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(54) FLUID PUMP ASSEMBLY

(57) A fluid pump assembly **(100)** includes a fluid pump housing **(110).** The fluid pump housing **(110)** includes a suction side inlet channel **(117)** and a pressure side outlet channel **(118).** A filter assembly (**120** is arranged downstream of the suction side inlet channel **(117).** A valve assembly **(123)** is arranged downstream of the filter assembly **(120)** for selectively allowing flow of fluid from the suction side inlet channel **(117)** towards the pressure side outlet channel **(118).** The valve assembly **(123)** includes a valve housing **(124).** The valve housing **(124)** includes a valve seat **(125)** for operatively supporting a valve body **(126).** A valve stem **(127)** is operatively coupled to the valve body **(126).** The fluid pump assembly **(100)** is characterized in that the valve assembly **(123)** is operatively coupled with the filter assembly **(120).** The fluid pump assembly **(100)** further comprises a pressure relief housing **(131)** disposed downstream of the filter assembly **(120).** The valve assembly **(123)** is operatively coupled with the pressure relief housing **(131).**

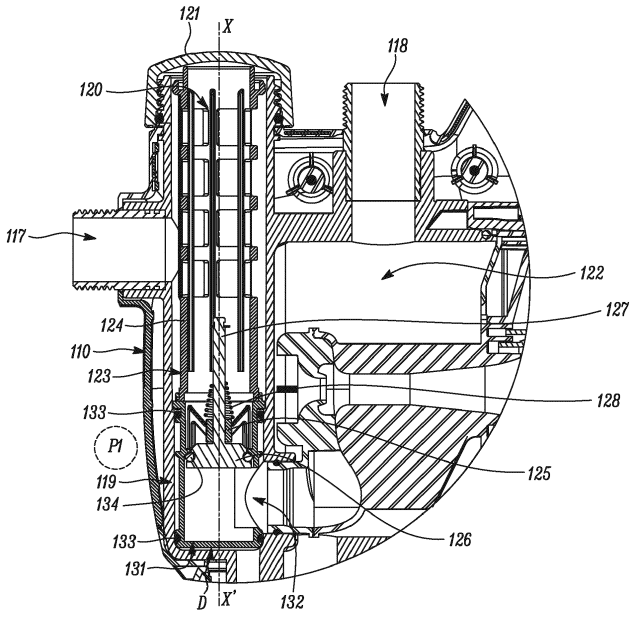

FIG. 3

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a fluid pump assembly. More specifically, the present disclosure relates to an improved design of the fluid pump assembly that may improve life of the fluid pump assembly and allow its efficient working.

BACKGROUND

[0002] A fluid pump assembly may serve to convey a fluid, in particular drinking water or service water, from a source or from a storage vessel into a water line network, which may be provided, for example, for supplying a building and/or a garden. The fluid pump assembly may include a fluid pump housing which may further house a drive motor, which may be designed as a mains-operated electric motor, and a fluid pump coupled thereto. The fluid pump may typically be designed as a single-stage or multi-stage self-priming centrifugal pump and may comprise a fluid pump impeller which may be accommodated in the fluid pump housing and may be driven by the drive motor. The fluid pump housing may further include a suction-side inlet channel and a pressure-side outlet channel, which may permit an inflow of fluid to the fluid pump impeller and an outflow of the fluid pressurized by the fluid pump impeller, for example, into the water line network.

[0003] The fluid pump assembly may further include a pressure vessel coupled to a discharge channel of the fluid pump housing such that the pressure vessel may communicate with the pressurized fluid. The pressure vessel may be provided to avoid a frequently recurring switching on and off of the drive motor due to the occurring pressure loss in the event of possibly existing leakages in the water line network. The pressure vessel, which may be designed as a pressure accumulator, may provide a limited fluid volume which is pressurized by means of the fluid pump and ensures an essentially constant water pressure at least when small amounts of fluid flow into the water line network.

[0004] The fluid pump assembly or the fluid pump housing thereof may further include a non-return valve located between the suction-side inlet channel and the pressure vessel. The non-return valve prevents back flow of the pressurized fluid when the fluid pump is in a non-operational state. The fluid pump assembly may further include a filter assembly upstream of the non-return valve to filter the fluid received from the source by the fluid pump assembly.

[0005] An example of a fluid pump assembly is provided in European patent 2 211 057 (hereinafter referred to as '057 reference). The '057 reference provides a pump device that includes a drive motor and a fluid pump which is coupled to the drive motor. The pump device further includes a pump housing with at least one suction-side inflow channel and one pressure-side outflow channel and having a pressure container which is coupled to the outflow channel of the fluid pump to communicate with it. At least one non-return valve is arranged near the suction-side inflow channel such that when the fluid pump starts up, the non-return valve opens the inflow duct because of the negative pressure arising in the pump housing and allows fluid to flow in from the source. Further, a filter assembly is disposed upstream of the non-return valve. However, the '057 reference seems short of disclosing the design improvements to combat the effect of forces generated by the pressure difference in suction side and pressure side of the fluid pump assembly on the functional components, such as the filter assembly and the non-return valve or on the structural components such as those binding the functional components with the fluid pump assembly and further prevent damage or deformation of the functional or structural components of the fluid pump assembly.

[0006] Thus, there is a need of an improved fluid pump assembly which has an improved design to improve a working efficiency of the fluid pump assembly and further improve life-span of the components of the fluid pump assembly.

SUMMARY

[0007] In view of the above, it is an objective of the present invention to solve or at least reduce the drawbacks discussed above. The objective is at least partially achieved by a fluid pump assembly. The fluid pump assembly includes a fluid pump housing. The fluid pump housing includes a drive motor and a fluid pump coupled to the drive motor. The fluid pump assembly further includes a suction side inlet channel and a pressure side outlet channel. A filter assembly is arranged downstream of the suction side inlet channel. A valve assembly is arranged downstream of the filter assembly for selectively allowing flow of fluid from the suction side inlet channel towards the pressure side outlet channel. The valve assembly includes a valve housing. The valve housing includes a valve seat for operatively supporting a valve body. A valve stem is operatively coupled to the valve body. Further, a spring is disposed around the valve stem to allow the valve body to move between a first position and a second position. The valve assembly disallows the flow of fluid from the suction side inlet channel towards the pressure side outlet channel in the first position of the valve body. The valve assembly allows the flow of fluid from the suction side inlet channel towards the pressure side outlet channel in the second position of the valve body. The fluid pump assembly is characterized in that the fluid pump assembly further comprises a pressure relief housing disposed downstream of the valve assembly. The valve assembly is operatively coupled with the pressure relief housing. Hereby the pressure relief housing is formed on the pressure side of the fluid pump assembly such that the forces introduced on it com-

bat or counteract against the effect of forces on the valve body or the valve assembly generated by the pressure difference in suction side and pressure side of the fluid pump assembly.

[0008] Thus, the present disclosure provides the fluid pump assembly which is advantageously designed in a manner such as to combat or counteract against the effect of forces generated by the pressure difference in suction side and pressure side of the fluid pump assembly on the valve assembly and prevent damage or deformation of the valve assembly. As there are less pressure forces acting on the valve assembly there is also less force onto the connection of the valve assembly with any part of the fluid pump assembly, so that they can be designed less force prove and/or bulky. In the same way the valve assembly does transfer much less pressure than usually (without pressure relief housing) towards any components connected to it (for example a filter arrangement) so that they can be designed less force prove and/or bulky. Thus the improved design of the fluid pump assembly provides the pressure relief at the valve assembly and further improves the working life of the fluid pump assembly.

[0009] According to an embodiment of the present disclosure a clearance "D" is formed by a sealed space between the pressure relief housing and a vertical channel of the fluid pump assembly, preferably its bottom surface, introducing a force combating or counteracting the force on the valve body or the valve assembly. Advantageously the pressure within this clearance "D" is significantly lower than the pressure within the pressure side within the fluid pump assembly, preferably the pressure is the same or even less than the pressure on the suction side.

[0010] According to an embodiment of the present disclosure, the valve assembly is operatively coupled with the filter assembly. The coupling between the filter assembly and the valve assembly allows for easy, fast, and user-friendly removal of the filter assembly and the valve assembly for maintenance or cleaning purposes.

[0011] According to an embodiment of the present disclosure, the valve assembly is threadedly coupled to the pressure relief housing. In some embodiments, the valve assembly is coupled to the pressure relief housing via a bayonet coupling. The valve assembly may be removably or fixedly coupled to the pressure relief housing as per the application requirements without limiting the scope of the present disclosure.

[0012] According to an embodiment of the present disclosure, the valve assembly is removably coupled to the filter assembly. The valve assembly may be removably coupled to the filter assembly for easy maintenance and thorough cleaning of individual assemblies.

[0013] According to an embodiment of the present disclosure, the fluid pump housing is fluidly coupled to a pressurized container. The pressurized container may supplement the fluid pump and may also allow the fluid pump to operate intermittently. The fluid pump may be operated intermittently because a continuously operating fluid pump may have a shorter operational lifetime.

[0014] According to an embodiment of the present disclosure, the spring is one or more of a compression spring and a disc spring. The spring may be chosen based on application requirement. Further, the disc spring may allow for compact design of the fluid pump assembly.

[0015] According to an embodiment of the present disclosure, the valve assembly corresponds to the assembly of a non-return valve. The non-return valve may be employed for blocking fluid pressure which may be applied by the fluid pump. The non-return valve prevents the fluid pressure built up by the fluid pump from dropping due to the outflow of fluid into the suction side inlet channel.

[0016] According to an embodiment of the present disclosure, the valve body in the second position of the valve body is positioned such that the flow of fluid is upstream of the valve body. The second position of the valve body is advantageously defined such as to avoid or prevent obstruction of the fluid flowing from the suction side inlet channel towards the pressure side outlet channel of the fluid pump assembly. The free flow of the fluid without obstruction of fluid flow due to the valve body minimizes the pressure losses in the fluid pump assembly and improves the working efficiency of the fluid pump assembly.

[0017] According to an embodiment of the present disclosure, the pressure relief housing includes a plurality of sealing elements around the outer periphery of the pressure relief housing. The plurality of sealing elements prevents the flow of fluid around the outer periphery of the pressure relief housing such as to allow optimum pressure relief for the valve assembly.

[0018] Other features and aspects of this invention will be apparent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The invention will be described in more detail with reference to the enclosed drawings, wherein:

FIG. 1 shows a front view of a fluid pump assembly, in accordance with an aspect of the present disclosure;

FIG. 2 shows a side cross-sectional view of a fluid pump assembly with a valve body in first position, in accordance with an aspect of the present disclosure;

FIG. 3 shows an enlarged view of a portion of the fluid pump assembly of **FIG. 2,** in accordance with an aspect of the present disclosure;

FIG. 4 shows a side cross-sectional view of a fluid pump assembly with a valve body in second position, in accordance with an aspect of the present disclosure; and

FIG. 5 shows an enlarged view of a portion of the

fluid pump assembly of **FIG. 4,** in accordance with an aspect of the present disclosure.

DESCRIPTION OF EMBODIMENTS

[0020] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the invention incorporating one or more aspects of the present invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, one or more aspects of the present invention may be utilized in other embodiments and even other types of structures and/or methods. In the drawings, like numbers refer to like elements.

[0021] Certain terminology is used herein for convenience only and is not to be taken as a limitation on the invention. For example, "upper", "lower", "front", "rear", "side", "longitudinal", "lateral", "transverse", "upwards", "downwards", "forward", "backward", "sideward", "left," "right," "horizontal," "vertical," "upward", "inner", "outer", "inward", "outward", "top", "bottom", "higher", "above", "below", "central", "middle", "intermediate", "between", "end", "adjacent", "proximate", "near", "distal", "remote", "radial", "circumferential", or the like, merely describe the configuration shown in the Figures. Indeed, the components may be oriented in any direction and the terminology, therefore, should be understood as encompassing such variations unless specified otherwise.

[0022] **FIG. 1** illustrates a fluid pump assembly **100.** The fluid pump assembly **100** may serve to convey a fluid, in particular water, from a source or from a storage vessel into a water line network, which may be provided, for example, for supplying a building and/or a garden. The fluid pump assembly **100** may be made from plastic, cast iron, stainless steel, cast steel, bronze, composite materials, carbon structural steel, alloy steel, or any other suitable material commonly known and utilized in the related art to provide strength and rigidity to the fluid pump assembly **100** against external or internal pressure or forces, such as, but not limited to, difference in working fluid pressure in different sections of the fluid pump assembly **100.**

[0023] The fluid pump assembly **100,** as shown in **FIGS. 1** and **2,** includes a fluid pump housing **110.** The fluid pump housing **110** includes a drive motor **112** and a fluid pump **115** coupled to the drive motor **112.** The drive motor **112** includes a motor shaft **111** which is mounted with ball bearings **113** and on each of which a fan wheel **114** and a fluid pump impeller **116** are mounted at the ends. The fluid pump impeller **116** has an essentially disk-shaped outer contour and is provided with guide vanes, which are provided for a radially outwardly directed delivery of the fluid during a rotational movement of the fluid pump impeller **116.** The fluid pump impeller **116** is disposed in a fluid pump chamber **122** defined within the fluid pump housing **110.**

[0024] The fluid pump assembly **100** further includes a suction side inlet channel **117** and a pressure side outlet channel **118.** The suction side inlet channel **117** allows for the introduction or inlet of the fluid to the fluid pump assembly **100** whereas the pressure side outlet channel **118** allows for the delivery or outlet of the pressurized fluid from the fluid pump assembly **100** for various domestic and industrial applications.

[0025] The suction side inlet channel **117** is disposed in an end region of the fluid pump housing **110** facing away from the drive motor **112.** The suction side inlet channel **117** is fluidly connected to the fluid pump housing **110** via a vertical channel **119.** The vertical channel **119** provides passage to the fluid entering the fluid pump assembly **100** towards the fluid pump chamber **122** via an opening **132.** The opening **132** is marginally above the bottom surface of the vertical channel **119** parallel to a central longitudinal axis X-X' (as shown in **FIG. 3)** of the vertical channel **119.** Further, the vertical channel **119** is equipped with a filter assembly **120.** The filter assembly **120** is arranged downstream of the suction side inlet channel **117.** The filter assembly **120** includes a filter network which is supported by a supporting structure. The filter assembly **120** may prevent damage to the fluid pump **115** by particles such as sand grains contained in the fluid. The filter assembly **120** may be made from plastic or any other suitable light-weight material known in the related art.

[0026] The filter assembly **120** may be removably arranged in the vertical channel **119** of the fluid pump housing **110** from top of the vertical channel **119** such that the top of the vertical channel **119** is covered by a cap **121** after the insertion of the filter assembly **120** in the vertical channel **119** of the fluid pump housing **110.** The cap **121** prevents the entry of the foreign elements (present in the surroundings of the fluid pump assembly **100)** in the vertical channel **119** and hence the filter assembly **120** to allow efficient working of the filter assembly **120.** In some embodiments, the cap **121** may be threadedly engaged with the vertical channel **119** and may be removed when the filter assembly **120** is to be removed from the fluid pump housing **110** for maintenance or cleaning purposes.

[0027] Further, as shown in **FIGS. 2** and **3,** a valve assembly **123** is arranged downstream of the filter assembly **120** for selectively allowing flow of fluid from the suction side inlet channel **117** towards the pressure side outlet channel **118** disposed in the fluid pump chamber **122.**

[0028] In some embodiments, the valve assembly **123** may be fixedly coupled to the vertical channel **119** by any means known in the related art. The valve assembly **123** may be advantageously coupled with the vertical channel **119** such that the valve assembly **123** may be able to absorb forces due to the differential pressure in the fluid

pump assembly **100.** The differential may be due to the pressure difference between suction side and pressure side of the fluid pump assembly **100.**

[0029] In some embodiments, the valve assembly **123** is removably disposed in the vertical channel **119** of the fluid pump housing **110** and is spatially arranged downstream of the filter assembly **120.**The valve assembly **123** is operatively coupled with the filter assembly **120** such that the valve assembly **123** and the filter assembly **120** may together be removed or withdrawn from the vertical channel **119** of the fluid pump housing **110** for maintenance or cleaning purposes which is advantageous over the prior art where the valve assembly **120** is not coupled to the filter assembly. In some embodiments, the valve assembly **123** and the filter assembly **120** may be fixedly coupled to one another. In some embodiments, the valve assembly **123** and the filter assembly **120** may be removably coupled to one another. The valve assembly **123** may be removably coupled to the filter assembly **120** for easy maintenance and thorough cleaning of individual assemblies. The coupling between the valve assembly **123** and the filter assembly **120,** whether permanent or removable, may be achieved by any suitable means known in the related art such as, but not limited to, use of adhesives, snap fitting among others.

[0030] In some embodiments, the center of the valve assembly **123** may be along the central longitudinal axis X-X'. In some embodiments, the center of the valve assembly **123** may be slightly offset from the central longitudinal axis X-X'. However, in actual implementation of the present disclosure, the valve assembly **123** may have any orientation with respect to the central longitudinal axis X-X' or the filter assembly **120** or the vertical channel **119** as per the feasibility of the operation of the fluid pump assembly **100** and without limiting the scope of the present disclosure in any manner.

[0031] The valve assembly **123** of the present disclosure corresponds to the assembly of a non-return valve. The non-return valve may be employed for blocking fluid pressure which may be applied by the fluid pump **115.** The non-return valve prevents the fluid pressure built up by the fluid pump **115** from dropping due to the outflow of fluid into the suction side inlet channel **117.**

[0032] The valve assembly **123** includes a valve housing **124.** The valve housing **124** includes a valve seat **125** for operatively supporting a valve body **126.** The valve body **126** includes an O-ring **134** around its outer periphery to prevent potential leakages. However, any other sealing element **134** is within the scope of the present disclosure. A valve stem **127** is operatively coupled to the valve body **126.** Further, a spring **128** is disposed around the valve stem **127.** The spring **128** is one or more of a compression spring and a disc spring. The spring **128** may be chosen based on application requirement, space constraint in the fluid pump assembly **100,** among other factors. Further, the disc spring may allow for compact design of the fluid pump assembly **100.**

[0033] The spring **128** allows the valve body **126** to move between a first position "P**1**" (as shown in **FIGS. 2** and **3)** and a second position **"P2"** (as shown in **FIGS. 4** and **5).** The valve assembly **123** disallows the flow of fluid from the suction side inlet channel **117** towards the pressure side outlet channel **118** in the first position "P**1**" of the valve body **126.** The valve assembly **123** disallows the flow of fluid from the suction side inlet channel **117** towards the fluid pump chamber **122** in the first position "P**1**" of the valve body **126.** Further, the valve assembly **123** allows the flow of fluid from the suction side inlet channel **117** towards the pressure side outlet channel **118** in the second position "P**2**" of the valve body **126.** The valve assembly **123** allows the flow of fluid from the suction side inlet channel **117** towards the fluid pump chamber **122** in the second position "P**2**" of the valve body **126.**

[0034] In a preferred embodiment of the present disclosure, the valve body **126** in the second position "P**2**" of the valve body **126** is positioned such that the flow of fluid is upstream of the valve body **126** or at least partly upstream of the valve body **126.** The valve body **126** in the second position "P**2**" of the valve body **126** is positioned such that the valve body **126** is at least partly below the opening **132.** The second position "P**2**" of the valve body **126** is advantageously defined such as to avoid or prevent obstruction of the fluid flowing from the suction side inlet channel **117** towards the pressure side outlet channel **119** of the fluid pump assembly **100.** The free flow of the fluid without obstruction of fluid flow due to the valve body **126** minimizes the pressure losses in the fluid pump assembly **100** and improves the working efficiency of the fluid pump assembly **100.**

[0035] Further, as shown in **FIGS. 1, 2** and **4,** the fluid pump assembly includes a pressurized container **129.** The fluid pump housing **110** is fluidly coupled to the pressurized container **129** via a flow channel **130.** The pressurized container **129** may supplement the fluid pump and may also allow the fluid pump **115** to operate intermittently. The fluid pump **115** may be operated intermittently because a continuously operating fluid pump **115** may have a shorter operational lifetime. The pressurized container **129** may establish a wired or wireless communication with the drive motor **112** and the fluid pump **115.** Further, the pressurized container **129** may be essentially designed as a cylindrical pressurized container **129** with a circular opening on the end face, through which a membrane made of elastic material may be introduced into a volume section surrounded by the pressurized container **129.**

[0036] Further, in the preferred embodiment of the present disclosure, as shown clearly in an enlarged view in **FIGS. 3** and **5,** the fluid pump assembly **100** includes a pressure relief housing **131** disposed downstream of the filter assembly **120** and the valve assembly **123** is operatively coupled with the pressure relief housing **131.** The pressure relief housing **131** is arranged downstream of both the filter assembly **120** and the valve assembly **123.** The pressure relief housing **131** may be made from

same or different material to the valve housing **124** as per the application requirement among other factors.

[0037] In some embodiments, the valve assembly **123** is threadedly coupled to the pressure relief housing **131.** In some embodiments, the valve assembly **123** is coupled to the pressure relief housing **131** via a bayonet coupling. The valve assembly **123** may be removably or fixedly coupled to the pressure relief housing **131** as per the application requirements without limiting the scope of the present disclosure. Further, a plurality of sealing elements **133** such as, but not limited to, O-rings **133** may be frictionally engaged between the pressure relief housing **131** and the side walls of the vertical channel **119.** The pressure relief housing **131** includes the plurality of sealing elements **133** around the outer periphery of the pressure relief housing **131** to prevent the flow of fluid around the outer periphery of the pressure relief housing **131** such as to allow optimum pressure relief for the valve assembly **123.** Further, the filter assembly **120,** the valve assembly **123** and the pressure relief housing **131** may together be taken out of the fluid pump housing **110** for maintenance or cleaning purposes in the embodiments where the filter assembly **120** is operatively coupled with the valve assembly **123.**

[0038] The pressure relief housing **131** includes an opening that aligns with the opening **132** to allow fluid flow from the suction side inlet channel 117 towards the pressure side outlet channel **118.** The bottom surface of the pressure relief housing **131** and the bottom surface of the vertical channel **119** have a clearance "D" between them as shown in **FIGS. 2, 3, 4** and **5.**

[0039] The clearance "D" is advantageously provided such as to combat or counteract against the effect of forces generated by the pressure difference in suction side and pressure side of the fluid pump assembly **100** on the valve body **126** or the valve assembly **123** during backflow of the fluid in the fluid pump assembly **100.** The clearance "D" allows the fluid to apply a downward force on the bottom of the pressure relief housing **131** during backflow of the fluid in the fluid pump assembly **100.** The downward force on the bottom of the pressure relief housing **131** results in reduction in net force on the valve body **126** or the valve assembly **123** and hence the filter assembly **120** coupled to the valve assembly **123.** This pressure relief housing **131** and the clearance "D" between the pressure relief housing **131** and the bottom surface of the vertical channel **119** provides advantage over the prior art where there is no provision for counterforce in an opposite direction to reduce the force acting on the valve body **126** or the valve assembly **123** that may damage or deform the filter assembly **120** and/or the valve assembly **123.**

[0040] In some embodiments, the clearance "D" may be 3 mm. In some embodiments, the clearance "D" may be between 3 mm - 6 mm. However, in actual implementation of the present disclosure, the clearance "D" may depend on various operational and structural factors of the fluid pump assembly **100.** Further, the spatial region representing the clearance "D" is well protected from inflow of the backflow fluid. The protection of clearance "D" from backflow fluid for proper functioning of the pressure relief housing **131** is achieved by virtue of the plurality of sealing elements **133** around the periphery of the pressure relief housing **131.**

[0041] Thus, the present disclosure provides the fluid pump assembly **100** which is advantageously designed in a manner such as to combat or counteract against the effect of forces generated by the pressure difference in suction side and pressure side of the fluid pump assembly **100** on the filter assembly **120** and the valve assembly **123** and prevent damage or deformation of the filter assembly **120** and the valve assembly **123.** The improved design of the fluid pump assembly **100** provides the pressure relief at the valve assembly **123** and further improves the working life of the fluid pump assembly **100.** The improved fluid pump assembly **100** allows for the filter assembly **120** with a light design thereby reducing the overall weight of the fluid pump assembly **100.** Further, the coupling between the filter assembly **120** and the valve assembly **123** allows for easy, fast, and user-friendly removal of the filter assembly **120** and the valve assembly **123** for maintenance or cleaning purposes.

[0042] In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation of the scope of the invention being set forth in the following claims.

LIST OF ELEMENTS

[0043]

100	Fluid Pump Assembly
110	Fluid Pump Housing
111	Motor Shaft
112	Drive Motor
113	Ball Bearings
114	Fan Wheel
115	Fluid Pump
116	Fluid Pump Impeller
117	Suction Side Inlet Channel
118	Pressure Side Outlet Channel
119	Vertical Channel
120	Filter Assembly
121	Cap
122	Fluid Pump Chamber
123	Valve Assembly
124	Valve Housing
125	Valve Seat
126	Valve Body
127	Valve Stem
128	Spring
129	Pressurized Container
130	Flow Channel
131	Pressure Relief Housing

132 Opening
133 O-rings, Sealing Elements
134 O-rings, Sealing Elements
P1 First Position
P2 Second Position
X-X' Central Longitudinal Axis
D Clearance

Claims

1. A fluid pump assembly **(100)** comprising:
a fluid pump housing **(110),** wherein the fluid pump housing **(110)** comprising:

a drive motor **(112);**
a fluid pump **(115)** coupled to the drive motor **(112);**
a suction side inlet channel **(117)** and a pressure side outlet channel **(118);**
a filter assembly **(120)** arranged downstream of the suction side inlet channel **(117);**
a valve assembly **(123)** arranged downstream of the filter assembly **(120)** for selectively allowing flow of fluid from the suction side inlet channel **(117)** towards the pressure side outlet channel **(118),**
wherein the valve assembly **(123)** comprises:

a valve housing **(124),** wherein the valve housing **(124)** includes a valve seat **(125)** for operatively supporting a valve body **(126);**
a valve stem **(127)** operatively coupled with the valve body **(126);** and
a spring **(128)** disposed around the valve stem **(127)** to allow the valve body **(126)** to move between a first position (**P1**)and a second position **(P2)** such that the valve assembly **(123)** disallows the flow of fluid from the suction side inlet channel **(117)** towards the pressure side outlet channel **(118)** in the first position (**P1**) of the valve body **(126)** and the valve assembly **(123)** allows the flow of fluid from the suction side inlet channel **(117)** towards the pressure side outlet channel **(118)** in the second position **(P2)** of the valve body **(126);**

characterized in that:

the fluid pump assembly **(100)** further comprises a pressure relief housing **(131)** disposed downstream of and operatively coupled to the valve assembly **(123),**
wherein the pressure relief housing is formed on the pressure side of the fluid pump assembly **(100)** such that the forces introduced on it combat or counteract against the effect of forces on the valve body **(126)** or the valve assembly **(123)** generated by the pressure difference in suction side and pressure side of the fluid pump assembly **(100).**

2. The fluid pump assembly **(100)** of claim 1, wherein a clearance "D" is formed by a sealed space between the pressure relief housing **(131)** and a vertical channel **(119)** of the fluid pump assembly **(100),** preferably its bottom surface, introducing a force combating or counteracting the force on the valve body **(126)** or the valve assembly **(123).**

3. The fluid pump assembly **(100)** of any one of , wherein the valve assembly **(123)** is operatively coupled with the filter assembly **(120).**

4. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the valve assembly **(123)** is threadedly coupled to the pressure relief housing **(131).**

5. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the valve assembly **(123)** is coupled to the pressure relief housing **(131)** via a bayonet coupling.

6. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the valve assembly **(123)** is removably coupled to the filter assembly **(120).**

7. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the fluid pump housing **(110)** is fluidly coupled to a pressurized container **(129).**

8. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the spring **(128)** is one or more of a compression spring and a disc spring.

9. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the valve assembly **(123)** corresponds to the assembly of a non-return valve.

10. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the valve body **(126)** in the second position (P**2**) of the valve body **(126)** is positioned such that the flow of fluid is upstream of the valve body **(126).**

11. The fluid pump assembly **(100)** of any one of the preceding claims, wherein the pressure relief housing **(131)** includes a plurality of sealing elements **(133)** around the outer periphery of the pressure relief housing **(131).**

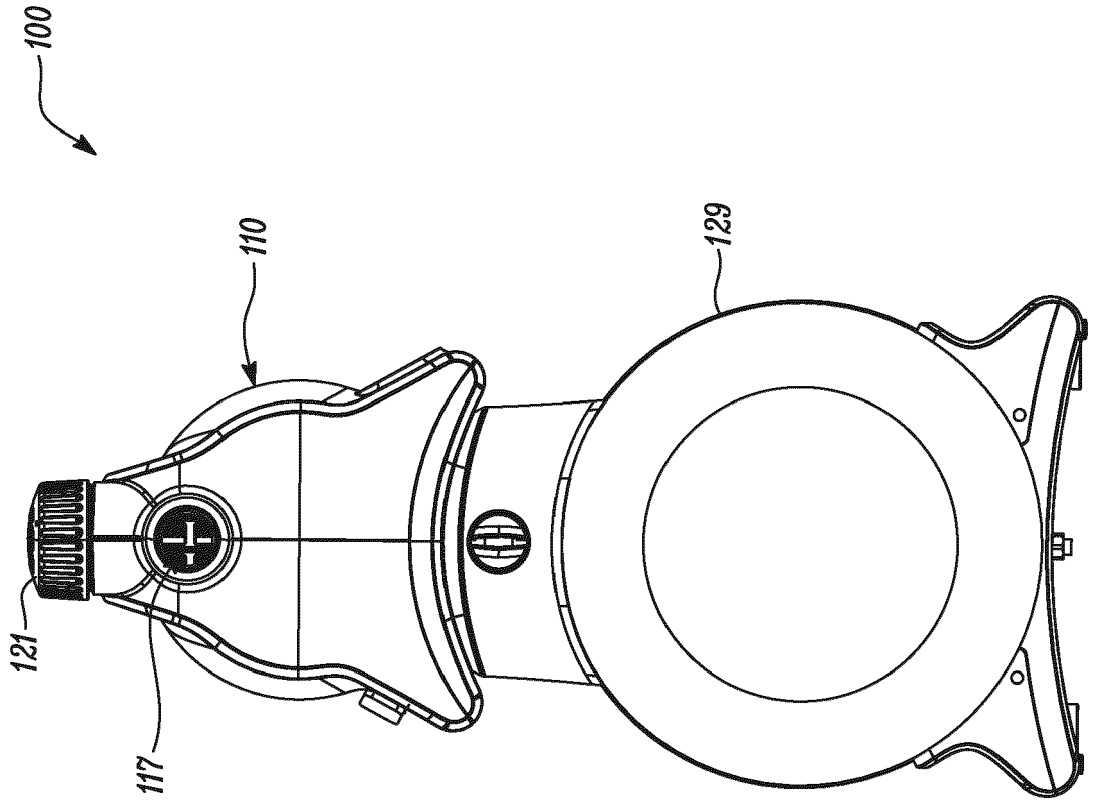

FIG. 1

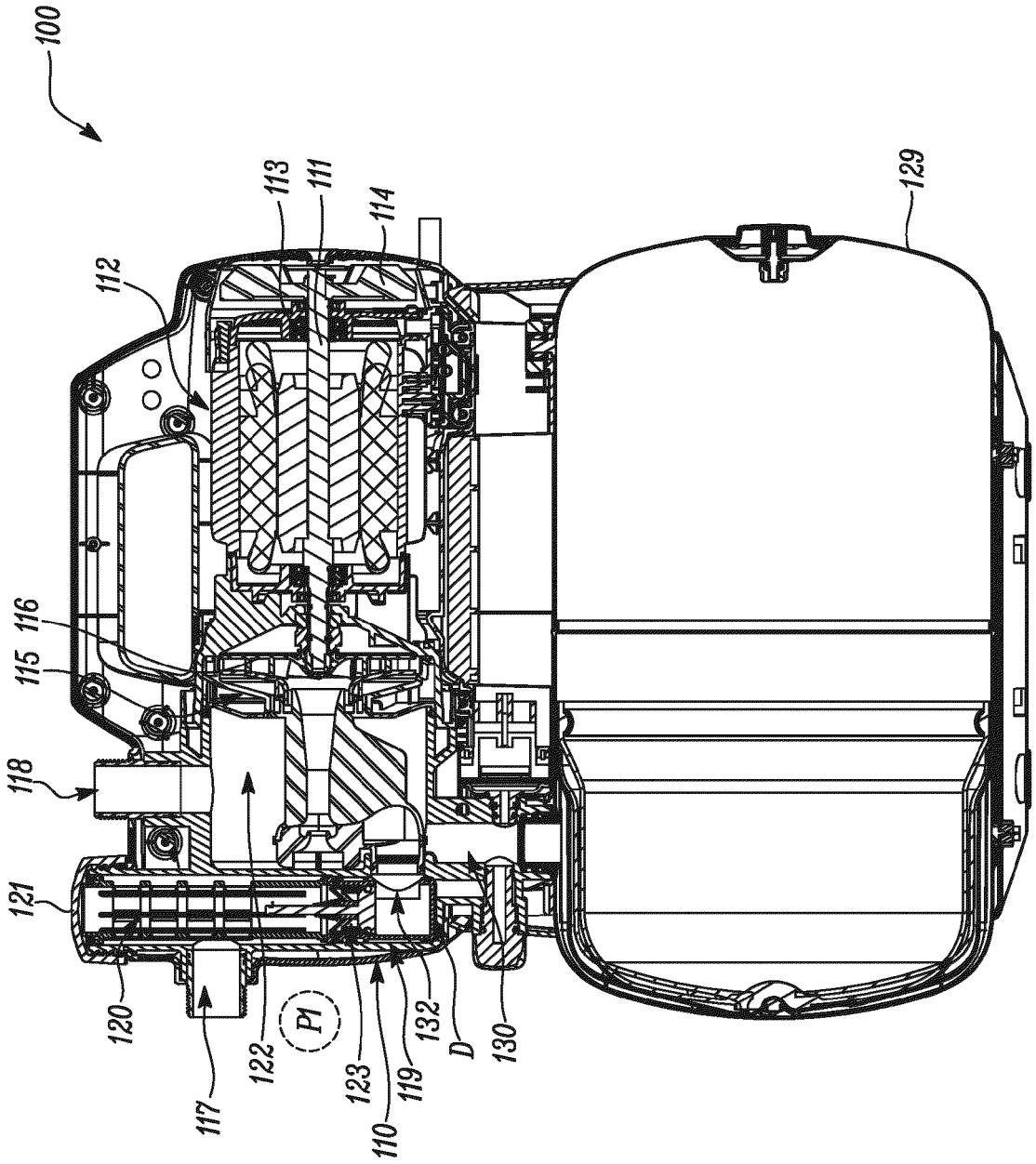
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FIG. 2

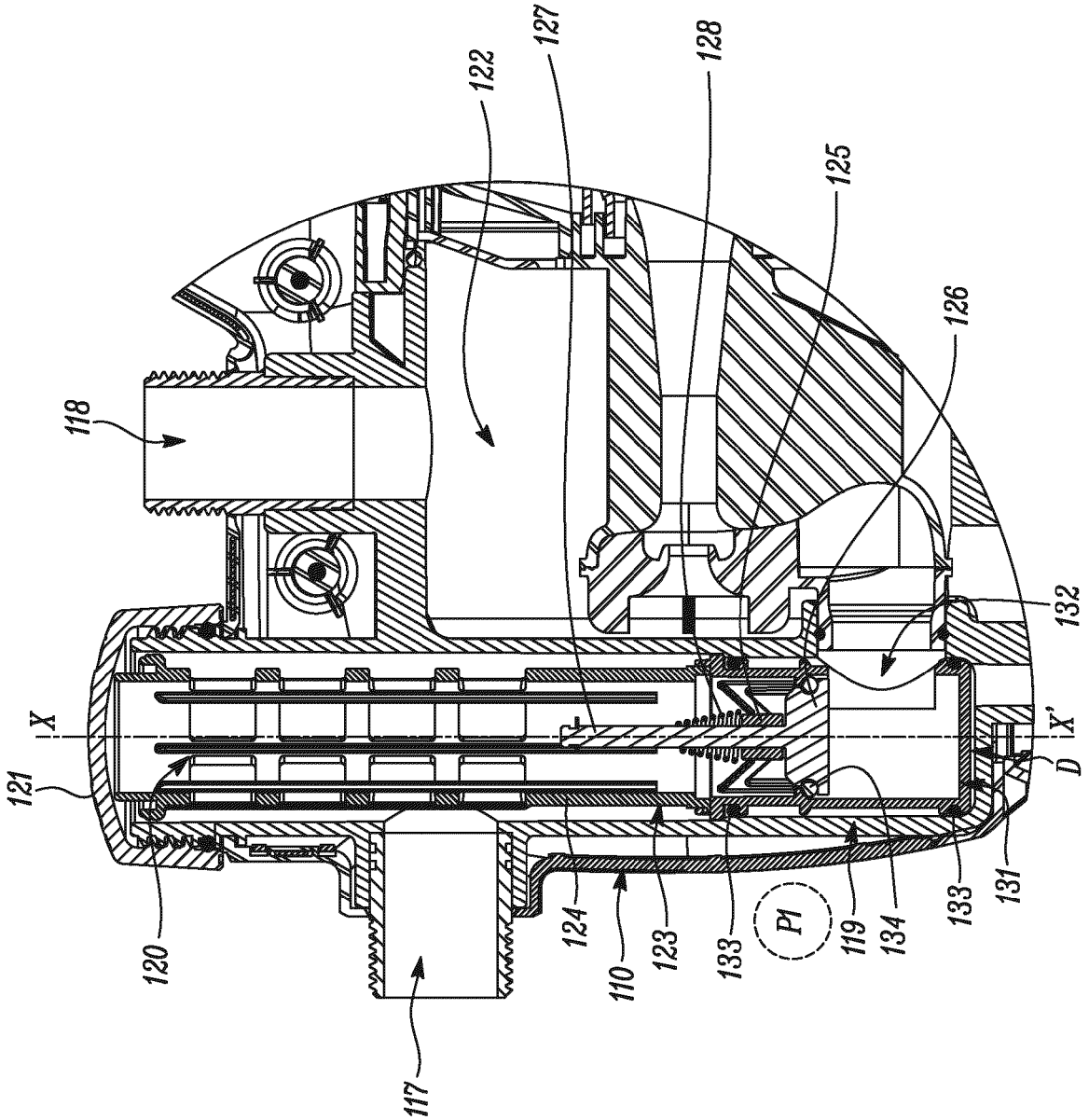
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FIG. 3

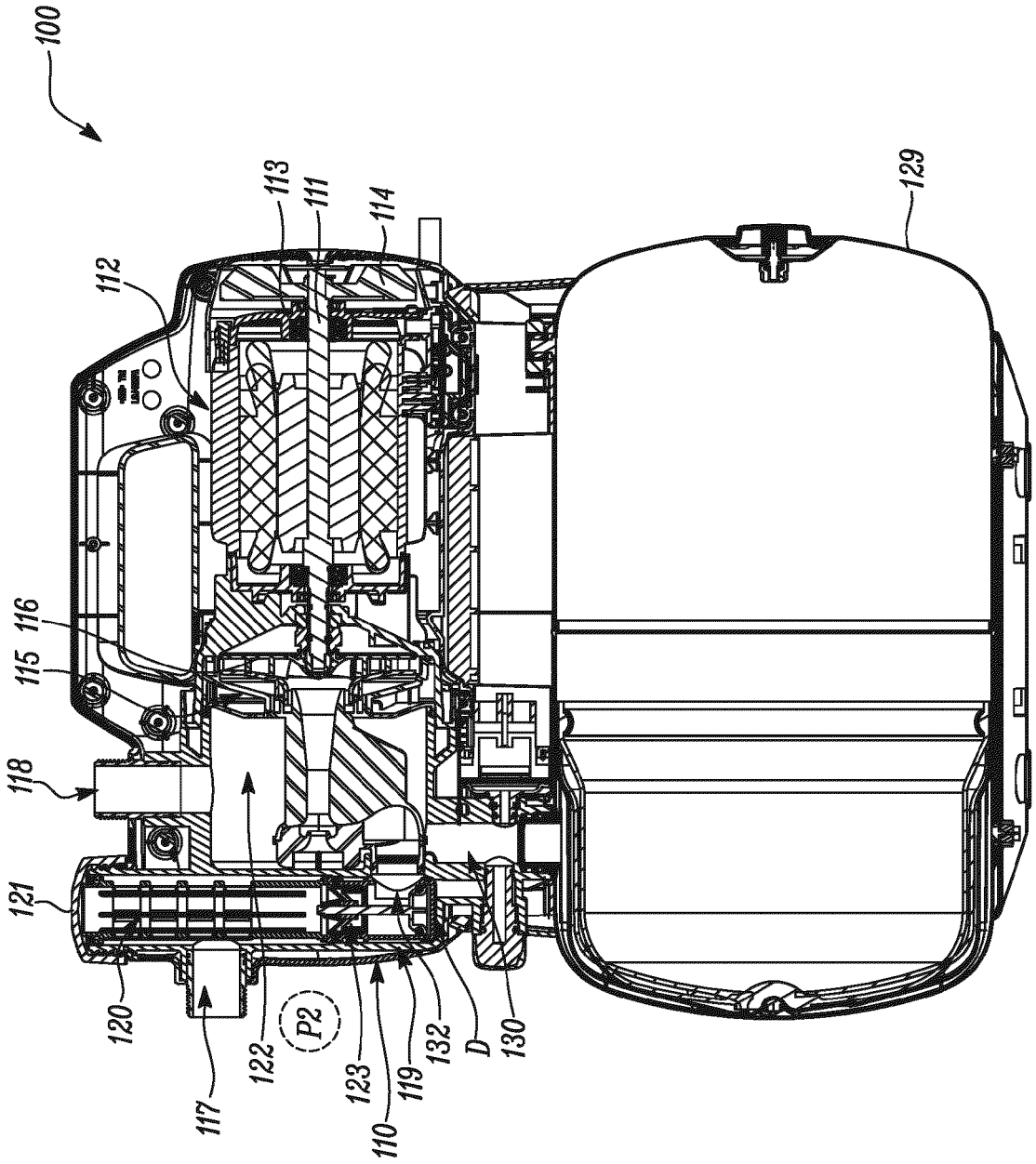
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FIG. 4

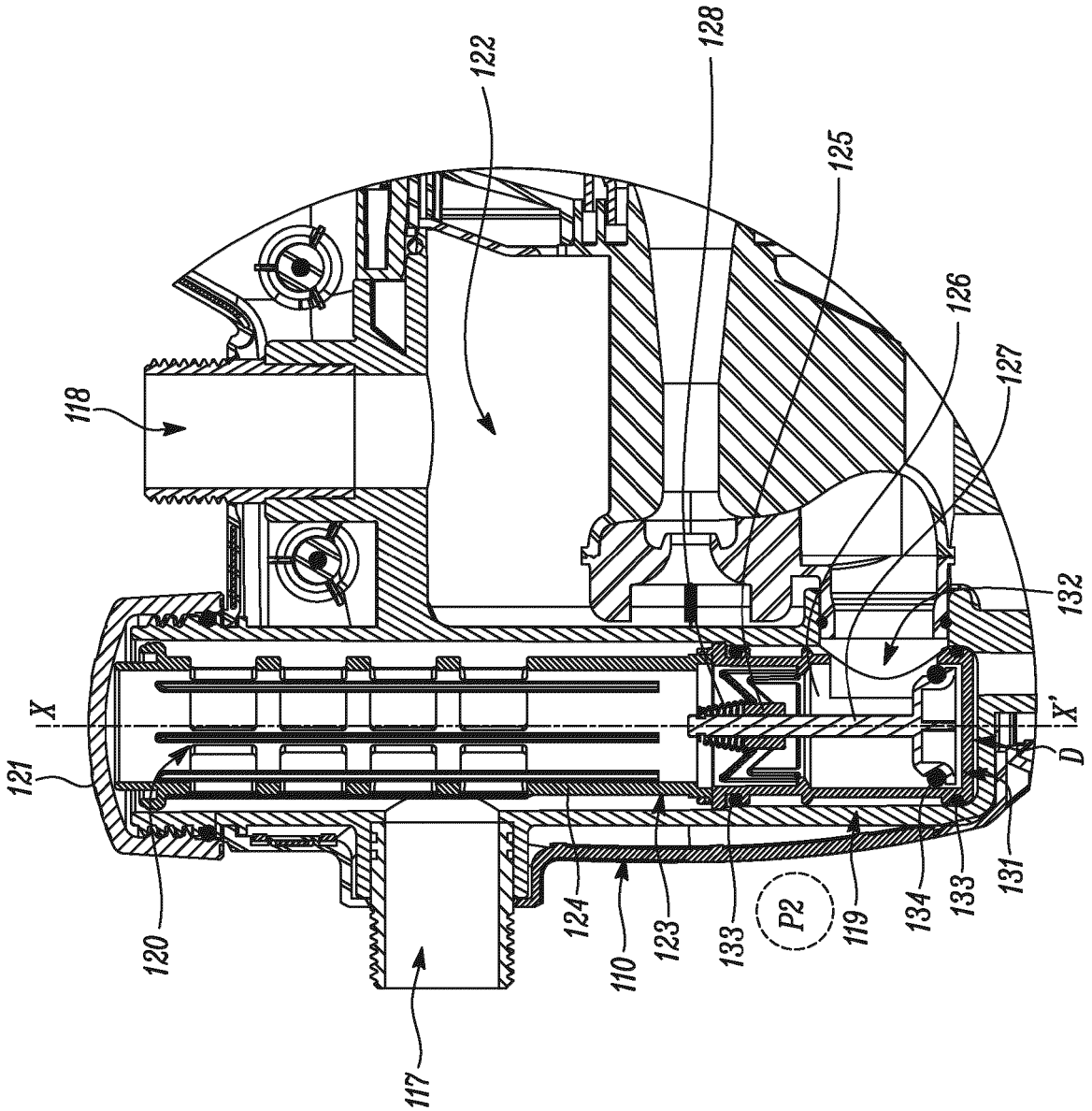
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FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 November 2022	Ingelbrecht, Peter

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