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

(11) Publication number: **0 372 642 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89203058.6**

(51) Int. Cl.[5]: **A61H 33/02**

(22) Date of filing: **04.12.89**

(30) Priority: **07.12.88 IT 2225888 U**

(43) Date of publication of application:
13.06.90 Bulletin 90/24

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

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(54) Outlet fitting for a hydromassage plant.

(57) Outlet for hydromassage plant comprising a casing (12), an orientable nozzle (26) therein contained. The nozzle can, under water pressure action on flange (44), slide outwardly against opposing force of a spring (46), thus opening a passage for exiting water which entrains, by Ventury action, air through the check valve (58) of the axially located nozzle (52).
In the absence of water pressure, nozzle (26) slides back onto (52) thus preventing water back flow.

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Outlet fitting for a hydromassage plant

The present invention relates to an orientable outlet fitting for hydromassage plants, to be used in a bath tub, of the type which can be secured to a wall of the tub, said fitting comprising a first nozzle for the inlet of a water jet surrounding a second coaxial nozzle for the inlet of the air within the aforesaid water jet.

Hydromassage plants are known since long time , permitting jets of water under pressure mixed with air , as delivered by one or more fittings fixed or incorporated in the walls of a tub or swimpool, to strike the body of the user immersed in the said tub or swimpool.

In said fittings the water, passed through a nozzle having a cross section shaped as Venturi pipe, causes a depression to be generated , inducing the air suction from a coaxial internal nozzle , the air being intimately admixed with the water in form of small bubbles dragged together with the water jet.

The known fittings are provided with systems by which they are, although limitedly, orientable as desired so as to direct the jet according to a desired direction.

A first problem raised by the known fittings is that of the adjustment and more particularly of the closing of a water jet outcoming from a fitting, while other fittings are maintained in operation, which owing to their section shaped as a Venturi pipe may induce a depression within the air duct such as to cause a water return from the tub through the internal nozzle of the out of operation fitting.

Another problem which is too connected to the known fittings is that of the retention of a certain amount of water within the body of the fitting, since , this water being often the same soapy water contained within the bath tub subjected to a recirculation, said retention might induce hygienic problems.

A further drawback to be faced is the return of water from the tub within the recirculation circuit for the hydromassage through the same fittings during a normal use of the bath tub only for deterging purposes, whereby solutions of soaps or detergents containing surface active substances may lead to an excessive forming of foam when the hydromassage operation is started again, without take it into account the hygienic drawbacks as above mentioned with relation to the retention of such solutions within the said recirculation circuit.

The patent for utility model No. 189.450, filed on July 17, 1984 and granted on January 31, 1986 in the name of the same Applicant as the present application, takes care of preventing the water from returning within the air carrying sections of a hydromassage fitting and also water from being retained within the most external parts of the fitting and its operation is rather good but requires the care of manually closing the jets of hydromassage water to prevent the return of water within the circulation plant, when the tub is to be used for an ordinary bathing operation.

The Italian Patent Application No. 22165 A/85 filed on September 17, 1985, discloses a solution by which the water and air delivery openings of a fitting mounted to a bath tub are closed , said closure being controlled by a valve normally closed by a spring which, being pushed outwardly from the recirculation water pressure, causes simultaneously a passage for a jet of said water and for the air to be admixed with said jet to be opened, the circulation water being admitted owing to the opening of a hydraulically controlled valve.

This solution operates in a rather good manner but shows the drawback of a remarkable complexity related to the use of the hydraulically controlled valve actuated by a water pressure generated by the same recirculation pump for the hydromassage and moreover , since said normally closed valve must be opened by the same recirculation water pressure and since the surfaces of the said valve onto which said pressure is acting are rather restricted, the pressure of the recirculation water must be maintained at levels such as to generate very strong jets which sometimes can not be beared by persons suffering from problems such as blood capillary fragility or the like.

A remedy to said drawback of excessive jet pressure has been proposed by the invention disclosed in the Italian Patent Application No. 22221 A/87 filed on October 12, 1987 in the name of the same Applicant as the present application, according to which a hydromassage fitting is provided containing a coaxial nozzle movable in axial direction by means of an electromagnet parallely connected to be motor actuating a recirculation pump by which said nozzle is withdrawn , thus opening an inlet for the recirculation water, and generates a depression in the water jet causing a valve placed within said coaxial nozzle to be opened in order to admit air into said jet.

This system operates in a very good manner since the activation of the water jet is completely independent from the pressure given to the recirculation water, but the use of an electromagnet, although externally to the fitting in areas which should be never contacted by water, raises safety problems connected to the fact that an electrically actuated organ is adjacent to a hydromassage fitting containing water, said electrically actuated or-

gan having the possibility of accidentally coming into contact with the water, in the case of failures or malfunctions, leading to lightening risks.

Said risks might be reduced by using members which can be actuated at sufficiently load voltages, but it would involve a cost increase and greater complication due to the use of a voltage lowering transformer with a suitable isolation between the primary and secondary windings and to the use of connections and circuit grounding at low voltage.

The present invention aims to eliminate these drawbacks by providing an outlet fitting having an outer casing or shell, which can be secured to a tub wall, containing a water nozzle surrounding a coaxial nozzle for the air introduction, characterized in that said water nozzle is movable towards the exterior and under a pressure given by the outcoming water is displaced into a position such as to originate a water jet and a depression applied to the said coaxial nozzle for the introduction of air within the jet through the opening of a check valve placed at the outlet of said coaxial nozzle for the air.

Preferably, said water nozzle is slidably connected to a sleeve of a joint element which is substantially spherical, consisting of two hemispherical shells, comprising two cavities, coaxial to each other and separated, the outer most of which is into comunication at one and with a chamber and a water duct and the other end with said water nozzle movable outwardly and the inner most is into comunication at one end with an air chamber and at the other end forms said coaxial jet, for the introduction of air internally with respect to said water nozzle, said upwardly movable water nozzle, being provided with a planar relief to which the water pressure is applied and against the action of a spring to displace it upwardly in order to open a passage between said outer nozzle and said internal nozzle.

More preferably, said spherical joint abuts against a seat provided with a gasket ensuring the tight sealing between the water chamber and the air chamber.

Particularly, in order to obtain a suction effect of the internal nozzle for the air, the outer nozzle for the water is shaped as a Venturi pipe with the area of minimum section or throat occupying the position around the outlet edge of said internal nozzle when the outer nozzle is moved outwardly by the water to cause therein a depression adapted to open the said check valve and air in form of bubbles is entered within the water jet.

The aforesaid and other features of the present invention shall more clearly appear from the detailed description of an embodiment thereof, not to be construed in any way in limiting sense, with reference to the enclosed drawings in which:

fig. 1 is a cross section view of an outlet fitting for hydromassage according to the present invention in its closed and non operative state;

fig. 2 is a cross section view of the same fitting of figure 1 in its open and activated state.

Referring to the figures, a hydromassage fitting 10 consists of a shell 12, having essentially cylindrically cavities fixed to a wall 14 of a bath tub by means of a threaded locking ring 16 which is screwed within a corresponding threaded seat of said shell 12, and is provided with a covering 18 for the connection to the said tub wall 14 fixed to said locking ring 16 by means such as screw 20 and 22 screwed on within suitable threaded holes in the same locking ring 16.

A jet generator assembly 24 comprises an outer nozzles 26 inserted into a substantially spherical joint formed by an essentially fore semispherical shell 28 fixed to a substantially rear semispherical shell 30 and housed within a rear chamber 32 of the said shell 12 wherein it is pushed by a threaded locking ring 34, having an internal edge thickened and rounded 36, against a bottom gasket 38 surround by a circular relief 40 placed onto the bottom of the rear chamber 32.

The outer nozzles 26 is guided by a sleeve 42 coming out of the fore semispherical shell 28 and is provided at the internal end with a planar relief 44 pushed by a spring 46 against the fore edge 48 of the rear semispherical shell 30 whereas and anular gasket 50 providies for the sealing between said nozzle 26 and said sleeve 42.

The rear semispherical shell 30 is provided cross-wise with a substantially cylindrical duct ending in the fore part with a nozzle 52, which is internal and coaxial with respect to the above mentioned outer nozzle 26 and defining a through cavity 54 closed at about the middle thereof by a check valve 56 consisting of a disk 58 maintained abutted against it sit by a spring 60. Said through cavity 54 is indirect comunication with a chamber 62 connected by a tub (not shown) with an external air suction inlet.

The periphery of the same rear semispherical shell 30 is provided with slit or cuts 64 by which a cavity 66 thereof sorrounding said internal nozzle 52 is put into comunication with the rear chamber 32 of the shell 12 which, in turn, is connected to a duct 68 serving to bring water, coming from a recirculation pump, within the shell 12 of the hydromassage fitting.

As it can be more easily seen in figure 2, the outer nozzle 26 is crossed by a duct having the shape of a Venturi pipe with a first converging area 70 followed by a throat area 72 and then by a divergent area 74.

The operation of the present invention is as

follows:
when the fitting 10 is out of the operation the outer nozzle 26 is maintained in the withdrawn position by the pressure of the spring 46 pushing against the planar relief 44 whereby a closure between the outer nozzle 26 and coaxial internal nozzle 52 is ensured.

Also the valve 56 within the nozzle 52 is maintained in the closed condition by the action of the spring 60 keeping the disk 58 adherent to the lower seat whereby possible water present in the tub is prevented from returning within the air inlet circuit connected to the chamber 62.

The fact that the outer nozzle 26 is in the withdrawn position and abutted against the internal nozzle 52 prevents the water possible present in the tub to enter the water recirculation circuit connected to the duct 68.

When through the duct 68 water is sent to the fitting 10, the pressure thereof, acting onto the planar relief 44 pushes, by overcoming the relatively low force of the spring 46 said nozzles 26 to take the advanced position outwardly as shown in figure 2.

The water flows in said nozzle 26 passing subsequently through the convering area 70, the throat area 72 and then the divering area 74, which together form a Venturi pipe, whereby in the throat area 72 a depression is originated such as the force of the spring 60 in the valve 56 is overcome and the air arriving into the chamber 62 is allowed to enter the center portion of the water jet coming out of the nozzle 26, whereby air bubbles area formed, which are necessary for the hydromassage.

As soon as the water introduction through the duct 68 is stopped the pressure acting on the planar relief 44 cheases and the spring 46 causes the nozzle 26 to return in the abutting position against the out a surface of the nozzle 52 whereby the comunication between the tub and the water recirculation circuit is essentially closed. Meanwhile , owing to the stopping of the depression generated by the water jet within the throat area 72 (see figure 2) of the Venturi pipe, the valve 56 under the action of the spring 60, brings the disk 58 into abuttment against the seat thereof, whereby it is closed and is maintained in the closed condition by the pressure of the water present in the tub whereby whatever return of water within the air chamber 62 is prevented.

The assembly of the two semispherical shells 28 and 30 present in the chamber 32 forms a spherical joint permitting an arbitrary orientation, although limited, of the generating assembly 24 to direct the ject according to a desired direction.

The internal round edge 36 permit a relatively free sliding of the surface of the fore semispherical shell 28 whereas the bottom gasket 38, although permitting a relatively free sliding motion of the surface of the rear semispherical shell 30, prevents water from passing from the rear chamber 32 to the air chamber 62.

The above is a description of an embodiment of the present invention and it will be obvious for the skilled in the art to find out similar or equivalent solution to be considered all hereby covered.

For example, the valve 56 might be a valve with elastic membrane which can be raised by the air streem entering from the chamber 62 and which can be collapsed under the action of the water contained within the tub and the gasket 50 might be multiple instead of being only one as represented in the figures , without folling out of the scope of the invention.

Claims

1. Outlet fitting for hydromassage plants having an outer casing or shell (12), which can be secured to a tub wall (14) , containing a water nozzle (26) surrounding a coaxial nozzle (52) for the air introduction, characterized in that said water nozzle (26) is movable towards the exterior and under a pressure given by the outcoming water is displaced into a position such as to originate a water jet and a depression applied to the said coaxial nozzle (52) for the introduction of air within the water jet owing to the opening of a check valve (56) placed at the outlet of said coaxial nozzle (52) for the air.

2. Outlet fitting for hydromassage plant according to claim 1, characterized in that said water nozzle (26) is slidably connected to a sleeve (42) of a joint element which is substantially spherical, consisting of two hemispherical shells (28, 30) comprising two cavities, coaxial to each other and separated, the outer most (66) of which is into comunication at one end with a chamber (32) and a water duct (68) and the other end with said water nozzle (26) movable outwardly and the inner most (54) is into comunication at one end with an air chamber (62) and at the other end forms said coaxial jet (52) for the introduction of air, internally with respect to said water nozzle (26), said upwardly movable water nozzle being provided with a planar relief (44) to which the water pressure is applied and opposed by the action of a spring (46) to displace it upwardly in order to open a passage between said nozzle (26) and said internal nozzle (52).

3. Outlet fitting for hydromassage plant according to claim 2, characterized in that said spherical joint abuts against a seat formed by a relieved part (40 and) provided with a gasket (38) ensuring the tight sealing between the water chamber (32) and

the air chamber (62).

4. Outlet fitting for hydromassage plant according to claim 2, characterized in that in order to obtain a suction effect in the internal nozzle (52) for the air, the outer nozzle (26) for the water is shaped as a Venturi pipe with an area of minimum section or throat (72) occupying the position around the outlet edge of said internal nozzle (52) when the outer nozzle (26) is moved outwardly by the water to cause therein a depression adapted to open the said check valve (56) and air in form of bubbles is entered within the water jet.

5. Outlet fitting for hydromassage plant, according to claim 4, characterized in that said check valve (56) is formed by a disk (58) maintained abutted against its seat by the action of a spring (60).

6. Outlet fitting for hydromassage according to claim 4, characterized in that said check valve consists of a membrane adhering at discrete points to the said valve seat, which can be raised by the action of the air sucked in by the water jet and lowered under the pressure of water possibly present within the tubs.

Tav.I

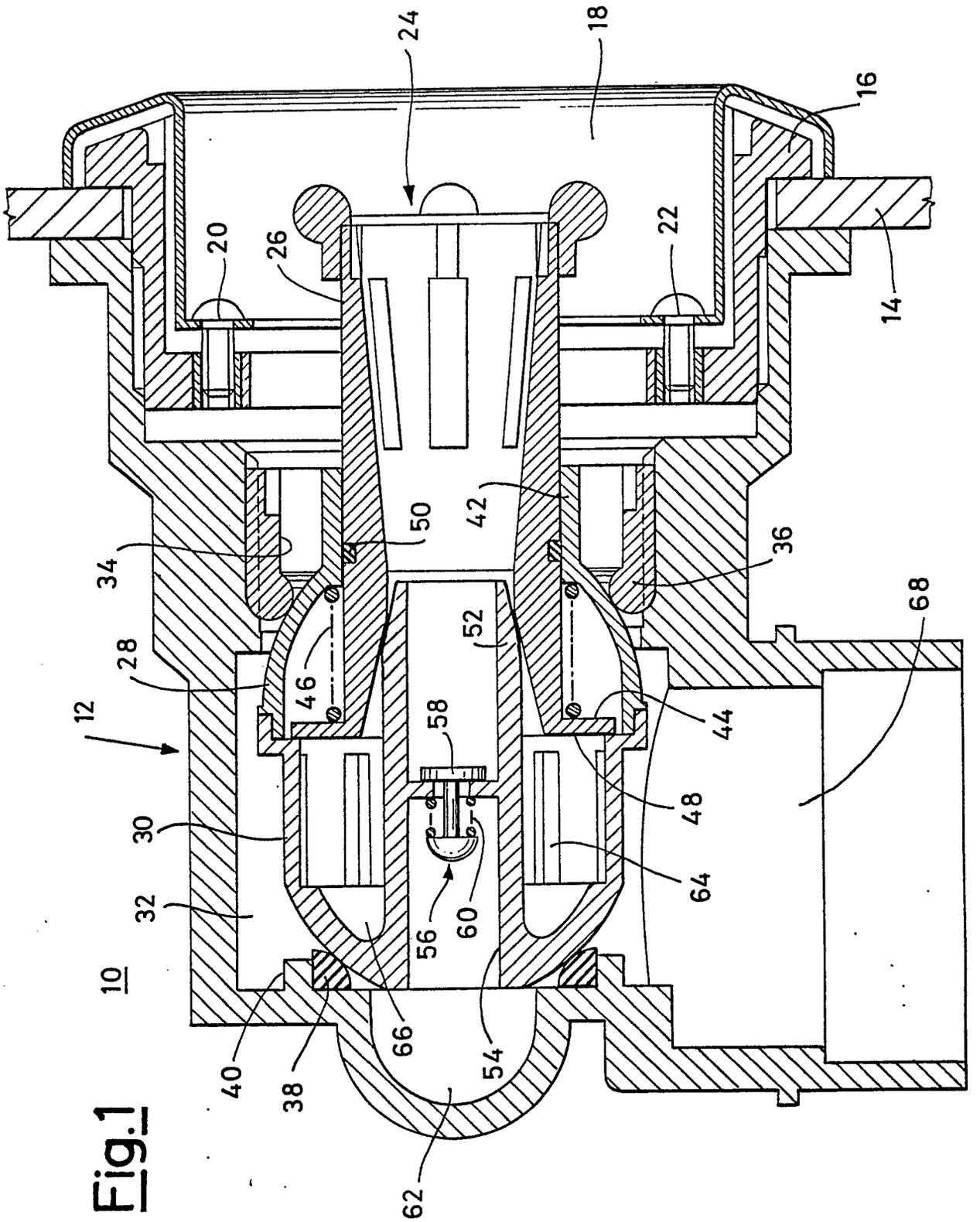
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Fig.1

Tav. II

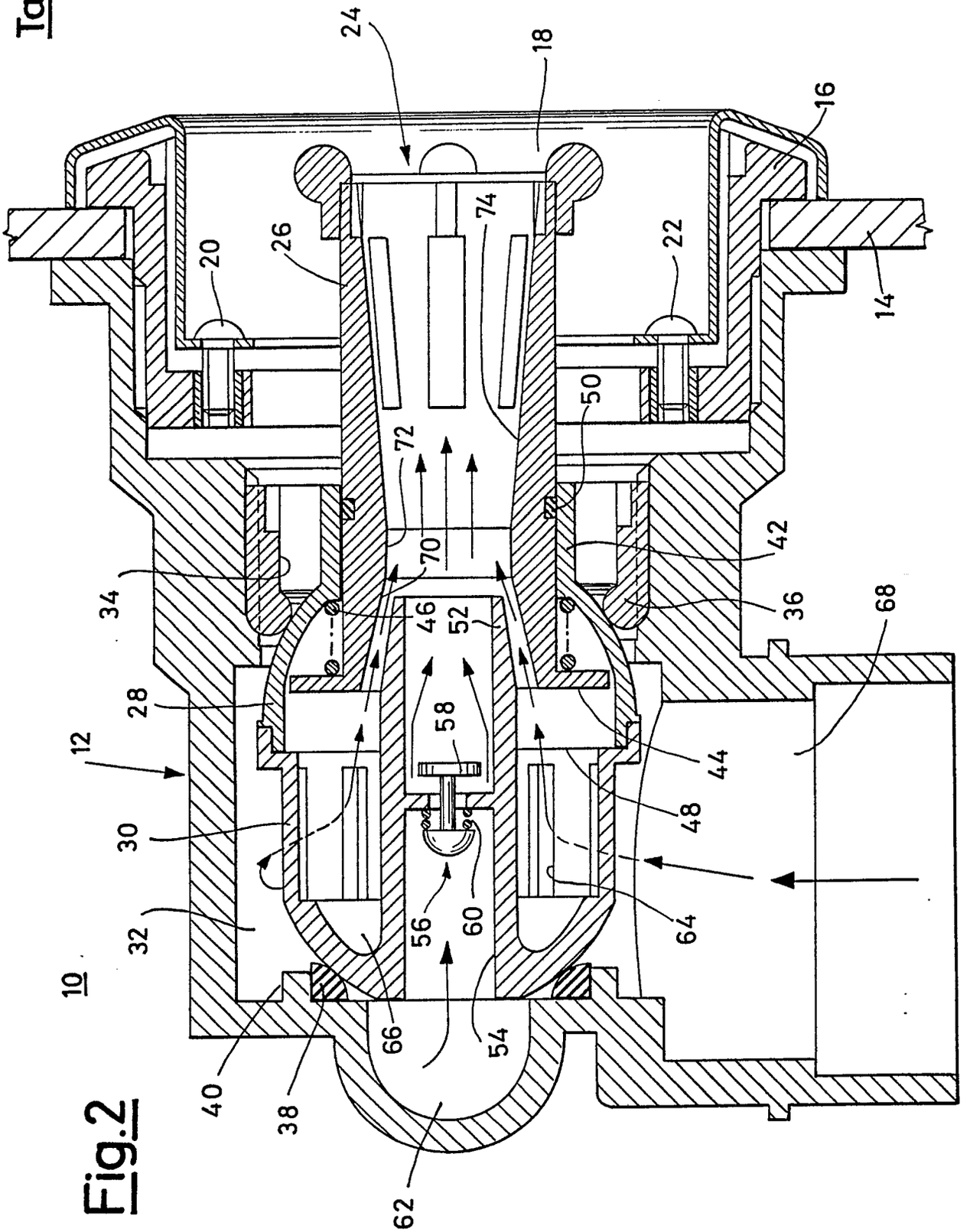
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Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 20 3058

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	WO-A-8 801 858 (SCHÜSSLER) * Page 12, line 31 - page 13, line 6; page 13, lines 33-34; page 13, line 38 - page 14, line 20 *	1	A 61 H 33/02
A	EP-A-0 168 823 (JACUZZI EUROPE Spa)		
P,A D	EP-A-0 311 967 (JACUZZI EUROPE Spa)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 61 H
B 05 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21-02-1990	PAPONE F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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