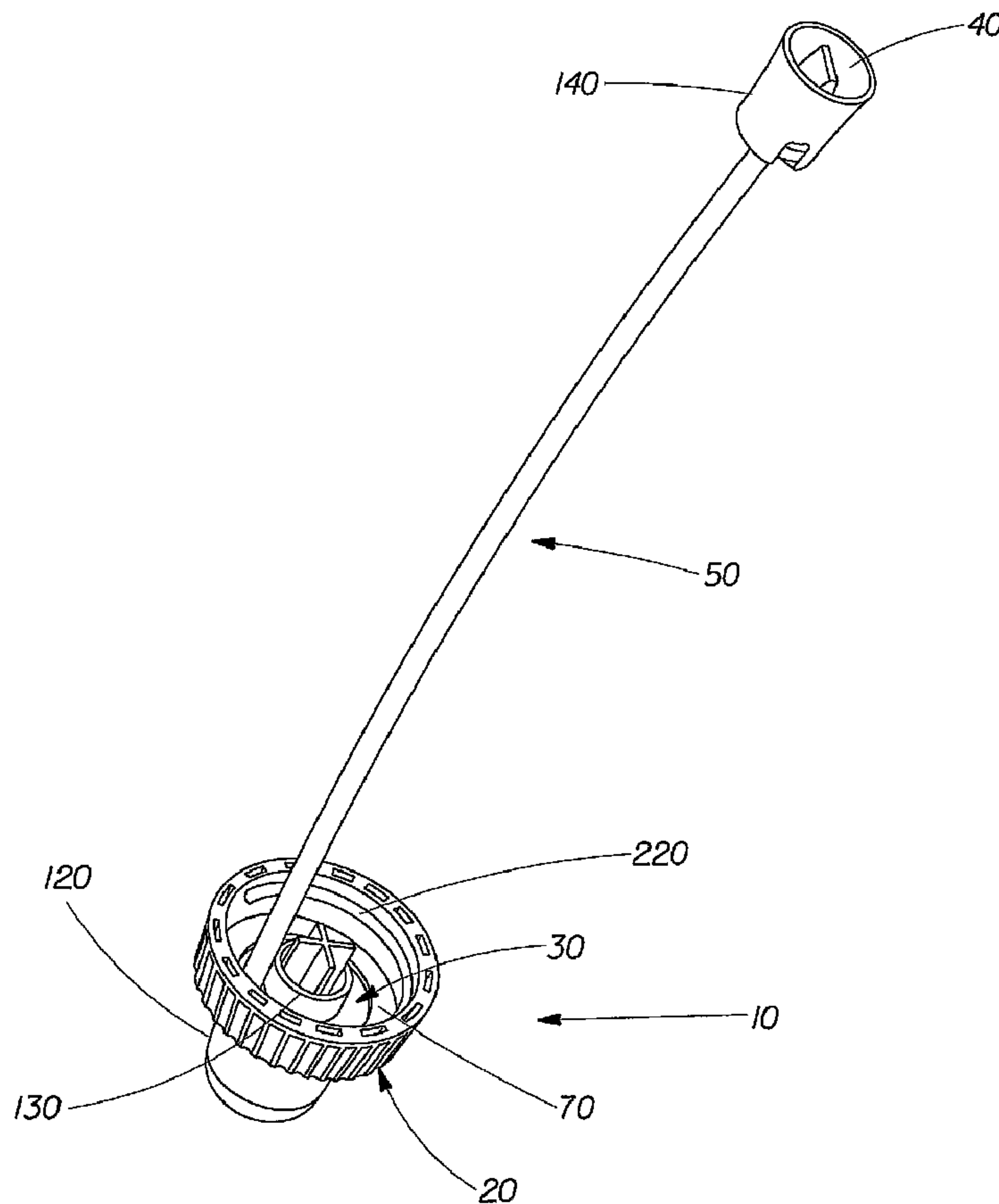




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 (72) Inventeurs/Inventors:  
HOFTE, PAULUS ANTONIUS AUGUSTINUS, BE;  
SPOONER, GREGORY CLEGG, CN;  
CURTIS, TERENCE GRAHAM, GB;  
VONG, HOSS, CN;  
NAGEL, PHILLIP GENE, US  
 (73) Propriétaire/Owner:  
THE PROCTER & GAMBLE COMPANY, US  
 (74) Agent: DIMOCK STRATTON LLP

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(57) Abrégé/Abstract:

The present invention provides a fluid transfer fitment (10) for controllably retaining a fluid in a reservoir in a leak-tight manner. This fluid transfer fitment can be used with a variety of fluid delivery mechanisms. The fluid transfer fitment has a cap portion (20, 30), an

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engaging segment (120), a fluid transfer check valve (80) and a vent check valve (40). The fluid transfer check valve of the fitment is located within the engaging segment of the fitment. The present invention also provides fluid delivery mechanisms (12), which can be used with a cleaning implement (5). The fluid delivery mechanisms can be used with a fitment (10) having a cap portion (20, 30), an engaging segment (120) and a fluid transfer check valve (80).

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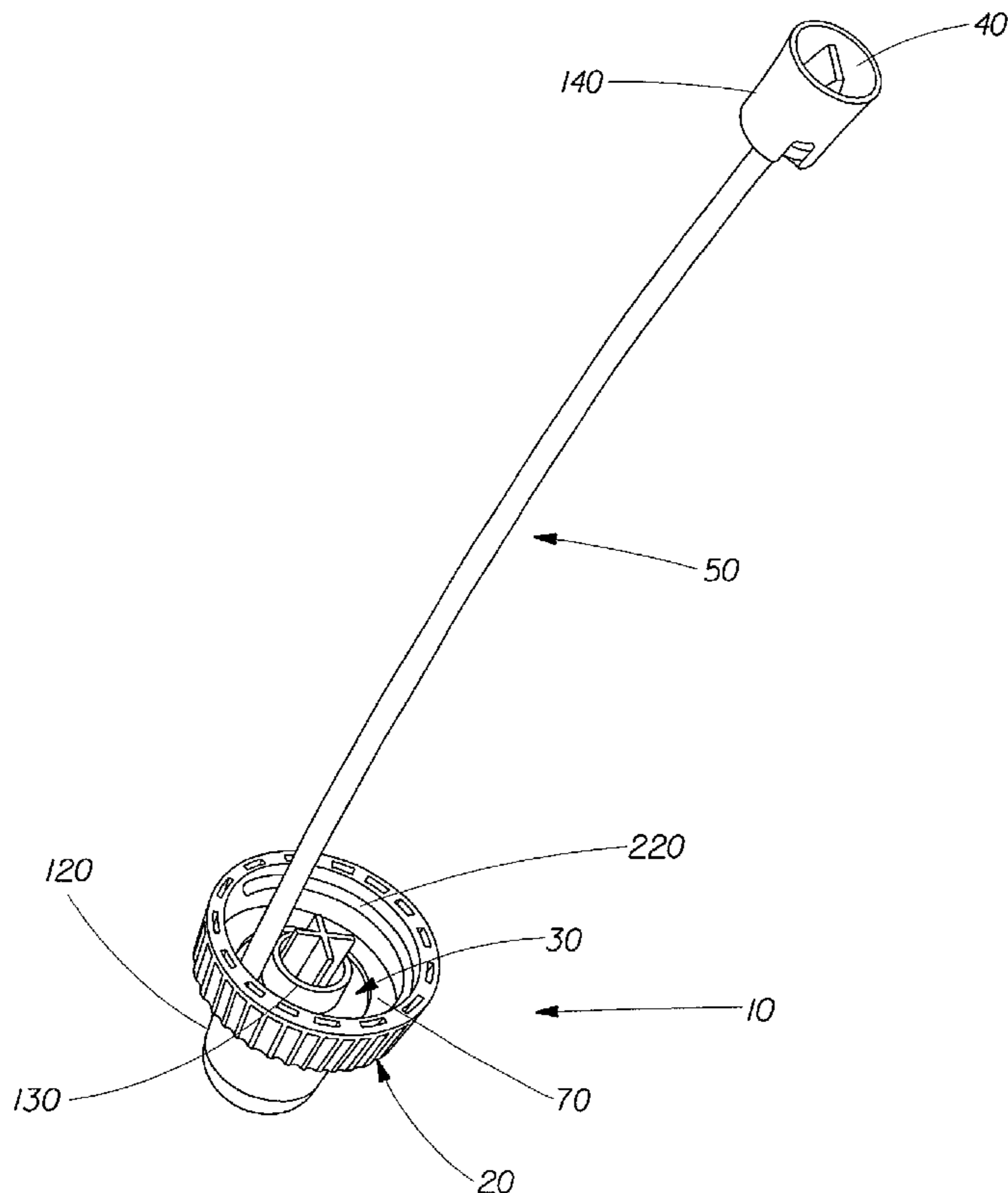
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- (71) Applicant: THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).
- (72) Inventors: HOFTE, Paulus, Antonius, Augustinus; Kortrijkse Steenweg 20, B-9830 Sint Martens Latem (BE). SPOONER, Gregory, Clegg; Flat 17a No. 46, Robinson Road, Hong Kong (CN). CURTIS, Terence, Graham; 7 Bay Tree Close, Loudwater, High Wycombe, Buckinghamshire HP11 1JN (GB). VONG, Hoss; Room 504 Block H, Sui Wo Court, Fotan, Hong Kong (CN). NAGEL, Phillip, Gene; 7385 Fire Plcae Court, West Chester, OH 45069 (US).
- (74) Agents: REED, David, T. et al.; The Procter & Gamble Company, 6110 Center Hill Rd., Cincinnati, OH 45224 (US).
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(54) Title: FLUID DELIVERY MECHANISM



(57) Abstract: The present invention provides a fluid transfer fitment (10) for controllably retaining a fluid in a reservoir in a leak-tight manner. This fluid transfer fitment can be used with a variety of fluid delivery mechanisms. The fluid transfer fitment has a cap portion (20, 30), an engaging segment (120), a fluid transfer check valve (80) and a vent check valve (40). The fluid transfer check valve of the fitment is located within the engaging segment of the fitment. The present invention also provides fluid delivery mechanisms (12), which can be used with a cleaning implement (5). The fluid delivery mechanisms can be used with a fitment (10) having a cap portion (20, 30), an engaging segment (120) and a fluid transfer check valve (80).

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## **FLUID DELIVERY MECHANISM**

### **TECHNICAL FIELD**

The present invention relates to a fitment suitable for use with a variety of a fluid delivery mechanism of cleaning implements used to clean hard surfaces.

The present invention also relates to fluid delivery mechanisms suitable for a cleaning implement for cleaning a hard surface.

### **BACKGROUND OF THE INVENTION**

The literature is replete with products capable of cleaning hard surfaces such as ceramic tile floors, hardwood floors, counter tops and the like. In the context of cleaning floors, numerous mopping devices and other cleaning implements are described which comprise a handle attached to a mop head, a fluid delivery mechanism which can be either attached to or incorporated within the handle and a reservoir which can be used to store a cleaning composition and which is in fluid communication with the fluid delivery mechanism. These cleaning implements usually have a handle comprising at least one pole segment attached at one end to a mop head and at the other end to a hand-grip. The hand-grip can include a trigger, a switch or any other type of actuating mechanism suitable for remotely actuating the fluid delivery mechanism. Some cleaning implements comprise a reservoir which is permanently attached to the implement and which can be filled by a user. Examples of such cleaning implements are disclosed in U.S. patent No 2,228,573 to A. L. Lowe, filed March 4, 1938, and U.S. patent No. 6,227,744 to Fodroczy et al, filed October 12, 1999, which disclose cleaning implements with a refillable reservoir. Other types of cleaning implements comprise a reservoir which is removably attachable to the fluid delivery mechanism of the cleaning implement. One example of such cleaning implements can be found in International Publication No. WO/2001/072195 to Hall et al., published October 4, 2001, and assigned to the Clorox Company, which describe cleaning implements having a liquid reservoir which is removably attachable to a fluid delivery mechanism which can be integrated into a cap and which is removably attachable to the finish of the reservoir. The first end of a tube is attached to this cap and the second end is attached to a nozzle which can be removably attached to the mop head of a cleaning implement. In order to replace an

emptied reservoir, a user must remove the nozzle from the mop head, then thread it through the universal joint connecting the mop head to the handle and remove the cap from the emptied bottle. A user can then reattach the cap to a new filled reservoir and then reattach the nozzle to the mop head. Alternatively, when replacing an emptied reservoir, the user can also leave the nozzle attached to the mop head but in this case, the length of the tube can limit the ability of the user to maneuver or manipulate the reservoir while maintaining the cleaning implement stable. In addition, the disclosed fitment including the fluid delivery mechanism is specific in the sense that it is only usable as a gravity fed delivery mechanism and does not allow the user to use the reservoir with another kind of fluid delivery mechanism.

The reservoir of the described cleaning implements can be removably attached to a fluid delivery mechanism with a mechanism such as the one described in U.S. 6,206,058 to Nagel et al, filed November 9, 1998, and assigned to The Procter & Gamble Company, which discloses a fitment removably attachable to a reservoir and including a venting valve and a fluid transfer check valve.

Another type of mechanism is also disclosed in U.S. patent 6,386,392, to Lawson et al., filed May 22, 2000, and assigned to The Procter and Gamble Company, which discloses a reservoir comprising a cap having an opening covered with a needle-pierceable membrane. When this bottle is inserted in the housing of a cleaning implement, this membrane can be pierced by a first needle for delivering a liquid and by a second needle for venting this reservoir. As the cap having the needle-pierceable membrane is attached to the reservoir, the user can conveniently handle the reservoir and insert it or remove it from the housing. Nonetheless, this type of reservoir can only be used with a fluid delivery mechanism comprising at least one needle.

While the prior art addresses the problem associated with cleaning implements having a liquid delivery mechanism to deliver a liquid from a reservoir, the fitments which are disclosed are specialized in the sense that they do not provide a fluid transfer fitment usable with a variety of fluid delivery mechanisms which can be conveniently attachable by a user to a reservoir.

As such, there remains a need for such a fitment attachable to a reservoir that offers both convenience, a low manufacturing cost and the ability to be used with a variety of fluid delivery mechanism.

### SUMMARY OF THE INVENTION

The present invention relates to a fluid transfer fitment suitable for controllably retaining a liquid in a reservoir in a leak-tight manner and capable of being used with a variety of fluid delivery mechanisms. In one embodiment, the fluid transfer fitment can have a cap portion, an engaging segment, a fluid transfer check valve and a vent check valve. In a preferred embodiment, the fluid transfer check valve can be located within the engaging segment of the fitment.

The present invention also relates to fluid delivery mechanisms, in connection with a cleaning implement and suitable for being used with a fitment having a cap portion, an engaging segment and a fluid transfer check valve.

All documents cited herein are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention.

It should be understood that every maximum numerical limitation given throughout this specification will include every lower numerical limitation, as if such lower numerical limitations were expressly written herein. Every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Every numerical range given throughout this specification will include every narrower numerical range that falls within such broader numerical range, as if such narrower numerical ranges were all expressly written herein.

All parts, ratios, and percentages herein, in the Specification, Examples, and Claims, are by weight and all numerical limits are used with the normal degree of accuracy afforded by the art, unless otherwise specified.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an isometric view of a fitment of the present invention;

Fig. 2 is an exploded view of the embodiment shown in Fig. 1;

Fig. 3 is a partially cut-out isometric view of the fitment of Fig. 1 shown in a closed position;

Fig. 4 is a partially cut-out isometric view of the embodiment of Fig. 1 shown in an opened position;

Fig. 5 is an isometric view of a cleaning implement of the present invention;

Fig. 6 is an isometric view of a mop head of the cleaning implement shown in Fig. 5;

Fig. 7 is a partial cross section view of the cleaning implement shown in Fig. 5;

Fig. 8A is a partially cut-out isometric view of the mop head of Fig. 6;

Fig. 8B is an isometric view of the embodiment of the invention shown in Fig. 8A;

Fig. 8C is an isometric view of a resilient member according to the invention;

Fig. 8D is an isometric view of the resilient member of Fig. 8C in fluid communication with a nozzle;

Fig. 9 is an isometric view of a reservoir of the present invention;

Fig. 10 is a partial isometric view of the reservoir of Fig. 9 inserted in the housing of a cleaning implement;

Fig. 11 is an isometric view of a docking member of the present invention;

Fig. 12 is a partial cross section view of the an embodiment of the invention;

Fig. 13 is a partial isometric view of the embodiment of Fig. 12;

Fig. 14 is an exploded isometric view of a portion of a fluid delivery mechanism of the invention;

Fig. 15 is a partially cut-out isometric view of the embodiment shown in Fig. 14 in a closed position;

Fig. 16 is a partially cut-out isometric view of the embodiment shown in Fig. 14 in an opened position;

Fig. 17 is a cross-sectional view of a receiving member shown in a relaxed state.

Fig. 18 is a cross-sectional view of a receiving member shown in a compressed state.

Fig. 19 is a partially cut-out isometric view of the fitment shown in Fig. 1 and the fluid delivery mechanism shown in Fig. 15 shown in a closed position; and

Fig. 20 is a partially cut-out isometric view of the embodiment of Fig. 19 shown in a opened position.

#### DETAILED DESCRIPTION OF THE INVENTION

While not intending to limit the utility of the fluid delivery mechanism herein, it is believed that a brief description of its use in association with a modern mopping implement will help elucidate the invention.

In heretofore conventional wet-mopping operations, the mop user requires a source of deterative liquid for application to the surface being cleaned by means of the mop head. Earlier practice was to dip the mop head into an external source of liquid, such as a bucket, optionally wring-out the excess of liquid, and then apply the mop head to the surface with sufficient force to dislodge soil therefrom. Unfortunately, after repeated usage, the mop heads themselves, become dirty, unsanitary, unsightly and have to be removed and laundered.

Modern mopping implements employ disposable sheets or absorbent pads, which are releasably affixed to the head of the mopping implement, and which can conveniently be discarded and replaced after soiling. Even more modern implements carry their own reservoir of deterative liquid, thereby greatly enhancing their usefulness and convenience. In use, the liquid is dispensed onto the surface being cleaned via a liquid delivery mechanism.

As will be immediately appreciated, it becomes necessary to, somehow, affix the reservoir to such an implement. Moreover, from time-to-time, it is necessary to replenish the deterative liquid in the reservoir. As will be seen from the disclosures herein this affixing-usage-removal-refill-replacement sequence results in several problems whose solutions are non-trivial.

The first problem faced by the manufacturer is that the reservoir is typically inverted and affixed to the implement in an inverted position so that the gravity force contributes to the deliver of the deterative liquid. Inversion of a fluid-containing reservoir can, of course, result in spillage. Moreover, with certain designs, a small amount of liquid can remain in the reservoir and/or in the implement and/or in the various fitments and tubes connecting the whole assembly when the liquid in the reservoir is sufficiently

depleted that its refill is judged necessary or that a different type of detergent liquid is desired. Even such small amounts of liquid can cause unacceptable spillage or leakage when the reservoir is removed.

In addition, the coupling of the inverted reservoir to the implement must be simple for users so that an essentially leak-proof joint or connection is achieved. Moreover, various vents, seals, valves, and the like, must be employed to provide good flow of the detergent liquid to the mop head or directly onto the surface being cleaned. Operational means to start-and-stop the liquid flow must be provided. Yet, the overall construction of the implement and its reservoir should be sufficiently simple that it is economical to manufacture and sell. As noted, the overall construction of the reservoir and its interconnecting fluid transfer fitment, is preferably one that would be useful on a variety of implements having different types of fluid delivery mechanism.

The foregoing considerations are addressed by the present invention, as will be clear from the detailed disclosures which follow.

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings wherein like numerals indicate the same elements throughout the views and wherein reference numerals having the same last two digits (e.g., **20** and **120**) connote similar elements.

#### I. Fluid Transfer Fitment

Referring to Fig. 1, a fluid transfer fitment which is preferably removably attachable to a reservoir is represented.

In one embodiment, the fluid transfer fitment **10** comprises a cap portion **20** having an engaging segment **120** with an opening **220** as shown in Fig. 2. In one embodiment, the cap portion **20** and the engaging segment **120** can be made of any kind of plastic materials, metals or any combination thereof. In a preferred embodiment, the cap portion **20** and the engaging segment **120** are made of Copolymer Polypropylene. In one embodiment, the cap portion **20** can be attached to a reservoir (not shown for clarity) but it can be preferred that the cap portion **20** be removably attachable to the finish of a reservoir. In one embodiment, the reservoir can have a base portion connected to a wall

portion forming a cavity and a "crown" or top portion which is connected to the wall of the reservoir and which can have a finish portion for receiving the fitment **10**. The cap portion **20** can be removably attached to a reservoir with screw threads **320** located on the inner surface of the cap portion, as it is well known in the art, but the cap portion can also be removably attached to a reservoir via a clip member, a bayonet portion or with a plug seal and still provide the same benefits. In one embodiment, the engaging segment **120** can have a substantially cylindrical shape and a height comprised between about 5 mm and 30 mm, an inner diameter comprised between about 5 mm and about 60 mm and an outer diameter comprised between about 6 mm and about 65 mm. In a preferred embodiment, the engaging segment **120** can engage a receiving member of a fluid delivery mechanism which will be later described. One skilled in the art will understand that the engaging segment **120** can have any other shape and still provide the same benefits. Non-limiting examples of suitable cross-sectional shapes can be triangular, rectangular or, more generally, polygonal but it can be preferred that the engaging segment have substantially the same cross-sectional geometric shape as the receiving member. The fluid transfer fitment **10** can comprise an interconnecting member **30**, as shown in Fig. 2-4, which can be located within the cap portion **20**. For ease of manufacturing, the cap portion and the interconnecting member **30** can be two distinct elements but one skilled will understand that these elements can be manufactured as a single element via a molding process. The interconnecting member **30** can have a fluid transfer opening **130** and a vent opening **230**. In one embodiment, a vent valve **40** can be in fluid communication with the vent opening **230** of the interconnecting member **30** via a tube **50** attached in a substantially leak-tight manner to the vent valve **40** and the vent opening **230** such that air from the outside atmosphere can penetrate in the reservoir to compensate the "void" left by the liquid being withdrawn from the reservoir while substantially preventing the liquid in the reservoir from flowing through the vent opening **230**. The vent valve can be any known vent valve in the art such as for example, duckbill valve, ball and spring valve, slit valve or a venting membrane comprising a porous material which allows air transport in one direction but no liquid transport in the opposite direction. In one embodiment, the vent valve **40** can be attached to the end of a tube **50** such that when the fluid transfer fitment is attached to a reservoir filled with a fluid, preferably a liquid, the vent valve **40** is located within the reservoir, in a region

substantially adjacent the bottom wall of a reservoir. Among other benefits, the location of the vent valve **40** in a region a region substantially adjacent the bottom wall of the reservoir, minimizes the risk of leakage of the liquid through the check valve **40** when the reservoir is inverted. In one embodiment, the vent valve **40** can be a normally opened type of vent valve which stays substantially opened until it is submersed in a fluid and the pressure of the fluid onto the walls of the valve causes this valve to close. When the normally opened valve is submersed in for example a liquid, air is allowed to flow through the normally opened valve when the pressure differential which is caused by the liquid being withdrawn from the reservoir, forces the vent valve to open and then, to reclose when the pressure is equalized. In another embodiment, the vent valve **40** can be a normally closed type of vent valve, which stays substantially closed even when it is not being submersed in a fluid. When the normally closed valve is submersed in for example a liquid, air is allowed to flow through the normally closed valve when the pressure differential which is caused by the liquid being withdrawn from the reservoir, forces the vent valve to open or "crack" and then, to reclose when the pressure is equalized. In a preferred embodiment, the vent valve **40** is a duckbill valve made of an elastomeric material such as silicones, rubbers, Poly Vinyl Chloride ,metallocene catalyzed Low Density Polyethylene and the pressure differential between the outside atmosphere and the reservoir and which causes air to flow through the check valve **40** is between about 0 bar and about 0.5 bars, preferably between about 0 bar and about 0.2 bars. In one embodiment, the vent valve **40** can be located within a substantially rigid shielding member **140** which protects the check valve **40** and reduces the chance that the check valve **40** would accidentally open when the fitment **10** is attached to the finish of a fluid filled reservoir. One skilled in the art will understand that a vent valve **40** in fluid communication with a vent opening may only be required when the reservoir needs to be vented. This might be the case for example, with a reservoir having substantially rigid walls, i.e. walls which do not deform sufficiently to compensate the negative pressure created in the reservoir when the fluid is withdrawn from the reservoir. In one embodiment, the reservoir can be made of a substantially flexible material such as a flexible pouch or sachet, which can deform as the liquid is withdrawn from the reservoir. In another embodiment, the reservoir can have substantially non-deformable walls and a substantially flexible pouch for storing a liquid and being located within the reservoir. As

the fluid is withdrawn from the pouch, the pouch is deformed and no venting is necessary. In yet another embodiment, a reservoir having substantially rigid walls can have a vent opening, located for example on the bottom surface of the reservoir. This vent opening can be sealed with a one way valves like an umbrella valve, a ball valve or any of the previously discussed vent valves or with a piece of adhesive tape such that the fluid contained in this reservoir does not leak through this vent opening when the reservoir is in a upright position. The reservoir can also have instructions instructing the user to remove this adhesive tape when the bottle is inverted and/or connected to the fluid delivery mechanism of a cleaning implement. In another embodiment, a user can also be instructed to puncture a wall of the reservoir, preferably the base portion of the reservoir, when the reservoir is inverted and/or fluidically connected to the fluid delivery mechanism.

In one embodiment, the cap portion **20** can have an opening **420** for allowing the vent opening **230** to be in fluid communication with the outside atmosphere. In a preferred embodiment, the cap portion **20** can have a groove **520**, preferably a substantially circular groove, located on the inner bottom surface of the cap portion as shown in Fig. 3 and 4, such that no matter where the vent opening **230** is located relative to the opening **420** of the cap portion, the vent opening is always in fluid communication with the opening **420** of the cap portion **20**. A first seal member **60** which can be for example an O-ring allows the interconnecting member **30** to be connected to the cap portion **20** in a substantially leak-tight manner. A second seal member **70**, which can have a substantially annular shape prevents the fluid from flowing through the vent opening **230** of the cap portion when the fitment **10** is attached to a reservoir and the reservoir is inverted. The first and the second seal members **60** and **70** can be made of Polyethylene, Polypropylene, Poly Vinyl Chloride , rubbers, silicones, a laminate with foamed Polyethylene or Polypropylene, Ethylene Vinyl Acetate, Ethylene Vinyl Alcohol , Aluminium or any kind of elastomeric materials. The skilled artisan will understand that the first and second seal members **60**, **70** may not be required when the cap portion **20** and the interconnecting member **30** are molded as a single element. In one embodiment, the fitment **10** can have a check valve **80** for controlling the flow of fluid being withdrawn from the reservoir. The check valve **80** can have an actuating shaft portion **180** having a first end and a second end. The actuating shaft portion **180** is distally

movable within the engaging segment **120** and/or the interconnecting member **30**. In a preferred embodiment, the actuating shaft portion **180** can have a substantially cross shape and it can have four fins **1180** slideably movable within the opening **130** of the interconnecting member **30**. Without intending to be bound by any theory, it is believed that the fins **1180** act as a guiding means for the check valve **80**. The actuating shaft portion **180** can be connected to a piston portion **280** which can have the complementary shape of the opening **220** of the cap portion **20** or the complementary shape of the fluid transfer opening **130** of the interconnecting member **30**. This piston portion **280** prevents a fluid from flowing through the opening **220** of the cap portion and/or the fluid transfer opening **130** of the interconnecting member **30** as shown in Fig. 3. In one embodiment, the actuating shaft portion **180** and the piston portion **280** can be made of any type of plastic materials, metals or combinations thereof. In a preferred embodiment, the actuating shaft portion **180** and the piston portion **280** are made of Polyoxymethylene. In a preferred embodiment, the piston portion **280** can have a seal member **1280** which can be an O-ring, and which can seal the opening(s) **220** and/or **130** in a substantially leak-tight manner. In a preferred embodiment, the check valve **80** can be spring-loaded with a spring member **380** which can resiliently maintain the opening(s) **220** and/or **130** closed until enough pressure is applied on the check valve **80** to move the piston portion **280** distally such that a fluid can flow through the openings **220** and **130** as represented in Fig. 4. In a preferred embodiment represented in Fig. 3 and 4, the check valve **80** is capable of closing the opening **220** of the cap portion **20** which is located in a lower region of the engaging segment **120**. In this embodiment, the diameter of the opening **220** is preferably smaller than the diameter of the adjacent inner cylindrical volume of the engaging segment **120** such that the fluid can flow along the actuating shaft portion **180** and around the piston portion **280** and seal member **1280** and then through the opening **220** when the check valve **80** is displaced within the engaging segment **120** as shown in Fig. 4. A user can easily and conveniently attach the previously described fitment to the finish of a fluid filled reservoir and then manipulate this reservoir without having the fluid leak through the opening **220** as the spring-loaded check valve keeps this opening closed. Among other benefits, the previously described fitment minimizes the risk of spillage of a liquid which in one embodiment can be a cleaning solution having at least an active ingredient. A user can also connect the filled reservoir with the fitment to any fluid delivery

mechanism which can be used to controllably or permanently apply pressure on the check valve such that the fluid contained in the reservoir flows by gravity from the reservoir when the reservoir is inverted, i.e. when the fitment is substantially pointing downward.

In another embodiment, the check valve 80 can be a movable spring-loaded ball valve or a slit seal valve which can be engaged by a probe.

In another embodiment, the fitment 10 can be attached to the finish of the "crown" portion of a reservoir and an additional cap portion can be attached to the base portion of the reservoir such that a user can refill the reservoir through the additional cap when the reservoir is inverted.

One skilled in the art will understand that the previously described fitment can be used with any fluid delivery mechanism having a receiving member.

## II. Fluid delivery Mechanism.

Another aspect of the invention is related to fluid delivery mechanisms and in particular cleaning implements having a fluid delivery mechanism comprising a receiving member, which can be used in combination with the previously described fluid transfer fitment.

Referring to Fig. 5, a cleaning implement 5 having a fluid delivery mechanism is represented. In one embodiment, the cleaning implement 5 comprises a handle 15, rotatably attached at one end to a mop head 25 suitable for retaining an absorbent cleaning pad or cleaning sheet (not shown for clarity) and at the other end to a pistol-grip 35 comprising a trigger member 135. The handle of the cleaning implement can have a single pole segment but preferably comprises a plurality of pole segments 115 which can be releasably attached to each other.

In one embodiment, the cleaning implement comprises a housing 45 for enclosing a fluid delivery mechanism and receiving at least a portion of a reservoir 55 and which is attached to the handle 15.

Fig. 6 shows the lower portion of the handle 15 which can be rotatably attached to the mop head 25 via a universal joint 65 having two rotational axes. In one embodiment,

the handle 15 is attached to the top surface of the mop head via a universal joint 65 having a first and a second rotational axis X-X and Y-Y where the first rotational axis X-X is substantially perpendicular to the second rotational axis Y-Y. In a preferred embodiment the first and second rotational axes of the universal joint 65 are located in two different planes as shown in Fig. 6. In one embodiment, the mop head comprises at least one but preferably four grippers 125 for engaging and retaining an absorbent cleaning pad or a cleaning sheet about the mop head 25. A non-limiting example of suitable grippers can be found in copending U.S. Publication No. US 2002-0184726 to Kingry et al., published December 12, 2002, and assigned to The Procter and Gamble Company. In another embodiment, hook fasteners can be attached to the mop head 25, preferably to the lower surface of the mop head, for engaging corresponding loop fasteners, which can be located on an absorbent cleaning pad or cleaning sheet, preferably to the top surface of a cleaning pad or cleaning sheet. In a preferred embodiment, a nozzle 225 is attached to the top surface of the mop head 25 and is substantially adjacent to the leading edge of the mop head 25. In one embodiment, the cleaning implement comprises at least one nozzle 225 which can be fixedly or releasably attached to the mop head 25. One skilled in the art will understand that the nozzle 225 can also be attached to the universal joint 65 or the handle 15 and still provide the same benefits. The nozzle 225 can be any nozzle known in the art, which is suitable for generating at least one stream of fluid. In one embodiment, the nozzle 225 is capable of generating at least one, preferably between 1 and 10, continuous streams of fluid. In another embodiment, the nozzle 225 is capable of generating at least one discontinuous stream of fluid. In one embodiment represented in Fig 7, the nozzle (not shown) can be in fluid communication with the fluid delivery mechanism 12 located in the housing 45 via a tube 75. The tube 75 can be made of any type of material suitable for conveying a fluid in a substantially leak-tight manner. Non limiting examples of material suitable for the tube can be Polyurethane , Poly Vinyl Chloride , Polyethylene, Polypropylene, metallocene catalyzed resins or any mixtures thereof. In a preferred embodiment, the tube 75 can be inserted through an opening 215 located radially in the handle 15. This opening 215 is preferably located in a portion of the handle 15 which is at least partially covered by the housing 45 and then the tube 75 runs along the handle 15 towards the mop head 25. In one embodiment, the tube 75 can extend or exit from a lower portion of the handle 15 through an opening located radially

on a portion of the handle **15**, preferably located adjacent the mop head **25**. In a preferred embodiment, represented in Fig. 8A the tube **75** extends from the distal end of the handle **15** and passes within the universal joint **65**. Among other benefits, the location of the tube **75** within the handle **15** and preferably within the universal joint **65**, prevents the tube from getting entangled with the handle **15** when the user is cleaning a hard surface such a floor. The location of the tube **75** within the handle **15** and preferably within the universal joint **65** also minimizes the risk of the tube being damaged during use, transport, packaging and/or storage of the implement. In one embodiment, the tube **75** can be located outside the handle **15**. In this embodiment, the tube **75** can be located within the universal joint **65** or alternatively can go around the universal joint **65** and the handle **15**.

Optionally but preferably, at least one resilient member **85** can be located about the portion of the tube **75** which is located within the universal joint **65** as shown in Fig. 8A. Without intending to be bound by any theory, it is believed that when the handle **15** is moved at an extreme angle relative to the mop head **25**, i.e. when the handle is substantially parallel to the top surface of the mop head **25**, the tube **75** can be pinched. Depending on the mechanical properties of the material used to manufacture the tube **75** (such as elasticity or recovery properties), the pinching of the tube **75** can result potentially in a permanent deformation of the tube **75** which, in turn, can impact on the flow rate of a fluid flowing within the tube **75** as well as the spray pattern generated by the nozzle **225** of the cleaning implement. The impact on the flow rate or spray pattern can be noticeable when the cleaning implement is a gravity fed implement, such as the one which will later be described and which uses gravity for conveying the fluid from the reservoir to the nozzle **225**. A portion of the tube **75** located within the universal joint can be pinched when the portion of the handle rotatably attached to the mop head is "leaning" substantially against the top surface of the mop head **25** as shown in Fig. 8B. This situation can happen when the cleaning implement is packaged in a box or a carton to be shipped, stored and displayed in a store. While being capable of being deformed to the same extent that the tube **75**, the resilient member **85** returns to its original shape when the angle between the handle **15** and the mop head **25** is not as acute. The resilient member **85** can be such that it substantially restores the shape of the portion of the tube which has been pinched, therefore offering less resistance or frictions to the fluid flowing within the tube **75**. In one embodiment, the resilient member **85** can be a spring made of

stainless steel and can be located outside but preferably within the inner portion of the tube **75** which is located within the universal joint **65**. In another embodiment, the resilient member **85** can be a hollow member having a substantially corrugated shape as shown in Fig. 8C and 8D. This corrugated shape hollow member can be located substantially around or within the portion of the tube located within the universal joint **65**. In another embodiment, a corrugated shape hollow member can be used to fluidically connect a portion of the tube **75** located above the universal joint **65**, to a portion of the tube which is in fluid communication with the nozzle **225** or even directly to the nozzle **225**. The shape recovery property of the resilient member **85** contributes to minimize the frictions and turbulences of the liquid which is flowing down to the nozzle **225** and, as a result, optimizes the flow rate of the liquid and the spray pattern generated by the nozzle **225**.

## II. (a) Gravity fed fluid delivery mechanism.

As previously discussed, the fluid delivery fitment can be attached to a fluid filled reservoir, as represented in Fig. 9 and can be inverted and then be connected to a fluid delivery mechanism of a cleaning implement having a receiving member.

For clarity purposes, Fig. 10 shows a portion of the handle of the cleaning implement having a housing **45** into which at least a portion of a fluid filled reservoir **55** is inserted. In one embodiment, the housing **45** forms a cavity, as shown in Fig. 7, where the functional elements of the fluid delivery mechanism **12** are preferably located and which allows a user to insert at least a portion of a reservoir **55**. One skilled in the art will understand that for a cleaning implement having a gravity fed fluid delivery mechanism, it can be preferred that the fluid filled reservoir and the fluid delivery fitment as shown in Fig. 9, be inserted in the housing **45** such that the fitment, which is attached to the reservoir **55**, points in a substantially downward direction.

In one embodiment, a docking member **95**, represented in Fig. 11, can be attached to the housing and/or the handle of the cleaning implement via screws, rivets, clips, adhesive or any molding or welding process as it is known in the art. In a one embodiment, the docking member **95** can be made of any type of plastic material, metals or any combination thereof. In a preferred embodiment, the docking member **95** is made

of Acrylonitrile-Butadiene-Styrene polymer. In a preferred embodiment, the docking member **95** comprises a cylindrical portion **195** for connecting and attaching the docking member **95** to the handle of the cleaning implement. In one embodiment, the docking member **95** comprises a top surface **295** having an upper opening **1295**, a wall **395** extending downwardly from the top surface **295** and forming a cavity **495** for receiving at least a portion of the fluid delivery fitment previously described and a bottom surface **595** connected to the wall **395** and having a lower opening **1595**. In a preferred embodiment, the upper and lower openings, **1295** and **1595**, are substantially circular. In one embodiment, the diameter of the upper opening **1295** is greater than the diameter of the lower opening **1595**. In a preferred embodiment, the diameter of the upper opening is slightly greater than the diameter of the cap portion **20** of the fluid delivery fitment **10** and the diameter of the lower opening **1595** is slightly greater than the diameter of the engaging segment **120** of the fluid delivery fitment **10** such that the cap portion and the engaging segment of the fluid delivery fitment **10** fit within the cavity **495** of the docking member **95** and such that the engaging segment **120** can extend through the lower opening **1595**.

In one embodiment, the docking member **95** comprises at least one but preferably two flexible snapping members **695** and **795**. Each snapping member **695** and **795**, can be deflected in a substantially downward and/or upward direction when the fluid transfer fitment, which is connected to the reservoir, is respectively inserted and/or removed from the housing and the cavity **495** of the docking member **95**. When the cap portion **120** of the fluid delivery fitment **10** is located within the cavity **495** of the docking member **95** and past the snapping members **695**, **795**, each snapping member **695**, **795** returns suddenly to its original position and generate an audible signal. Among other benefits, the snapping members **695** and **795** provide an audible signal informing the user that the reservoir has been properly inserted in the housing. The snapping members **695** and **795** also act as a snapping/locking device maintaining the fitment in place in the cavity **495** of the docking member **95** and therefore the reservoir within the housing of the cleaning implement. The reservoir **55** is properly maintained within the housing until a sufficient pulling or extracting force is applied by the user on the reservoir in order to disengage the reservoir from the housing **45**.

For clarity purposes, Fig. 12 shows the housing 45 attached to the handle 15, a fluid delivery mechanism 12 connected to the docking member 95 as well as the fluid delivery fitment 10 connected to the reservoir 55 and which is in communication with the fluid delivery mechanism 12.

In one embodiment, the fluid delivery mechanism 12 can be controllably actuated by a lever member 22 which comprises a first end 122 and a second end 222. In a preferred embodiment, the first end 122 of the lever member 22 is pivotably connected via a pin or protrusion to a non-moving part of the cleaning implement. In one embodiment, the first end 122 of the lever member 22 is pivotably connected to the housing 45. In a preferred embodiment, the first end of the lever member 22 is pivotably connected to an extending portion 895 of the docking member 95 via an opening 1895 shown in Fig. 11. In one embodiment, the second end 222 of the lever member 22 is connected to a longitudinal member 32 such that an upward motion of the longitudinal member 32 causes the lever member 22 to pivot about the pivot point 1122 and to actuate the fluid delivery mechanism 12. The longitudinal member 32 can be any apparatus or device capable of applying a pulling force to the lever member 22 such as to cause the rotation of the lever member 22 about the pivot point 1122. The longitudinal member 32 is connected to an actuation mechanism which can be a trigger member 135 (shown in Fig. 5) which can be located about the upper portion of the handle 15, preferably in the hand-grip 35, such that a user can controllably actuate the fluid delivery mechanism 12 via the longitudinal member 32 and the lever member 22. In one embodiment, the longitudinal member 32 can be a rod made of a substantially rigid material. In another embodiment, the longitudinal member can be a cable, a rope, a wire or a tape. In a preferred embodiment, the longitudinal member 32 is a tape which can be put under tension by a self-tensioning mechanism.

When this tape is tensioned, a user can controllably pull on the tape, which is windably connected to a spring-loaded winding member, by squeezing a trigger member.

Fig. 13 shows the lever member 22 pivotably attached to the extending portion 895 of the docking member 95 with the fluid delivery mechanism 12 and a portion of the reservoir 55 covered by the housing (not shown for clarity purposes).

In one embodiment, the lever member **22** has a substantially “fork” shape and comprises a right arm portion **322** and an opposing left arm portion **422**. In a preferred embodiment, the right and left arm portions **322**, **422** are pivotably connected to the extending portion **895** of the docking member **95**. In one embodiment, the right and/or left arm portions **322**, **422** can have at least one but preferably two ear portions **1322**, **1422** extending upwardly from the right and/or left arm portion. The ear portions are capable of contacting and lifting in a substantially upward direction a clipping member **72** of the fluid delivery mechanism **12** when the longitudinal member pulls on the lever member **22**.

In one embodiment represented in Figs. 14-16, the fluid delivery mechanism **12** comprises a receiving member **42** for receiving the engaging segment **120** of the fluid delivery fitment **10**. The receiving member **42** comprises a wall **142** defining a chamber **242** for conveying a fluid from the engaging segment **120** of the fitment to the tube **75** in a substantially leak tight manner. The receiving member **42** comprises an upper inlet **1242** and a lower outlet **2242**. In one embodiment, the receiving member **42** can have a substantially cup shape. In one embodiment, the engaging member **42** is made of a material which is substantially deformable and optionally but preferably elastic, i.e. which can be deformed when pressure is applied but returns to its original shape when pressure ceases to be applied against the receiving member **42**. Non-limiting examples of suitable materials having appropriate deformability, elasticity and recovery properties include natural and synthetic rubbers, elastomeric materials and silicone type materials. In a preferred embodiment, the receiving member is made of silicone having a hardness or durometry between about 40 degrees Shore A and 90 degrees Shore A, preferably comprised between about 60 degrees Shore A and 80 degrees Shore A. A suitable receiving member is made of is made by Hayco Manufacturing Ltd company located in Hong Kong. In one embodiment, the upper portion of the receiving member **42** can be connected to the bottom surface **595** of the docking member **95**. In a preferred embodiment, the upper portion of the receiving member **42** comprises a substantially circular channel **1142** such that an annular portion, which is adjacent to the lower opening **1595** of the bottom surface **595** of the docking member **95**, engages the upper portion of the receiving member **42** within the channel **1142**. In one embodiment, the engaging segment **120** of the fitment **10** can be inserted within the chamber **242** of the receiving

member through the upper inlet 1242 in a substantially leak-tight manner. In a preferred embodiment, the receiving member 42 comprises a substantially circular “lip” 2142, shown in Figs. 15-20, extending outwardly from the inner surface of the receiving member 42 such that the diameter at the tip of the “lip” 2142 is slightly smaller than the diameter of the engaging member 120. Among other benefits, the “lip” 2142 improves the leak-tightness of the connection between the engaging segment 120 and the receiving member 42 when the engaging segment 120 is inserted within the receiving member 42. When a user inserts the reservoir 55 with the fitment 10 and therefore the engaging segment 120 within the chamber 242 of the receiving member 42, the engaging segment 120 can potentially detach a portion if not all of the receiving member 42 from the bottom surface 595 of the docking member 95 if the engaging segment is not properly aligned with the receiving member 42. In a preferred embodiment, a protecting member 52 (shown in Fig. 12 and 17) is disposed on the top of the receiving member 42. The protecting member 52 can have a substantially annular shape and can be sized such that the outer rim of the receiving member 42 is “covered” by the protecting member 52. The protecting member 52 minimizes the risk that the receiving member 42 is detached from the docking member 95 when the engaging segment 120 of the fitment 10 is inserted within the receiving member 42. In one embodiment, when the receiving member is in a relaxed state as shown in Fig. 17, the receiving member has a height A1 comprised between about 10 mm and about 100 mm, a lower outer diameter B1 comprised between about 10 mm and about 50 mm, an outlet diameter C comprised between about 1 mm and about 20 mm, a top connecting diameter D comprised between about 10 mm and about mm, an inner top diameter E comprised between about 6mm and about 66mm, an inner “lip” diameter F comprised between about 5mm and about 64 mm, a connecting thickness G comprised between about 0.5 mm and about 5 mm, an inner chamber diameter H comprised between about 5 mm and about 49 mm, a body thickness I comprised between about 0.5 mm and about 5 mm, and a lower radius J1 comprised between about 2 mm and 40 mm. In one embodiment, when the receiving member is in a compressed state as shown in Fig. 18, the receiving member has a height A2 comprised between about 50% and 99% of the height A1, a lower outer diameter B2 comprised between about 101% and about 150% of the lower outer diameter B1, and a lower radius J2 comprised between about 30% and about 99% of the lower radius J1.

In one embodiment, the fluid delivery mechanism 12 comprises a transition member 62 for conveying a fluid from the receiving member 42 to the tube 75 in a substantially leak-tight manner. The transition member 62 comprises a hollow body 162 (shown in Fig. 19 and 18) having at least one upper opening 1162 in fluid communication with a lower opening 2162. In one embodiment, the upper opening 1162 can be located in the upper portion of the transition member 62 and the lower opening 2162 can be located in the lower portion of the transition member 62. In a preferred embodiment, the upper portion of the transition member 62 is located within the receiving member 42 and the lower portion of the transition member 62 extends beyond the lower outlet 2242 of the receiving member 42 such that the lower portion of the receiving member 42 can be connected to the tube 75 in a substantially leak-tight manner. Among other benefits, the transition member 62 allows a liquid in the chamber 242 to flow through the upper opening 1162 of the transition member 62, within the transition member 62 and through the lower opening 2162, in a substantially leak-tight manner. In a preferred embodiment, a clipping member 72 is attached, preferably forceably attached to the lower portion of the receiving member 42 such that a motion of the clipping member 72 in a substantially upward direction as represented by the arrow A of Fig. 16 and 18, causes the transition member 62 to move in a substantially upward direction. In a preferred embodiment, the upper portion of the receiving member 42 is fixedly attached to the bottom surface 595 of the docking member 95 such that an upward motion of the clipping member 72 causes the receiving member 42 to be deformed as represented by the deformation d shown in Fig. 16 and 18. Among other benefits, the clipping member 72 improves the leak-tightness of the connection between the lower portion of the receiving member 42 and the transition member 62. In addition, the clipping member 72 provides a greater contact surface allowing the ear portions 1322, 1422 of the lever member 22 to "lift" in an upward direction the transition member 62.

In one embodiment, the transition member 62 comprises means 262 for actuating for actuating the check valve 80 of the fitment 10. The actuating means 262 can be any device suitable for movably engaging the check valve 80. Non-limiting example of means 262 for actuating the check valve 80 can be rod, pole, shaft, which can be hollow, tubular and/or solid and which allow a fluid to flow within and/or along the means for actuating the check valve 80 when this actuating means engages the check valve 80. In a

preferred embodiment, the actuating means is an actuating rod which has a substantially cross shape at a cross-sectional. The actuating rod **262** is preferably connected to the upper portion of the transition member **62**. When a user controllably causes the longitudinal member **32** to impart a pulling motion to the lever member **22**, the ear portions **1322** and **1422**, push the clipping member **72** in a substantially upward direction. The upward motion of the clipping member **72** causes the transition member **62** and the actuating rod **262** to move in a substantially upward direction concurrently. As the actuating rod **262** moves in the substantially upward direction, the actuating rod **262** pushes the piston portion **280** upwards such that the lower opening **220** of the engaging segment **120** ceases to be sealed causing the fluid contained in the reservoir **55** to flow by gravity from the reservoir **55** and the fitment **10**, into the chamber **242**, from the chamber **242** into the tube **75** via the transition member **62**, from the tube **75** to the nozzle **225** and from the nozzle **225** to a surface to be cleaned. One skilled in the art will understand that the fluid in the reservoir **55** keeps flowing to the nozzle **225** as long as the actuating rod **262** actuates the check valve **80**, i.e. as long as the longitudinal member **32** maintains the lever member **22** in an upward position. When the user allows the longitudinal member **32** to return to its original position, the lever member **22** can pivot back to a downward position causing the clipping member **72**, the transition member **62** and, as a result, the actuating rod **262** to return concurrently to their original downward position as shown in Fig. 15 and 17, and the biasing action of the spring member **380** causes the piston portion **280** to seal the lower opening **220** of the fitment **10** which, in turn, prevents the fluid from flowing to the nozzle **225**. One skilled in the art will understand that depending on the elastic and/or recovery properties of the flexible receiving member, the receiving member **42** returns to its original position when pressure ceases to be applied on the clipping member **72**. In another embodiment, the receiving member **42** can be such that the elastic and/or recovery properties of the receiving member do not allow the receiving member **42** to return to its original shape on its own when pressure ceases to be applied on the clipping member **72**. In this embodiment, it can be preferred to add an additional spring member which can be connected at one end to the housing **45** or docking member **95** and at the other end to the receiving member **42** either directly or indirectly via the clipping member **72**. The actuating rod **262** can have any shape suitable for actuating the check valve **80**. In one embodiment, the actuating rod **262** can have a substantially cross shape

and a height comprised between about 1 mm and 40 mm, preferably comprised between about 2 mm and 20 mm. In one embodiment, the distance between the check valve **80** and the actuating rod **262** is comprised between about 0 mm and about 10 mm, preferably between about 1 mm and about 5 mm. Among other benefits, a “gap” between the actuating rod **262** and the check valve **80** minimizes the risk that the check valve is accidentally actuated by the actuating rod **262** when a user inserts the reservoir **55** within the housing **45**.

Optionally but preferably, the transition member **62** comprises a disk portion **362** for sealing the lower portion of the chamber **242** of the receiving member **42** in a substantially leak-tight manner.

One skilled in the art will understand that when a user actuates the previously described fluid delivery mechanism **12** while a fluid filled reservoir and a fitment **10** are inserted within the housing **45**, the fluid flows by gravity to the nozzle **225**. When the user ceases to actuate the fluid delivery mechanism **12**, a column of fluid is “trapped” within the receiving member **42** and the tube **75** due to the leak-tightness between the check valve **80** and the lower opening **220** of the engaging segment **120** as well as the leak-tightness between the engaging segment **120** and the receiving member **42**. In the event a user wishes to remove the reservoir from the housing **45** before the reservoir has been emptied, this leak-tightness to the outside atmosphere ceases and the column of fluid undesirably flows onto the floor surface. This situation may happen when for example the user wishes to use a different type of fluid contained in a different reservoir or wishes to disassemble the cleaning implement to decrease its storage space. As a result, it is believed that it can be useful to add stoppage means from preventing this column of fluid to flow undesirably onto a surface when the reservoir is removed. In one embodiment, the stoppage means can be a disk portion **362** which can be connected to the transition member **62** such that it is located between the actuating rod **262** and the upper opening **1162** of the transition member **62**. In a preferred embodiment, the diameter of the disk portion **362** is slightly greater than the diameter of the portion of the receiving member **42** which is adjacent to the disk portion **362** such that the disk portion **362** contacts the inner surface of the receiving member in a substantially leak-tight manner. The disk portion **362** separates an upper portion **3242** of the chamber **242** of the receiving member **42** from the lower portion **4242** of the chamber **242** in a substantially leak-tight manner as shown

in Figs. 15 and 17. When a user actuates the liquid delivery mechanism **12**, the deformation *d* of the receiving member as shown in Fig. 16 and 18, allows the fluid to flow by gravity around the disk portion **362** of the transition member **62**. When the user ceases to actuate the fluid delivery mechanism **12**, the receiving member **42** returns to its original shape as shown in Figs. 15 and 17, and the disk portion sealably contacts the inner surface of the receiving member **42** causing the upper portion **3242** of the chamber **242** to be sealingly separated from the lower portion **4242** of the chamber **242**. One skilled in the art will understand that if a user wishes to remove the reservoir **55** from the housing **45**, the column of fluid contained within the lower portion **4242** of the chamber **242** and the tube **75** is "trapped" and does not flow unwontedly onto the floor. Without intending to be bound by any theory, it is believed that when the receiving member **42** is compressed, it deforms substantially outwardly as represented by element *d* of Figs. 16 and 18 due to the thickness and the concavity of the receiving member **42**. In addition, when the engaging segment is inserted within the receiving member, the substantially rigid wall of the engaging segment causes the receiving member to deform outwardly rather than inwardly. In one embodiment, weaknesses can be added to the receiving member **42** in order to assure its outward deformation. In one embodiment, these weaknesses can be in the form of a groove or channel.

While particular embodiments of the subject invention have been described, it will be apparent to those skilled in the art that various changes and modifications of the subject invention can be made without departing from the spirit and scope of the invention. In addition, while the present invention has been described in connection with certain specific embodiments thereof, it is to be understood that this is by way of limitation and the scope of the invention is defined by the appended claims which should be construed as broadly as the prior art will permit.

1. A fluid transfer fitment, said fitment comprising:
    - a cap portion having a first fluid transfer opening;
    - an engaging segment for engaging a receiving member of a fluid delivery mechanism, wherein said engaging segment extends from said first fluid transfer opening of said cap portion and wherein said engaging segment comprises a wall defining a cavity and a second fluid transfer opening in fluid communication with said first fluid transfer opening; and
    - a fluid transfer check valve for controllably preventing a fluid from flowing through said fitment, wherein said fluid transfer check valve is connected to said engaging segment and wherein at least a portion of said fluid transfer check valve is located within said engaging segment; said fitment comprising a fluid filled reservoir having substantially rigid walls and having a finish portion wherein said cap portion is releasably attached to said finish portion and wherein said fluid filled reservoir is inverted;
- wherein said cap portion comprises a vent opening in fluid communication with the outside atmosphere and a vent valve in fluid communication with said vent opening; wherein said fluid transfer check valve controllably closes said first fluid transfer opening in a substantially leak-tight manner;
- and wherein said fluid transfer check valve controllably closes said second fluid transfer opening in a substantially leak-tight manner.

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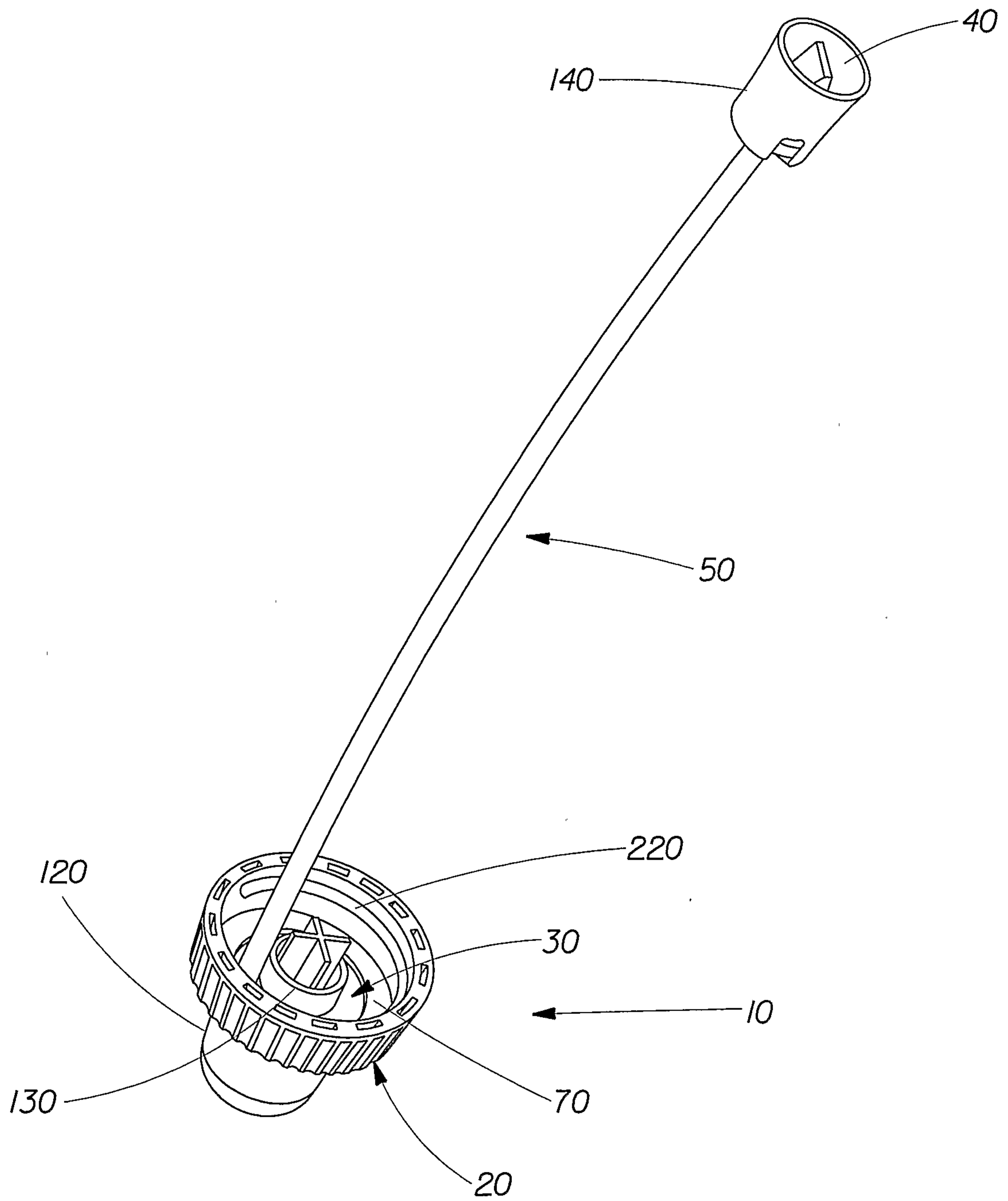


Fig. 1

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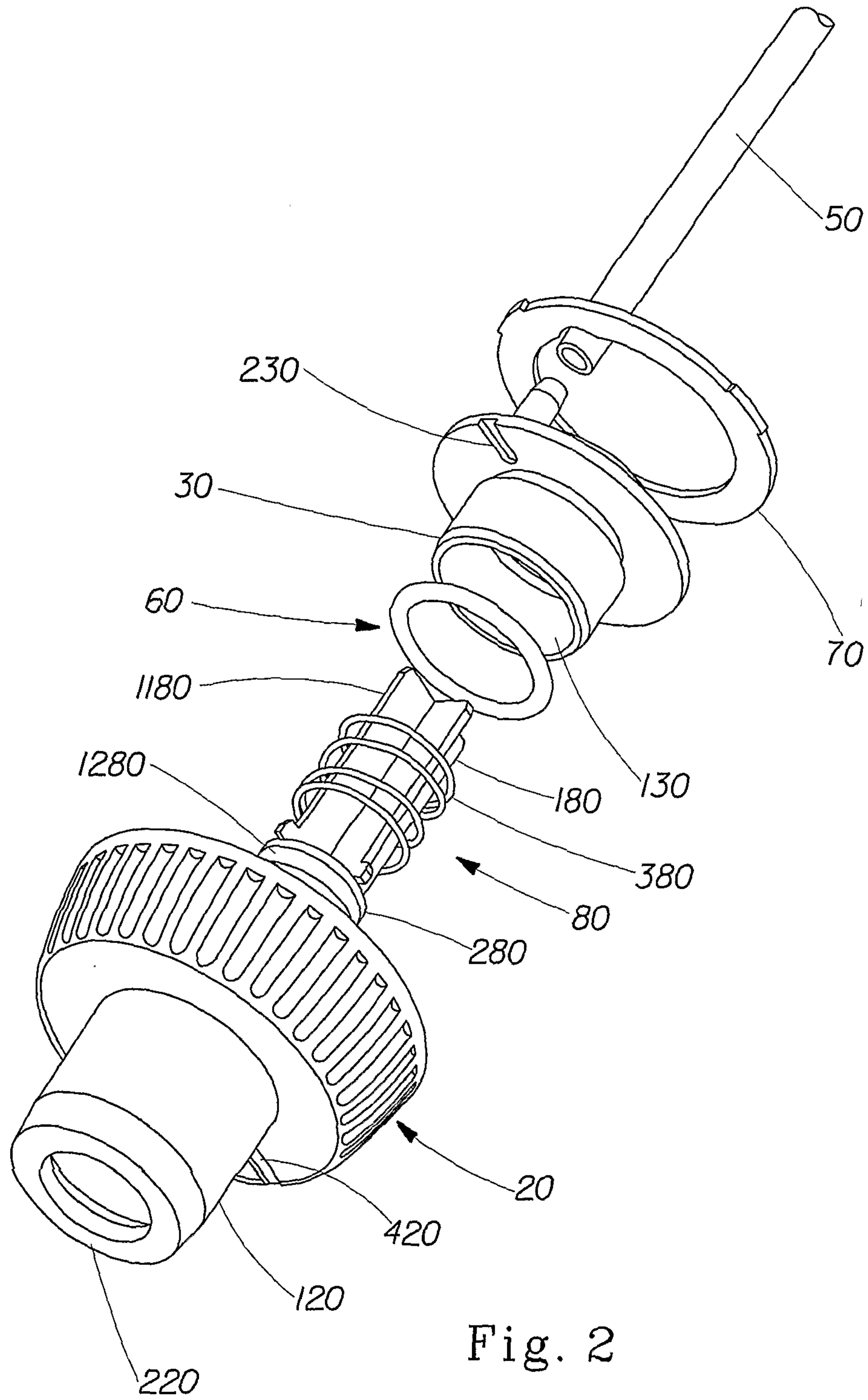


Fig. 2



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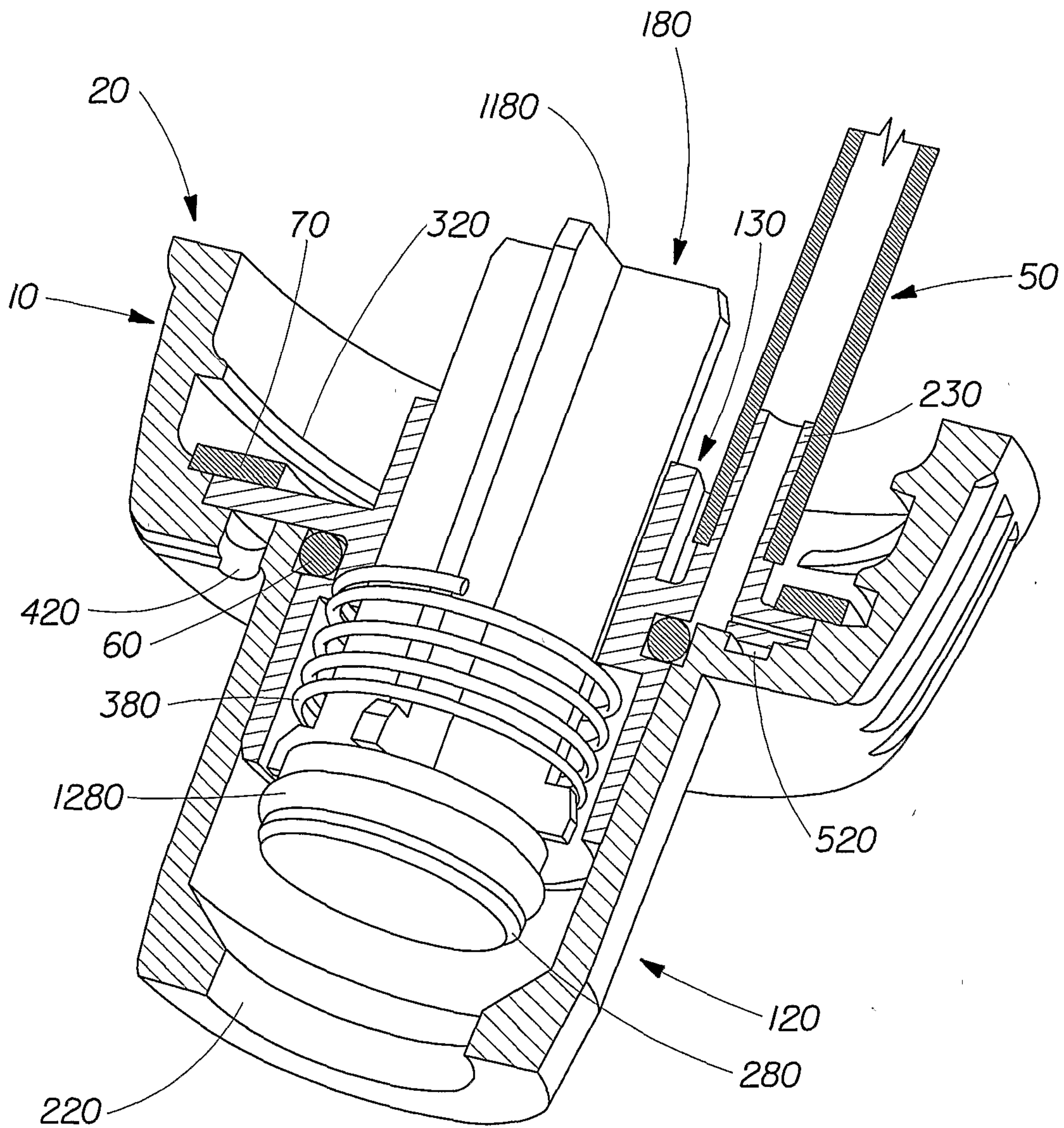
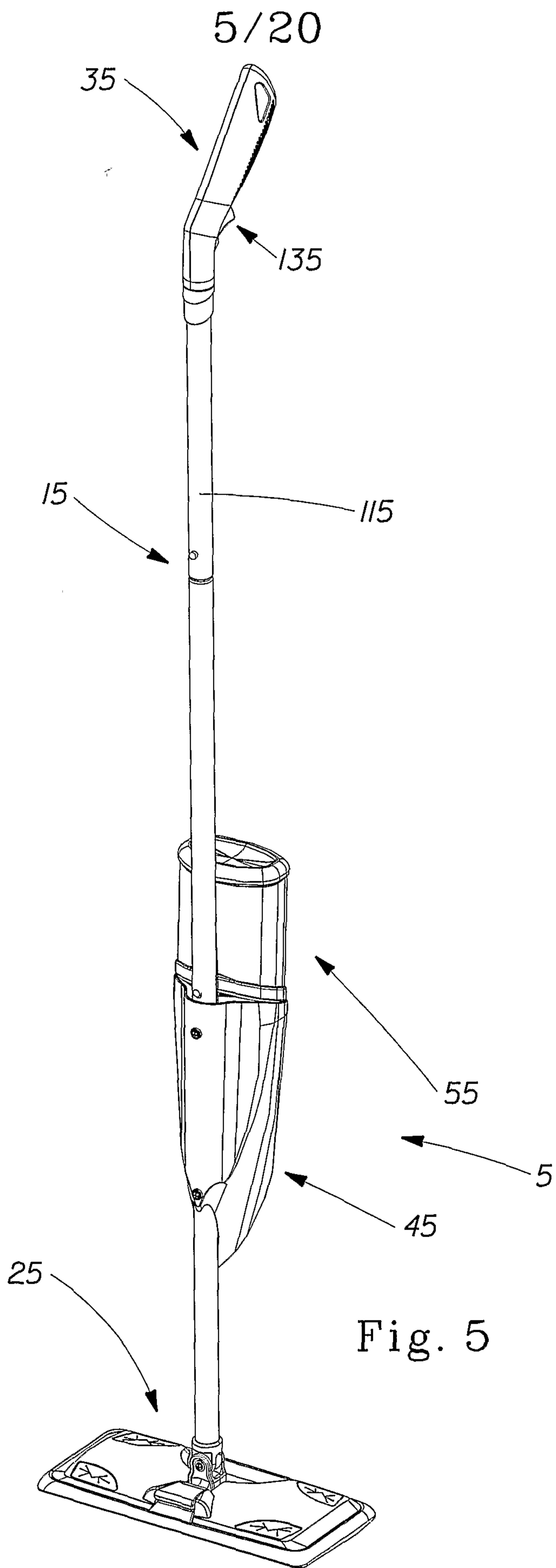


Fig. 4



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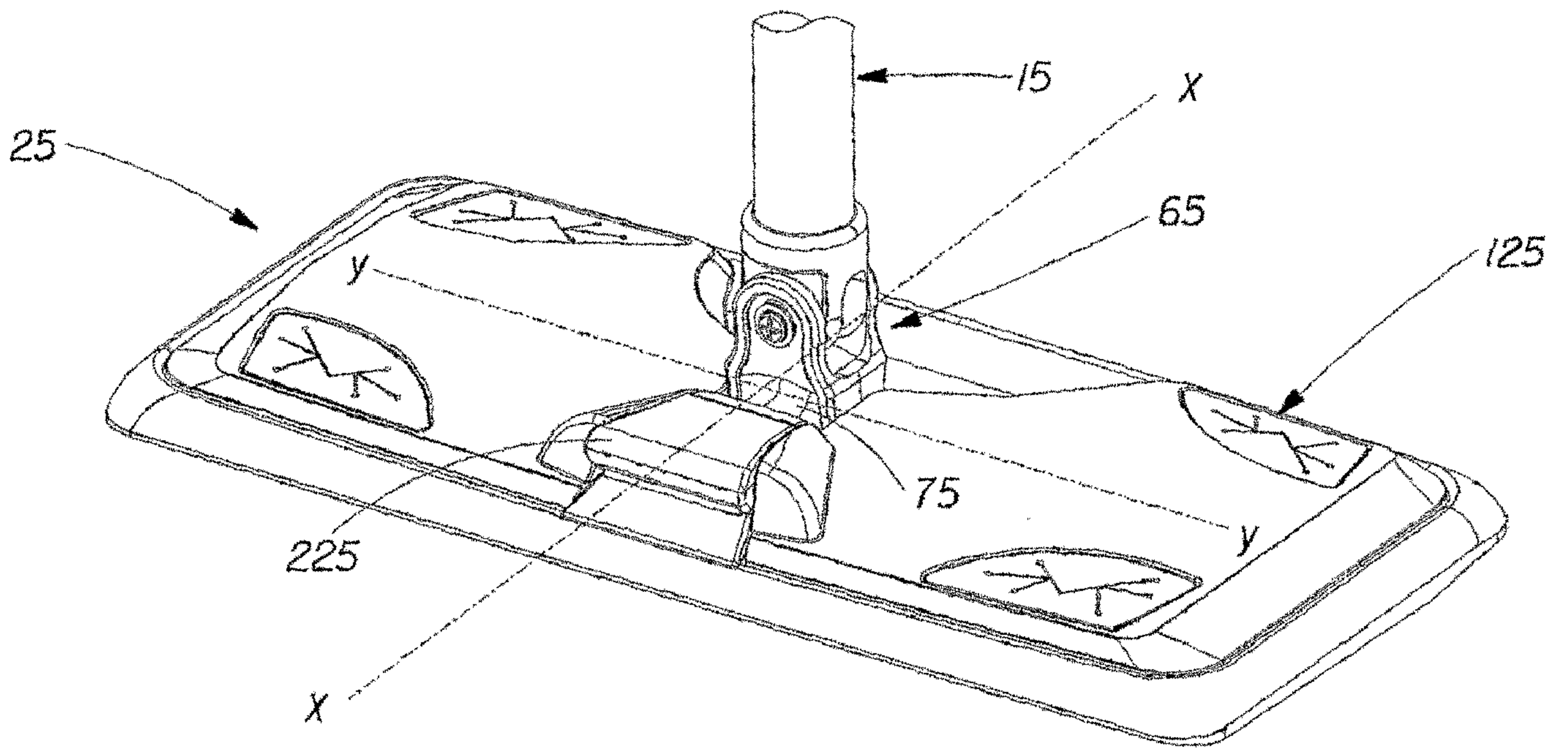


Fig. 6

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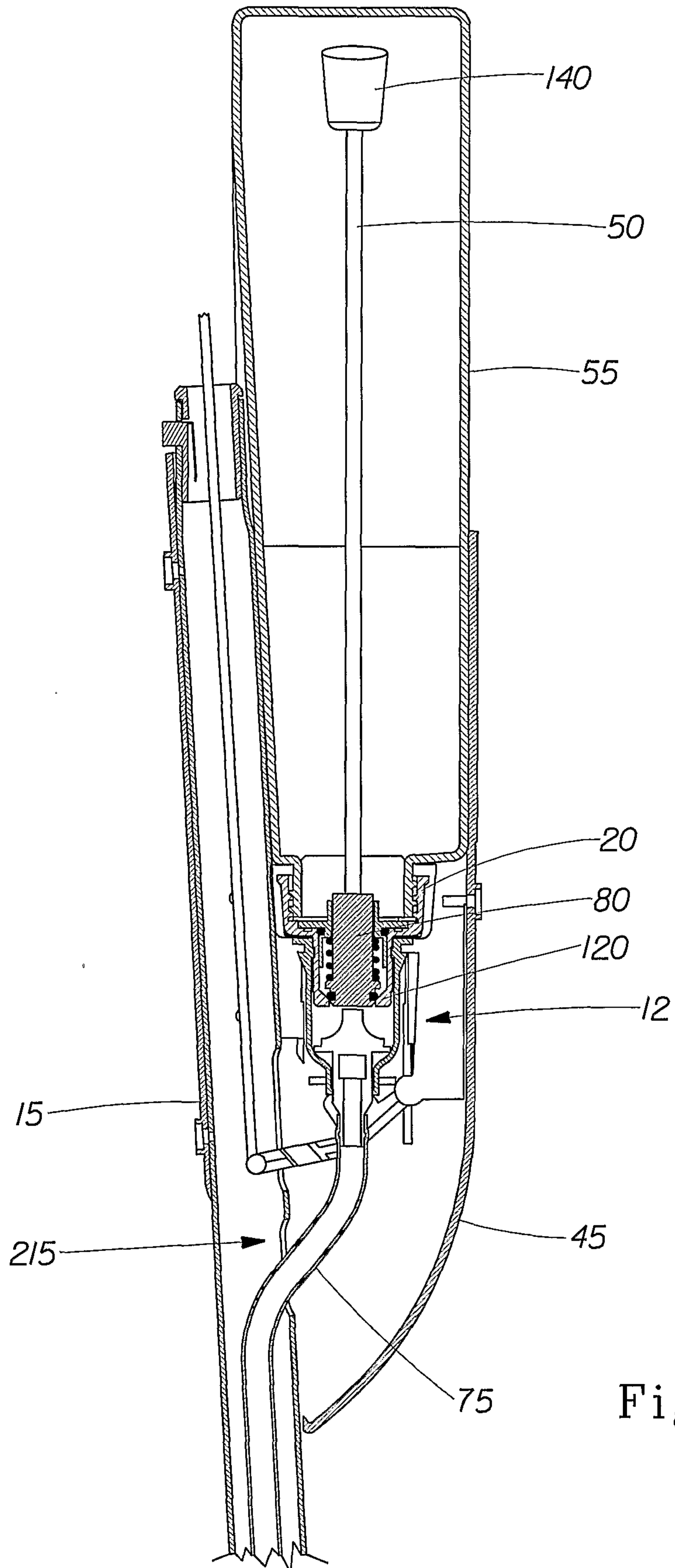


Fig. 7

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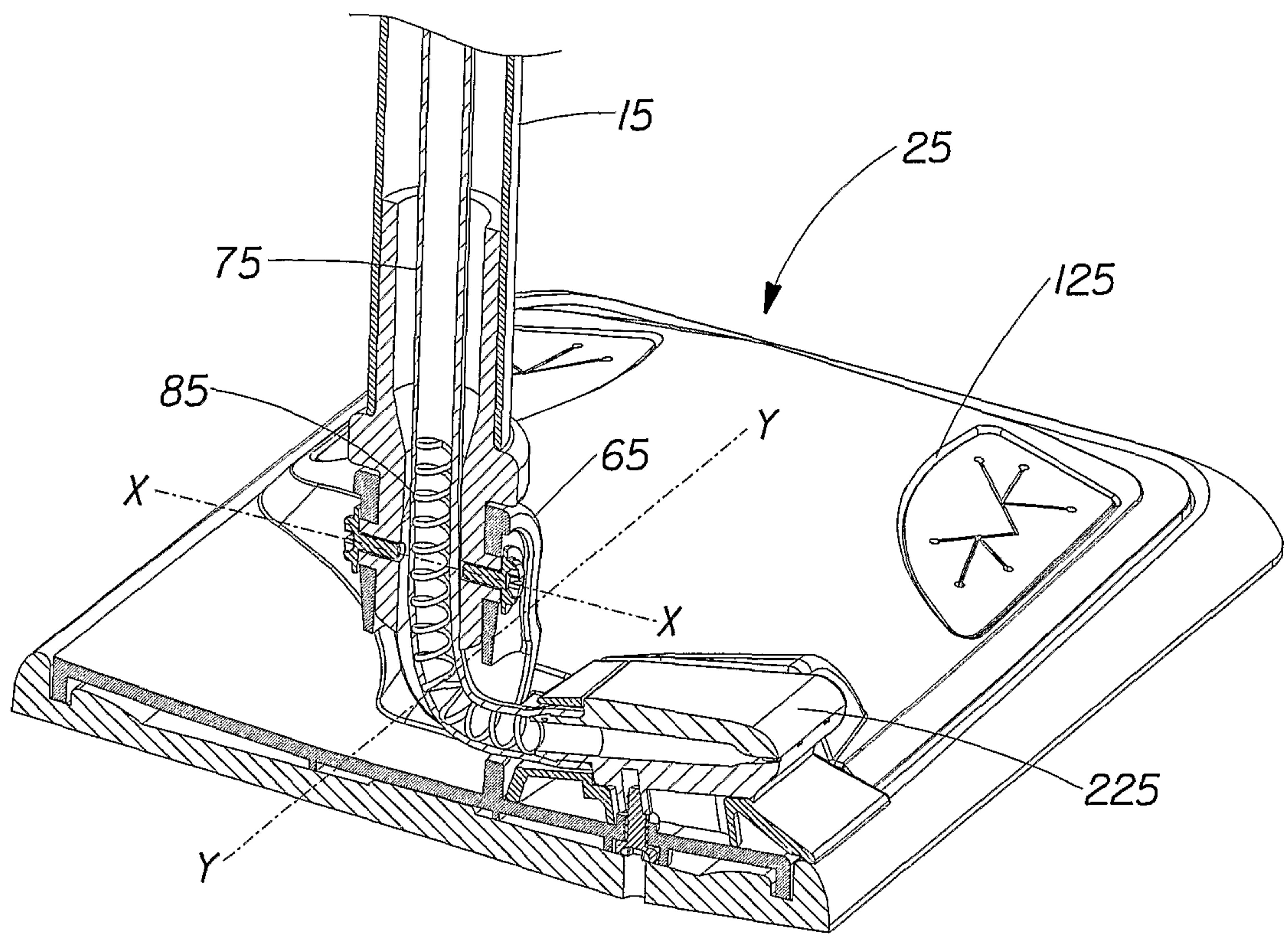


Fig. 8A

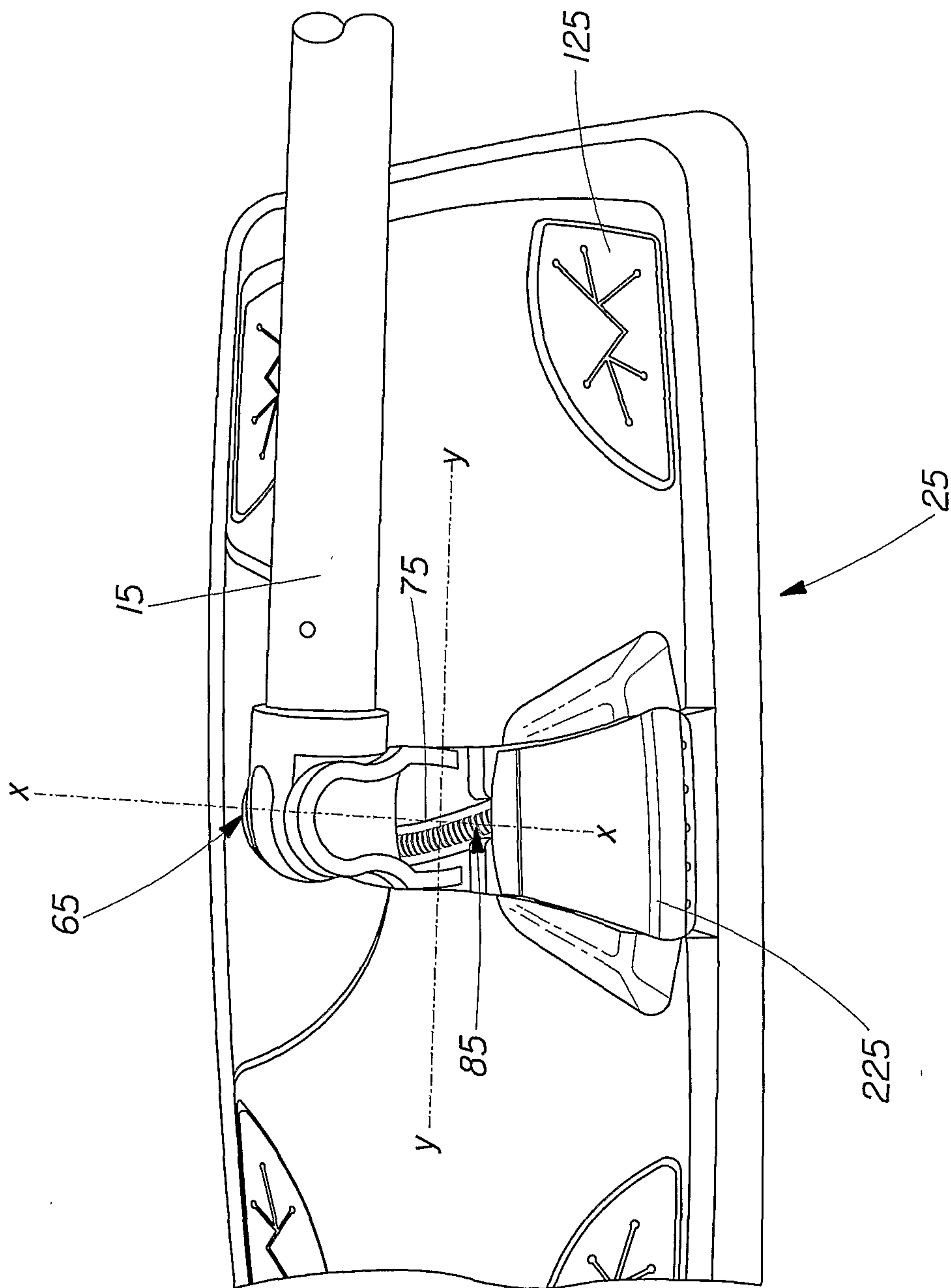


Fig. 8B

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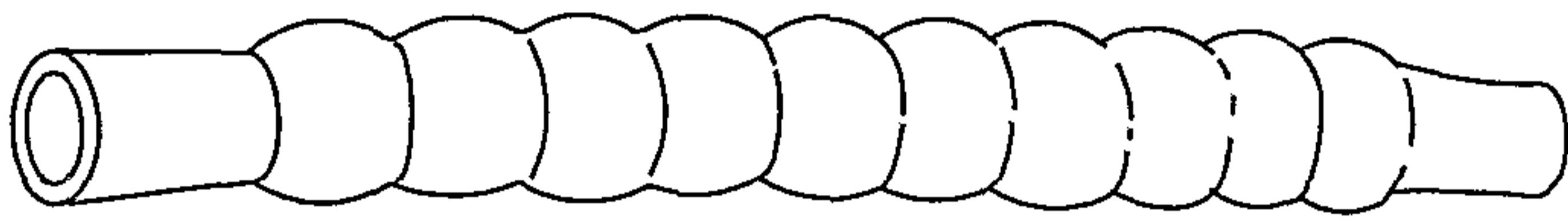


Fig. 8C

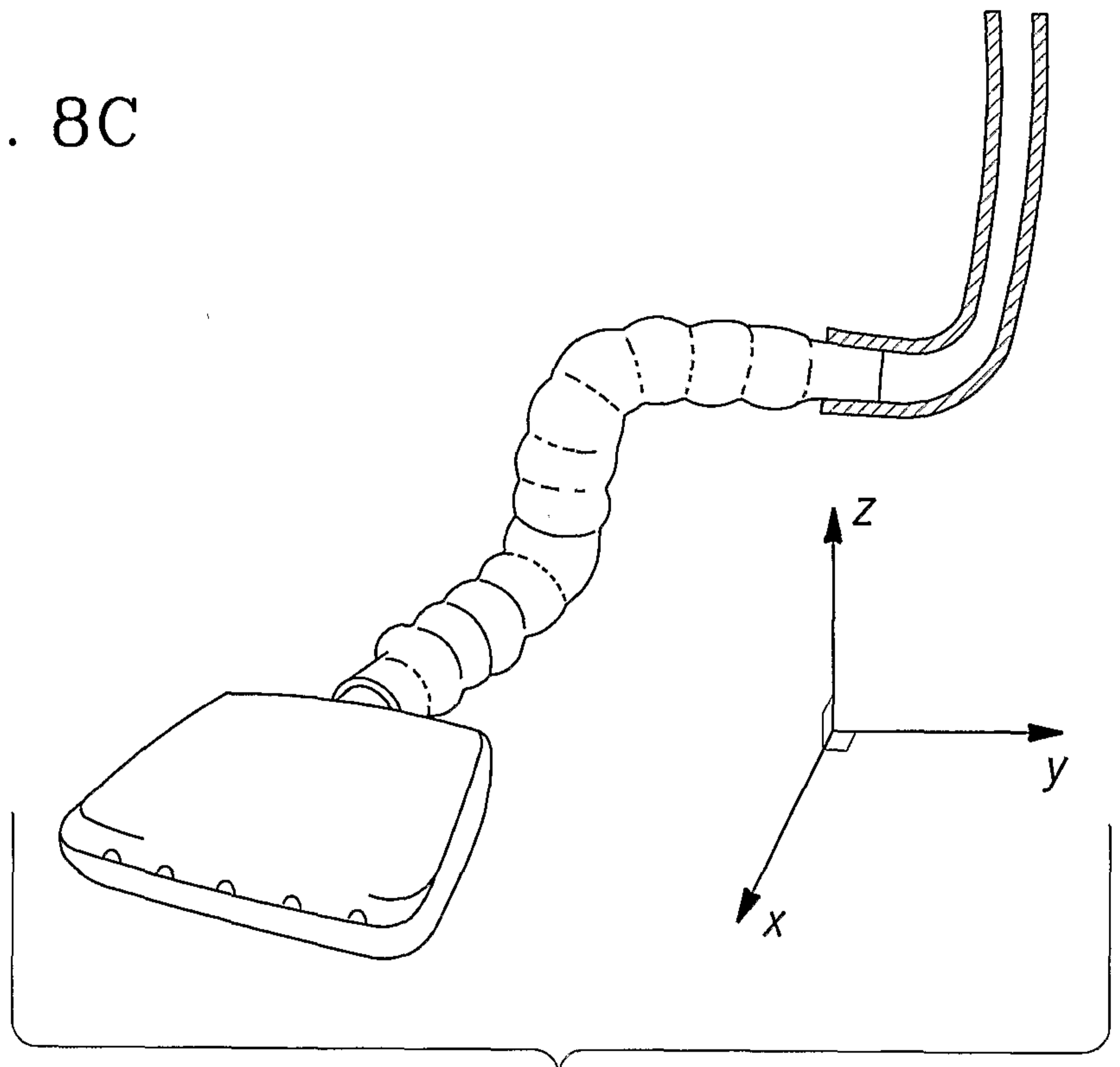


Fig. 8D

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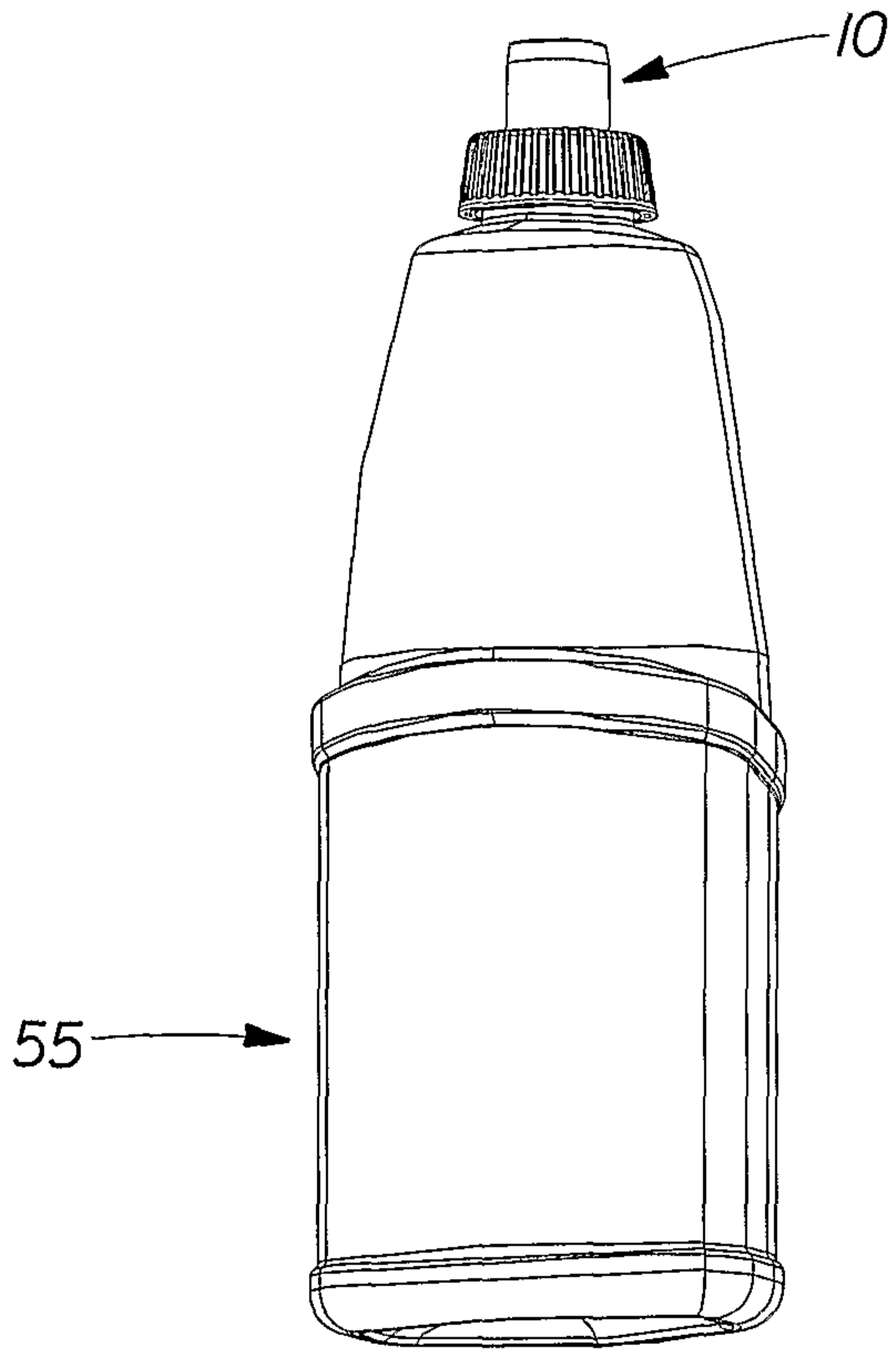


Fig. 9

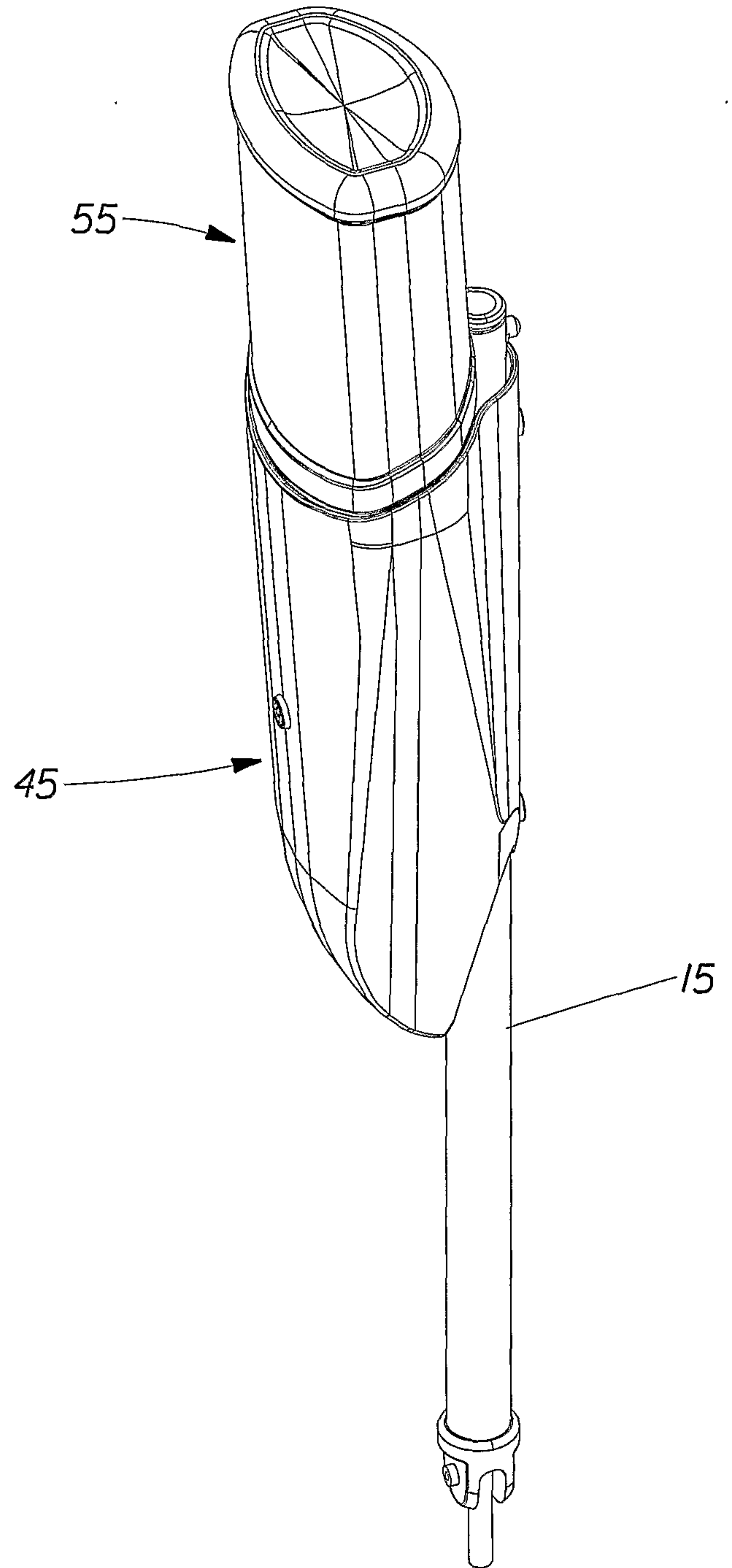


Fig. 10

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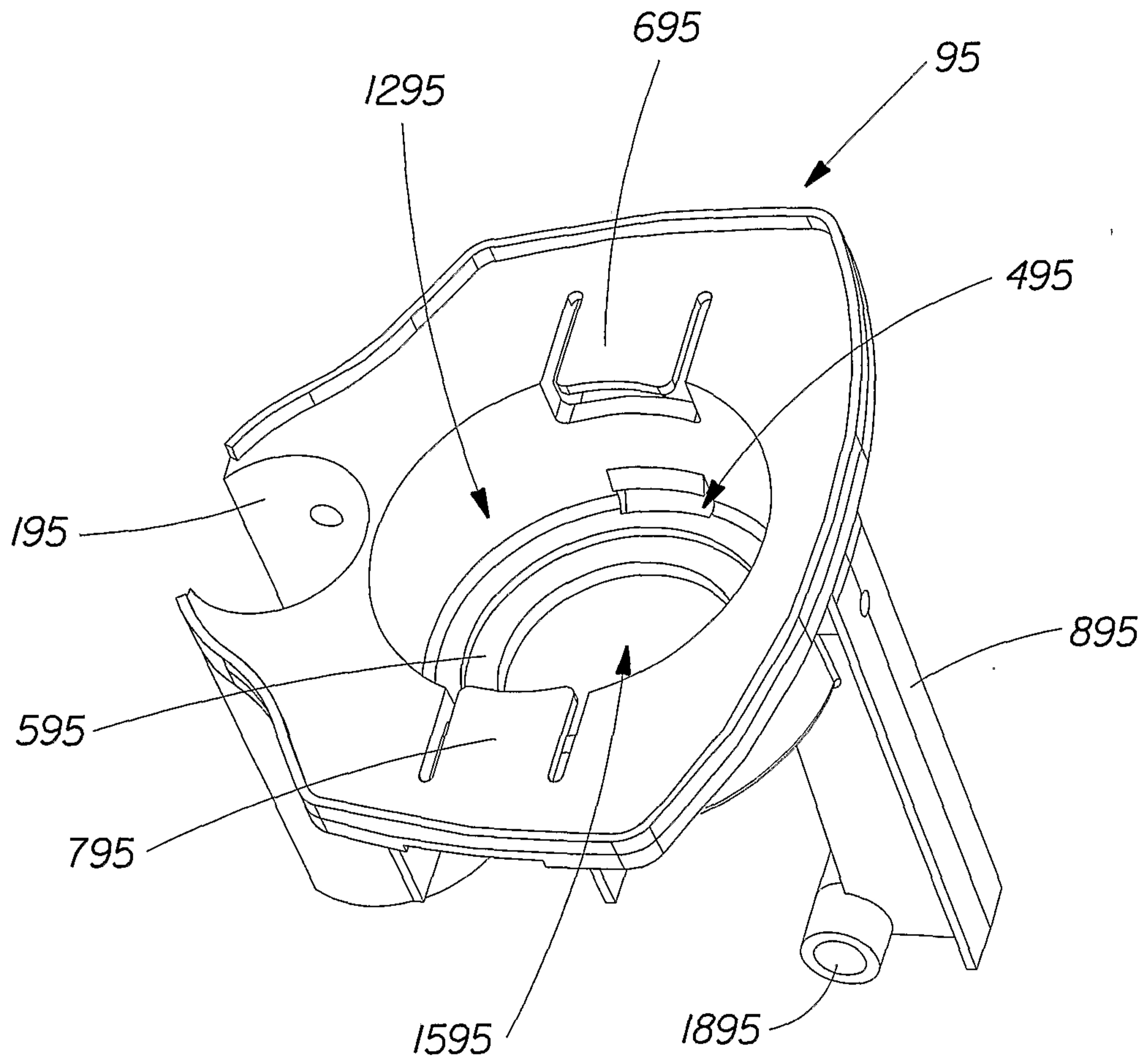


Fig. 11

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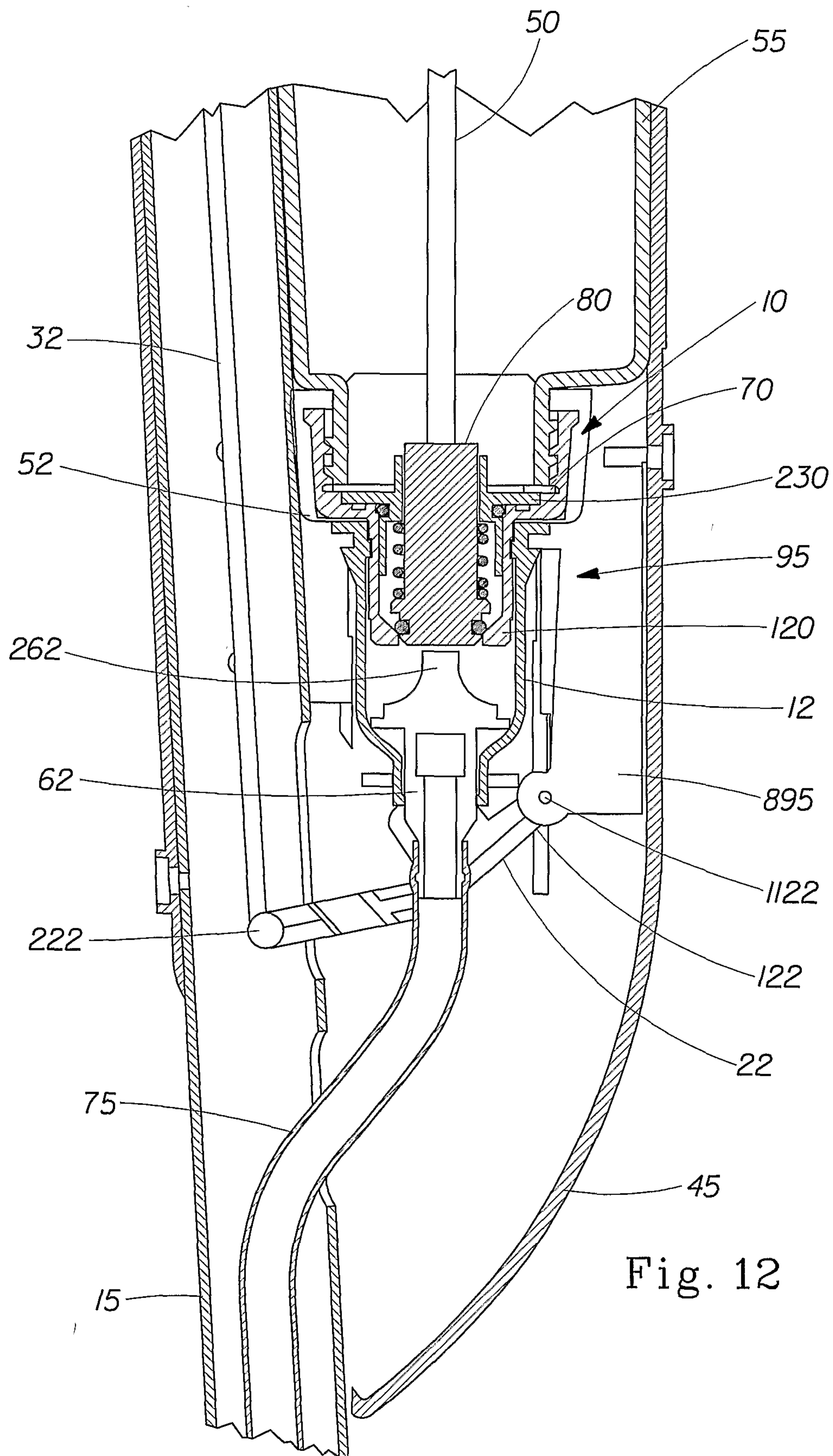


Fig. 12

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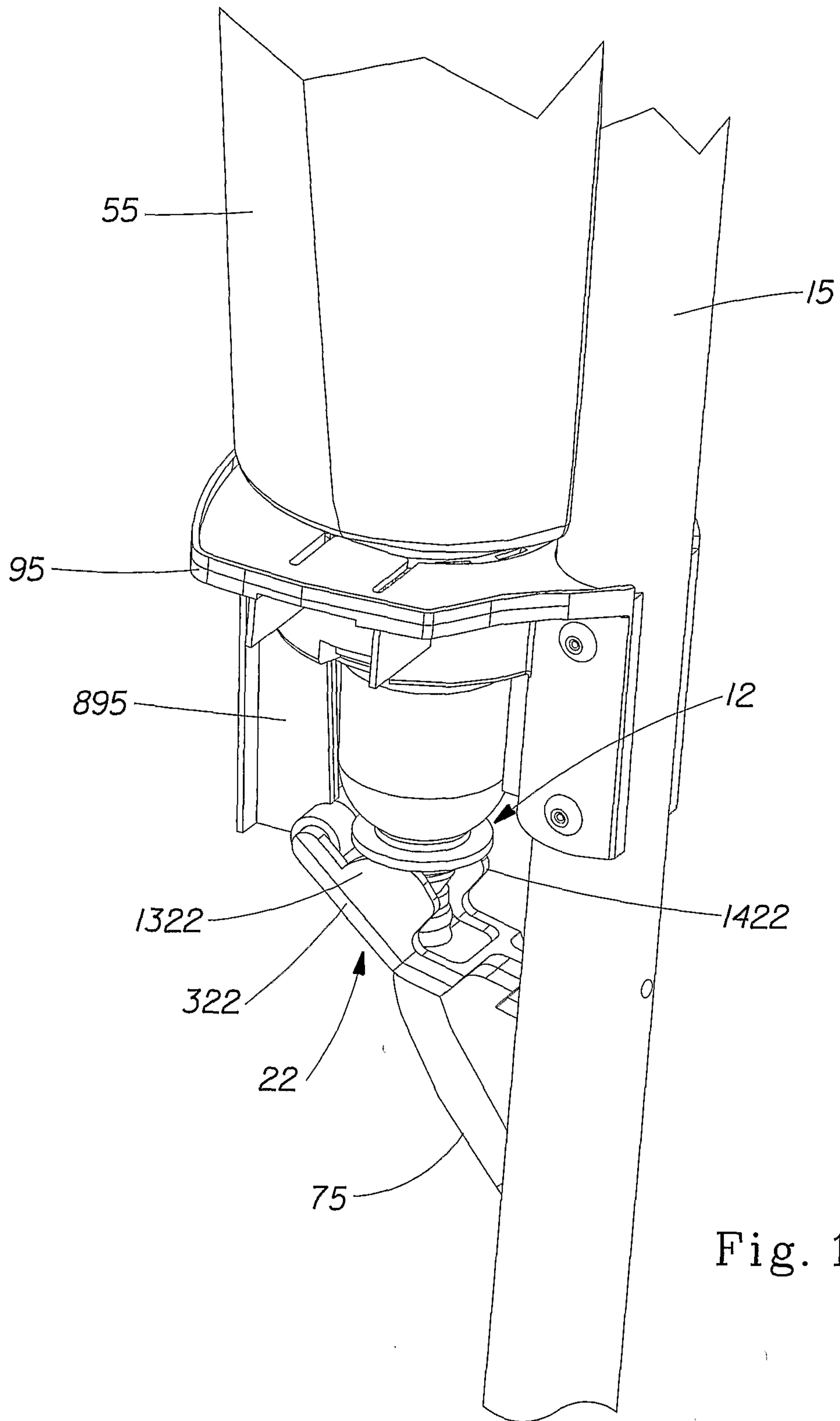


Fig. 13

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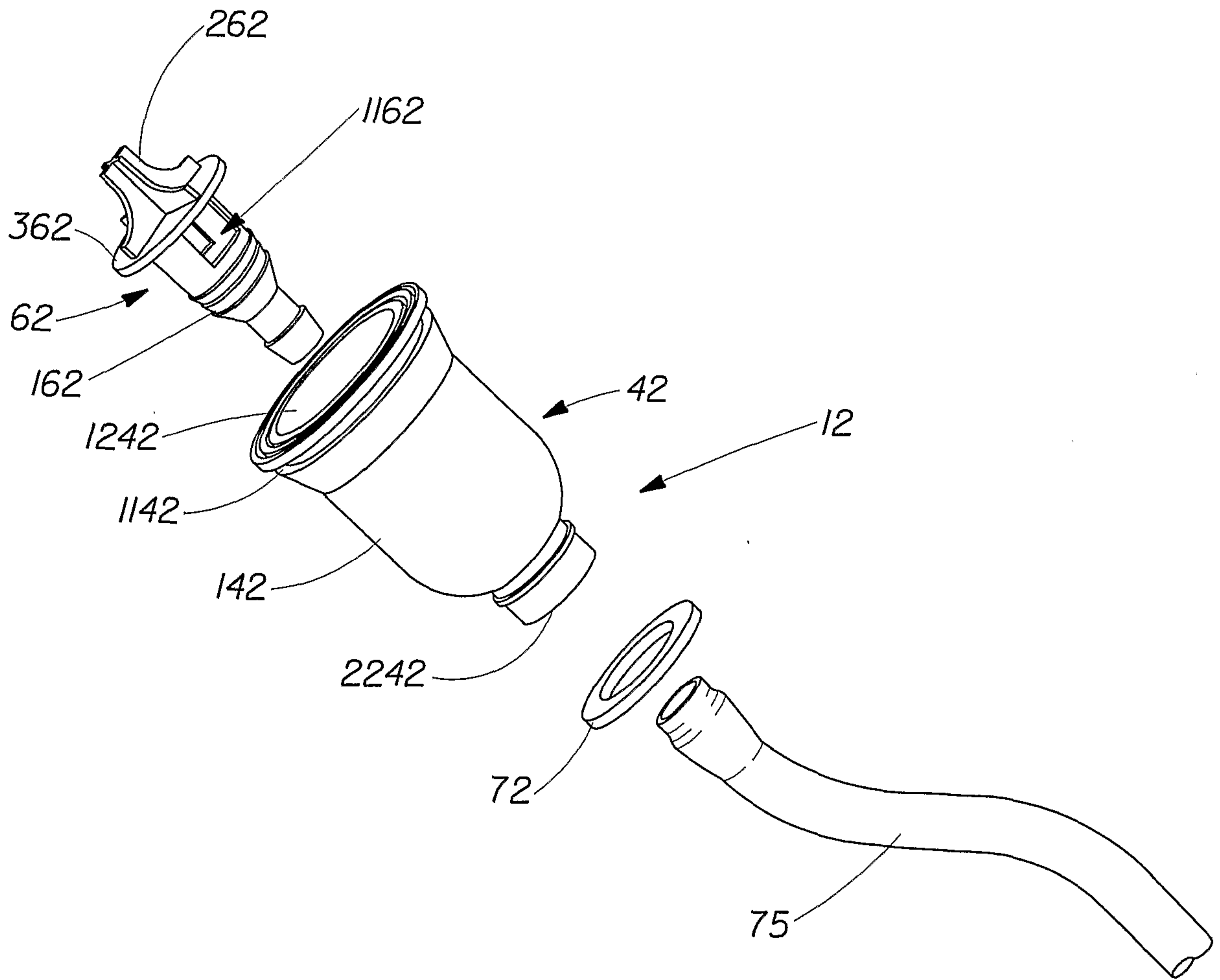


Fig. 14

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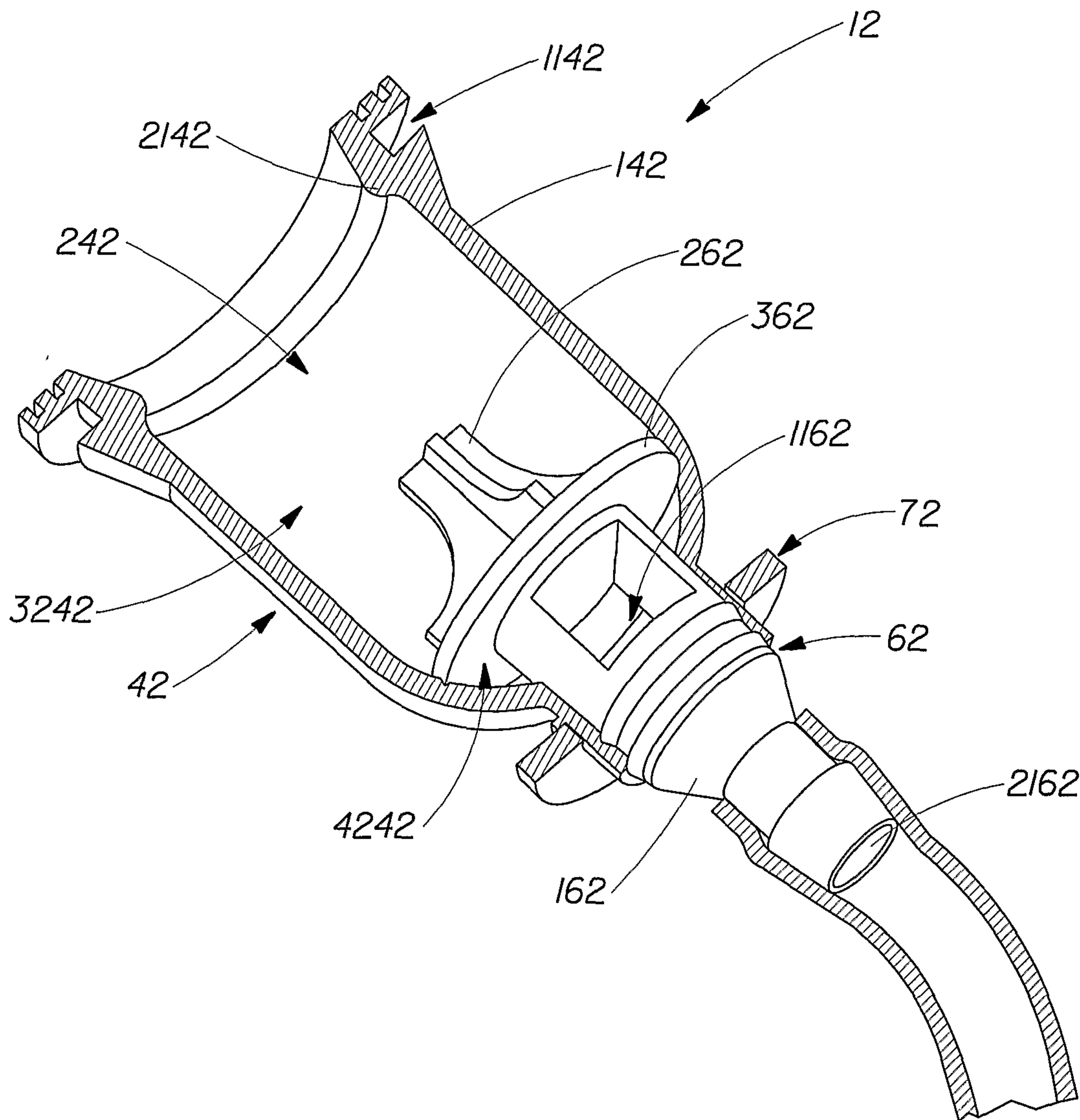


Fig. 15

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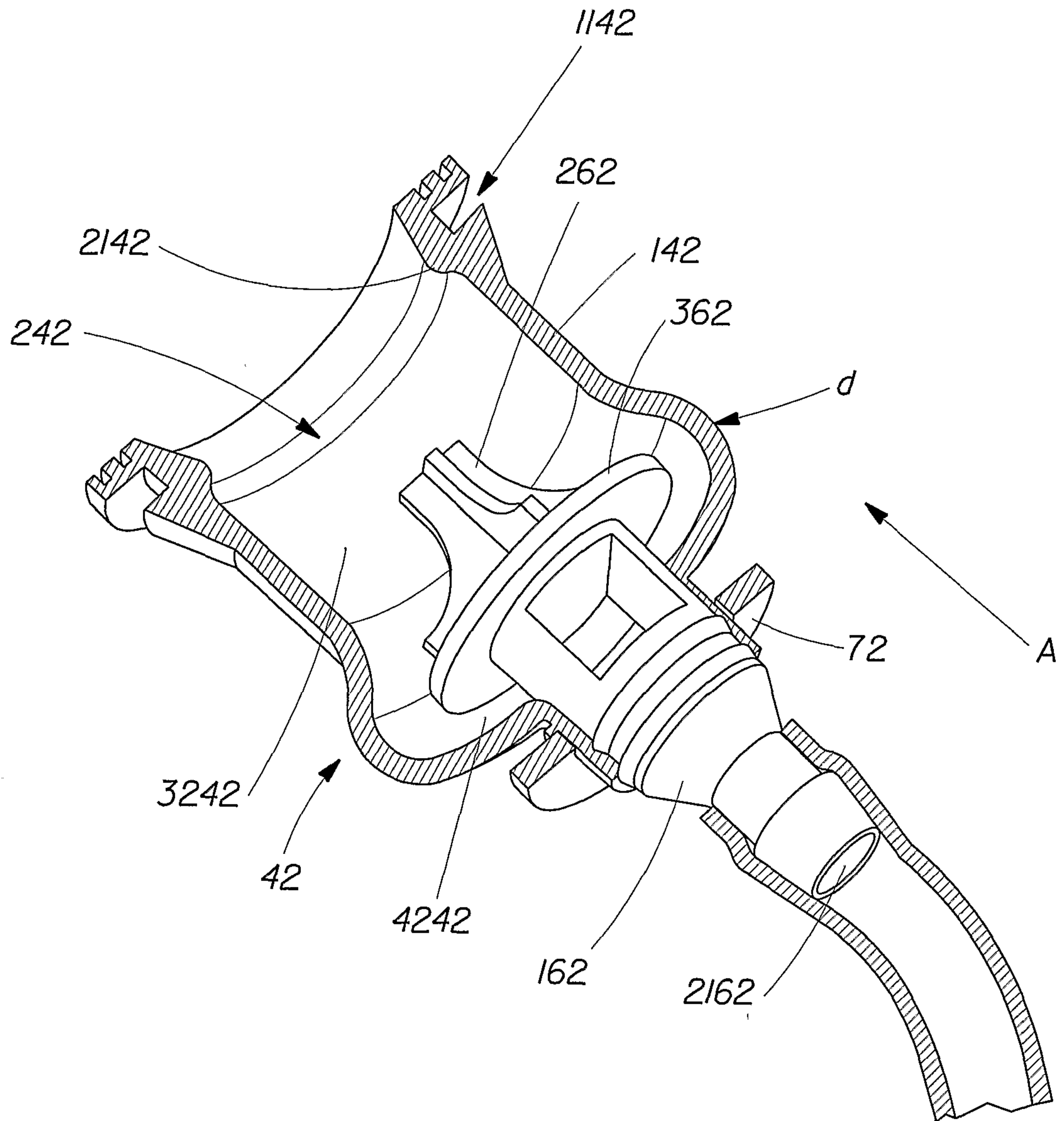


Fig. 16

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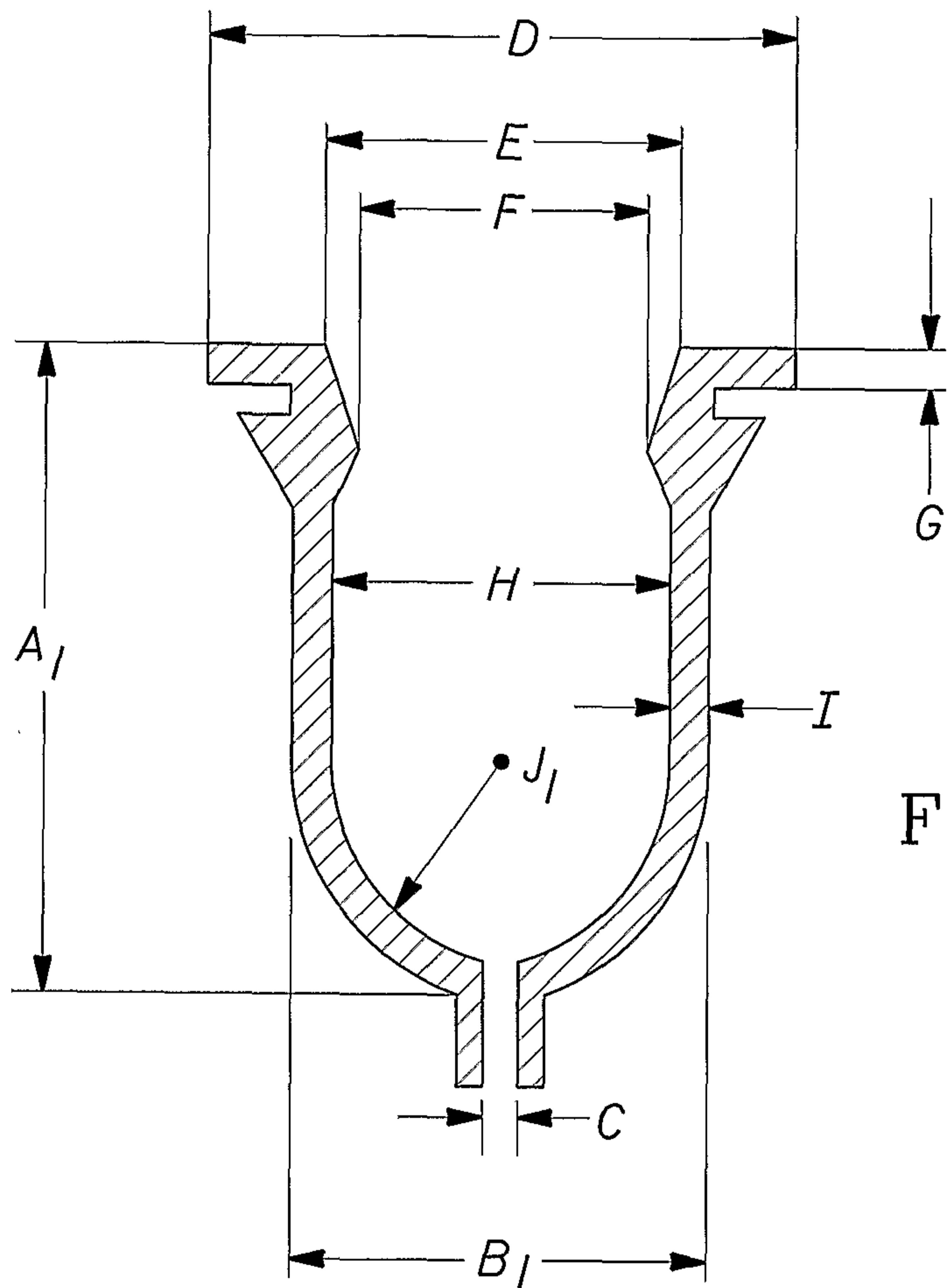


Fig. 17

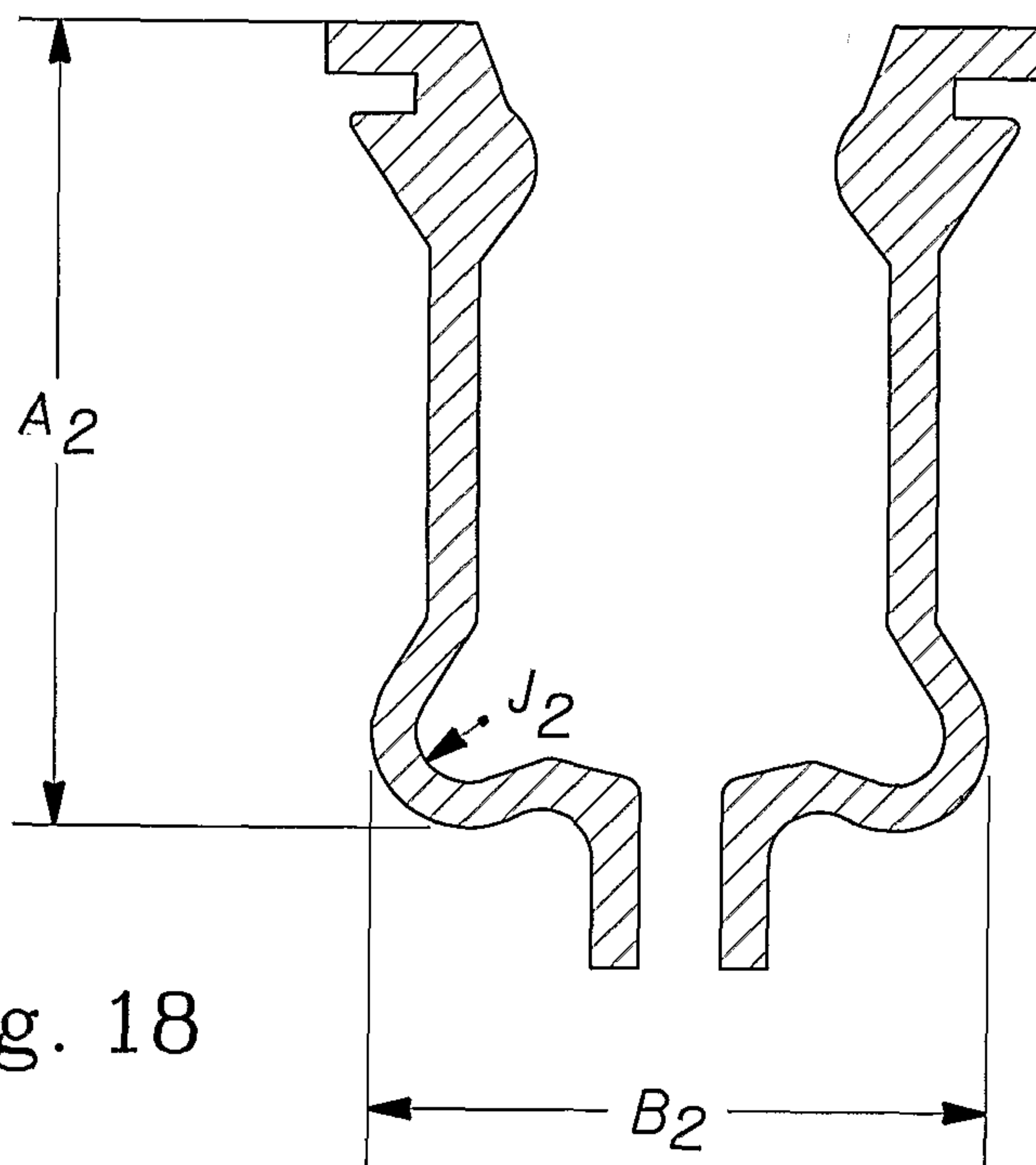


Fig. 18

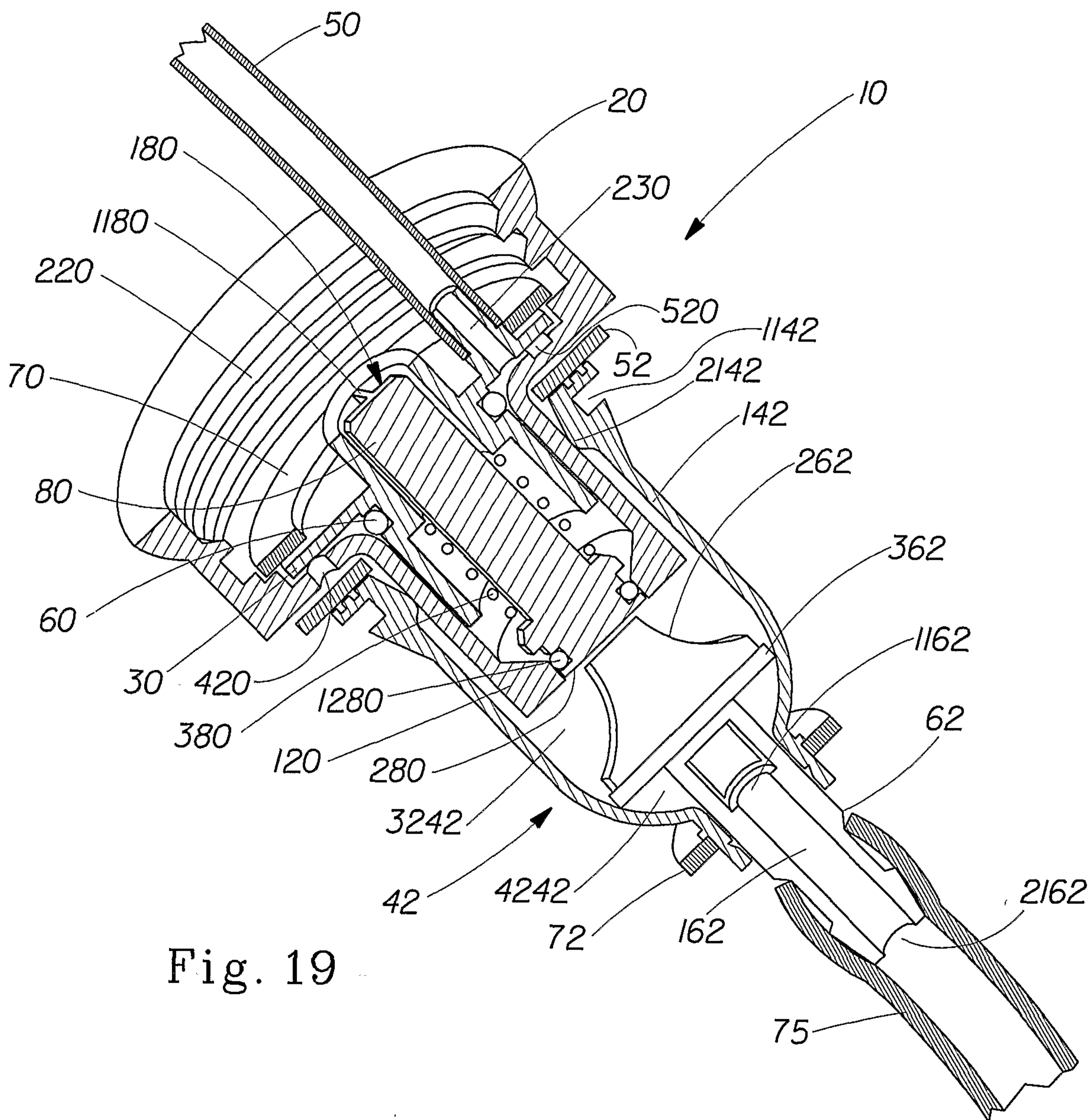


Fig. 19

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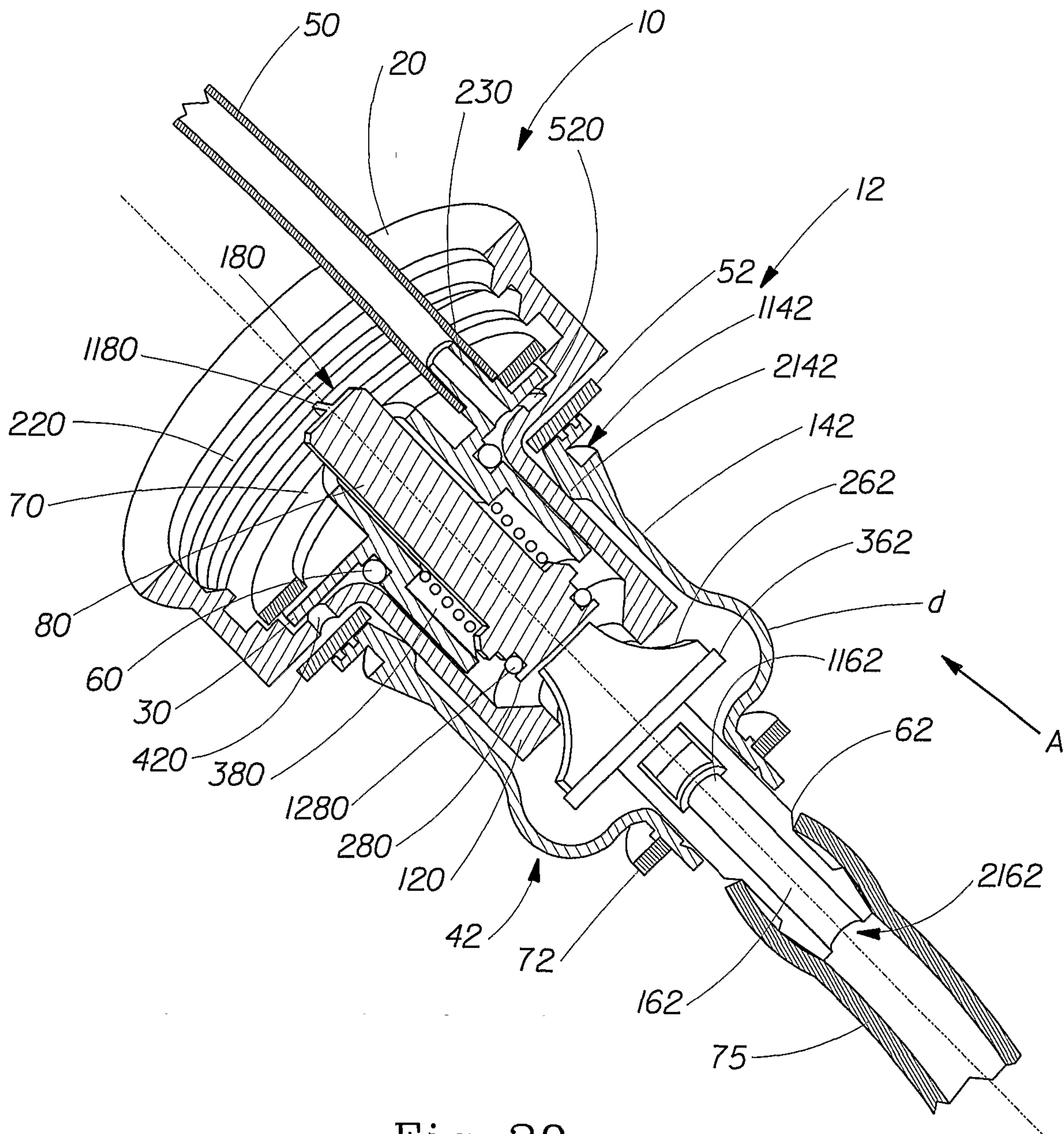


Fig. 20

