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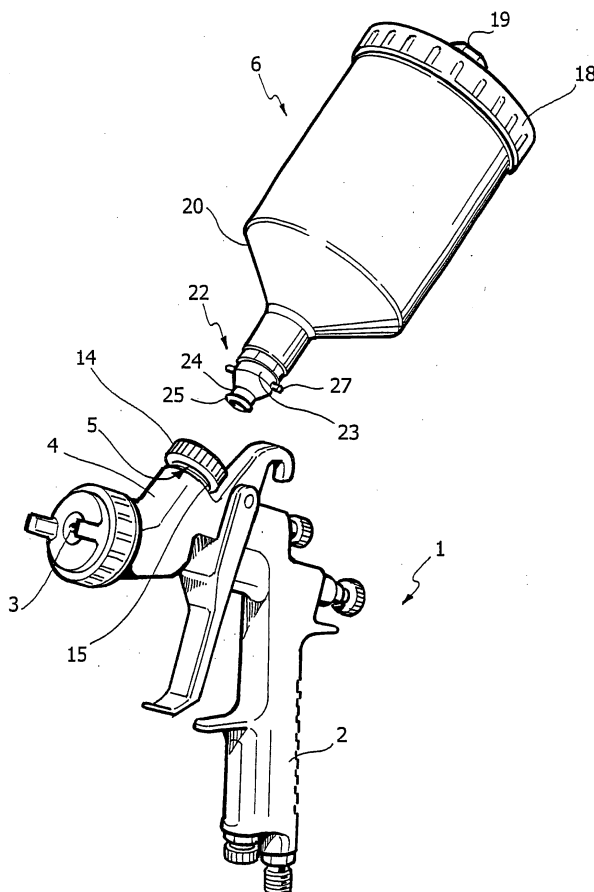
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(54) **A manual spray gun and associated cup**

(57) A cup (6; 28) for spray guns, having an outflow union (22) to be coupled with an inflow union (5) of the gun body (1) by removable connection means compris-

ing a bayonet coupling (27, 11) with associated safety device (27, 14) for its positive locking in the coupled condition.

FIG. 1



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Description

Field of the Invention

[0001] The present invention relates to manual guns for the spraying application of coating substances such as paints, chemicals and the like.

[0002] More in particular the invention relates to a spray gun of the type comprising a body having a union for the inflow of a substance to be sprayed, whereon is able to be connected a cup containing the substance to be sprayed and having an outflow union designed to be coupled with said inflow union through removable connecting means.

Background Art

[0003] Traditionally, the removable coupling between the inflow union of the gun body and the outflow union of the cup is achieved by means of a screw-on system: more in particular, through an external thread whereof is provided the inflow union of the gun body whereon is screwed an internal thread of the outflow union of the cup or, alternatively, by means of an external thread of the outflow union of the cup which is screwed into an inner thread of the inflow union of the gun body.

[0004] This traditional connection system has essentially two problems.

[0005] In the first place, the screwing and unscrewing between the cup and the gun body require a relatively long and inconvenient operation.

[0006] In the second place, with this system, which is technologically simple and hence easily reproducible, there is the risk that the guns of a given manufacturer may be equipped with cups not produced by the same manufacturer, i.e. not original. In this case, it is possible that non original cups may induce an improper operation of the gun, and otherwise an operation that does not correspond with the use of the original cups for which the gun was designed.

[0007] To attempt to result this second problem, the international patent application WO-03/069208 proposes a particular removable system between the cup and the pistol, which provides a threaded coupling with a wedge system between the inflow union of the gun body and the outflow union of the cup. However, this system, in addition to being relatively complicated from the constructive viewpoint, does not solve the first problem outlined above, but in fact complicates it further.

Disclosure of the Invention

[0008] The object of the present invention is to provide a simple, economical and functional solution to both technical problems described above.

[0009] According to the invention, this object is achieved thanks to the fact that the aforesaid removable connection means between the inflow union of the gun

body and the outflow union of the cup containing the substance to be sprayed comprise a bayonet coupling to which a safety device for the positive locking of said bayonet coupling in the coupled condition is operatively associated.

[0010] According to a preferred embodiment of the invention, the aforesaid safety device includes a ring nut able to rotate coaxially to the inflow union of the gun body for the arrest in rotation between said inflow union and said outflow union in the coupled condition of said bayonet coupling.

[0011] Moreover, the injection union of the gun body and the outflow union of the cup have peculiar complementary profiles which assure their precise sealed mutual coupling eliminating, during the operation of the gun, risks of leaks of the substances to be sprayed.

Brief Description of the Drawings

[0012] The invention will now be described in detail in reference to the accompanying drawings, provided purely by way of non limiting example, in which:

- Figure 1 is an exploded schematic view of manual spray gun according to a first embodiment of the invention,
- Figure 2 is an axial section view, in enlarged scale, showing the connection area between the body of the gun and the cup of the substance to be sprayed,
- Figure 3 is an exploded perspective view of Figure 2, and
- Figure 4 shows a variant of Figure 1.

Detailed Description of the Invention

[0013] Initially referring to Figure 1, the number 1 designates the body of a gun for spray painting, provided posteriorly with a grip 2 and anteriorly with a generally conventional nebuliser nozzle 3.

[0014] In the upper part of the gun body 1 is formed a tubular boss 4 communicating with a feeding conduit, not shown, connected in known fashion to the atomising nozzle 3.

[0015] Into the boss 4 is permanently inserted, for example screwed, a tubular inflow union 5 adapted for the removable sealed connection of a cup 6 containing the substance to be sprayed by means of the gun 1. In the case of the illustrated example, the substance to be sprayed contained in the cup 6 is in use fed to the gun by gravity, placed in upside down position above the gun 1.

[0016] As shown in detail in Figures 2 and 3, the inflow union 5 has a cylindrical terminal portion 7, an intermediate portion with conical inner surface 8 and an initial cylindrical portion 9 with narrowed conformation, i.e. having reduced cross section with respect to that of the cylindrical terminal portion 7.

[0017] The edge of the free end of the narrowed initial

portion 9 has an annular inner narrowing with conical surface 10.

[0018] The cylindrical terminal portion 7 is formed with a pair of diametrically opposite slits 11, each whereof has, as shown in detail in Figure 4, a general "L" shape with an axially directed upper segment 12 and an inclined or generally horizontal lower segment 13.

[0019] The reference 14 designates a ring nut which coaxially surrounds in rotatable fashion the cylindrical terminal portion 7 of the inflow union 5 and is axially movable relative thereto for a downwards travel, i.e. the initial narrowed portion 9, by an extent that is limited inferiorly by an arresting ring 15. As Figure 3 shows in detail, the ring nut 14 is formed on its inner wall with an annular groove 16 communicating with a pair of diametrically opposite axial grooves 17, whereof one is shown in Figure 3.

[0020] The cup 6 shown in Figure 1 is generally conventional and consists of a container of generally cylindrical shape, for example metallic or made of moulded plastic material, provided at an end with a removable lid 18 which may have an opening and aerial valve 19, and formed at the opposite end with a generally funnel shaped bottom 20 provided with an axial outflow union 22 able to be coupled in sealed, removable fashion with the inflow union 5 of the gun body 1, in the manner made more readily apparent below.

[0021] Referring now in greater detail to Figures 2 and 3, the outflow union 22 has a complementary shape to the inflow union 5: in detail, it comprises a broadened cylindrical initial portion 23, complementary to the final portion 7 of the inflow union 5, an intermediate portion with conical outer surface 34 complementary to the conical inner surface portion 8 of the inflow union 5, and a cylindrical terminal tang 24, complementary to the initial portion 9 of the inflow union 5.

[0022] The terminal tang 24 of the outflow union 22 has at its free end an externally enlarged annular edge 25 with a conical outer surface 26 complementary to the conical surface 10 of the inflow union 5.

[0023] As shall be described below, one or the other of the conical surfaces 10 or 26 can be provided with a circumferential throat for the insertion of a sealing O-ring made of elastomeric material, not shown in the drawings. However, said sealing O-ring is optional.

[0024] The reference number 27 designates a radial pin or stake which traverses the broadened cylindrical initial portion 23 of the outflow union 22 and whose opposite ends project externally thereto. It should be noted that the through pin 27 could be replaced with two distinct and separate pins, projecting outside two diametrically opposite areas of the initial cylindrical portion 23, in a wholly equivalent manner at the opposite ends of said through pin 27. It should also be noted that, instead of two diametrically opposite projecting pins, a single pin could also suffice, projecting radially outside the initial cylindrical portion 23. In this case, the cylindrical terminal portion 7 of the inflow union 5 may be provided with

a single L shaped slit 11 and, similarly, the ring nut 14 may be provided with a single axial groove 17.

[0025] With the above described arrangement, the removable connection between the outflow union 22 of the cup 6 and the inflow union 5 of the gun is achieved, according to the peculiar characteristic of the invention, through a bayonet coupling with associated safety device for its reversible locking.

[0026] Said bayonet coupling is in practice constituted at one side by the opposite projecting end of the diametrical pin 27 of the outflow union 22, and at the other by the L shaped slits 11 of the inflow union 5, whilst the safety device is constituted by the rotatable and slidable ring nut 14.

[0027] To achieve the coupling between the cup 6 and the gun 1 it is simply necessary, starting from the configuration shown in Figure 1, to introduce axially the outflow union 22 into the inflow union 5, until the abutment between the conical surfaces 34 and 8 and 26 and 10, in the manner shown in Figure 2. During this manoeuvre, the projecting ends of the pin 27 are introduced into the axial portions 12 of the slits 11. Then, rotating the unions 22 and 5 relative to each other, the projecting ends of the pin 27 are made to slide along the portions 13 of the slits 11, until positioning themselves in correspondence with their terminal ends: the bayonet coupling between the unions 22 and 5 is thereby completed. The stability of said connection can be improved as a result of the yielding and of the consequence elastic reaction of the optional sealing O-ring inserted between the conical surfaces 10 and 26, or with the aid of possible additional elastic means. In any case, as explained above, the presence of the sealing ring is not strictly necessary, although it is preferable also for the purposes of a more secure hermetic seal between the unions 22 and 5.

[0028] To proceed with the positive locking of the bayonet coupling, it is therefore simply necessary axially to position the safety ring nut 14 engaging the projecting ends of the pin 27 into the axial grooves 17, and then to rotate said ring nut 14 to engage the ends of the pin 27 into the annular groove 16.

[0029] In this way, all risks of accidental or undesired disengagement between the cup 6 and the gun 1 are prevented.

[0030] To remove the cup 6, it will thus be sufficient to disengage the safety ring nut 15 from the projecting ends of the pin 27 and then disengage said ends of the pin 27, first by rotation and then axially, from the slits 11.

[0031] The bayonet coupling system with positive safety locking described above is applicable not only to conventional cups 6, but also to disposal cups, such as the one designated by the reference number 28 in Figure 4, in which parts that are identical or similar to those already described above are designated by the same numerical references.

[0032] According to said variant, the cup 28 comprises a disposable container 29, normally made of mould-

ed plastic material, and the outflow union 22 is borne by a substantially funnel shaped bottom 30 separated from the container 29 and connected in removable fashion thereto by means of a ring nut 31. The arrangement of the cup 28 could be, for example, of the type described and illustrated in European patent application no. 03026312.3 by the same Applicant, not published as of the priority date of the present application. Otherwise, it may be of the type currently produced and marketed by the same Applicant with the commercial name "Mix & Spray Cup". In this case, the funnel shaped bottom 30 with the outflow union 22 may in practice constitute an integral part of the body of the gun 1, in the sense that it may remain permanently coupled to the gun by means of the bayonet coupling and the safety locking between the unions 22 and 5.

[0033] As an additional alternative, the funnel shaped bottom 30 can be disposable like the container 29: in this case, the outflow union 22 may also be, with the or with each projecting radial pin for the engagement of the or of each L-shaped slit 11, integrally formed by moulding of plastic material with said bottom 30.

[0034] Naturally, the construction details and the embodiments may vary widely from what is described and illustrated herein, without thereby departing from the scope of the present invention as defined in the appended claims.

Claims

1. A manual spray gun comprising a body (1) having an inflow union (5) of a substance to be sprayed, whereinto is able to be connected a cup (6; 28) containing the substance to be sprayed and having an outflow union (22) designed to be coupled with said inflow union (5) by removable connection means, **characterised in that** said removable connecting means comprise a bayonet coupling (27, 11) to which a safety device (27, 14) for the positive locking of said bayonet coupling in the coupled condition is operatively associated.
2. Gun as claimed in claim 1, **characterised in that** said safety device comprises a ring nut (14), rotatable coaxially to said inflow union (5) of the gun body (1) for the arrest in rotation between said inflow union (5) and said outflow union (22) in the coupled condition of said bayonet coupling (27, 11).
3. Gun as claimed in claim 1 or claim 2, **characterised in that** said outflow union (22) of the cup (6, 28) consists of a tubular body having a broadened cylindrical initial portion (23), an intermediate portion with conical outer surface (34) and a terminal tang (24), said initial cylindrical portion (23) bearing at least one radial stake (27) projecting outwards, and said inflow union (5) of the gun body (1) has a cylindrical terminal portion (7), an intermediate portion with conical inner surface (8) and a narrowed initial portion (9), designed to be engaged by shape coupling respectively with said first cylindrical initial part (23), said intermediate portion with conical outer surface (34) and said narrowed terminal tang (24) of said outflow union (22).
4. Gun as claimed in claim 2 and 3, **characterised in that** said rotatable safety ring nut (14) is axially slidable outside said cylindrical terminal portion (7) of the inflow union (5) of the gun body (1) for a travel of a predetermined amount and it has at least one inner groove (16, 17) to engage, axially and in rotation, said at least one radial stake (27).
5. Gun as claimed in claim 3, **characterised in that** said initial cylindrical portion (23) of the outflow union (22) of the cup (6; 28) has a pair of said projecting radial stake (27), diametrically opposite to each other.
6. Gun as claimed in claim 6, **characterised in that** said stakes are defined by the end of a pin (27) inserted through said initial cylindrical portion (23) of the outflow union (22).
7. Gun as claimed in claim 3, **characterised in that** said narrowed terminal tang (24) of the outflow union (22) of the cup (6; 28) has an externally enlarged annular end edge (25) and said initial portion (9) of the inflow union (5) of the gun body (1) has a complementary inner annular narrowing (10) to bear said externally enlarged annular end edge (25).
8. Gun as claimed in claim 7, **characterised in that** said enlarged annular end edge (25) and said complementary internal annular narrowing having respective conical surfaces (26, 10).
9. Gun as claimed in claim 7 or claim 8, **characterised in that** a sealing elastic ring is interposed between said enlarged annular end edge (25) and said inner annular narrowing (26).
10. Gun as claimed in one or more of the previous claims, in which said outflow union (22) is borne by a substantially funnel-shaped bottom (20) of the cup (6), **characterised in that** said bottom is integral with the cup (6).
11. Gun as claimed in one or more of the claims 1 through 9, in which said outflow union (22) is borne by a substantially funnel shaped bottom (30) of the cup (28), **characterised in that** said bottom (30) is connected to the cup (28) in removable fashion.
12. A cup (6; 28) for spray guns, comprising an outflow

union (22) designed to be coupled by means of removable connection to an inflow union (5) of the gun body (1), **characterised in that** said removable connection means comprise a bayonet coupling (27, 11) with associated safety device (27, 14) for positive locking thereof. 5

13. Cup as claimed in claim 12, **characterised in that** said outflow union (22) consists of a tubular body having a broadened initial cylindrical portion (23), an intermediate portion with conical outer surface (34) and a terminal tang (24), said initial cylindrical portion (23) bearing at least one radial stake (27) projecting outward. 10

14. Cup as claimed in claim 13, **characterised in that** said at least one radial stake (27) projecting outwards is designed to be engaged by a rotatable ring nut (14). 15

15. Cup as claimed in claim 13 or 14, **characterised in that** said initial cylindrical portion (23) of the outflow union (22) of the cup (6; 28) has a pair of said projecting radial stakes (27), diametrically opposite from each other. 20

16. Cup as claimed in claim 15, **characterised in that** said stakes are defined by the ends of a through pin (27) inserted through said initial cylindrical portion (23) of the outflow union (22). 25

17. Cup as claimed in claim 13, **characterised in that** said narrowed terminal tang (24) of the outflow union (22) has an externally enlarged annular end edge (25). 30

18. Cup as claimed in claim 17, **characterised in that** said enlarged annular end edge (25) has conical surface (26). 35

19. Cup as claimed in claim 17 or claim 18, **characterised in that** an elastic sealing ring is associated to said enlarged annular end edge (25). 40

20. Cup as claimed in one or more of the claims 12 through 19, in which said outflow union (22) is borne by a substantially funnel shaped bottom (20) of the cup (6), **characterised in that** said bottom (20) is integral with the cup (6). 45

21. Cup as claimed in one or more of the claims 12 through 19, in which said outflow union (22) is borne by a substantially funnel shaped bottom (30) of the cup (28), **characterised in that** said bottom (30) is connected to the cup (28) in a removable fashion. 50

22. Cup as claimed in one or more of the claims 12 through 19, **characterised in that** it is disposable. 55

FIG. 1

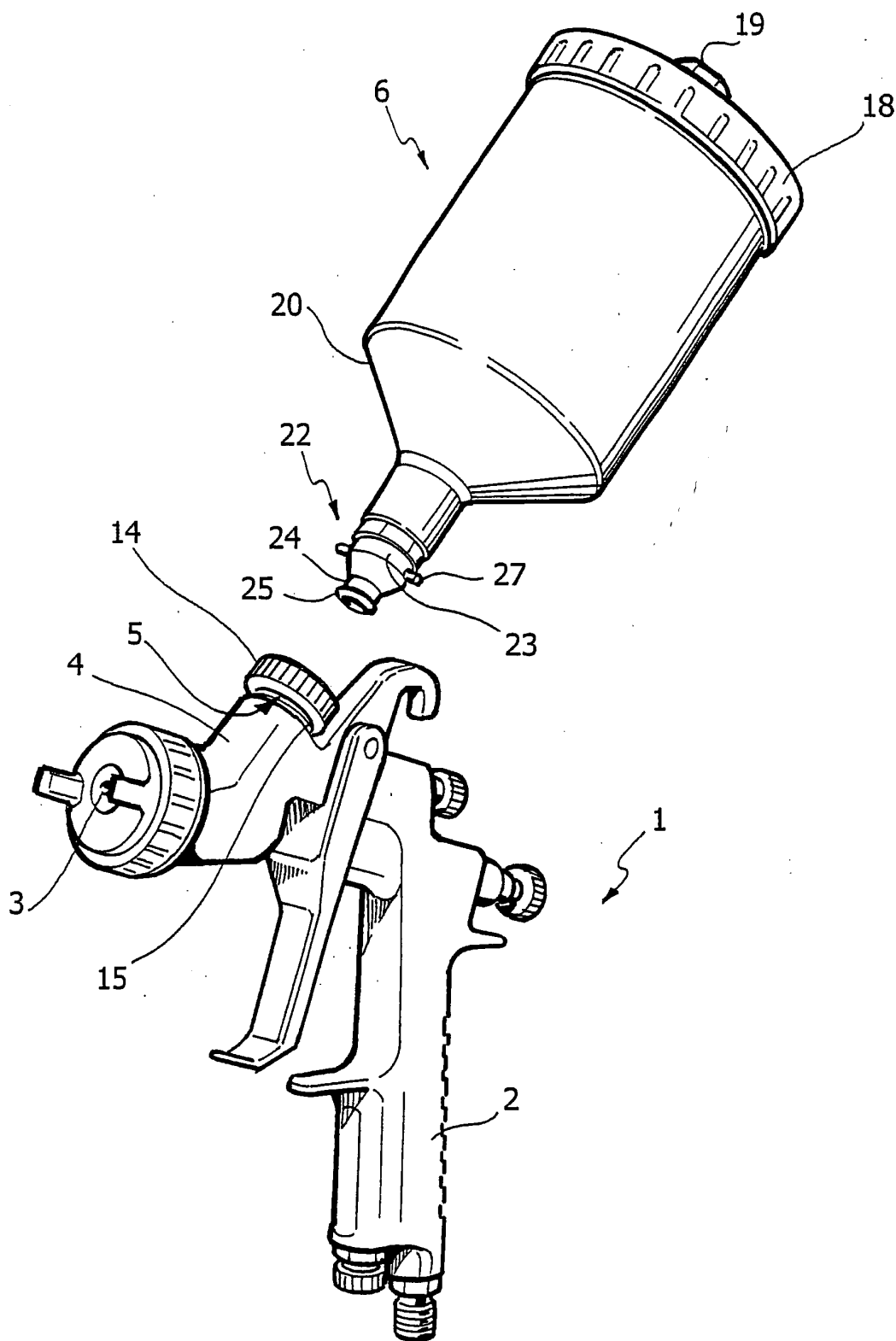


FIG. 2

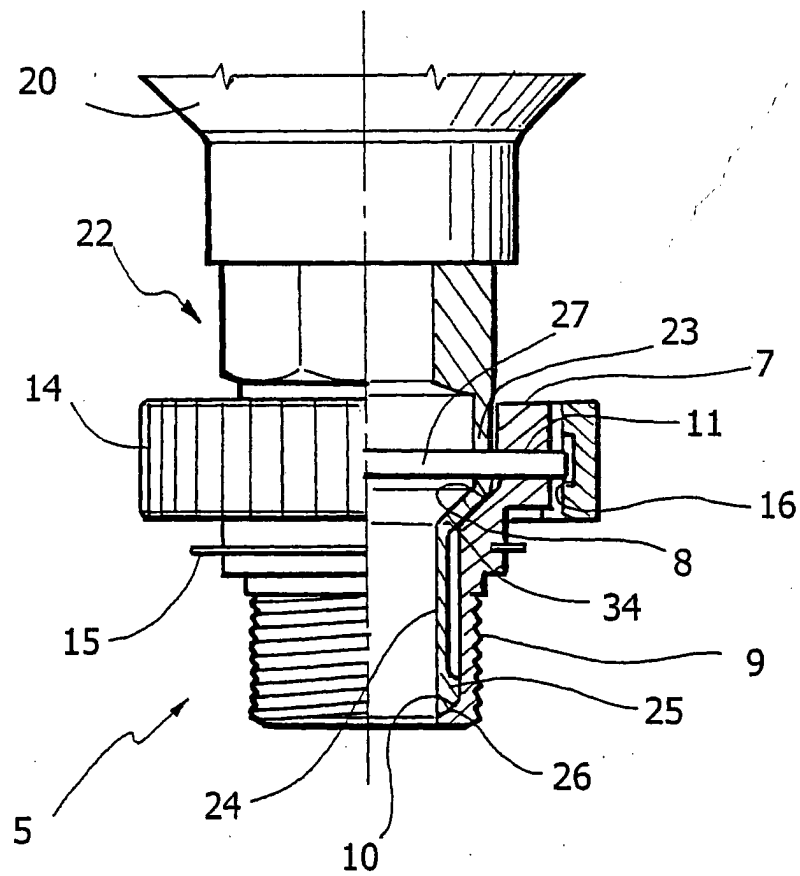


FIG. 3

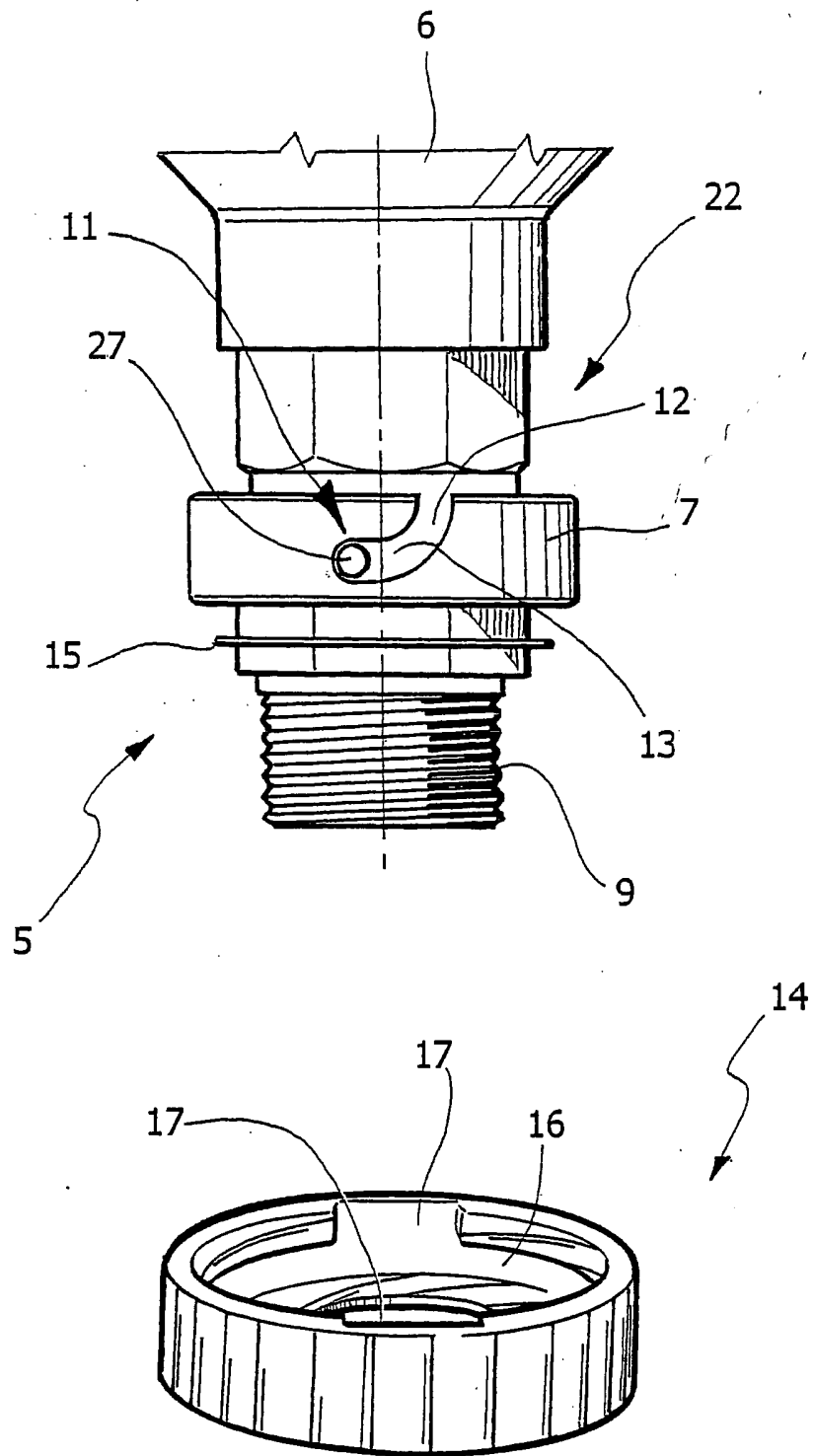


FIG. 4

