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(54) Aerator device and shower comprising such aerator

(57) Assembly (1) for the aeration and dispensing of a flow of water, comprising a shower which defines nozzles for the dispensing of a plurality of jets of water and which comprises a shower body (2) ending proximally with a connection portion (4), and a water supply tube (6) of the nozzles mechanically constrained to the connection portion (4) by means of a blocking component (8), wherein the connection portion (4) and the blocking component (8) have complementary coupling means.

The assembly further comprises an aerator device (10) partially interposed between the connection portion (4) and the supply tube (6) to create an air-suction passage; and which delimits a mixing chamber (14) of the water entering the shower body (2) and a flow of external air transiting through the air-suction passage. In addition, the air-suction passage comprises a space (16) comprised between the complementary coupling means.

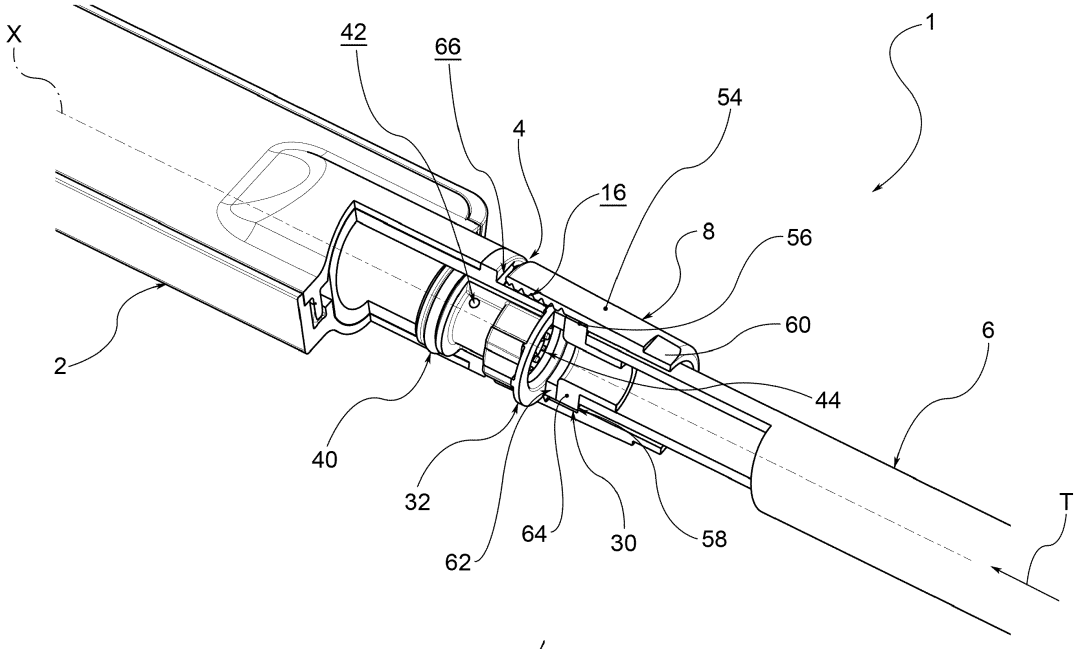

Fig.1

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Description

[0001] The present invention relates to an assembly for the aeration and dispensing of a flow of water, and an aerator device usable in such assembly.

[0002] Legislative progress on the matter of saving water has imposed on companies operating in the water management and distribution sectors, and in particular in the taps sector, to develop products aimed at achieving saving of natural resources. Within this framework models of aeration valves and of showers/taps with integrated aeration devices which provide for generating a flow of water mixed with air, have appeared in recent years. Such devices (such as for example those illustrated in the prior art documents CN201720146U or CN202045036U) make it in fact possible to create an "aerated" jet of water-air, which with a smaller quantity of water, provides the user with a perceived volume corresponding to a non-aerated water flow.

[0003] The current strategy for adapting to such legislation provides however for replacing a traditional tap, shower or hand-held shower with a new article specifically designed to house within it an aeration device or valve.

[0004] The resulting mistake is evident, above all for users, in terms of cost and water, in that dispensing devices which work perfectly well but no longer in compliance with the changed requisites must be adapted by means of total replacement, for example of the shower, in the impossibility of implementing existing systems.

[0005] The present invention falls within such context, setting out to provide an assembly and an aerator device able to overcome the aforementioned drawbacks, and in particular to provide an aerator device specifically configured to be inserted in any traditional shower or hand-held shower, without it needing to specially predisposed for such application.

[0006] Such objective is achieved by an assembly according to claim 1, and by means of an aerator device according to claim 15. The dependent claims show preferred embodiments.

[0007] The object of the present invention will now be described in detail, with the help of the attached drawings, wherein:

- figures 1 and 2 respectively show a perspective view partially in cross-section and a side view in longitudinal cross-section of an assembly which the present invention relates to according to a possible embodiment; and
- figures 3 to 6 show a perspective view and three views orthogonal to each other of the aerator device used in the assembly in figure 1.

[0008] With reference to the aforementioned drawings, reference numeral 1 globally denotes an assembly for the aeration and dispensing of a water flow in the form of a jet.

[0009] Such assembly comprises a shower which distally defines nozzles (not shown) for the dispensing of a plurality of jets, and which comprises a shower body 2 ending proximally with a connection portion 4, for example a tubular connection body.

[0010] Within the present description, the term "distal" will be understood to mean the components of the assembly facing or positioned towards the shower nozzles, in relation to a main direction of extension X of said shower; conversely, the term "proximal" is understood to mean the directions or portions positioned on the opposite side, that is to say towards a water supply tube of said shower. On occasion, except where specified otherwise, the term "radial" will be used with reference to such direction of extension X.

[0011] It follows that, for example as shown in the drawings 1 and 2, the shower and/or the shower body 2 extend along such direction X between a proximal portion and a distal portion.

[0012] According to one variant, the shower comprises at least one grippable portion 50 to be manually directed by a user, such grippable portion extending distally from the connection portion 4. Preferably, the grippable portion 50 is a narrowed part of the shower body 2, to be ergonomic in relation to the hand of a user thereof, who may thereby easily manoeuvre it.

[0013] According to a further variant, the shower ends with an enlarged portion, at least compared to the shower body proximal thereto, at which the nozzles are made. Advantageously, such enlarged portion comprises (for example underneath) a plate which delimits a plurality of nozzle apertures. According to an alternative embodiment, the plate which delimits the nozzles is dimensionally equal (or even smaller) to the grippable portion 50 proximal thereto.

[0014] The assembly 1 further comprises a water supply tube 6 of the nozzles mechanically constrained to the connection portion 4 by means of a blocking component 8.

[0015] In the embodiment shown, the blocking component 8 comprises a blocking nut or bush, which defines a component seat 52 (for example a through hole) crossed by the water supply tube 6. Preferably, the blocking nut defines an outer surface 54 tapered in a proximal direction. Optionally, an area 60 of the outer surface 54 may be shaped in a complementary manner to a tool, such as a spanner, to facilitate the assembly/dismantling of the tube to/from the shower body.

[0016] According to a preferred variant, such nut defines an inner surface 56 which forms a step or a narrowing 58 of the component seat 52, which extends radially inwards to retain the water supply tube 6 (or tube fitting 30 connected thereto) at least in an axial direction.

[0017] Preferably, the supply tube 6 has at least one flexible part and, even more preferably, comprises a flexible hose.

[0018] In addition, the connection portion 4 and the blocking component 8 have complementary coupling

means to perform the aforesaid constraint.

[0019] According to a particularly advantageous embodiment, the complementary coupling means comprise corresponding threaded portions 12 made on the connection portion 4 (for example externally) and on the blocking component 8 (for example internally).

[0020] The assembly 1 further comprises an aerator device 10 partially interposed/inserted between the connection portion 4 and the supply tube 6 to create an air-suction passage; such device 10 delimits a mixing chamber 14 of the water entering the shower body 2 and a flow of external air (in particular external to the body 2) transiting through the air-suction passage. Such air-suction passage also comprises a space 16 comprised between the complementary coupling means, and in particular delimited between them.

[0021] In fact, as it may be seen for example from the drawing in figure 2, a water-transit passage 38 and the air-suction passage merge inside the mixing chamber 14 to aerate the flow of fluid destined to come out of the nozzles.

[0022] Consequently, as will be discussed further below, the interposition of the aerator device is not so as to seal both to the shower body and to the supply tube; such device is instead configured to realise therein a section of the air-suction passage towards the mixing chamber, and preferably to create such passage between itself and the shower body. In addition, according to a preferred embodiment, the aerator device 10 abuts proximally onto the supply tube 6 or a relative tube fitting 30 so as to seal it.

[0023] This way a mixture of the fluids outside the mixing chamber is substantially prevented.

[0024] In other words, the aerator device prevents the complementary coupling means from clinching together in an airtight manner, but instead favours the creation of a space or interstice through which the external air flows to reach the mixing chamber.

[0025] In yet other words the complementary coupling means form, by interacting, the mechanical connection between the supply tube and the connection portion; at the same time, the space enclosed by such means during the coupling (for example extending in the form of a tubular or annular surface coaxial to the direction of extension X), acts as an air-suction passage to supply the mixing chamber.

[0026] Preferably, for the variants which provide for threaded portions, the air-suction passage comprises the winding space 16 between the threads of said portions 12.

[0027] In other words, the specific conformation of the aerator device on the one hand makes it possible to create the air-suction passage as discussed above. In addition, by virtue of the encumbrance created by such device between the complementary coupling means, an entrance aperture 66 (for example annular) of the external air into the air-suction passage through which such air flows inside the aerator device is created between the shower body and blocking component.

[0028] One preferred embodiment provides that the air-suction passage comprises one or more sections 18, 20 delimited by a device surface 22, 24, 26 of the aerator device 10 and an opposite body surface 28 of the shower body 2.

[0029] Consequently, according to these variants and considering a path opposite to that taken by the air towards the aerator device, the mixing chamber 14 communicates with the air-suction passage through at least one suction aperture 42 made in the aerator device, after which such passage extends longitudinally (for example parallel to the direction of extension X) between the device surface 22, 24 of the aerator device 10 and an opposite body surface 28 (shown schematically in figure 5 by means of a dotted line). After which, before terminating in the space 16 delimited by the complementary coupling means, such passage extends for a radial section 20 between the thickness of the connection portion and a radial positioning ring 32 of the aerator device 10. Lastly, after passing through the space 16 delimited by the complementary coupling means, the air-suction passage of the air terminates externally through the entrance aperture 66.

[0030] According to a further embodiment, as shown for example in figure 2, the tube fitting 30 is partially inserted in the supply tube 6 and rests on the aerator device 10 by means of a gasket 62 or other suitable sealing means.

[0031] Preferably, such tube fitting 30 comprises an annular lip 64, which extends radially externally from an outer surface of such fitting, and which advantageously interacts with the step or narrowing 58 made on the blocking component 8.

[0032] According to an advantageous variant, the aerator device 10 is partially inserted in the connection portion 4, and is provided with the projection or radial positioning ring 32 projecting externally to the shower body 2. Preferably, the supply tube 6 or the relative tube fitting 30 lie in abutment with the radial positioning ring 32 (optionally by means of the aforementioned gasket 62 or suitable sealing means).

[0033] According to a particularly advantageous embodiment, the radial positioning ring 32 is axially distanced from the connection portion 4 (and in particular from the relative thickness) by means of one or more separation bosses 34, thereby delimiting a section 20 of the air-suction passage.

[0034] In fact, the presence of the separation bosses 34 makes it possible, independently of the force with which the complementary coupling means are tightened, to keep the air-suction passage open, that is to prevent the radial positioning ring 32 and the connection portion 4 from forming a sealed abutment with each other. Moreover, by means of such partial distancing, the space for the entrance aperture 66 is furthermore created.

[0035] According to a further variant, the aerator device 10 comprises a device body 36 crossed by the water-transit passage 38, which communicates upstream with

the supply tube 6 and downstream with the nozzles. Between the device body 36 and the shower body 2, a sealing element 40 is preferably inserted, for example an O-ring or a gasket, to prevent a back flow of the water coming out of the mixing chamber 14.

[0036] In fact, if a significant back flow were to occur, the flow coming out of the mixing chamber could flow back (for example on account of the pressure) against the current in relation to the direction of transit of the water T, thereby penetrating the air-suction passage and making water flow out copiously from the complementary coupling means. As is obvious, such phenomenon must instead be preferably avoided. However, if the flow mechanism described above were of a slight entity, or if it were to happen only when no water was in transit through the shower body, this could in any case be tolerated.

[0037] According to one variant the device body 36 delimits the suction aperture 42 for a fluidic communication between the air-suction passage and the mixing chamber 14; said aperture 42 is preferably positioned upstream of the sealing element 40 in relation to the transit direction T of the water.

[0038] According to a further variant, the aerator device 10 comprises at least one limiting valve 44 of the flow of water towards the nozzles. Advantageously, such valve 44 is at least partially housed inside the device body 36. In the cross-section in figure 2, such valve is completely housed in the aerator device 10.

[0039] According to yet a further preferred embodiment, the limiting valve 44 comprises a casing 46 which delimits a plurality of apertures for the transit of the water, and a ring in polymer material 48 housed in the casing 46. Preferably, the casing 46 has centrally a stem on which the ring in polymer material 48 is fitted on. This way, the ring remains in a specific position in relation to the casing which houses it.

[0040] According to a further variant, the ring in polymer material 48 is suitable to be deformed by the flow of water in transit so as to reduce the cross-section of transit by means of at least one of such apertures. In fact, the deformation or flattening of the ring will be that much greater the greater the speed of the flow through the valve and, consequently, the percentage of ring-aperture overlap will be increased as such speed increases.

[0041] The present invention further relates to an aerator device 10 for mixing air with a flow of water supplied by a supply tube 6 and coming out of a shower in the form of a jet. As mentioned above, the shower distally defines nozzles for the dispensing of a plurality of jets and comprises a shower body 2 ending proximally with a connection portion 4, the shower extending along a main direction of extension X. The water supply tube 6 of the nozzles is suitable to be mechanically constrained to the connection portion 4 by means of a blocking component 8, where the connection portion 4 and the blocking component 8 have complementary coupling means, for example corresponding threaded portions 12. The aerator device 10 is configured to be partially interposed between the connection portion 4 and the supply tube 6 to create an air-suction passage, and delimits a mixing chamber 14 of the water entering the shower body 2 and a flow of external air transiting through the air-suction passage, wherein the air-suction passage comprises a space 16 comprised (preferably delimited) between the complementary coupling means.

[0042] Innovatively, the assembly which the present invention relates to can be implemented in any existing dispensing system, without the shower or hand-held shower in which the aerator device is inserted having to be predisposed beforehand for such implementation.

[0043] In fact, the shower body is lacking through apertures through its thickness, unlike most traditional systems, so that the aerator device described (preferably in cartridge form) automatically provides for the creation of the passages and external air apertures needed.

[0044] Advantageously, the flow of water coming out of the nozzles possesses unrivalled toning properties, given the control of the flow combined with the aeration.

[0045] A person skilled in the art may make variations or replacements of elements with others functionally equivalent to the aforementioned embodiments of the assembly and the device so as to satisfy specific requirements.

[0046] For example, despite one of the variants described above providing that the complementary coupling means between the connection portion and the blocking component comprise threaded portions, other embodiments comprise a bayonet or pressure connection or the like in place of such means.

[0047] Such variants are also contained within the scope of protection as defined by the following claims.

[0048] In addition, each variant described as belonging to a possible embodiment may be realised independently of the other embodiments described.

Claims

1. Assembly (1) for the aeration and dispensing of a flow of water in the form of a jet comprising:

   - a shower which distally defines nozzles for the dispensing of a plurality of said jets and which comprises a shower body (2) ending proximally with a connection portion (4), said shower extending along a main direction of extension (X);
   - a water supply tube (6) of the nozzles mechanically constrained to the connection portion (4) by means of a blocking component (8), where the connection portion (4) and the blocking component (8) have complementary coupling means, for example corresponding threaded portions (12);

   wherein the blocking component (8) comprises a blocking nut or bush which delimits a component

seat (52) crossed by said tube (6);

- an aerator device (10) partially interposed between the connection portion (4) and the supply tube (6) to create an air-suction passage, and which delimits a mixing chamber (14) of the water entering the shower body (2) and a flow of external air transiting through the air-suction passage;

said assembly (1) being **characterised in that** the air-suction passage comprises a space (16) delimited between the complementary coupling means.

2. Assembly according to claim 1, wherein the complementary coupling means comprise threaded portions (12) made on the connection portion (4) and on the blocking component (8), the latter comprising for example a blocking nut, and wherein said air-suction passage comprises the winding space (16) between the threads of said portions (12).

3. Assembly according to claim 1 or 2, wherein the air-suction passage comprises one or more sections (18, 20) delimited between a device surface (22, 24, 26) of the aerator device (10) and an opposite body surface (28) of the shower body (2).

4. Assembly according to any of the previous claims, wherein, proximally, the aerator device (10) abuts onto the supply tube (6) or on a relative tube fitting (30) so as to seal it.

5. Assembly according to any of the previous claims, wherein the aerator device (10) is partially inserted in the connection portion (4), and is provided with a projection or radial positioning ring (32) projecting externally to the shower body (2).

6. Assembly according to claims 4 and 5, wherein the supply tube (6) or the relative tube fitting (30) lie in abutment with the radial positioning ring (32).

7. Assembly according to claim 5 or 6, wherein the radial positioning ring (32) is axially distanced from the connection portion (4) by means of one or more separation bosses (34), thereby delimiting a section (20) of the air-suction passage.

8. Assembly according to any of the previous claims, wherein the aerator device (10) comprises a device body (36) crossed by the water-transit passage (38), communicating upstream with the supply tube (6) and downstream with the nozzles, between the device body (36) and the shower body (2), a sealing element (40) being preferably inserted, for example an O-ring or a gasket, to prevent a back flow of the water coming out of the mixing chamber (14).

9. Assembly according to claim 8, wherein the device body (36) delimits a suction aperture (42) for a fluidic communication between the air-suction passage and the mixing chamber (14), said aperture (42) being positioned upstream of the sealing element (40) in relation to the transit direction (T) of the water.

10. Assembly according to any of the previous claims, wherein the aerator device (10) comprises at least one limiting valve (44) of the flow of water towards the nozzles, said valve (44) being at least partially housed inside said device.

11. Assembly according to claim 10, wherein said limiting valve (44) comprises a casing (46) which delimits a plurality of apertures for the transit of the water, and a ring in polymer material (48) housed in the casing (46) and suitable to be deformed by the flow of water so as to reduce the cross-section of transit through at least one of said apertures.

12. Assembly according to any of the previous claims, wherein the supply tube (6) has at least one flexible part.

13. Assembly according to any of the previous claims, wherein the shower comprises at least one grippable portion (50) to be manually directed by a user, said grippable portion extending distally from the connection portion (4).

14. Assembly according to any of the previous claims, wherein the blocking nut or bush defines an inner surface (56) which forms a step or a narrowing (58) of the component seat (52), which extends radially inwards to retain the water supply tube (6) or a tube fitting (30) connected thereto at least in an axial direction.

15. Aerator device (10) for mixing air with a flow of water supplied by a supply tube (6) and coming out of a shower in the form of a jet;
wherein the shower distally defines nozzles for the dispensing of a plurality of said jets and which comprises a shower body (2) ending proximally with a connection portion (4), said shower extending along a main direction of extension (X);
and wherein the water supply tube (6) of the nozzles is suitable to be mechanically constrained to the connection portion (4) by means of a blocking component (8), where the connection portion (4) and the blocking component (8) have complementary coupling means, for example corresponding threaded portions (12);
said aerator device (10) being configured to be partially interposed between the connection portion (4) and the supply tube (6) to create an air-suction passage, and which delimits a mixing chamber (14) of

the water entering the shower body (2) and a flow of external air transiting through the air-suction passage;
the air-suction passage comprising a space (16) delimited between the complementary coupling means.

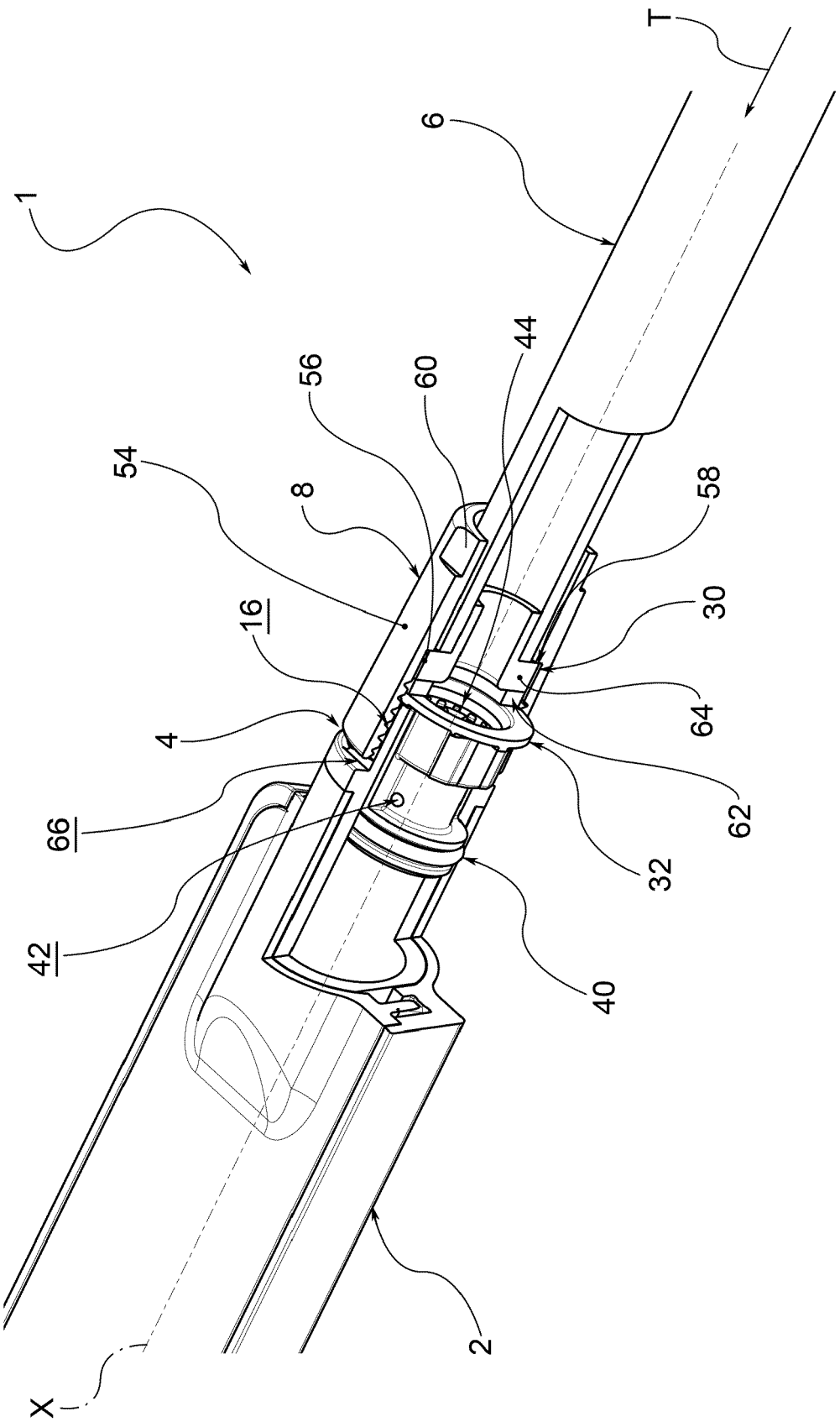

Fig. 1

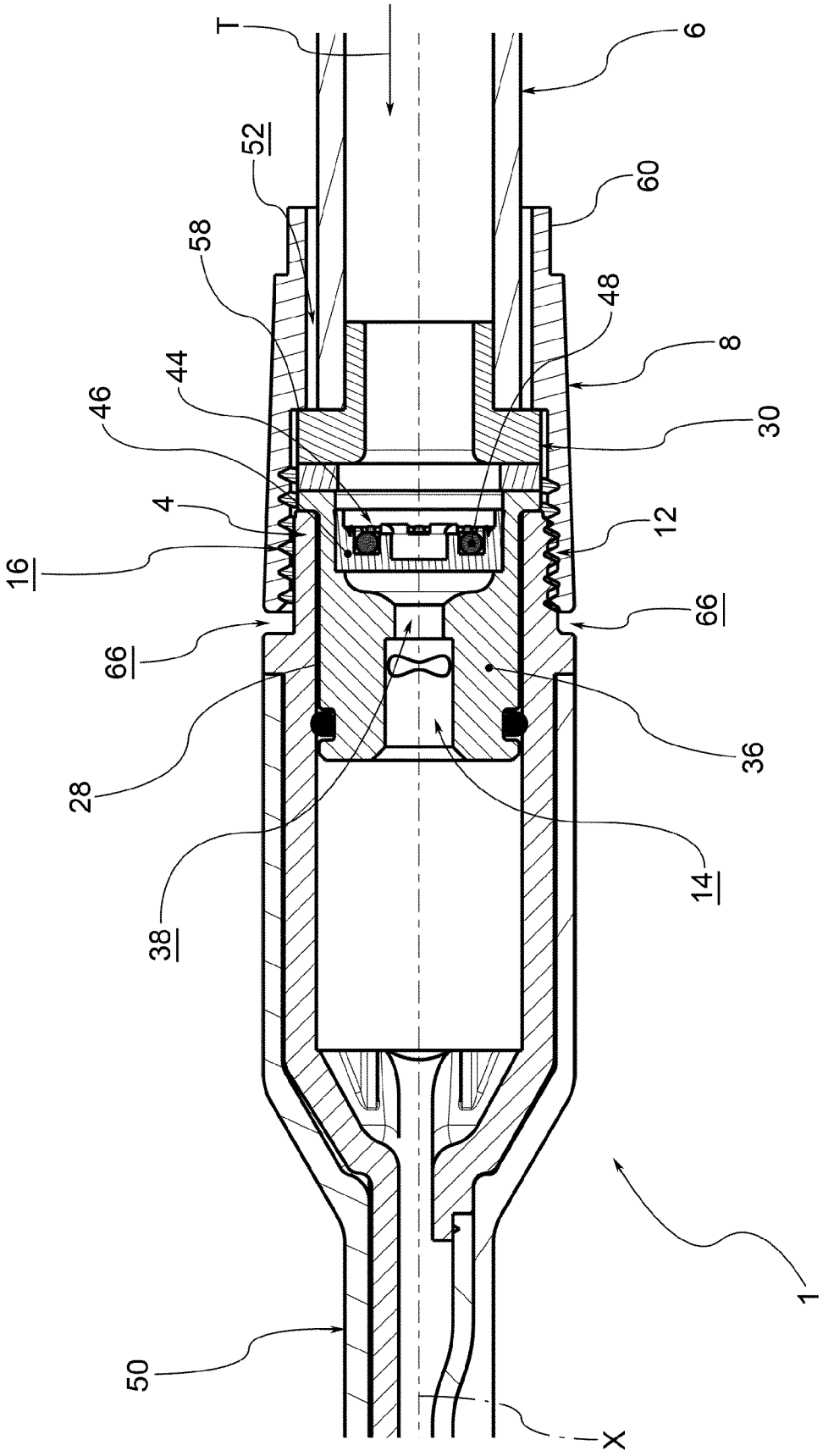

Fig. 2

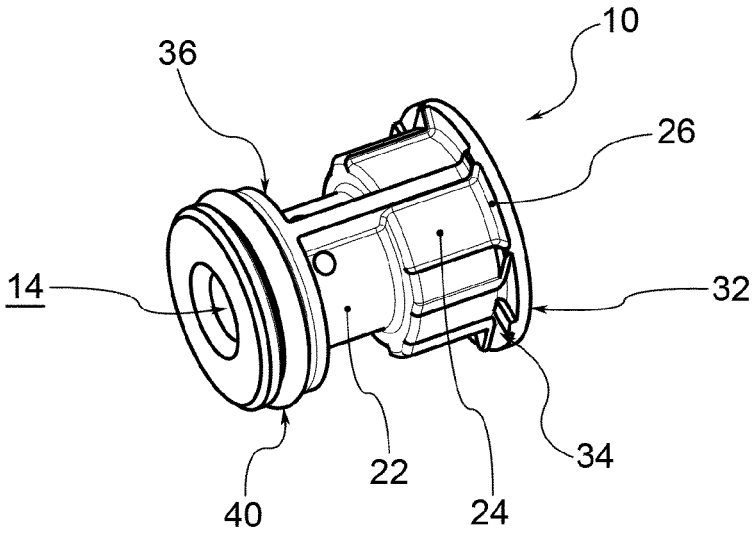

Fig.3

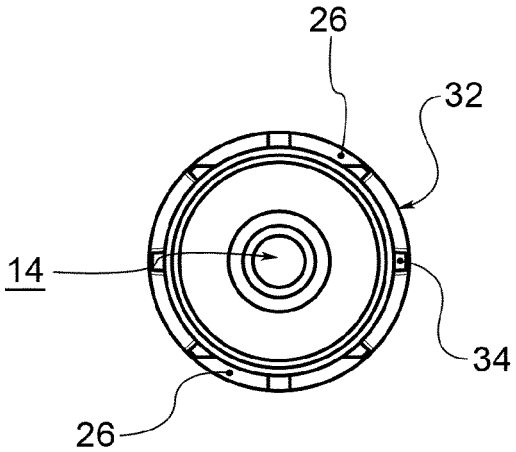

Fig.4

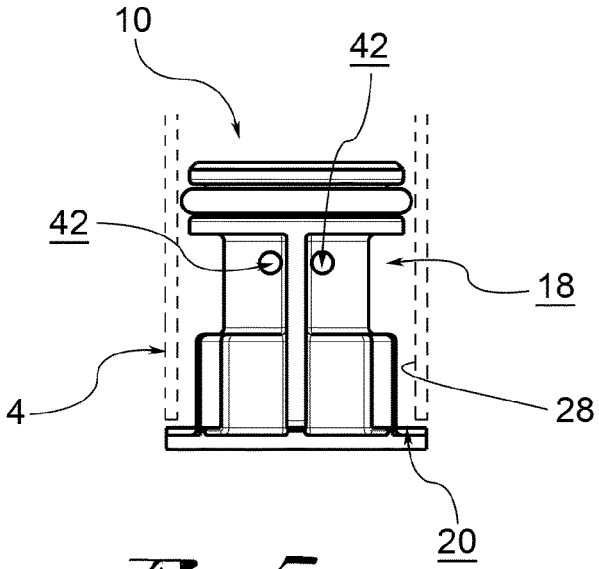

Fig.5

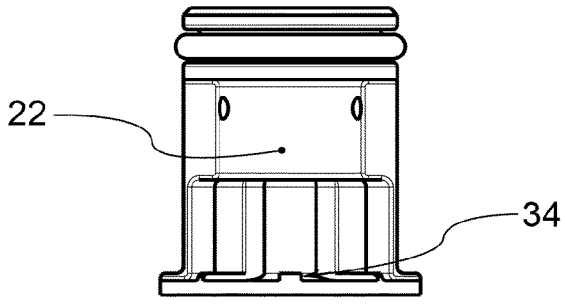

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 9201

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B01F
B05B
E03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 January 2014	Zattoni, Federico

CATEGORY OF CITED DOCUMENTS

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30-01-2014

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REFERENCES CITED IN THE DESCRIPTION

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