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(54) **Automatic dosing valve**

(57) An automatic dosing valve for mixed drinks machines comprising, a coupling structure (2), a liquid flow structure (8), a dispenser piston (6) and an eccentric shaft (7). The dosing valve fits in the bottle through the coupling structure (2), which will fit in a mixed drinks machine through a support structure with linear guides making, at the same time, connection with an electric motor through the eccentric shaft (7). The linear movement of the dispenser piston (6) is ensured by the eccentric shaft (7) which goes through it, which is driven by the electric motor embedded in the machine. The rotational action in the electric motor, above the eccentric shaft (7) will broadcast a linear movement vertically in the dispenser piston (6) allowing to block or release the liquid passage from the inside the bottle to the dosing chambers (11).

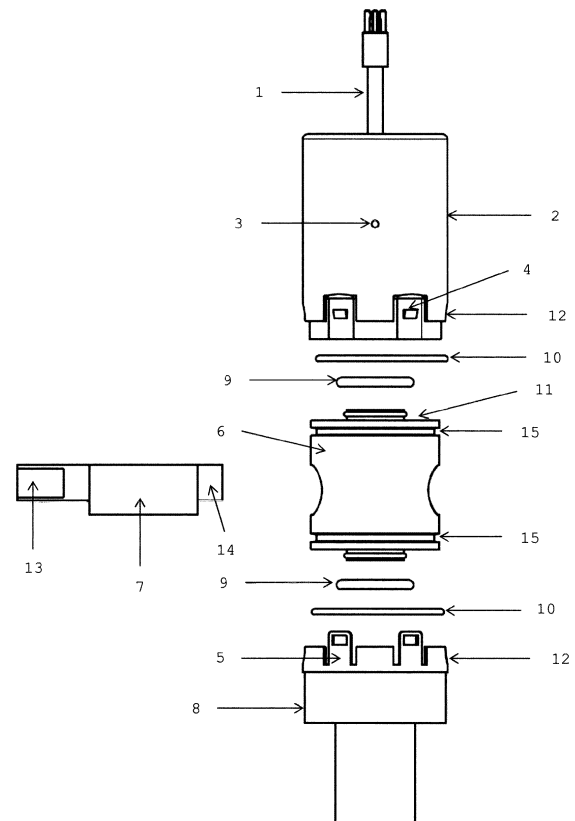


FIG. 1

Description

Field of the invention

[0001] The present invention describes an automatic dosing valve for mixed drinks machines application. The valve is fitted in the bottleneck which, in turn will be inserted in the mixed drinks machine, making coupling with an electric motor, integrant part of the mixed drinks machine. The valve being coupled to the electric motor enables automatic dosings.

[0002] The motor is electronically controlled for different four stop positions (90°, 180°, 270° and 360°). For volume dosings supported by the dosing chambers, is defined the 180° position which corresponds to the timed filling chambers, and the 360° position corresponds to the dosing chambers flow. For the 90° and 270° positions, the dosing is constant and equally timed, and a determined liquid volume is associated to the time selected.

[0003] The dosing valve is water tight, preventing the entry of dross inside it, as well as the occurrence of fluid leakages. All the components that comprise the dosing valve are conceived in polymer plastic materials, which are in accordance with the requisites of Standards and Directives, within materials that can be used in equipments in contact with food grades.

[0004] The dosing valve allows washing the elements that are in contact with the liquid, without being necessary to disassemble it.

Background of the invention

[0005] The present invention arose from the need to find a solution for the automatic dosing by inserting a dosing valve in a bottle and allowing its posterior coupling in mixed drinks machines.

[0006] In the market there are several drinks ranges dispensers to apply in bottles. There are dispensers which functioning is automatic and manual. The functioning concept of the wide range of dispensers find in the prior art, is based on the use of metallic components inside, such as, spheres and springs. The lack of cleanliness in that kind of dispensers can cause obstruction to the passage of liquids with higher density, in the channels containing the spheres and springs mentioned.

[0007] In the prior art it was found the document GB2077230, which describes a dispenser with a measure chamber and valves associated to the liquid input and output. The actuating means is composed by an eccentric gear guided by an electric motor, which performs the valves operation in a pre-determined sequence. The electric motor is activated through a button.

[0008] The present invention describes an automatic dosing valve that, when the electric motor is driven, this one applies a rotational force over the eccentric shaft, creating a linear movement over the dispenser piston. The linear movement of the dispenser piston is ensured by the eccentric shaft that goes through it.

[0009] This invention doesn't use spheres, springs or any other metallic component inside. Thereby, doesn't incur the risk of blockages to the liquid passage through the dosing channels, when the valve is used in high density drinks. It allows dosings for pre-determined quantities by the dosing chambers and also timed continuous dosings.

Brief description of the drawings

[0010] In order to complement the detailed description of the present invention, providing a better understanding of the invention features, as well as the technical details in the dosing valve, are presented the following drawings:

FIG. 1 - Exploded view of the components comprising the dosing valve;

FIG. 2 - Isometric view of the dosing valve totally sealed;

FIG. 3 - Top isometric view without coupling structure;

FIG. 4 - Isometric view of the dispenser piston with eccentric shaft inserted;

FIG. 5 - Isometric view of the dispenser piston;

FIG. 6 - Isometric view of the eccentric shaft;

FIG. 7 - Isometric view of the coupling structure;

FIG. 8 - Isometric view of the liquid flow structure;

Detailed description of the invention

[0011] The automatic dosing valve for mixed drinks machines is composed by the following elements: coupling structure (2) with air inlet (3), air pipe (1), liquid flow structure (8), dispenser piston (6) and the eccentric shaft (7). The coupling structure (2) to fit in the bottle while the liquid flow structure (8) is aligned with a dosing channel that's inside the machine.

[0012] On the inside the dispenser piston (6) contains dosing chambers (11) which enables dosings for liquid volume according to the chambers (11) capacity.

[0013] The coupling structure (2) has one hole for the air inlet (3). Inside there is inserted an air pipe (1) which provides the air inlet, ensuring the liquid flow by gravity.

[0014] In one end the eccentric shaft (7) has in one end a coupling surface (13) which allows the connection to the spindle of the electric motor. This connection is performed by a coupler located in the machine between the motor spindle and the coupling surface (13). On the opposite site, it has an cylindrical shape extremity (14), which facilitates the eccentric shaft (7) rotation over the roller cage (12).

[0015] The roller cages (12) located between the coupling structure (2) and the liquid flow structure (8) work as support over which the eccentric shaft (7) moves. The eccentric shaft (7) is over the roller cages (12).

[0016] The living hinges (5) are integral parts of the liquid flow structure (8), which have as function allow the junction of the liquid flow structure (8) with the coupling

structure (2) through clips (4). The mentioned clips (4) are integral parts of the coupling structure (2). The living hinges (5) are flexible and they have a cavity with the clips (4) shape to facilitate their engagement.

[0017] The dosing valve components are produced separately, which implies an assembling process of all the pieces that comprise the same. Assembling procedure:

- Insert the lateral o-rings (10) in the slots (15) and the top o-rings (9) in the dispenser piston (6);
- Place the eccentric shaft (7) through the oblong hole (18) contained in the dispenser piston (6);
- Insert the dispenser piston (6) over the liquid flow structure (8), with the coupling surface (13) and the cylindrical shape of the eccentric shaft (7) over the roller cages (12);
- Insert the air pipe (1) in the coupling structure (2), in the hole corresponding to the air inlet (3);
- Align the coupling structure (2) with the liquid flow structure (8) through the roller cages (12), coupling the referred structures (2 and 8) through the clips engagement (4) in the living hinges (5), creating a dosing valve water tight.

[0018] To fit the dosing valve in the bottle, the dispenser piston (6) must be in the "closed" position. By keeping the dispenser piston (6) in that position, the user can invert the bottle, without liquid waste, facilitating the dosing valve fitting in the mixed drinks machine. The user can manually rotate the eccentric shaft (7) manually to the "closed" position of the dispenser piston (6).

[0019] To use the automatic dosing valve, the user fits it in the bottleneck, through the coupling structure (2). On the other hand, this one will fit in the mixed drinks machine in a support structure with linear guides, making, at the same time, the connection between the eccentric shaft (7) and the electric motor spindle through the coupling surface (13). To the right coupling between the eccentric shaft (7) and the electric motor spindle, the dispenser piston must be in the "closed" position. The linear movement of the dispensing piston (6) is ensured by the eccentric shaft (7) that goes through it.

[0020] When the electric motor is driven, it applies a rotational movement over the eccentric shaft (7), which transmits a linear movement to the dispenser piston (6). The linear movement applied to the dispenser piston (6) allows blocking or releasing the liquid passage, from inside the bottle to the dosing chambers (11), or directly to the dosing channel.

[0021] The dispenser piston (6) has a cylindrical shape comprising on the horizontal center, an oblong hole (18) where the eccentric shaft (7) will spin, transmitting a linear movement to the dispenser piston (6). The dispenser piston (6) has dosing chambers (11) in the vertical side edges, opposite to the oblong hole (18). The dosing chambers (11) allow dosing a liquid volume pre-defined by them. The eccentric shaft (7) has an eccentric zone that,

when it's applied a rotational movement, allows the transmission of a linear movement to the dispenser piston (6), making the dosing chambers (11) filling or draining.

[0022] The dispenser piston (6) has the positions "closed" and "open". When the dispenser piston (6) is in the upper limit of the coupling structure (2) it means that it's in the "closed" position, not allowing the liquid dosing. When the dispenser piston (6) is in the lower limit of the liquid flow structure (8), it means that it's in the "open" position, allowing the liquid flow to inside the dosing chambers (11).

[0023] The eccentric shaft (7) position boils down to the following operating cycles:

- Positioning to 90° or 270° - allows a constant dosing, timed, this is, the dispenser piston (6) is "open" in the upper and lower ends, which allows the constant liquid flow.
- Positioning to 180° - When the eccentric shaft (7) is in this position, it means that the dispenser piston (6) is "open" in the upper end and "closed" in the lower end. Thereby, it enables filling the dosing chambers (11).
- Positioning to 360° - When the eccentric shaft (7) is in this position, it means that the dispenser piston (6) is "open" in the lower end and "closed" in the upper end. Thereby, it enables the liquid flow contained in the dosing chambers (11).

[0024] When the valve is fitted in the machine, the dispenser piston (6) is in the "closed" position and there is no liquid in the dosing chambers (11).

[0025] As soon as the electric motor is driven for one dosing, the eccentric shaft (7) will rotate and move the dispenser piston (6) vertically, until it leans against the liquid flow structure (8). While this cycle occurs, the dosing chambers (11) fulfill with liquid. After filled, the dispenser piston (6) by the action of the eccentric shaft (7), which is coupled to the electric motor, will move vertically in reverse until the dispenser piston (6) leans against the coupling structure (2) and blocks the liquid flow from inside the bottle. At the same time, occurs the liquid dosing contained in the dosing chambers (11) through the liquid flow structure (8).

[0026] In the upper end of the dispenser piston (6), there is allocated a top o-ring (9) that guarantees the sealing of the liquid that comes from inside the bottle. For the dispenser piston (6) this position is defined as "closed". In the lower end of the dispenser piston (6), there is also allocated a top o-ring (9) to guarantee that there is no liquid flow from inside the dosing chambers (11), when it is adjusted to the chamfer (17), while the dosing chambers (11) filling is done.

[0027] The coupling structure (2) and the liquid flow structure (8) have chamfers (16 and 17) that assist the top o-rings (9) adjustment and guarantee the perfect liquid sealing.

[0028] The lateral o-rings (10) guarantee that the liquid

only circulates through the dosing chambers (11). They're incorporated in the dispenser piston (6) over the slot (15), allowing the sealing between the dispenser piston (6), the coupling structure (2) and the liquid flow structure (8). These o-rings (10) also guarantee the roller cages (12) sealing while occurs a dosing.

[0029] With the lateral o-rings (10) is guaranteed a perfect sealing of the eccentric shaft (7) because with them there is no lateral leaks between the dispenser piston (6), and the coupling structure (2) and the liquid flow structure (8).

[0030] The lateral o-rings (10) have a high elasticity because they slide over the coupling structure (2) and the liquid flow structure (8) while the dispenser piston (6) makes a linear movement. The lateral o-rings (10) have a hardness of 70 shore enough to support the friction to which they are subjected during the linear movement of the dispenser piston (6).

[0031] It's only possible to replace the bottle when the dispenser piston (6) is in the "closed" position. This position is the only one that allows uncoupling the dosing valve of the machine. If the mixed drinks machine is making a dosing cycle, the user can't remove the dosing valve from the machine. Thereby, it is guaranteed that there is no liquid leakage by removing the dosing valve from the machine.

[0032] The dosing valve enables cleaning the components that are in contact with the liquid without being necessary disassembling it. For cleaning, the user must remove the dosing valve from the mixed drinks machine and uncouple the valve from the bottle. After this process, the user must manually rotate the eccentric shaft (7) to an intermediate position, which corresponds to the washing position. The intermediate position is marked in the dosing valve. After rotating the eccentric shaft (7) to the intermediate position, the user can introduce water inside through the interior of the dosing valve, enabling washing of the components that are in contact with the liquid.

3. rd. Automatic dosing valve, according to claim n°1, **characterized by** a dispenser piston (6) containing dosing chambers (11) in the vertical side edges.

5 4. th. Automatic dosing valve, according to claim n°1, **characterized by** lateral o-rings (10) incorporated in the dispenser piston (6) over the slot (15).

10 5. th. Automatic dosing valve, according to claim n°1, **characterized by** comprising living hinges (5), which fit in the clips (4).

15 6. th. Automatic dosing valve, according to claim n°5, **characterized by** the living hinges (5) which are integral parts of the liquid flow structure (8), and the clips (4) of the coupling structure (2).

Claims

1. st. Automatic dosing valve comprising:

- Coupling structure (2) to fit in the bottle,
- Liquid flow structure (8),
- Dispenser piston (6) allocated top o-rings (9), lateral o-rings (10) and with oblong hole (18),
- Support roller cages (12) over which the eccentric shaft (7) moves,
- Eccentric shaft (7) that goes through the dispenser piston (6).

2. nd. Automatic dosing valve, according to claim n°1, **characterized by** the rotational movement of the eccentric shaft (7) that transmits a linear movement to the dispenser piston (6).

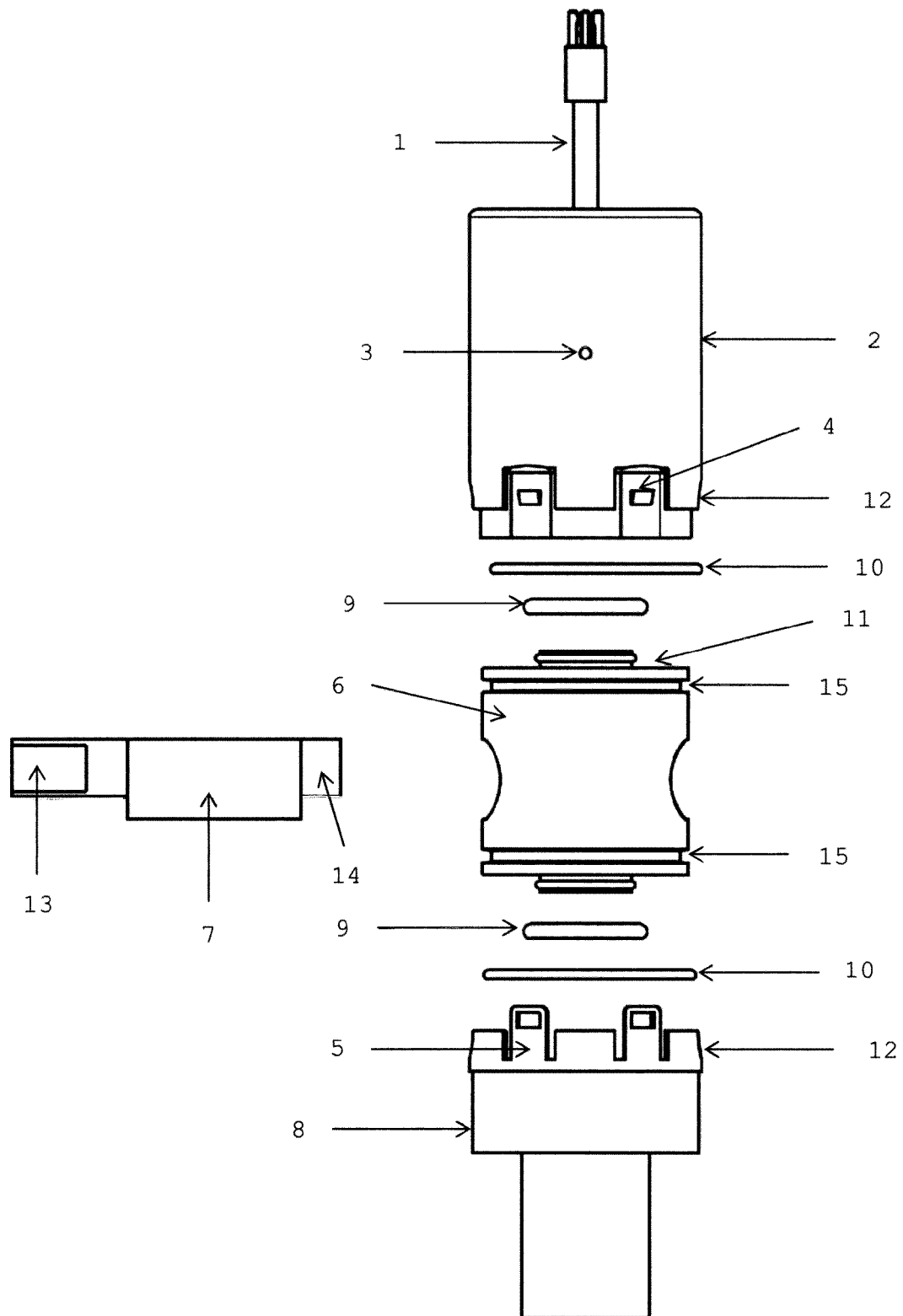


FIG. 1

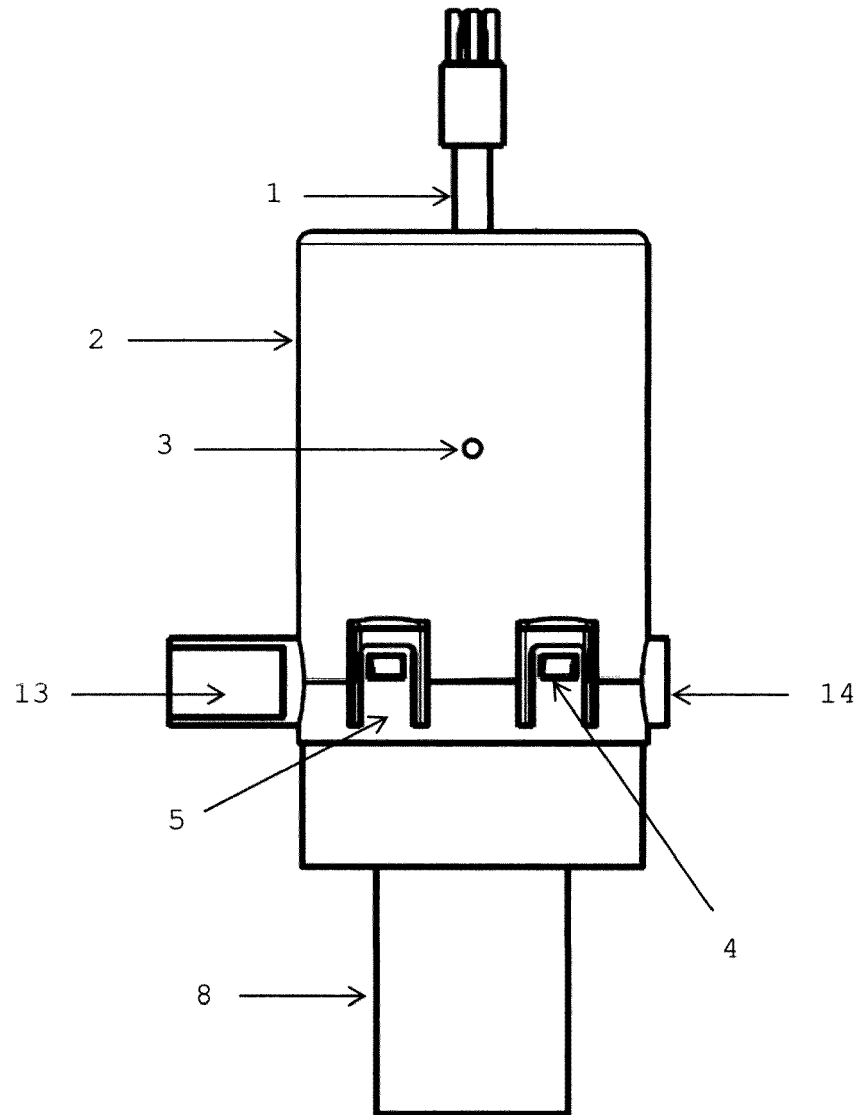


FIG. 2

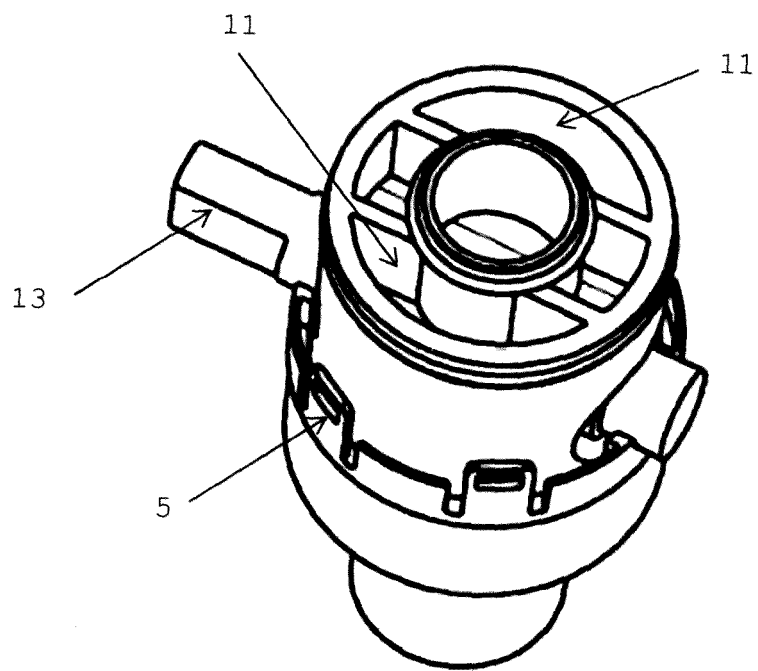


FIG. 3

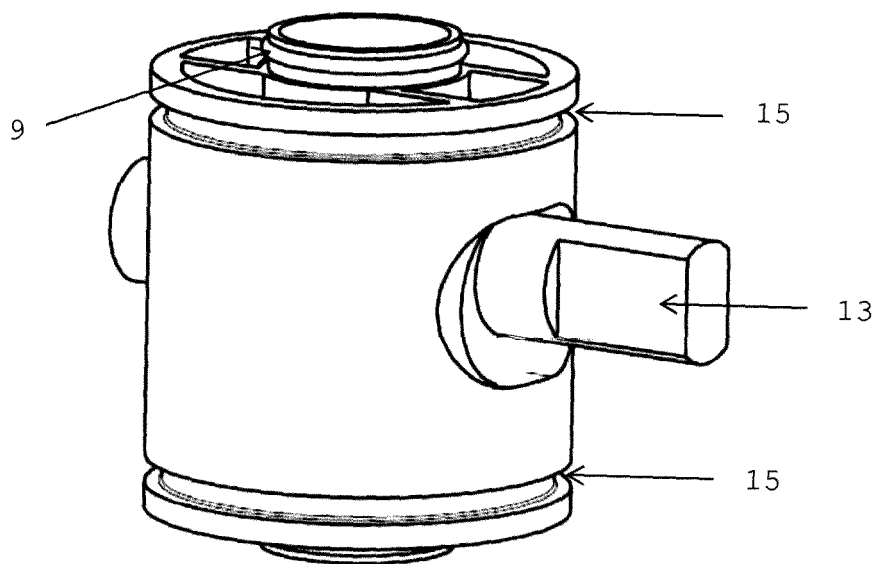


FIG. 4

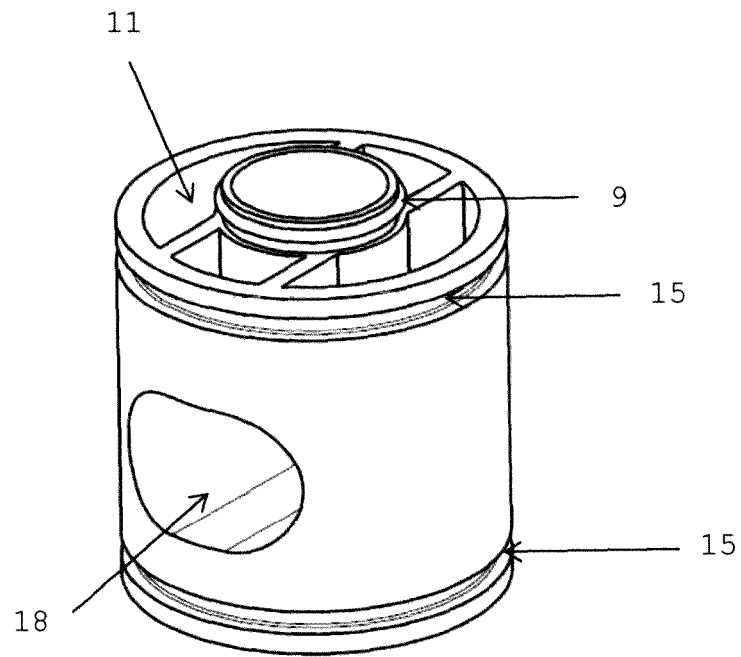


FIG. 5

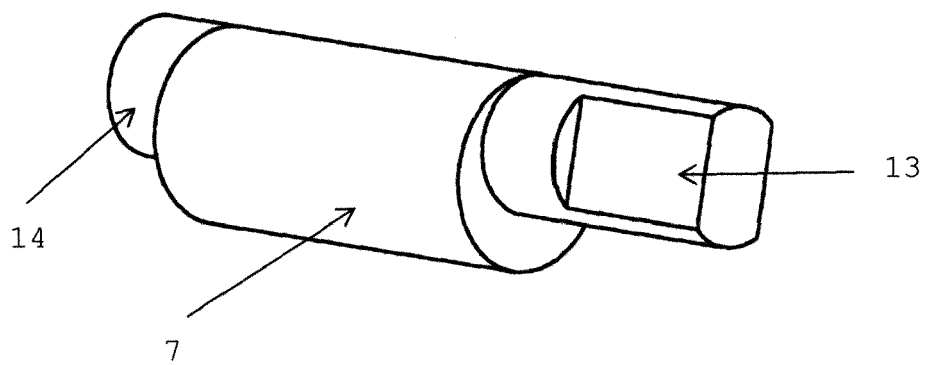


FIG. 6

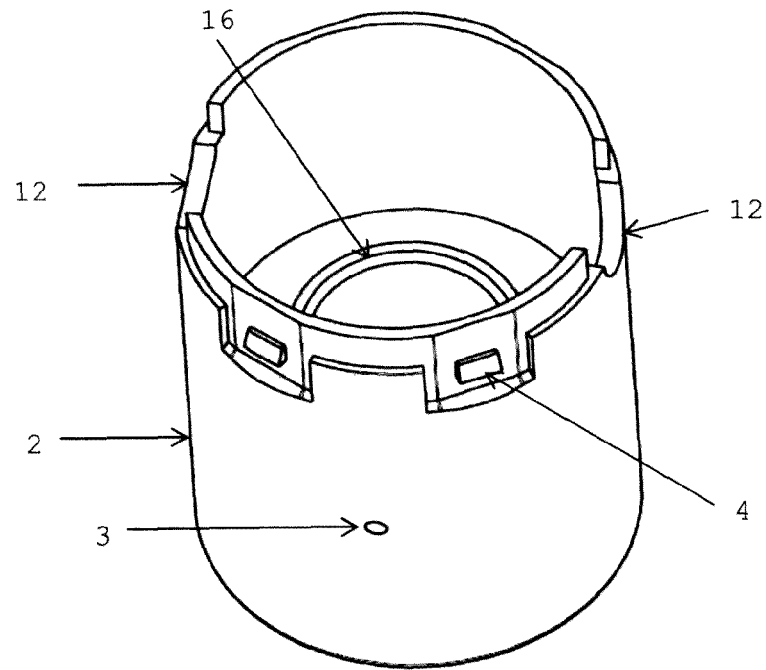


FIG. 7

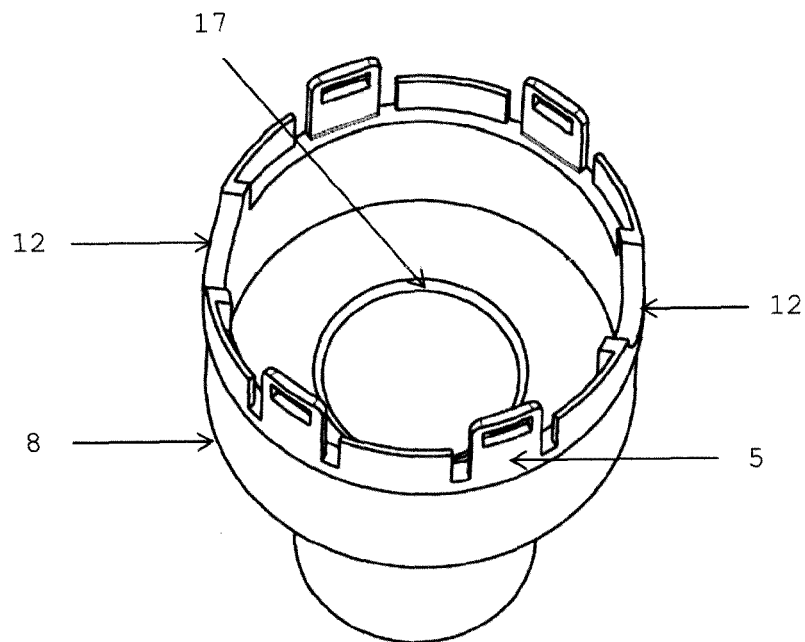


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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