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(54) **LOCKING DEVICE FOR A WATER-DISPENSING UNIT AND WATER-DISPENSING UNIT**

(57) A locking device (1) for a water-dispensing unit (2), such as a mixer tap, is disclosed. The locking device comprises: a tubular element (3) that extends with a longitudinal axis (X), a bottom element (4) positionable inside the tubular element to connect a hydraulic cartridge (5) to one or more conduits for the water withdrawal, screw means (6) connected to the bottom element and arranged for being screwed from inside the tubular element, one or more locking elements (7) housed in the bottom element and shaped to cooperate with the screw means, each locking element being movable, by tightening the screw means, in a direction transverse to the longitudinal axis against an inner surface of a wall (3a) of the tubular element to lock the bottom element, preventing an axial movement thereof and a rotation around the longitudinal axis with respect to the tubular element.

A water-dispensing unit is disclosed comprising the locking device.

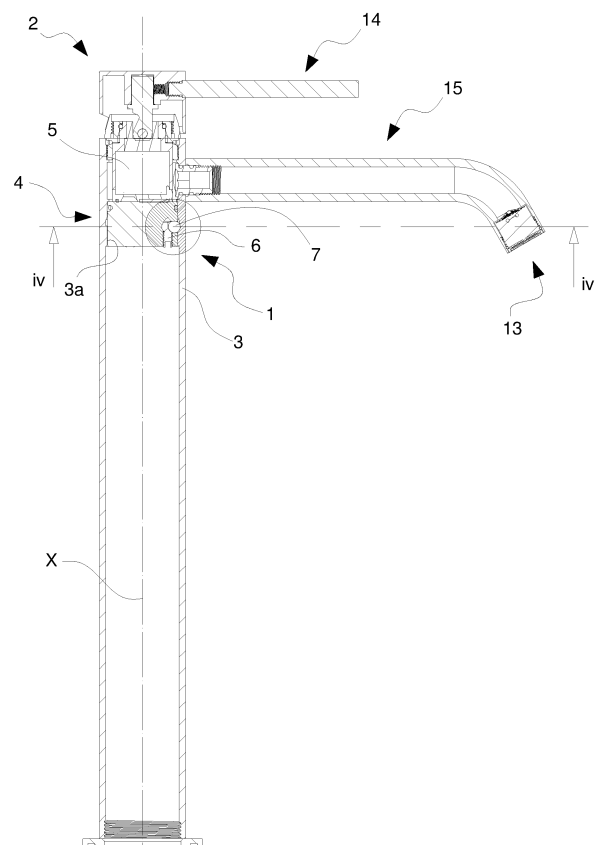


Fig. 1

Description

Background of the invention

[0001] The invention relates to a locking device for a water-dispensing unit and a water-dispensing unit.

[0002] Specifically but not exclusively, the locking device according to the invention can be used in the technical field of sanitary taps and fittings, in particular for a sink or washbasin, used in kitchens or bathroom, particularly in the field of minimalist sanitary taps and fittings, where a minimalist tap means a tap having a geometrical conformation that is extremely simple and reduced to the essential.

[0003] The locking device can be used in a water-dispensing unit, such as for example a mixer tap, to lock or fix inside a hollow body of the water-dispensing unit a bottom element, also called a "bottom", i.e. a water interface element between a cartridge (for example a mixer cartridge) and conduits for the water withdrawal from a water circuit, or from the mains circuit.

Prior Art

[0004] In currently known dispensing units, the bottom element is fitted to a rest protrusion that protrudes inside the body of the water-dispensing unit.

[0005] The rest protrusion in prior art dispensing units has a significantly extended surface with respect to other dimensions of the body of the dispensing unit, in particular with respect the thickness of the body of the dispensing unit. In fact, such a rest protrusion has to be wide enough to enable a coupling hole to be obtained thereupon that is intended to house a plug or pin to couple the bottom element with the rest protrusion so as to block a movement of the bottom with respect to the body of the dispensing unit.

[0006] Further, in order to prevent a corresponding movement of the bottom element with respect to the body of the prior art dispensing unit, the bottom element is clamped between the rest protrusion and another clamping element, which can be for example a cover screwed to the body of the dispensing unit.

[0007] It is known to produce the body of the dispensing unit, provided with the aforementioned rest protrusion, by casting. Alternatively, it is possible to remove material from a semifinished product so as to obtain therein the rest protrusion. The removal entails the drawback of inevitable and undesired waste of material. This drawback is the greater the more it is desired to create a minimalist product. In fact, a water-dispensing unit of this type has relatively thin thicknesses, including for example between 1 mm and 4 mm, so removing material from the solid would result in an enormous amount of waste material.

[0008] On the other hand, machining by casting is more difficult than material removal, and is less suitable for objects that are slender and have thin thicknesses like

those used in minimalist sanitary taps and fittings because the particular geometry and the relatively reduced dimensional tolerances of these products can be limited by technological needs of casting, in particular by the dimensions of the draft angles.

[0009] In the light of the above, there is accordingly wide ground for improvement of the aforesaid locking devices and for water-dispensing units. In particular, it would be desirable to have available a locking device and a water-dispensing unit that enable material waste to be limited, making the production of such water-dispensing units more advantageous from an economic point of view and more sustainable from the point of view of environmental impact.

Objects of the invention

[0010] One object of the invention is to improve current locking devices for water-dispensing units and current water-dispensing units.

[0011] A further object of the invention is to provide an alternative locking device to those provided in the prior art.

[0012] A still further object of the invention is to provide a solution that enables the production and fitting of a water-dispensing unit to be significantly simplified. In particular, a locking device is proposed the structural configuration of which is simple but effective in performing its function, makes it possible to assemble the various components of a water-dispensing unit rapidly and at the same time without any need to perform laborious and costly work on the body of the water-dispensing unit.

[0013] Another object of the invention is to provide a locking device for water-dispensing units configured so as to permit a decrease of production material waste of the water-dispensing unit, so as to make the production of water-dispensing units advantageous from the economic point of view and more sustainable from the point of view of environmental impact.

Summary of the invention

[0014] Such objects and still others are achieved by a locking device for water-dispensing units and a water-dispensing unit as defined in the appended claims.

[0015] The thus configured device, particularly owing to the locking elements in the bottom element, is able to stably secure the bottom element to a tubular element, facilitating processing of the tubular element, and thus of the entire water-dispensing unit.

[0016] Owing to the direct action of the locking elements on the inner surface of the tubular body it is possible to limit or even eliminate the entire support protrusion that protrudes inside the tubular body, also making the use of tubular semifinished products possible; in this manner it is possible to noticeably limit or even eliminate material waste, namely the quantity of material that is removed during machining of the water-dispensing unit.

[0017] Further, owing to the fact that it is possible to act on screw means from the inside of the tubular element it is possible to lock the bottom element with respect to the tubular element without having to make holes with access outside the tubular element, which would detract from the aesthetic appeal of the product.

[0018] Further, owing to locking recesses on the inner surface of the tubular element, it is possible to lock both rotationally and axially the bottom element with respect to the tubular element.

[0019] Owing to the cooperation of the screw means with the locking elements, it is possible to ensure a locking device that is constructionally simple and at the same time able to perform a high-efficiency locking action.

[0020] Further, owing to the arrangement of the housing seats of the locking elements and of the screw means, it is possible to obtain a compact device that is easily integrable into a dispensing unit, particularly into a water-dispensing unit with a minimalist design.

Short description of the drawings

[0021] The invention can be better understood and implemented with reference to the appended drawings, which illustrate an embodiment thereof by way of non-limiting example, in which:

Figure 1 is an elevated section passing through a longitudinal axis of a water-dispensing unit comprising a locking device according to this invention in which a line of a plane iv-iv is shown;

Figure 2 is an enlarged detail of the locking device of Figure 1;

Figure 3 is a raised frontal view of the water-dispensing unit of Figure 1;

Figure 4 is a section from the bottom along the line of the plane iv-iv of Figure 1;

Figure 5 is a top view of a tubular element of the locking device of Figure 1;

Figure 6 is a raised section of the tubular element taken on the section plane of Figure 1;

Figure 7 is a raised section of the tubular element taken on a plane that is orthogonal to the section plane of Figure 6;

Figure 8 is an enlarged detail of Figure 2;

Figure 9 is an enlarged detail of Figure 7.

Detailed description

[0022] In the aforementioned figures, the numeric reference 1 is a locking device suitable for a water-dispensing unit 2, like a mixer tap (Figure 1).

[0023] The water-dispensing unit 2 can be used in the field of sanitary taps and fittings, in particular in a wash-basin or a sink, in particular of a bathroom or of a kitchen.

[0024] By way of non-limiting example, the locking device 1 and the water-dispensing unit 2 can be used in the field of sanitary taps and fittings of minimalist type.

[0025] The locking device 1 is configured to lock a movement of a bottom element 4, also called "bottom", on a tubular element that will be disclosed below.

[0026] In the context of the invention, bottom element 4 or bottom means a hydraulic interface element between a hydraulic cartridge 5 (for example a mixer cartridge) and water withdrawal conduits (not shown) for the water withdrawal from a water circuit, or directly from the mains.

[0027] The water-dispensing unit 2 comprises, in particular, manual drive means 14 for controlling the hydraulic cartridge 5 so as to mix water coming from the water circuit. The manual drive means 14 can comprise, as in the illustrated embodiment, a drive lever (Figure 1).

[0028] In another embodiment that is not illustrated, the manual drive means 14 can comprise a drive knob.

[0029] The water-dispensing unit 2 comprises, in particular, a water-dispensing pipe 15 operationally connected, at a first end, to the hydraulic cartridge 5 and having, at a second end opposite the first end, a dispensing port 13 for the exit of water, in particular of mixed water (Figure 1).

[0030] The locking device 1 comprises a tubular element 3 that extends with a longitudinal axis X. The tubular element 3 can comprise a hollow body of the water dispensing unit 2 intended to house the hydraulic cartridge 5 and the aforesaid water withdrawal conduits.

[0031] The water-dispensing pipe 15 can be arranged, in particular, in connection with an outlet of the hydraulic cartridge 5, and near an upper end portion of the tubular element 3.

[0032] In the illustrated embodiment, the tubular element 3 comprises a substantially cylindrical hollow body, thus having a cross section, i.e. taken on a plane that is transverse, in particular orthogonal, to the longitudinal axis X, which is circular, in particular circular crown. (Figures 4, 5 and 8).

[0033] In one embodiment that is not illustrated, the tubular element 3 may have a cross section that is different from the circular cross section, in particular the tubular element 3 can have a section which is polygonal, in particular square. In this embodiment that is not illustrated, the polygonal cross section can have sharp corners.

[0034] In a further embodiment that is not illustrated, the polygonal cross section can be have chamfered, i.e. connected edges.

[0035] The locking device 1 comprises screw means 6 (Figures 1 and 2) connected to the bottom element 4 and arranged for being screwed from the inside of the tubular element 3. For example, it is possible to act on these screw means 6 with a screw driver, the shaft of which can be inserted inside the tubular element 3.

[0036] The locking device 1 comprises one or more locking elements 7 (Figures 1, 2 and 8) housed in the bottom element 4 and shaped to cooperate with the screw means 6.

[0037] Each locking element 7 is movable, upon a tightening action of the screw means 6, in a direction trans-

verse to the longitudinal axis X against an inner surface of a wall of the tubular element 3, or wall inner surface 3a, so as to lock the bottom element 4 preventing an axial movement thereof along the longitudinal axis X and a rotation around the longitudinal axis X with respect to the tubular element 3.

[0038] In the illustrated embodiment, the one or more locking elements 7 comprise ball elements (Figures 1, 2 and 8).

[0039] In one embodiment that is not illustrated, the one or more locking elements 7 may comprise prismatic elements. In a further embodiment that is not illustrated, the one or more locking elements can comprise cylindrical elements.

[0040] On the inner surface 3a, at least one locking recess 9 can be obtained (Figures 2, 6 and 7) to engage a respective locking element 7. The locking recess 9 has a concave shape corresponding to a profile of the locking element 9, the profile - during operation - facing the inner surface 3 a.

[0041] In the illustrated embodiment, in which there are spherical locking elements 7, the locking recess 9 has a corresponding concave shape of a spherical impression.

[0042] The bottom element 4 can be substantially cylindrical. The axis of this cylinder may be parallel to, in particular coinciding with, the longitudinal axis X. The bottom element may have one or more through holes 16, 17 (Figure 8) arranged for housing the conduits for withdrawing water from the water circuit.

[0043] In the illustrated embodiment, there is a first hole 16 for hot water and a second hole 17 for cold water.

[0044] On a side surface of the bottom element 4, a side opening may be obtained that faces the wall inner surface 3a of the tubular element 3. The side opening defines a housing seat 8 that extends transversely to the longitudinal axis X inside the bottom element 4 to house a respective locking element 7 (Figure 2).

[0045] In the illustrated embodiment, the side surface of the bottom element 4 is a substantially cylindrical surface.

[0046] In the illustrated embodiment, the housing seat 8 extends substantially orthogonally to the longitudinal axis X. The locking element 7 is movable, upon an action of the screw means 6, in the housing seat 8 to contact the wall inner surface 3a and thus lock the bottom element 4 with respect to the tubular element 3.

[0047] On the side surface of the bottom element 4, a further housing seat 12 (Figure 2) may be further obtained for a seal element, like a gasket 11. This housing seat 12 may be arranged at a height - measured on the longitudinal axis X - different from the height at which the locking elements 7 are provided. The gasket 11, during operation, prevents leaking of water from the housing of the hydraulic cartridge 5 to other parts of the tubular element 3.

[0048] In one embodiment that is not illustrated, the locking device 1 can be devoid of the seal element; in

this embodiment that is not illustrated, the hydraulic cartridge 5 is isolated fluidly with respect to the tubular element 3 and/or with respect to the bottom element 4.

[0049] On the bottom element 4 at least one nut screw seat 6a may be obtained, i.e. a threaded hole, that extends substantially parallel to the longitudinal axis X and which the respective screw means 6 (Figure 2) engages. The conformation of the screw means 6 and of the nut screw seat 6a mean that the action of the screw means 6 is directed substantially parallel to the longitudinal axis X, or axially.

[0050] In the illustrated embodiment, the screw means 6 comprises a screw without a head, of the adjusting grubscrew type.

[0051] In a further embodiment that is not illustrated, the screw means 6 can comprise a screw with a head. In another embodiment that is not illustrated, the screw means 6 can comprise a bolt.

[0052] The nut screw seat 6a and the housing seat 8 (of the locking elements 7) are contiguous and communicate together, to permit contact between the screw means 6 and the respective locking element 7.

[0053] In the illustrated embodiment (Figures 2 and 8), the nut screw seat 6a comprises a non-through hole through an axial dimension (thickness) of the bottom element 4 and the housing seat 8 comprises non-through hole diametrically through the bottom element 4.

[0054] Nevertheless, in a further embodiment that is not illustrated, it is possible for both the nut screw seat 6a and the housing seat 8 to pass through the bottom element 4.

[0055] The screw means 6 may comprise a tapered tip drive portion 6b (Figure 2) arranged, in particular for contacting a respective locking element 7 so as to transform an axial movement (i.e. directed substantially parallel to the longitudinal axis X) of the screw means 6 in a transverse movement (i.e. directed transversely to the longitudinal axis X) of the locking element 7 against the wall inner surface 3a of the tubular element 3.

[0056] The nut screw seat 6a and the housing seat 8 may extend transversely, in particular substantially orthogonally, to one another. As mentioned, the screw means 6 is rotatable to advance parallel to the longitudinal axis X and the locking elements 7 are movable radially with respect to the longitudinal axis X.

[0057] Referring to Figures 1, 4, 6 and 7, the tubular element 3 has a dimension, i.e. the cross section, that is noticeably smaller than the longitudinal dimension (height) and the transverse dimension (diameter).

[0058] The tubular element 3 may have a relatively thin cross section (with respect to the other dimensions). In particular, this cross section may be comprised between 1 mm and 4 mm, in particular, the cross section of the tubular element 3 may be about 2.5 mm.

[0059] The tubular element 3 may have a substantially constant thickness.

[0060] In the illustrated embodiment, there is a portion 19 of the tubular element 3 that has internally a narrowed

cross section (Figures 6 and 9). On the wall inner surface 3a near the engagement recess 9, a circumferential chamfered zone 10 is obtained that is arranged for gradually guiding and compressing and facilitating the transit of the gasket 11 to the narrowed section portion 19 in a step of inserting the bottom element 4 into the tubular element 3.

[0061] In other words, in the illustrated embodiment, at the narrowed cross section 19 a chamfer has been made so that the gasket 11 - which is subjected to compression action between the further housing seat 12 and the engagement recesses 9 - does not get damaged by the sharp-corner edges of the engagement recesses 9 when the bottom element 4 is taken to a desired position inside the tubular element 3.

[0062] In the illustrated embodiment, three locking elements 7 are provided (Figures 4 and 8), each of which is drivable by respective screw means 6, and arranged angularly equidistant by 120° around the longitudinal axis X.

[0063] Nevertheless, in one embodiment that is not illustrated, one locking element may be provided. In alternative versions, two locking elements, or four locking elements, or five locking elements, or six locking elements, or several locking elements may be provided.

[0064] It is possible to insert the bottom body 4 inside the tubular element 3 and once a desired position is reached along the longitudinal axis X, drive the screw means 6 to drive the locking elements 7 and lock the bottom element 4 against the tubular element 3.

[0065] In the illustrated embodiment, the desired position inside the tubular element 3 is defined by the (axial) position of the engagement recesses 9 and by an abutment element 18 that protrudes inside the tubular element 3 to the inside (Figures 1 and 9).

[0066] In an alternative embodiment, the desired position of the bottom element 4 can be determined by the sole position of the engagement recesses 9.

[0067] In addition or alternatively, the desired position of the bottom element 4 inside the tubular element 3 can be determined by the insertion of a removable body (not shown) inside the tubular element 3 that provides a temporary support to the bottom element 4 before the latter is locked by an action on the screw means 6.

[0068] In the light of what has been disclosed above and shown with reference to the attached drawings, it is clear that the locking device 1 and the water-dispensing unit 2 successfully achieve the objects declared above.

[0069] The thus configured locking device 1, particularly owing to the presence of the locking elements 7 housed in the bottom element 4, is able to secure the bottom element 4 stably directly to the wall inner surface 3a of the tubular element 3.

[0070] As mentioned, owing to the direct action of the locking elements 7 on the inner surface 3a of the tubular body 3, it is possible to limit or even completely eliminate the overall dimensions of the prior art support protrusion that protrudes inside the tubular body. This makes it pos-

sible to use tubular semifinished products and thus greatly limits (or eliminates) the amount of material removed during machining of the water-dispensing unit.

[0071] Further, owing to the fact that it is possible to act on the screw means 6 from inside the tubular element 3 it is possible to lock the bottom element 4 with respect to the tubular element 3 without providing holes with access outside the tubular element that would detract from the aesthetic appeal of the product, overcoming the limits of the prior art.

[0072] Further, owing to owing to the provision of locking recesses 9 on the inner surface 3a of the tubular element 3, it is possible to provide both rotation and axial locking of the bottom element 4 with respect to the tubular element 3.

[0073] Owing to the cooperation of the screw means 6 with the locking elements 7, in particular owing to the tapered tip conformation of the drive portion 6b, it is possible to ensure a locking device 1 that is constructionally simple and at the same time capable of effective locking.

[0074] Further, owing to the arrangement inside the bottom element 4 of the housing seats 8 of the locking elements 7 and of the screw means 6 it is possible to obtain a compact device that is easily integrable into a dispensing unit 2, in particular into a water-dispensing unit with a minimalist design.

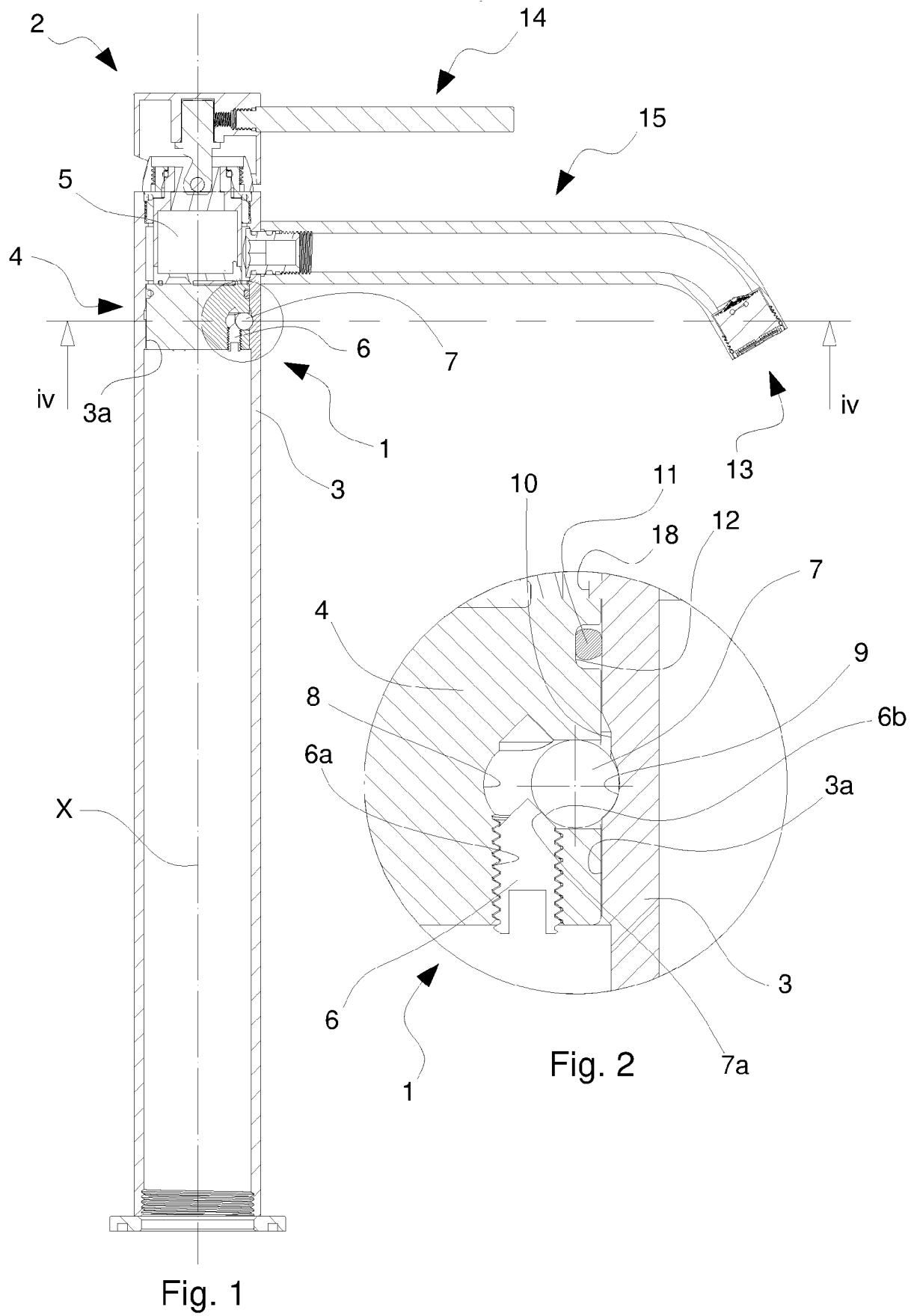
Claims

1. Locking device (1) suitable for a water-dispensing unit (2), such as a mixer tap, and comprising:

- a tubular element (3) that extends with a longitudinal axis (X),
- a bottom element (4) positionable inside said tubular element (3) and suitable for connecting a hydraulic cartridge (5) - intended to be housed in said tubular element (3) - with one or more conduits for the water withdrawal from a water circuit,
- screw means (6) connected to said bottom element (4) and arranged for being screwed from inside said tubular element (3),
- one or more locking elements (7) housed in said bottom element (4) and shaped to cooperate with said screw means (6), each locking element (7) being movable, upon a tightening action of said screw means (6), in a direction transverse to said longitudinal axis (X) against an inner surface of a wall (3a) of said tubular element (3) to lock said bottom element (4) preventing an axial movement thereof along said longitudinal axis (X) and a rotation around longitudinal axis (X) with respect to said tubular element (3).

2. Locking device (1) according to claim 1, wherein on said inner surface (3a) at least one locking recess

- (9) is obtained for engaging a respective locking element (7).
3. Locking device (1) according to any one of the preceding claims, wherein on a side surface of said bottom element (4) a side opening is obtained that faces said inner surface of the wall (3a) of said tubular element (3), said side opening defining a housing seat (8) that extends transversely to said longitudinal axis (X) inside said bottom element (4) to house a respective locking element (7), said locking element (7) being movable, upon an action of said screw means (6), in said housing seat (8) to contact said inner surface of the wall (3a) and thus lock said bottom element (4) with respect to said tubular element (3).
 4. Locking device (1) according to any one of the preceding claims, wherein on said bottom element (4) at least one nut screw seat (6a) is obtained that extends substantially parallel to said longitudinal axis (X) and which respective screw means (6) engages.
 5. Locking device (1) according to claim 4 as appended to claim 3, wherein said nut screw seat (6a) and said housing seat (8) are contiguous and communicate together, to permit contact between said screw means (6) and the respective locking element (7).
 6. Locking device according to claim 5, wherein said screw means (6) comprises a tapered tip drive portion (6b) arranged for contacting a respective locking element (7) so as to transform an axial movement of said screw means (6) into a transverse movement of said locking element (7) against said wall inner surface (3a) of said tubular element (3).
 7. Locking device (1) according to any one of the preceding claims, wherein said one or more locking elements (7) comprise ball elements.
 8. Locking device (1) according to one of claims 5 to 7 wherein said nut screw seat (6a) and said housing seat (8) extend substantially orthogonally to one another, said screw means (6) being rotatable to advance parallel to said longitudinal axis (X) and said locking elements (7) being movable radially with respect to said longitudinal axis (X).
 9. Locking device (1) according to any one of the preceding claims, wherein said bottom element (4) and said wall inner surface (3a) are substantially cylindrical.
 10. Locking device (1) according to any one of the preceding claims, wherein on a side surface of said bottom element (4) a further housing seat (12) is obtained for a gasket (11).
 11. Locking device (1) according to any one of the preceding claims, wherein said tubular element (3) has a substantially constant transverse thickness.
 12. Locking device (1) according to any one of claims 1 to 10, wherein a portion (19) of said tubular element (3) has internally a narrowed cross section and wherein on said inner surface of the wall (3a) near said at least one engagement recess (9) a circumferential chamfered zone (10) is obtained arranged for guiding and gradually compressing and facilitating the transit of said gasket (11) to said narrowed cross section portion (19) in an phase of inserting said bottom element (4) into said tubular element (3).
 13. Locking device (1) according to any one of the preceding claims, wherein said tubular element (3) has a transverse thickness comprised between 1 and 4 mm.
 14. Water-dispensing unit (2), such as a mixer tap, comprising manual drive means (14) for controlling a hydraulic cartridge (5) for mixing water coming from a water circuit, a water-dispensing pipe (15) operationally connected, at a first end, to said hydraulic cartridge (5) and having, at a second end opposite said first end, a dispensing port (13) for the exit of mixed water, and a locking device (1) that includes:
 - a tubular element (3) extending with a longitudinal axis (X) and arranged for housing said hydraulic cartridge (5),
 - a bottom element (4) positionable inside said tubular element (3) and suitable for connecting said hydraulic cartridge (5) to one or more conduits for the water withdrawal from said water circuit,
 - screw means (6) connected to said bottom element (4) and arranged for being screwed from inside said tubular element (3),
 - one or more locking elements (7) housed in said bottom element (4) and shaped to cooperate with said screw means (6), each locking element (7) being movable, upon a tightening action of said screw means (6), in a direction transverse to said longitudinal axis (X) against an inner surface of a wall (3a) of said tubular element (3) to lock said bottom element (4) preventing an axial movement thereof along said longitudinal axis (X) and a rotation around longitudinal axis (X) with respect to said tubular element (3).



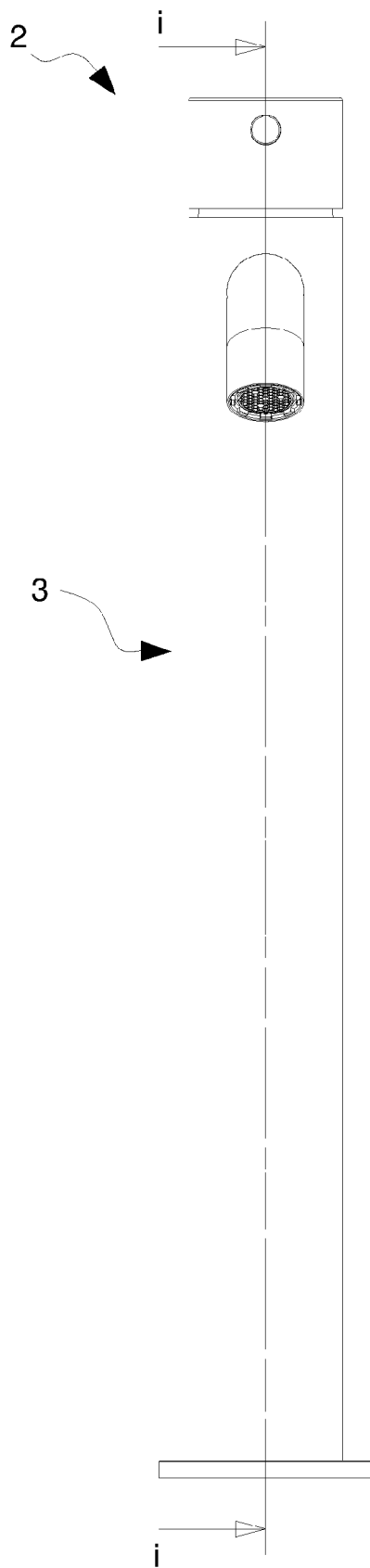


Fig. 3

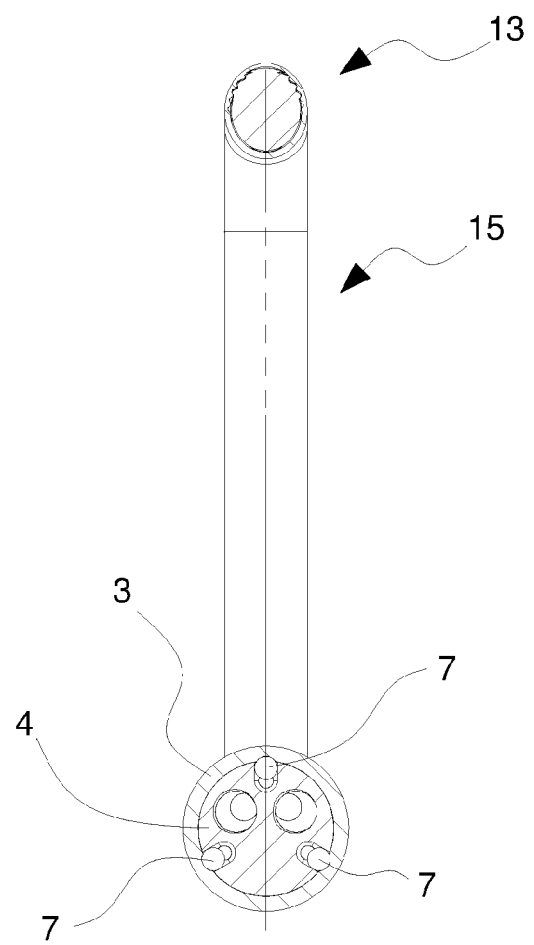


Fig. 4

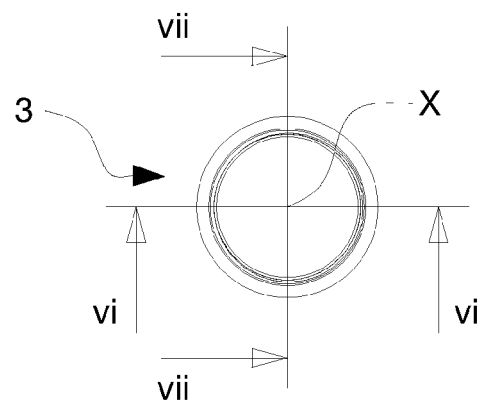


Fig. 5

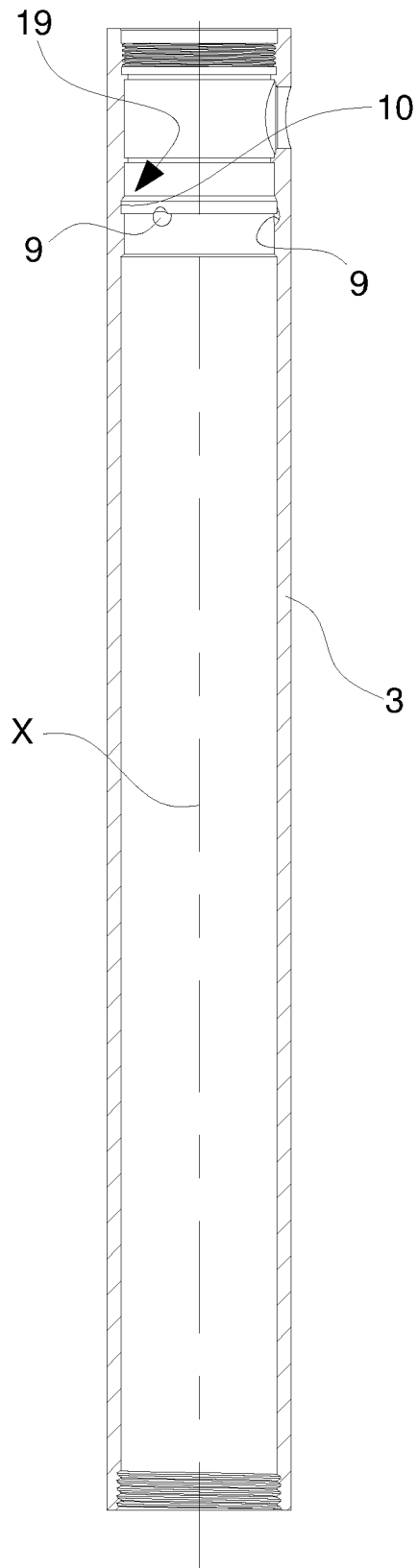


Fig. 6

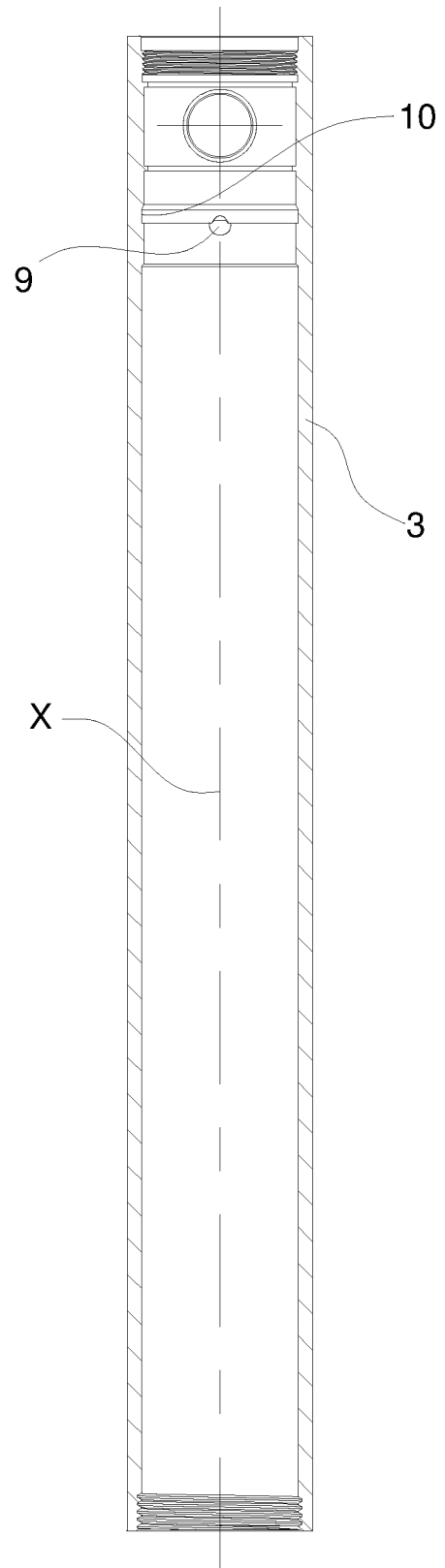
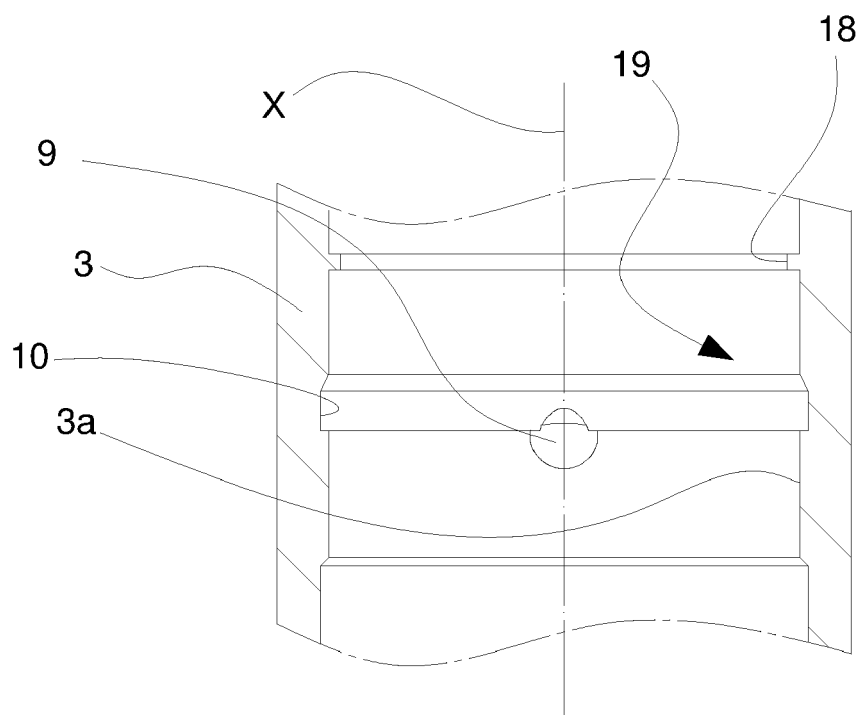
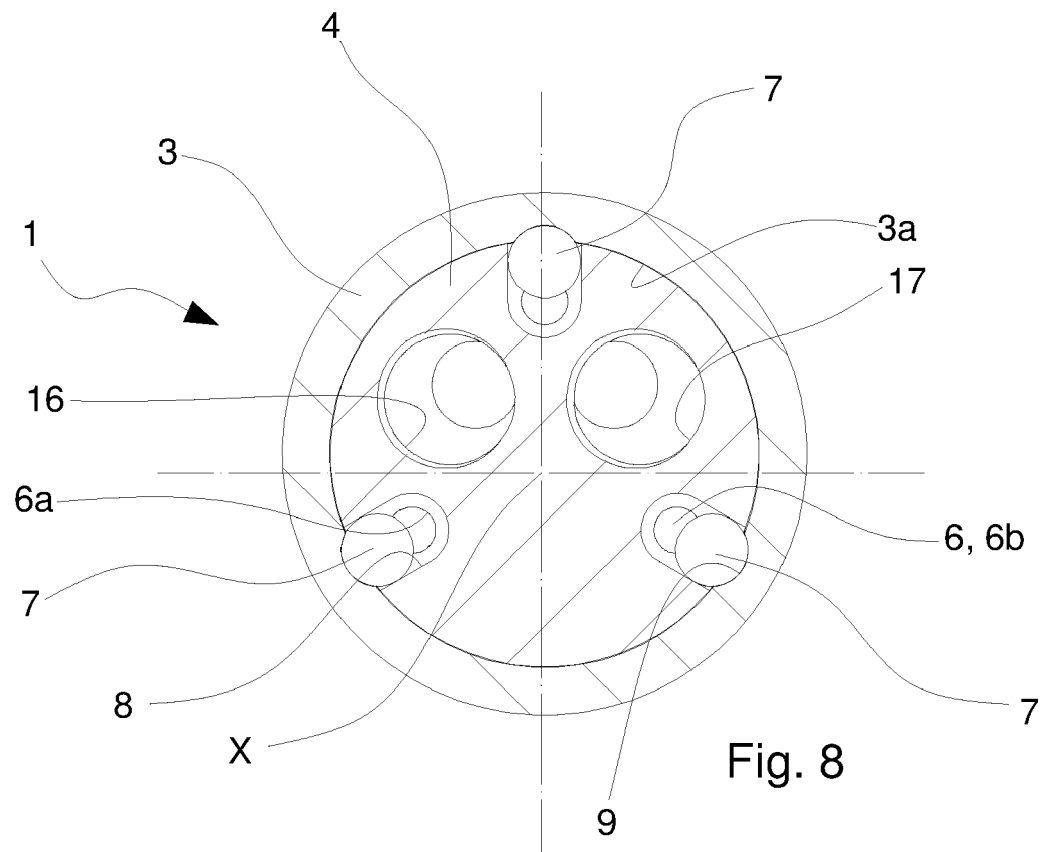


Fig. 7





EUROPEAN SEARCH REPORT

Application Number

EP 23 16 0285

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EPO FORM 1503 03.82 (P04C01)

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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)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 July 2023	Examiner Leher, Valentina
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	

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

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