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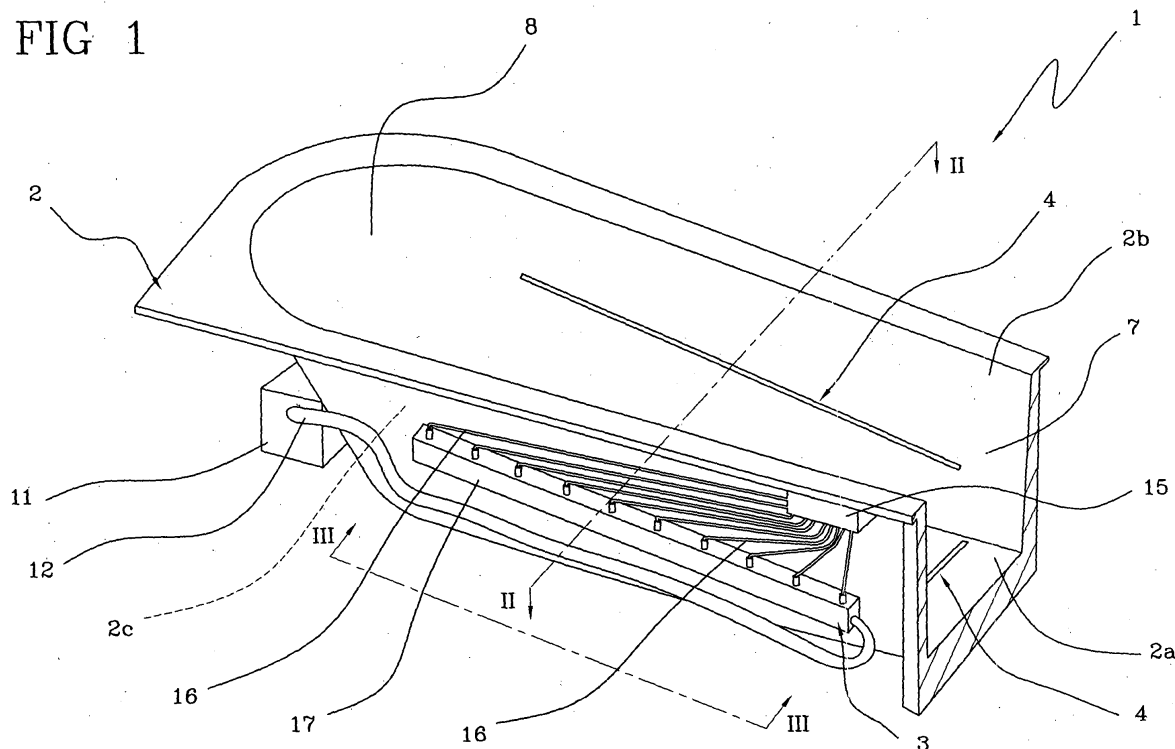
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(54) **A whirlpool bathtub**

(57) A whirlpool bathtub comprises a bathtub body (2) and at least one distributor (3) of a flow of air-water mixture placed in fluid communication with the bathtub

body (2). The whirlpool bathtub comprises at least one diffusion chamber (4) operatively functioning between the distributor (3) and the interior of the bathtub body (2) to spread the flow evenly inside the bathtub body (2).

**FIG 1**



## Description

**[0001]** The present invention relates to a whirlpool bathtub.

**[0002]** Whirlpool bathtubs fitted with single outlets distributed around the inside the body of the bathtub are known to the background art.

**[0003]** Each outlet is usually associated with both a water circuit and an air circuit.

**[0004]** The water entering through these outlets, fed by the water circuit, is mixed with the air supplied by the air circuit.

**[0005]** This produces a flow of bubbles from the outlets, striking the user's body with massaging effects.

**[0006]** The outlets, which can also be equipped with devices for adjusting and orienting the flow, are usually positioned to correspond with parts of the user's body, such as for example feet, hips and back, that are to be subjected to the massaging effect produced by the flow of the air and water mixture.

**[0007]** The Applicant has found that whirlpool bathtubs known to background art can be improved from various points of view.

**[0008]** In fact, in whirlpool bathtubs known to background art each outlet must be individually connected to the water and air circuits.

**[0009]** This implies a large number of hydraulic connections with a notable effect on the production costs of the whirlpool bathtubs, since the assembly of each hydraulic connection takes a considerable amount of time.

**[0010]** In addition, the presence of a large number of hydraulic connections means high maintenance costs, since potential water leaks are proportional to the number of these connections.

**[0011]** Moreover, in known whirlpool bathtubs the position of the outlets may not be ideal for every person using the whirlpool effect since everyone has different physical characteristics.

**[0012]** It is in fact sufficient to imagine the home use of whirlpool bathtubs where all family members use the bathtub, i.e. men, women and children who are clearly of different heights.

**[0013]** The main technical aim of this invention is thus to propose a whirlpool bathtub that can overcome the disadvantages mentioned above.

**[0014]** In particular, the aim of this invention is to provide a whirlpool bathtub which is as universal as possible, so that it can be used in an ideal way by users with different physical characteristics.

**[0015]** Another aim of this invention is to propose a whirlpool bathtub which makes it possible to reduce potential water leaks of the system to a minimum.

**[0016]** These aims are substantially achieved by a whirlpool bathtub comprising the technical features described in one or more of the attached claims.

**[0017]** Further characteristics and advantages of the invention are apparent from the detailed indicative description which follows of a preferred embodiment of a

whirlpool bathtub provided merely by way of example without restricting the scope of the inventive concept, as shown in the accompanying drawings in which:

- 5 - Figure 1 is a perspective view of whirlpool bathtubs according to the present invention with one part cut away in order to better illustrate other parts;
- Figure 2 is a cross-section view along the plane II-II of a part of the whirlpool bathtub shown in Figure 1;
- 10 - Figure 3 is a cross-section view along the plane III-III of a part of the whirlpool bathtub shown in Figure 1;
- Figure 4 is a perspective view of another embodiment of the whirlpool bathtub with one part cut away to better illustrate others.
- 15

**[0018]** With reference to the accompanying drawings, the reference number 1 indicates the whirlpool bathtub in general.

- 20 **[0019]** The whirlpool bathtub 1 comprises a bathtub body 2 which, to make illustration easier, is represented as a bathtub body with a bottom wall 2a and two side walls 2b, 2c connected by two other walls, only one of which is shown.

- 25 **[0020]** The bathtub body 2 may, however, be any shape, as long as it has a concave part designed to contain the water.

- 30 **[0021]** The whirlpool bathtub 1 also comprises a flow distributor 3 of a mixture consisting of air and water and which is located in communication with the bathtub body 2.

- 35 **[0022]** Advantageously, the whirlpool bathtub 1 comprises at least one diffusion chamber 4, operatively active between the distributor 3 and the interior of the bathtub body 2, that is the concave part of the bathtub body 2 designed to contain the water, to uniformly distribute the flow of air-water mixture inside the bathtub body 2.

- 40 **[0023]** Advantageously, the diffusion chamber 4 comprises at least one through section 5 for the air-water flow developing prevalently in the direction X with respect to the others.

- 45 **[0024]** In the preferred embodiment this through section 5 is substantially polygonal in shape with two opposite side of the polygon being much longer than the other sides; however, the through section 5 can also be elliptically shaped with one axis of symmetry being much longer than the other.

**[0025]** In general terms, the through section 5 is shaped like a slit.

- 50 **[0026]** This particular characteristic of the diffusion chamber 4 ensures that the outlet flow from the diffusion chamber 4 has a laminar configuration, that is to say that the dimension of the outlet flow in one development direction is negligible with respect to the other two.

- 55 **[0027]** Advantageously, the diffusion chamber 4 develops along at least one wall 2a, 2b, 2c of the bathtub body 2. A diffusion chamber 4 is preferably associated with each wall 2a, 2b, 2c of the bathtub body 2 and faces

towards the inside of the bathtub body 2.

**[0028]** In addition, a flow distributor 3 is associated with each diffusion chamber 4 and connected in a watertight manner to the outside of the bathtub body 2; the association between the diffusion chamber 4 and the flow distributor 3 is therefore both operative and physical.

**[0029]** In particular, this coupling between the diffusion chamber 4 and the flow distributor 3 is made through a plurality of through channels 6, cut in the diffusion chamber 4 corresponding with each physical coupling with the distributor 3, to allow the flow mixture to pass from the distributor 3 to the diffusion chamber 4 which then delivers the flow mixture in a laminar form.

**[0030]** Advantageously, this plurality of through channels 6 is inclined along a direction that goes from the portion 7 of the bathtub body 2 that will accommodate the feet of the user to the portion 8 of the bathtub body 2 that will accommodate the head of the user.

**[0031]** In this way, the air-water mixture flow will strike the user along a path starting at the feet and reaching the head.

**[0032]** Advantageously, the flow distributor 3 consists of a water manifold 9 with a plurality of holes 10 directly facing the through channels 6 of the distributor 3 to ensure that the water is fed into the diffusion chamber 4.

**[0033]** The supply of water to the manifold 9 is guaranteed by a hydraulic pump 11 which takes water from inside the bathtub body 2 and is connected, by means of just one delivery pipe 12 to one end of the manifold 9. The opposite end of the manifold 9 can be closed or open, in certain applications, such as for example in a possible series arrangement of several distributors 3 on the same wall or of all or part of the distributors 3 of the entire bathtub.

**[0034]** Together with the holes 10 for the supply of water to the diffusion chamber 4, the flow distributor 3 comprises a plurality of nozzles 13 to supply the second component of the mixture, i.e. the air, to the diffusion chamber 4.

**[0035]** In detail, each air nozzle 13 feeds a corresponding through channel 6; in fact, the nozzles 13 discharge air in exact correspondence with the holes 10 in the manifold 9.

**[0036]** This configuration allows the two components of the mixture, air and water, to mix together during their passage in the through channels 6, supplying the diffusion chamber 4 with a more or less uniform mixture.

**[0037]** Advantageously, each nozzle 13 presents a reduced cross-section at the air discharge end 14 to achieve an increase in the output speed of the air from the nozzle 13 with a consequent decrease in pressure.

**[0038]** The localised reduction in pressure creates a Venturi effect that draws water from the water manifold 9 below, increasing the turbulence of the air and water flow and thus favouring the mixing of the two components.

**[0039]** All the nozzles 13 are connected to a source

of air 15 through one or more conduits 16. This source of air 15 can usefully be a centrifugal compressor, an axial compressor or a source of compressed air.

**[0040]** From the construction point of view, the diffusion chamber 4 is preferably set into one or more walls 2a, 2b, 2c of the bathtub body 2 and can be completely contained in the thickness of the walls 2a, 2b, 2c of the bathtub body 2 or protrude from the wall of the bathtub body 2 towards the interior.

**[0041]** In a preferred embodiment, there are three diffusion chambers 4 and three flow distributors 3 set into three different walls 2a, 2b, 2c of the bathtub body 2.

**[0042]** In particular, the bottom wall 2a of the bathtub body 2 comprises a diffusion chamber 4 which extends from a side wall 2b to the opposite side wall 2c; each of these side walls 2b, 2c also comprises a respective diffusion chamber 4 which extends along the entire longitudinal development of each wall 2b, 2c.

**[0043]** Each flow distributor 3 associated with each diffusion chamber 4 can either be a single body, thus comprising the manifold 9, the through channels 6 and the air nozzles 13 in a single box-shaped body, or it can consist of a plurality of modules 18 connected by the single water manifold 9.

**[0044]** In this latter configuration, each module 18 comprises at least one through channel 6 and at least one air nozzle 13.

**[0045]** This invention achieves the proposed aims.

**[0046]** In fact, the diffusion chamber makes it possible to obtain a massaging flow which propagates inside the bathtub body in a laminar manner and extends along the entire length of the bathtub body, allowing the optimum use of the whirlpool bathtub by any user regardless of his or her height.

**[0047]** In addition, the use of a single flow distributor, and thus of a single water manifold, to supply a single diffusion chamber makes it possible to reduce the number of hydraulic connections present in the whirlpool bathtub to a minimum, thus increasing the reliability and reducing potential leaks in the water circuit.

**[0048]** The invention also allows an important advantage to be achieved.

**[0049]** In fact, the slope of the through channels together with the form of the output flow from the diffusion chamber (determined by the shape of the diffusion chamber itself) makes it possible to strike the entire body of the user with a uniform flow of the air-water mixture with a propagation direction from the feet towards the head of the user.

**[0050]** It is a known fact that this propagation direction makes it possible to achieve the greatest massaging effect.

## Claims

1. A whirlpool bathtub comprising a bathtub body (2) and at least one distributor (3) of a flow of air and

water mixture placed in fluid communication with the bathtub body (2), **characterised in that** it comprises at least one diffusion chamber (4) operating between the at least one distributor (3) and the inner part of the bathtub body (2) to spread the flow evenly inside the bathtub body (2).

2. A whirlpool bathtub according to claim 1 wherein at least one diffusion chamber (4) presents at least one through section (5) for the flow extending prevalently in one dimension (X) with respect to the others to give this flow of air and water mixture a laminar form. 5
3. A whirlpool bathtub according to claim 2 wherein the through section of the diffusion chamber (4) is substantially a polygon with two opposite sides much longer than the other sides of the polygon. 10
4. A whirlpool bathtub according to any of the foregoing claims wherein the at least one diffusion chamber (4) extends along at least one wall (2a, 2b, 2c) of the bathtub body, each diffusion chamber (4) being connected with a flow distributor (3). 15
5. A whirlpool bathtub according to any of the foregoing claims wherein the flow distributor (3) comprises a plurality of through channels (6) for the air and water mixture in order to place the distributor (3) in fluid communication with the diffusion chamber (4). 20
6. A whirlpool bathtub according to claim 5 wherein the through channels (6) are sloped in order to direct the flow in a direction that starts from a portion (7) of the bathtub body (2) designed to accommodate the feet of a user to a portion (8) of the bathtub body (2) designed to accommodate the head of a user. 25
7. A whirlpool bathtub according to claim 5 or 6 wherein the flow distributor (3) comprises a water manifold (9) with a plurality of holes (10) directly facing the through channels (6) to supply each through channel (6) of the plurality of through channels (6) with water. 30
8. A whirlpool bathtub according to any of the foregoing claims wherein the at least one water manifold (9) is fed with water by a hydraulic pump (11). 35
9. A whirlpool bathtub according to any of the claims from 4 to 8 wherein the flow distributor (3) comprises a plurality of nozzles (13) to supply the through channels (6) with air from a source of air (15). 40
10. A whirlpool bathtub according to claim 9 wherein the plurality of nozzles (13) discharge air at the plurality of holes (10) of the water manifold (9). 45

11. A whirlpool bathtub according to any of the foregoing claims wherein the at least one diffusion chamber (4) is placed directly in one wall (2a, 2b, 2c) of the bathtub body (2).

12. A whirlpool bathtub according to any of the claims from 9 to 11 wherein the flow distributor (3) comprises a plurality of modules (18) connected by the manifold (9), each module (18) of the plurality of modules (18) comprising at least one through channel (6) of the plurality of through channels (6) and at least one nozzle (13) of the plurality of nozzles (13).

FIG 1

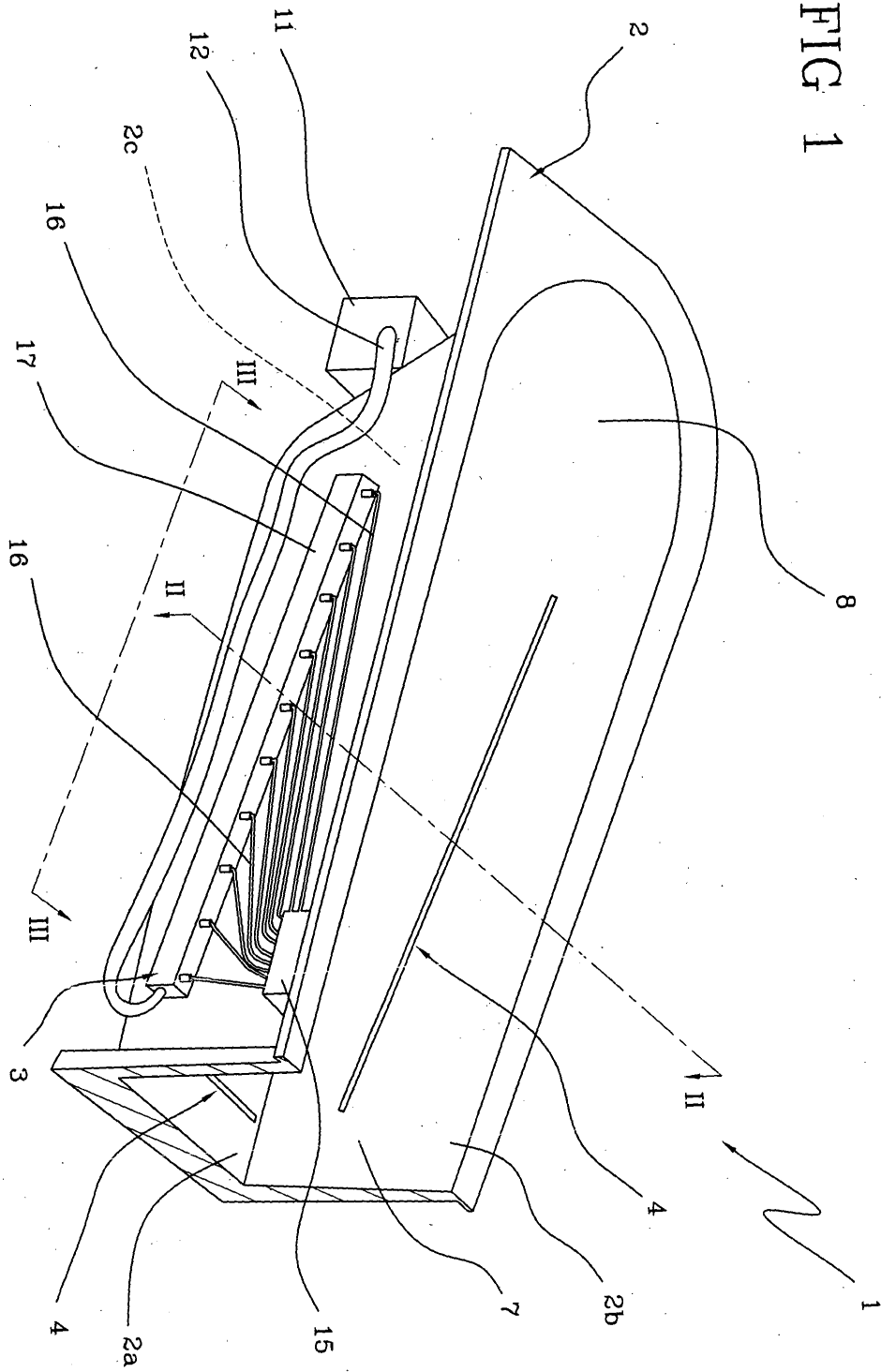


FIG 2

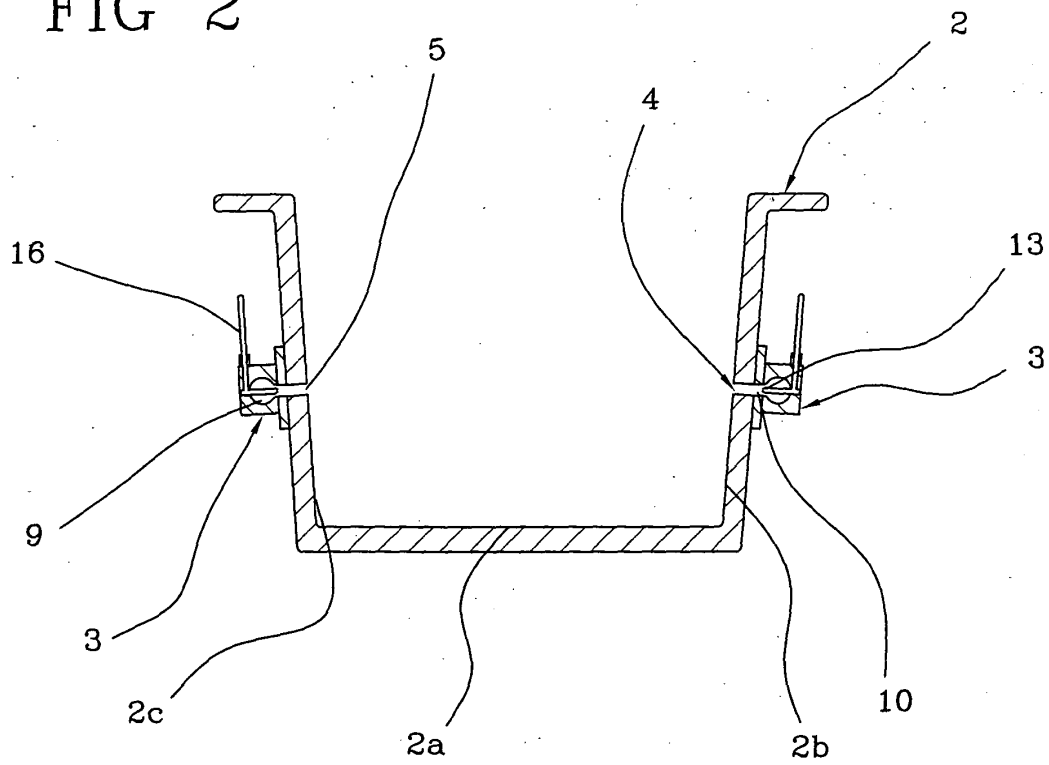


FIG 3

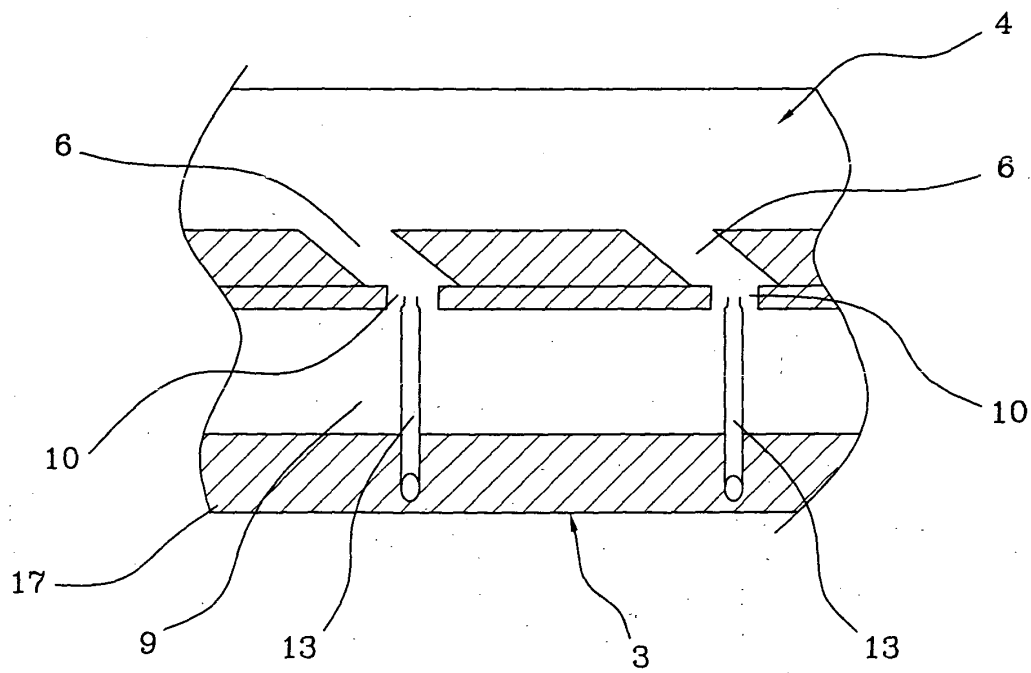
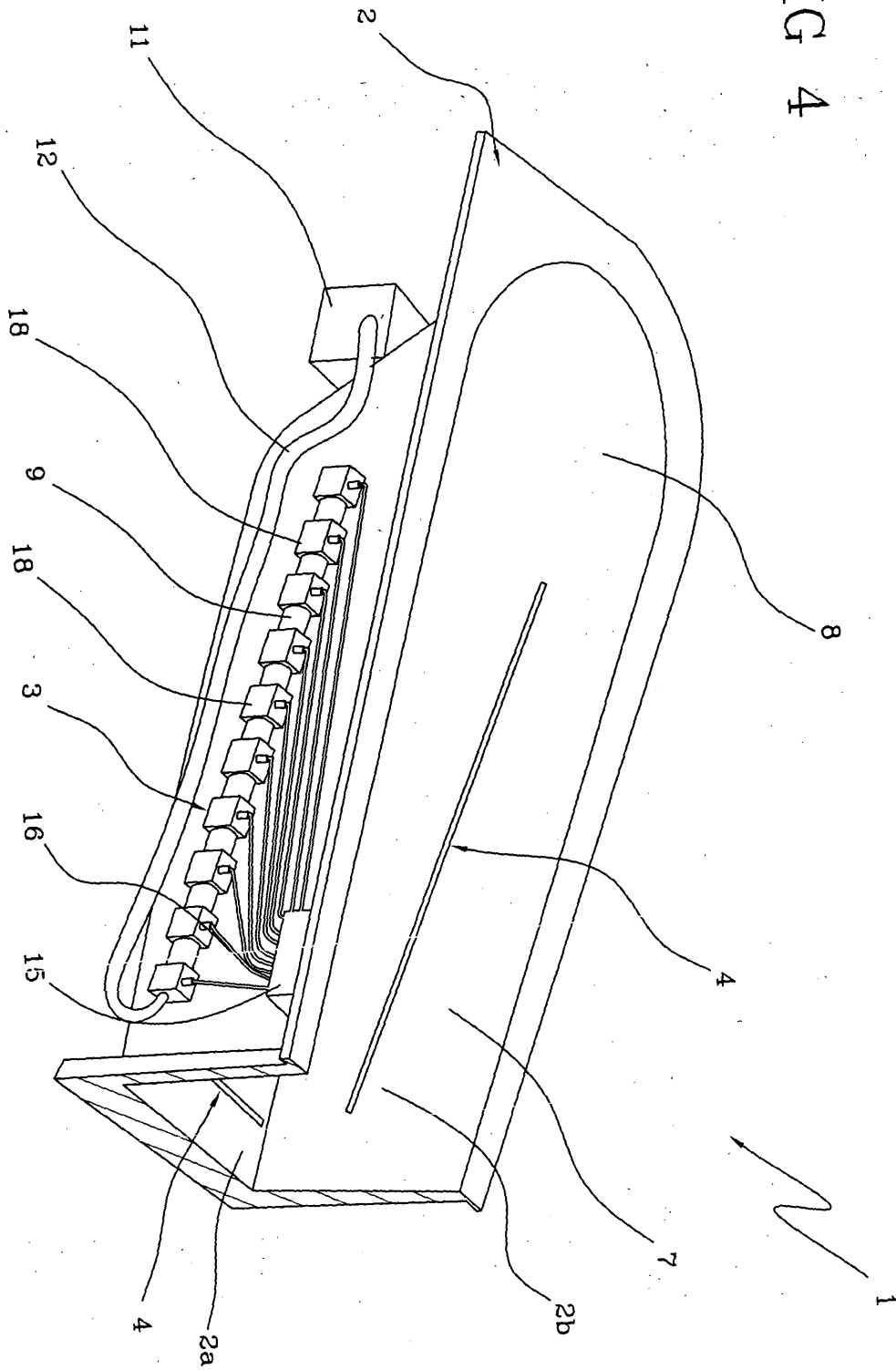


FIG 4





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# EUROPEAN SEARCH REPORT

Application Number  
EP 05 42 5158

| 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.7)        |
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| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 4 764 999 A (RUSHING ET AL)<br>23 August 1988 (1988-08-23)<br>* figures 1,2,4,5 *<br>* column 1, line 59 *<br>* column 2, paragraph 1 *<br>* column 3, paragraphs 1,3-5 *<br>-----<br><br>-/--                                                                                                           | 1-4,7,9                                                   | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.7)<br><br>A61H |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                             |                                                           |                                                     |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                             | Date of completion of the search<br><b>29 August 2005</b> | Examiner<br><b>Tejada Biarge, D</b>                 |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>-----<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                                                                                                                                                             |                                                           |                                                     |

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EPO FORM 1503 03.82 (P04C01)



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# EUROPEAN SEARCH REPORT

Application Number  
EP 05 42 5158

| 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.7) |
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| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 6 510 277 B1 (DONGO PAUL A)<br>21 January 2003 (2003-01-21)<br>* figure 9 *<br>-----                                                                                                                                                                                                                                                                                                                | 7-12                             |                                              |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                        |                                  | TECHNICAL FIELDS SEARCHED (Int.Cl.7)         |
| Place of search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                        | Date of completion of the search | Examiner                                     |
| The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                        | 29 August 2005                   | Tejada Biarge, D                             |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>.....<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |                                              |

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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