(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 311 967 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88116836.3**

(51) Int. Cl.[4]: **A61H 33/02**

(22) Date of filing: **11.10.88**

(30) Priority: **12.10.87 IT 2222187**

(43) Date of publication of application:
19.04.89 Bulletin 89/16

(84) Designated Contracting States:
DE ES FR GB SE

(71) Applicant: **Jacuzzi Europe Spa**
S.S. Pontebbana km 97,2
I-33098 Valvasone (Pordenone)(IT)

(72) Inventor: **Villafranca Soissons, Emanuele**
Via Martiri della Libertà, 10
I-33098 Vavasone (Pordenone)(IT)

(74) Representative: **Dragotti, Gianfranco et al**
SAIC BREVETTI s.r.l. Viale Bianca Maria, 15
I-20122 Milano(IT)

(54) Improved hydromassage fitting with automatic closure.

(57) In a hydromassage fitting (10) a first sleeve (54), a jet generator mounted on an orientable spherical body (12) and containing an axially movable nozzle (60),actuated by an external actuator (82), said nozzle being retracted under the control of said external actuator (82) to leave a passage space for the jet water, said nozzle (60) comprining a non return valve (100) adapted to permit the flow of fluids from inside to outside of the nozzle but not viceversa, thus acting as a check valve to prevent the backflow of water from a tub served by said fitting (10) to the air pipings of said fitting, said nozzle (60) cooperating with the sleeve (54) to prevent, in the extended position, the backflow of water from said tub to water circulation circuits of said fitting.

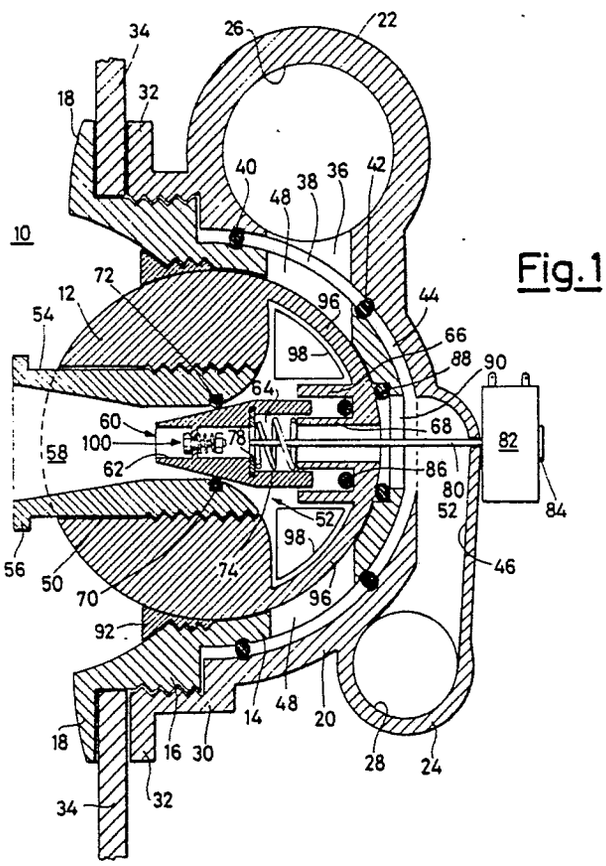

Fig.1

EP 0 311 967 A2

"IMPROVED HYDROMASSAGE FITTING WITH AUTOMATIC CLOSURE"

The present invention relates to an improved hydromassage fitting provided with an automatic closing system to prevent the backflow of water, present in a bath tub, both in the water circulation system and in the air suction nozzles of said fitting.

It is well known that the hydromassage practice consists in having the body of the user, immersed within a tub or pooll, impinged with a water jet under pressure, mixed with air, delivered by one or more fittings provided in the walls of the tube or pool.

More particulary the water, passing through a Venturi pipe shaped section, gives place to a depression wich, in turn, causes an air suction wich is intimatly admixed with the water to occur.

The fittings of known type are moreover provided with systems rendering them orientable, although within a rather limited angle range, so that the jet is directed with the desired inclination with respect to the user's body.

A first problem related to the known fittings is that of the adjiustment, particularly of the closing of the jet delivery from one fitting, the other fittings connected to the same hydraulic and pneumatic circuit being maintained in operation. As a matter of fact, when the total closing of the water supply to a fitting is carried out, often a water suction from the inside of the tub through the air suction duct of the subject fitting takes place.

Another problem related to the known fittings is that of the stagnation of a certain amount of water in the body of the fitting during the non operation period, that stagnation involving hygienic problems which do not need further comments.

An other problem related to the known fittings is that of the possibility of an easy dismounting for the access to the internal parts for operations of cleaning, maintenance and/or failure repairing.

A further problem is the risk of water backflow from the tub into the water recirculation circuit for the hydromassage through the said fittings during a normal use of the bath tube for the only detersion which may lead to the entrance in into said circuit of aqueous solutions of soaps or other detergents containing surface active substances which give place to serious drawbacks of an excessive foaming when the hydromassage is started again, apart from the above mentioned hygienic problems related to the stagnation of said solutions within the water recirculation circuit.

Part of the above mentioned problems is faced and solved by the provisions disclosed in the European Patent Application No. 85.108.947.4 filed on July 17, 1985 in the name of same Applicant as the present application, according to which the backflow of water in the sections conveying air of a hydromassage fitting and also the stagnation of water in the most external parts of the same fitting are prevented, at the same time permitting an easy dismounting of the said fitting to carry out maintenance and repairing operations.

Said fitting, as described and claimed in the above mentioned European Patent Application No. 85.108.947.4, is rather satisfactory in operation as regards the water backflow within the air circuit and the elimination of stagnation within the fitting body, whereas it requires the manual closure of the jets of hydromassage water in order to avoid the backflow of the bath water into the water circulation system, in the case said tub is to be used for an ordinary bath operation.

The latter drawback is essentially done away with by means of the solution proposed in the Italian Patent Application No. 22165 A/85, filed on September 17, 1985, which in this connection provides such a closing of the hydromassage fittings of at least a suction valve to prevent the entrance of soapy water within the recirculation system of the hydromassage, said closing being obtained for said fittings by means of a plug member wich is maintained in normal closed condition by a spring and is brought to the open condition by the pressure building acting in the hydromassage recirculation water, and on said that least one normally closed suction valve which is opened by a hydraulic membrane actuator providing for the opening of said valve as a conseguence of the water pressure being formed within the said recirculation system and consequently within the hydraulic actuator.

This solution operation in a rather good manner, but has the drawback of a not negligible complexity related to the hydraulic actuators operated by water pressure generated by the hydromassage recirculation pump and moreover makes the opening for at least one suction valve depending on the presence of pressure within the delivery duct of the recirculation pump and, owing to the use of normally closed filing members within the delivery fittings, makes it necessary a pressure supplied from the recirculation pump such as to overcome the springs of said plug members, whereby the hydromassage pressure cannot be lowered below a certain minimum value which might be dangerous for particularly delicate persons who are readily subjected to rupture of the blood capillaries as caused by a too energic hydromassage action.

The above mentioned drawbacks are eliminated by a hydromassage fitting according to the present invention comprising automatic closing

means for the fitting controlled by external actuators (such as electromagnets), which are controlled together with a motor of a recirculation pump.

Said hydromassage fitting is essentially formed by a hallow sleeve (54) mounted to an orientable spherical body (12), internally provided with a converging-diverging passage (58) shaped as a Venturi pipe, characterized in that in said passage (58) a movable nozzle (60) is contained, which operates between an advanced position for the closing of said passage and a withdrawn position for the opening thereof, which can be actuated by means of an external actuator (82) which is operated simultanouesly with motor driving the recirculation pump.

More particulary, said external actuator (82) is an electromagnet which is parallelly connected with respect to the motor of said recirculation pump.

Still more particularly said movable nozzle is provided with a check valve (100) , preventing the water present in the tub from flowing within the air circuit of the hydromassage system and when is opened with the movable nozzle (60), being withdrawn, permits the outflow of water in the Venturi pipe passage (58) with attendant depression before the same nozzle (60).

Still more particularly, said movable nozzle (60) consists of a first conical part followed by a cylindrical part adapted to enter between two guiding cylindrical walls (66 and 68) when said nozzle is withdrawn to permit the passage of water and the consequent air suction.

Furthermore said movable nozzle (60) is maintained in the closed position by a spring (74) reacting between said nozzle (60) and the internal cylindrical wall (68) of the two coaxial cylindrical walls (66 and 68) and is withdrawn into the open position by a rod or flexible wire (80) actuated by said electromagnet of the external actuator (82).

Said movable nozzle (60) is pushed by said spring (74) through a perforated plate or disk (78) and the movement thereof is limited and dampered by an elastic bearing (86) housed between the two cylindrical walls (66) and (68) it operating also as a further seal packing to prevent leakage of water under pressure in the air passage area.

Particularly said sleeve (54) mounted in said spherical body (12) is movable according to an axial direction provided by the engagement of a screwed part thereof within a screwed hole (50) of said spherical body to vary the flow rate of said sleeve.

Alternatively said electromagnetic actuator (82a) is housed within a chamber in which said suction air is flowing and is fastened to a wall thereof by means of an orientable joint, such as a ball joint (85), to follow the orientation given to the sleeve (54) and to the movable nozzle (60) by the positions taken by the spherical body (12).

According to a further alternative said electromagnetic actuator (82a), housed in said chamber in which said suction hair is flowing, is fixed to a wall thereof by means of a flexible support.

These and other features and advantages of the present invention shall appear from the following detailed description taken together with the enclosed drawings, in which:

figure 1 is a cross-section view of a fitting according to the present invention in the non operating status;

figure 2 is a cross-section, enlarged view of a detail of the air suction nozzles of the aforesaid fitting in the non operating status;

figure 3 is a cross-section view of the same fitting according to the present invention in the operating status;

figure 4 is a cross-section, enlarged view of the detail of the air suction nozzle of the aforesaid fitting in the operating status;

figure 5 is a partial cross-section view of a fitting according to the present invention in the non operating status using an alternative type of actuating electromagnet permitting a greater jet orientability of the fitting jet;

figure 6 is a partial cross-section view of the same fitting of figure 5 in the operating status.

Referring to the above listed figures 1 to 4 it is seen that the fitting 10 according to the present invention comprises an orientable body 12 of essentially spherical shape, inserted within a first base 14 shaped as a hemispherical cavity, adapted to the shape of said body 12 , and further terminating with an outwardly screwed cylindrical area 16, extended by a flange 18, said base 14 being in turn inserted within a housing or case 20 of essentially hemispherical shape having integrally formed therewith a pipe connection 22 for the inlet of water and a pipe connection 24 for the air inlet , comprising respective ducts, 26 and 28, and extended in a cylindrical part 30 which is outwardly screwed and terminates with a flange 32 cooperating with the flange 18 to fasten the fitting 10 to a wall 34 of a tub or pool.

The said housing or case 20 is provided with the passage 36 communicating with the duct 26 for the water and determines with the internal base 14 a hollow space.

Said hollow space is divided into a first zone 38 forwardly defined by a first packing 40 and rearwardly by a second packing 42 and in a second zone 44 which is internally delimited by said packing 42 and rearwardly connected with a cavity 46 in turn communicating with the air duct 28.

Said internal base 14 is moreover provided

with openings 48 communicating with said first zone of the hollows space 38 to permit a water flow to within the same base 14.

Taking again into consideration the spherical body 12, it is provided with an axial cylindrical cavity 50 which is partially screwed and terminates into a chamber 52 essentially shaped as a spherical cap with curved bottom radiused with a cylindrical sleeve 54 which terminates forwardly with an enlarged flange 56 and is internally provided with a converging-diverging passage 58 forming a Venturi pipe, which is radiused in the converging part to the said spherical cap chamber 52.

Within said Venturi pipe passage 58, a movable nozzle 60 is housed having substantially the shape of a truncated cone connected to a cylinder, provided with a first internal duct 62 broadening in a second greater duct 64 and with a cylindrical part slidable between two coaxial cylindrical walls 66 and 68 forming a guide therefor.

The conical surface of said movable nozzle may be sealingly engaged against an annular packing 70 housed in a suitable grove 72 within the converging area of the Venturi pipe.

The movable nozzle 60 is maintained in the position shown in figure 1 by a spring 74 abutting from one side against a shoulder 76 determined by the transition part between the greater duct 64 and the minor duct 62 (see particularly figure 2) and by the other side against the internal end of the cylindrical wall 68 so that, by abutting against the annular packing 70, a perfect sealing effect is ensured between the passage 58 of the sleeve 54 and the said nozzle 60.

More particularly, the spring 74 abuts against the shoulder 76 through a circular plate 78, perforated or anyhow having holes, from the center of which a small rod or wire unextensible and having a certain flexibility 80 comes out, it being connected to a movable armature of an actuating device such an electromagnet 82 and terminating with a stop disk 84.

An elastic bearing 86, such as an annular rubber seal, is housed in the hollow space between the two cylindrical walls 66 and 68 , acting as shock absorber of shocks and as sealing packing for said movable nozzle 60.

An annular packing 88, clamped between the outer surface of the spherical body 12 and a shoulder of the hemispherica activity base 14 , close to a bottom opening thereof 90, provides a sealing effect between the areas involving pressure water and the areas involving suction air, said packing 88 being pressed within its seat against the bottom opening 90 from the spherical body 12 pushed and maintained in its position by a substantially annular screwed body 92 which is screwed in an internal screwed part of the base 14.

The rear part of the spherical body 12, enclosing the spherical cap chamber 52, is formed by ribs or lands 96, alternating with opening or windows 98, which permits a comunication with the openings 48 of the base 14 and thus with the first zone of hollow space 38, the passage 36 and the water duct 26.

The cavity 62 of the movable nozzle 60 contains also a check valve 100 comprising check head 102 engageable against a perforated abutting wall or seat 104 connected to said movable nozzle 60 by a stem 106, normally screwed, by a return spring 108 and by a nut 110 for the adjustment of said spring 108.

An alternating form of actuating electromagnet 82a is shown in the figures 5 and 6, said electromagnet 82a being housed in a dome 83 formed in the air entry path and connected to a cavity 46a like the cavity 46 of the figures 1 and 3.

The electromagnet 82a is housed in a cover or bracket 81 of isolating material, for example obtained by casting or injection molding, around the electromagnet body and provided with a screwed wall adapted to engage the stem of a hemispherical head screw 85, having curvature facing towards the stem, cooperating with the hemispherical seat 85 to form a ball joint permitting the electromagnet 82a to be orientated according to the orientation of the spherical body 12 so that the electromagnet 82a is always perfectly aligned with the rod 80, which thus may be manufactured with greater streenght then a simple wire, unextensible and slightly flexible.

The electromagnet 82a is energized by means of two electrodes 89 connected to two elastic blade contacts 91, abutting against two conducting metal lands fixed to the isolating cover 81 of the electromagnet 82a, so as to always ensure a good connection between said electrodes 89 and consequently the external network, and the coil of said electromagnet 82a. The operation of the fitting 10 of the present invention is the following: the spherical body 12, having the cylindrical sleeve 54 mounted thereto, serves as orientable jet carrier to direct at will the hydromassage jet within some obvious limits.

The movable nozzle 60 within the Venturi type passage 58 is in the position of figure 1, when the hydromassage fitting is non operating, abutting against the annular packing 70 and consequently preventing any backflow of water from the tub to the recirculation system of the hydromassage water.

For the same purpose , the valve 100 within the internal duct 62 of the movable nozzle 60 prevents the tub water backflow to the air inlet system of the hydromassage since not only the spring 108 tends to keep the valve 100 closed but

moreover the water column present in the tub cooperates to the closing thereof.

When the fitting 10 is to be operated, the water recirculation pump is actuated, by which water is conveyed to the duct 26 and, at the same time, the electromagnet 82 is energized which , by means of the rod or wire 80 does attract the through-hole plate 78 consequently also the movable nozzle 60, which, by overcoming the force of the spring 74, takes the position of figure 2 with the edge of its cylindrical portion abutted against the elastic bearing 86 acting also as sealing packing , whereby possible leakage of water from the chamber 52 to the cavity defined by the cylindrical wall 68, acting as air inlet within the nozzle 60, are prevented.

The presence of pressure within the water duct 26 and the withdrawal of the movable nozzle 60 owing to the electromagnet 82 permits the same water to come out from the passage 58 to the Venturi pipe within the tub-.As a matter of fact water passes from the duct 26, in the manner indicated by the arrows 12 and 114, within the hollow space 38, the openings 48 of the base 14 an through the windows 98 in the chamber 52 flowing therefrom according to the arrows 116 through the throat of the Venturi pipe passage 56 and then within the same tub itself originating a jet.

Owing to the narrowing formed between the passage 58 and the nozzle 60 a depression is caused just before the same nozzle, thus provoking the resing of the valve 100 and thus the outler of air which is admixed with the water jet giving place to the required hydromassage effect.

As indicated in the figures 3 and 4 the air coming from the duct 24 passes through the cavity 46 and the chamber defined by the wall 68 according to the arrow 118 and then comes out from the nozzle 60 along the arrows 120 thus producing bubbles in the same water jet.

The stopping of the water circulation pump with simultaneous deenergizing of the electromagnet 82 restores the movable nozzle to the position of figure 1, engaging it against the annular seal packing 70 and thus preventing any water backflow from the tub within the inside of the fitting 10.

The possibilities of orientation at will of the jet of the fitting 10 are afforded by hemispherical shape of the body 12 which, being retained within the cavity formed by the base 14 and by the screwed annular body 92 screwed in said base 14, is freely orientable within the limits allowed by the flexibility of the wire 80 connecting the perforated plate 78 of the nozzle 60 with the electromagnet 82.

In order to select the desired orientation of the body 12 it is enough to grasp the protruding part of the cylindrical sleeve 54 and bring it to the desired position.

The alternative embodiment partially illustrated in the figures 5 and 6 permits the jet of the fitting 10 to be still oriented, but at that time a change of orientation of a spherical body 12 does not correspond to a change of deflexion of the small rod or wire 80, but to a different orientation of the head of the screw 85 , by which the electromagnet 82 is secured within its hemispherical seat 87 so that the rod 80 and the electromagnet 82a are always axially aligned, permitting a safer operation of said electromagnet.

Within some limits also the flow rate of the hydromassage jet can be adjusted by screwing on or off the said cylindrical sleeve with respect to the spherical body 12, wherein the space being formed between the throat of the passage 58 with Venturi tipe and outer wall of the movable nozzle 60 when it is in the operating position of figure 3, and thus the water flow rate through said space are diminished or increased.

The assembling of the fitting 10 and the securing thereof to a wall 34 of a tub or pool can be carried out in the following manner:

The spherical body 12 having the movable nozzle 60 inserted thereinto and provided with all the necessary auxiliary parts, such as the check valve 100, the perforate plates 78, the return spring 74 and the small rod or wire 80 is prepared and lastly the cylindrical sleeve 54 is screwed into the axial cylindrical cavity 50 so as to close the spherical body 12.

Then the spherical body 12 is inserted within the hemispherical base 14, taking care of abutting it against the elastic annular packing 88 which in turn in abutted against a shoulder adjacent to a bottom opening 90 of said base and then it is tightened within the base by inserting the annular screwed body 92 within its seat and screwing it so as to ensure a permanent connection between the spherical body 12 and the base 14 although a sliding motion betweeen each other is permitted.

Then the assembly comprising the base 14 and the spherical body 12 is inserted within an opening of a wall 34 of tub or pool, behind which the case 20 has been positioned.

Obviously before inserting said base 14 within the opening of the wall 34 it is provided with the annular packings 40 and 42 which shall serve to position the base 14 with respect to the case 20, thus determining the first hollow space zone 38 and the second hollow space zone 44 and during the insertion care is taken of having the small rod or wire 80 passing through a hole of a cavity 46 to permit the connection thereof to the electromagnet 82.

Alternatively , in the case of the embodiment shown in figures 5 and 6, care must be taken of inserting the electromagnet 82a within the dome

shaped part 83, having the screwed hole of the isolating cup 81 thereof coincident with an enlarged perforation within the hemispherical seat 87, so as to permit the securing of the electromagnet 82a to the bottom of the dome 83, although a orientation change of the spherical body 12 is permitted.

Once the base 14 is inserted within the case 20, its screwed cylindrical part 16 is screwed within the screwed cylindrical part 30 permitting a clamping of the wall 34 between the flange 18 of the base and the flange 32 of the case 20 and consequently a final securing of the fitting 10 to the wall 34.

The above is a preferred embodiment of the invention , with an alternative thereof, and the person skilled in the art from the reading of the present specification shall be able to conceive variations and solutions totally or partially equivalent to be considered all within the scope of the present invention, such as for example the use of an elastic flexible mounting for the electromagnet 82a instead of the hemispherical head screw 85, as above illustrated.

Claims

1. Hydromassage fitting provided with a sleeve (54) for the direction a water jet, housed within an orientable spherical body (12) contained in a case (20), characterized in that said sleeve (54) comprises automatic closing means controlled by actuators (82), externally positioned with respect to said fitting , controlled together with a motor of a water recirculation pump.

2. Hydromassage fitting according to claim 1, essentially formed by a hollow sleeve (54) internally provided with a passage (58) characterized in that said passage 58 is of converging -diverging shapes as a Venturi pipe, and in the same passage a movable nozzle (60) is contained, operating between an advanced position in which said passage (58) is closed and a withdrawn position in which it is open, actuatable by means of an external actuator (82) which is operated simultaneously as the motor driving said recirculation pump.

3. Hydromassage fitting according to claim 2, characterized in that said external actuator (82) is an electromagnet connected parallely to the motor of said recirculation pump.

4. Hydromassage fitting according to claim 2, characterized in that said movable nozzle (60) is provided with a check valve 100, preventing the water present in the tub from backflowing within the air circuit of the hydromassage system and is opened when the movable nozzle (60) being withdrawn permits the entry of water in the Venturi pipe passage (58) with the attendant depression before the same nozzle.

5. Hydromassage fitting according to claim 2, characterized in that said movable nozzle (60) comprises a first conical zone followed by a cylindrical zone adapted to be inserted between two guiding cylindrical walls (66 and 68) when said nozzle is withdrawn to permit the passage of water and the consequent air suction .

6. Hydromassage fitting according to claim 5, characterized in that said movable nozzle (60) is maintained in the closed position by a spring 74 abutting between said nozzle (60) and the cylindrical wall (68) of the two coaxial cylindrical walls (66 and 68) and is withdrawn into the opening position by a small rod or wire (80) actuated by said electromagnet of the external actuators (82).

7. Hydromassage fitting according to claim 6, characterized in that said movable nozzle (60) is pushed by said spring (74) through a perforate plate or disk (78) and the movement thereof is limited and dampered by an elastic bearing (86) housed between the two cylindrical walls (66) and (68), acting also as further sealing packing to prevent the leakage of water under pressure into the areas of air flow.

8. Hydromassage fitting according to claim 2, characterized in that said sleeve (54) mounted in said spherical body (12) is movable according to an axial movement obtained by engagement of a screwed part thereof in a screwed hole (50) of said spherical body (12) in order to vary the flow rate of the said sleeve.

9. Hydromassage fitting according to claim 2, characterized in that an electromagnetic actuator (82a) is housed within a chamber in which said suction air is flowing and is secured to a wall thereof by means of an orientable joint such as ball joint (85) to follow the orientation given to the sleeve (54) and to the movable nozzle (60) by the position taken by the spherical body (12).

10. Hydromassage fitting according to claims 2 and 9, characterized in that said electromagnetic actuator (82a), housed in said chamber in which suction air is flowing, is fastened to a wall thereof by means of a flexible support.

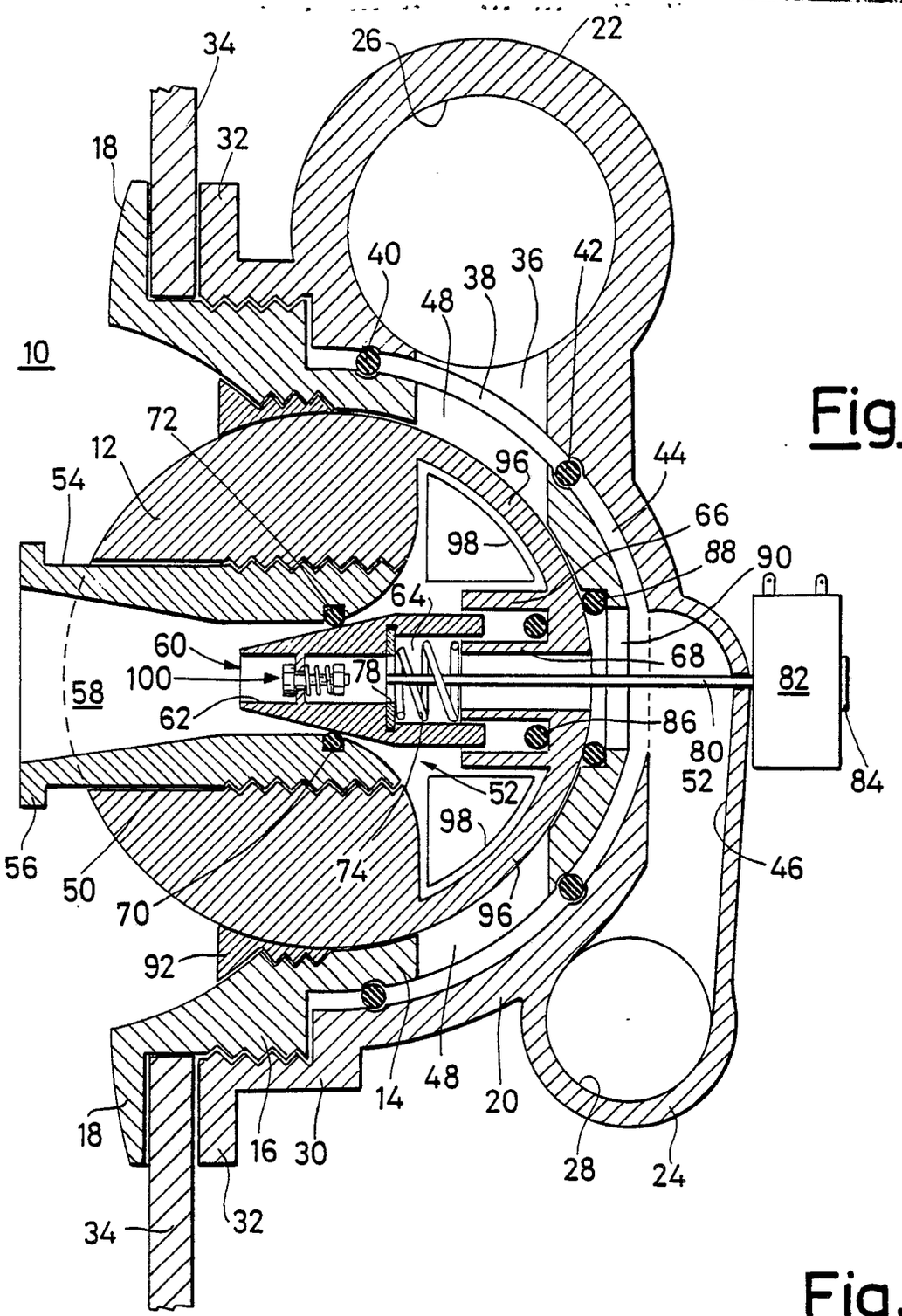

Fig.1

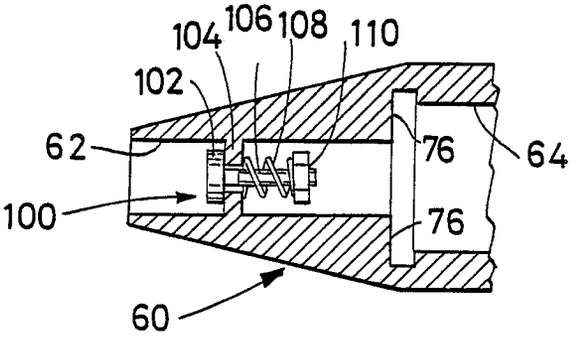

Fig.2

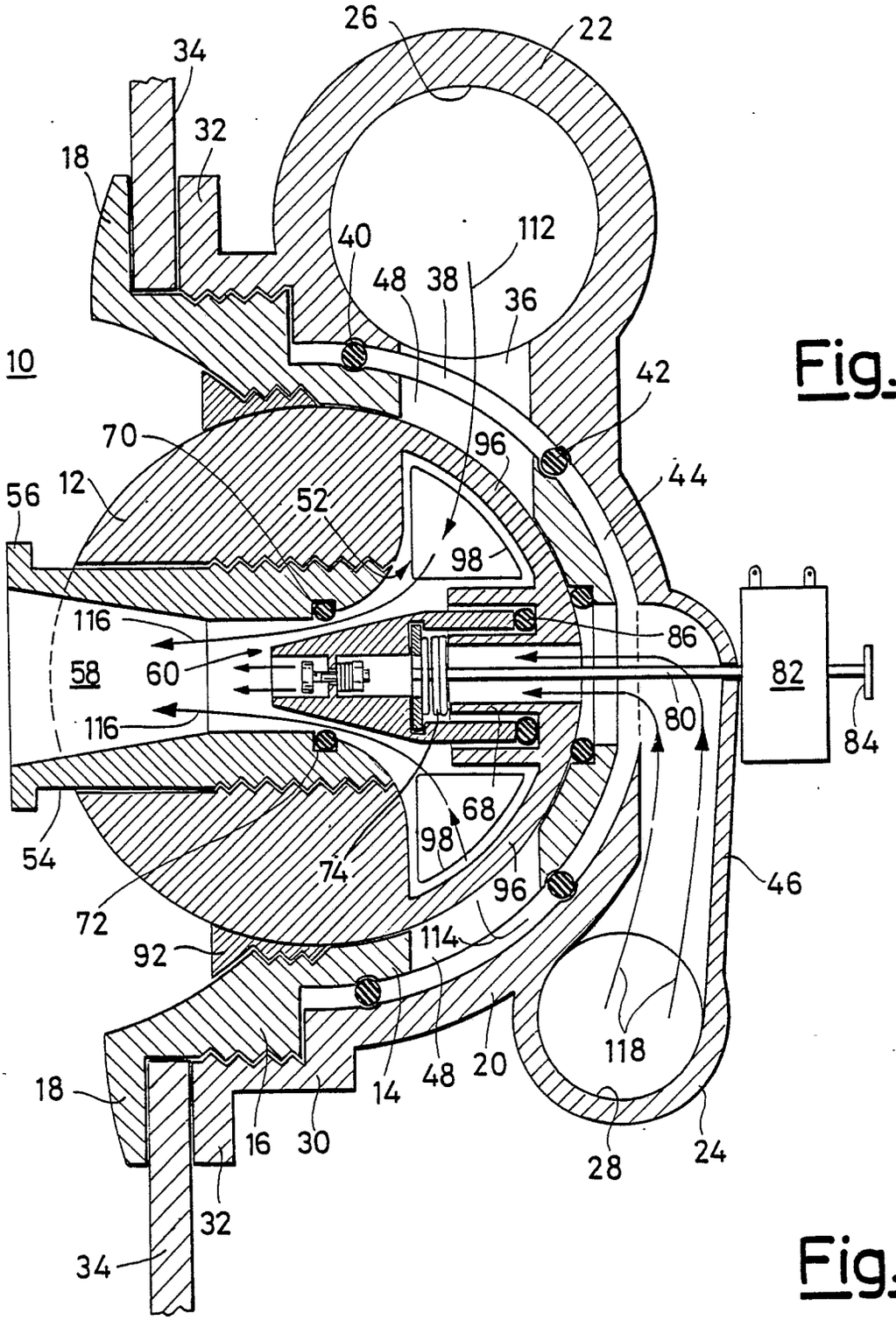
26
22
34
32
18
40
112
48
38
36
10
42
70
96
44
56
12
52
98
116
86
58
60
82
116
80
84
68
54
98
74
96
46
72
92
114
118
18
48
20
14
16
30
28
24
32
34

Fig.3

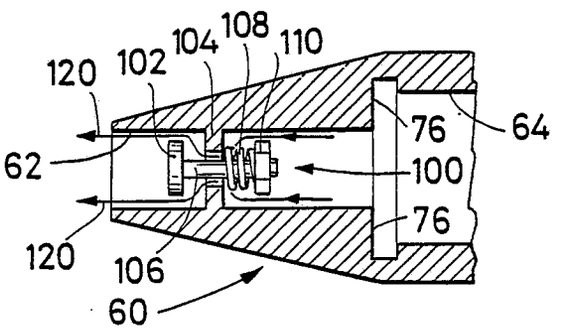
120
102
104
108
110
76
64
62
100
76
120
106
60

Fig.4

Fig.5

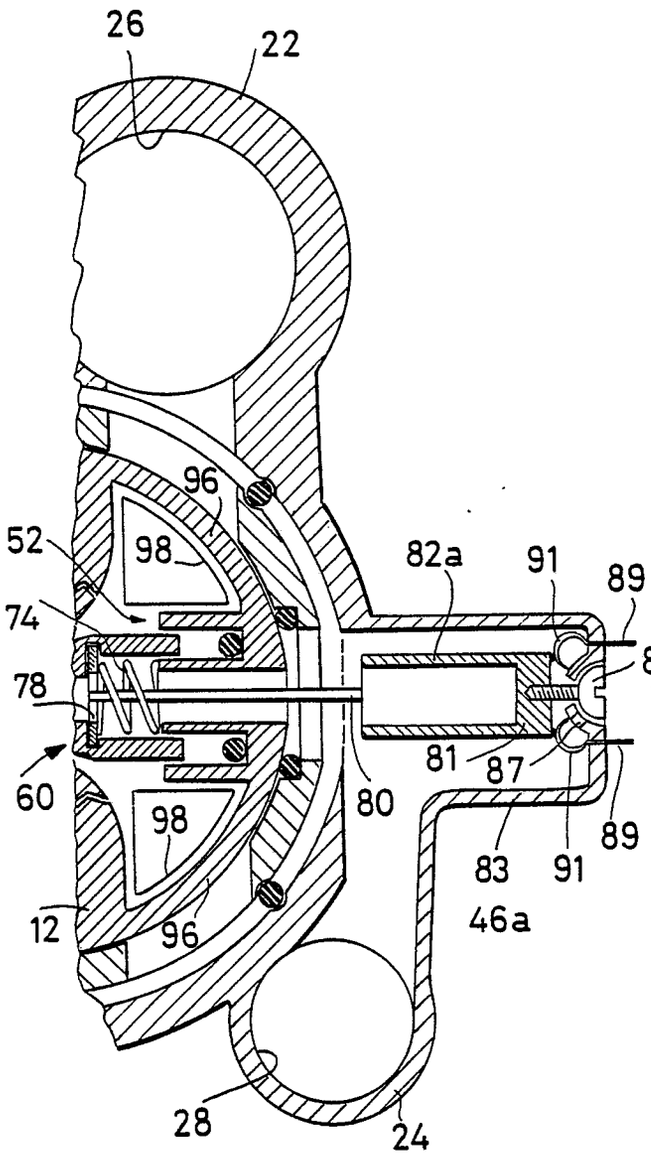

Fig.6