(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 323 772 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.05.2018 Bulletin 2018/21

(21) Application number: **17193780.8**

(22) Date of filing: **28.09.2017**

(51) Int Cl.:
B67B 1/10 *(2006.01)* ***B29C 65/00*** *(2006.01)*
B67B 3/12 *(2006.01)* ***B67B 3/20*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **16.11.2016 IT 201600115892**

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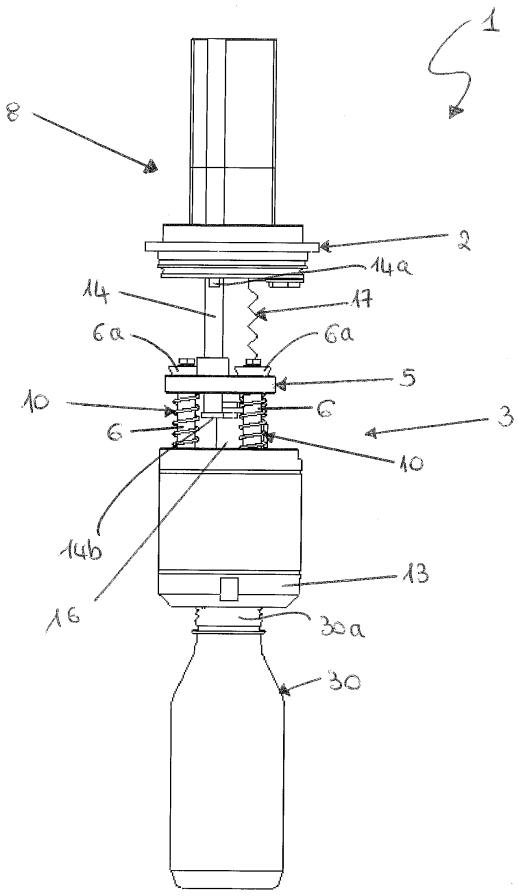
(54) DEVICE FOR APPLYING A CLOSURE ON A MOUTH OF A CONTAINER

(57) Device (1) for applying a closure on a mouth (30a) of a container (30), comprising:
a capping or sealing head (13) bearing the closure;
a plate-shaped body (5) elastically coupled to the capping or sealing head (13);
a plurality of centring plugs (6) integrally constrained to the capping or sealing head (13) and slidably inserted in a same number of slots (7) afforded in the plate-shaped body (5), each of the centring plugs (6) having a conical end (6a) and the corresponding slot (7) being counter-shaped so as to house the conical end (6a), as the plate-shaped body (5) can shift in such a way that the device (1) passes from a first configuration in which the capping or sealing head (13) is spaced apart from the mouth (30a) and the conical ends (6a) engage the slots (7), to a second configuration in which the capping or sealing head (13) is brought close to the mouth (30a) and the conical ends (6a) at least partly disengage from the slots (7);
a blocking system (9) for blocking the reciprocal sliding of the centring plugs (6) with respect to the plate-shaped body (5).

FIG. 6



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Description

[0001] The present invention The present invention relates to a device for applying a closure on a mouth of a container.

[0002] The reference sector is the bottling of so-called "sensitive" food products, i.e. products that are particularly sensitive to bacteriological contamination and oxidation, such as, for example, isotonic drinks, juices, nectars, soft drinks, tea, milk-based drinks, coffee-based drinks, etc., for which it is fundamental to prevent any microbiological contamination throughout the packaging steps.

[0003] Packaging lines using aseptic technology are already known, wherein the various operations take place in a controlled contamination environment, whereby the bottled products can be stored for a long period of time and have physico-chemical and organoleptic stability even at ambient temperature.

[0004] In this context, attention turns to the capping or sealing of the containers in an aseptic line, by means of caps or capsules or aluminium sheets.

[0005] According to the prior art, devices for applying closures generally have a vertical elastic degree of freedom. An example is represented by the solution proposed in GB2137928, in which a heating ring can slide vertically with respect to the main cylindrical body, nearing the mouth of the underlying container.

[0006] Disadvantageously, this solution is not suitable for use in aseptic technology. In particular, the reciprocal sliding zones between the surfaces are generally inaccessible, so that they are difficult to sterilise. Further, such zones are more subject to wear of the components thereof.

[0007] When these zones are at the boundary between the sterile environment and the non-sterile (external) environment, there is generally a member which moves alternately between the two environments, actually transferring contaminants from the non-sterile environment to the sterile environment.

[0008] In order to maintain the contamination level below a predetermined threshold it is therefore necessary to predispose sterilisation cycles. Sometimes one or more bellows are keyed on the member and/or on part of the movement systems thereof. In some cases, even the whole critical volume is protected with a single large-dimensions bellows.

[0009] The use of bellows, however, leads to problems of reliability as any breakage thereof is not easily detectable. A damaged bellows carries a very high risk of contamination.

[0010] In this context, the technical task of the present invention is to provide a device for applying a closure on a mouth of a container which obviates the drawbacks in the prior art as described above.

[0011] Particularly, an object of the present invention is to provide a device for applying a closure on a mouth of a container that is usable in an aseptic environment.

[0012] The specified technical task and the specified aims are substantially attained by a device for applying a closure on a mouth of a container, comprising:

- a capping or sealing head bearing the closure;
- a plate-shaped body elastically coupled to the capping or sealing head;
- at least a centring plug integrally constrained to the capping or sealing head and slidably inserted in a slot afforded in the plate-shaped body, said centring plug having a conical end and said slot being counter-shaped so as to house said conical end;
- activating means operatively active on the plate-shaped body for shifting the plate-shaped body so that the device passes from a first configuration in which the capping or sealing head is spaced apart with respect to the mouth and the conical end engages said slot, to a second configuration in which the capping or sealing head is brought close to the mouth and the conical end at least partly disengages from the slot,

characterised in that it comprises a blocking system for blocking the reciprocal sliding of the centring plug with respect to the plate-shaped body.

[0013] In a first embodiment, the blocking system comprises:

- a first cylindrical element having an end constrained to a fixed portion of the device and the other end being free, said first cylindrical element being slidably inserted in an additional slot afforded in the plate-shaped body;
- a second cylindrical element, having an end constrained to the capping or sealing head and the other end being free, the free ends of the cylindrical elements being shaped so that in a third configuration of the device they are brought close to one another and reciprocally abut in such a way as to define a joint.

[0014] In a second embodiment, the blocking system comprises:

- two cylindrical elements, each of which has an end constrained to a fixed portion of the device and the other end being free, said cylindrical elements being slidably inserted in additional slots afforded in the plate-shaped body;
- a block integrally constrained to the capping or sealing head, the free ends of the cylindrical elements having projections shaped for inserting in a groove of the block when the device is in a third configuration.

[0015] The device preferably comprises a plurality of centring plugs integrally constrained to the capping or sealing head and slidably inserted in a same number of

slots afforded in the plate-shaped body. Each centring plug has a conical end and the corresponding slot is counter-shaped so as to house said conical end.

[0016] The device comprises elastic means interposed between the plate-shaped body and the capping or sealing head for coupling thereof. For example, the elastic means consist of as many springs as centring plugs. Each centring plug is partly enveloped by one of said springs.

[0017] Additional features and advantages of the present invention will become more apparent from the indicative, and thus non-limiting, description of a preferred, but non-exclusive embodiment of a device for applying a closure on a mouth of a container as illustrated in the appended drawings, wherein:

- figures 1, 2 and 3 are partial section views of a first embodiment of a device for applying a closure on a mouth of a container, according to the present invention, respectively in a first, second and third configuration;
- figure 4 is a perspective view of the device of figure 3;
- figures 5, 6 and 7 are side views of a second embodiment of a device for applying a closure on a mouth of a container, according to the present invention, respectively in a first, second and third configuration;
- figure 8 is a perspective view of the device of figure 6;
- figure 9 is a simplified version of the device of figure 6, in which the elastic means have been removed for clarity;
- figure 10 is a different side view of the device of figure 6.

[0018] With reference to the figures, 1 denotes a device for applying a closure on a mouth 30a of a container 30.

[0019] In this context, the term "closure" means both a cap or capsule and a seal on the mouth 30a, the seal being embodied by an aluminium sheet.

[0020] The device 1 comprises a fixed portion 2 and a mobile portion 3 which in turn comprises a capping or sealing head 13 bearing the closure to be applied.

[0021] The mobile portion 3 further comprises a plate-shaped body 5 elastically coupled to the capping or sealing head 13.

[0022] At least a centring plug 6 is integrally constrained to the capping or sealing head 13 and is slidably inserted in a slot 7 (i.e. a through-hole) afforded in the plate-shaped body 5.

[0023] In the embodiments herein described and illustrated, a plurality of centring plugs 6 integrally constrained to the capping or sealing head 13 is provided.

[0024] Each of such centring plugs 6 is slidably inserted in a corresponding slot 7 (i.e. a through-hole) afforded in the plate-shaped body 5.

[0025] Elastic coupling means 10 are interposed between the plate-shaped body 5 and the capping or sealing head 13.

[0026] The elastic means 10 preferably consist of as many springs as centring plugs 6. In particular, each centring plug 6 is partly enveloped by one of the springs.

[0027] Each centring plug 6 has a conical end 6a and the corresponding slot 7 is counter-shaped so as to house the conical end 6a. Therefore, each slot 7 has a conical shape.

[0028] The device 1 comprises activating means 8 operatively active on the plate-shaped body 5 so as to shift it so that the device 1 passes at least from:

- a first configuration in which the capping or sealing head 13 is spaced apart from the mouth 30a and the conical end 6a of each centring plug 6 engages the corresponding slot 7,
- to a second configuration in which the capping or sealing head 13 is brought close to the mouth 30a in order to apply the closure thereto and the conical end 6a at least partly disengages the corresponding slot 7.

[0029] For example, the activating means 8 comprise a pneumatic piston. In the embodiments herein described and illustrated, the pneumatic piston is not visible as it is covered by a bellows 17.

[0030] The device 1 originally comprises a blocking system 9 for blocking the reciprocal sliding of the centring plug 6 (or the centring plugs 6) with respect to said plate-shaped body 5.

[0031] In an embodiment, illustrated in figures 1 to 4, the blocking system 9 comprises a first cylindrical element 11 and a second cylindrical element 12.

[0032] The first cylindrical element 11 has an end 11 a which is constrained to the fixed portion 2 and to the other end 11 b being free.

[0033] The second cylindrical element 12 has an end 12a which is constrained to the capping or sealing head 13 and the other end 12b being free.

[0034] The first cylindrical element 11 is slidably inserted in an additional slot (i.e. a further through-hole) afforded in the plate-shaped body 5.

[0035] The free ends 11 b, 12b of the two cylindrical elements 11, 12 are advantageously shaped so that in a third configuration of the device 1 (illustrated in figure 3) they are brought close to one another and reciprocally abut in such a way as to define a joint.

[0036] In an alternative embodiment, illustrated in figures 5 to 10, the blocking system 9 comprises two cylindrical elements 14, 15, each of which has an end 14a, 15a constrained to the fixed portion 2 and the other end 14b, 15b being free.

[0037] The two cylindrical elements 14, 15 are slidably inserted in further slots afforded in the plate-shaped body 5.

[0038] The blocking system 9 further comprises a block 16 integrally constrained to the capping or sealing head 13.

[0039] The free ends 14b, 15b of the two cylindrical

elements 14, 15 advantageously have projections shaped for inserting in a groove or recess 16a of the block 16 when the device 1 is in the third configuration. The operation of the device for applying a closure on a mouth of a container, according to the present invention, is described below.

[0040] The container 30 is positioned in a capping station located under the capping or sealing head 13.

[0041] Let us consider initially the device 1 in the first configuration (see figures 1 and 5) in which the capping or sealing head 13 is spaced apart from the mouth 30a and the conical end 6a of each centring plug 6 engages the corresponding slot 7.

[0042] The device 1 is then brought into the second configuration. In particular, the pneumatic piston 8 moves the plate-shaped body 5 in the direction of the mouth 30a of the container 30. Owing to the elastic coupling between the plate-shaped body 5 and the capping or sealing head 13, the head begins to shift towards the mouth 30a of the container 30 up to reaching the mouth 30a and applying the closure (see figures 2 and 6).

[0043] In particular, the lowering of the plate-shaped body 5 determines the sliding of the centring plugs 6 into the corresponding slots 7. The springs 10 are thus compressed between the plate-shaped body 5 and the capping or sealing head 13 which, once the mouth 30a of the container 30 is reached, cannot further shift downwards.

[0044] In addition to the application of the closure, it is considered useful to briefly describe the sterilisation process, which takes place in the absence of the containers (line out of production). By describing this process the function of the blocking system 9 will be understood.

[0045] The pneumatic piston 8 moves the plate-shaped body 5 away from the fixed portion 2. Owing to the elastic coupling between the plate-shaped body 5 and the capping or sealing head 13, the head begins to translate away from the fixed portion 2.

[0046] In particular, the lowering of the plate-shaped body 5 determines the sliding of the centring pins 6 into the corresponding slots 7. The springs 10 are thus compressed between the plate-shaped body 5 and the capping or sealing head 13.

[0047] With reference, for example, to the first embodiment, the two cylinders 11, 12 of the blocking system 9 have been gradually brought close to one another until their free ends 11 b, 12b abut and define a joint.

[0048] The device 1 is therefore in the third configuration, illustrated in figure 3, whereby the slots 7 of the plate-shaped body 5 are partly disengaged from the conical ends 6a.

[0049] The device 1 remains in the third configuration due to the blocking system 9.

[0050] As the conical ends 6a at least partly disengage from the corresponding slots 7, the capping device 1 can be subjected to a first treatment using a fluid sterilising agent that is able to penetrate into the slots 7. Subsequently, the blocking system 9 is deactivated, the device 1 is taken back to the first configuration and a second treatment is provided, using the fluid sterilising agent (this time directed especially to the free ends 11 b, 12b of the cylinders 11, 12).

[0051] From the description the characteristics of the device for applying a closure on a mouth of a container, according to the present invention, are clear.

[0052] In particular, owing to the blocking system described herein, which in fact starts operation with the line empty (i.e. not in production mode) the through slots of the plugs are accessible even in the absence of the container and can be subjected to a sterilisation treatment with a fluid agent. When the slots are engaged by the conical ends of the plugs, a sterilisation treatment can be carried out on the free ends of the cylinders. Alternatively, it is possible to predispose a bellows having small dimensions at the pneumatic piston.

[0053] Alternatively a barrier of known type (e.g. electrical, steam) in place of the bellows can be used.

Claims

1. Device (1) for applying a closure on a mouth (30a) of a container (30), comprising:

a capping or sealing head (13) bearing said closure;
a plate-shaped body (5) elastically coupled to said capping or sealing head (13);
at least a centring plug (6) integrally constrained to said capping or sealing head (13) and slidably inserted in a slot (7) obtained in said plate-shaped body (5), said centring plug (6) having a conical end (6a) and said slot (7) being counter-shaped so as to house said conical end (6a);
activating means (8) operatively active on said plate-shaped body (5) for shifting it in such a way that the device (1) passes from a first configuration in which the capping or sealing head (13) is spaced apart with respect to said mouth (30a) and the conical end (6a) engages said slot (7), to a second configuration in which the capping or sealing head (13) is brought close to said mouth (30a) and the conical end (6a) at least partly disengages said slot (7),
characterised in that it comprises a blocking system (9) for blocking the reciprocal sliding of the centring plug (6) with respect to said plate-shaped body (5).

2. Device (1) according to claim 1, wherein said blocking system (9) comprises:

a first cylindrical element (11) having an end (11 a) which is constrained to a fixed portion (2) of the device (1) and the other end (11 b) which is free, said first cylindrical element (11) being sl-

idably inserted in a further slot obtained in said plate-shaped body (5);
a second cylindrical element (12) having an end (12a) which is constrained to said capping or sealing head (13) and the other end (12b) which is free, the free ends (11 b, 12b) of said cylindrical elements (11, 12) being shaped so that in a third configuration of the device (1) they are brought close to one another and reciprocally abut in such a way as to define a joint.

3. Device (1) according to claim 1, wherein said blocking system (9) comprises:

two cylindrical elements (14, 15), each of which has an end (14a, 15a) which is constrained to a fixed portion (2) of the device (1) and the other end (14b, 15b) which is free, said cylindrical elements (14, 15) being slidably inserted in further slots obtained in said plate-shaped body (5);
a block (16) integrally constrained to said capping or sealing head (13), the free ends (14b, 15b) of said cylindrical elements (14, 15) having projections shaped for inserting in a groove (16a) of said block (16) when the device (1) is in a third configuration.

4. Device (1) according to any one of the preceding claims, comprising a plurality of centring plugs (6) integrally constrained to said capping or sealing head (13) and slidably inserted in a same number of slots (7) obtained in said plate-shaped body (5), each of said centring plugs (6) having a conical end (6a) and the corresponding slot (7) being counter-shaped so as to house said conical end (6a).

5. Device (1) according to claim 4, comprising elastic means (10) interposed between said plate-shaped body (5) and said capping or sealing head (13) for coupling thereof, said elastic means (10) consisting in a same number of springs as the centring plugs (6), each centring plug (6) being partly enveloped by one of said springs.

6. Device (1) according to any one of the preceding claims, wherein said activating means (8) comprise a pneumatic piston.

FIG. 1

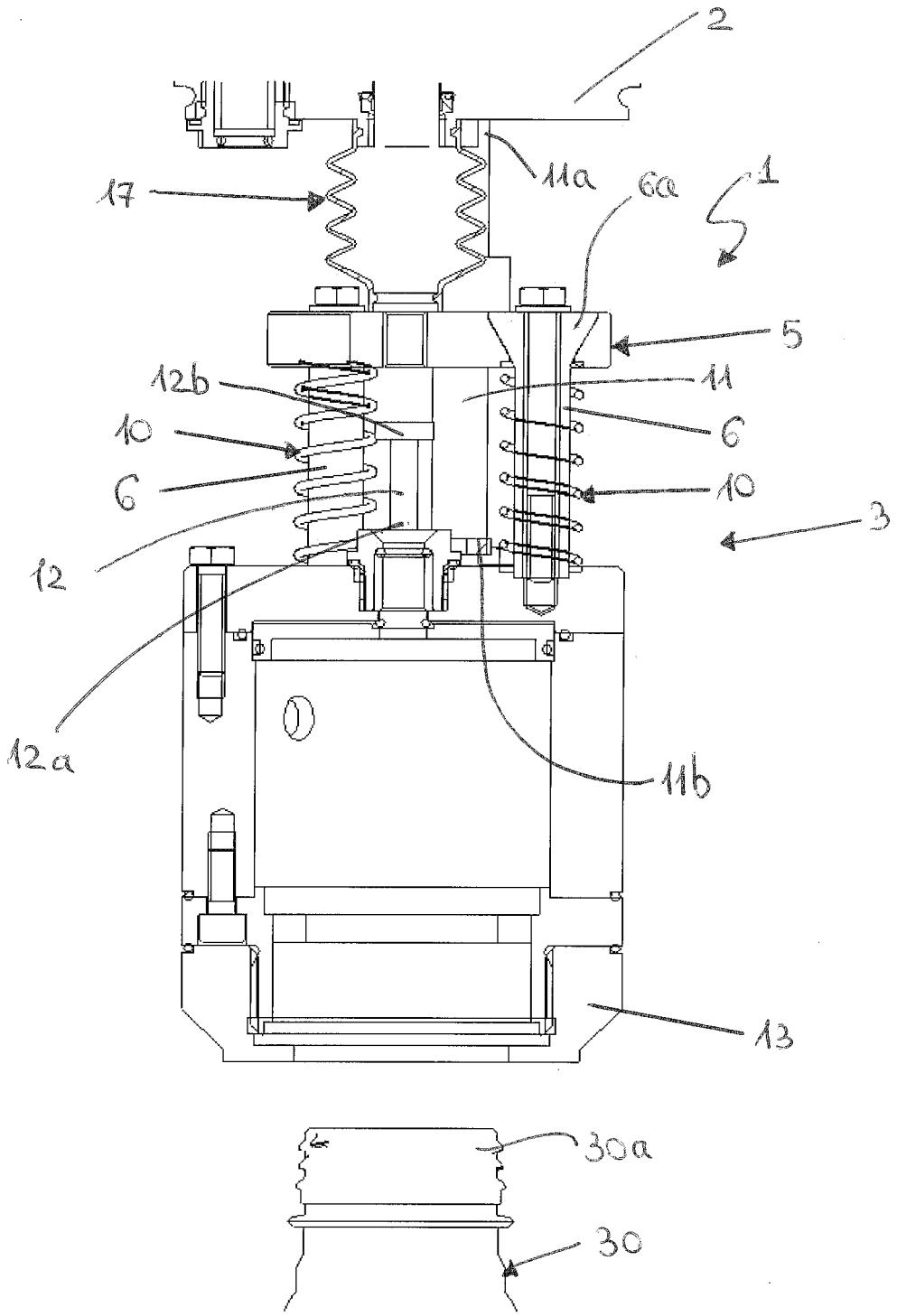


FIG. 2

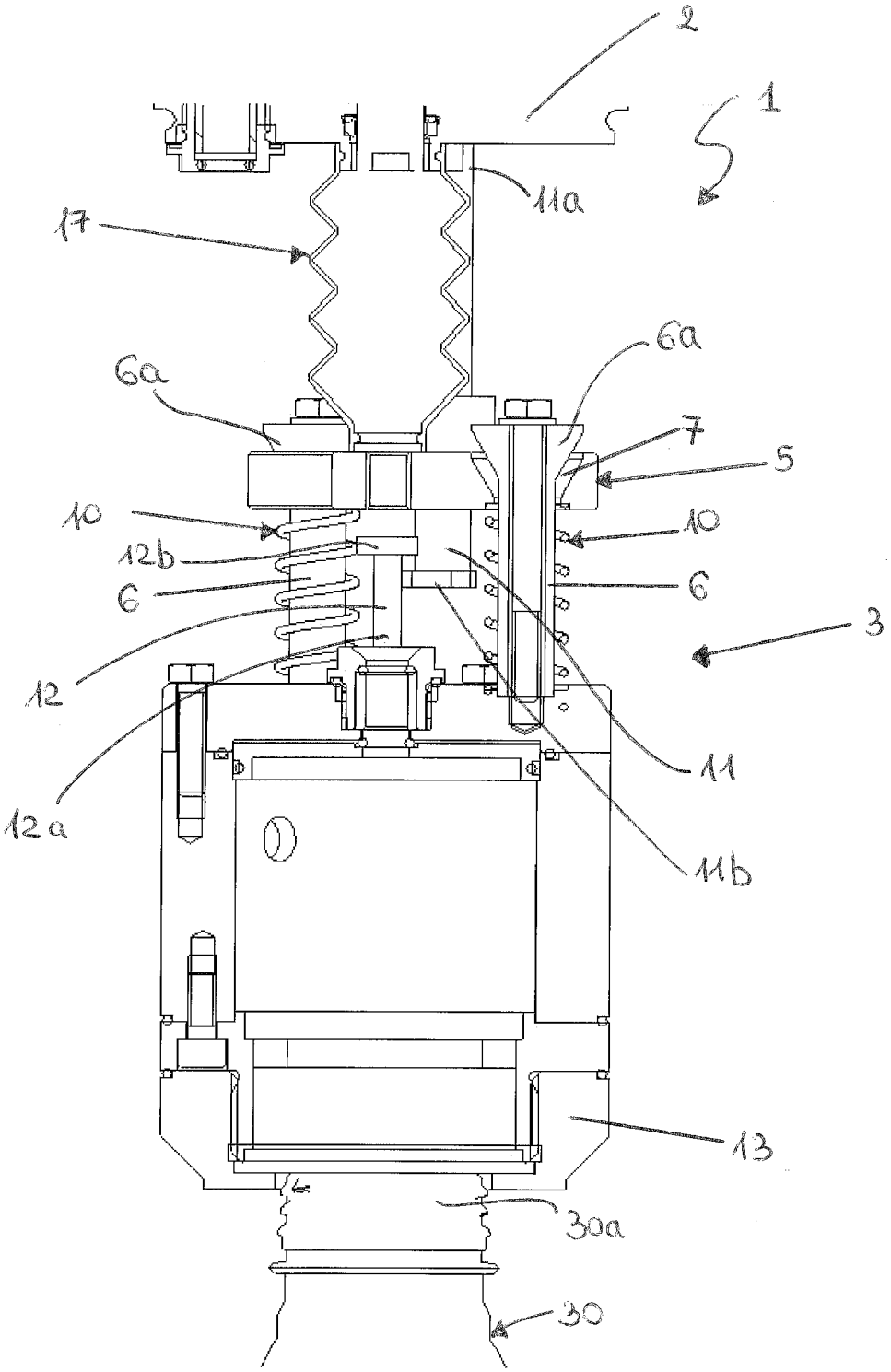


FIG. 3

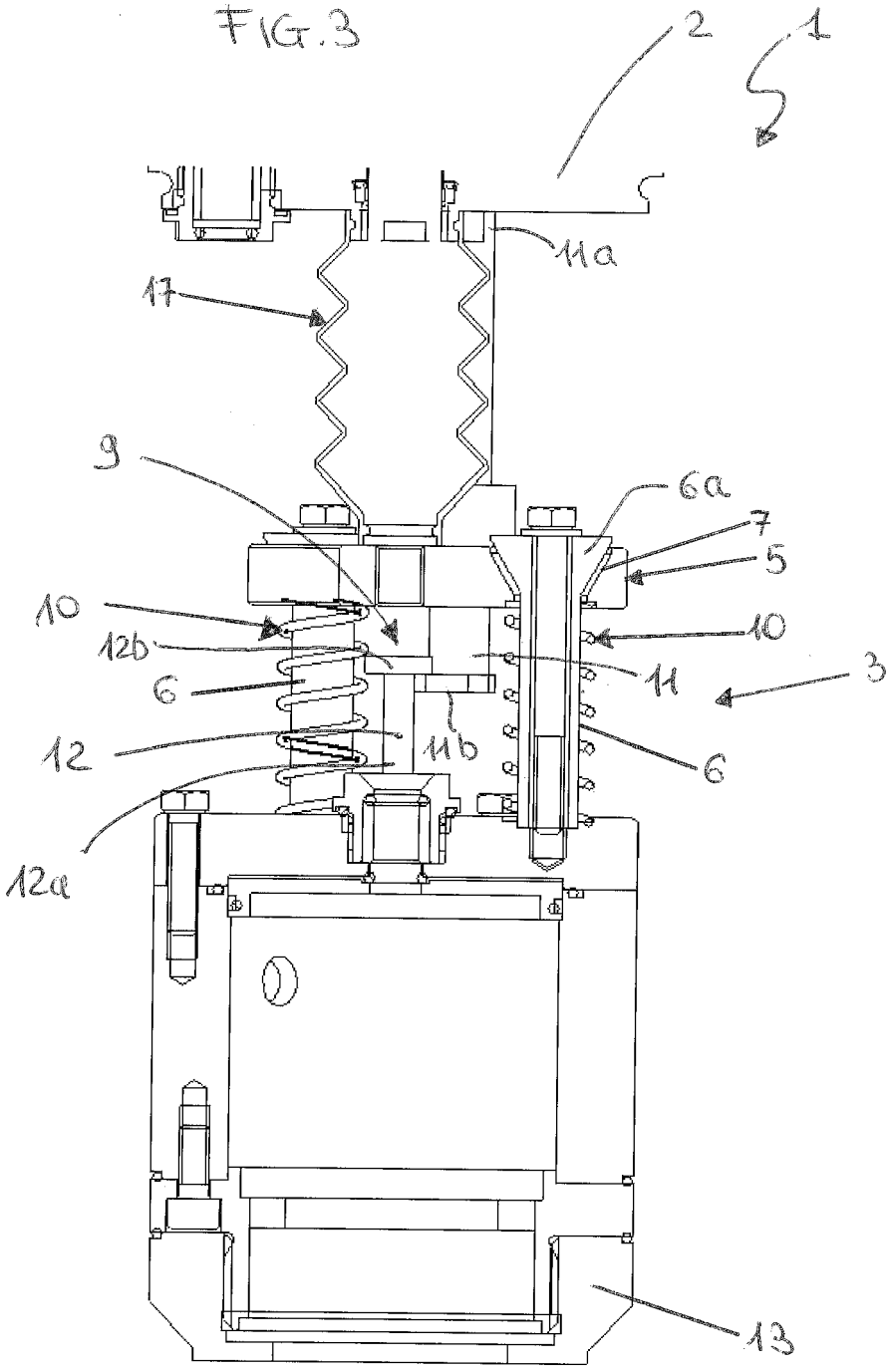


FIG.4

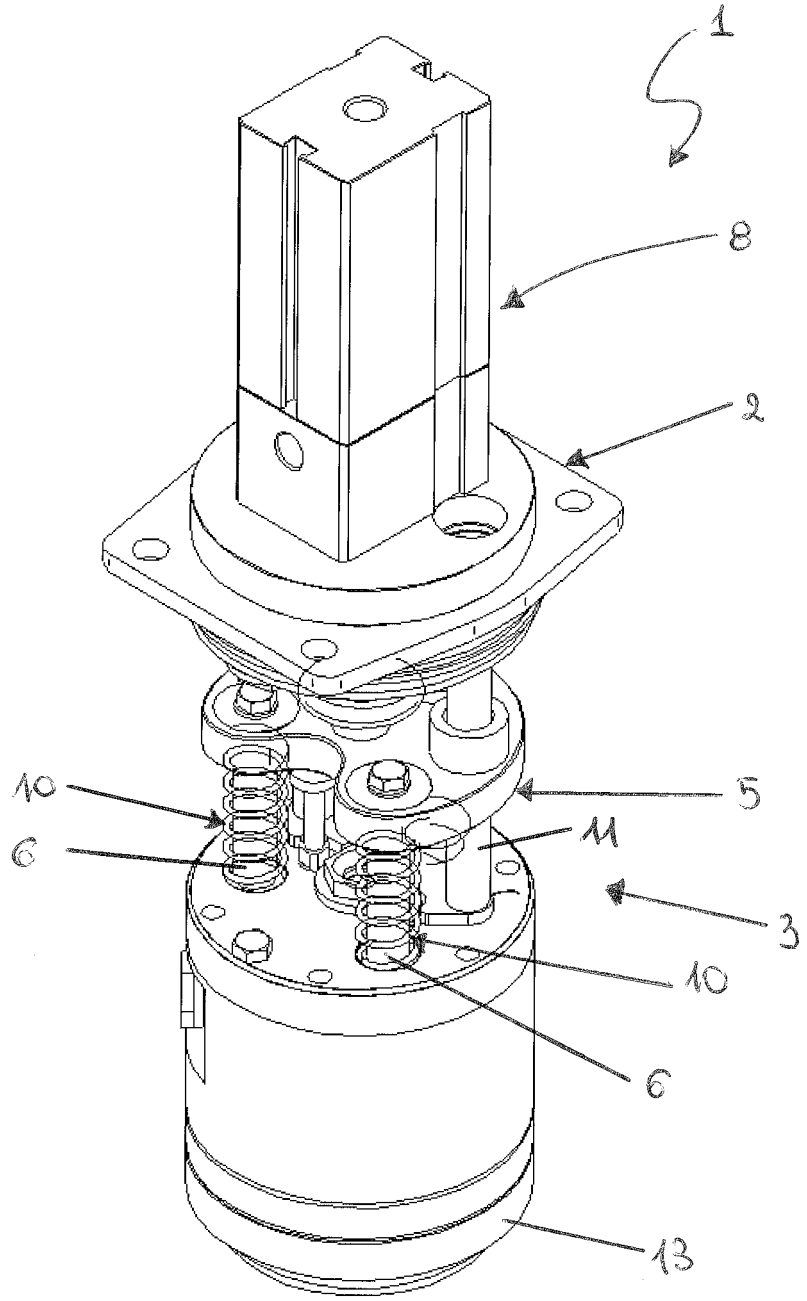


FIG. 5

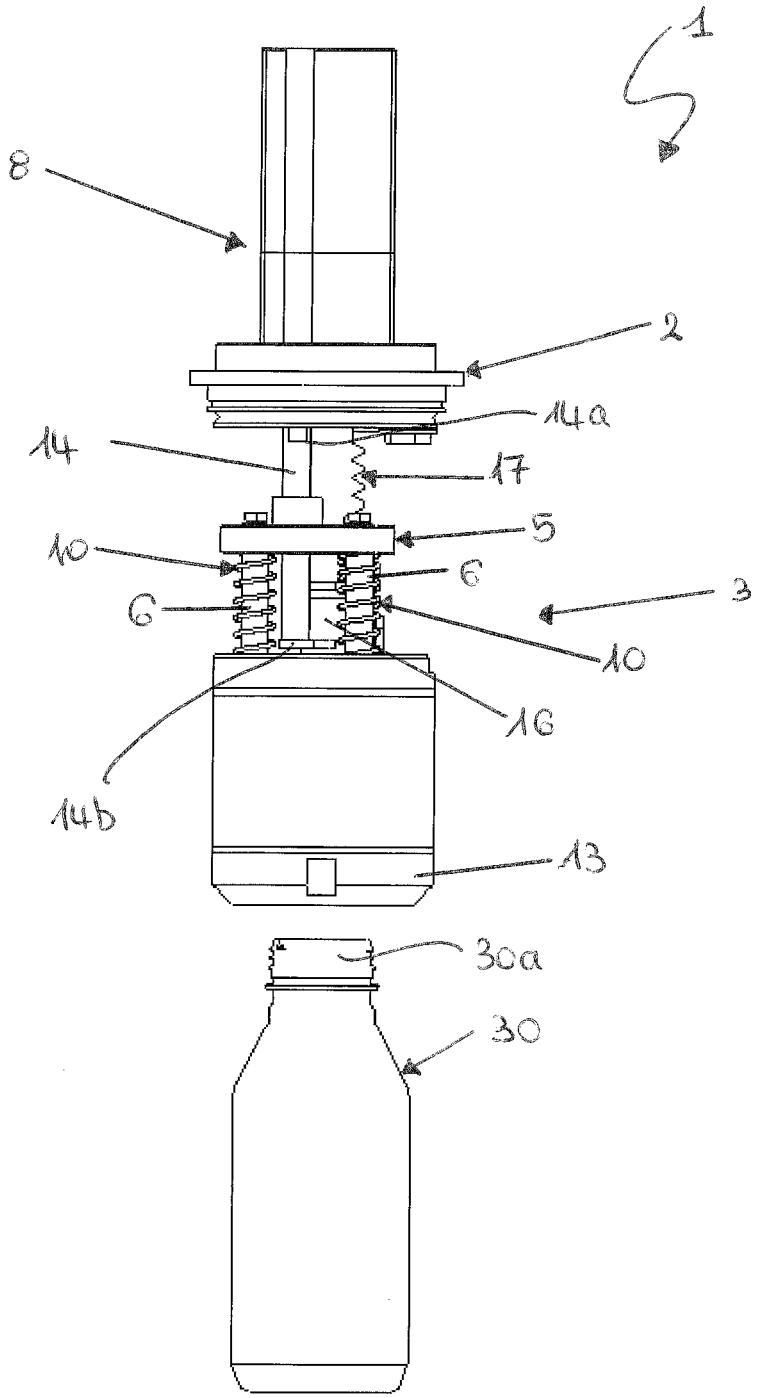


FIG. 6

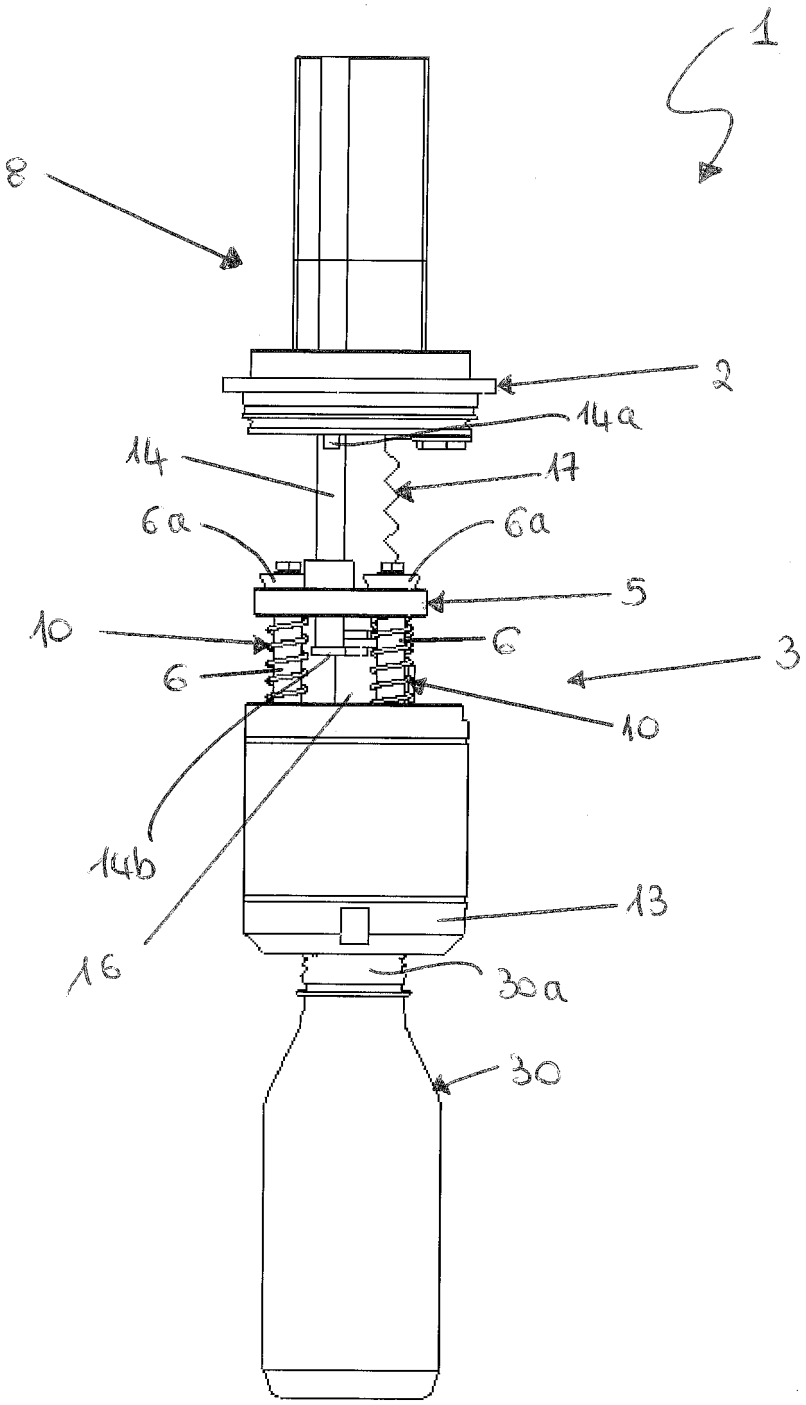


FIG.7

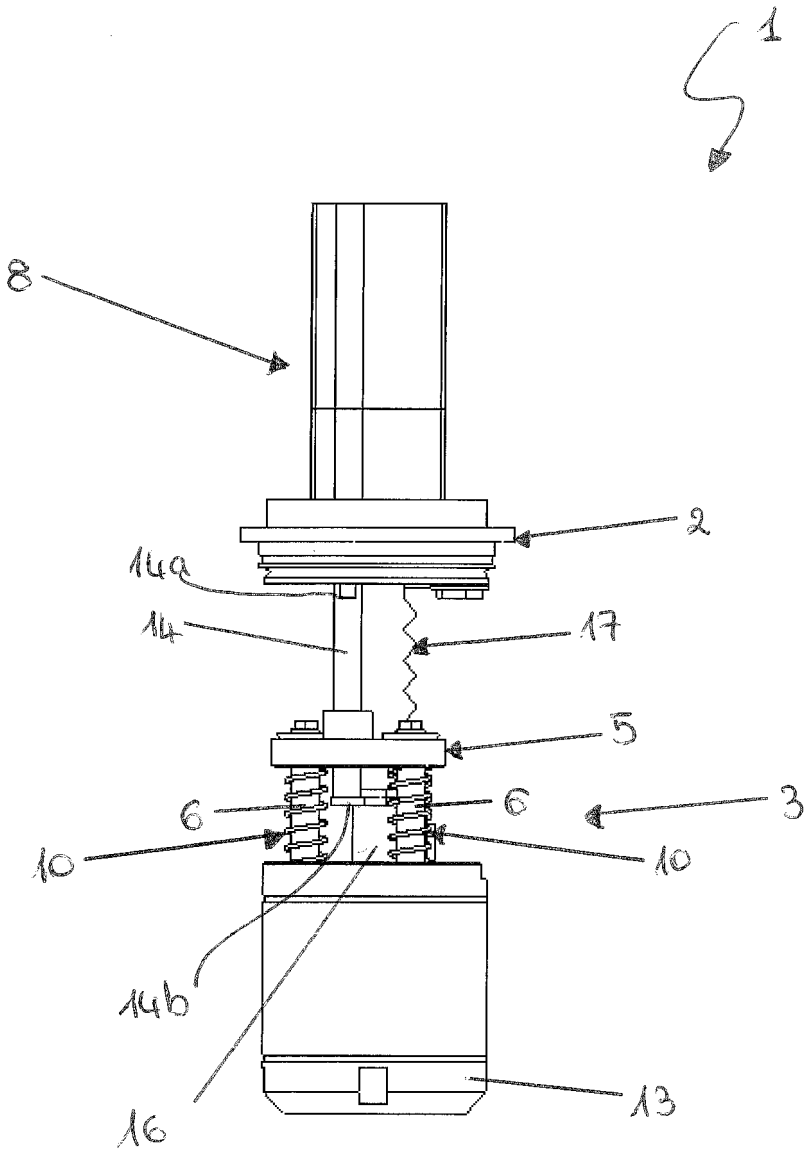


FIG. 8

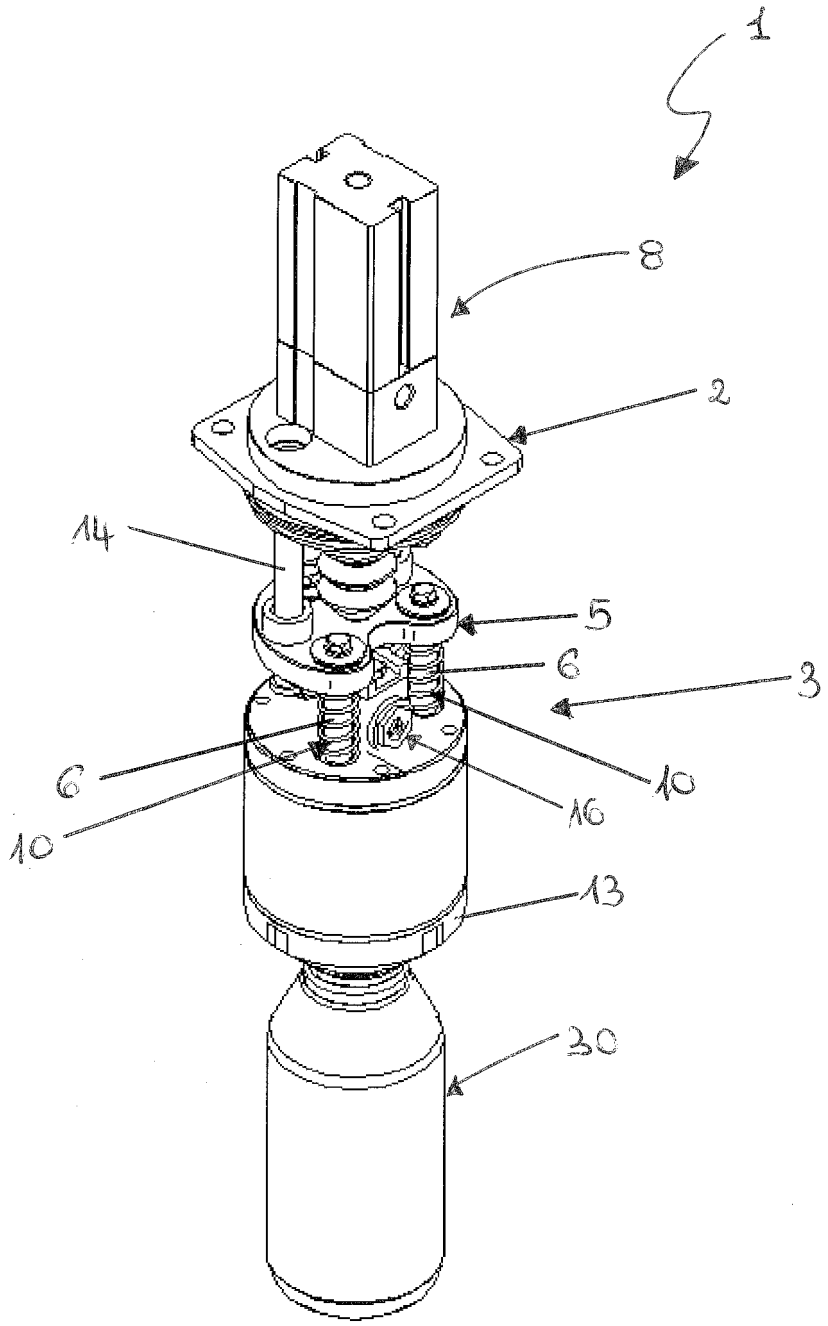


FIG. 9

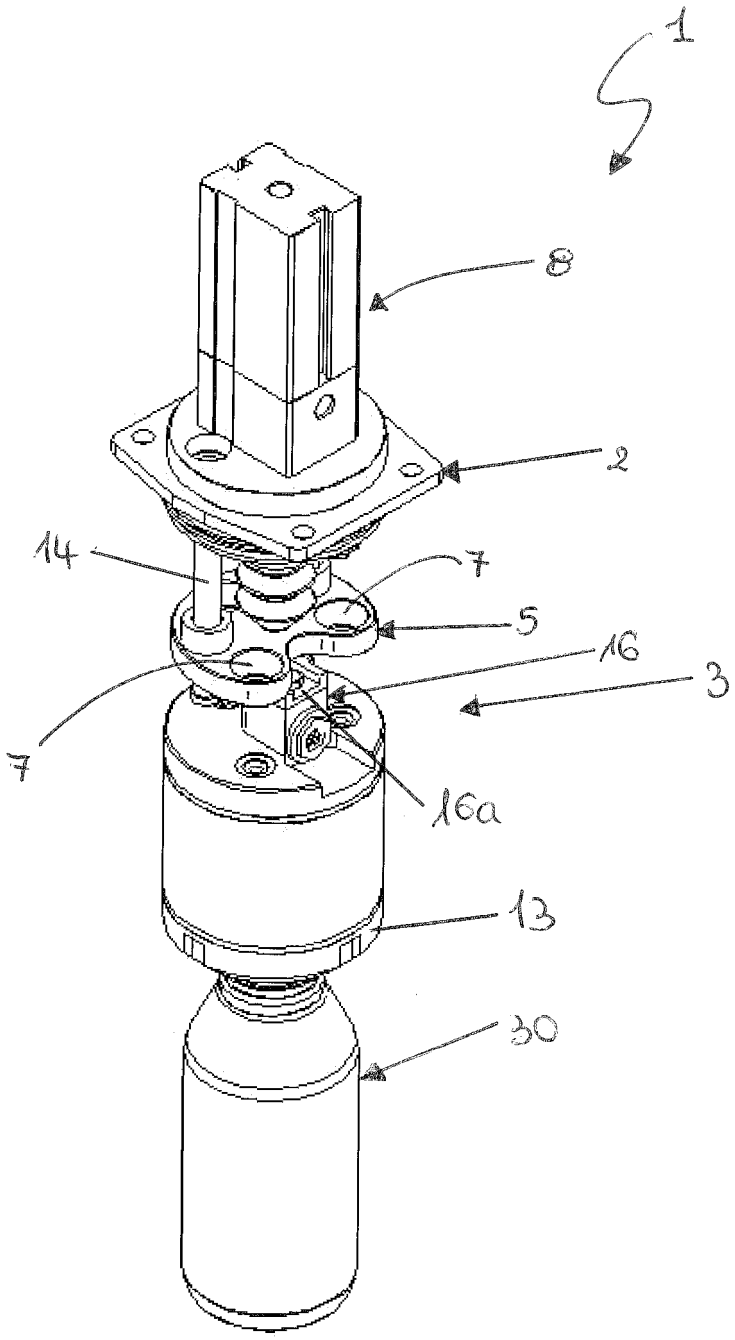
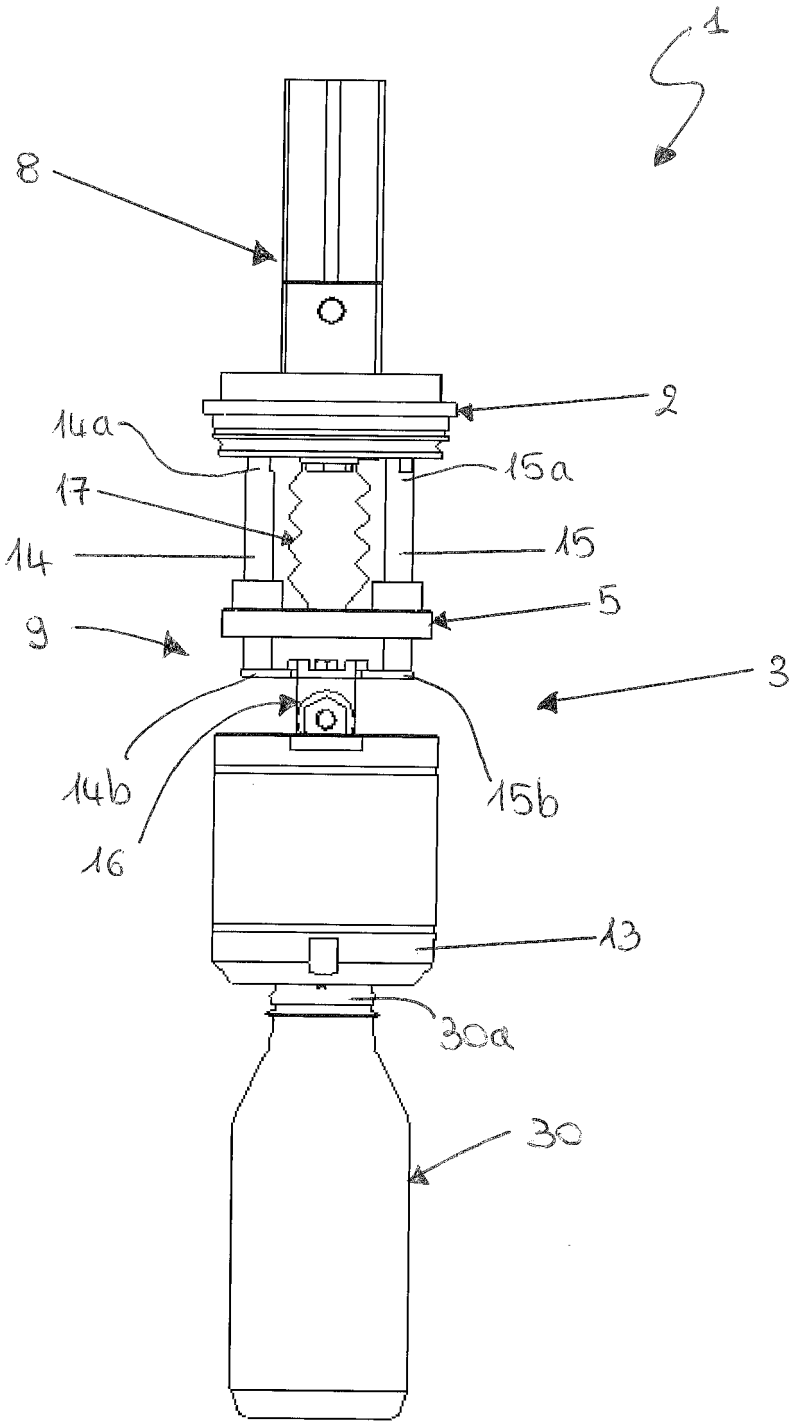


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 3780

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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A	JP H11 43195 A (SHIBUYA KOGYO CO LTD) 16 February 1999 (1999-02-16) * abstract; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B29C
B67B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 March 2018	Pardo Torre, Ignacio

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08-03-2018

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