dispensing pump for fluid substances withdrawable from a container, formed in accordance with the technical teachings of the accompanying claims.

**[0013]** Further characteristics and advantages of the invention will be evident from the description of a preferred but non-exclusive embodiment of the closable dispensing pump for fluid substances withdrawable from a container, illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a section through a pump according to the present invention, when in an open position; Figure 2 is a section through the pump of Figure 1, when in a closed position; Figure 3 is a section on the line 3-3 of Figure 1; Figure 4 is a section on the line 4-4 of Figure 1; Figure 5 is a side view of an alternative embodiment of the pump of the present invention shown in its open position; Figure 6 is a front view of Figure 5; Figure 7 is a section on the line 8-8 of Figure 5; Figure 8 is a section on the line 9-9 of Figure 6; and Figure 9 shows the same section as Figure 7, but with the pump in its closed position.

**[0014]** With reference to said figures, these show, indicated overall by 1, a closable pump for fluid substances withdrawable from a container.

**[0015]** Known pumps comprise a cup-shaped body 5 defining an intake, containing and compression chamber 6 in which a known piston 7 is sealedly slidable, driven by a stem 2. The cup-shaped body presents at least one intake hole 8 closed by at least one first valve 9 of known type and communicating via a dip tube 10 with the interior of the container on which the pump 1 is mounted. The stem is internally hollow, its cavity communicating via at least one second valve 12, also of known type, with the compression chamber 6.

**[0016]** The stem 2 is slidably mounted through an endpiece 13 which closes said cup-shaped body 5. More precisely, the stem 2 is guided through the endpiece 13 by a cylindrical guide surface 13a thereof. This surface presents a projection 13b which engages in a groove 2a present in the stem outer surface to make the stem 2 and endpiece 13 torsionally rigid. In this respect, the stem 2 can slide through the endpiece 13 to drive the piston 7, but cannot rotate about the endpiece, this rotation being prevented by said projection 13a.

**[0017]** Mounted on the stem 2 there is a dispensing pushbutton 4 presenting a second passage 14 for dispensing the fluid substance and opening towards the outside of said dispensing pushbutton.

**[0018]** Specifically, the stem 2 presents a flat first surface 2b of circular contact section which cooperates by contact with a second contacting surface 4a of said dis-

pensing pushbutton 4, which is also flat and of circular section (and consequently of complementary shape to the first). The first contacting surface 2b and the second contacting surface 4a cooperate frontally and rest against each other when the stem is inserted into the pushbutton. The stem cylindrical surface also presents an undercut 2c which locks the stem in a cylindrical hole 4b provided in the pushbutton; slight interference is present between the stem and said cylindrical hole 4b.

**[0019]** Consequently if a torque is applied to the pushbutton 4, it can rotate relative to the stem 2 about a longitudinal axis A of the stem 2, coinciding with that of the pushbutton.

**[0020]** In the stem 2 a first passage 3 is provided presenting a first aperture 3a and connecting said first aperture 3a to the cavity in the stem 2. The passage 3 is substantially an axial hole provided in a position offset from the stem axis A, the aperture 3a also consequently being offset from this latter.

**[0021]** The second passage 14 presents a substantially linear first portion 14a connected to a second portion 14 when the pushbutton is mounted on the stem, has its axis substantially parallel to the stem axis A. This second portion 14b presents an aperture 14c at the pushbutton second surface 4a. The second aperture 14c is offset from the axis A, and when the pushbutton is in a first open position the second aperture 14c faces and is substantially coaxial with the first aperture 3a of the stem 2, so that these apertures communicate and the fluid product can be dispensed by operating the pushbutton.

**[0022]** Advantageously the first aperture 3a and second aperture 14c have identical dimensions and shape.

**[0023]** When the pushbutton is rotated, for example through 90° into a closed position as in Figure 2, the first aperture 3a and the second aperture 14c do not face each other but each of them contact and faces the second contacting surface 4a and the first contacting surface 2a respectively. The first aperture 3a is hence closed substantially tightly and the fluid product in the stem cavity and in the first passage 3 is isolated from the outside atmosphere.

**[0024]** In that portion coupled to the stem 2, the dispensing pushbutton 4 presents a cylindrical ring 20 which is integral with the pushbutton 4 and from which a pair of first abutments 21 a, 21 b extend radially in mutual alignment.

**[0025]** The endpiece presents a pair of cylindrical second abutments 22a, 22b, these being separated from each other by a pair of slots 23a, 23b.

**[0026]** When the dispensing pushbutton 4 is in its open position (Figure 1) each of the first abutments 21 a, 21 b is aligned with one of the slots 23a, 23b. When the pushbutton 4 is pressed, each of the slots 23a, 23b receives the relative first abutment 21 a, 21 b, hence enabling the pushbutton to move and dispense the product.

**[0027]** When the pushbutton is in its closed position, each of the first abutments 21 a, 21 b faces one of the second abutments 22a, 22b of the endpiece, so prevent-

ing pushbutton movement.

**[0028]** Advantageously, conventional stops (not shown) are provided on the second abutments 22a, 22b to cooperate with said first abutments 21 a, 21 b, to limit pushbutton rotation to between its open position and its closed position.

**[0029]** Figures 5-9 show a preferred embodiment of the present pump. These figures show only a part of the stem and pushbutton, the pump connected to the stem being of any type. The stem 70 is sealedly inserted in a cavity 71 suitably provided in the dispensing pushbutton 72, and is locked in its seat by a snap-acting undercut 73. The undercut enables the pushbutton to rotate about the stem axis. The seal is provided by the contact between the stem outer surface 70b and that surface 71 A defining the cavity. The top 70A of the stem 70 is open, at its open top there being laterally provided a U-shaped groove 74 facing an aperture 74A in the lateral outer surface of the stem and also in the upper edge of the stem 70. This groove 74 is functionally similar to the first passage 3 of the preceding embodiment. In particular, a groove of this type is easily moulded without the aid of carriers in the plastic moulds, given that it is provided at the top of the piece. It will be noted that top of the stem, although open, sealedly rests against the pushbutton 72.

**[0030]** The dispensing pushbutton comprises a fluid dispensing passage 76, functionally similar to the second passage 14. This fluid dispensing passage 76 is a hole which opens at 76A directly onto the lateral surface defining the cavity in which the stem 70 is inserted.

**[0031]** This passage is also easily obtainable by moulding, this time by means of a carrier.

**[0032]** The operation of this embodiment is entirely similar to the preceding. In this respect, when the stem and pushbutton are in the open position such that the aperture 74A of the stem groove faces the aperture of the pushbutton passage 76 (Figures 5-7), dispensing is possible. In contrast, when these apertures do not face each other and the stem aperture 74A faces the surface defining the stem cavity while the passage aperture 76A faces the stem outer surface, dispensing is not possible (Figure 8).

**[0033]** To facilitate alignment between the first and second aperture when the pump is in the open position, in the surface defining the pushbutton cavity a circular arc shaped cut-out 77 is provided, on the stem surface there being provided a rib 78 which becomes inserted into said cut-out when the stem and pushbutton are coupled. When the pump is open the rib abuts against a first limit stop (Figure 8, Figure 9) defined by a wall of the cut-out, while when the limit stop abuts against the other wall of the cut-out the pump is closed (Figure 7). This solution can also be applied in a totally similar manner to the previously described embodiment.

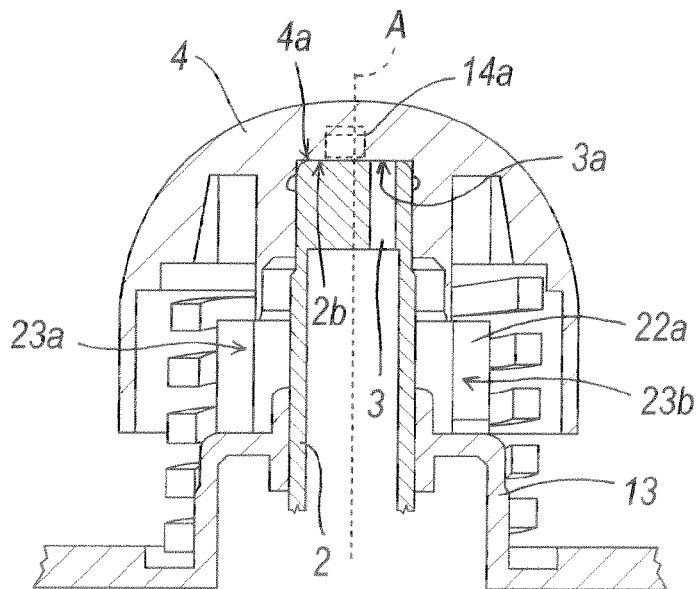
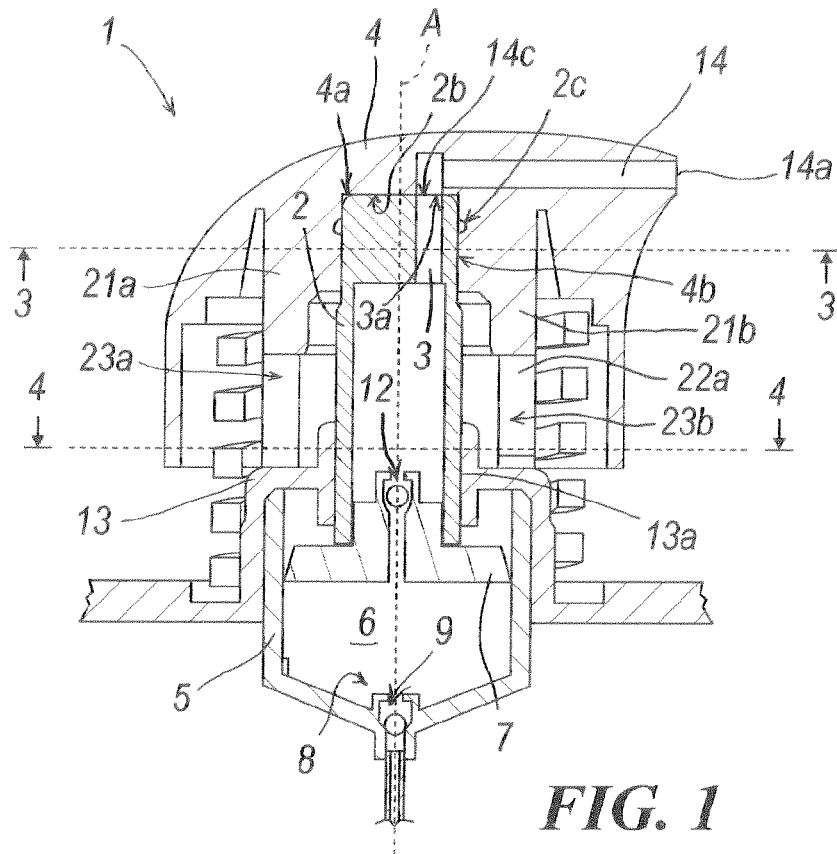
**[0034]** Advantageously, by means of only a small rotation the aforescribed embodiment enables a large distance to be created between the apertures, to achieve a more effective closure. Moreover as already stated

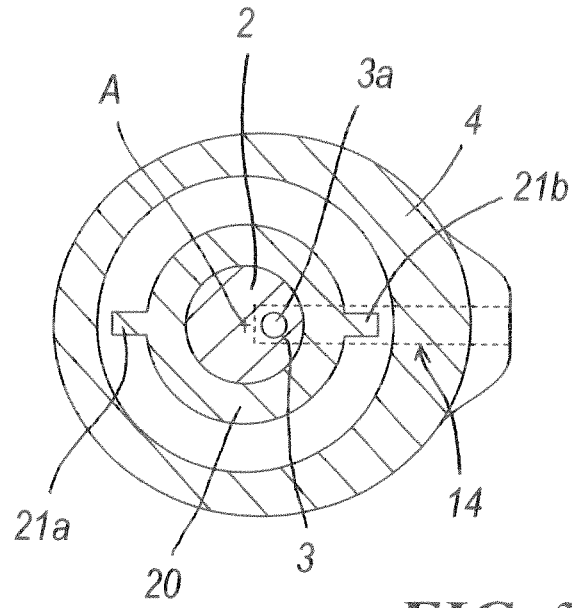
moulding the stem, which is of plastic material as is the pushbutton, is extremely easy given that no carrier is required in the mould.

**[0035]** As in the preceding embodiment and in a totally similar manner, abutments can be provided between the endpiece and pushbutton, to limit their movement when the pump is in the closed position. Means can also be provided between the endpiece and stem to make these latter torsionally rigid.

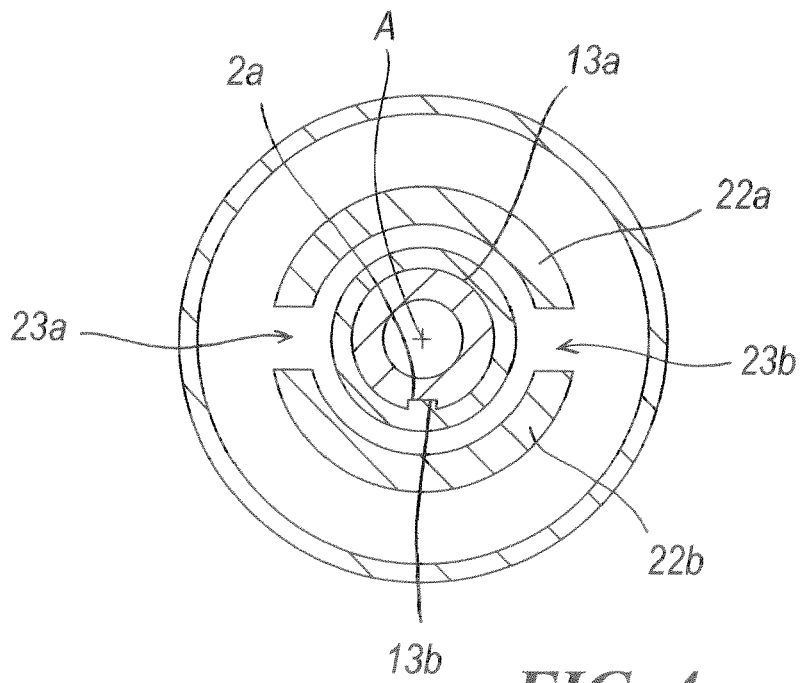
## Claims

1. A closable dispensing pump (1) for fluid substances withdrawable from a container, comprising a cup-shaped body (5) defining a chamber (6) in which a piston (7) is slidable, drivable by a stem (2), the cup-shaped body presents at least one intake hole (8) closed by at least one first valve (9) and communicating via a dip tube with the interior of the container, said stem (2, 70) presenting in its interior at least one first passage (3, 74) communicating, via at least one second valve (12) with said chamber and being slidably mounted through an endpiece (13) which closes said cup-shaped body (5), and a dispensing pushbutton (4, 72) presenting, for dispensing the fluid substance, a second passage (14, 76) opening towards the outside of said dispensing pushbutton (4), said stem (70) presenting a first contacting surface (2b, 70B) cooperating substantially sealedly and by contact with a second contacting surface (4a, 71A) of said dispensing pushbutton, **characterised in that** said first passage (3, 74) presents a first aperture (3a, 74A) which opens onto said first contacting surface (2b, 70B), said second passage (14, 76) presenting a second aperture (14c, 76A) which opens onto said second contacting surface (4a, 71A), said pushbutton and said stem being mutually rotatable about a longitudinal axis (A) between at least one open position in which said first and second aperture face each other and are in mutual communication, and a closed position in which they are mutually isolated and displaced.
2. A pump as claimed in claim 1, **characterised in that** said first surface (2a) and second surface (4a) are frontal surfaces of said pushbutton and said stem.
3. A pump as claimed in claim 2, **characterised in that** said first aperture is in a position offset from an axis (A) of said stem (2).
4. A pump as claimed in claim 2, **characterised in that** said second aperture is provided in a position offset from an axis (A) of said dispensing pushbutton (4).
5. A pump as claimed in claim 1, **characterised in that** said first passage (3) is an axial hole provided in a position offset from said stem axis (A).
6. A pump as claimed in claim 1, **characterised in that** said first surface (70B) and second surface (71A) are lateral surfaces of said pushbutton (72) and said stem (70).
7. A pump as claimed in claim 6, **characterised in that** said first passage (74) is a lateral groove provided at the top of the stem, and faces both the upper edge of the stem and, with an aperture (74A), the lateral outer surface (70B) of the stem.
8. A pump as claimed in claim 7, **characterised in that** said top of the stem is open.
9. A pump as claimed in claim 6, **characterised in that** said second passage (76) is a hole which opens directly onto the lateral surface (71A) defining the cavity housing the stem.
10. A pump as claimed in claim 1, **characterised in that** said stem (2, 70) and said endpiece (13) are torsionally rigid.
11. A pump as claimed in claim 8, **characterised in that** said endpiece (13) presents, at a stem guide surface thereof, a projection (13b) cooperating with a groove (2a) provided in the stem.
12. A pump as claimed in claim 1, **characterised in that** said dispensing pushbutton and said endpiece each present at least one abutment (21 a, 21 b, 22a, 22b) which, when the pushbutton is in its closed position, mutually cooperate to block the stroke of said pushbutton and hence of the stem.
13. A pump as claimed in claim 2, **characterised in that** the pushbutton presents a pair of abutments (21 a, 22a) radially projecting from the body of the pushbutton, the endpiece presenting a pair of cylindrical abutments (22a, 22b), each being separated by a pair of grooves (23a, 23b), each of which receives an abutment (21 a, 21 b) of the pushbutton during the pushbutton stroke when the pushbutton is in its open position.
14. A pump as claimed in claim 1, **characterised in that** a cut-out (77) is provided in that surface defining the pushbutton cavity, on the stem surface a rib (78) being provided which becomes inserted into said cut-out when the stem and pushbutton are connected together, said cut-out and said rib cooperating to facilitate alignment between the first and second aperture when the pump is in its open position, and to limit rotation between the pushbutton and stem.

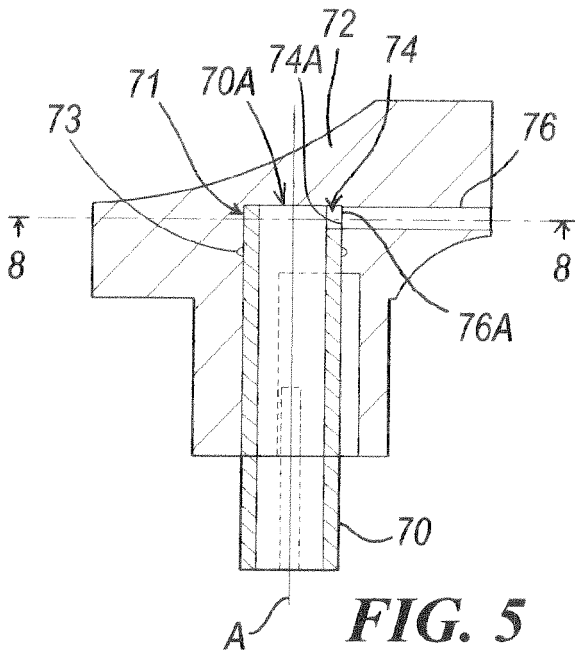




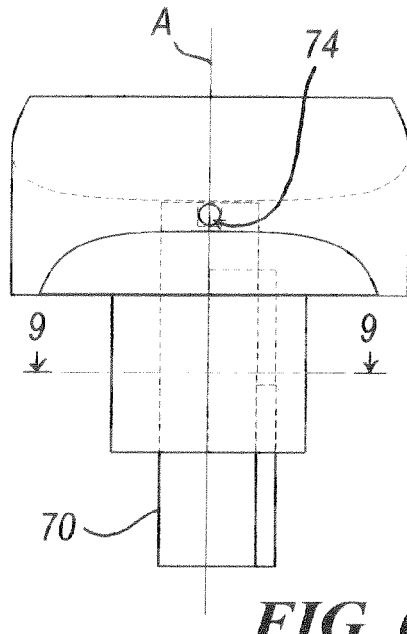
**FIG. 3**



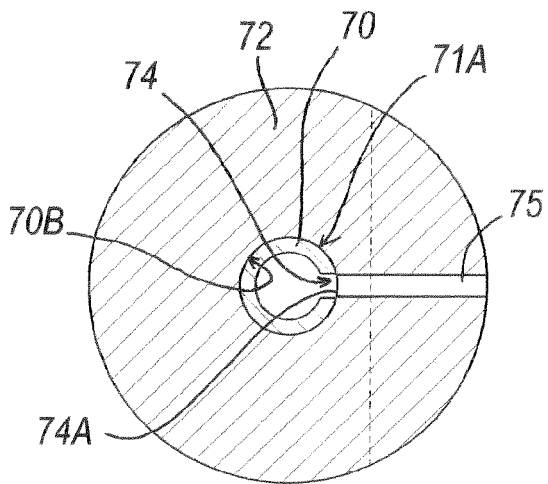
**FIG. 4**



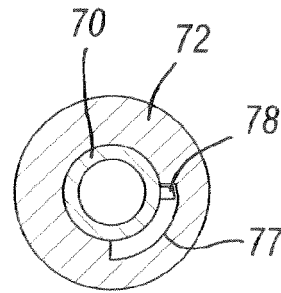
**FIG. 5**



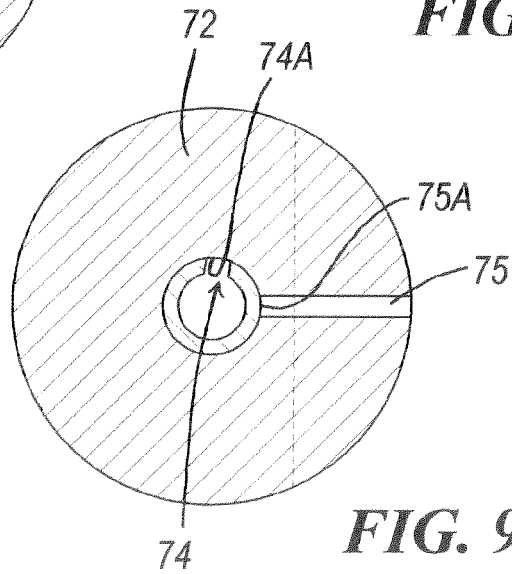
**FIG. 6**



**FIG. 7**



**FIG. 8**



**FIG. 9**



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