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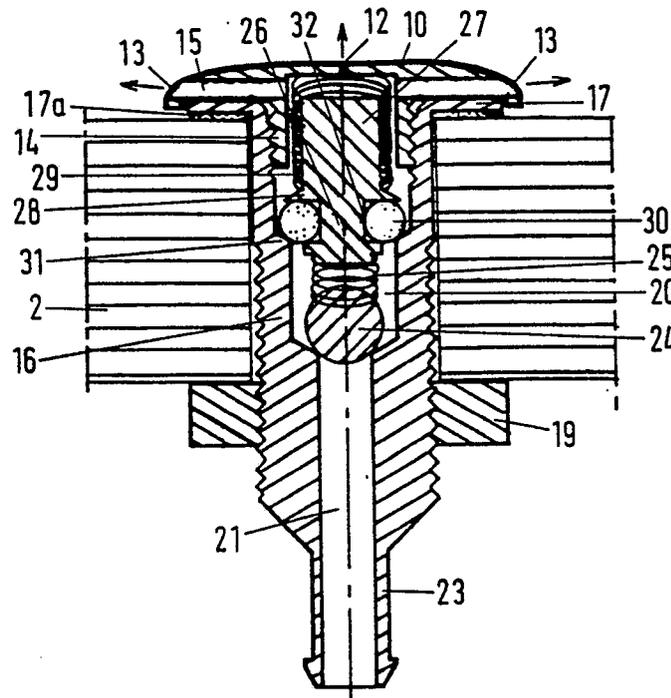
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**Whirlpools operating with air insufflation systems.**

Whirlpool systems comprising an air insufflation system with insufflation jets and an air pump. The insufflation jets have a flat, disc-shaped head with a plurality of radial air outlets and at least one air outlet extending approximately transversely to the plane of the disc-shaped head.



**FIG.3**

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### Whirlpools operating with air insufflation systems

This invention relates to a whirlpool system wherein air is blown into the water through an air pump. The dosing of the air in the water is effected by an insufflation nipple, generally known as a jet. Consequently, they will be referred to as jets here-

in. The existing jets can dose the air in the water through one or more exhaust outlets, with the air being exhausted either straightly upwards or laterally. As the jets are provided mostly in the bottoms of baths, it will be clear that the effect of the jets blowing straightly upwards is strongly reduced or entirely impeded when a bathing person places himself on it. It has been tried to remove this problem by blowing out the air laterally, which precludes purposive exhaust of air in upward direction. The upwardly directed air jets are used for jetting the known massage points in the back or other parts of the body.

Furthermore, insufflation systems are used wherein the air is not preheated, in which case the contemplated effect, relaxation of the muscles, will precisely be reversed, as the muscles warmed up already by the hot bath water will precisely be strained by the cold air.

There are open and closed air whirlpool systems. It will be best when the pipes of the system are always dry. If water is contained in the air pipe system, it is not impossible that disease germs are produced. Therefore, it is recommendable, from a viewpoint of prevention, to place a valve between the bath water and the pipes of the insufflation system. This valve is absent in many systems or is not optimally constructed in systems which do comprise valves. Often the insufflation systems are connected with a flexible hose to the air pump, in which case the hose has to be installed with a curve underneath the bath to above the bath water level, to prevent water from penetrating the electric air pump in the event of failure of a valve. As these systems are freely sold, the insight of the persons installing them is primarily relied on.

It is an object of the present invention in general to provide an effective and safe whirlpool system and in particular a whirlpool system which lacks the above drawbacks. To that effect, according to the present invention, a whirlpool system comprising an air insufflation system with insufflation jets and an air pump is characterized in that the insufflation jets have a flat, disc-shaped head with a plurality of radial air outlets and at least one air outlet extending substantially transversely to the plane of the disc-shaped head

Some embodiments of the present invention will now be described, by way of example, with

reference to the accompanying drawings, in which:

Fig. 1 and Fig. 2 are a diagrammatic top view, and a side view, respectively, of an example of a bath tub having a whirlpool system;

Fig. 3 is a diagrammatic longitudinal section of an embodiment of an exhaust jet according to the present invention;

Fig. 4 is an exploded view of the exhaust jet of Fig. 3;

Fig. 5 is a bottom view of a part of an insufflation jet according to Fig. 3; and

Fig. 6 is a diagrammatic view of an example of a pipe system according to the present invention.

Fig. 1 and Fig. 2 are a diagrammatic top view, and a side view, respectively, of an example of a bath tub 1 having a whirlpool system. Provided in the bottom 2, and in the example shown also in the back portion 3, of the bath tub are air insufflation means, the so-called jets, indicated at 4. Through the jets, air can be insufflated into the water-filled bath, as diagrammatically shown at 5. To prevent reflexes of the muscles, the air to be insufflated is preferably heated to above the body temperature by means, not shown, comprising e.g. an electric heating element, whether or not combined with the air pump.

Figs. 3-5 diagrammatically show an embodiment of a jet for a whirlpool system according to the present invention. The jet is designed in such a manner that there is no exclusively upward or exclusively lateral exhaust, but both an upward and a lateral exhaust, so that both an accurately defined local effect and a more spatially distributed effect occur.

The jet shown includes a head 10, which is very flat, having a beveled edge 11, so that the jet can be placed conveniently in the bottom of a bath tub. In the example shown, jet 10 is substantially disc-shaped with a central axial outlet 12 and a plurality of radial outlets 13. The disc-shaped head is provided at the underside with a central tubular portion 14, which is threaded externally. The tubular portion forms an air chamber that communicates directly with the outlet 12 and through radial channels 15 with the outlets 13. The threaded tubular portion, in mounted condition, is screwed into a tubular jet body 16 having a flat upper flange 17 which, through a sealing ring 17a, lies on the bottom of the bath tub.

The jet body 16 is furthermore provided with external screw thread 18 spaced apart from flange 17, and can be secured with a nut 19.

In the mounted condition, the threaded portion 14 of the head is screwed in an enlarged chamber

20 in the jet body. The enlarged chamber 20 connects to a narrower axial air supply channel 21, which can be supplied with air through e.g. a flexible hose 22. Hose 22 can be mounted on a narrowed portion 23 of the jet body e.g. with a hose clamp.

The chamber 20 contains a ball 24, made e.g. from stainless steel, and which, in the rest position, closes air supply channel 21 under the influence of pressure exerted by a spring 25. Spring 25 has its end remote from ball 24 bearing on a valve member 26 extending axially within chamber 20 into the tubular portion 14 of the head. The valve member has an upper, e.g. cylindrical, portion 27, extending above a peripheral shoulder 28, and loosely fitting in the tubular portion 14. Resting on the peripheral shoulder is a spring 29 placed around portion 27, which spring bears at its other end on the upper wall of the air chamber in the head. Spring 29, consequently, presses valve member 26 downwards.

Provided underneath peripheral shoulder 28 is a sealing ring 30, e.g. an O-ring, adapted to sealingly coact with a recessed edge 31 formed in chamber 20. Preferably, the sealing ring lies in a recess 32 in the valve member.

The jet described can be cleaned in a simple manner, because the head can be screwed out of the jet body. Besides, the water-tightness of the system is ensured, because two seals are employed. The first seal is formed by ring 30 and the second by ball 24. Preferably, spring 29 has a higher tension than spring 25.

During the insufflation of air, the two springs are compressed, so that the air can pass the ball and the ring. At that moment, no water penetration is possible due to the air pressure.

Fig. 6 is a diagrammatic side view of a bath tub 1 filled up to the maximum level 40 defined conventionally by an overflow.

The bath tub is provided with jets, not shown in Fig. 6, which can be provided with air through an air supply system. The air supply system includes an electric pump 41, which may have a heating element, and which can supply air to the jets through a pipe 42. Pipe 42, in this example, includes a substantially horizontal portion 43, sometimes called "air buffer", and which is connected to the jets again through branch pipes and flexible hoses.

The pipe further includes an inverted-U-shaped portion 44 whose horizontal path 45 lies above the maximum level 40. Even if both seals of a jet are inoperative, water can still not reach the electric pump. At any rate, the U-shaped portion is preferably made from hard tube secured to the pump, so that a vertical position is maintained.

To provide for the case that the overflow of the bath is clogged, a non-return valve 46 can be

provided in the horizontal path 45 for the sake of security. Various modifications will readily occur to one skilled in the art after reading the above. Thus the air output may for instance be controllable.

It is also possible for the air pump to continue blowing for a while after bathing, so that the bath can be after-dried. As an additional security, a germ-removing or germ-destroying installation can be incorporated in the system. The system described can be used in any bath of any design, material and model, also in a shower cubicle or shower bath as a foot massaging device. In addition to massaging purposes, the system can be employed for any purpose contemplated by the user. Besides baths, the system can be utilized in any other environment, unit, combination etc. contemplated by the user.

These and similar modifications are deemed to fall within the scope of the present invention.

#### Claims

1. Whirlpool system comprising an air insufflation system with insufflation jets and an air pump, characterized in that the jets have a flat, disc-shaped head with a plurality of radial air outlets and at least one air outlet extending approximately transversely to the plane of the disc-shaped head.

2. Whirlpool system as claimed in claim 1, characterized in that the disc-shaped head is provided with a central tubular portion forming an air chamber and which is externally threaded and adapted to coact with screw thread of a substantially tubular jet body.

3. Whirlpool system as claimed in claim 2, characterized in that the jet body has a bore terminating in an enlarged chamber and that the axial bore is closed by a spring-biased ball.

4. Whirlpool system as claimed in claim 2 or 3, characterized by a valve member extending within the air chamber and into an enlarged chamber in the jet body, and by a sealing ring abutting against spring pressure against a peripheral edge in the enlarged chamber.

5. Whirlpool system as claimed in any one of claims 2-4, characterized in that the jet body has an enlarged chamber wherein, on the one hand, the tubular portion of the head is screwed and wherein, on the other hand, an axial air supply channel terminates, and that the enlarged chamber contains a valve member having a peripheral shoulder and a portion extending from the peripheral shoulder into the tubular portion of the head, and a pressure spring provided between the peripheral shoulder and the head pressing the valve member in the direction of a peripheral edge in the enlarged

chamber, a sealing ring being provided between the peripheral edge and the peripheral shoulder and a ball being positioned at the mouth of the air supply channel, and a spring being mounted between the ball and the valve member.

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6. Whirlpool system as claimed in any of the preceding claims, characterized in that the air insufflation system includes a pump and a pump-connected inverted U-shaped pipe section, which is dimensionally stable and a horizontal portion of which, in the operative condition, is situated above the overflow level of a bath tub wherein the system is incorporated.

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7. Whirlpool system as claimed in claim 6, characterized in that a non-return valve is provided in the horizontal portion.

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8. Whirlpool system as claimed in any of the preceding claims, characterized by a heating element for heating the air to be insufflated.

9. Whirlpool system as claimed in any one of claims 6-8, characterized in that at least the inverted U-shaped portion is made from hard tube and, in fixed position, is connected to the pump.

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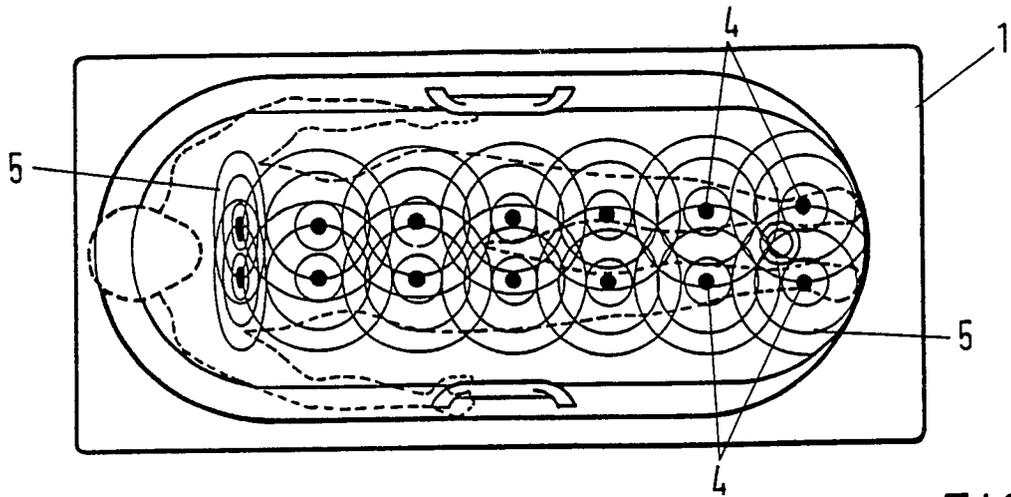


FIG. 1

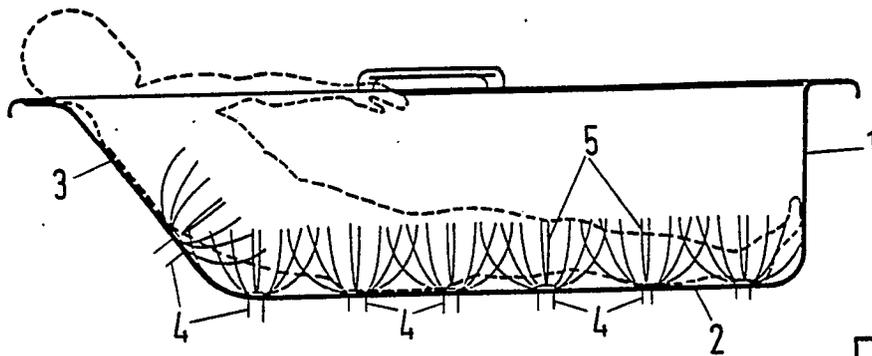


FIG. 2

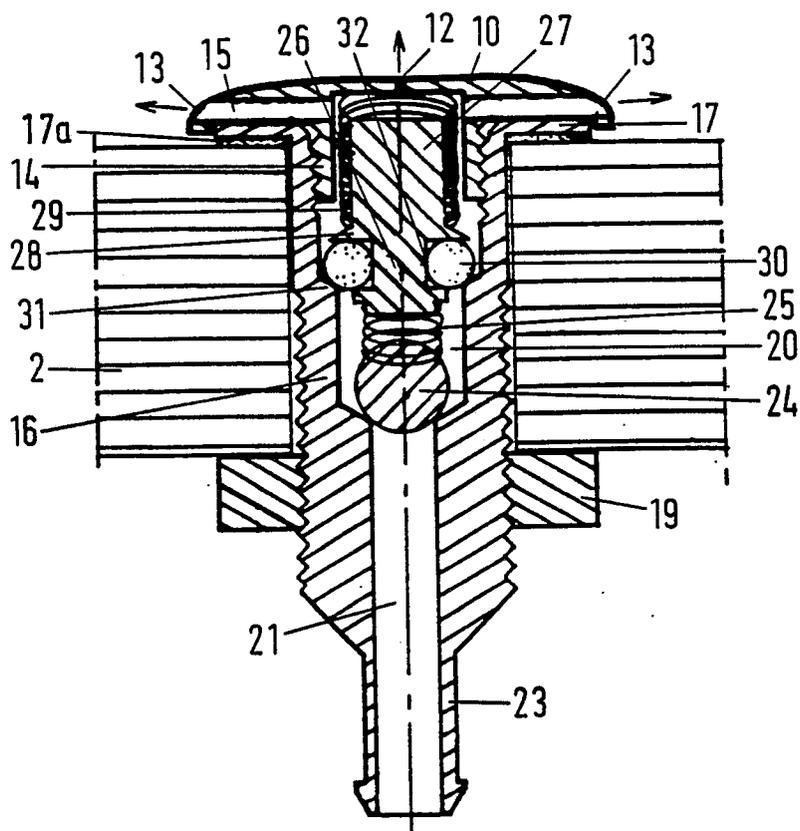


FIG. 3

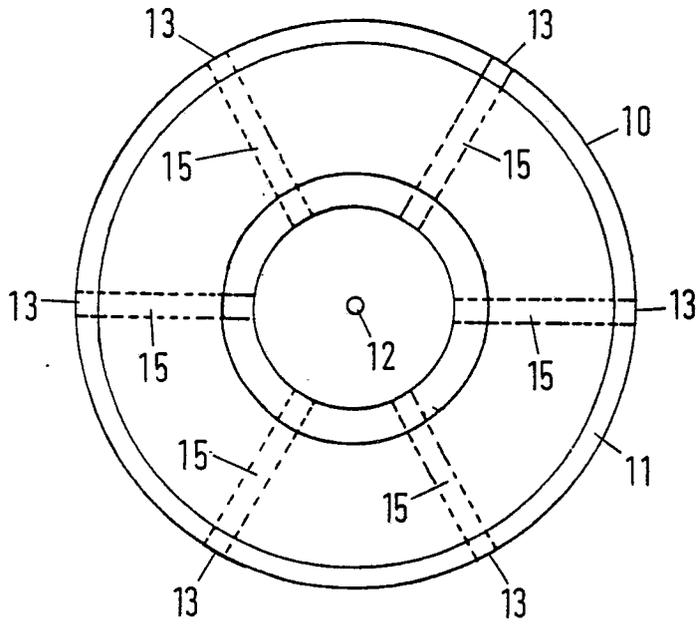


FIG. 5

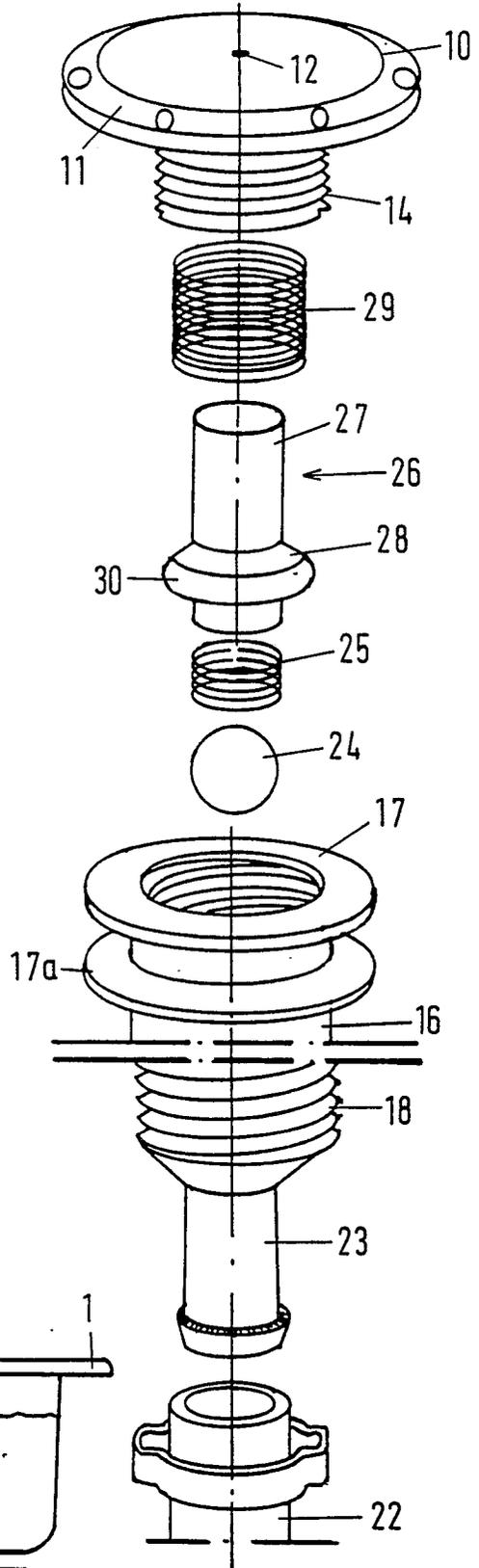


FIG. 4

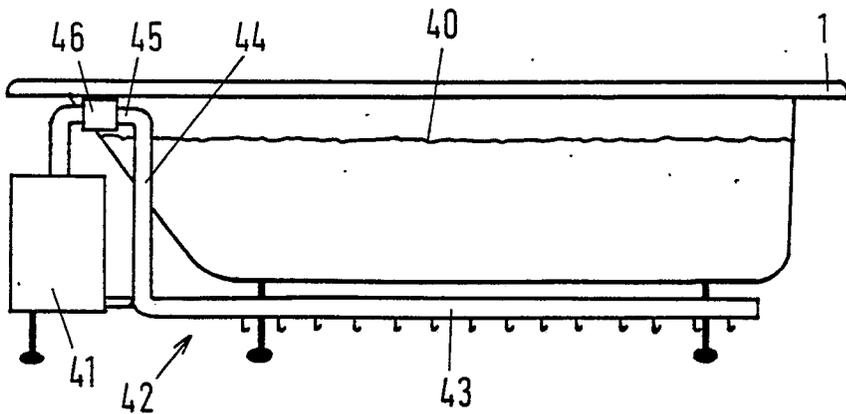


FIG. 6



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)
P,X	WO-A-8 910 112 (HYDRABATHS INC.) * Page 16, paragraph 2 - page 17, line 4 *	1,2	A 61 H 33/02
A	DE-C-3 720 637 (F. KALDEWEI GmbH) * Fig. 5; column 6, lines 30-60 *	1-4	
A	GB-A-2 114 021 (C. RAMBLE) * Figs.; page 1, lines 106-125; page 2, lines 21-41 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 61 H
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		11-04-1990	VEREECKE A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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