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

(11) EP 0 560 097 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
04.12.1996 Bulletin 1996/49

(51) Int. Cl.[6]: **A61H 33/02**

(21) Application number: **93102586.0**

(22) Date of filing: **19.02.1993**

(54) Water delivery head for whirlpool baths

Wasserzuführdüse für Whirlpoolwannen

Buse d'arrivée d'eau pour baignoires de balnéothérapie

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **10.03.1992 IT PN920008 U**

(43) Date of publication of application:
15.09.1993 Bulletin 1993/37

(73) Proprietor: **ALBATROS SYSTEM S.p.A.**
I-33097 Spilimbergo (Pordenone) (IT)

(72) Inventor: **Sandrin, Gianni**
I-33080 Porcia, Pordenone (IT)

(74) Representative: **Busca, Luciano et al**
PROPRIA
Protezione Proprietà Industriale srl
Via Mazzini 13
33170 Pordenone (IT)

(56) References cited:
DE-U- 8 526 472
DE-U- 8 812 993
US-A- 4 972 531

EP 0 560 097 B1

Description

The present invention relates to an improvement in a water delivery head capable of being used in whirlpool bath-tubs or small whirlpool swimming pools so as to deliver a mixture of water and air under pressure.

Water delivery heads for whirlpool baths are already known to substantially comprise a manifold-like body adapted to receive water under pressure and provided with at least an air suction opening, said air being taken in by Venturi effect and then substantially emulsified in the water under pressure for being finally delivered as an air-water mixture into the bath tub or pool through an adjustable nozzle that is supported in a swiveling manner by the manifold body. Usually, the swiveling nozzle has a substantially spherical outer surface cooperating with a corresponding supporting seat provided in the manifold body. As a consequence, the swiveling nozzle has a quite large surface area making friction with the manifold body and, therefore, making it difficult for the swiveling nozzle to be adjusted conveniently. In particular, this problem is undesirably worsened by the thermal expansion events which the various component parts undergo periodically, as well as by scale formation and/or foreign-matter and dirt build-up that may eventually occur on said component parts. As a result, it may well occur that adjusting the swiveling nozzle will eventually prove unacceptably inconvenient and difficult to perform with the desired accuracy.

Furthermore, the adjustment of the flow rate of the water and air jet issued by the nozzle is usually performed by means of a central pin which is ajustable by being screwed up and down so as to be displaced axially with respect to a corresponding conical seat provided on the nozzle or, anyway, on the delivery head. It ensues that the afore mentioned scale formation and buildup can eventually make it impossible to adequately shut off the swiveling nozzle and, as a consequence, the delivery nozzle. On the other hand, a possibility to fully shut off the swiveling nozzle is quite desirable when the general operation of the whirlpool bath-tub is to be adapted to comply to particular needs, and also to prevent foreign matters from building up, encrusting and/or fouling the delivery head and the conduits associated therewith when the bath-tub is used to other purposes than whirlpool bathing. It will be easily appreciated that the latter is a problem that is particularly felt in cases such as those involving whirlpool bath-tubs installed in hotel rooms and the like.

DE-U-8 812 993 discloses a delivery head of the above-mentioned type in which the outer surface of the swiveling nozzle cooperating with a support seat is substantially semispherical, thereby correspondingly rendering orientation of the swiveling nozzle more convenient. This solution, however, substantially suffers from the same drawbacks described above with regard to the impossibility to adequately shut off the delivery nozzle. The adjustment of the flow rate of the water and air jet issued by the nozzle is in fact performed, undesirably using a special tool, by screwing up and down an annular element supporting the swiveling nozzle, which is axially displaced accordingly with respect to a fixed air supply nozzle, thereby adjusting the flow rate. As a consequence, also in this case scale formation and buildup can make it impossible to adequately shut off the swivelling nozzle.

It is a purpose and the main object of the present invention to provide a simple water delivery head for whirlpool bath-tubs, which is provided with a swiveling nozzle that is capable of being adjusted in a particularly convenient and smooth manner, substantially under all conditions of use.

It is a further purpose of the present invention to provide a water delivery head of the above cited kind, in which foreign matters can effectively be prevented from entering both the delivery head and the conduits associated therewith.

These and other aims are reached according to the present invention in a water delivery head for whirlpool bath-tubs embodying the characteristics recited in the appended claims.

The characteristics, features and advantages of the present invention will clearly emerge from the following description which is given by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a schematic view showing the front elevation of the delivery head according to the present invention;
- Figure 2 is a view of a lengthwise cross-section of a preferred embodiment of the delivery head according to the present invention; and
- Figure 3 is a schematic rear view of a detail of the delivery head shown in Figure 2.

Referring now in particular to Figures 1 and 2, it can be seen that the delivery head substantially comprises a manifold body 4 provided with at least an inlet orifice 5, through which it is adapted to receive water under pressure, as well as with at least an air suction orifice 6 (there are two of them in the embodiment described here by way of example), through which air can be taken into the manifold body 4. The latter can be installed on the wall 18 of a whirlpool bath-tub, in correspondence of an appropriately provided hole, and preferably under interposition of at least a sealing gasket 20 therebetween, by means of a front ring nut 19 screwed in on the front inner surface of the manifold body 4; in a *per sè* known manner, said ring nut 19 may be covered with a ring 11 to essentially aesthetical purposes. The delivery head is further provided frontally with an outlet nozzle 7 having a tapered inner lead-in opening 9 and formed axially on a substantially semispherical hollow body 8, preferably integral therewith.

Said hollow body 8 is kept in an axial position inside

the manifold body 4 by means of a supporting annular element 10 which is substantially curvilinear in its cross-section, is arranged between the two elements 4 and 8, and is in turn fixed inside the manifold body 4 by means of a rear threaded portion 12 that is screwed down into a corresponding threaded portion provided inside the manifold body 4.

In particular, according to a preferred feature of the present invention the outer surface of the semispherical body 8 co-operates slidably with said element 10 only in correspondence of an inner annular rib 13 thereof, which is provided in a front position and in relation to which said body 8 can be tilted and/or swiveled to adjust the nozzle 7.

Referring also to Figure 3, it can be seen that said semispherical body 8 is provided on its rear side with a flexible discoidal wall 14, whose peripheral edge 15 has preferably a stepped shape so as to be able to engagingly mate with the circumferential edge of the body 8, which it is rotatably integral with (in a *per sè* known way, not shown here).

Furthermore, the edge 15 of said discoidal wall 14 engages externally with a corresponding peripheral edge 16 of a further flexible discoidal wall 17. The latter is concentric and adjacent to said discoidal wall 14, but angularly integral with the manifold body 4 (in a *per sè* known way, not shown here). The flexibility of both said discoidal walls 14 and 17 is increased owing to the fact that they comprise a plurality of respective ports 21, 22 which are substantially identical to each other and are formed on their surface, regularly spaced in a concentric circle. Furthermore, both said discoidal walls 14 and 17 are in a preferred way slightly arcuated towards the rear portion of the delivery head.

In the discoidal wall 14, the ports 21 surround an axial portion 23, which is preferably formed integrally therewith, protrudes frontally and defines an axial passage. As a matter of fact, said axial passage extends from the wall 14 with a first flared axial portion 24 and a second cylindrical axial portion 25; furthermore, the front end of the axial portion 23 enters partially, in a loose way, the lead-in opening 9 of the nozzle 7.

The discoidal wall 17 has a central hole having a diameter which is at least equal to the largest diameter of the flared passage portion 24, against the inner surface of which abuts the preferably rounded-off front end portion 27 of a concentric pin 26 that extends from the rear wall of the manifold body 4. In particular, said pin 26 has a diameter size lying between the diameter of said cylindrical passage portion 25 and the largest diameter of said flared passage portion 24, so that the discoidal walls 14 and 17, along with the semispherical body 8 and the nozzle 7, can be caused to swivel to a very wide extent with respect to the pin 26 having a negligibly small friction surface.

The dimensions of the various component parts can be easily calculated so as to cause said end portion 27 of the pin 26 to keep the various component parts pressed into a mutual axial engagement, as mentioned above, and, in particular, said discoidal walls 14 and 17 to undergo a slight elastic deformation axially (towards the front portion). In this connection, it should be noticed that such an elastic thrust turns out to be particularly advantageous, since it inherently prevents scaling and other foreign matters, that may possibly get into the delivery head, to settle down and build-up in correspondence of the pivoting point 27 of the nozzle 7.

The pin 26 is provided with an axial through-hole 28 that communicates with the air intake orifices 6 in correspondence of a chamber 29. This chamber is defined by a seat 30, which is formed on the rear wall of the manifold body 4, and an enlarged rear end 31 of the pin 26 which joins sealingly with said seat 30.

Under operating conditions, when the manifold body 4 receives water under pressure from the inlet orifice 5, the water seeps into the semispherical body 8 through the ports 22 and 21 of the discoidal walls 17 and 14 and flows along the passage defined by the axial portion 23 and the lead-in opening 9 of the nozzle 7. In correspondence of the front end of the axial portion 23, the water flow brings about a negative pressure which takes in air from the orifices 6 through the hole 28 of the pin 26 and the cylindrical passage portion 25 connected therewith.

In a *per sè* known manner, the air being so taken in forms a mixture with the water under pressure and this mixture is then ejected frontally by the nozzle 7. The flow rate of the jet produced by the nozzle 7 can be conveniently adjusted to a high degree of accuracy by rotating the same nozzle (which may to this purpose be provided externally with appropriate impressions 32, as shown in Figure 1), so as to vary in this way the relative angular position of the ports 21, 22 in the discoidal walls 14, 17 from a fully-open to a fully-closed condition of the cross-section of the passage provided for the water under pressure. In Figure 3, said cross-section of the passage for the water under pressure is shown to reflect a condition in which it is half-open. It can be noticed that, since said adjustment of the water passage cross-section is performed through a simple rotary sliding movement, instead of an axial one, possible foreign matters will under no condition be able to prevent said passage cross-section from being fully and correctly shut. For instance, such a need may well arise whenever the bath-tub 18 is going to be used for taking a bath in the traditional way, excluding a whirlpool action. In all these cases, fully closing ports 21, 22 will prevent dirty or contaminated water, which may seep into the delivery head through the nozzle 7, from reaching the manifold body 4, the orifice 5 and the water supply conduits (not shown) associated therewith.

According to a further preferred feature of the present invention, such a safety provision may be further enhanced in its effectiveness by providing a check valve means in correspondence of the passage defined between the lead-in opening 9 of the nozzle 7 and said axial portion 23. In a preferred way, said check valve means consists of a flexible diaphragm 33 having the

shape of a ring, whose rear end is forcedly fitted around the axial portion 23, and whose front end is flared as shown in Figure 2 so as to elastically rest against the lead-in opening 9, thereby shutting it, only when a backflow of water towards the inner side of the semispherical body 8 occurs. Even this semispherical body 8 is therefore effectively and reliably protected against any possible backflow of contaminated water.

In a preferred way, a similar check valve means is also provided in the hole 28 of the pin 26, for instance in correspondence of the chamber 29. Such a valve means is preferably constituted by a flexible diaphragm 34 that is adapted to only close the air passage cross-section in the occurrence of a possible backflow of water from the nozzle 7 towards the orifices 6, through the passages 25 and 28. As a consequence, even the air intake circuit associated with the delivery head according to the present invention is effectively and reliably protected against any possible backflow of contaminated water.

It will be appreciated that the afore described delivery head may be the subject of any modification considered to be appropriate, without departing from the scopes of the invention.

Claims

1. Water delivery head for whirlpool bath-tubs, comprising a manifold body (4) with at least a pressurized-water inlet orifice (5) communicating with an outlet nozzle (7) through adjustment means for the water passage cross-section and a hollow body (8) that is integral with said nozzle and capable of being swiveled with respect to said manifold body, the latter further comprising at least an air intake orifice (6) communicating with the lead-in opening (9) of said nozzle so as to form an air-water mixture being ejected by the same nozzle, said hollow body (8) being formed with a substantially semispherical surface cooperating with a substantially annular rib (13) that is fixed to said manifold body (4), **characterized in that** said hollow body (8) is coupled on its rear side with a flexible discoidal wall (14) which is rotatably integral therewith and comprises an axial portion (23) extending forwards, in correspondence of the lead-in opening (9) of the nozzle (7), with a central passage having a flared axial portion (24) pivotally mounted on the end portion (27) of a central pin (26) that is fixed on its rear side to the manifold body (4) and is provided with an axial hole (28) through which said intake orifice (6) communicates with the nozzle (7), said flexible discoidal wall (14) comprising a plurality of ports (21) and forming said adjustment means together with a further discoidal wall (17), arranged concentrically adjacent thereto, which is angularly integral with said manifold body (4) and is provided with a plurality of further ports (22), the relative angular position of said discoidal walls (14, 17) with the respective ports (21, 22) being adjustable from a fully open condition to a fully closed condition of said passage cross-section.

2. Water delivery head according to claim 1, **characterized in that** said end portion (27) of the central pin (26) is rounded-off.

3. Water delivery head according to claim 1, **characterized in that** said flexible discoidal wall (14) is arcuated towards said central pin (26), against the end portion (27) of which it abuts so as to be slightly deformed elastically.

4. Water delivery head according to claim 1, **characterized in that** it further comprises a check valve (33) in correspondence of the passage defined between the lead-in opening (9) of the nozzle (7) and said axial portion (23) of the discoidal wall (14).

5. Water delivery head according to claim 4, **characterized in that** said check valve comprises a flexible diaphragm (33) having the shape of a ring whose rear end portion is forcedly fitted around said axial portion (23), and whose front end portion is flared and adapted to cooperate elastically against said lead-in opening (9) of the nozzle (7).

6. Water delivery head according to claim 1, **characterized in that** it further comprises a check valve (34) in correspondence of the axial hole (28) of said central pin (26).

7. Water delivery head according to claim 6, **characterized in that** said check valve comprises a flexible diaphragm (34).

Patentansprüche

1. Wasserzuführdüse für Whirlpoolbadewannen mit einem Sammelkörper (4) mit mindenstens einem durch Wasserdurchflußquerschnitt-Regelmittel und einen fest mit einer Austrittsdüse (7) verbundenen, gegenüber dem genannten Sammelkörper schwenkbaren Hohlkörper (8) mit der genannten Wasseraustrittsdüse (7) in Verbindung stehenden Druckwasser-Einlaßstutzen (5), wobei solcher Sammelkörper ferner mindestens einen Lufteinsaugstutzen (6) aufweist, der mit der Einmündung (9) der genannten Düse so in Verbindung steht, daß eine aus derselben Düse austretende Wasser- und Luftmischung entstehen kann, wobei der genannte Hohlkörper (8) mit einer im wesentlichen halbsphärischen, mit einer im wesentlichen ringförmigen, mit dem genannten Sammelkörper (4) fest verbundenen Rippe zusammenwirkenden Fläche ausgestaltet ist, **dadurch gekennzeichnet**, daß der genannte Hohlkörper (8) hinterseitig an einer biegsamen scheibenförmigen Wand (14) befestigt

ist, die mit ihm drehungsmäßig fest verbunden ist und einen sich frontseitig im Bereich der Einmündung (9) der Düse (7) erstreckenden Axialteil mit einem zentralen Durchlaß aufweist, der eine ausgeweitete, sich auf den Endteil (27) eines hinterseitig am Sammelkörper (4) befestigten Zentralstiftes (26) stützende Strecke (24) umfaßt, wobei solcher Zentralstift (26) mit einer Axialbohrung (28) versehen ist, durch die der Luftansaugstutzen (6) mit der Düse (7) in Verbindung steht, wobei die genannte biegsame scheibenförmige Wand (14) eine Vielfalt von Öffnungen (21) umfaßt und durch Zusammenwirkung mit einer weiteren konzentrisch naheliegenden, biegsamen und scheibenförmigen Wand (17), die winkelig mit dem genannten Sammelkörper (4) fest verbunden und mit einer Vielfalt von weiteren Öffnungen (22) versehen ist, die eingangs genannten Regelmittel bildet, wobei die relative Winkellage der genannten scheibenförmigen Wände (14, 17) und der jeweiligen Öffnungen (21, 22) zueinander von einer vollgeöffneten bis zu einer dichtgeschlossenen Stellung des genannten Wasserdurchflußquerschnitts regelbar ist.

2. Wasserzuführdüse nach Anspruch 1, **dadurch gekennzeichnet**, daß der genannte Endteil (27) des Zentralstiftes (26) abgerundet ist.

3. Wasserzuführdüse nach Anspruch 1, **dadurch gekennzeichnet**, daß die genannte biegsame scheibenförmige Wand (14) gegen den genannten Zentralstift (26) gekrümmt ist, gegen den Endteil (27) davon sie so anschlägt, daß sie leicht elastisch verformt wird.

4. Wasserzuführdüse nach Anspruch 1, **dadurch gekennzeichnet**, daß sie ferner ein Rückschlagventil (33) im Bereich des zwischen der Einmündung (9) der Düse (7) und dem genannten Axialteil (23) der scheibenförmigen Wand (14) abgegrenzten Zwischenraums umfaßt.

5. Wasserzuführdüse nach Anspruch 4, **dadurch gekennzeichnet**, daß das genannte Rückschlagventil eine flexible Membrane (33) umfaßt, die in der Form eines Ringes ausgestaltet ist, dessen hinterer Endteil rings um den genannten Axialteil (23) durch Einpressen befestigt ist und dessen vorderer Endteil ausgeweitet und so ausgestaltet ist, daß er gegen die genannten Einmündung (9) der Düse (7) elastisch damit zusammenwirken kann.

6. Wasserzuführdüse nach Anspruch 1, **dadurch gekennzeichnet**, daß sie ferner ein Rückschlagventil (34) im Bereich der Axialbohrung (28) des genannten Zentralstiftes (26) umfaßt.

7. Wasserzuführdüse nach Anspruch 6, **dadurch gekennzeichnet**, daß das genannten Rückschlagventil eine flexible Membrane (34) umfaßt.

Revendications

1. Buse d'arrivée d'eau pour baignoires de balnéothérapie comprenant un corps collecteur (4) avec au moins une goulotte d'entrée (5) d'eau sous pression communiquant avec un gicleur de sortie (7) à travers des moyens de régulation de la section de passage de l'eau et un corps creux (8) qui est solidaire dudit gicleur et orientable par rapport audit corps collecteur, ce dernier comprenant en outre au moins une goulotte d'aspiration d'air (6) communiquant avec l'embouchure (9) dudit gicleur de façon telle à donner lieu à un mélange d'eau et air sortant du même gicleur, ledit corps creux (8) étant conformé avec une surface essentiellement hémisphérique coopérant avec une nervure (13) essentiellement annulaire solidaire dudit corps collecteur (4), **caractérisée en ce que** ledit corps creux (8) est accouplé dans sa partie postérieure avec une paroi discoïdale souple (14) qui est solidaire en rotation du même corps creux et comprend une partie axiale (23) s'étendant à l'avant, en correspondance de l'embouchure (9) du gicleur (7), avec un passage central ayant une partie évasée (24) axée sur l'extrémité (27) d'un pivot central (26) fixé à l'arrière au corps collecteur (4) et pourvu d'un trou axial (28) à travers lequel la goulotte d'aspiration (6) communique avec le gicleur (7), ladite paroi discoïdale souple (14) comprenant une pluralité d'ouvertures (21) et formant lesdits moyens de régulation en conjonction avec une autre paroi discoïdale souple (17), adjacente et concentrique, qui est solidaire angulairement dudit corps collecteur (4) et est pourvue d'une pluralité d'autres ouvertures (22), la position angulaire relative desdites parois discoïdales (14, 17) ed de leurs ouvertures (21, 22) étant réglable d'une position d'ouverture maximale jusqu'à une position de complète fermeture de ladite section de passage.

2. Buse d'arrivée d'eau selon la revendication 1, **caractérisée en ce que** ladite extrémité (27) du pivot central (26) est arrondie.

3. Buse d'arrivée d'eau selon la revendication 1, **caractérisée en ce que** ladite paroi discoïdale souple (14) est arquée vers ladit pivot central (26), contre l'extrémité (27) duquel elle bute de façon telle qu'elle en est légèrement déformée élastiquement.

4. Buse d'arrivée d'eau selon la revendication 1, **caractérisée en ce qu**'elle comprend en outre une soupape de retenue (33) en correspondance de l'interstice qui est défini entre l'embouchure (9) du gicleur (7) et ladite partie axiale (23) de la paroi discoïdale (14).

5. Buse d'arrivée d'eau selon la revendication 4, **caractérisée en ce que** ladite soupape de retenue comprend une membrane souple (33) ayant la forme d'un anneau dont l'extrémité arrière est montée de façon forcée autour de ladite partie axiale (23) et dont l'extrémité frontale est évasée et apte à coopérer élastiquement contre ladite embouchure (9) du glicleur (7).

6. Buse d'arrivée d'eau selon la revendication 1, **caractérisée en ce qu**'elle comprend en outre une soupape de retenue (34) en correspondance du trou axial (28) dudit pivot central (26).

7. Buse d'arrivée d'eau selon la revendication 6, **caractérisée en ce que** ladite soupape de retenue comprend une membrane souple (34).

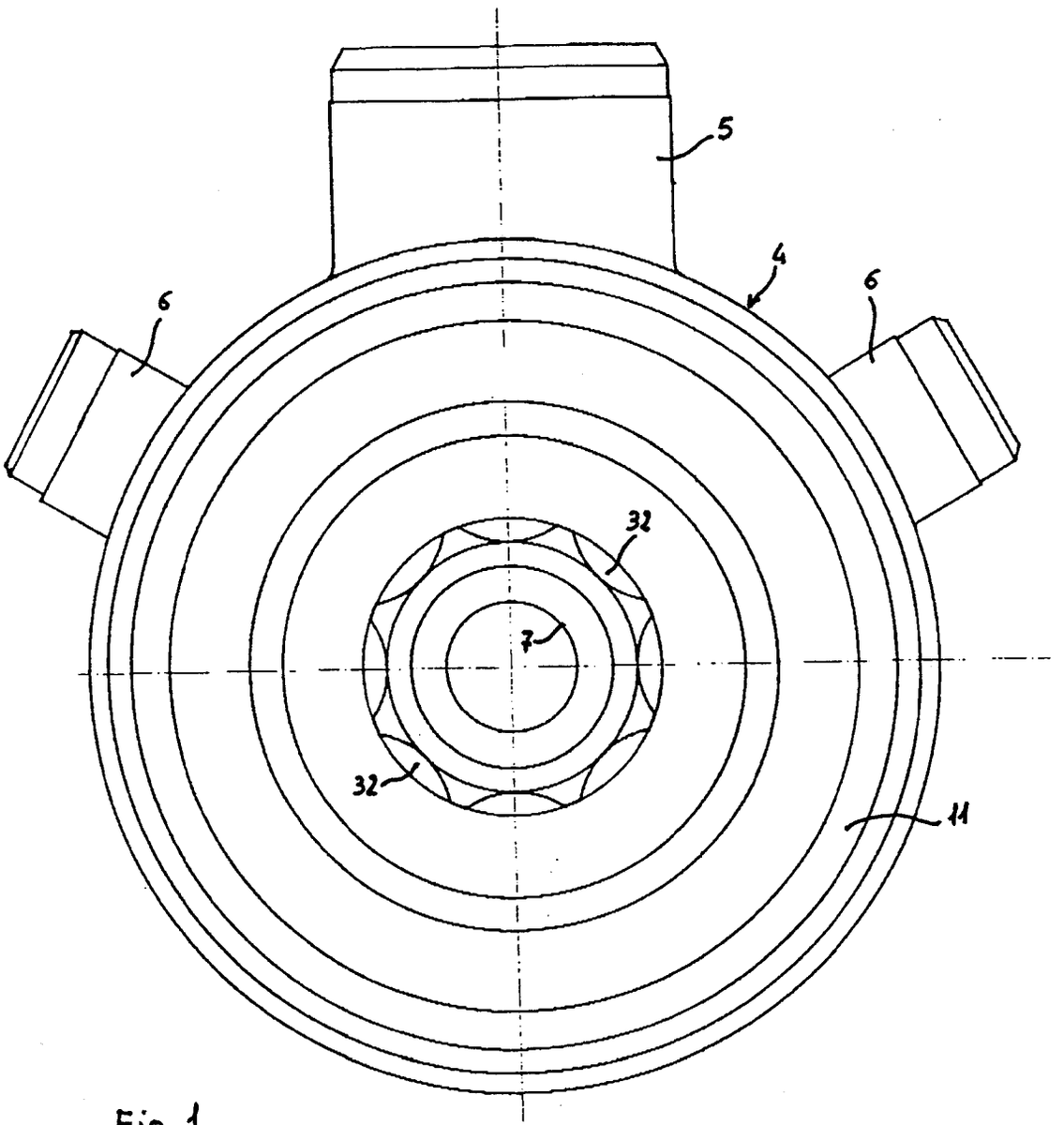

Fig. 1

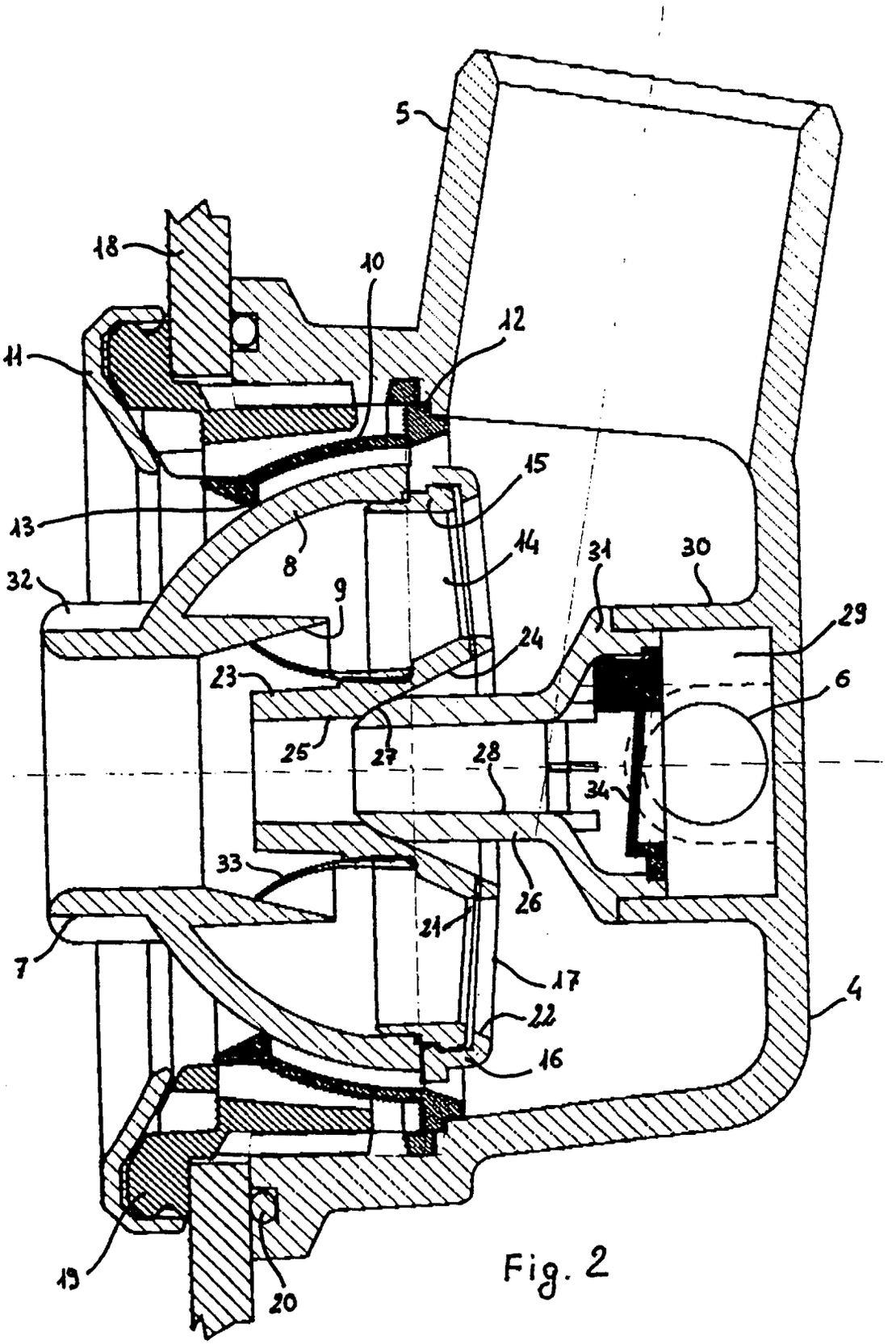
5
18
10
12
11
15
13
8
14
31
30
32
9
29
24
23
6
25
27
28
34
33
26
21
7
17
4
22
16
19
20

Fig. 2

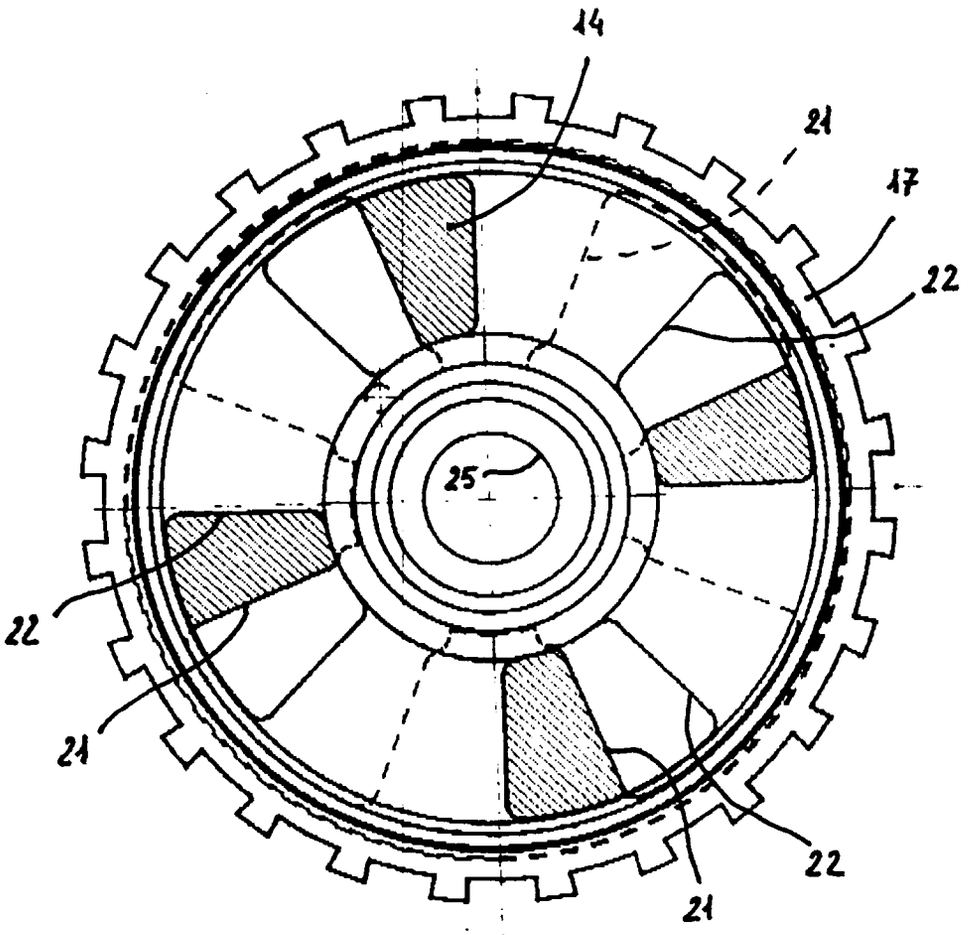

Fig. 3