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(54) **TAMPER DETECTION CAPSULE OF CONTAINER, USE AND OPERATING METHOD THEREOF**

(57) The present invention relates to a tamper detection capsule (1) of container comprising an upper cover member (2), a spring support inner member (3), a spring member (4) and a lower cover member (5), wherein spring member (4) is moveable between i) a first closed position in which it is arranged on inner member (3), and

ii) a second open position, in which it is arranged between inner member (3) and upper cover member (2) in order to block the capsule (1) mechanism in the second open position. The invention further relates to an operating method of the tamper detection capsule (1), which is intended to close beverage containers.

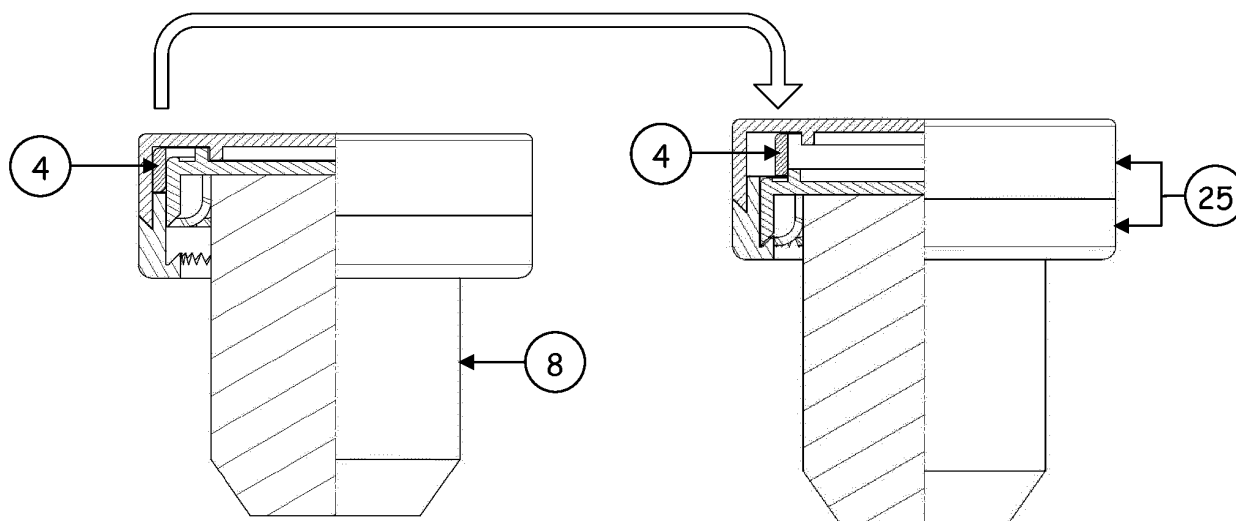


Fig. 4

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a tamper detection capsule of container designed to provide information to a user about the existence of an attempted tampering of the closed container with such a capsule. The invention further relates to the operating method of the tamper detection capsule. The present invention is applicable in the field of production and commercialization of capsules for all kind of containers, in particular beverage bottles, and it is principally for application in the field of production of stoppers in the cork industry sector.

BACKGROUND OF THE INVENTION

[0002] It is well known to use capsules having mechanisms allowing to easily identify the first time a closed container with such a capsule is opened, in particular in beverage or food product bottles. Many of these capsules now available on the market are systems likely to be damaged, that is, upon the first opening of a closed container with such a capsule, it is necessary to partially or totally damage such a capsule the first time it is removed from the container.

[0003] Another issue occurring with such capsules is the reversibility mechanisms allowing its operation. That is, if the function of such capsules is to inform consumers about the first opening of a closed container having such a capsule, it is mandatory that such capsule is flawless regarding the reversibility of its operating mechanism, otherwise its operating mechanism reversibility could be used by a hypothetical counterfeiter to bypass the safety and authenticity of the capsule.

[0004] For example, WO 2014/122300 discloses a capsule having a mechanism allowing a user to identify if a closed container having such a capsule has been tampered with. The disclosed capsule in this document is comprised by a top cap, a spring, an inner member, and an outer cylindrical member moveable relative to the inner member, from a first position corresponding to the closed position before the first opening of the container to a second position after the capsule is removed by a user. The operating mechanism acts in such a way that when the capsule is first removed from the container, that is, when the capsule is actuated for the first time, the spring, fixedly housed inside the inner member, cooperates with the outer cylindrical member and allows blocking of such outer cylindrical member in relation to the inner member in said second position, indicating a change in the shape of the capsule allowing a user to identify the tampering of the container.

[0005] However, the design of the capsule disclosed in the prior art document stated above allows tampering of a closed container having such a capsule by a user without actuating the detection mechanism, that is, it allows the removal of the capsule (and respective stopper)

of the container without actuating the mechanism.

[0006] In some embodiments of said capsule, it is also possible to unlock its detection mechanism after its activation and resetting it back to its initial safety position.

This weakness allows removal of the capsule (and respective stopper) of the bottle and then after resetting it to its initial tamper detection disposition, reinsert it in the same or in another container, leaving no evidence of the tampering.

[0007] It is also possible to open a closed bottle having the capsule disclosed in the above mentioned document without the activation of the operating mechanism of such a capsule due to the combination of movements between the outer cylindrical component and the inner component. Given that in the capsule of WO 2014/122300 the base of the outer cylindrical member and the base of the inner member share the same plane, that is, are both at the same position before the actuation of the capsule, thus being possible to access the base or lower end of the inner member without moving the outer cylindrical member that actuates the detection mechanism of the capsule. Since it is the displacement of the outer cylindrical member relative to the inner member that actuates the mechanism, it is understood that by preventing such movement during removal of the capsule it is possible to remove it without the mechanism actuation. For example, by placing an object between the top of the container neck and the base of the capsule, it is possible to exert traction in the capsule by supporting said object on the base of the inner member without causing any movement of the outer cylindrical member.

[0008] According to the above, exists the need in the art for a tamper detection capsule of container having an irreversible blocking mechanism which solves the aforementioned vulnerability of the prior art capsules.

SUMMARY OF THE INVENTION

[0009] The present invention relates to a tamper detection capsule of container, comprising an upper cover member, a spring support inner member, a spring member and a lower cover member, characterized in that:

the upper cover member is coupled to the lower cover member forming an assembly defining a cavity therein;

the assembly is displaceable from a first closed position to a second open position, and is disposed to move said spring member between said first and second positions;

the spring support inner member is arranged within said cavity of the assembly;

the spring member is arranged within the cavity of the assembly and is moveable between:

said first closed position, in which it is arranged in a tensioned condition on the spring support inner member, and

said second open position, in which it is arranged in a resting condition between the spring support inner member and upper cover member, blocking the assembly in the second open position.

[0010] In a preferred embodiment, in said first closed position of the capsule, the spring member is arranged on the spring support inner member in compression or in traction.

[0011] Preferably, said spring member is a compression spring. More preferably, the spring member is a traction spring, and most preferably, the spring member is a circular segment.

[0012] In another embodiment of the present invention, the assembly comprises an irreversible connection between the upper cover member and the lower cover member, rendering the access to said cavity unfeasible from outside.

[0013] In an aspect, lower cover member has a splined inner rim, and the spring support inner member has splines arranged to come into contact with the splined rim of the lower cover member in the second open position.

[0014] In another aspect, the splines of the splined inner rim are shaped as pyramidal teeth.

[0015] In yet another aspect, the lower cover member is made of a translucent material.

[0016] In another embodiment, a portion of the spring support inner member is visible to the user when said assembly is in the second open position.

[0017] In yet an embodiment of the invention, the spring support inner member further comprises a cylindrical body adapted for insertion into a container mouth.

[0018] In yet another aspect, said cylindrical body and spring support inner member are made of the same material or different materials.

[0019] In yet another aspect of the invention, said cylindrical body and spring support inner member are both made of cork or plastic or one of them is made of plastic and the other of cork.

[0020] The capsule of the present invention closes containers holding a beverage selected from the group consisting of wine, beer, spirit drinks, water and soft drinks.

[0021] The present invention also relates to an operating method of a tamper detection capsule of container, the method characterized in that comprises the steps of:

- moving, from a first closed position to a second open position, the assembly in relation to the spring support inner member in which the spring member is arranged in a tensioned condition;

- moving, by means of said assembly, the spring member between said positions;

- in the second open position, allowing the spring member to adopt a resting condition, blocking the assembly in the second open position.

BRIEF DESCRIPTION OF DRAWINGS

[0022] In the following the description of the invention is made with reference to the accompanying drawings, wherein:

Fig. 1 is a schematic exploded view of a preferred embodiment of the tamper detection capsule of container according to the present invention, including a stopper.

Fig. 2 is a schematic exploded view of the embodiment of Fig. 1 shown in another perspective.

Fig. 3 shows the capsule of the present invention associated with a cork stopper, in its two possible operating positions, respectively in the first closed position, left side of the figure, and in the second open position, after tampering, right side of the figure.

Fig. 4 shows, in partial section, the capsule of the invention, illustrating in particular the spring member movement between the first closed position and second open position, caused by the assembly formed by the upper cover member and the lower cover member.

Fig. 5 is a section view of a preferred embodiment of the capsule of the present invention.

Fig. 6 is a partial section view of a preferred embodiment of the capsule of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] The present invention relates to a tamper detection capsule of container and to the operating method of the same. Said capsule is intended in particular to close containers holding beverages. This invention allows a user to immediately notice if the capsule was tampered with, and therefore if there was at least an attempt to open the container.

[0024] The actuation of the capsule of the present invention occurs whenever a user pulls or tries to pull said capsule with the purpose of removing it from the mouth or neck of a container.

[0025] When the capsule is tampered with, and, as such, its detection mechanism actuated, a change in the shape of the capsule will occur.

[0026] It was surprisingly found that the capsule of the

present invention fully solves the problem identified in the prior art capsule, preventing the possibility of any capsule removal attempt without actuation thereof, and providing an irreversible and tamper detection blocking of its operating mechanism due to its innovative design.

[0027] In contrast to the prior art capsule mechanism, capsule (1) of the present invention comprises a spring member (4) which is moveable. This spring member is in a tensioned condition before the actuation of the capsule (1). Upon actuation of the capsule (1) to remove it from the container where it is disposed, said spring is moved to a second position in which it becomes free from the tension to which it was subjected before the actuation, which results in a dimensional change of the same. This dimensional change will allow irreversibly block the capsule (1) in a position indicating tampering. The fact that the spring is moveable between two distinct positions allows addressing the problem associated with the removal of the capsule without actuating the same.

[0028] The technical solution of the present invention as described below is considerably different from the prior art solution mentioned herein. In the prior art solution, the spring remains in the same position and in a resting condition before and after the detection mechanism of the capsule is actuated. This spring design enables the position reversibility of the tamper detection if there is a possibility to access the spring from the outside, for example using a thin and flexible tool. Such solution also enables the removal of the cap without actuating the same as explained above.

[0029] In the context of the present invention, the term "container" means an object with a closed shape generally globular, provided with a mouth or neck, and intended to receive a food or non-food product. The capsule of the present invention is intended to, for example containers of food products namely beverage containers, e.g., bottles for beverages selected from the group consisting of wine, beer, spirit drinks, water, soft drinks and the like. Also, the capsule of the invention can of course be used for containers holding non-food products, since the nature of the capsule is not limited by the type of container which it may close or cover, nor by the product hold in this container.

[0030] The expression "container mouth" refers to the open portion of a container, e.g., a neck of a bottle.

[0031] The term "capsule" refers to a cover to close or cover a container, being disposed outside of the same, for example, covering the free end of a bottle's neck, the capsule being able to be associated with a stopper which is disposed inside the container mouth. A capsule can be made of any suitable material, being typical the use of plastic materials.

[0032] The expression "cylindrical body" refers to a body with a substantially cylindrical or conical shape having two ends. One end can be bevelled or rounded, and is intended to be partially or totally inserted into the mouth or neck of a container, and the opposite end may be connected by any means to a capsule, if so desired. As

an example, the cylindrical body in the context of the present invention is a stopper.

[0033] The expression "cork material" or simply "cork" refers to natural cork, colmated natural cork, agglomerated cork, micro agglomerated cork or combinations thereof.

[0034] The expression "plastic material" or simply "plastic" refers to polyethylene terephthalate (PET), polyethylene, high density polyethylene (HDPE), polyvinyl chloride (PVC), polypropylene (PP), polystyrene (PS), Acrylonitrile-Butadiene-Styrene (ABS) or the like or combinations thereof.

[0035] The expression "spring member" refers to a member intended to store potential energy and which complies with Hooke's law of elasticity. By way of example, springs selected from the group comprising helical springs, spiral springs, elastic rings, circular segments and the like and combinations thereof can be used in the present invention.

[0036] The expression "circular segment" or simply "segment" means a member configuring a portion of a circle comprised between a chord and any of the corresponding arcs of the circumference.

[0037] In the context of the present invention, the expression "tensioned condition" means a condition resulting from a traction or compression force. A member in a tensioned condition is subjected to one of the aforementioned forces. For example, a tensioned spring is subjected to a traction or compression force.

[0038] In the context of the present description, the term "comprising" should be interpreted as "including, among others". As such, said term should not be interpreted as "consisting only of".

[0039] Referring to Figs. 1 to 6, the capsule (1) of the present invention comprises an upper cover member (2), a spring support inner member (3), a spring member (4) and a lower cover member (5), wherein:

upper cover member (2) is coupled to lower cover member (5) forming an assembly (25) defining a cavity therein;

assembly (25) is displaceable from a first closed position to a second open position, and displaces said spring member (4) between said first and second positions;

spring support inner member (3) is arranged within said cavity of the assembly (25);

spring member (4) is arranged within the cavity of assembly (25) and is moveable between:

said first closed position (capsule on the left side of Fig. 3), in which it is arranged in a tensioned condition on spring support inner member (3), and

said second open position (capsule on the right side of Fig. 3), in which it is arranged in a resting condition between spring support inner member (3) and upper cover member (2), blocking assembly (25) in the second open position.

[0040] Spring support inner member (3) may have the same or other shape as assembly (25), provided it is adapted to allow the movement of assembly (25) between said two positions.

[0041] In a preferred embodiment, in said first closed position, spring member (4) is arranged on spring support inner member (3) in compression or traction as shown in Fig. 5.

[0042] In one embodiment, said spring member (4) is a compression spring. In this disposition, said compression spring is in tension, remaining compressed on spring support inner member (3) in the first closed position, wherein the movement of assembly (25) displaces said spring to the second open position, where it adopts an expanded condition, at rest, by losing the compressive stress which constrained it in the first closed position. Of course, inner member (3) should support spring member (4) compressed in the first closed position.

[0043] In a preferred embodiment, spring member (4) is a traction spring, most preferably a circular segment, for example, an elastic ring having open ends as shown in Figs. 1 and 2, which is disposed in tension around spring support inner member (3) in the first closed position. The movement of assembly (25) displaces said elastic ring to the second open position, where it adopts a resting condition. It is noted that in the first closed position the elastic ring disposed around inner member (3) is under traction, which results in an opening of its ends relative to its normal resting condition. Such tensile stress exerted by inner member (3) on the elastic ring ensures gripping of the same on inner member (3) in the first closed position while allowing displacement of said ring (or spring member (4)) to the second open position in case of being actuated by assembly (25).

[0044] When assembly (25) is pulled by the user to remove the capsule (1) from the container, it moves to said second open position dragging along with this movement spring member (4) to the second position. In this position, spring member (4), having been detached from inner member (3), adopts its resting condition in which it has a diametrical size smaller than that adopted in the first closed position, in that it is no longer subjected to tensile stress caused by inner member (3) and, as such, being able to reset to its normal resting condition with their ends closer to each other.

[0045] In this second open position, in which spring member (4) is at its resting condition and, as such, adopting an expanded or retracted condition (depending on being respectively a compression or traction spring) relative to the condition adopted in the first closed position, such dimensional variation of spring member (4) associated with its change of position with respect to inner mem-

ber (3) causes a physical obstacle to the return of spring member (4) and therefore assembly (25) to the first closed position as illustrated in Fig. 4.

[0046] Spring support inner member (3) is able to receive a compression spring or a traction spring. Additionally, embodiments of the capsule (1) of the present invention contemplate several dispositions of spring support inner member (3) depending on the condition of the compression springs, traction springs or combinations thereof.

[0047] Preferably, in assembly (25), upper cover member (2) and lower cover member (5) are irreversibly connected such that the access from outside to said cavity defined therein is precluded.

[0048] With reference to Fig. 4, upper cover member (2) is coupled to lower cover member (5) through a permanent connection, safeguarding access to the cavity inside, wherein assembly (25) formed by both moves between the first closed position and the second open position as a single member. The permanent connection between the lower portion of upper cover member (2) and the upper portion of lower cover member (5) is performed by any suitable method known to those skilled in the art, for example gluing, welding, fitting, threading or the like or combinations thereof.

[0049] In an aspect of the invention, lower cover member (5) has a splined inner rim (6) and spring support inner member (3) has splines (7) arranged to come into contact with splines (9) of splined rim (6) of lower cover member (5) in the second open position as shown in Fig. 2.

[0050] Thus, in the first closed position, splined inner rim (6) of lower cover member (5) does not come into contact with splines (7) of spring support inner member (3). Thus, assembly (25) is able to rotate freely around spring inner member (3). Such a solution does not allow a user to remove the capsule (1) using only torsional forces, which would allow its removal from the container without actuating the detection mechanism. Thus, to remove capsule (1), the user is forced to pull the assembly (25) of capsule (1) out of the mouth or neck of the container, actuating the detection mechanism, that is, placing the assembly (25) in the second open position.

[0051] In this second open position, said splined inner rim (6) comes into contact with splines (7) of spring support inner member (3), and friction caused by such a contact causes a blocking of rotational movement between assembly (25) and inner member (3), facilitating removing of capsule (1), by adding a torsional force to said traction force mentioned above.

[0052] Splines (9) of splined inner rim (6) may have a pyramidal teeth shape or other appropriate to the function, as shown in Fig. 2.

[0053] Regarding splines (7) of spring support inner member (3), they should block rotational movement of assembly (25) when the latter is in the second position. Thus, in one embodiment of the invention, splines (7) are shaped as pyramidal teeth or alternatively they are ar-

ranged as protuberances on the inner member (3) (as shown in Fig. 2).

[0054] In another embodiment according to Figs. 3 and 4, a portion of spring support inner member (3) is visible to a user when assembly (25) is blocked in the second open position, that is, when capsule (1) is actuated. This is possible by using a lower cover member (5) made of a translucent material.

[0055] In another embodiment of the invention, as shown in Figs. 1 to 6, spring support inner member (3) further comprises a cylindrical body (8) adapted for insertion into the mouth of a container. Obviously, said cylindrical body (8) and spring support inner member (3) may be formed by the same material or different materials, i. e., both can be made of cork or plastic, or one of them being made of plastic and the other cork.

[0056] Preferably, the capsule (1) of the present invention may comprise a spring support inner member (3) made of plastic, comprising a cork stopper designed for closing containers holding a beverage, e.g., wine, beer, spirit drinks, water, soft drinks or the like.

[0057] The present invention also relates to an operating method of the tamper detection capsule (1) of container.

[0058] The process comprises the steps of, in a capsule (1) of the invention:

- i) moving, from a first closed position to a second open position, the assembly (25) in relation to the spring support inner member (3) in which the spring member (4) is arranged in a tensioned condition;
- ii) moving, by means of said assembly (25), the spring member (4) between said closed and open positions;
- iii) in the second open position, allowing spring member (4) to adopt a resting condition, in which it changes his condition relative to the condition adopted in first closed position, blocking assembly (25) in the second open position.

EXAMPLE

[0059] With reference to Fig. 5, the tamper detection capsule (1) of container is composed of four plastic parts: an upper cover member (2), a spring support inner member (3) provided with a red colour (or another colour, as desired), an elastic ring (of segment type) - spring member (4) - and a transparent lower cover member (5).

[0060] A cork cylindrical stopper is glued on the base of the inner member (3) body and the elastic ring (spring member (4)) is arranged around inner member (3) body, being retained by the latter due to the force exerted by the spring on said inner member (3).

[0061] Then, upper cover member (2) and lower cover member (5) are joined by means of the lower portion of the upper cover member (2) and by means of the upper portion of the lower cover member (5). After assembling, such connection is irreversible, such that the spring sup-

port inner member (3) and the elastic ring (spring member (4)) disposed therein cannot be accessible from the outside.

[0062] The capsule (1) thus formed is placed into a spirit beverage bottle by inserting the cylindrical body (8) of the cork stopper into the bottle neck.

[0063] To actuate the detection mechanism of capsule (1), a user pulls assembly (25) in order to remove the stopper from the bottle. With this movement, the elastic ring (spring member (4)) is displaced, by the action of assembly (25), from the first closed position to the second open position, freeing itself from the tension to which it was subjected. When the elastic ring (spring member (4)) is no longer under tension, it shrinks its diameter and accommodates itself into a groove formed on the upper portion of inner member (3). This groove locates the elastic ring (spring member (4)) on the top of inner member (3), between the latter and the upper cover member (2), constituting an obstacle that blocks assembly (25) in the second open position and precludes the return of assembly (25) to the first closed position. Thus, the locking mechanism is irreversible.

[0064] The elastic ring (spring member (4)) is not accessible due to be contained in the cavity of assembly (25).

[0065] To provide torsion to the capsule (1), inner cover member (5) is provided with pyramidal teeth therein that fit into inner member (3) after capsule (1) mechanism is actuated. Size and geometry of these pyramidal teeth, as well as the relative position between lower cover member (5) and inner member (3), allow a free rotation of assembly (25) in the first closed position, thus precluding torsion of the whole capsule (1) for assist in its removal. In the second open position, the pyramidal teeth of lower cover member (5) come into contact with splines (7) of inner member (3) blocking the rotational movement of assembly (25) and thereby allowing providing a torsional force to the stopper to assist in its removal.

[0066] The description herein should be understood as exemplary and not limiting the scope of the present invention, which is defined in the appended claims.

Claims

1. A tamper detection capsule (1) of container, comprising:

an upper cover member (2),
a spring support inner member (3),
a spring member (4), and
a lower cover member (5),

characterized in that:

the upper cover member (2) is coupled to the lower cover member (5) forming an assembly (25) defining a cavity therein;

the assembly (25) is displaceable from a first closed position to a second open position, and is disposed to move said spring member (4) between said first and second positions;
the spring support inner member (3) is arranged within the cavity of assembly (25);
the spring member (4) is arranged within the cavity of assembly (25) and is moveable between:

said first closed position, in which it is arranged in a tensioned condition on the spring support inner member (3), and
said second open position, in which it is arranged in a resting condition between the spring support inner member (3) and upper cover member (2), blocking assembly (25) in the second open position.

2. The capsule (1) according to claim 1, **characterized in that**, in said first closed position, spring member (4) is arranged on the spring support inner member (3) in compression or in traction. 20
3. The capsule (1) according to any one of the preceding claims, **characterized in that** the spring member (4) is a compression spring. 25
4. The capsule (1) according to any one of claims 1 to 2, **characterized in that** the spring member (4) is a traction spring. 30
5. The capsule (1) according to any one of claims 1 to 2, **characterized in that** the spring member (4) is a circular segment. 35
6. The capsule (1) according to claim 1, **characterized in that** assembly (25) comprises an irreversible connection between upper cover member (2) and lower cover member (5), rendering the access to said cavity unfeasible from outside. 40
7. The capsule (1) according to claim 1, **characterized in that** lower cover member (5) has a splined inner rim (6), and spring support inner member (3) has splines. 45
8. The capsule (1) according to claim 7, **characterized in that** splined rim (6) has splines (9) shaped as pyramidal teeth. 50
9. The capsule (1) according to claim 1, **characterized in that** lower cover member (5) is made of a translucent material. 55
10. The capsule (1) according to claim 1, **characterized in that** spring support inner member (3) further comprises a cylindrical body (8).

11. The capsule (1) according to claim 10, **characterized in that** said cylindrical body (8) and spring support inner member (3) are made of the same material or different materials.

12. The capsule (1) according to claim 11, **characterized in that** said cylindrical body (8) and spring support inner member (3) are both made of cork or plastic or one of them is made of plastic and the other of cork.

13. Use of the capsule claimed in any one of claims 10 to 12, **characterized in that** it closes containers holding a beverage selected from the group consisting of wine, beer, spirit drinks, water and soft drinks.

14. An operating method of the capsule (1) claimed in any one of claims 1 to 13, **characterized in that** comprises the steps of:

- moving, from a first closed position to a second open position, assembly (25) in relation to the spring support inner member (3) in which spring member (4) is arranged in a tensioned condition;
- moving, by means of the assembly (25), spring member (4) between said positions;
- in the second open position, driving spring member (4) to a resting condition by blocking assembly (25) in the second open position.

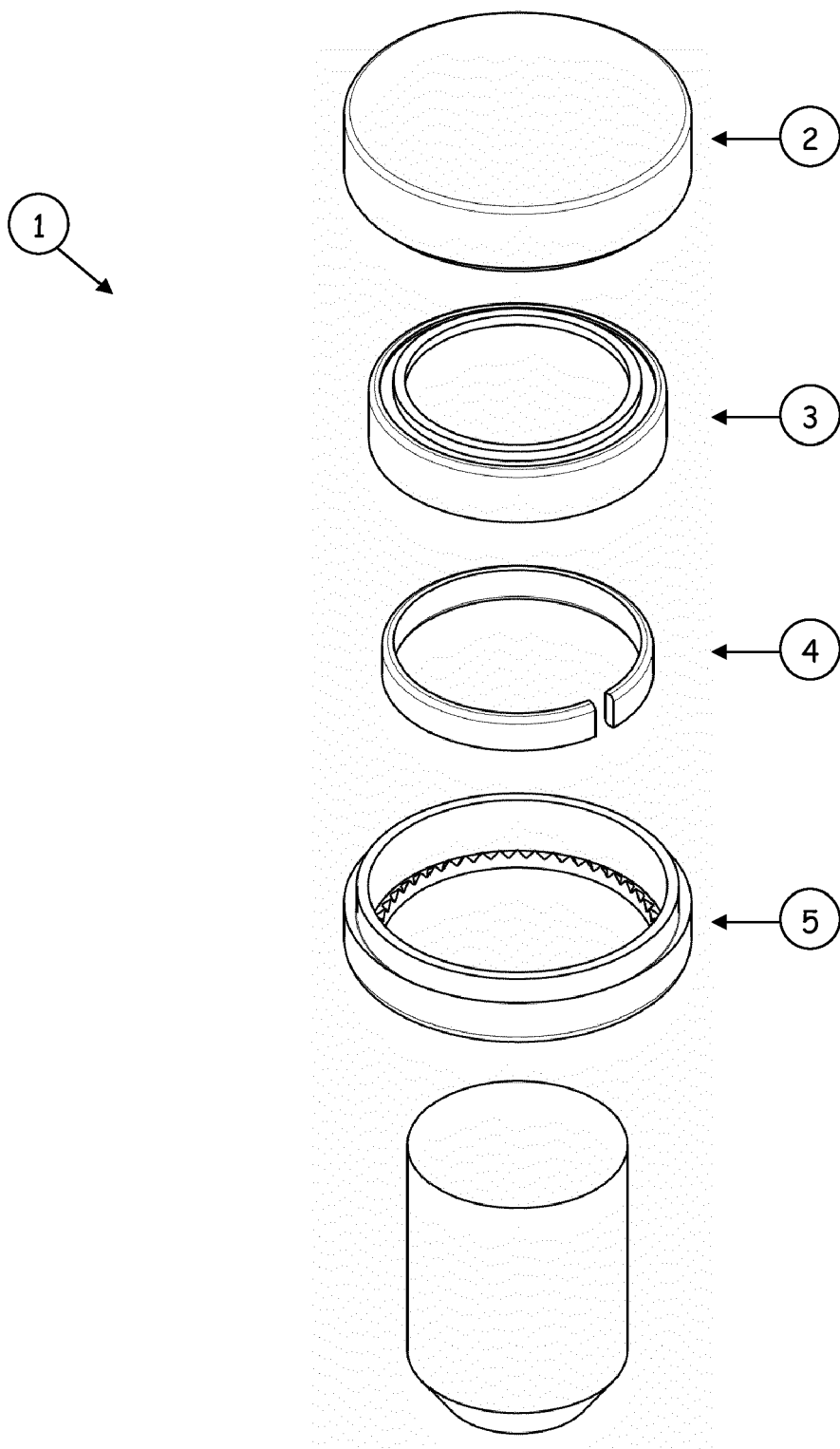


Fig. 1

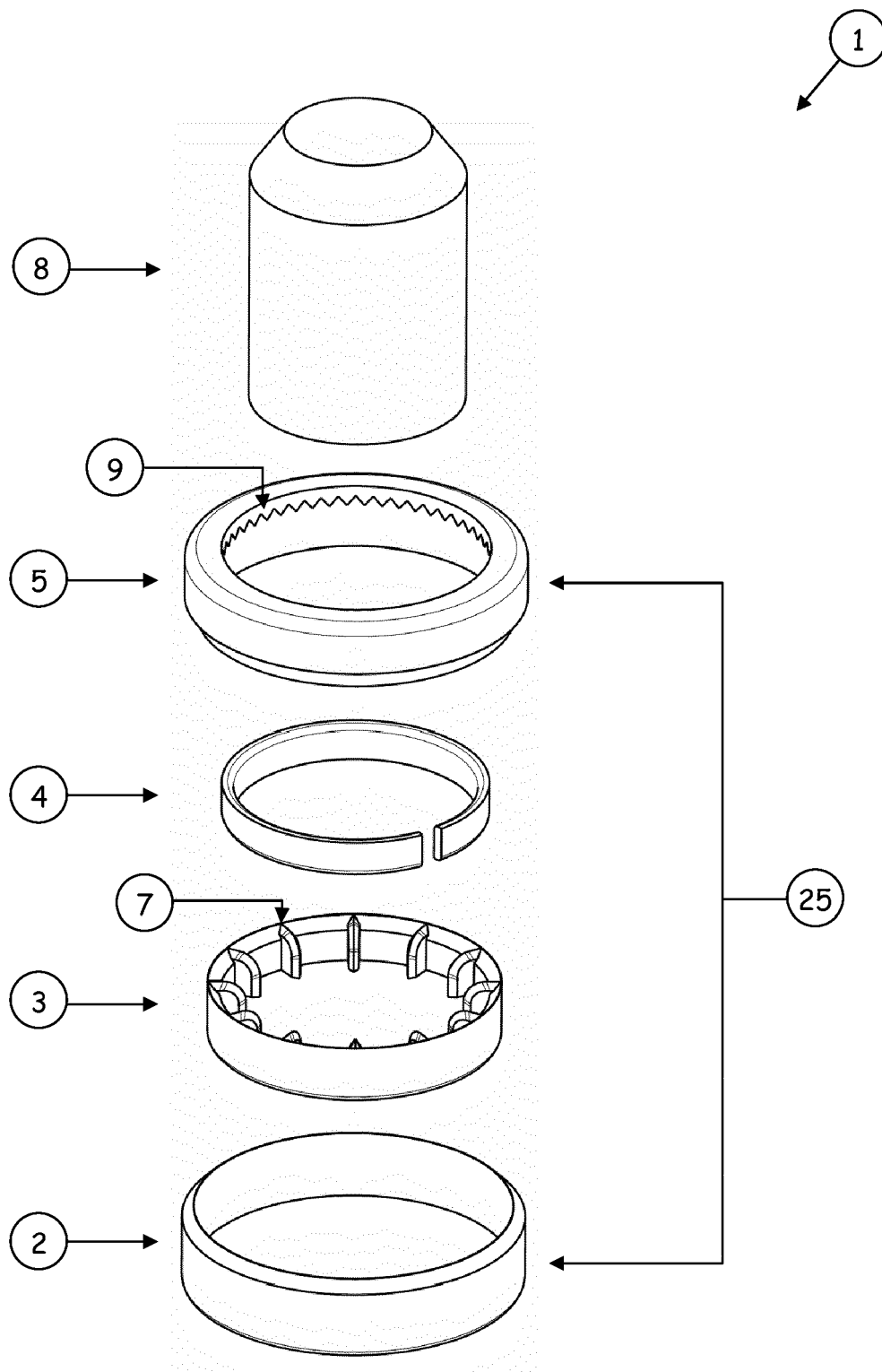


Fig. 2

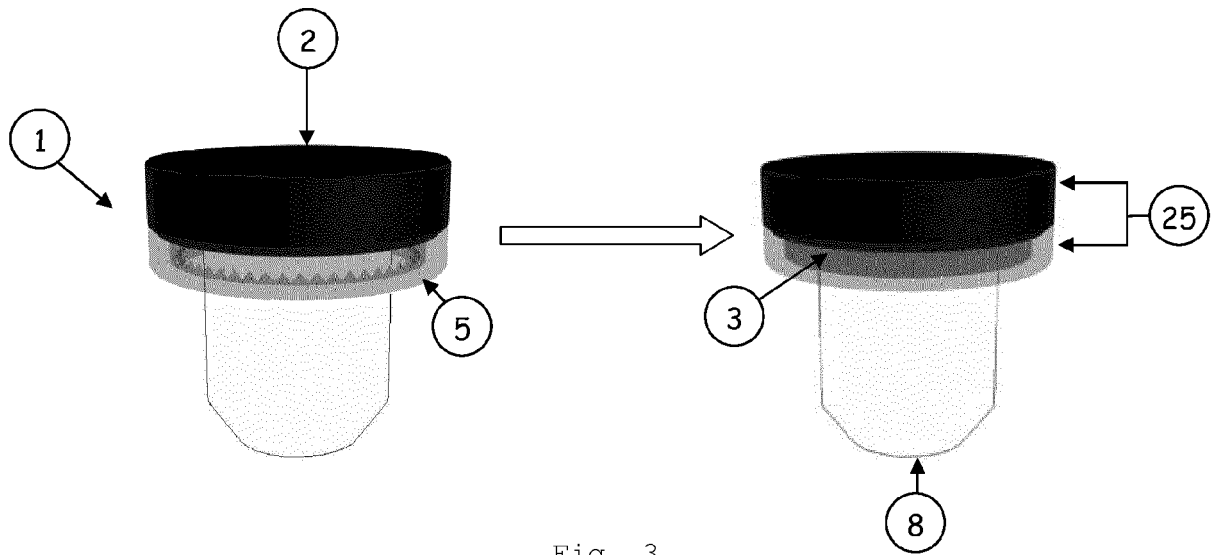


Fig. 3

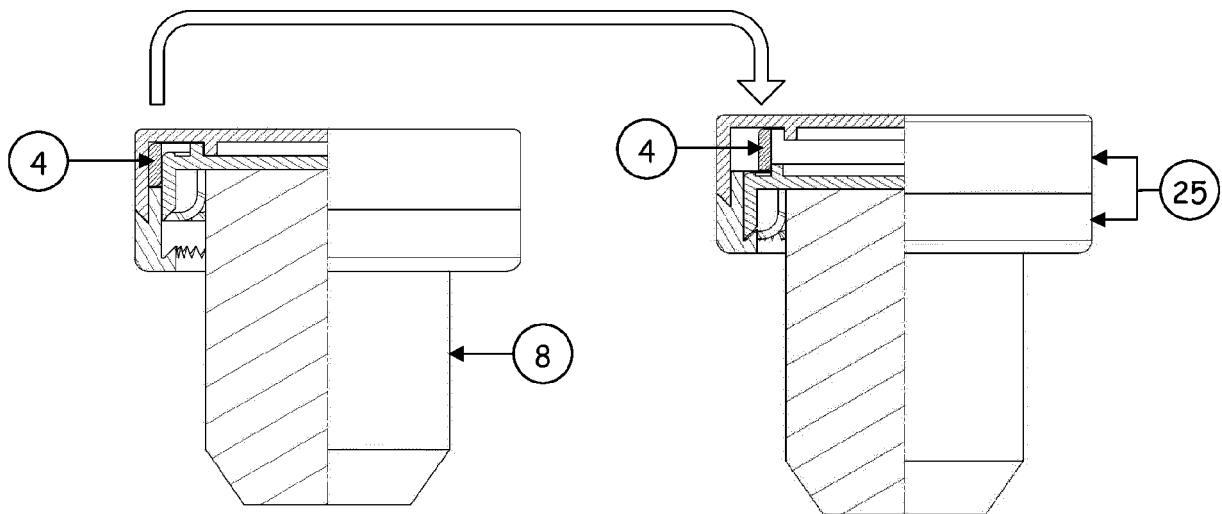


Fig. 4

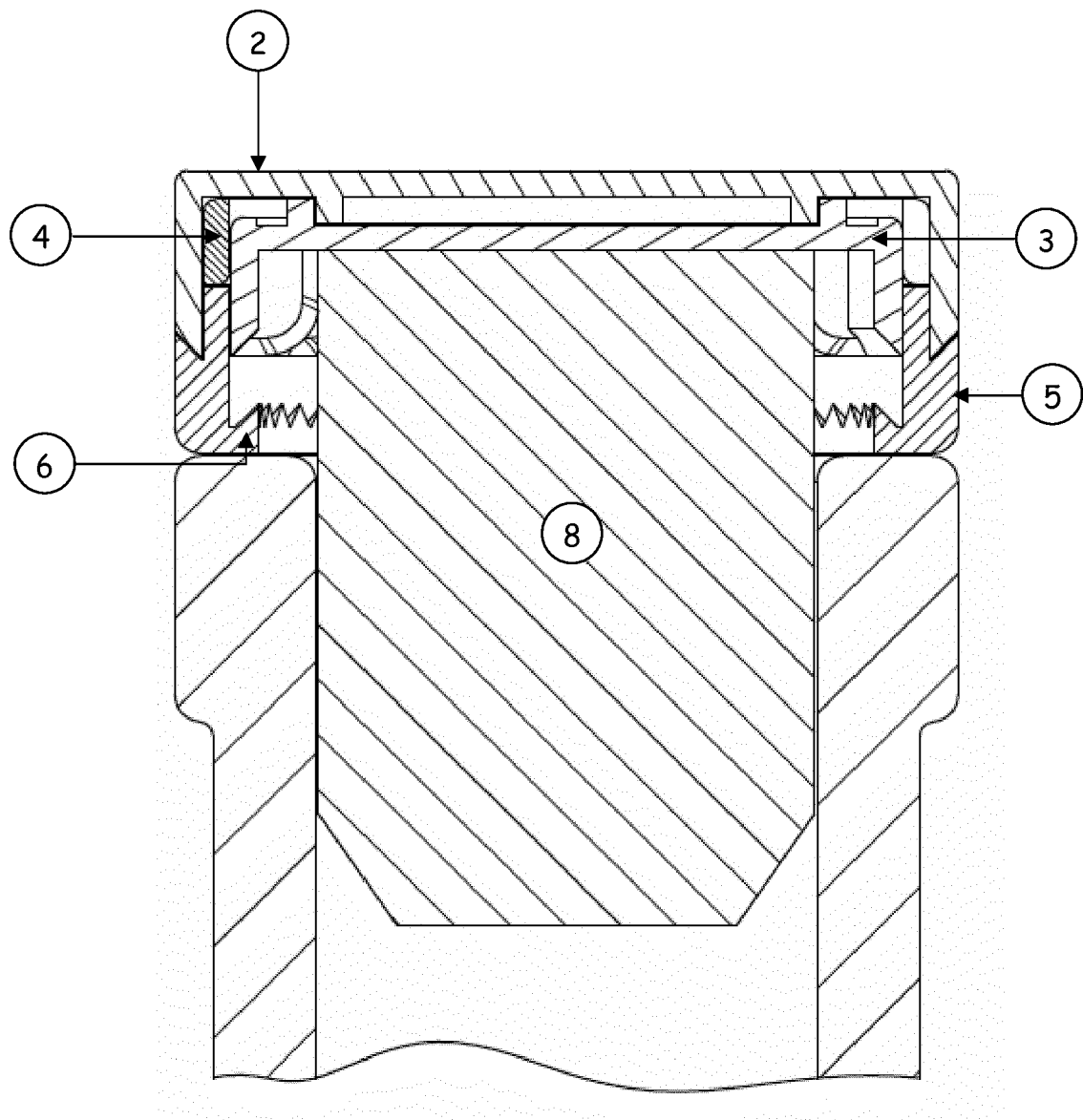


Fig. 5

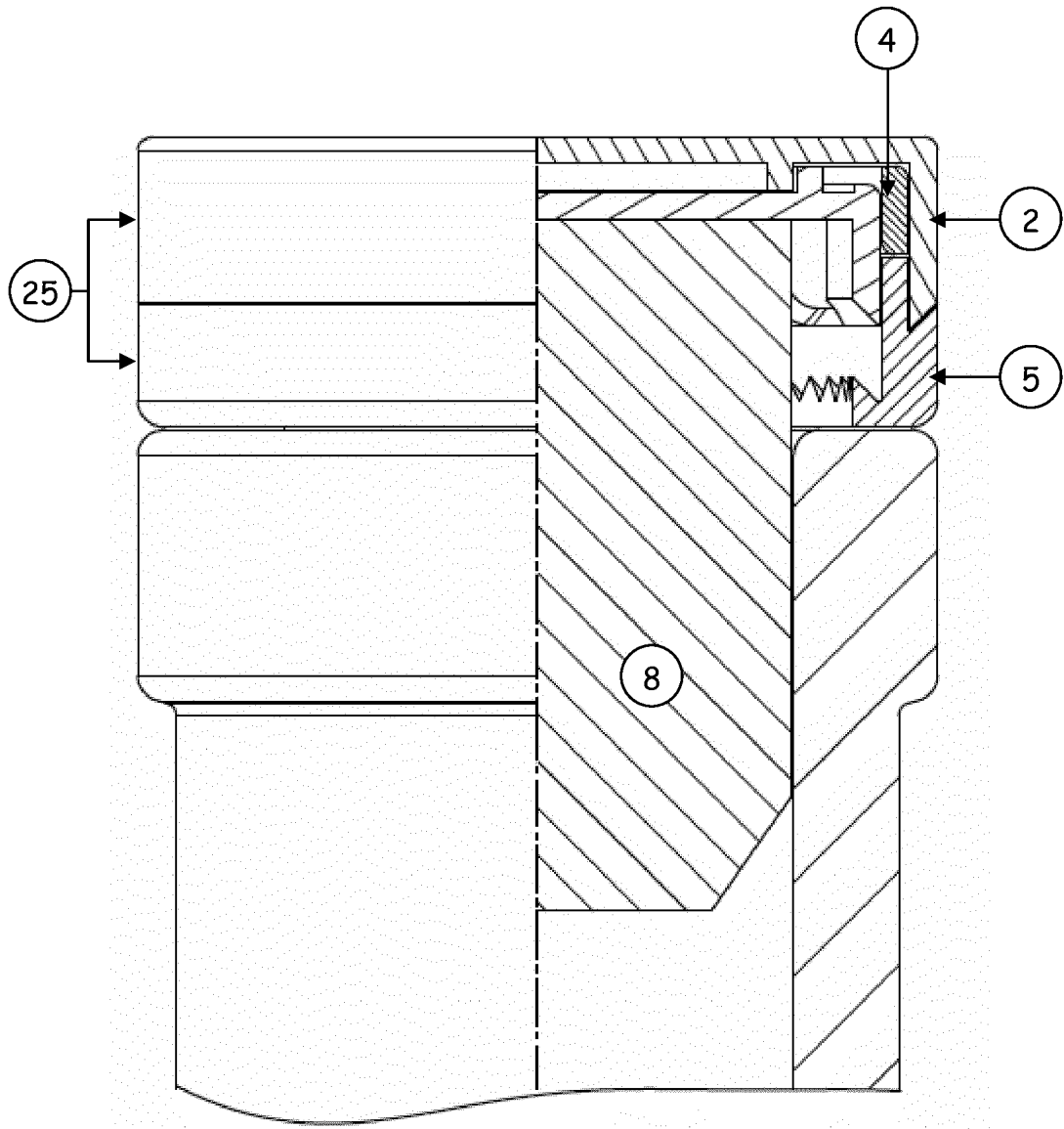


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 16 18 0781

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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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