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Amended claims in accordance with Rule 86 (2) EPC.

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(54) **Safety cap for pressure vessels, particularly boilers for electrical household appliances and the like**

(57) A safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, which comprises a body (2) that can be screwed onto the mouth (3) of a boiler (4) and the like and is rigidly associable with a support (20) on which a knob (30) is rotatably associable. The particularity of the invention is constituted by the fact that it comprises, between the knob (30) and the support (20), radial coupling means that are adapted to rotationally rigidly couple the knob (30) and the support (20), in the direction for screwing on the cap, and axial coupling means, which are adapted to rotationally rigidly couple the knob (30) and the support (20) by axial compression of the knob (30) with respect to the support (20).

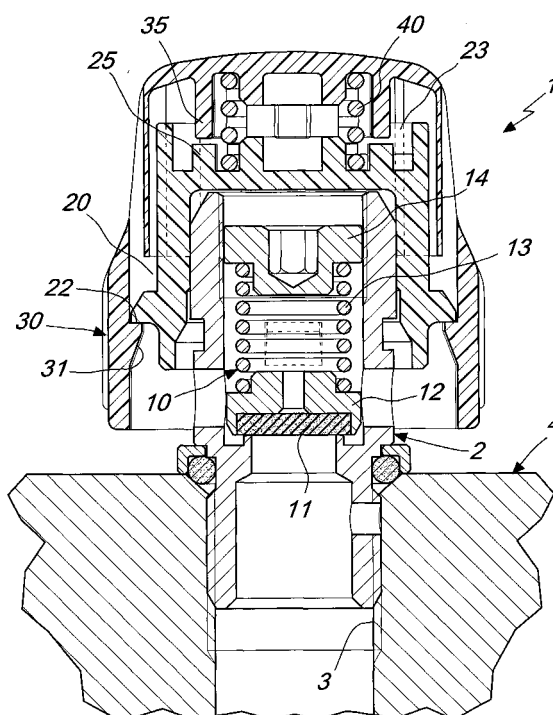


Fig. 1

Description

[0001] The present invention relates to a safety cap for pressure vessels, particularly boilers for electrical household appliances.

[0002] As is known, many commercially available household appliances, such as ironing machines, floor cleaning machines, sterilizers and so forth are provided with pressurized steam devices that use a boiler on which a cap is applied; for safety reasons, said cap must be removed only when the boiler has cooled and there is no dangerous residual pressure.

[0003] Safety caps for pressure vessels have already been provided for this purpose which have the characteristic of requiring two simultaneous actions both during screwing and during unscrewing, i.e., an axial compression on the cap together with a rotation, in order to screw them on and off.

[0004] This solution entails that when the cap is screwed on and the knob is turned counterclockwise, i.e., in the unscrewing direction, without being pressed, such knob turns freely, giving no perception of whether the cap is really screwed on fully or not.

[0005] Moreover, in known types of cap it is necessary to interpose, between the knob and the support, an additional element, which entails additional machining operations in order to connect by welding or gluing the third annular component to the knob.

[0006] The aim of the present invention is to eliminate the drawbacks noted above, by providing a safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, that allows to simplify the screwing operations since it does not require, for this step, the use of two separate and simultaneous actuations.

[0007] Within this aim, an object of the invention is to provide a safety cap that during unscrewing, if actuation is not performed correctly, achieves a ratchet-like engagement that produces a characteristic noise that warns that the cap is fitted correctly on the mouth and that correct closure is ensured.

[0008] Another object of the present invention is to provide a safety cap that thanks to its particular constructive characteristics is capable of giving the greatest assurances of reliability and safety in use.

[0009] Another object of the present invention is to provide a safety cap that is simply constituted by two parts that can be assembled each other easily and is further competitive from a merely economical standpoint.

[0010] This aim and these and other objects that will become better apparent hereinafter are achieved by a safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, according to the invention, which comprises a body that can be screwed onto the mouth of a boiler and the like and is rigidly associable with a support on which a knob is rotatably associated, characterized in that it comprises,

between said knob and said support, radial coupling means that are adapted to rotationally rigidly couple said knob and said support, in the direction for screwing on said cap, and axial coupling means, which are adapted to rotationally rigidly couple said knob and said support by axial compression of said knob with respect to said support.

[0011] Further characteristics and advantages will become better apparent from the description of a preferred but not exclusive embodiment of a safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic sectional view of the safety cap according to the invention, applied to a pressure vessel;

Figure 2 is a sectional view of the safety cap during axial compression;

Figure 3 is a top plan view of the support;

Figure 4 is an elevation view of the support;

Figure 5 is a sectional view, taken along the line V-V of Figure 3;

Figure 6 is a plan view of the knob, taken from the inner side;

Figure 7 is an elevation view of the knob;

Figure 8 is a transverse sectional view of the cap during screwing, illustrating the engagement of the radial coupling means;

Figure 9 is a transverse sectional view of the cap during an attempt to unscrew it without axial compression;

Figures 10 and 11 are sectional views of the cap during unscrewing with insertion of the axial coupling means, regardless of the position of the radial coupling means.

[0012] With reference to the figures, the safety cap according to the invention, generally designated by the reference numeral 1, comprises a body 2, which is preferably made of metallic material and can be screwed onto a mouth 3 of a pressure vessel, which is generally designated by the reference numeral 4 and is constituted for example by a boiler for steam generation.

[0013] Inside the body 2 it is possible to provide a safety valve, generally designated by the reference numeral 10, which is advantageously constituted by a gasket 11 that is pushed against a passage port and is supported by a flow control element 12, which is pushed by a spring 13 that acts, at its other end, on a ring 14 that can be set in order to adjust the compression of the spring 13.

[0014] A support 20 is rigidly associated with the body 2 and advantageously forms internally a polygonal cavity 21 for engagement with the outer surface of the body 2.

[0015] A knob, generally designated by the reference numeral 30, is rotatably associable with the support 20.

[0016] For mutual coupling, the support 20 has an annular rim 22 that acts as a retention element against axial extraction for engagement teeth 31, which are provided as an undercut on the knob 30, allow snap insertion of the knob on the support 20, and prevent subsequent accidental extraction; with this embodiment, therefore, it is possible to provide the cap by assembling just two parts, thus achieving a considerable constructive simplification.

[0017] An important particularity of the invention is constituted by the fact that radial coupling means are provided that act between the knob 30 and the support 20 and are designed to rotationally rigidly couple the knob and the support in the screwing direction.

[0018] The radial coupling means have two radial tabs 23, which are provided at the outer upper edge of the body 20 and have a radial width that increases from the portion for coupling to the body 20 toward the free end, where a radial abutment 24 is formed.

[0019] Correspondingly, on the inner surface of the knob 30 there are cam-like contours 32 that are uniformly distributed circumferentially and form an abutment 33 that is designed to engage the radial plane 24 in order to rigidly rotationally couple the knob 30 and the support 20 during the screwing of the cap, while during unscrewing the radial tabs, in contact with the cams 32, yield elastically and contract, providing in practice a ratchet-like coupling that is unable to transmit the rotation to the support and accordingly to the cap.

[0020] An important particularity of the invention is constituted by the fact that in combination with the radial coupling means there are axial coupling means, which are provided by axial teeth 25 that are uniformly distributed circumferentially and spaced and are provided on the upper end of the support 20.

[0021] Correspondingly, on the inner bottom of the knob there are complementary axial teeth 35, which are also distributed circumferentially and are spaced so that they can intersect and fit between the teeth 25.

[0022] A pusher spring 40 acts between the support 20 and the knob 30 and in normal conditions keeps the knob 20 spaced from the support.

[0023] When one wishes to unscrew the cap, it is necessary to apply an axial compression in order to overcome the elastic contrast applied by the spring and engage the complementary teeth 35 between the teeth 25, thus rotationally rigidly coupling the knob and the support.

[0024] If axial compression and rotation are performed in combination, when the teeth 25 and the complementary teeth 35 mesh it is possible to unscrew the cap; if axial compression is not performed, the cap cannot be unscrewed.

[0025] From the above description it is therefore evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that a safety cap is provided that can be screwed on without particular techniques, since the radial coupling means rotation-

ally rigidly couple the knob and the support, but requires a combined compression and rotation for unscrewing, thus providing a high-level safety criterion.

[0026] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0027] All the details may further be replaced with other technically equivalent elements.

[0028] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements.

[0029] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs, do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, comprising a body (2) that can be screwed onto the mouth (3) of a boiler (4) and the like and is rigidly associable with a support (20) on which a knob (30) is rotatably associated, **characterized in that** it comprises, between said knob (30) and said support (20), radial coupling means that are adapted to rotationally rigidly couple said knob (30) and said support (20), in the direction for screwing on said cap (1), and axial coupling means, which are adapted to rotationally rigidly couple said knob (30) and said support (20) by axial compression of said knob (30) with respect to said support (20).
2. The safety cap according to claim 1, **characterized in that** it comprises a safety valve (10) inside said body (2).
3. The safety cap according to the preceding claims, **characterized in that** it comprises a rim (22) that is rigidly coupled to said support (20) and constitutes a retention element against axial extraction for engagement teeth (31) which are provided on said knob (30) and can be inserted with a snap action beyond said rim (22).
4. The safety cap according to the preceding claims, **characterized in that** said radial coupling means comprise radial tabs (23) whose free end protrudes in a radial direction, said tabs ending with a radial abutment (24) that can engage, during rotation in the screwing direction, a radial plane formed by cam-like profiles (33) provided on the inner surface of said knob (30).

5. The safety cap according to one or more of the preceding claims, **characterized in that** said tabs (23) have a thickness that increases radially from the portion for coupling to said support toward said free end. 5
6. The safety cap according to one or more of the preceding claims, **characterized in that** it comprises axial coupling means, constituted by axial teeth (25) that are uniformly distributed circumferentially and spaced and are provided at the upper end of said support (20), axial complementary teeth (35) being further provided on the inner bottom of said knob (30), said complementary teeth (35) being uniformly spaced and distributed circumferentially and being detachably insertable between said axial teeth (25). 10 15
7. The safety cap according to one or more of the preceding claims, **characterized in that** it comprises a pusher spring (40), which acts between said support (20) and said knob (30) in order to keep said teeth (25) and said complementary teeth (35) in a mutually spaced condition in the absence of an axial compression adapted to overcome said spring (40). 20 25

Amended claims in accordance Rule 86(2) EPC

1. A safety cap for pressure vessels, particularly boilers for electrical household appliances and the like, comprising a body (2) that can be screwed onto the mouth (3) of a boiler (4) and the like and is rigidly associable with a support (20) on which a knob (30) is rotatably associated, further comprising, between said knob (30) and said support (20), radial coupling means that are adapted to rotationally rigidly couple said knob (30) and said support (20), in the direction for screwing on said cap (1), and axial coupling means, which are adapted to rotationally rigidly couple said knob (30) and said support (20) by axial compression of said knob (30) with respect to said support (20) **characterized in that** said radial coupling means comprise radial tabs (23) whose free end protrudes in a radial direction, said tabs ending with a radial abutment (24) and **in that** the inner surface of said knob (30) is provided with cam-like profiles (33) disposed on a radial plane so that said radial abutment (24) can engage, during rotation in the screwing direction, with said cam-like profiles (33). 30 35 40 45 50
2. The safety cap according to claim 1, **characterized in that** said tabs (23) have a thickness that increases radially from the portion for coupling to said support toward said free end. 55
3. The safety cap according to claim 1 or 2, **characterized in that** it comprises a safety valve (10)

inside said body (2).

4. The safety cap according to anyone of the preceding claims, **characterized in that** it comprises a rim (22) that is rigidly coupled to said support (20) and constitutes a retention element against axial extraction for engagement teeth (31) which are provided on said knob (30) and can be inserted with a snap action beyond said rim (22).

5. The safety cap according to anyone of the preceding claims, **characterized in that** it comprises axial coupling means, constituted by axial teeth (25) that are uniformly distributed circumferentially and spaced and are provided at the upper end of said support (20), axial complementary teeth (35) being further provided on the inner bottom of said knob (30), said complementary teeth (35) being uniformly spaced and distributed circumferentially and being detachably insertable between said axial teeth (25).

6. The safety cap according to anyone of the preceding claims, **characterized in that** it comprises a pusher spring (40), which acts between said support (20) and said knob (30) in order to keep said teeth (25) and said complementary teeth (35) in a mutually spaced condition in the absence of an axial compression adapted to overcome said spring (40).

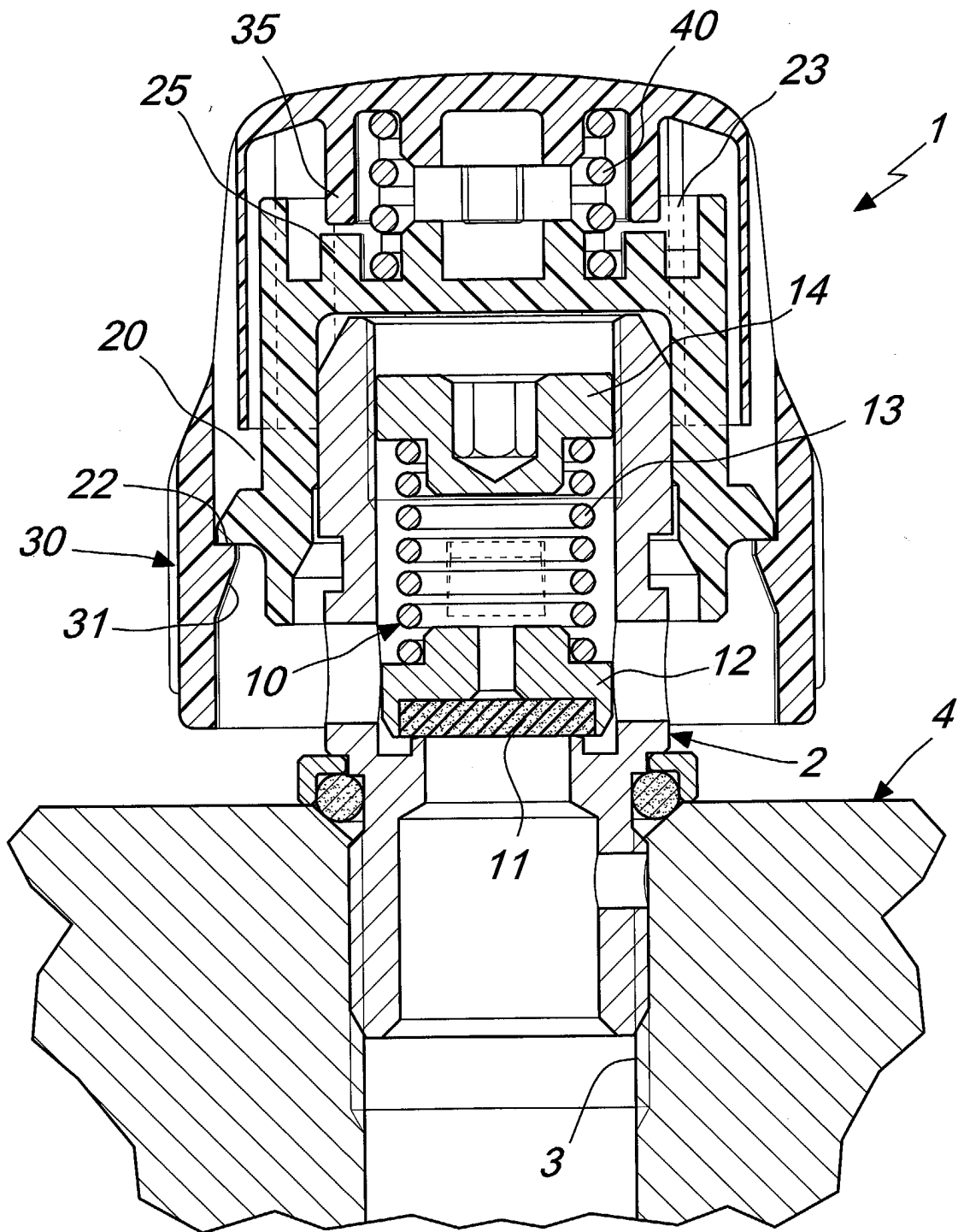


Fig. 1

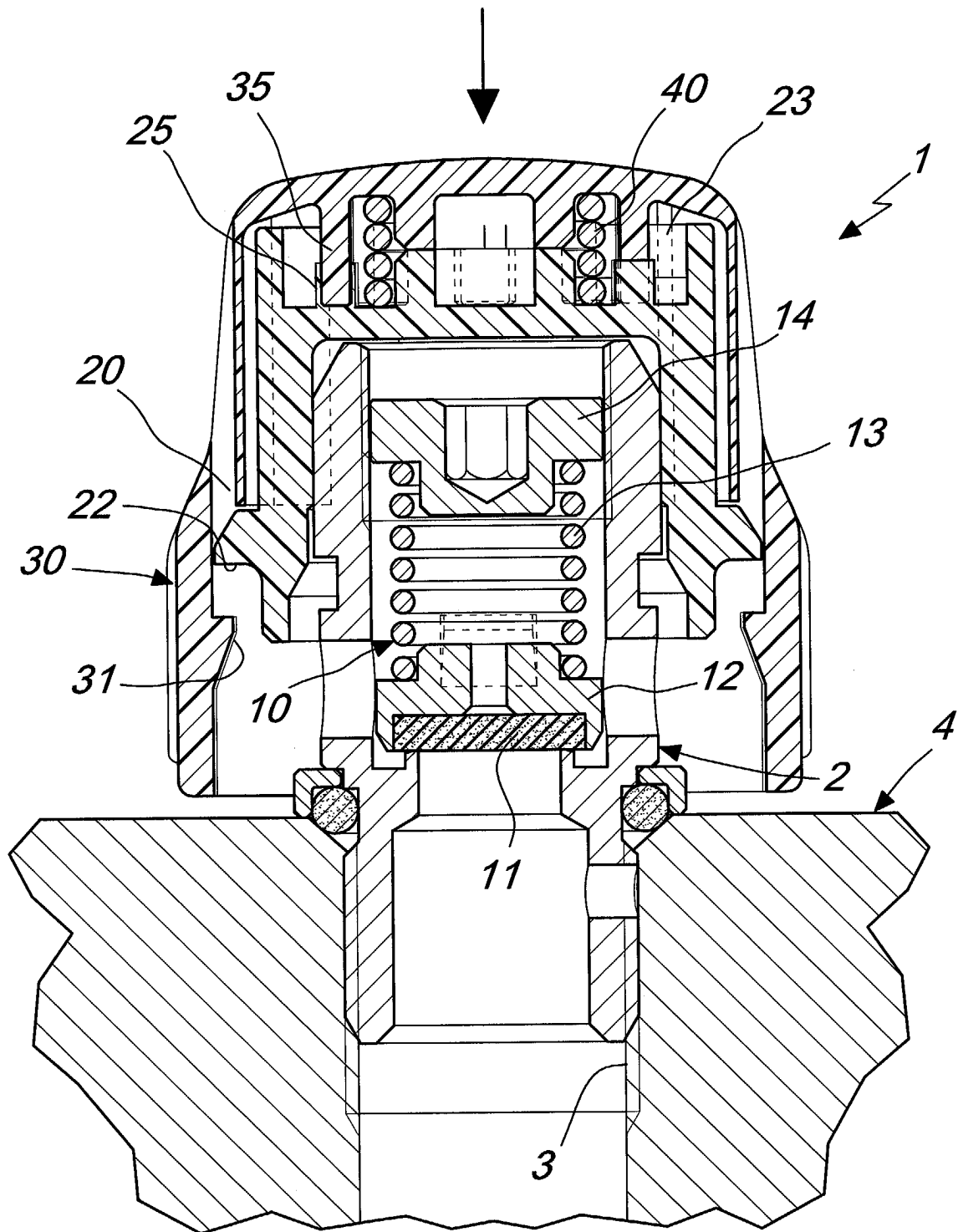
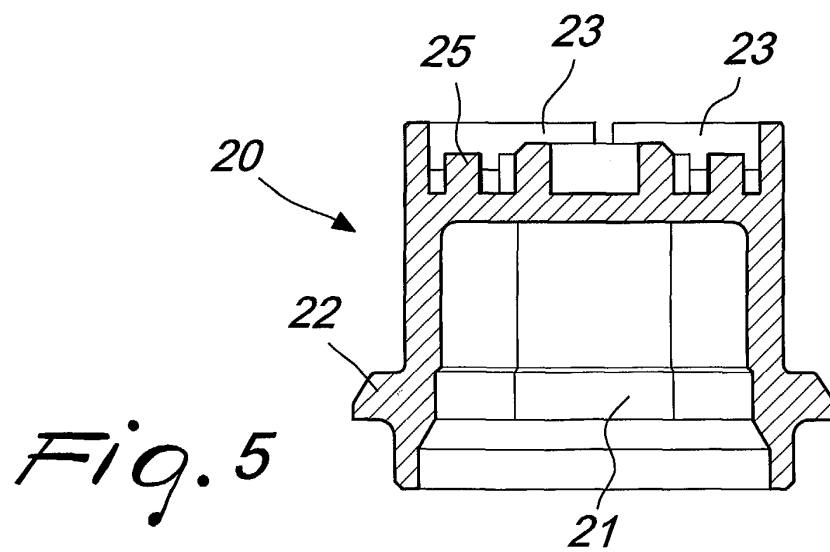
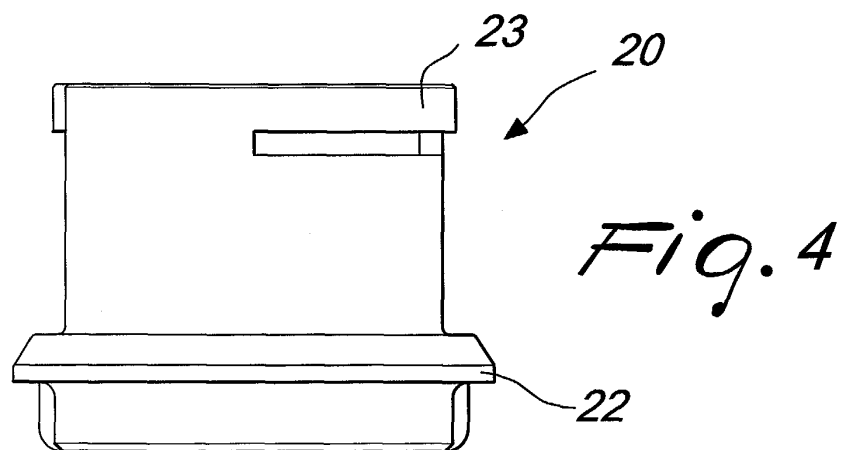
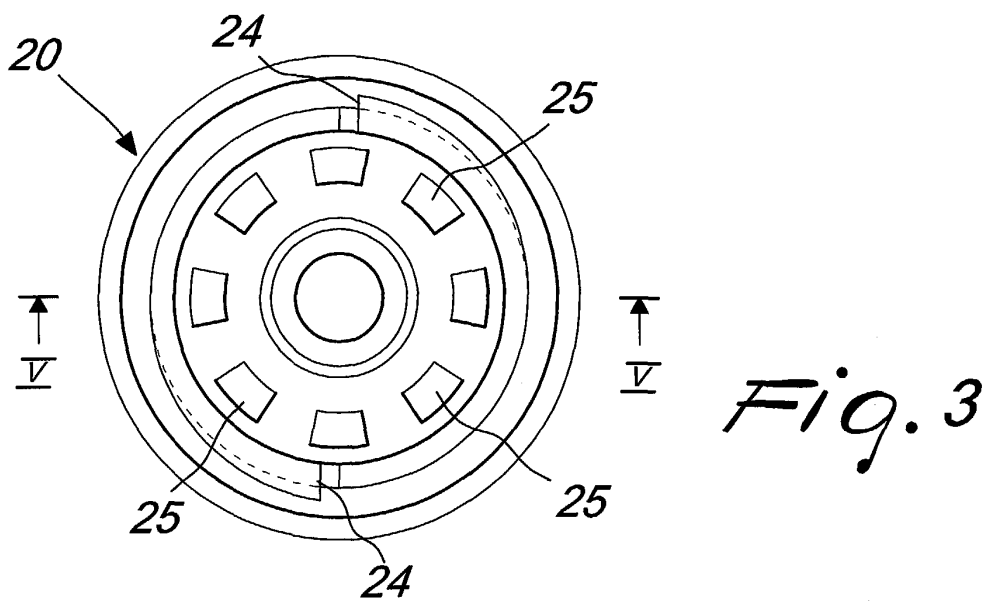
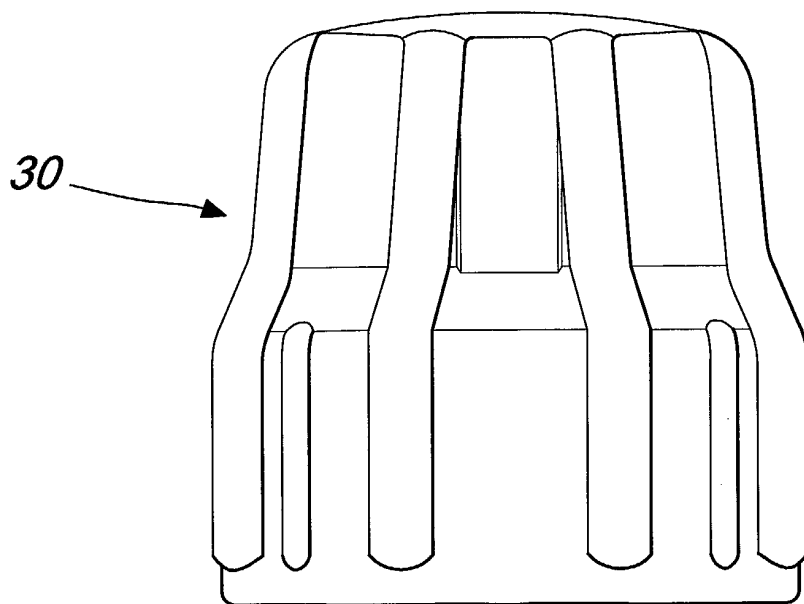
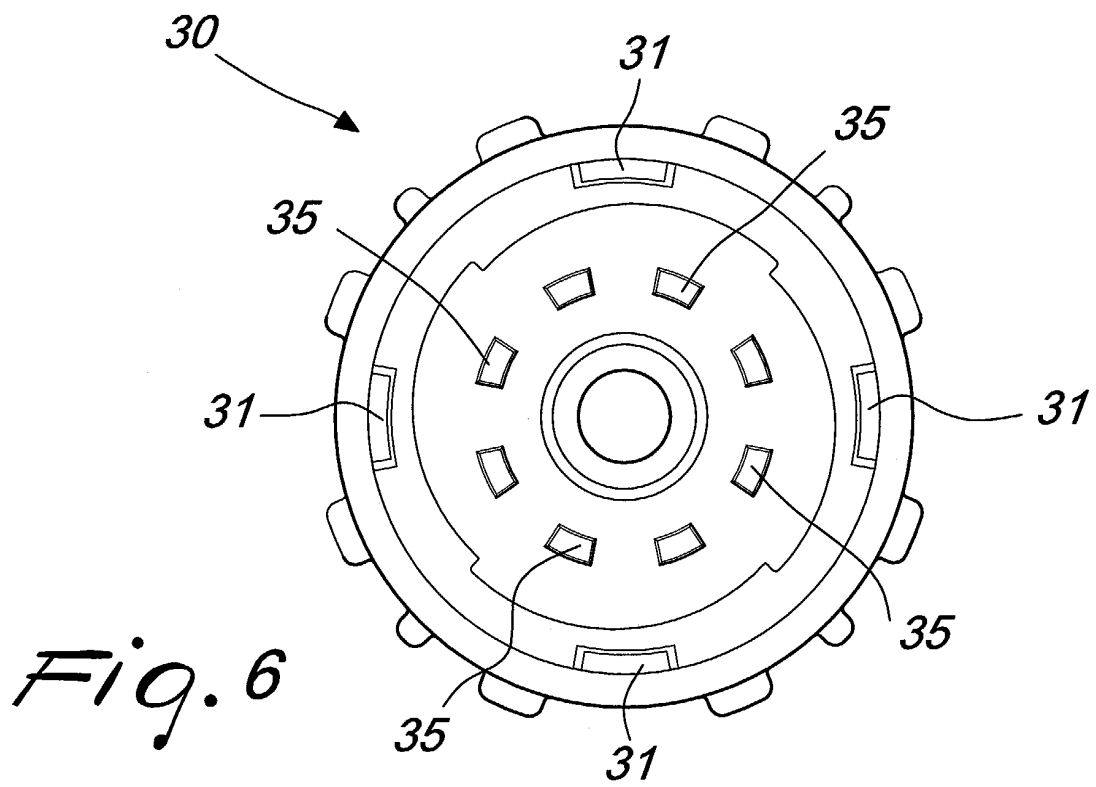
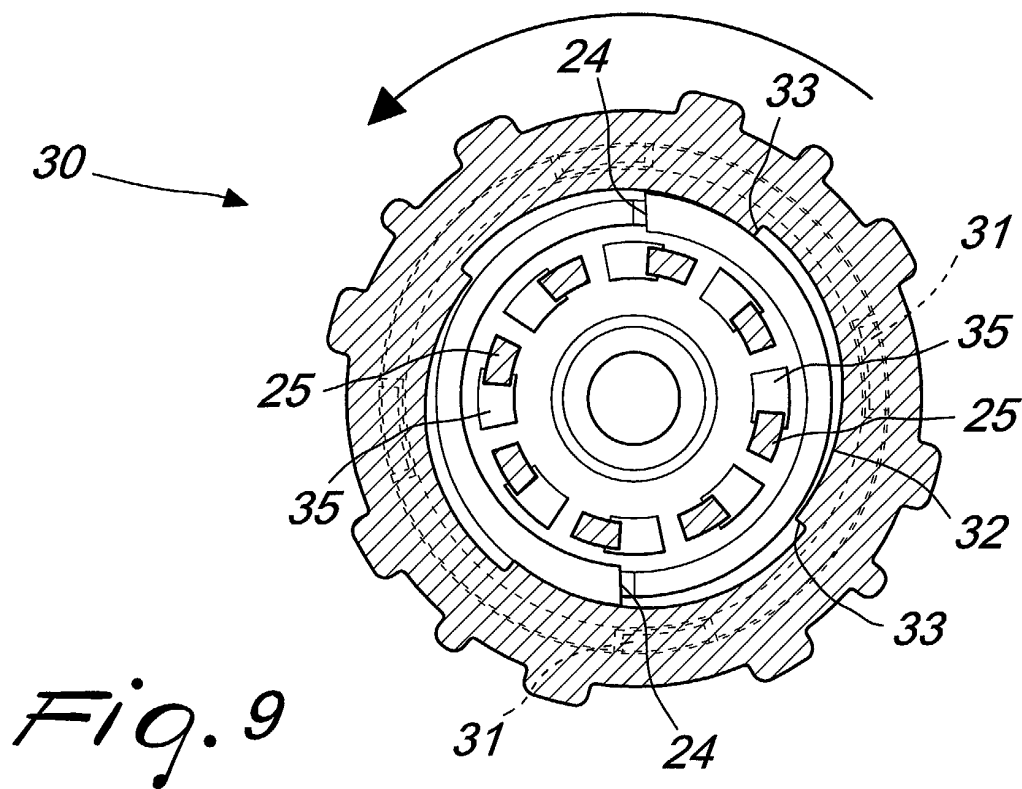
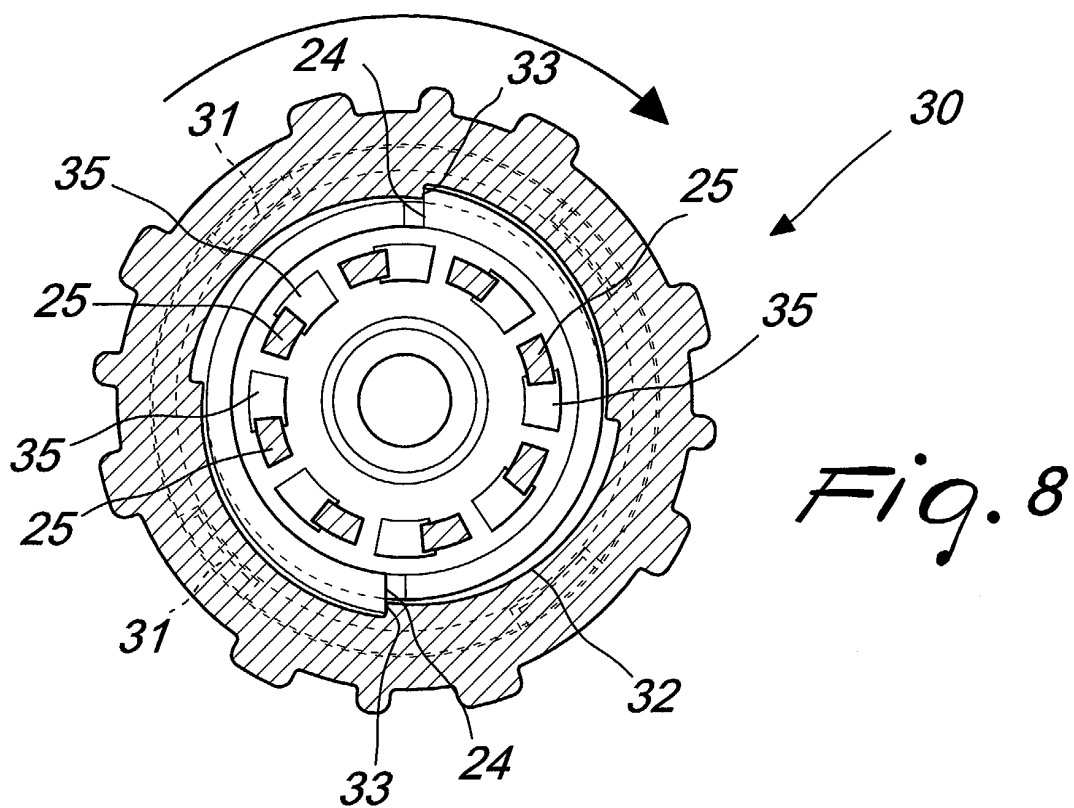
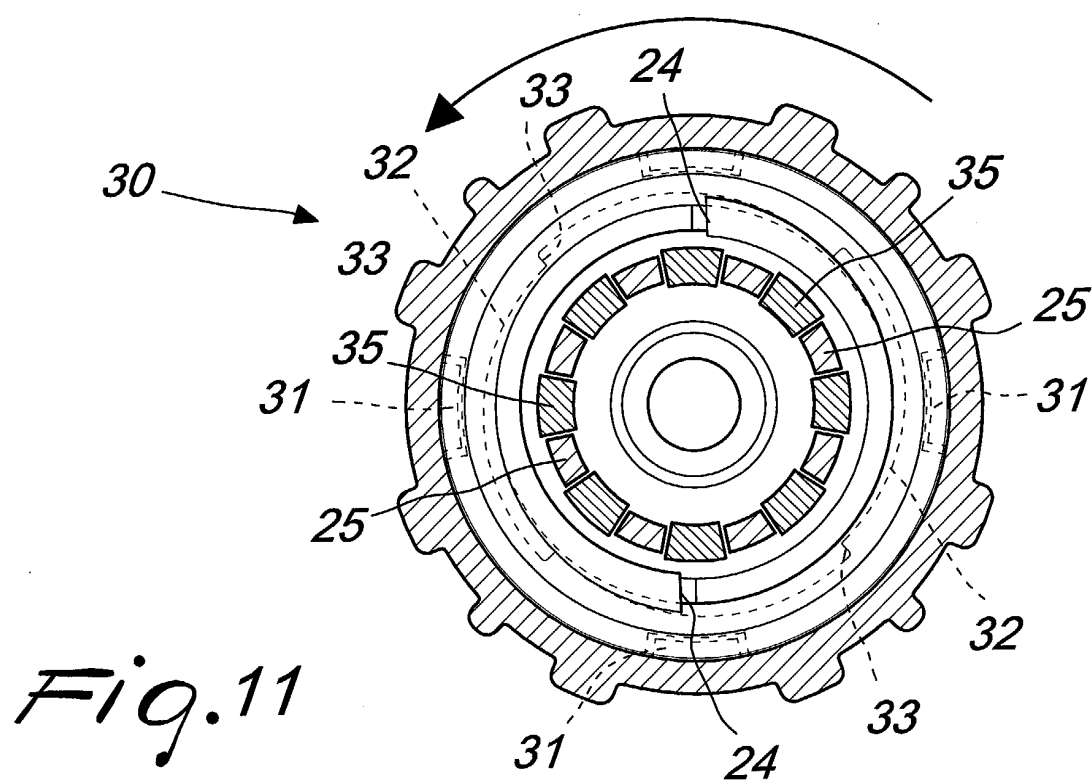
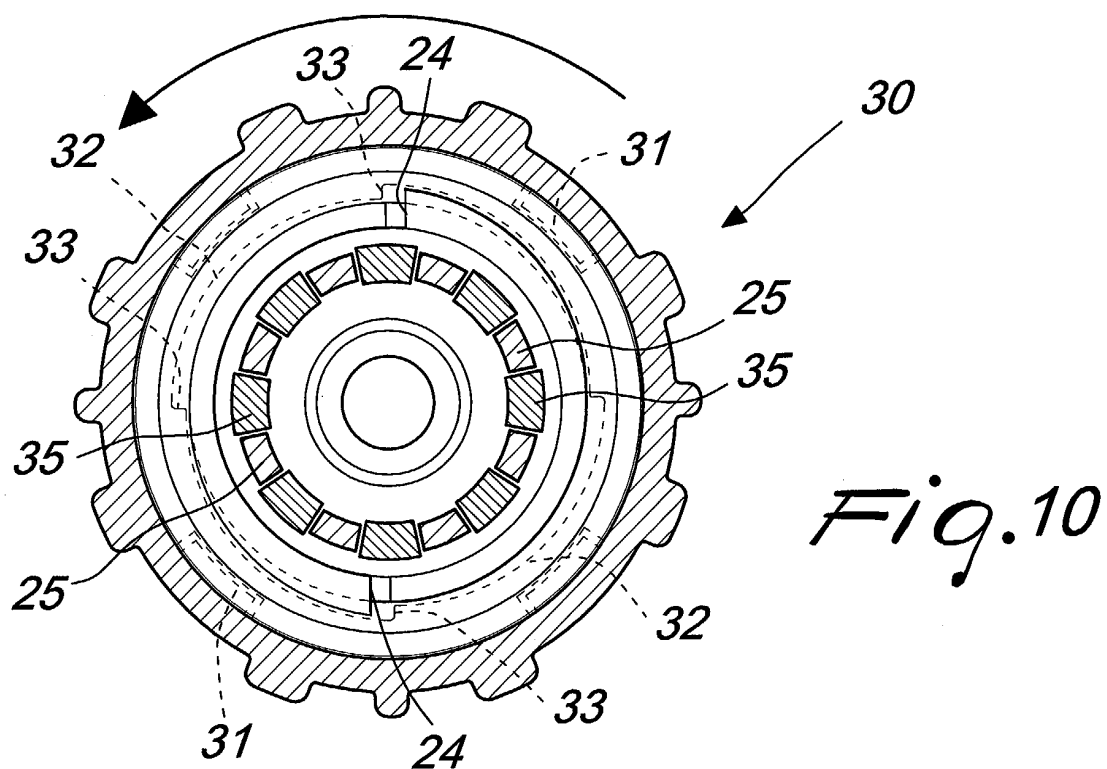


Fig. 2











European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5255

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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 8 September 2003	Examiner De Terlizzi, M
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			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 42 5255

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