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(54) **MULTIPLE FLOW DELIVERY UNIT**

MEHRKANAL-FÖRDEREINHEIT

UNITÉ FOURNISSANT DE MULTIPLES ÉCOULEMENTS

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WO-A1-2009/062546
WO-A1-2011/074018

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Description

Field of the invention

[0001] The present invention generally finds application in the field of fluid delivery devices and particularly relates to a multiflow delivery unit.

Background art

[0002] Delivery units are known to be used in water systems, with taps for controlling a water flow from a water supply line.

[0003] These units comprise at least one delivery unit having a cut-off member that can be maneuvered by a user to change the rate and temperature of the water flow.

[0004] A particular type of taps also allows delivery of a hot airflow, for drying objects and/or parts of the body of a user that have been previously wetted with the water flow.

[0005] In a known embodiment of these delivery units, the airflow passage is formed distinct and separate from the water flow passage.

[0006] The airflow passage is connected via an additional conduit to a hot air generator, which is adapted to be actuated by a user, manually by means of a switch or automatically by interaction with appropriate sensor means.

[0007] Nevertheless, in view of reducing the complexity of the delivery unit and providing a lower overall number of parts for assembly, taps have been developed which allow delivery of respective water and air flows through a single delivery passage.

[0008] For example, JP2001003407 discloses a delivery unit that comprises a tubular body with a first end connected to the water mains and a second end comprising the water outlet having a given diameter.

[0009] Furthermore, the delivery unit comprises a small pipe having a much smaller diameter than that of the outlet, with a first end connected to a warm or hot air blower and a second end inserted in the tubular body placed within the water delivery outlet.

[0010] Selective actuation of the blower will allow the airflow to flow out of the second end of the pipe through the delivery outlet of the tubular body.

[0011] A first drawback of this solution is that the airflow that is delivered from the small pipe has a considerably lower rate as it flows through the outlet and scatters with respect to the axial direction of the tubular body.

[0012] This will result in an increase of the time for drying the wet objects and/or body parts and the need to place them closer to the outlet of the delivery conduit, with the risk of burns.

[0013] A further drawback of this solution is that the internal part of the small air pipe projects out of the tubular body and has to be secured to the wall during installation of the tap.

[0014] This adversely affects installation costs and times, as well as aesthetics, due to the part of air pipe that projects out of the tubular body.

[0015] Furthermore, WO2011/074018, WO2009/062546 and EP2177142 disclose multiflow air and water delivery units having all the features of the preamble of claim 1. More precisely, WO2011/074018 on which is based the preamble of claim 1, discloses a multiflow delivery unit in accordance with the preamble of claim 1 and comprising a first conduit connected to the water mains for water flow delivery at a first outer end and a second conduit connected to airflow supply means for airflow delivery at a second outlet end, a diffuser with a passage fluidly connected to the first outlet end and a plurality of second passages fluidly connected to the second outlet end.

[0016] Nevertheless, the airflow that is delivered by these units is not conveyed in a predetermined direction, but tends to scatter in the environment, which increases the hand drying time.

Disclosure of the invention

[0017] The object of the present invention is to obviate the above drawbacks, by providing a multiflow water and air delivery unit that is highly efficient and relatively cost-effective.

[0018] A particular object of the present invention is to provide a delivery unit that allows wet objects and/or body parts to be dried in a relatively short time.

[0019] Another object of the present invention is to provide a delivery unit that allows drying of objects and/or body parts even when they are at a considerable distance from the delivery passage.

[0020] Yet another object of the present invention is to provide a delivery unit that allows easy installation, without requiring particularly invasive actions on the support surface.

[0021] These and other objects, as better explained hereafter, are fulfilled by a multiflow delivery unit as defined in claim 1, characterized in that the downstream end face has an inwardly converging countersunk annular surface at the periphery of the at least one first passage, the plurality of second passages having outlet sections at the annular surface for the outflow of air in corresponding directions converging toward the longitudinal axis.

[0022] With this configuration, the delivery unit of the invention can deliver a particularly concentrated hot air jet, that will dry wet surfaces in short drying times, even when these surfaces are relatively far from the diffuser element.

[0023] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief description of the drawings

[0024] Further features and advantages of the invention will be more apparent from the detailed description

of a preferred, non-exclusive embodiment of a multiflow delivery unit of the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIG. 1 is a partially sectioned schematic view of a water and air delivery unit having a diffuser without converging second passages, this multiflow delivery unit thus not falling under the invention;
FIG. 2 is a front view of a first detail of an inventive diffuser used alternatively with the multiflow delivery unit of Fig. 1;
FIG. 3 is a sectioned side view of the diffuser shown in Fig. 2;
FIG. 4 is a perspective view of a detail of Fig. 1;
FIG. 5 is a sectioned side view of the detail of Fig. 4.

Detailed description of a preferred embodiment

[0025] Referring to the above figures, a multiflow water and air delivery unit, generally designated by numeral 1, may be installed in water systems W for residential, industrial, health care use or the like.

[0026] Also, the delivery unit 1 of the invention may be also connected to a hot or warm airflow supply device A.

[0027] The delivery unit 1 is equipped with control means for selectively varying the delivery of the water and air flows, and for delivery of the airflow at a later time, to dry the surfaces wetted with water.

[0028] The water and air delivery unit 1 of the invention comprises a first conduit 2 for water passage and a second conduit 3 for air passage.

[0029] The first water conduit 2 has a first inlet end 4 which is designed to be connected to the water mains W and a first outlet end 5 for water flow delivery.

[0030] The second air conduit 3 has a second inlet end 6 for connection to airflow supply means A, which are external to the unit and do not fall within the scope of the invention, and a second outlet end 7 for air delivery.

[0031] One of the conduits 2, 3 may be inserted in the other conduit 3, 2.

[0032] According to a peculiar characteristic of the invention, the first outlet end 5 and the second outlet end 7 are substantially coplanar, i.e. lie on the same plane π.

[0033] A substantially tubular diffuser 8 is further provided, which has a longitudinal axis L between the conduits 2, 3 at their respective second outlet ends 5, 7.

[0034] The diffuser 8 has a first passage 9 connected to the first outlet end 5 and at least one second passage 10 separate from the first passage 9 and connected to the second outlet end 7 for delivery of respective flows.

[0035] Conveniently, the first conduit 2 may be substantially coaxial with and entirely contained in the second conduit 3.

[0036] The embodiment shown in FIG. 1 is a delivery unit in accordance with the prior art, and which differs from the present invention for the arrangement of the diffuser 8 which will described hereinafter with reference to FIG. 2 and 3. In this prior art delivery unit the second air conduit 3 is formed using a substantially tubular body, which integrally and coaxially comprises a pipe of smaller diameter which defines the first water conduit 2.

[0037] The tubular body of the conduit 3 may be removably anchored to the support surface T by suitable fastening means, e.g. of the screw type or the like.

[0038] With these features, installation of the unit 1 is particularly simple, with minor and lowly invasive actions on the support surfaces T.

[0039] The diffuser 8 may have an annular shape with a first central passage 9 and a second peripheral passage 10, and may have a substantially cylindrical lateral surface 11 with an upstream end face 12 and a downstream end face 13, as oriented relative to the flow directions.

[0040] In a preferred, non-limiting embodiment, the longitudinal axis L of the diffuser may be inclined to the vertical V at an angle α that preferably ranges from 0° to 40° and is preferably about 20°.

[0041] Furthermore, the first passage 9 and the second passage 10 may be substantially parallel, such that their respective water and air flows have directions X, Y substantially orthogonal to the plane π.

[0042] Preferably, the second passage 10 may have a substantially curved and partially circular cross section having a predetermined angular extent β.

[0043] In the embodiment as shown in FIG. 1, the delivery directions X, Y of the first 9 and second 10 passages may be substantially parallel to the longitudinal axis L of the diffuser 8.

[0044] In accordance with the present invention, as best shown in FIGS. 2 and 3, the diffuser 8 may comprise a plurality of second passages 10 having identical cross sections in evenly and angularly offset positions.

[0045] The second passage 10 as shown in FIG. 2 may comprise an inlet section 15 and an outlet section 16 for the airflow.

[0046] Particularly, as best shown in FIG. 2, four outlet sections 16 are provided, which have an angular extent β of about 90°. Of course, the number of outlet sections 16 may be other than four, with an angular extent that can substantially cover the entire circumferential area of the second passage 10, for uniform airflow delivery along the circumferential area of the diffuser 8.

[0047] Since the outlet sections 16 of the second passages 10 are smaller than the cross section of the second end of the second conduit 3, then the flow velocity at the outlet of such sections 16 will be higher than that in the second conduit 4, thereby providing shorter surface drying times.

[0048] The upstream end face 12 may be substantially flat and the downstream end face 13 may comprise an inwardly converging countersunk annular surface 17 at the periphery of the first passage 9.

[0049] As best shown in FIG. 3, the annular surface 17 may be inclined to the longitudinal axis L at an acute inclination angle γ ranging from 10° to 85°, preferably of about 35°.

[0050] Advantageously, the outlet section 16 of the second passage 10 may be located at the annular surface 17.

[0051] Thus, as best shown in FIGS, 2 and 3, the passage 10 may deliver an airflow along a direction Y that converges toward the longitudinal axis L.

[0052] Accordingly, by appropriately varying the outlet section 16 and the point of convergence of the direction Y with the longitudinal axis L, surfaces located relatively far from the diffuser 8 may be also dried.

[0053] Conveniently, the delivery unit 1 may comprise a connecting sleeve 18, as best shown in FIGS. 4 and 5, with a third conduit 19 connected by a first inlet port 20 to the water mains W and by a first outlet port 21 to the first inlet end 4 of the first conduit 2.

[0054] The sleeve 18 further comprises a fourth conduit 22 connected by a second inlet port 23 to the external air supply means A and by a second outlet port 24 to the second inlet end 6 of the second conduit 4.

[0055] The connecting sleeve 16 may have a substantially cylindrical shape and be designed to at least partially fit into the first 2 or second 3 conduits at the corresponding inlet sections 3, 5.

[0056] Particularly, as best shown in FIGS. 1, 4 and 5, the first inlet port 20 of the third conduit 19 may be formed on the side wall 25 of the sleeve 18 for easier connection thereof to the water mains W.

[0057] The delivery unit 1 may comprise flow control means 28 of manual and/or automatic types, which are connected to the water mains W and can control water flow in the first outlet end 5.

[0058] Conveniently, as shown in FIG. 1, the flow control means 26 may be located upstream from the first inlet end 4 of the first conduit 2 and be fixed to the support surface T in a position external to the conduits 2, 3.

[0059] Particularly, as shown in FIG. 1, the flow control means 26 may comprise a user-controlled actuator 27 which comprises a valve, not shown, for varying the water flow to be conveyed into the first conduit 2 and delivered through the first passage 9.

[0060] Otherwise, in an alternative configuration of the invention, the flow control means 26 may be of automatic type and autonomously control the water flow rate in the first outlet end 5 without requiring any action by a user.

[0061] Conveniently, the flow control means 27 may be adapted to vary the ratio of the flows that come from respective hot water and cold water circuits W_H, W_C connected to the water mains W, in the first outlet end 5.

[0062] Conveniently, as schematically shown in FIG. 1, the external air supply means A may comprise an air conduit C in fluid connection with the second inlet end 6 of the second conduit 3 for supplying a predetermined hot or warm airflow therein.

[0063] The external air supply means A may comprise an electric fan B connected to the mains through a power outlet R.

[0064] Also, the external air supply means A may comprise a switch K for turning on/off the operation of the electric fan B by the pressure exerted thereon by an operator.

[0065] Alternatively, in a configuration of the invention that is not shown, the external air supply means A may comprise sensor means, no shown, of the photocell or the like type, which are adapted to turn on/off the operation of the electric fan B according to an interaction of the user therewith.

[0066] Furthermore, the air supply means A may comprise an electrical resistor, not shown, which is placed in the air conduit C upstream from the second inlet end 5 to heat the airflow generated by the electric fan B.

[0067] The above disclosure clearly shows that the invention fulfills the intended objects, and particularly meets the requirement of providing an air and water delivery unit, which can deliver a highly concentrated airflow and can be simply manufactured and quickly installed.

[0068] The air and water delivery unit of the invention is susceptible to a number of changes or variants, within the inventive concept as disclosed in the appended claims. The materials may vary depending on different needs, without departure from the scope of the invention.

[0069] While the air and water delivery unit has been described with particular reference to the accompanying figures, the numerals are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A multiflow delivery unit, comprising:

- a first conduit (2) with a first inlet end (4) connected to the water mains (W) and a first outlet end (5) for water flow delivery;
- a second conduit (3) with a second inlet end (6) connected to airflow supply means (A) and a second outlet end (7) for airflow delivery;

wherein one of said conduits (2, 3) is entirely contained in the other, and wherein said first outlet end (5) and said second outlet end (7) are substantially coplanar, a diffuser (8) being further provided, which has a substantially tubular shape and a longitudinal axis (L) interposed between said conduits (2, 3) at said outlet ends (5; 7), said diffuser (8) having a first passage (9) connected to said first outlet end (5) and a plurality of second passages (10) separate from the first passage (9) and connected to said second outlet end (7) for delivery of respective flows; and wherein said diffuser (8) has an upstream end face (12) and a downstream end face (13), as oriented relative to respective water and air flows, said upstream end face (12) being substantially flat;
characterized in that said downstream end face (13)has an inwardly converging countersunk annular surface (17) at the periphery of said at least one first

passage (9), said plurality of second passages having outlet sections (16) at said annular surface (17) for the outflow of air in corresponding directions (Y) converging toward said longitudinal axis (L).

2. A delivery unit as claimed in claim 1, **characterized in that** said first conduit (2) is substantially coaxial with said second conduit (4).

3. A delivery unit as claimed in claim 1, **characterized in that** said diffuser (8) has a substantially annular shape, said at least one first passage (9) being provided at a substantially central position, and said at least one second passage (10) being provided at the periphery of said first passage (9), with a substantially curved cross section.

4. A delivery unit as claimed in claim 3, **characterized in that** said plurality of second longitudinal passages (10) have identical cross sections and are arranged in evenly and angularly offset positions.

5. A delivery unit as claimed in claim 1, **characterized in that** said outlet cross section (16) is smaller than the cross section of said second end (7) of said second conduit (3).

6. A delivery unit as claimed in claim 1, **characterized in that** it comprises a connecting sleeve (18) with a third conduit (19) and a fourth conduit (22), wherein said third conduit (19) has a first inlet port (20) connected to the water mains (W) and a first outlet port (21) connected to said first inlet end (4) and wherein said fourth conduit (22) has a second inlet port (23) connected to airflow supply means (A) and to a second outlet ort (24) connected to said second inlet end (6).

7. A delivery unit as claimed in claim 1, **characterized in that** it comprises flow control means (26) of manual and/or automatic types, which are adapted to control water flow in said first outlet end (5).

8. A delivery unit as claimed in claim 7, **characterized in that** said flow control means (26) are adapted to vary the ratio of the flows coming from respective hot water and cold water circuits (W_H, W_C) connected to the water mains (W), in the first outlet end (5).

Patentansprüche

1. Eine mehrflutige Liefereinheit bestehend aus:

   - einer ersten Leitung (2) mit einer ersten Einlaufseite (4), verbunden mit dem Wassernetz (W) und einer ersten Auslaufseite (5) für die Wasserflussbereitstellung
   - einer zweiten Leitung (3) mit einer zweiten Einlaufseite (6), verbunden mit der Luftzufuhreinrichtung (A) und einer zweiten Auslaufseite (7) für die Luftflussbereitstellung;

   wobei eine der genannten Leitungen (2, 3) vollständig in der anderen enthalten ist, und wobei die genannte erste Auslaufseite (5) und die genannte zweite Auslaufseite (7) im Wesentlichen komplanar sind, außerdem ein Luftverteiler (8) vorhanden ist, der eine im Wesentlichen rohrähnliche Form und dessen Längsachse (L) zwischen den genannten Leitungen (2, 3) an den genannten Auslaufseiten (5, 7) zwischengeschaltet ist, wobei der genannte Luftverteiler (8) einen ersten, am genannten ersten Auslaufende (5) verbundenen Durchgang (9) und eine Vielzahl von zweiten Durchgängen (10) aufweist, die vom ersten Durchgang (9) getrennt sind und mit dem genannten zweiten Auslaufende (7) zur Bereitstellung der jeweiligen Flüsse verbunden sind; und
   wobei der genannte Luftverteiler (8) eine vorgeschaltete Stirnseite (12) und eine nachgeschaltete Stirnseite (13) besitzt, die entsprechend zu den jeweiligen Wasser- und Luftflüssen gerichtet sind, wobei die genannte vorgeschaltete Stirnseite (12) im Wesentlichen flach ist;
   dadurch gekennzeichnet, dass in dieser genannten nachgeschalteten Stirnseite (13) eine nach innen konvergierende, gesenkte kreisförmige Fläche (17) im Umkreis des genannten zumindest einen ersten Durchgangs (9) vorhanden ist, sowie die genannte Vielzahl von zweiten Durchgängen Auslaufbereiche (16) an der genannten kreisförmigen Fläche (17) für den Abfluss von Luft in die entsprechenden Richtungen (Y) aufweist, die zur genannten Längsachse (L) konvergieren.

2. Eine Liefereinheit gemäß Patentanspruch 1 **dadurch gekennzeichnet, dass** der genannte Luftverteiler (2) im Wesentlichen koaxial zur genannten zweiten Leitung (4) verläuft.

3. Eine Liefereinheit gemäß Patentanspruch 1, **dadurch gekennzeichnet, dass** der genannte Luftverteiler (8) im Wesentlichen ringförmig ist, zumindest ein erster Durchgang (9) in einer im Wesentlichen zentralen Position sowie mindestens ein zweiter Durchgang (10) im Umkreis des genannten ersten Durchgangs (9) mit einem im Wesentlichen Querabschnitt vorhanden ist.

4. Eine Liefereinheit gemäß Patentanspruch 3, **dadurch gekennzeichnet, dass** die genannte Vielzahl von zweiten Längsdurchgängen (10) einen identischen Querschnitt haben und in gleichmäßig und winklig versetzter Lage angeordnet sind.

5. Eine Liefereinheit gemäß Patentanspruch 1, **da-**

durch gekennzeichnet, dass der genannte Auslaufquerabschnitt (16) kleiner als der Querschnitt der genannten zweiten Ausläufe (7) der genannten zweiten Leitung (3) ist.

6. Eine Liefereinheit gemäß Patentanspruch 1, **dadurch gekennzeichnet, dass** sie eine Anschlussmuffe (18) mit einer dritten Leitung (19) und einer vierten Leitung (22) umfasst, wobei die genannte dritte Leitung (19) einen ersten Einlaufanschluss (20), der mit dem Wassernetz (W) verbunden ist, sowie einen zweiten Auslaufanschluss (21) aufweist, der mit der genannten ersten Einlaufseite (4) verbunden ist und worin die genannte vierte Leitung (22) einen zweiten Einlaufeanschluss (23) besitzt, der mit der Luftzufuhreinrichtung (A) und einem zweiten Auslaufanschluss (24) verbunden ist, der an die genannte zweite Einlaufseite (6) angeschlossen ist.

7. Eine Liefereinheit gemäß Patentanspruch 1, **dadurch gekennzeichnet, dass** sie Vorrichtungen zur Flussregelung (26) manueller und/oder automatischer Art umfasst, die zur Regelung des Wasserflusses in der genannten ersten Auslaufseite (5) eingesetzt werden.

8. Eine Liefereinheit gemäß Patentanspruch 7, **dadurch gekennzeichnet, dass** die genannten Vorrichtungen zur Flussregelung (26) ausgebildet sind, um das Verhältnis der von den jeweiligen Kalt- und Warmwasserleitungen (W_H, W_C) kommenden Flüsse zu variieren, die mit dem Wassernetz (W) auf der ersten Auslaufseite (5) verbunden sind.

Revendications

1. Unité de distribution à débit multiple, comprenant :

   - une première conduite (2) présentant une première extrémité d'entrée (4) raccordée à la conduite principale d'eau (W), et une première extrémité de sortie (5) pour la distribution d'eau ;
   - une deuxième conduite (3) présentant une deuxième extrémité d'entrée (6) raccordée à une conduite d'apport d'air (A) et une deuxième extrémité de sortie (7) de distribution d'air ;

   dans laquelle l'une des deux conduites (2, 3) est entièrement contenue dans l'autre, et dans laquelle ladite première extrémité de sortie (5) et ladite deuxième extrémité de sortie (7) sont sensiblement coplanaires, un diffuseur (8) étant prévu, ayant une forme sensiblement tubulaire et un axe longitudinal (L), interposé entre lesdites conduites (2, 3), au niveau desdites extrémités de sortie (5 ; 7), ledit diffuseur (8) comportant un premier passage (9), raccordé à ladite première extrémité de sortie (5), et une pluralité de deuxièmes passages (10), séparés du premier passage (9) et raccordés à ladite deuxième extrémité de sortie (7) pour la distribution de débits respectifs ; et
   dans laquelle ledit diffuseur (8) possède une face d'extrémité en amont (12) et une face d'extrémité en aval (13), par rapport aux débits d'eau et d'air respectifs, ladite face d'extrémité en amont (12) étant sensiblement plate ;
   caractérisée en ce que ladite face d'extrémité en aval (13) possède une surface annulaire (17) évasée convergeant vers l'intérieur sur la périphérie dudit au moins un premier passage (9), ladite pluralité de deuxièmes passages comportant des sections de sortie (16) au niveau de ladite surface annulaire (17) pour l'écoulement d'air en directions correspondantes (Y), convergeant vers ledit axe longitudinal (L).

2. Unité de distribution selon la revendication 1, **caractérisée en ce que** ladite première conduite (2) est sensiblement coaxiale avec ladite deuxième conduite (4).

3. Unité de distribution selon la revendication 1, **caractérisée en ce que** ledit diffuseur (8) présente une forme sensiblement annulaire, ledit au moins un premier passage (9) étant situé dans une position sensiblement centrale, et ledit au moins un deuxième passage (10) étant situé sur la périphérie dudit premier passage (9), avec une section transversale sensiblement courbée.

4. Unité de distribution selon la revendication 3, **caractérisée en ce que** ladite pluralité de deuxièmes passages longitudinaux (10) présentent des sections transversales identiques et sont agencés en positions uniformément et angulairement décalées.

5. Unité de distribution selon la revendication 1, **caractérisée en ce que** ladite section transversale de sortie (16) est inférieure à la section transversale (7) de ladite deuxième conduite (3).

6. Unité de distribution selon la revendication 1, **caractérisée en ce qu'**elle comprend un manchon de liaison (18) avec une troisième conduite (19) et une quatrième conduite (22), dans laquelle ladite troisième conduite (19) possède un premier orifice d'entrée (20) relié au réseau de distribution d'eau (W) et un premier orifice de sortie (21) relié à ladite première extrémité d'entrée (4), et dans laquelle ladite quatrième conduite (22) possède un deuxième orifice d'entrée (23) relié aux moyens d'apport d'air (A) et à un deuxième orifice de sortie (24) relié à ladite deuxième extrémité d'entrée (6).

7. Unité de distribution selon la revendication 1, **carac-**

térisée en ce qu'elle comprend des moyens de contrôle de débit (26) de type manuel et/ou automatique, aptes à contrôler le débit d'eau dans ladite première extrémité de sortie (5).

8. Unité de distribution selon la revendication 7, **caractérisée en ce que** lesdits moyens de contrôle de débit (26) sont aptes à varier le rapport des débits provenant des circuits respectifs de l'eau chaude et de l'eau froide (W_H, W_C) raccordés au réseau de distribution d'eau (W), dans la première extrémité de sortie (5).

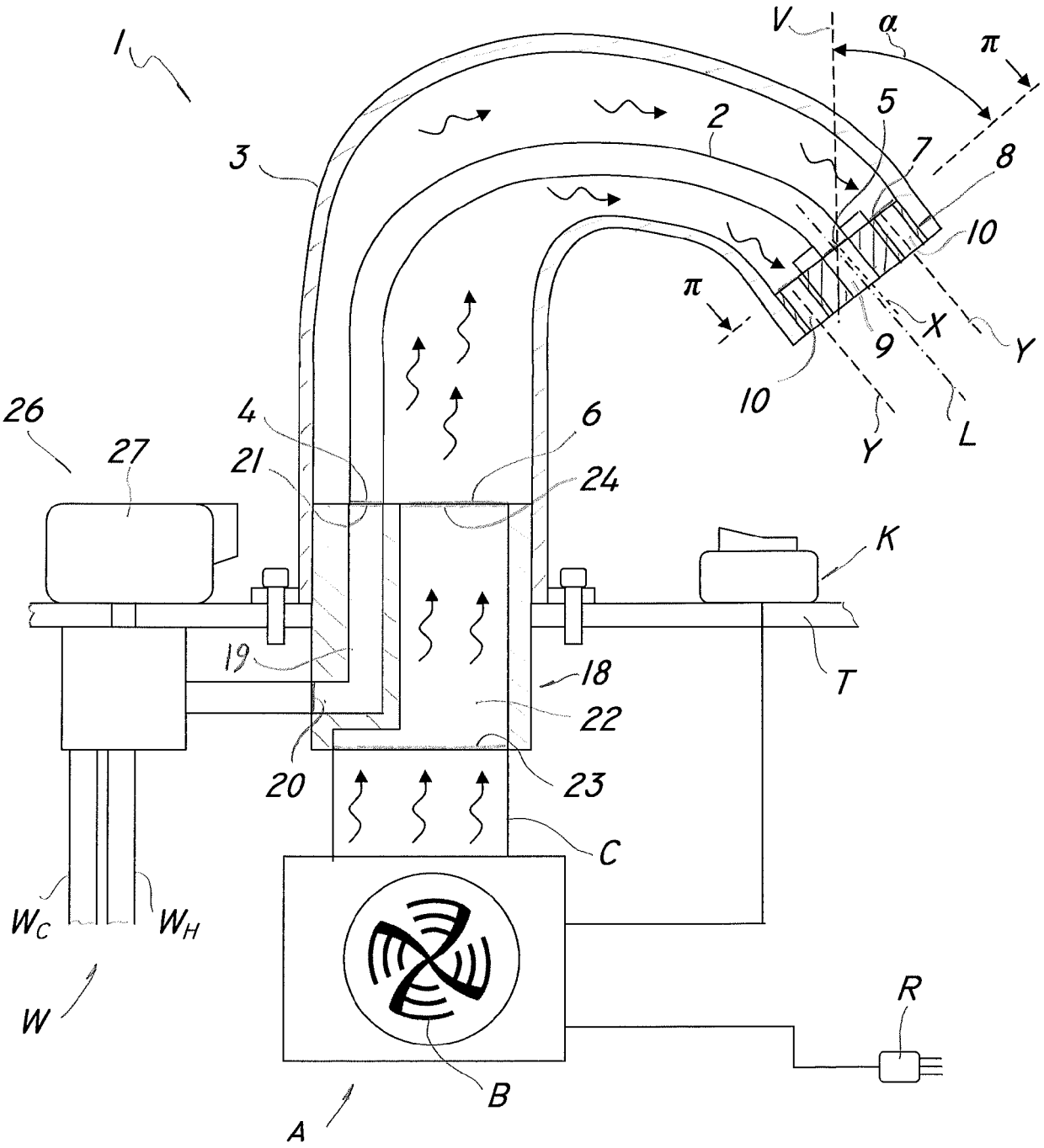
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FIG. 1

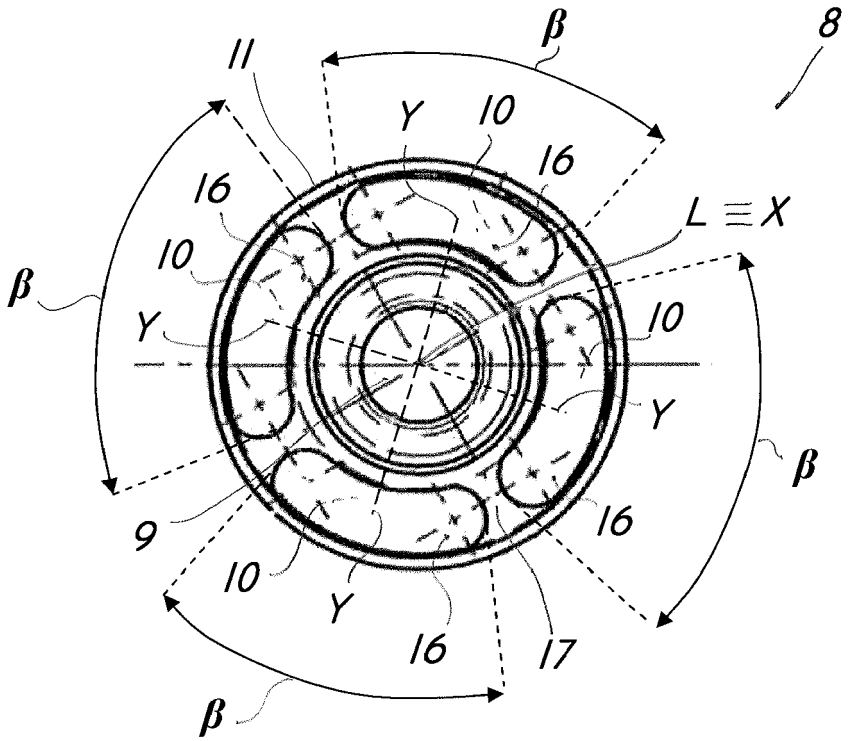
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FIG. 2

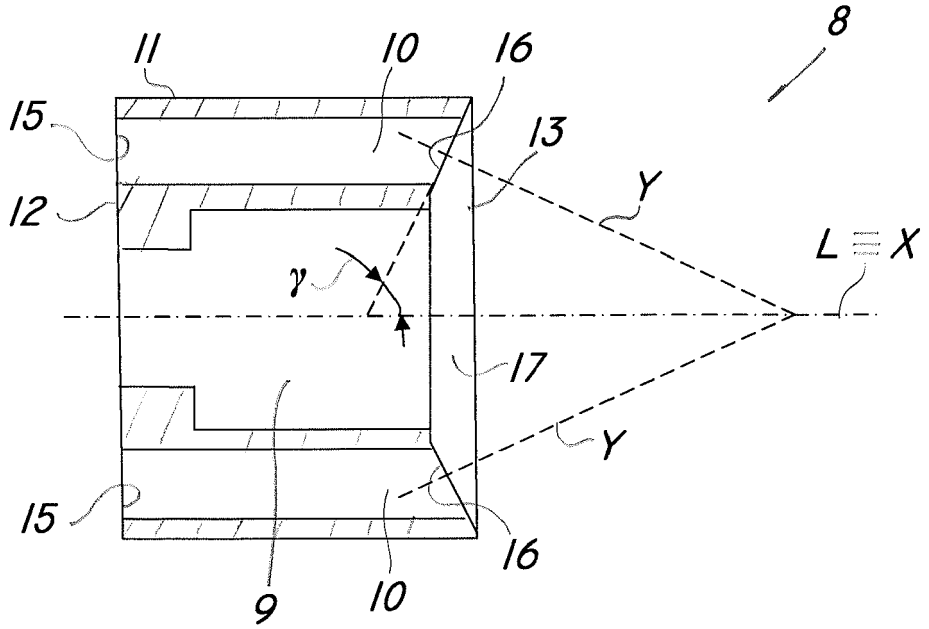
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FIG. 3

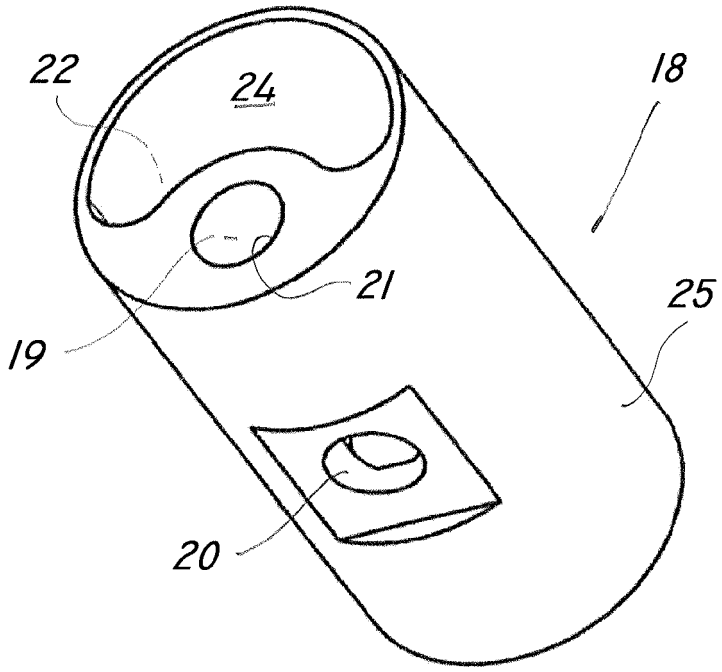

FIG. 4

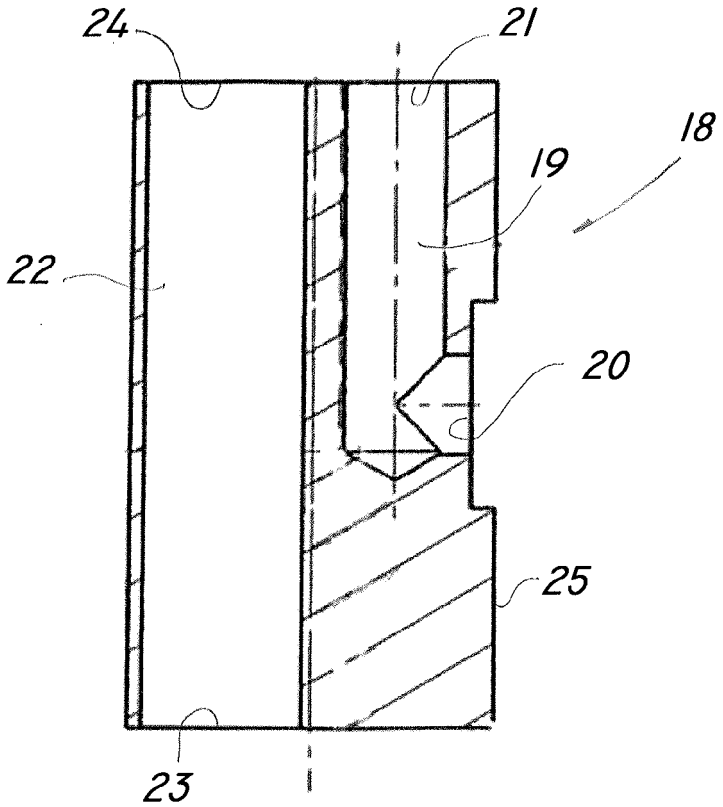

FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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