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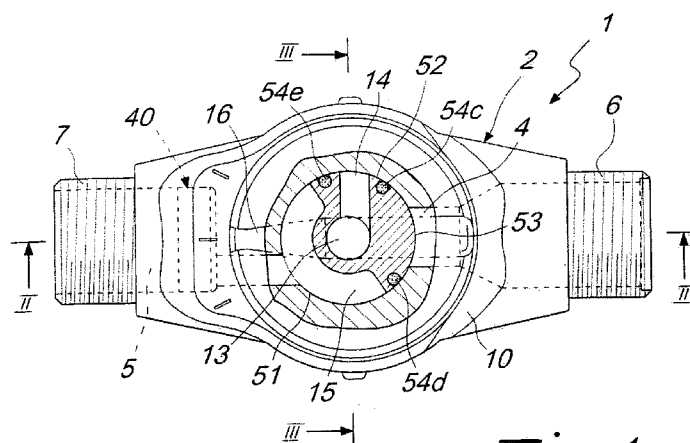


Fig. 1

(57) Abstract: A water mixer device applicable to water dispensing units, particularly of sanitary fittings, for adding water-soluble substances to the water, comprising a device body that forms internally a mixing chamber adapted to contain a water-soluble substance; said device body having an inlet and an outlet for the water and being provided, at least at said inlet, with a connector for connecting said device body to a water supply duct; a selector member being provided in said device body and being maneuverable from the outside of said device body into at least two operative positions: a first position in which it directly connects said inlet to said outlet by excluding the connection of said inlet to said mixing chamber, and a second position in which it connects said inlet to said outlet via said mixing chamber.

**WATER MIXER APPLICABLE TO WATER DISPENSING UNITS,
PARTICULARLY OF SANITARY FITTINGS, FOR ADDING WATER-
SOLUBLE SUBSTANCES TO THE WATER**

The present invention relates to a water mixer device applicable to water dispensers, particularly of sanitary fittings, for adding water-soluble substances to the water.

Devices are known for adding water-soluble substances to the water during dispensing.

Devices of this kind are used, for example, in the jet washer sector. Examples of devices for use in jet washers are described in US 4,671,311 and US 4,572,235.

These devices are generally built into the interior of a fairly complex dispensing apparatus and hence are unsuitable for use in the sanitary sector, in particular for personal hygiene.

Patent Application MI2004A-000606 of the same Applicant describes a device specifically designed for very simple installation on sanitary components, such as faucets, showers or bathtub units, to make it immediately possible to add water-soluble substances to the water dispensed by these components. This device is provided with a selector member by which the device can be made to dispense either water alone or water to which water-soluble substances, contained in a suitable vessel forming part of the same device, are added.

Essentially, the device described in Patent Application MI2004A-000606, particularly in its preferred application for personal hygiene, enables water to be used mixed with water-soluble substances with fragrancing or detergent or therapeutic effects comparable with those obtainable by considerably more complex and costly systems, such as hydromassage units.

This device which, because of its independent structure provided with standard connectors, can be installed directly by the user on existing sanitary system components, has proved during trials and use to be susceptible to improvements aimed principally at improving its performance.

In particular, in using this device, it has been found that a certain quantity of water-soluble substances mixed with the water is undesirably delivered even when the device is in that operating state in which it should deliver only water. This phenomenon is undesirable because it provides the user with a sensation of incomplete rinsing or at least of not completely satisfactory operation.

The main aim of the present invention is to solve the aforesated problem by providing a water mixer that allows water-soluble substances to be mixed with water during dispensing and which can be applied in a very simple manner to water dispensing units, including units that are already in use, particularly of sanitary fittings, with high reliability and operating precision.

Within this aim, an object of the invention is to provide a device that can be simply installed on a wide variety of water dispensing units, particularly on shower-type dispensing units or the like.

Another object of the invention is to provide a device that can be installed and optionally removed rapidly, especially by non-specialized personnel.

Another object of the invention is to provide a device offering adequate security guarantees against the danger of water leakage.

Another object of the invention is to provide a device that is compact and can be easily transported so that it can be used, at the user's discretion, in the most disparate places when using water dispensing units.

This aim and these and other objects that will become better apparent hereinafter are achieved by a water mixer applicable to water dispensing units, particularly of sanitary fittings, for adding water-soluble substances to the water, comprising a device body that forms internally a mixing chamber adapted to contain a water-soluble substance, said device body having an inlet and an outlet for the water and being provided, at least at said inlet, with a connector for the detachable connection of said device body to a water supply duct, a selector being provided in said device body and being maneuverable from the outside of said device body into at least two operative positions: a first position in which it directly connects said inlet to said outlet by excluding the connection of said inlet to said mixing chamber, and a second position in which it connects said inlet to said outlet via said mixing chamber, characterized by comprising

anti-backflow means arranged to oppose water recirculation between the outlet and said mixing chamber when said selector member is in said first position.

According to another aspect of the present invention the selector member has a substantially cylindrical form and is housed coaxially within said device body. The selector member is rotatable about its axis relative to said device body, to achieve said operative positions. On its lateral surface the selector member presents respectively, in rotational succession about its axes: a first zone presenting a recessed circumferential channel to connect said inlet to said outlet when said selector member is in said first position, a second zone having a conduit mouth opening into said mixing chamber to connect said inlet to said mixing chamber when said selector member is in said second position, and a zone for occluding said inlet when said selector member is in said third position; seal means being interposed between said selector member and said seat to sealedly isolate said three zones from each other and said seat from the outside; said seal means consisting of a gasket formed in one piece and at least partially housed in a relative seat defined on the lateral surface of said selector member.

Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the device according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a partly sectioned plan view of the device according to the invention in an operating condition;

Figure 2 is a sectional view of Figure 1, taken along the line II-II;

Figure 3 is a sectional view of Figure 1, taken along the line III-III;

Figure 4 is a sectional perspective view of the device according to the invention, in the operating condition of Figure 1;

Figure 5 is a sectional perspective view of the device according to the invention, in another operating condition with the anti-backflow means shown in exploded view;

Figure 6 is a sectional perspective view of the device according to the invention, in a further operating condition;

Figure 7 is a perspective view of a component of the device according to the invention;

Figures 8 to 10 schematically illustrate some of the possible applications of the device according to the invention.

Figure 11 is a perspective view of a unidirectional valve applicable to the outlet of the device of the present invention; and

Figures 12 and 13 are respectively a side view and a plan view of the valve of Figure 11.

With reference to said figures, the device according to the invention, generally designated by the reference numeral 1, comprises a device body 2 that forms internally a mixing chamber 3 adapted to contain a water-soluble substance.

The device body 2 has an inlet 4 and an outlet 5 for the water and is provided, at least at the inlet 4, with a connector 6, which allows the device body 2 to be detachably connected to a water supply duct.

Preferably, the device body 2 has a connector 7 also at the outlet 5 in order to allow detachable connection of the device body 2 to a water dispensing duct.

In the device body 2 there is a selector member 8, which can be operated from the outside of the device body 2 to be positioned in at least two operative positions, respectively: a first position in which it directly connects the inlet 4 to the outlet 5 by excluding the connection of the inlet 4 to the mixing chamber 3, and a second position in which it connects the inlet 4 to the outlet 5 through the mixing chamber 3. Preferably the selector member 8 is also positionable, relative to the device body 2, in a third operative position, in which it interrupts the connection of the inlet 4 to the outlet 5, as will become better apparent hereinafter.

The device body 2, preferably made of molded synthetic material, is suitably composed of at least two parts 9 and 10, respectively a first part 9 and a second part 10, which are detachably associated with each other so that they can be disassembled easily in order to allow access to the mixing chamber 3, for example in order to introduce into said mixing chamber 3 the water-soluble substance to be added to the water.

More particularly, the first part 9 is in the form of a tank, and at least part of the mixing chamber 3 is formed therein, while the second part 10 is provided with the connectors 6 and 7 and supports the selector member 8.

The inlet 4 is preferably arranged coaxially to the outlet 5, the selector member 8 being arranged between said inlet 4 and said outlet 5.

The first part 9 has a substantially cylindrical hollow shape, which is open at one of its end faces, and is connected by way of its open end face to the second part 10, by way of a coupling 11, preferably a threaded coupling, or of a bayonet coupling, as shown in the figures, the rotation axis whereof coincides with the axis of the first part 9.

The selector member 8 also preferably has a substantially cylindrical shape and is accommodated coaxially, so that it can rotate about its own axis 8a, in a receptacle 12, which is formed in the second part 10 of the device body 2 and is preferably coaxial to the first part 9.

The inlet 4 and the outlet 5 are formed on the lateral surface of the receptacle 12, in the selector member 8 there being provided, at its axis 8a, a duct 13 that leads into a central region of the mixing chamber 3 and is connected to an opening 14 provided on the lateral surface of the selector 8.

The selector member 8 has three zones on its lateral surface, namely a first zone 51, a second zone 52 and a third zone 53 respectively, in rotational succession about its axis 8a.

In the first zone 51 there is defined a recessed channel 15 extending through an arc of approximately 180°, in the second zone 52 there is defined the opening 14 of the duct 13, while the third zone is without openings or channels.

The three zones 51, 52, 53 are angularly spaced apart about the axis 8a of the selector member 8 such that the selector member 8, by its rotation about its axis 8a relative to the device body 2, achieves the aforesaid three operative positions. In the first position, illustrated in Figure 5, the recessed channel 15 directly connects the inlet 4 to the outlet 5, while the opening 14 is offset from the inlet 4 and outlet 5 such as to exclude the connection of the mixing chamber 3 to the inlet 4. In the second position, illustrated in Figure 6, the opening 14 is aligned with the inlet 4 such as to connect the inlet to the mixing chamber 3 via

the duct 13. In the third position, illustrated in Figures from 1 to 4, the selector member 8 faces the inlet 4 via the zone not occupied either by the recessed channel 15 or by the opening 14, and hence excludes the inlet 4, to completely prevent water passage through the device.

Seal means are interposed between the selector member 8 and the seat 12 in which it is housed, to sealedly isolate the three zones 51, 52, 53 from each other and said seat 12 from the outside. These seal means preferably consist of a gasket 54 formed in one piece and partially housed in a relative seat 55 defined on the lateral surface of the selector member 8.

In detail, the gasket 54, shown in Figure 7, is of cylindrical cage shape, composed of two annular parts 54a, 54b spaced apart coaxially and connected together by three axial bars 54c, 54d, 54e spaced angularly apart about the axis of the annular parts 54a, 54b. The annular parts 54a, 54b are mounted coaxially about the selector member 8, with the axial bars 54c, 54d, 54e defining the three zones 51, 52, 53 of the lateral surface of the selector member 8.

The selector member 8 is provided with an operating knob 16, which is arranged outside the device body 2 and can be operated in order to turn the selector 8 about its own axis 8a with respect to the device body 2.

The mixing chamber 3 is connected to the outlet 5 by means of a region that is proximate to the perimeter of the open end face of the first part 9 of the device body 2. It should be noted that this connection exists independently of the operative position of the selector member 8 relative to the device body 2.

According to the invention, the device comprises anti-backflow means 40 arranged to oppose water recirculation between the outlet 5 and the mixing chamber 3 when the selector member 8 is in the aforesaid first position.

These anti-backflow means 40 comprise an anti-backflow filter 41 mounted on the outlet 5 and consisting of a discoidal plate through which a plurality of holes 42 pass. This discoidal plate is provided on at least one of its faces with stiffening ribs 43 and is surrounded by a raised edge 44. The anti-backflow filter is inserted into the device body 2 at the outlet 5.

Conveniently, a filter mesh 17 is interposed between the mixing chamber 3 and the outlet 5. Said filter mesh 17 is preferably circular, so as to close the open end face of the first part 9, and is crossed centrally by the duct 13.

The connectors 6 and 7 preferably consist of threaded connectors provided with standardized threads, so as to allow their direct coupling to threaded connectors that are already provided on dispensing devices, such as for example faucets, units of bathtubs, shower-type dispensing units, or on connecting elements that are commercially available for connecting together components of water systems.

As an alternative, the connectors 6 and 7 can consist of bayonet connectors.

Figure 8 illustrates the possibility of fitting the device according to the invention on a faucet 20 for a washbasin or sink. Fitting can be achieved by associating the connector 6 with the outlet of the faucet 20, for example directly or by means of a connecting element.

Figures 9 and 10 illustrate the possibility of fitting the device according to the invention on a shower head 21.

As shown in Figure 9, fitting can be achieved by associating, for example directly or by means of a connecting element, the connector 7 with the body of the head 21 and the connector 6 to the flexible hose 22 that usually connects the head 21 with the wall-mounted faucet.

As shown in Figure 10, fitting can be achieved by associating, for example directly or by means of a connecting element, the connector 6 with the wall-mounted faucet and the connector 7 with the flexible hose 22 that usually connects the head 21 with the wall-mounted faucet.

The above described examples of fitting the device according to the invention are only a few of those that are possible, since the presence of the connectors 6 and 7 allows the device according to the invention to be fitted in an extremely simple manner onto a wide range of sanitary components, by interposing it more generally between a water supply duct and a dispensing outlet of the sanitary component.

The water-soluble substances or addition agents to be added to the water can be introduced during its dispensing in the mixing chamber 3. Said substances

can be fragrancing or detergent or therapeutic substances or other kinds of substances, according to the requirements. The substances may be in liquid or solid form, for example in the form of a tablet 30 that is designed to gradually dissolve upon contact with water.

For the sake of completeness of description, it should be noted that the sealing gasket 25 is provided between the first part 9 and the second part 10 of the device body 2 and an additional filter 18 provided at the inlet of the connector 6.

Operation of the device according to the invention is as follows.

When water is to be dispensed without additives, the selector 8 is set in the first operating position (Figure 5). With the selector 8 in this position, the water passes through the device by flowing directly from the inlet 4 to the outlet 5, without flowing through the mixing chamber 3.

It should be noted that when in this operative condition, although the outlet 5 is connected to the mixing chamber 3, the presence of the anti-backflow filter 41 at the outlet 5 regularizes outlet water flow by preventing turbulence or backflow effects which could draw fractions of the water-soluble substance contained in the mixing chamber 3 towards the outlet 5.

When water is to be dispensed with additives, the selector 8 is set in the second operating position (Figure 6). With the selector 8 in this position, the water passes through the device by flowing from the inlet 4 to the mixing chamber 3 and from there to the outlet 5.

When water dispensing is to be completely interrupted, the selector 8 is set in the third operating position (Figures 1-4). In this position, the selector 8 closes the inlet 4, preventing the flow of water through the device.

It should be noted that with the device according to the invention it is extremely simple to pass from dispensing water with additives to dispensing water without additives. The possibility to switch between these two operating positions can be used for example to perform, in succession, washing with a detergent substance added to the water and subsequent rinsing with additive-free water.

It should also be noted that since the device according to the invention is designed to be installed predominantly downstream of a mixer faucet or of two faucets for dispensing hot water mixed with cold water, switching the position of

the selector 8 does not alter the water mixing already preset by means of the mixer faucet or by means of the two faucets. In this manner, passage from dispensing additive-free water to dispensing blended water is possible, optionally with a period of interruption of the dispensing action, without having to act on the mixer faucet or on the two faucets.

After use, the first part 9 can be removed from the second part 10 in order to clean the mixing chamber 3 and optionally prepare the device for subsequent use by introducing fresh water-soluble substance into the mixing chamber 3.

It should be noted that, by virtue of the particular structure of the gasket 54, which is of cylindrical cage shape composed of two spaced apart coaxial annular parts 54a, 54b connected together by three axial bars 54c, 54d, 54e spaced angularly apart, high resistance of the overall gasket to torsional deformation is obtained, preventing it from disengaging from its seat.

Advantageously the gasket 54 is made of at least one polymeric material (preferably self-lubricating) and/or of silicone mixtures. This enables it to slide with low friction on the surface of the seat in which the selector member 8 is engaged. This prevents the gasket from curling up about itself during its rotation. It hence remains properly fixed in its original position.

It has been observed in practice that the device according to the invention fully achieves the intended aim, since it allows water blended with water-soluble substances to be used in an extremely simple and low-cost manner without requiring the purchase of expensive devices that are difficult to install, and is of totally satisfactory operation. In particular, the presence of anti-backflow means prevents undesired dispensing of water-soluble substances when the inlet is connected directly to the outlet.

Another advantage deriving from the presence of the anti-backflow means is that the dispensing pressure is lowered, to hence also obtain a saving in water consumption.

A further advantage of the device according to the invention is that it can be transported easily by the user in order to be installed on water dispensing units available in places visited by the user outside his own dwelling, such as for example in hotels, gymnasiums etc.

In an alternative embodiment of the invention, the anti-backflow means comprise a unidirectional valve 202, for example that shown in Figure 11. It is positioned exactly in place of or in addition to the anti-backflow filter 41, such that the water leaving the device flows in the direction of the arrow F. In particular, the unidirectional valve is a diaphragm valve.

It is formed of soft elastic polymeric material, and presents a flange 200 from which a cylindrical wall 201 extends. A pair of flexible lips 203, 204 extend from the cylindrical wall to define a linear outlet slot 205. Each of the lips is tapered at 203A, 204A in proximity to said slot 205. When a liquid flows in the direction of the arrow F the lips deform, the slot 205 widens and flow is permitted. Flow in the opposite direction to the arrow F (backflow) causes immediate lip closure, achieved both by the elastic return of their construction material and by their particular angulation.

Advantageously, in addition to acting as a gasket for the outlet, the flange 200 engages in the device outlet and stabilizes the valve in its predetermined position, hence preventing it from abandoning the device by sliding in the liquid flow direction.

The device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced by other technically equivalent elements.

In practice, the materials used, provided they are compatible with the specific use, as well as the dimensions, may be chosen according to requirements and to the state of the art.

CLAIMS

1. A water mixer device applicable to water dispensing units, particularly of sanitary fittings, for adding water-soluble substances to the water, comprising a device body that forms internally a mixing chamber adapted to contain a water-soluble substance; said device body having an inlet and an outlet for the water and being provided, at least at said inlet, with a connector for connecting said device body to a water supply duct; a selector member being provided in said device body and being maneuverable from the outside of said device body into at least two operative positions: a first position in which it directly connects said inlet to said outlet by excluding the connection of said inlet to said mixing chamber, and a second position in which it connects said inlet to said outlet via said mixing chamber.
2. A device as claimed in the preceding claim, characterized by comprising anti-backflow means arranged to oppose water recirculation between said outlet and said mixing chamber with said selector member in said first position.
3. A device as claimed in claim 2, characterized in that said anti-backflow means comprise an anti-backflow filter associated with said outlet.
4. A device as claimed in claims 2 and 3, characterized in that said anti-backflow filter consists of a discoidal plate through which a plurality of holes pass; said anti-backflow filter being inserted into said device body at said outlet.
5. A device as claimed in one or more of the preceding claims, characterized in that said discoidal plate presents stiffening ribs on at least one of its faces.
6. A device as claimed in one or more of the preceding claims, characterized in that said anti-backflow means comprise a unidirectional valve.
7. A device as claimed in one or more of the preceding claims, characterized in that said unidirectional valve is a diaphragm valve.
8. A device as claimed in one or more of the preceding claims, characterized in that said unidirectional valve presents a peripheral portion from which a pair of flexible lips extend to define a linear outlet slot.

9. A device as claimed in the preceding claim, wherein said flexible lips are tapered in proximity to said outlet slot.
10. A device as claimed in one or more of the preceding claims, wherein said unidirectional valve presents a flange which acts as a gasket for the outlet and stabilizes the valve in its predetermined position.
11. A device as claimed in one or more of the preceding claims, characterized in that said outlet is in communication with said mixing chamber independently of the position of said selector member.
12. A device as claimed in one or more of the preceding claims, characterized in that said selector member is positionable, relative to said device body, in a third operative position in which it interrupts the connection of said inlet to said outlet.
13. A device as claimed in one or more of the preceding claims, characterized in that said selector member has a substantially cylindrical form and is housed coaxially in a correspondingly shaped seat defined in said device body; said selector member being rotatable about its axis relative to said device body, to achieve said operative positions; on its lateral surface, said selector member presenting in rotational succession about its axes three respective zones: a first zone presenting a recessed circumferential channel to connect said inlet to said outlet when said selector member is in said first position, a second zone having a conduit mouth opening into said mixing chamber to connect said inlet to said mixing chamber when said selector member is in said second position, and a zone for occluding said inlet when said selector member is in said third position; seal means being interposed between said selector member and said seat to sealedly isolate said three zones from each other and said seat from the outside; said seal means consisting of a gasket formed in one piece and partially housed in a relative seat defined on the lateral surface of said selector member.
14. A device as claimed in one or more of the preceding claims, characterized in that said gasket is of cylindrical cage shape, composed of two spaced-apart coaxial annular parts connected together by three axial bars spaced angularly apart about the axis of said annular parts; said annular parts

being mounted coaxially about the selector member, and said axial bars defining said three zones of the lateral surface of said selector member.

15. A device as claimed in one or more of the preceding claims, characterized in that said gasket is made of at least one self-lubricating polymeric material and/or of silicone mixtures.

16. A device as claimed in one or more of the preceding claims, characterized in that said device body also presents a connector at said outlet to removably connect said device body to a water delivery duct.

17. A device as claimed in one or more of the preceding claims, characterized in that said device body is composed of at least two parts, namely a first and a second part, which are removably associated with each other and can be separated for access to said mixing chamber.

18. A device as claimed in one or more of the preceding claims, characterized in that said first part of the device body is formed as a tank, in which at least part of said mixing chamber is defined.

19. A device as claimed in one or more of the preceding claims, characterized in that said second part of the device body is provided with said connectors and supports said selector member.

20. A device as claimed in one or more of the preceding claims, characterized in that said inlet is arranged substantially coaxial to said outlet.

21. A device as claimed in one or more of the preceding claims, characterized in that said first part of the device body is of substantially hollow cylindrical shape open at one of its ends, and is connected via its open end to said second part of the device body.

22. A device as claimed in one or more of the preceding claims, characterized in that said first part of the device body is connected to said second part of the device body via a threaded or bayonet connector with its rotation axis coinciding with the axis of said first part of the device body.

23. A device as claimed in one or more of the preceding claims, characterized in that said first part of the device body is arranged coaxial to said selector member, said duct opening substantially at the centre of said mixing chamber.

24. A device as claimed in one or more of the preceding claims, characterized in that said mixing chamber communicates, via a zone proximate to the perimeter of the open end of said first part of the device body connected to said second part of the device body, with said outlet.

25. A device as claimed in one or more of the preceding claims, characterized in that said connectors are threaded or bayonet connectors.

26. A device as claimed in one or more of the preceding claims, characterized in that said selector member is provided with an operating knob arranged on the outside of said device body.

27. A water mixer device applicable to water dispensing units, particularly of sanitary fittings, for adding water-soluble substances to the water, characterized by comprising one or more of the described and/or illustrated characteristics.

28. A device as claimed in one or more of the preceding claims, characterized in that said connector for connecting said device body to a water feed duct is a removable connector.

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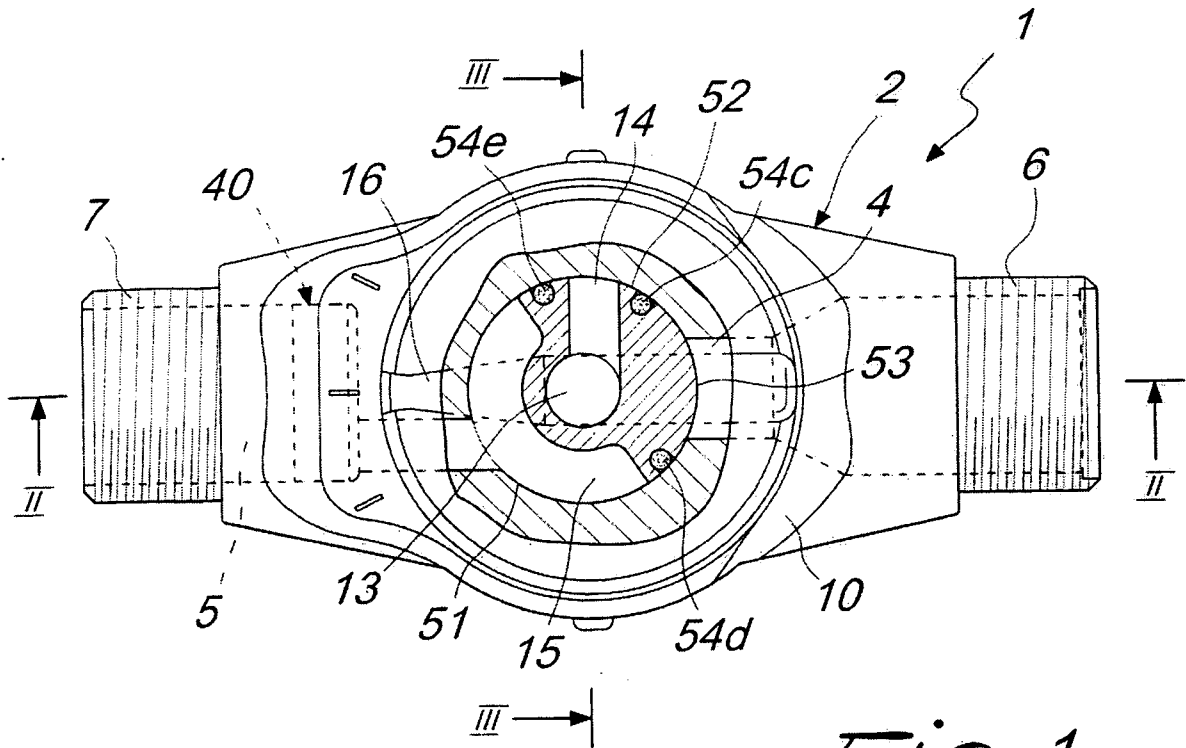


Fig. 1

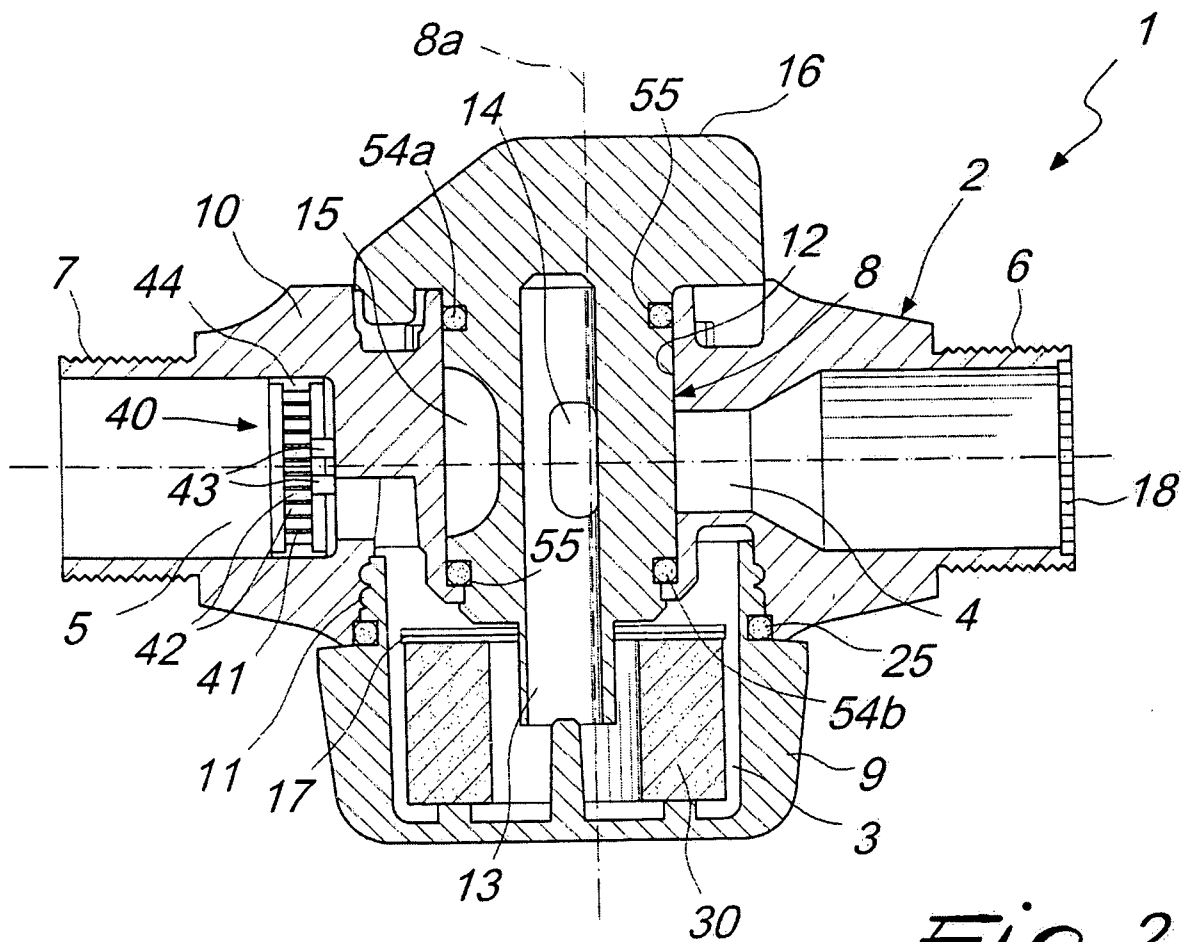


Fig. 2

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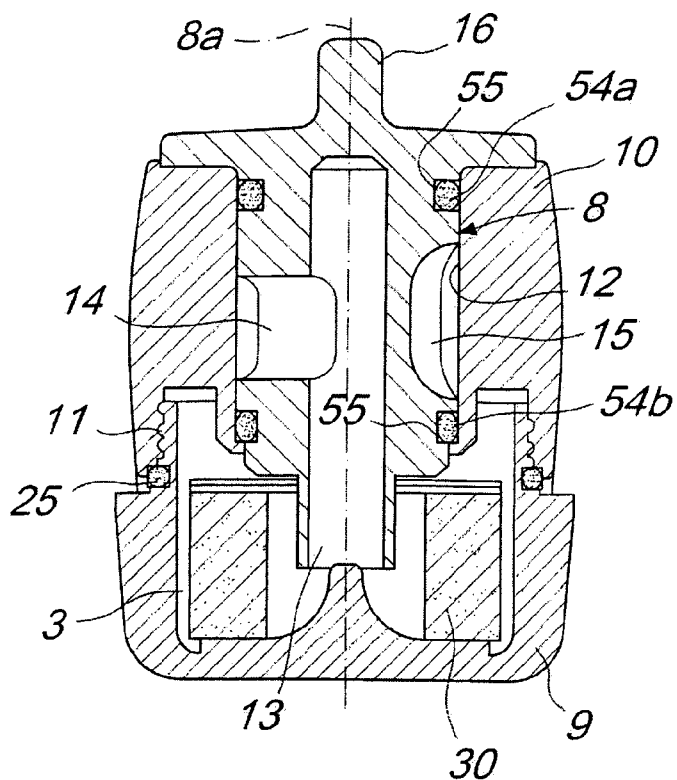


Fig. 3

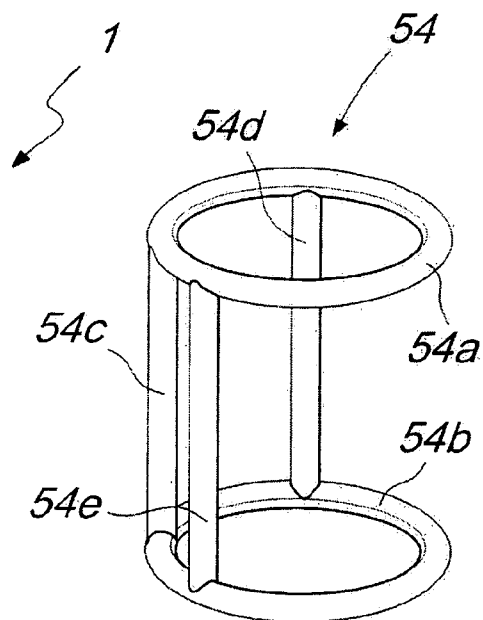


Fig. 7

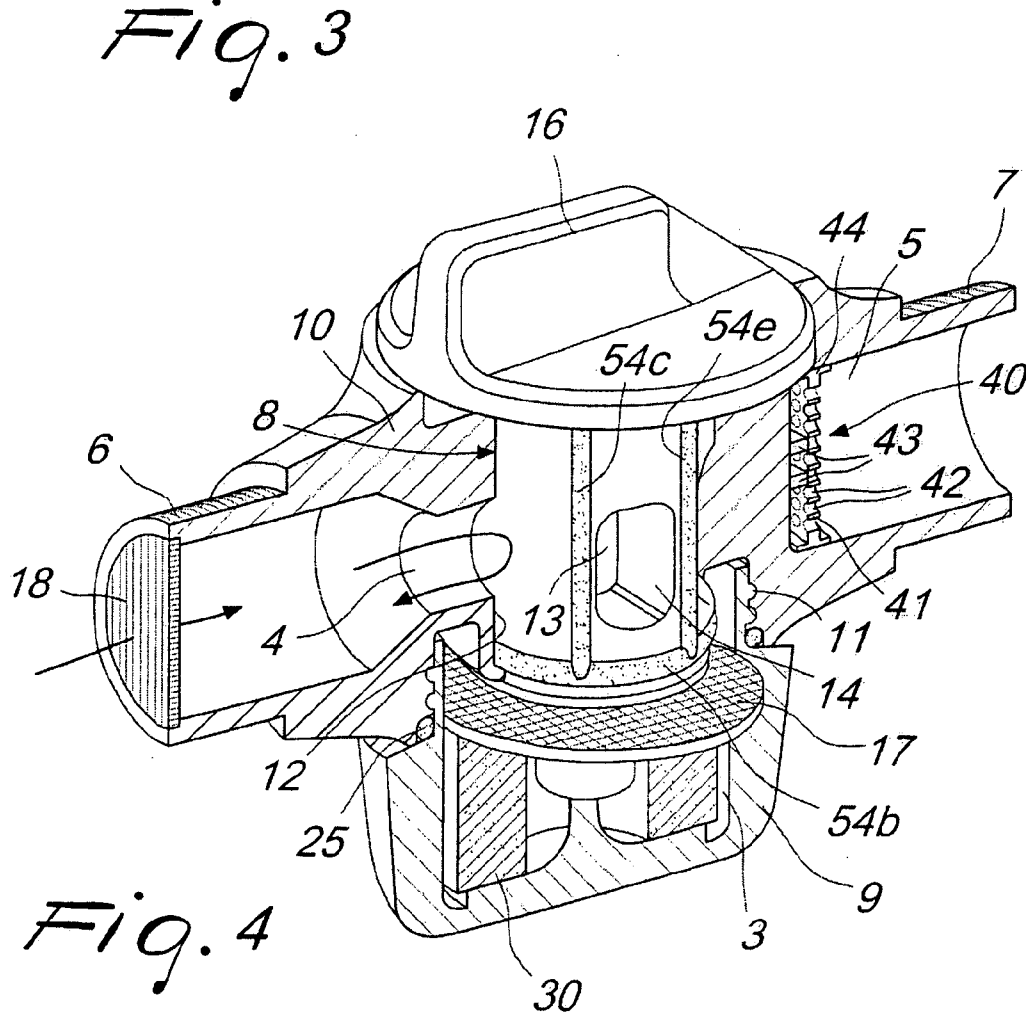
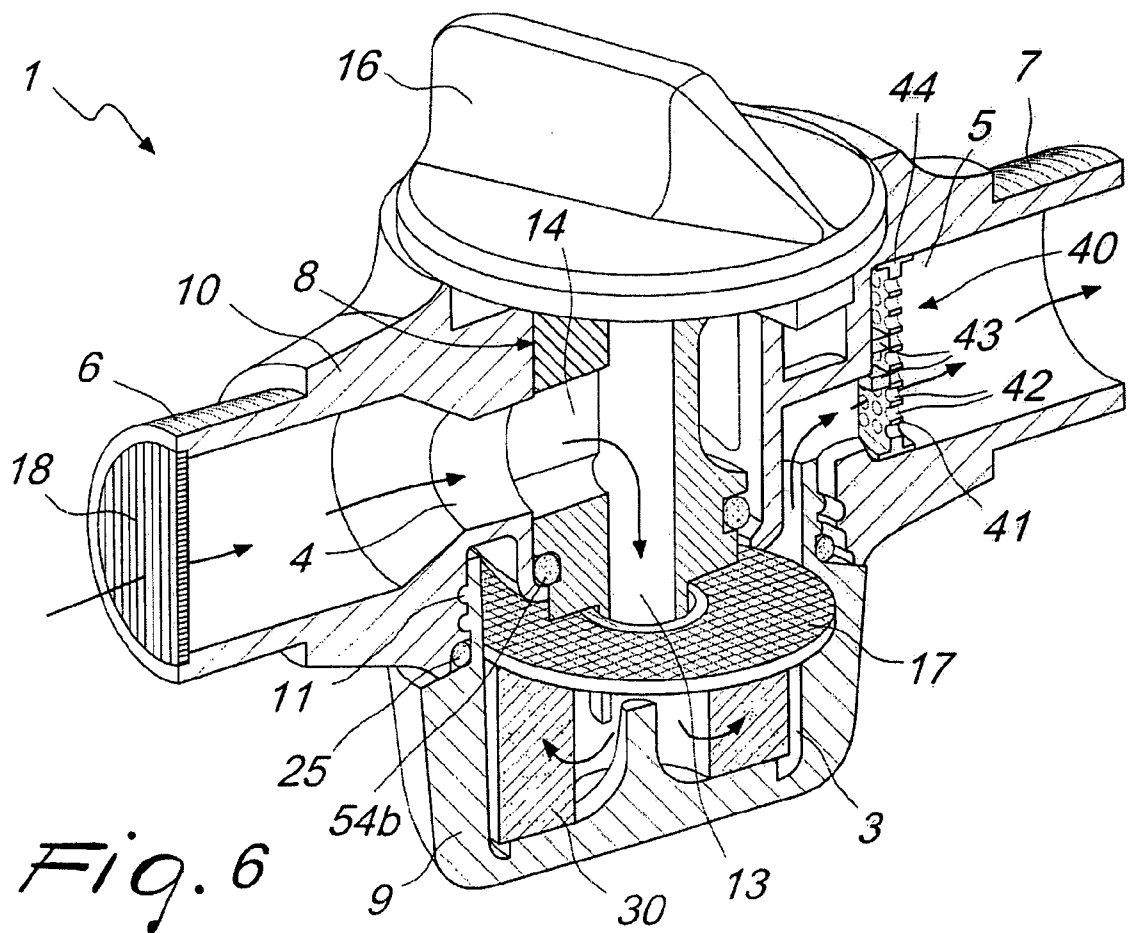
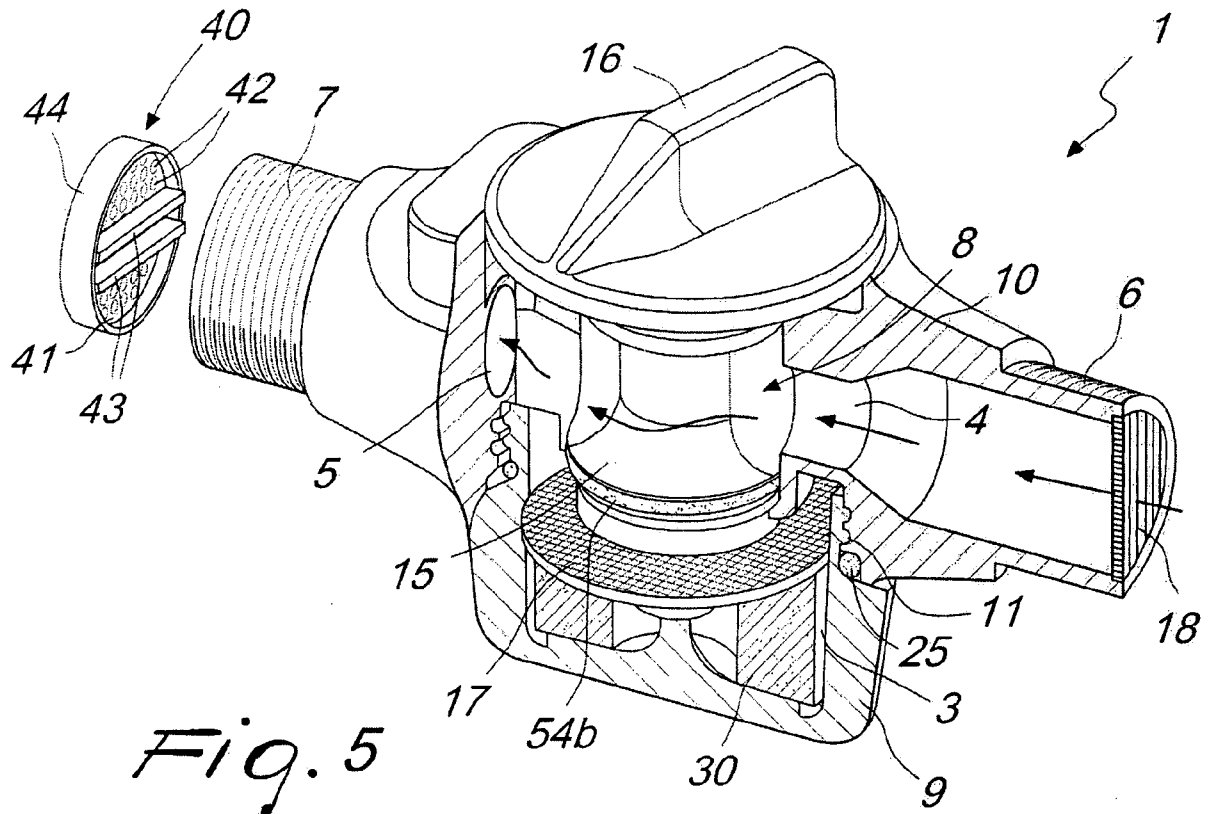
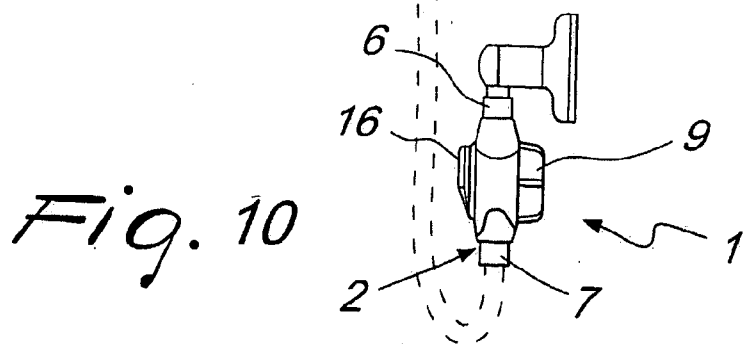
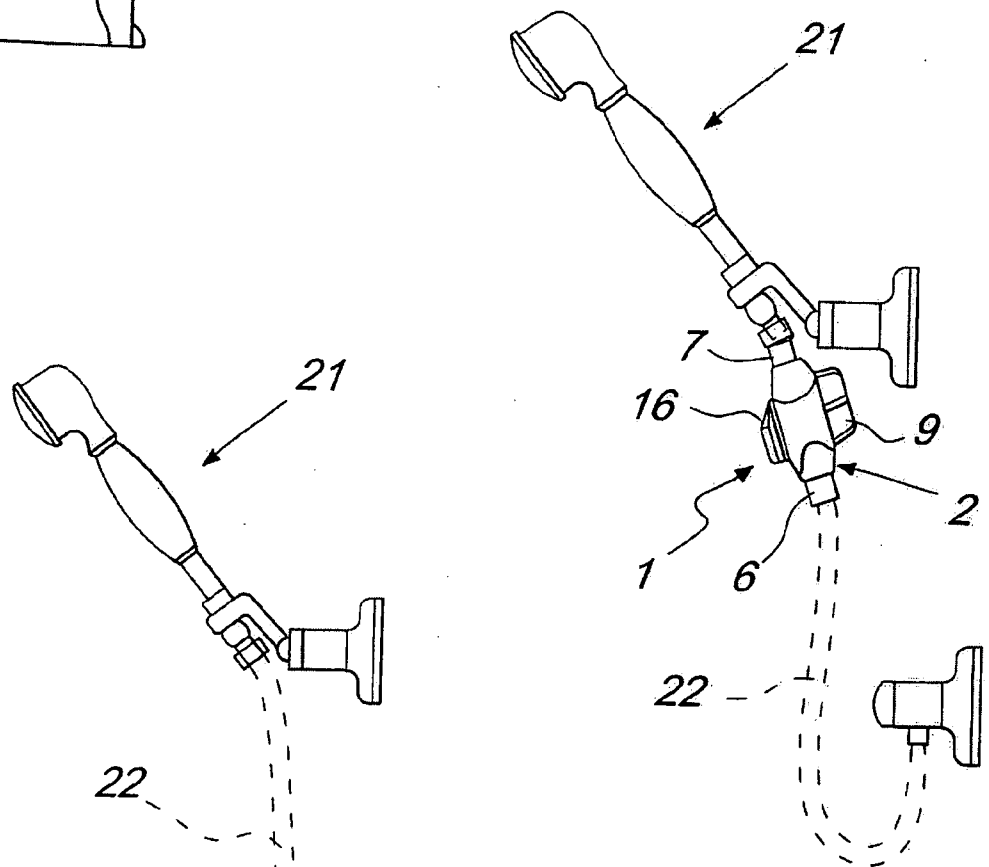
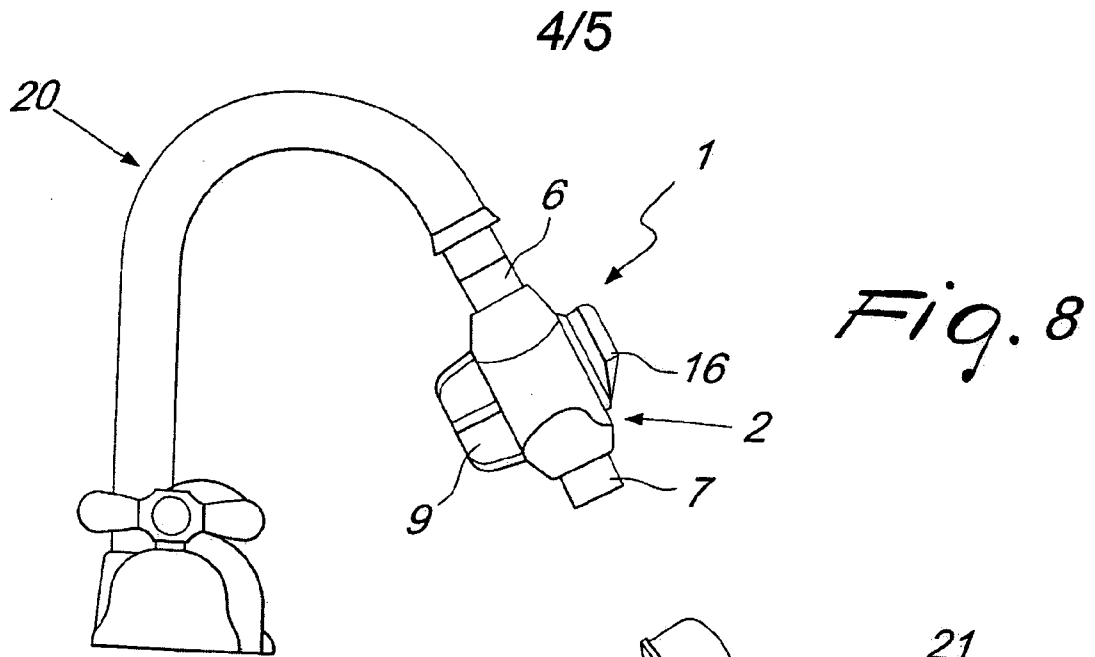


Fig. 4

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