

(19)



(11)

EP 3 375 528 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.09.2018 Bulletin 2018/38

(51) Int Cl.:
B05B 1/18 (2006.01) B05B 1/34 (2006.01)

(21) Application number: **17425029.0**

(22) Date of filing: **13.03.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(72) Inventors:
• **Nikles, Gerhard**
I-25013 Carpenedolo, Brescia (IT)
• **Turrini, Alberto**
I-25013 Carpenedolo, Brescia (IT)

(74) Representative: **Chimini, Francesco et al**
Jacobacci & Partners S.p.A.
Piazza della Vittoria 11
25122 Brescia (IT)

(71) Applicant: **Nikles Tec Italia S.r.l.**
25013 Carpenedolo Brescia (IT)

(54) **DISPENSER DEVICE OF A JET OF WATER IN THE FORM OF A VORTEX**

(57) A dispenser device of a jet of water in the form of a vortex comprises at least one swirl path (12) of the water comprising a swirl chamber (14) with a circular crosssection. The chamber has a side wall (16) which flows, narrowing progressively, into a respective dispenser nozzle (22). Each swirl path further comprises a

chamber supply channel (24) which can be fluidically connected to a water supply pipe and flowing into an inlet portion (162) of the side wall (16) of the swirl chamber (14). The chamber supply channel (24) is arranged tangentially relative to the swirl chamber (14).

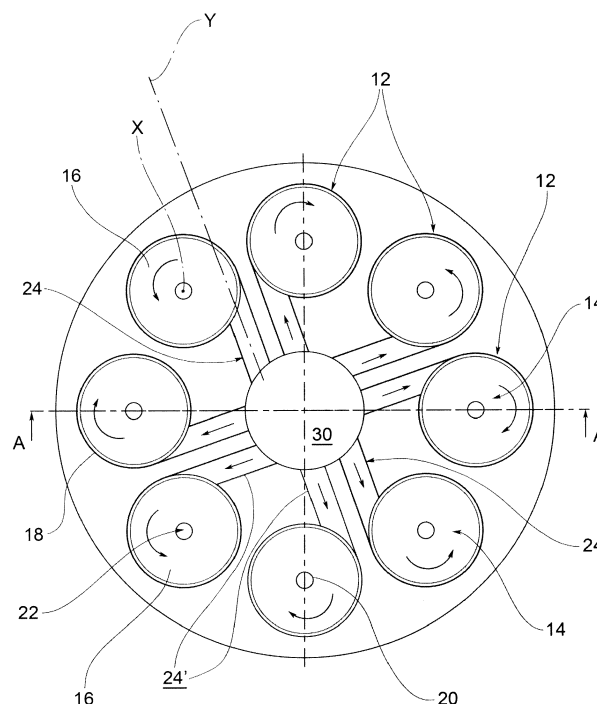


FIG.2

EP 3 375 528 A1

Description

[0001] The present invention relates to a dispenser device of jets of water in the form of a vortex, for example for hand showers, shower heads, body sprays i.e. small shower heads placed on one or more sides of the shower.

[0002] Dispenser devices are already known of suitable to generate one or more water jets in the form of a vortex. Depending on the operating pressure, these jets of water may be particularly gentle on the skin, or, as in the case of the body spray, give a massage-like effect.

[0003] In some embodiments, the dispenser device generates multiple jets of water in the form of a vortex that intersect each other causing the rupture of the bonds between the water molecules and thereby forming a jet of water spray, also known as "mist".

[0004] To form the vortex of water, some embodiments of the dispenser device use rotating propeller parts which, when hit by a stream of water, make the flow itself rotate. Other embodiments provide for the use of rotating nozzles oriented so as to be at an angle with each other.

[0005] All the known embodiments however, require the use of rotating parts and thereby prove complex and expensive to manufacture and more prone to malfunctions or breakage, for example due to the formation of limescale.

[0006] The purpose of the present invention is to provide a dispenser device of one or more jets of water in the form of a vortex with a particularly compact and simple structure consisting of a reduced number of components, and thus more reliable than those of the prior art.

[0007] Such purpose is achieved by a dispenser device according to claim 1. The dependent claims describe preferred or advantageous embodiments of the dispenser device according to the invention.

[0008] The characteristics and advantages of the dispenser device according to the invention will, in any case, be evident from the description given below of its preferred embodiments, made by way of a non-limiting example with reference to the appended drawings, wherein:

- figure 1 is a perspective view in axial cross-section of the dispenser device according to the invention;
- figure 2 is a top plan view of the swirl plate only of the dispenser device;
- figure 3 is an axial cross-section of the swirl plate along the line A-A in figure 2;
- figure 4 is a bottom plan view of the dispenser device; and
- figure 5 is a side view of the dispenser device in use.

[0009] In said drawings, reference numeral 1 globally denotes a dispenser device of jets of water in the form of a vortex according to the invention.

[0010] In a general embodiment, the device 1 comprises a device body 10 in which at least one path to swirl the water 12 is made. In the example shown in the drawings, the dispenser device is provided with eight swirl

paths 12, each suitable to generate a corresponding jet of water in the form of a vortex.

[0011] Each swirl path 12 comprises a swirl chamber 14 with a circular cross-section.

[0012] The swirl chamber 14 is defined by a side wall 16 extending axially between an inlet end 18 and an outlet end 20 of the water.

[0013] The outlet end 20 of the water flows into a respective dispenser nozzle 22. The side wall 16 narrows progressively from the inlet end 18 to the outlet end 20.

[0014] In other words, each swirl chamber 14 consists of a concavity made in the device body 10, having a circular cross-section, progressively decreasing in diameter and from the bottom of which a respective dispenser nozzle 22 extends.

[0015] For example, even every dispenser nozzle 22 is made in the device body 10 as in a duct, for example having a uniform cross-section.

[0016] Each swirl chamber 12 further comprises, made in the device body 10, a chamber supply channel 24. This chamber supply channel 24 can be fluidically connected to a water supply pipe and flows into an inlet portion 162 of the side wall 16 of the swirl chamber 14.

[0017] The chamber supply channel 24 is arranged tangentially relative to the respective swirl chamber 14.

[0018] As a result, the basic idea of the present invention is to introduce a stream of pressurised water into a swirl chamber 14 in a tangential direction to said chamber, so that the flow of water maintains its speed inside the chamber and, guided by the side wall, forms a vortex. The diameter of the dispenser nozzle 22 is chosen in such a way that the rotation of the water flow is maintained while passing through the dispenser nozzle 22 and translates, upon leaving the nozzle, into a jet with a substantially conical vortex, as shown in Figure 5.

[0019] For example, the diameter of the dispenser nozzle 22 is between 2 mm and 5 mm, preferably between 3 mm and 4.5 mm.

[0020] In one embodiment, the maximum size of the cross-section of the supply channel 24, such as its width, is less than the radius of circumference of the swirl chamber 14 at the water inlet end 18.

[0021] In one embodiment, the supply chamber 14 has, at least in a portion ending with the outlet end 20, a conical or spherical cap or parabolic profile, or a combination of such profiles.

[0022] In one embodiment, the inlet portion 162 of the side wall 16 has a cylindrical shape. In addition, in one embodiment, each chamber supply channel 14 is defined by side walls parallel to the axis of said cylindrical inlet portion 162. This way, at the inlet point of the supply channel 24 into the respective swirl chamber 14, the side wall of the inlet portion 162 connects seamlessly to the side wall of the supply channel 24.

[0023] In one embodiment, each swirl chamber 14 extends around a chamber axis X.

[0024] In one embodiment, the supply channel 24 comprises at least one straight portion 24' flowing into the

swirl chamber 14; this straight portion 24' defines a channel axis Y perpendicular to the chamber axis X.

[0025] In the example shown, the chamber supply channel 24 is straight for its entire extension.

[0026] Additionally, in one embodiment, the dispenser nozzle 22 is coaxial to the chamber axis X of the swirl chamber 14 which it extends from.

[0027] In one embodiment, in which, as in the example shown, a plurality of identical swirl paths 12 of the water are made in the device body 10 suitable to generate respective jets in the form of vortices, the swirl paths 12 are spaced from each other so that the water jets in the form of a vortex coming out of adjacent dispenser nozzles 22 intersect each other (Figure 5).

[0028] As mentioned in the introduction, the intersection of cone-shaped jets at the outlet of the dispenser device 1 causes a water misting effect.

[0029] In a preferred embodiment, the chamber supply channels 24 are made in such a way that the directions of rotation of the water flow inside adjacent swirl chambers 14 are opposite to each other, as shown by the arrows in Figure 2.

[0030] This way, the directions of rotation of adjacent jets of water at the outlet of the dispenser device are also opposite each other and this entails that in the intersection line between two adjacent jets, the directions of the water concur or are in phase. As a result, the interference between adjacent jets is of the "constructive", not "destructive" type as would be the case if the directions of rotation were the same. The combination of the jets of water thus produces a uniform and homogeneous overall jet, the formation of spurts of water and thus the dispersion of the flow directed at the user being prevented.

[0031] In one embodiment, the swirl chambers 14 are evenly distributed along at least one circular crown of the device body 10.

[0032] In one embodiment shown in the drawings, the swirl paths 12 are made in the thickness of a swirl plate 102 of the device body 10.

[0033] Moreover, in the embodiment illustrated, the chamber supply channels 24 branch out radially from a central distribution chamber 30 communicating with the water supply pipe and, for example, also made in the thickness of the swirl plate 102.

[0034] For example, the device body 10 comprises a closing cap 104 superposed on the swirl plate 102 and defining a water inlet passage 106 open onto the central distribution chamber 30 and connectable, for example by means of a threaded connection, to the water supply duct.

[0035] It is clear that the chamber supply channels 24, without prejudice to their tangential arrangement with respect to the respective swirl chambers 14, may come from other water inlet points in the device, for example from an annular distribution chamber placed around the swirl chamber 14.

[0036] A person skilled in the art may make modifications and adaptations to the embodiments of the dispens-

er device according to the invention, replacing elements with others functionally equivalent so as to satisfy contingent requirements while remaining within the sphere of protection of the following claims. Each of the characteristics described as belonging to a possible embodiment may be realised independently of the other embodiments described.

10 Claims

1. Dispenser device of a jet of water in the form of a vortex, comprising a device body (10) in which at least one swirl path (12) of the water is made comprising a swirl chamber (14) with a circular cross-section comprising a side wall (16) extending axially between an inlet end (18) of the water and an outlet end (20) of the water which flows into a respective dispenser nozzle (22), in which said side wall (16) narrows progressively from the inlet end to the outlet end, and a chamber supply channel (24) fluidically connectable to a water supply pipe and flowing into an inlet portion (162) of the side wall (16) of the swirl chamber (14), said chamber supply channel (24) being placed tangentially to the swirl chamber (14).
2. Device according to claim 1, wherein the maximum size of the cross-section of the supply channel (24) is less than the radius of circumference of the swirl chamber (14) at the water inlet end.
3. Device according to claim 1, or 2 wherein the supply chamber (14) has, at least in a portion ending with the outlet end (20), a conical profile or a spherical cap profile or a parabolic profile, or a combination of such profiles.
4. Device according to any of the preceding claims, wherein the inlet portion (162) of the side wall (16) has a cylindrical shape.
5. Device according to any of the preceding claims, wherein each swirl chamber (14) extends about a chamber axis (X), and wherein the supply channel (24) comprises at least one straight portion (24') flowing into the swirl chamber (14), said straight portion defining a channel axis (Y) perpendicular to the chamber axis (X).
6. Device according to any of the preceding claims, wherein each swirl chamber (14) extends about a chamber axis (X) and wherein the respective dispenser nozzle (22) is coaxial to said chamber axis.
7. Device according to any of the preceding claims, wherein a plurality of identical swirl paths (12) of the water are made in the device body (10) suitable to generate respective jets in the form of vortices, said

swirl paths being spaced from each other so that the water jets in the form of a vortex coming out of adjacent dispenser nozzles intersect each other.

8. Device according to the preceding claim wherein the chamber supply channels (24) are made in such a way that the directions of rotation of the water flow inside adjacent swirl chambers (14) are opposite to each other. 5
9. Device according to claim 7 or 8, wherein the swirl chambers (14) are evenly distributed along a circular crown of the device body (10). 10
10. Device according to any of the claims 7-9, wherein the swirl paths (12) are made in the thickness of a swirl plate (102) of the device body. 15
11. Device according to claim 9 or 10, wherein the chamber supply channels (24) branch radially from a central distribution chamber (30) communicating with the water supply pipe. 20

25

30

35

40

45

50

55

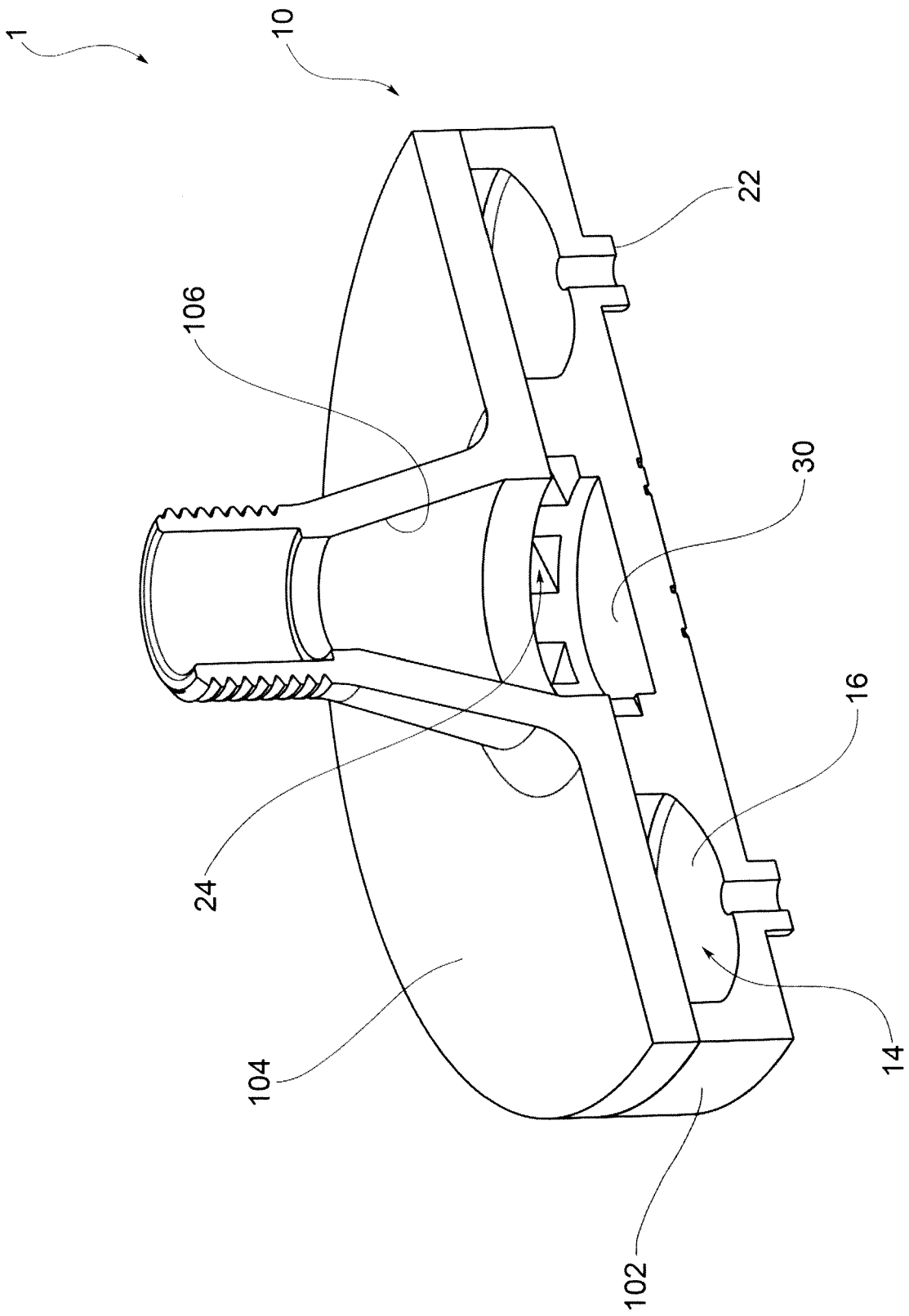


FIG.1

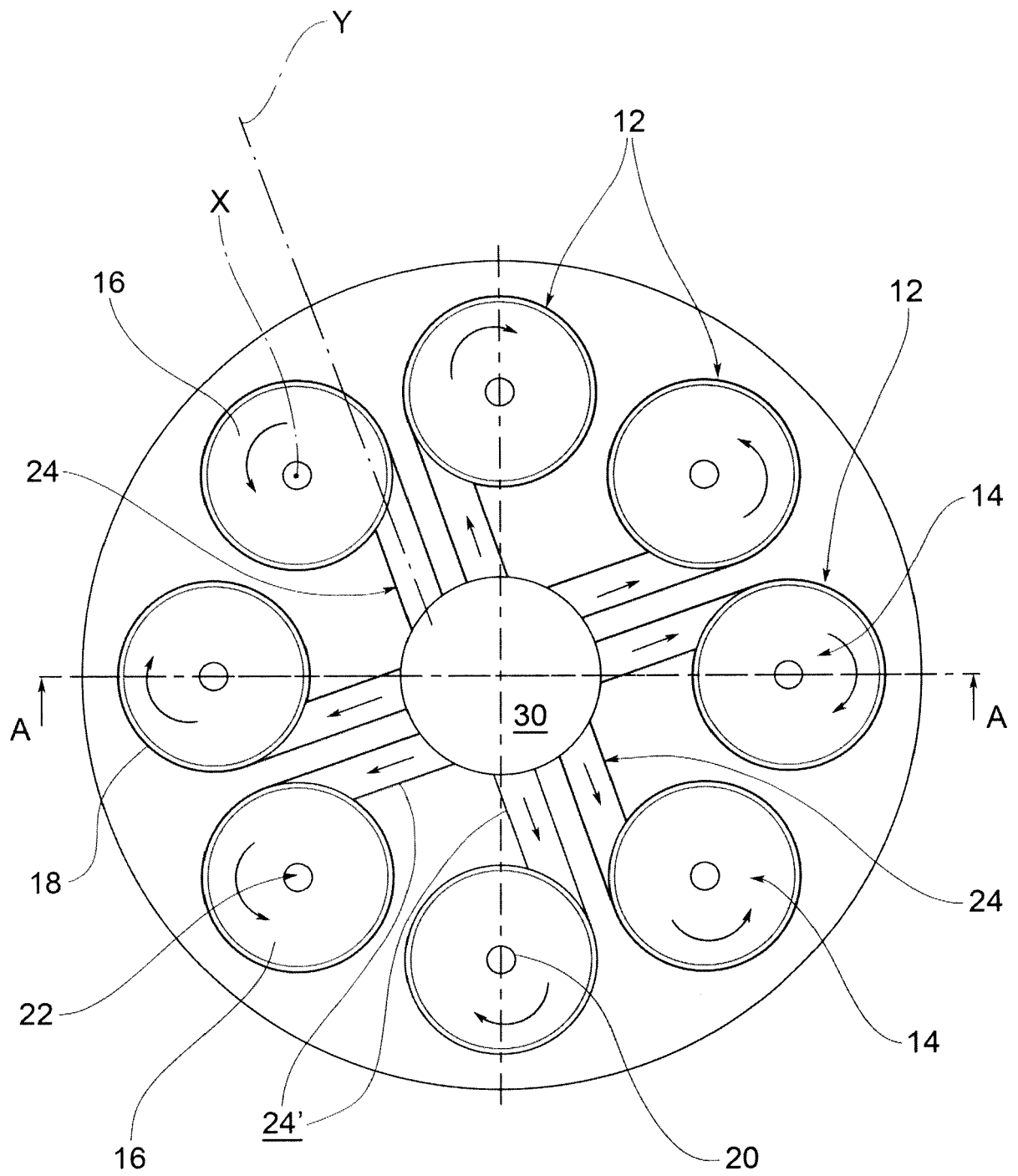


FIG.2

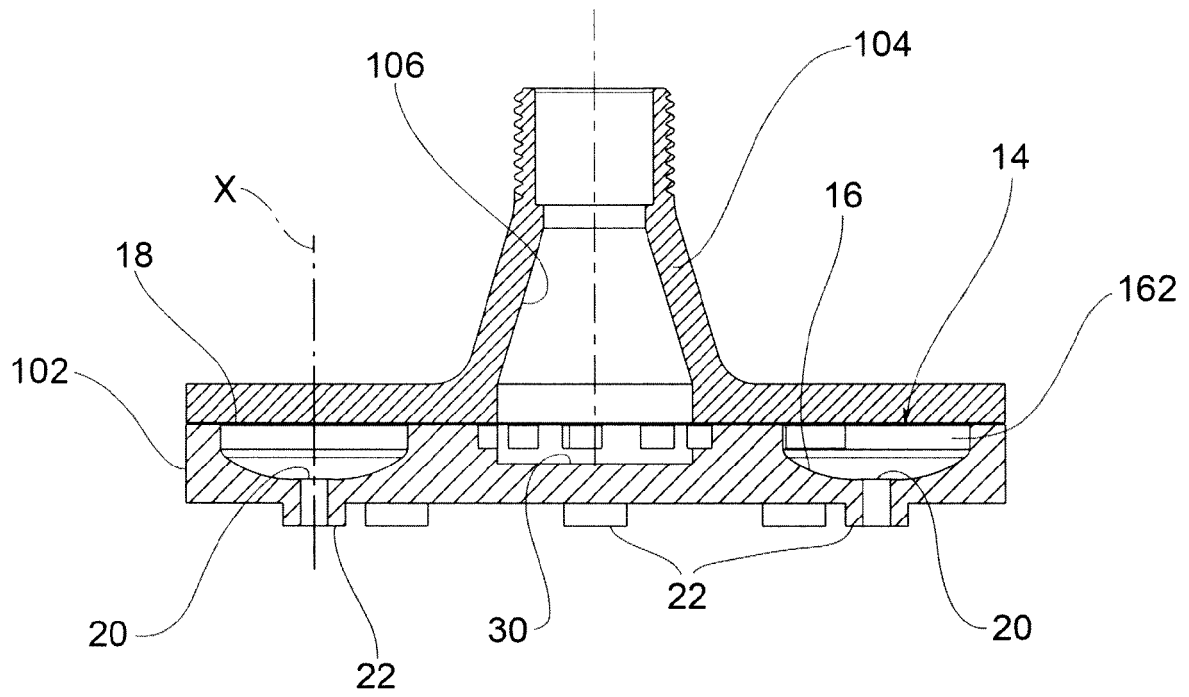


FIG.3

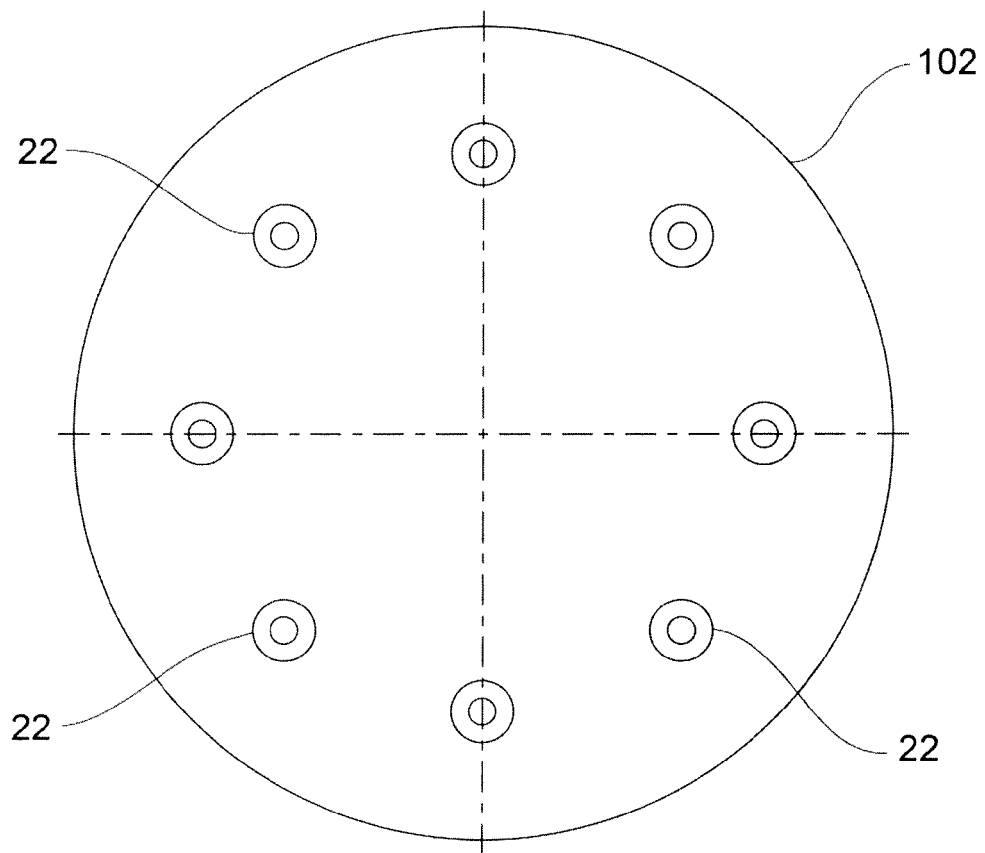


FIG.4

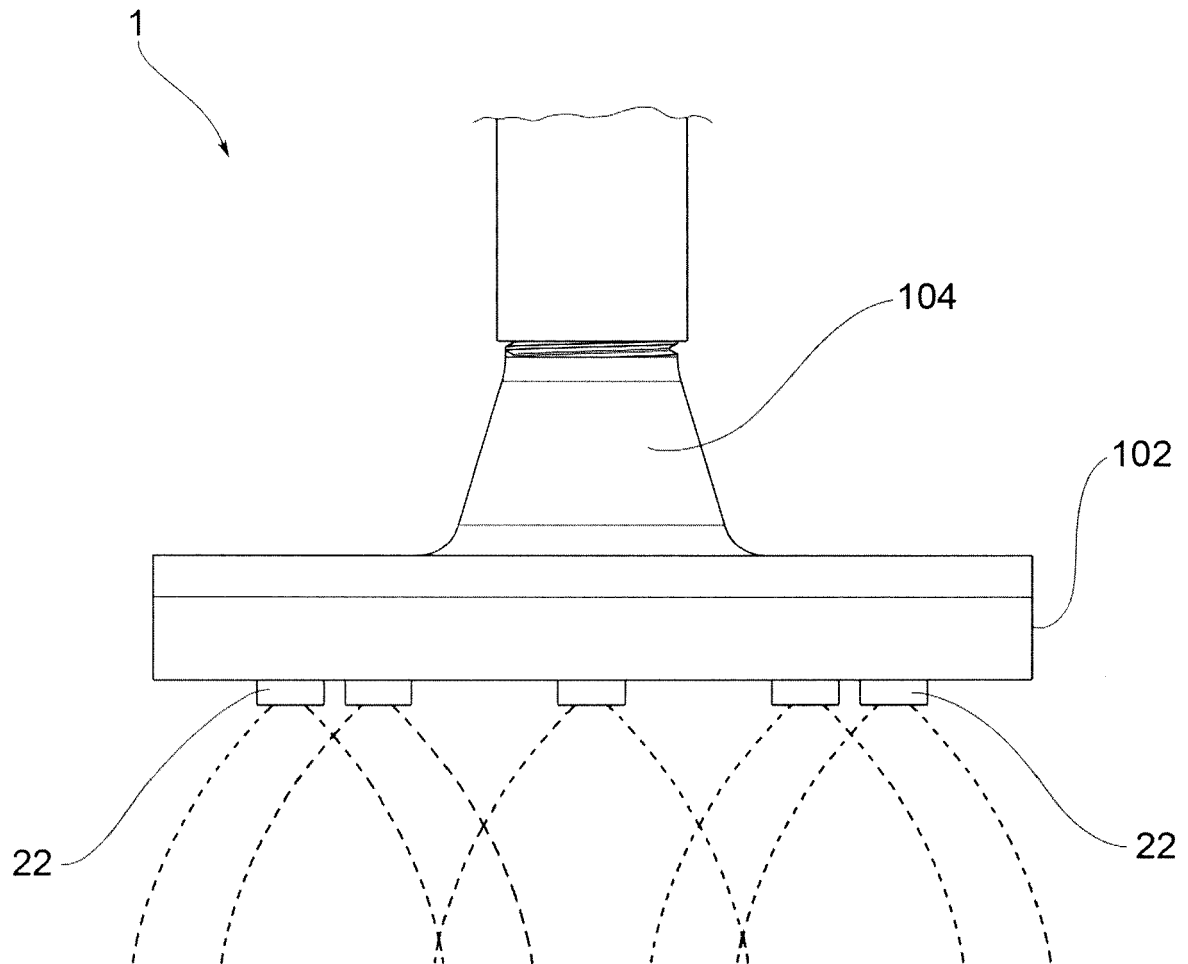


FIG.5



EUROPEAN SEARCH REPORT

Application Number
EP 17 42 5029

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2005/014176 A1 (AXENERGY AG [CH]; PADRUETT ROLF [CH]; SCHUERMANN PHILIPPE [CH]) 17 February 2005 (2005-02-17) * abstract; figures 1-5 * * page 10, line 10 - page 11, line 2 * -----	1-11	INV. B05B1/18 B05B1/34
X	WO 2009/126987 A1 (EXELL TECHNOLOGY PTY LTD [AU]; NORDSTROM LINDSAY [AU]) 22 October 2009 (2009-10-22) * abstract; figures 15-18 * * page 12, line 3 - line 26 * -----	1-11	
X	WO 98/01229 A1 (EXELL TRADING PTY LTD [AU]; NORDSTROM LINDSAY ERIK [AU]; NORDSTROM PHI) 15 January 1998 (1998-01-15) * abstract; figures 1-10 * -----	1-11	
X	JP H05 253515 A (NN) 5 October 1993 (1993-10-05) * abstract; figures 1,2 * -----	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			B05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 September 2017	Examiner Fregio, Maria Chiara
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			

 1
EPO FORM 1503 03.82 (P04C01)

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

EP 17 42 5029

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-09-2017

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005014176 A1	17-02-2005	CH 696426 A5 WO 2005014176 A1	15-06-2007 17-02-2005
-----	-----	-----	-----
WO 2009126987 A1	22-10-2009	AU 2009238194 A1 CN 102083542 A EP 2349580 A1 US 2011101132 A1 WO 2009126987 A1	06-10-2011 01-06-2011 03-08-2011 05-05-2011 22-10-2009
-----	-----	-----	-----
WO 9801229 A1	15-01-1998	CA 2259555 A1 US 6142390 A WO 9801229 A1	15-01-1998 07-11-2000 15-01-1998
-----	-----	-----	-----
JP H05253515 A	05-10-1993	NONE	
-----	-----	-----	-----

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82