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(54) **ENAMEL DISPENSING DEVICE**

(57) The enamel dispensing device (1), comprises at least one dispensing body (2) associable with an equipment (3) for enamel dispensing and provided with at least one dispensing channel (4) having at least one inlet port (5) and at least one outlet port (6) of the enamel itself, and comprises at least a first portion (7) and at least a second portion (8) separate from each other and mutually associated to define the dispensing channel (4), where the first portion (7) defines the outlet port (6) and is made of a first material of the metallic type and the second portion (8) defines the inlet port (5) and is made of a second material different from the first material and of the ceramic-metallic type

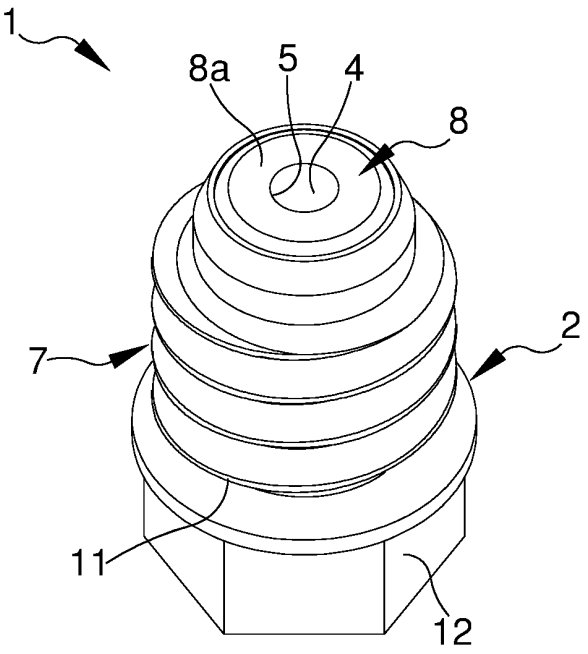

Fig.1

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Description

[0001] The present invention relates to an enamel dispensing device.

[0002] Several pieces of equipment are well known for the application of enamel on an article, which are provided with a plurality of nozzles having a channel for the passage of the enamel to be dispensed to the outside.

[0003] A particular type of equipment of known type provides that this dispensing is of the discontinuous type, so as to allow an even application and at the same time optimizing the amount of enamel used.

[0004] In order to precisely control the amount of enamel dispensed by each nozzle, the relevant enamel passage channel must be extremely small, in the order of microns.

[0005] In these pieces of equipment there is usually a tank containing the enamel to be applied on which the aforementioned nozzles face by means of a relevant orifice.

[0006] Inside the tank there is a roller, provided with protrusions, which, by rotating, allows the opening and closing of the orifices, alternately.

[0007] Rubbing the roller against the inside wall of the tank, however, not only causes wear on the contact parts but also reduces the efficiency of the equipment itself. The Italian patent application No 102017000090917, filed by the same applicant, shows an equipment wherein the orifices on the tank protrude towards the inside of the tank itself, so as to ensure the closure thereof following the overlapping with the respective protrusions defined on the roller, and at the same time, so as to avoid interaction and, therefore, friction between the roller and the inside wall of the tank.

[0008] The use of this equipment, however, may also lead to a frequent need to replace the parts undergoing mutual rubbing, with a consequent increase in the costs and timing associated with this technology.

[0009] In fact, the continuous rubbing of the roller on the protrusions of the orifices can lead to rapid wear of the orifices themselves, with the consequence that over time, the closure of the orifices is no longer optimal.

[0010] At the same time, the enamel passage hole must be made with the utmost precision in order to allow the enamel to flow out precisely and effectively.

[0011] In the light of the above considerations, it is clear that the aforementioned enamel dispensing devices are subject to further refinements aimed at enabling the application of enamel in a practical, efficient and cost-effective manner.

[0012] A known type of equipment is described by EP 2842753 A1, which describes a nozzle for the dispensing of enamel consisting of two parts, the first part of which defines the enamel inlet port, made of Titanium and adapted to operate in conjunction with the relevant shutter, and the second part, which defines the enamel outlet port, made of plastic material. This type of equipment requires the shutter, controlled by a piezoelectric, to move linearly along its longitudinal axis to open and close the inlet port defined on the first part of the nozzle. The shutter then presses locally on an abutment surface defined by the first part of the nozzle.

[0013] The main aim of the present invention is to devise an enamel dispensing device that allows a correct and effective closure of the orifices even after a prolonged use of the equipment over time.

[0014] Another object of the present invention is to devise an enamel dispensing device that allows reaching a compromise between the constructive precision and the resistance to rubbing.

[0015] Yet another object is to create a device that can be easily applied and replaced on the relevant enamel dispensing device.

[0016] Another object of the present invention is to devise an enamel dispensing device that allows overcoming the aforementioned drawbacks of the prior art within a simple, rational, easy, effective use and low cost solution.

[0017] The objects set out above are achieved by the present enamel dispensing device having the characteristics of claim 1.

[0018] The objects set out above are achieved by the present enamel dispensing device having the characteristics of claim 13.

[0019] Other characteristics and advantages of the present invention will be more evident from the description of a preferred, but not exclusive, embodiment of an enamel dispensing device, illustrated as an indication, but not limited to, in the attached tables of drawings in which:

Figure 1 is an axonometric view of the enamel dispensing device according to the invention, in a first embodiment;

Figure 2 is an exploded view of the enamel dispensing device in Figure 1;

Figure 3 is a side sectional view of the enamel dispensing device in Figure 1;

Figure 4 is a side sectional view of the enamel dispensing device in Figure 2;

Figure 5 is an axonometric view of the enamel dispensing device according to the invention, in a second embodiment;

Figure 6 is an exploded view of the enamel dispensing device in Figure 5;

Figure 7 is a side sectional view of the enamel dispensing device in Figure 5;

Figure 8 is a side sectional view of the enamel dispensing device in Figure 7;

Figure 9 is a side sectional view of the enamel dispensing device applied to a piece of enamel dispensing equipment;

Figure 10 is an enlargement of a detail in Figure 9, in a configuration of use;

Figure 11 is an enlargement of a detail in Figure 9, in a further configuration of use.

[0020] With particular reference to these figures, reference numeral 1 globally indicates an enamel dispensing device.

[0021] The enamel dispensing device 1 comprises at least one dispensing body 2 associable with a piece of equipment 3 for enamel dispensing and provided with at least one dispensing channel 4 having at least one inlet port 5 and at least one outlet port 6 of the enamel itself.

[0022] Substantially, the device 1 can be applied to a tank S of the aforementioned equipment 3 and, through the dispensing channel 4, allows the enamel to come out and consequently, be applied.

[0023] According to the invention, the device 1 is made up of two parts and comprises at least a first portion 7 and at least a second portion 8 separate from each other and mutually associated to define the dispensing channel 4.

[0024] The first portion 7 defines the outlet port 6 and is made of a first material while the second portion 8 defines the inlet port 5 and is made of a second material different from the first material.

[0025] According to the invention, the first material is of the type of a metallic material and the second material is, on the other hand, of the type of a wear-resistant material, e.g. it is a ceramic-metallic material.

[0026] More in detail, the ceramic-metallic material comprises at least one of: tungsten carbide, zirconium carbide, silicon nitride, or the like.

[0027] The manufacturing of the first portion made of metallic material makes it possible to obtain a particularly accurate processing precision; it should be noted, in fact, that the dispensing channel 4 extends almost completely along the first portion 7 and has a diameter in the order of microns.

[0028] The ceramic-metallic materials are characterized by a high resistance to rubbing and therefore allow a prolonged duration over time.

[0029] Advantageously, in the first embodiment shown in Figures 1 to 4, the first portion 7 defines a housing seat 13 inside which the second portion 8 is fitted. More specifically, the housing seat 13 defines an abutment surface 13a against which the second portion 8 rests.

[0030] Preferably, the extremity surface 8a of the second portion 8 as opposed to the one resting on the abutment surface 13a is protruding from the extremity of the first portion 7.

[0031] In the second embodiment shown in Figures 5 to 8, the second portion 8 is fitted on the first portion 7.

[0032] In particular, the first portion 7 has a truncated-cone coupling tract 9, converging away from the outlet port 6, on which the second portion 8 is fitted. Also in this case the second portion 8 defines an extremity surface 8a.

[0033] The latter, in turn, defines a truncated-cone cavity 10, converging towards the inlet port 5, adapted to define a cone-to-cone coupling with the truncated-cone coupling tract 9.

[0034] The truncated-cone cavity 10 has an angular opening comprised between 25° and 30°.

[0035] Conveniently, the device 1 comprises mutual fixing means interposed between the first portion 7 and the second portion 8.

[0036] More specifically, the fixing means are interposed between the truncated-cone coupling tract 9 and the truncated-cone cavity.

[0037] The fixing means can be of the type of a glue, epoxy resin or the like.

[0038] In addition, the first portion 7 comprises a thread 11 for fixing to the equipment 3, defined in an intermediate position between the inlet port 5 and the outlet port 6 and adapted to be screwed into a corresponding seat of the equipment 3.

[0039] The thread 11 allows practical assembly of the device 1 to the equipment 3 and, in addition, allows quick and easy removal if a replacement is required.

[0040] In more detail, the thread 11 is interposed between the truncated-cone coupling tract 9 and the outlet port 6.

[0041] In order to facilitate the screwing of the thread 11, the first portion 7 is provided with a hexagonal section head 12, defined in the proximity of the outlet port 6. The particular conformation of the first portion 7 means that, once applied to the equipment 3, the second portion 8 faces towards the inside of the equipment 3 so as to allow the enamel to enter into the dispensing channel 4.

[0042] The enamel dispensing equipment 3, shown in Figure 9, comprises: an internally hollow container 14 for the collection of enamel to be applied to an article M, at least one roller 15 housed offset inside the container 14 and operable in rotation around a relevant axis X, where the volume interposed between the internal walls of the container 14 and the roller 15 defines a containment chamber 16 of the enamel, and at least one group of devices 1 described above.

[0043] The devices 1 are associated with the container 14 in such a way that the corresponding inlet ports 5 protrude inside the containment chamber 16.

[0044] The outlet port 6 of each device 1 is facing and communicating with the outside of the container 14.

[0045] The roller 15 is provided with at least one set of protrusions 18 adapted to open and close by rubbing the inlet ports 5 during the rotation of the roller itself to allow and prevent, respectively, the enamel from coming out of the container 14.

[0046] The protrusions 18 therefore come into contact with the extremity surface 8a of the second portion 8 during the rotation of the roller 15. There is therefore a rubbing contact between the protrusions 18 and the extremity surface 8a.

[0047] More particularly, the devices 1 are positioned aligned with each other along at least one row (not visible in detail in the figures) substantially parallel to the axis X of the roller 15 and the protrusions 18 are adapted to overlap to and obstruct a relevant inlet port 5, when the protrusions themselves reach the point where the row of devices 1 is located.

[0048] Preferably, the protrusions 18 are adapted to close substantially at the same time the inlet ports 5 of the group of devices 1.

[0049] The operation of the present enamel dispensing device 1 is as follows.

[0050] The second portion 8 is fitted on the truncated-cone coupling tract 9 and fixed thereto by means of the fixing means, thus defining an individual dispensing body 2.

[0051] The dispensing body 2 is then applied to the enamel tank S of the equipment 3. The thread 11 is screwed into a special seat obtained in the container 14, by means of the head 12, so that the second portion 8 is protruding towards the inside of the containment chamber 16.

[0052] During the operation of the equipment 3, the relevant roller 15, as it rotates, intercepts with its protrusions 18 the second portion 8 of each device 1, so as to open and close the corresponding inlet port 5 alternately.

[0053] The wear-resistant material, of which the second portion 8 is made, avoids the rapid deterioration of the parts subject to mutual rubbing, ensuring their prolonged operation over time.

[0054] The enamel entering the dispensing channel 4 then comes out through the outlet port 6 defined in the first portion 7.

[0055] It has in practice been found that the described invention achieves the intended objects and in particular it is underlined that the enamel dispensing device 1 allows the correct and effective closure of the orifices even after a prolonged use of the equipment 3 over time.

[0056] In fact, the particular solution of manufacturing the device 1 in two separate portions, made of two different materials, makes it possible to achieve both high processing precision, necessary for the correct enamel dispensing, and high resistance to wear, which makes it possible to reduce maintenance operations to a minimum and, therefore, to reduce costs.

Claims

1. Enamel dispensing device (1), comprising at least one dispensing body (2) associable with an equipment (3) for enamel dispensing and provided with at least one dispensing channel (4) having at least one inlet port (5) and at least one outlet port (6) of the enamel itself, **characterized by** the fact that it comprises at least a first portion (7) and at least a second portion (8) separate from each other and mutually associated to define said dispensing channel (4), where said first portion (7) defines said outlet port (6) and is made of a first material of the metallic type and said second portion (8) defines said inlet port (5) and is made of a second material different from said first material and of the ceramic-metallic type.

2. Device (1) according to claim 1, **characterized by** the fact that said dispensing channel (4) extends by at least % of its length through said first portion (7).

3. Device (1) according to claim 1 or 2, **characterized by** the fact that said first portion (7) defines a housing seat (13) inside which said second portion (8) is fitted.

4. Device (1) according to claim 3, **characterized by** the fact that said housing seat (13) defines an abutment surface (13a) against which said second portion (8) rests.

5. Device (1) according to one or more of the preceding claims, **characterized by** the fact that said second portion (8) defines an extremity surface (8a) protruding from the extremity defined by said first portion (7).

6. Device (1) according to claim 1 or 2, **characterized by** the fact that said second portion (8) is fitted on said first portion (7).

7. Device (1) according to claim 6, **characterized by** the fact that said first portion (7) has a truncated-cone coupling tract (9), said second portion (8) being fitted on said truncated-cone coupling tract (9).

8. Device (1) according to claim 7, **characterized by** the fact that said truncated-cone coupling tract (9) is converging moving away from said outlet port (6) and that said second portion (8) defines a truncated-cone cavity (10) defining a cone-to-cone coupling with said truncated-cone coupling tract (9).

9. Device (1) according to claim 8, **characterized by** the fact that said truncated-cone cavity (10) has an angular opening comprised between 25° and 30°.

10. Device (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises mutual fixing means, interposed between said first portion (7) and said second portion (8).

11. Device (1) according to one or more of the preceding claims, **characterized by** the fact that said first portion (7) comprises a thread (11) for fixing to said equipment (3), defined in an intermediate position between said inlet port (5) and said outlet port (6) and adapted to be screwed into a corresponding seat of said equipment (3).

12. Device (1) according to claim 11, **characterized by** the fact that said thread (11) is interposed between said truncated-cone coupling tract (9) and said outlet port (6).

13. Enamel dispensing equipment (3), **characterized by** the fact that it comprises:

- an internally hollow container (14) for the collection of enamel to be applied to an article (M),
- at least one roller (15) housed offset inside said container (14) and operable in rotation around a relevant axis (X), where the volume interposed between the internal walls of said container (14) and said roller (15) defines a containment chamber (16) of the enamel,
- at least one group of devices (1) according to one or more of the preceding claims, where the relevant inlet ports (5) are communicating with said containment chamber (16) and protruding therein, and the relevant enamel outlet ports (6) are communicating with the outside,
and where said roller (15) is provided with at least one set of protrusions (18) adapted to open and close by rubbing said inlet ports (5) during the rotation of the roller itself to allow and prevent, respectively, the enamel from coming out of said container (2).

14. Equipment (3) according to claim 13, **characterized by** the fact that the devices (1) of said group are positioned substantially aligned with each other along at least one row substantially parallel to said axis (X) and by the fact that each of said protrusions (18) overlaps to and obstructs a relevant inlet port (5), when said protrusions (18) reach the point where said group of devices (1) is located.

15. Equipment (3) according to claim 14, **characterized by** the fact that said protrusions (18) are adapted to close said group of devices (1) substantially at the same time.

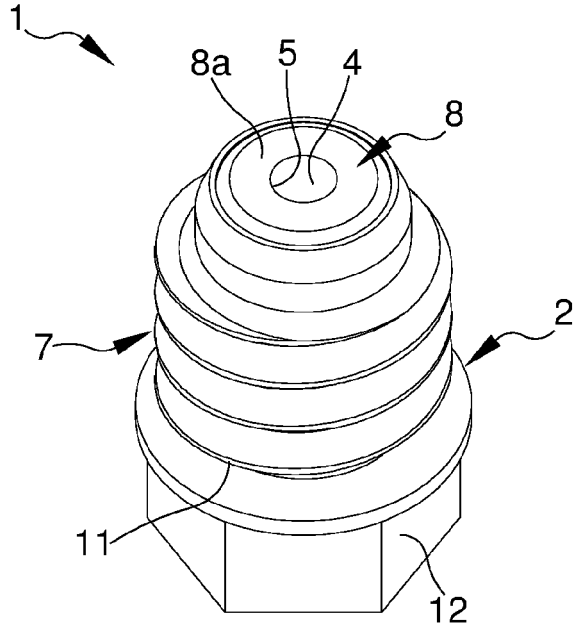

Fig.1

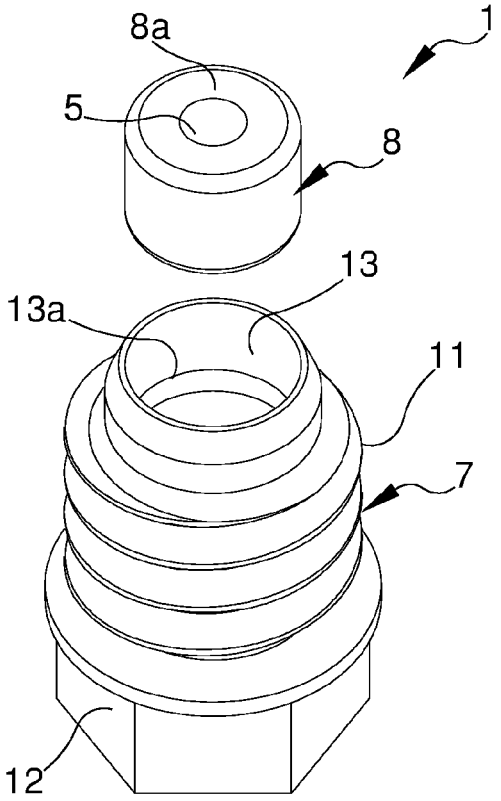

Fig.2

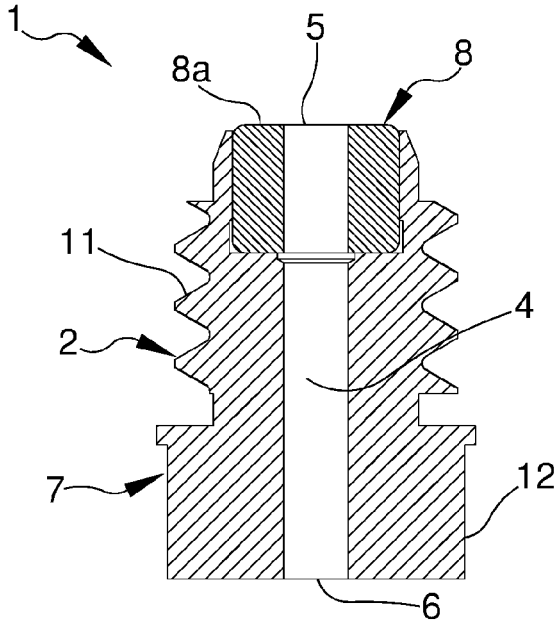

Fig.3

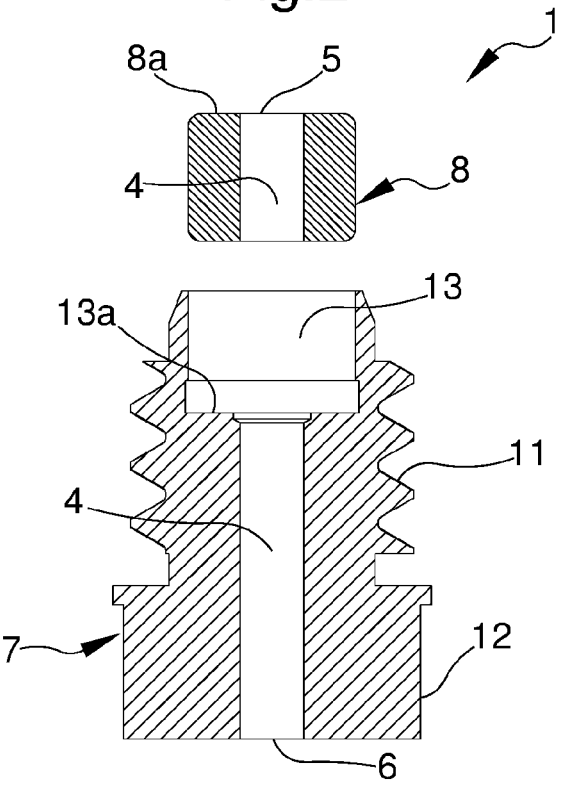

Fig.4

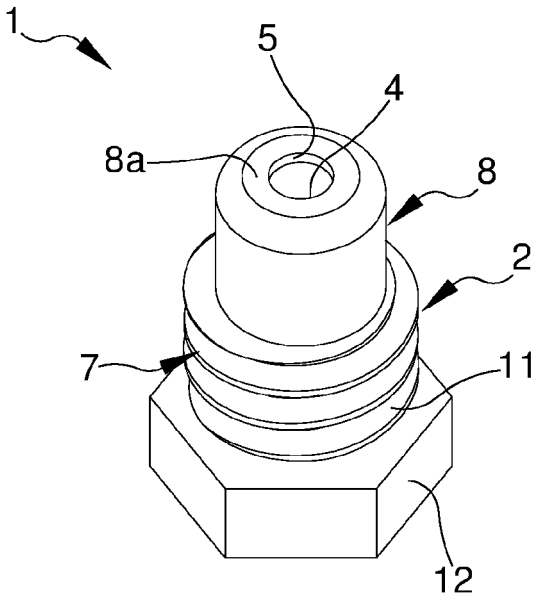

Fig.5

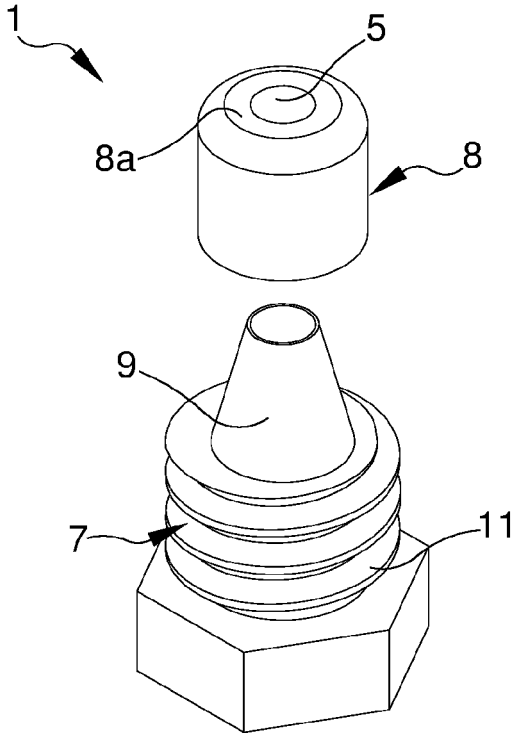

Fig.6

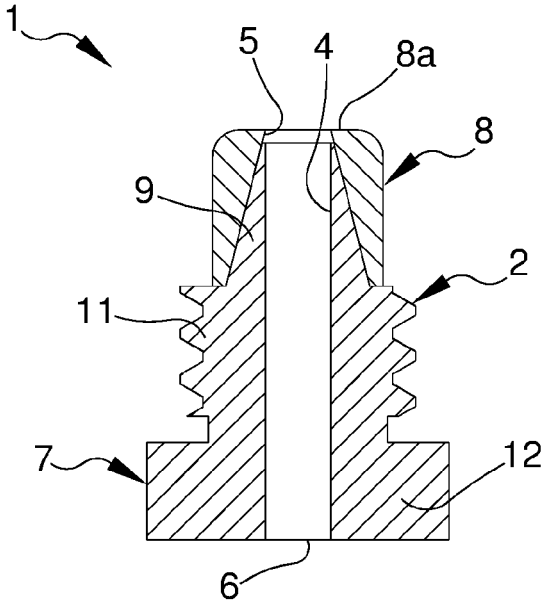

Fig.7

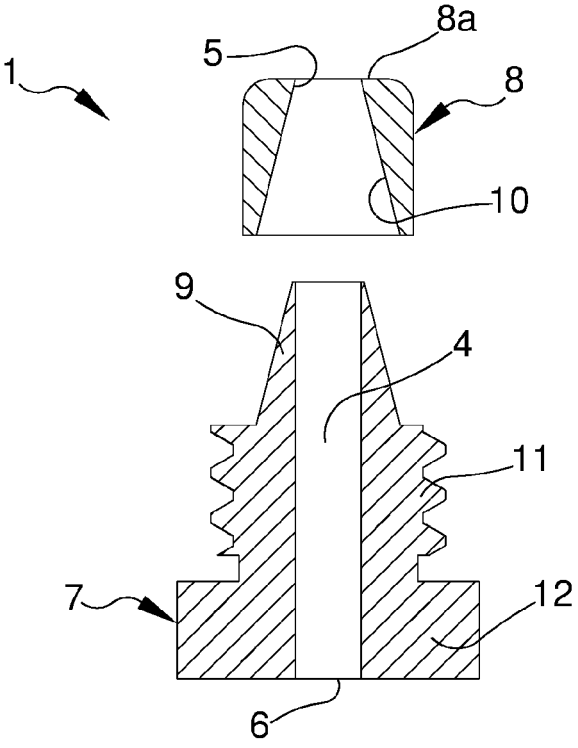

Fig.8

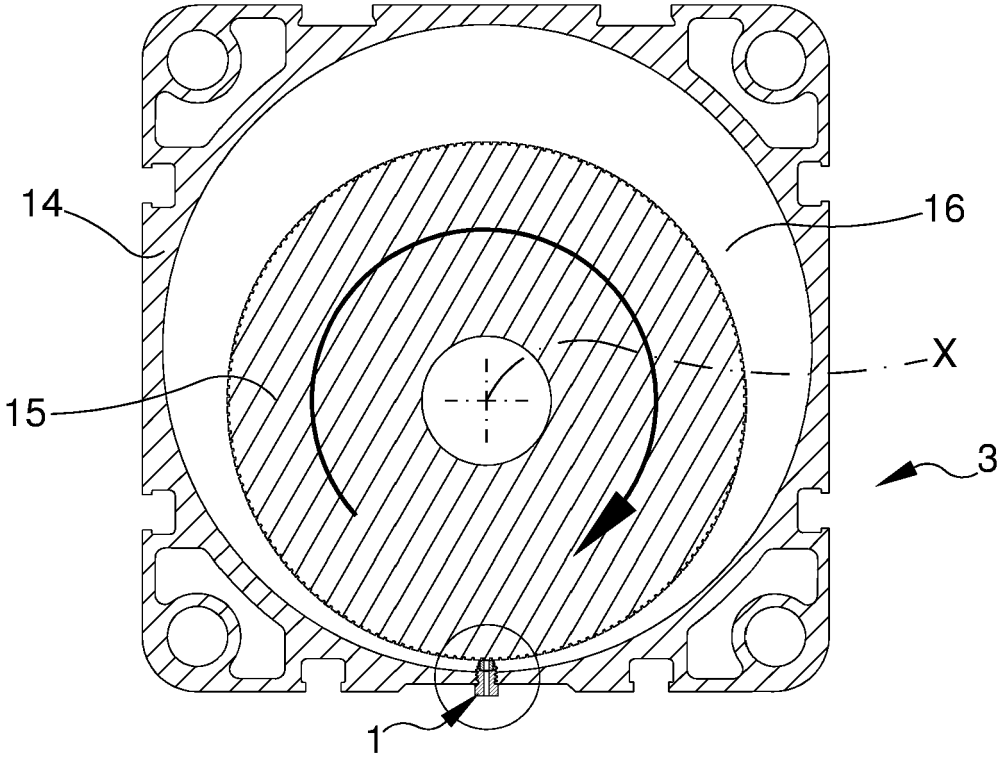

Fig.9

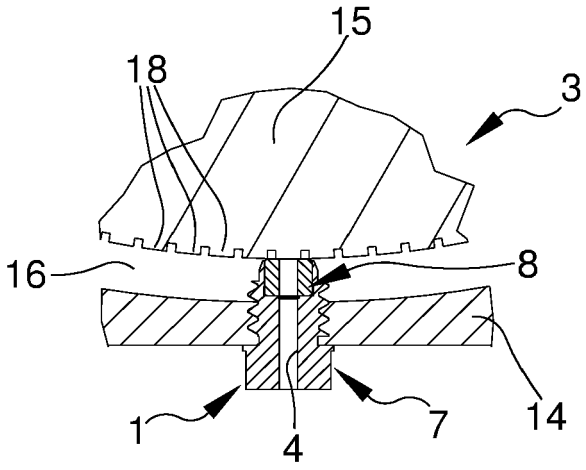

Fig.10

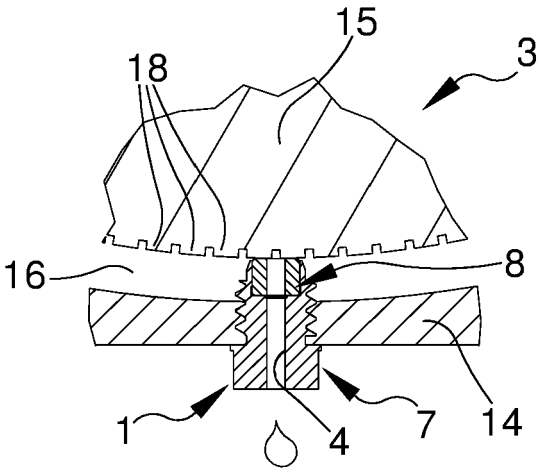

Fig.11

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 2842753 A1 **[0012]**