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(54) **CAPPING DEVICE AND CAPPING METHOD**

(57) There is described a capping device (6, 6') configured to apply caps (3) onto containers (2) containing a pourable product and comprising: a support member (7) for supporting one container (2) to be capped at a time; a sleeve (14) having a longitudinal axis (A), a first axial opening (15) facing the support member (7) and a second axial opening (16); and a capping head (8) extending along the longitudinal axis (A) and slidably engaging the second axial opening (16) of the sleeve (14) thereby closing it; the capping head (8) has a capping portion (12) for receiving and retaining one cap (3) at a time and arranged within the sleeve (14) and being axially movable through the sleeve (14) for applying the cap (3) to the respective container (2); wherein the sleeve (14) is axially movable towards and away from the support member (7) and between: a first position, in which the first axial opening (15) is open and axially spaced from the support member (7); and a second position, in which the sleeve (14) is configured to cooperate in contact with the support member (7) or with the container (2) for closing the first axial opening (15) and thereby delimiting a pressurization chamber (17) configured to be pressurized for pressurizing an inner environment of said container (2) supported, in use, by the support member (7).

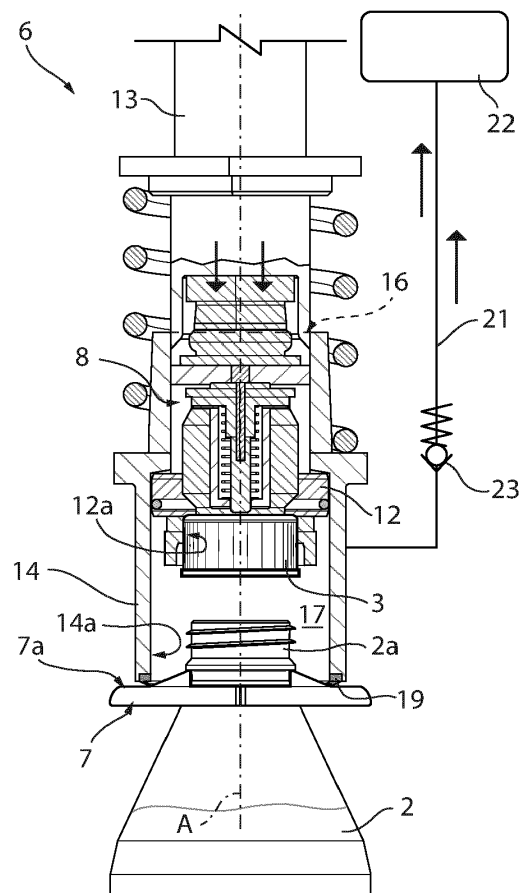


FIG. 3B

Description

TECHNICAL FIELD

[0001] The present invention relates to a capping device configured for capping containers containing a pourable product, preferably a pourable food product.

[0002] The present invention also relates to a method for capping containers containing a pourable product, preferably a pourable food product.

BACKGROUND ART

[0003] As it is known, many pourable product such as liquid products (e.g. mineral oils, lubricant oils, detergents, soap) or food liquid products (e.g. water, juice, wine, soft drinks, yogurt, milk) are sold in containers having different shapes, dimensions and materials.

[0004] The most common used material is plastic. Accordingly, the most common containers are plastic bottles, which are filled with the pourable product during a filling process and then undergo a capping process carried out by means of a capping machine.

[0005] Generally, the known capping machines are part of more complex handling assemblies adapted to carry out a series of successive operations on the above containers, such as forming, filling, capping and labelling.

[0006] A capping machine of the known type comprises a conveyor, typically a carousel rotatable about a vertical axis and including a plurality of peripheral receiving seats for receiving and supporting respective containers, and a plurality of capping devices, usually arranged in vertical alignment with the respective receiving seats and selectively activatable to apply and close a cap onto at least one container at a time, for example a screw cap or a snap-on cap.

[0007] Typically, the receiving seats and the capping devices are uniformly distributed about the carousel axis and are carried in rotation by the carousel itself.

[0008] Each capping device usually comprises a capping head including a control rod, drivable by an actuator, such as a motor or a cam, and a capping portion carried by the control rod at a free end thereof facing the respective receiving seat.

[0009] The capping portion is configured to grab and retain one cap to be applied at a time and is movable towards and away from the respective receiving seat to apply such cap to the respective container supported by the receiving seat.

[0010] A capping machine of the known type further comprises an infeed unit, such as an infeed star wheel, configured to feed containers to be capped to the carousel, and an outfeed unit, such as an outfeed star wheel, configured to receive capped containers from the carousel.

[0011] It is known in the field the need for pressurizing the containers before capping.

[0012] This is especially important when the containers

are made of a non-particularly rigid material, such as plastic, and even more important when such plastic containers are filled with non-carbonated (still) pourable products. In fact, such containers, when capped, do not have a strong structural stiffness and can be damaged during handling.

[0013] Furthermore, it is rising in the field the need for reducing the amount of plastic used to produce such containers. This results in containers having thinner plastic walls, which are therefore less stiff and more prone to deformation, especially during palletization.

[0014] According to a known widespread solution, the containers are pressurized, before capping, during their advancement on the infeed star wheel.

[0015] More precisely, the capping machine comprises means for injecting a predetermined amount of pressurizing agent, normally liquid nitrogen, inside the containers already filled with the pourable product. Since this process is carried out at atmospheric pressure, the liquid nitrogen then naturally passes into gaseous state, expanding its volume by several times.

[0016] In this way, the space between the free surface of the pourable product inside the container and the axial outlet opening of the container is filled with gaseous nitrogen, which stays in such space up to the capping of the container, hence pressurizing the container itself.

[0017] Although functionally and structurally valid, the capping machines and the capping devices of the above-mentioned type are still open to further improvements, in particular as to simplify the pressurization process of the containers.

DISCLOSURE OF INVENTION

[0018] It is therefore an object of the present invention to provide a capping device which is designed to meet the above-mentioned need in a straightforward and low-cost manner.

[0019] This object is achieved by a capping device as claimed in claim 1.

[0020] It is a further object of the present invention to provide a method for applying caps onto containers which is designed to meet the above-mentioned need in a straightforward and low-cost manner.

[0021] This object is achieved by a method for applying caps onto containers as claimed in claim 11.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Two non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic top view, with parts removed for clarity, of a capping machine comprising a plurality of capping devices according to the present invention;

Figure 2 is an enlarged-scale, perspective view, with

parts removed for clarity, of a carousel of the capping machine of Figure 1;

Figures 3A-3C are enlarged-scale, partially sectioned side views, with parts removed for clarity, of one capping device according to a first preferred embodiment of the present invention, during three successive operative conditions;

Figure 4 is an enlarged-scale, partially sectioned side view, with parts removed for clarity, of one capping device according to a second preferred embodiment of the present invention; and

Figures 5a-5b are enlarged-scale, perspective views, with parts removed for clarity, of a support member of the capping device according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0023] With reference to Figure 1, number 1 indicates as a whole a capping machine configured for capping containers 2, i.e. by at least applying caps 3 onto or to the containers 2. The containers contain or are filled with a pourable product, preferably a pourable food product.

[0024] Without losing generality, reference will be made in the following to containers 2 made of plastic, for example plastic bottles having a main body, a base and an upper end opening opposite to the base, arranged at a neck portion of the container and adapted to receive a cap 3.

[0025] In the preferred example shown herein, caps 3 are snap-on caps.

[0026] Alternatively, caps 3 could be screw caps.

[0027] As visible in Figure 1, capping machine 1 comprises:

- a conveyor, in particular a carousel 4 rotatable about an axis X, preferably vertical, and configured for carrying a plurality of containers 2 to be capped along a capping path;
- an infeed conveyor, preferably an infeed star wheel 5, configured for feeding containers 2 to be capped to carousel 4; and
- a plurality of capping devices 6 carried by carousel 4, each of the capping devices being configured to apply at least one respective cap 3 at a time to at least one respective container 2 at a time, during its advancement along the capping path.

[0028] In detail, capping devices 6 are mounted to a peripheral portion of carousel 4 and are equally angularly distributed about axis X.

[0029] Conveniently, capping machine 1 further comprises an outfeed conveyor, preferably an outfeed star wheel 5a, configured to receive the capped containers 2 from carousel 4.

[0030] For the sake of brevity, reference will be made in the following to a single capping device 6 configured to apply at least one cap 3 to at least one container 2.

However, all the structural and functional features described hereinafter for such capping device 6 are equally applicable to all capping devices 6 of capping machine 1.

[0031] In particular, capping device 6 comprises:

- a support member 7 for supporting the container 2 to be capped; and
- a capping head 8 extending along a longitudinal axis A, which is conveniently parallel to axis X and therefore vertical, preferably arranged in vertical alignment with support member 7 and selectively activatable to apply the cap 3 to the container 2, namely the container 2 supported by the support member 7.

[0032] According to this preferred embodiment, support member 7 comprises a gripper 10 (Figures 5a, 5b) mounted to a peripheral ring 4a of carousel 4, defining part of said peripheral portion, and configured for gripping a neck portion 2a of container 2.

[0033] In detail, gripper 10 has a pair of arms 11 movable between an open position and a closed position for surrounding and gripping neck portion 2a.

[0034] Capping head 8, and therefore capping device 6, is mounted to a peripheral ring 4b, spaced from peripheral ring 4a along axis X, and has a capping portion 12 with a seat 12a for receiving and retaining the cap 3, preferably coaxial with axis A.

[0035] In detail, the capping portion 12 is axially movable towards and away from support member 7 to apply cap 3 to container 2.

[0036] To this end, capping head 8 comprises a control rod 13 extending along axis A, carrying capping portion 12 at one axial end thereof, and axially movable towards and away from support member 7 in order to cause the axial movement of capping portion 12.

[0037] In greater detail, control rod 13 is fitted to an actuator which drives, in use, the movement of the control rod 13 itself, preferably under control of a control unit (not shown).

[0038] Capping device 6 further comprises a tubular sleeve 14 having a longitudinal axis, in particular having axis A, i.e. being coaxial to axis A, and including a first axial opening 15 facing support member 7 and a second axial opening 16 opposite the first axial opening 15.

[0039] In practice, first axial opening 15 defines a lower opening of sleeve 14 and second axial opening 16 defines an upper opening of sleeve 14 (Figures 3A-3C).

[0040] Preferably, second axial opening 16 has a diameter smaller than the diameter of first axial opening 15, in particular it has a diameter substantially equal to the diameter of control rod 13.

[0041] Control rod 13 slidably engages second axial opening 16, substantially in a fluid-tight manner, thereby closing second axial opening 16 substantially in a fluid-tight manner.

[0042] For example, a known gasket (not shown) is fitted to sleeve 14 so as to be radially interposed between second axial opening 16 and control rod 13, thus obtain-

ing such fluid-tight coupling.

[0043] It is specified that the term "substantially" hereby indicates that small, negligible leaks of fluid through the coupling between control rod 13 and second axial opening 16 could occur.

[0044] In other words, capping head 8 engages second axial opening 16 thereby closing second axial opening 16.

[0045] Capping portion 12 is arranged within sleeve 14 and is axially movable through sleeve 14 for applying cap 3 to container 2.

[0046] In practice, during the capping operation, capping portion 12 is always arranged inside sleeve 14 and is axially movable therein due to the axial movement imparted by control rod 13.

[0047] Sleeve 14 is, in turn, axially movable towards and away from support member 7 and between:

- a first position, in which first axial opening 15 is open and axially spaced from support member 7; and
- a second position, in which sleeve 14 cooperates in contact with support member 7 for closing first axial opening 15 and thereby delimiting a pressurization chamber 17, the chamber 17 being configured to be pressurized for pressurizing an inner environment of container 2.

[0048] In the case the container 2 is a bottle, the inner environment of the container 2 corresponds to the neck of the filled bottle. Said neck, for example in case the bottle contains a not carbonated pourable product, must be stiffened to improve the rigidity of the bottle. The stiffening is for reducing or avoiding the deformation to which the bottle, after the palletization, will be subjected due to the pressure of other bottles placed above. The pressurization can therefore be carried out for palletization purposes. According to the prior art, the pressurization is obtained by introducing an amount of an additional substance, which can be nitrogen in the liquid state. Said substance, thanks to the capping operation, passes from the liquid state to a pressurized gas state.

[0049] By means of the capping device according to present invention, the consumption of the additional substance is not any more necessary, because the pressurization is not obtained by means of introducing said substance. Therefore, it is provided a more efficient capping device configured for capping and stiffening a container containing a pourable product.

[0050] Accordingly, chamber 17 is delimited laterally by sleeve 14, superiorly by capping head 8, more precisely by control rod 13, and inferiorly by support member 7.

[0051] The so obtained chamber 17 houses, when sleeve 14 is in the second position, neck portion 2a of the container 2 to be capped.

[0052] According to an alternative configuration not shown, in the second position, sleeve 14 could be configured to cooperate in contact with container 2, in par-

ticular with an upper portion of the body of container 2 in order to cause first axial opening 15 to close, thereby delimiting pressurization chamber 17. In this case chamber 17 is delimited inferiorly by container 2.

[0053] In light of the above, chamber 17 is closable by sleeve 14 being in the second position.

[0054] Conveniently, sleeve 14 carries, at a lower end portion thereof, a sealing lip 19 configured to cooperate in contact (when sleeve 14 is in the second position) with support member 7 - or with container 2 - so that chamber 17 is closed substantially in a fluid-tight manner.

[0055] In the example shown, capping device 6 comprises a cam roller 50 (visible in Figure 2) configured to cooperate with a cam surface (not shown) to cause the movement of sleeve 14 between the first and second position.

[0056] Alternatively, sleeve 14 could be moved by a dedicated motor.

[0057] According to the non-limiting preferred embodiment shown, capping portion 12 extends radially up to an internal wall 14a of sleeve 14 and is axially movable towards and away from support member 7, by being driven in use by control rod 13, in sliding contact with internal wall 14a to define a piston within sleeve 14.

[0058] In other words, capping portion 14 slidably engages sleeve 14, radially occupying the whole internal cavity defined by sleeve 14.

[0059] Accordingly, capping portion 12 defines, in its axial movement within sleeve 14 a piston within sleeve 14 itself, while sleeve 14 defines the cylinder housing such piston.

[0060] Advantageously, capping portion 12 is configured to pressurize chamber 17 by moving towards support member 7 for capping the container 2 which is supported, in use, by support member 7. The device 1 is configured so that the capping portion 12 applies the cap 3 to the container 2 by means of an axial capping movement towards the support member 7. The device 1 is configured so that the capping portion 12 pressurizes the chamber 17 by means of the same axial capping movement. In this way the capping portion 12 contributes actively both to the pressurization and the capping, to simplify the capping device 6 and the control of the pressurization and capping operations.

[0061] Opportunely, capping portion 12 is movable towards support member 7 when sleeve 14 is in said second position.

[0062] In other words, in order to pressurize chamber 17, sleeve 14 is moved from the first position (Figure 3A) to the second position (Figure 3B) so that sealing lip 19 contacts support member 7 - or container 2 - thereby closing first axial opening 15. Then, capping portion 12, which carries a cap 3 to be applied, is moved, by driving control rod 13, towards support member 7 and, thus, towards container 2 (Figure 3C). By means of the movement of the capping portion 12 between Figure 3B and Figure 3C, the cap 3 is applied to the container 2 and the chamber 17 is pressurized, to pressurize the inner envi-

ronment of the container 2.

[0063] By this movement, and due to the fact that capping portion 12 cooperates in sliding contact with internal wall 14a, the pressure within chamber 17 increases.

[0064] In this way, since container 2 is still uncapped, the space between the free surface of the pourable product and the upper outlet opening of container 2 is pressurized at a pressure equal to the rising pressure inside chamber 17.

[0065] Advantageously, capping device 6 comprises a linear motor 20 (Figure 2), defining the above-mentioned actuator, configured to drive capping portion 12 in its movement towards and away from support member 7. Linear motor 20 allows to better adjust the capping movement based on the specific needs, which in turn depend for example on the features of the container 2 and/or on the features of the cap 3, and/or on the level of pressurization to be obtained within the chamber 17. In this way the flexibility of the filling device 6 is improved.

[0066] In detail, control rod 13 is coupled to linear motor 20 so that linear motor 20 drives, in use, control rod 13, thereby driving the capping movement of capping portion 12.

[0067] The use of linear motor 20 is particularly advantageous as it allows to control finely and precisely the axial movement of the piston/capping portion 12 within sleeve 14, which results in a more fine control of the pressurization of chamber 17.

[0068] Moreover, linear motor 20 is particularly advantageous when caps 3 of the snap-on type are used.

[0069] According to the preferred embodiment shown, capping device 6 further comprises:

- a duct 21 configured to pneumatically connect sleeve 14, and hence chamber 17, with a pressurized environment 22 which is at a predetermined pressure greater than atmospheric pressure; and
- a one-way valve 23 arranged along duct 21 and activatable for allowing a passage of pressurized gas from chamber 17 to pressurized environment 22.

[0070] The filling device 6 is configured so that the one way valve 23 allows the flow of pressurized gas from the chamber 17 to the pressurized environment 22 only when the pressure within the chamber 17 reaches a threshold physically correlated to the predetermined pressure.

[0071] Specifically this threshold could be ideally considered to correspond substantially to the same predetermined pressure. Therefore the maximum pressure and therefore the final pressurization within the chamber 17 can be controlled also by regulating the pressure within the pressurized environment 22. In this way the device 6 can be easier adapted to the specific needs, so that it is easier for the user to exploit the increased flexibility of the capping device 6.

[0072] In detail, capping machine 1 comprises a reservoir 22 defining the above pressurized environment and pneumatically connectable to chamber 17 by means

of one-way valve 23 and duct 21. The reservoir 22 can be considered as a counter pressure source.

[0073] In greater detail, when sleeve 14 is in the second position and capping portion 12 is moving towards support member 17 to apply cap 3 to container 2, the pressure inside chamber 17 rises up to a predetermined value which causes one-way valve 23 to open, thereby allowing a passage of the pressurized gas located inside chamber 17 from chamber 17 towards reservoir 22, through duct 21. This predetermined value is the threshold above.

[0074] In this way, a control of the pressurization of each container 2 can be carried out in a very simple and cost-effective way, by simply implementing an inexpensive one-way valve 23.

[0075] Furthermore, an undesired too high pressure value inside chamber 17 can be avoided, which could hinder a fluid and precise movement of the piston/capping portion 12 within sleeve 14.

[0076] Moreover, the above configuration is particularly useful in case a format change is due, i.e. in case capping machine 1 is configured to cap containers 2 of different format: in such a case, the space between the free surface of the pourable product and the outlet opening of container 2 is variable and thus variable is the pressurization value at which the different containers 2 have to be pressurized. By dimensioning the one-way valve 23 and/or by changing only the one-way valve it is possible to cap containers 2 of different format in an easy and cost-effective way.

[0077] As visible in Figures 5a and 5b, each arm 11 of gripper 10 of support member 7 carries an elastomeric pad 24, in particular made of silicon, at a free end thereof. Such pad 24 is configured to cooperate in contact, when arms 11 are in the closed position, with the elastomeric pad 24 carried by the other arm 11 of the same pair.

[0078] In use, sleeve 14, and in particular sealing lip 19, is configured to contact an upper surface 7a of support member 7, wherein such upper surface 7a radially protrudes from peripheral ring 4a of carousel 4 and is defined, for a part thereof, by one arm 11 and, for the remaining part, by the other arm 11.

[0079] Hence, the presence of elastomeric pads 24 ensures that, when sleeve 14 is in the second position, chamber 17 is inferiorly closed substantially in a fluid-tight manner, thereby limiting fluid leaks out of chamber 17.

[0080] Preferably, each arm 11 is provided with further elastomeric pads 25 at portions other from its free end, so as to more efficiently seal chamber 17 when sleeve 14 is in the second position.

[0081] According to an alternative embodiment not shown, sleeve 14, and in particular sealing lip 19, is configured to cooperate in contact, when in the second position, with support member 7 and peripheral ring 4a.

[0082] In detail, in this case peripheral ring 4a defines a first support wall 26 (Figure 2), in particular an upper support wall, and the end portion of each arm 11 has a second support wall, defined by a part of upper surface

7a, which is flush to first support wall 26 for defining, together with first support wall 26, a support surface for sleeve 14 in the second position.

[0083] Thus, in this case chamber 17 is delimited inferiorly by both support member 7 and peripheral ring 4a of carousel 4.

[0084] Thanks to the configuration described above, a method for applying caps 3 onto containers 2 containing a pourable product can be implemented by capping machine 1, the method comprising, for each container to be capped, the steps of:

- a) supporting container 2 by means of support member 7;
- b) providing capping head 8 spaced from support member 7;
- c) gripping one cap 3 to be applied by means of capping portion 12;
- d) moving capping portion 12 towards support member 7 to apply cap 3 to container 2 supported by support member 7; and
- e) capping container 2 by the step d) of moving capping portion 12;

wherein the method further comprises steps of:

- f) moving sleeve 14 from the first position to the second position; and
- g) pressurizing chamber 17 prior to the step e) of capping.

[0085] Figure 4 shows a capping device 6' according to an alternative embodiment of the present invention.

[0086] Since capping device 6' is functionally and structurally similar to capping device 6, the same reference numbers will be used to indicate similar parts.

[0087] In particular, capping device 6' differs from capping device 6 in that capping portion 12 does not extend radially up to internal wall 14a and by comprising, instead of duct 21 and one-way valve 23:

- a pressurization duct 21' configured to pneumatically connect sleeve 14 with a pressure source 22' (which can be part of capping machine 1 or not) containing a pressurizing gas, for example pressurized air; and
- a valve 23' arranged along the pressurization duct 21' and operable to selectively allow or prevent a flow of pressurization gas from pressure source 22' towards sleeve 14 and into chamber 17.

[0088] Preferably, capping machine 1 comprises a reservoir 22' defining the pressure source and pneumatically connectable to chamber 17 by means of valve 23'.

[0089] In greater detail, when sleeve 14 is in the second position and capping portion 12 is still spaced from container 2, valve 23' is opened to allow pressurized gas to flow from reservoir 22' into chamber 17, thereby pressurizing this latter and container 2.

[0090] Then, capping portion 12 is moved, by means of control rod 13, towards container 2 to apply the respective cap 3 to this latter.

[0091] Hence, in this preferred embodiment, capping portion 12 does not define a piston within sleeve 14.

[0092] The advantages of capping device 6, 6' according to the present invention will be clear from the foregoing description.

[0093] In particular, thanks to the above configuration, a simple and cost-effective way of pressurizing containers 2 filled with pourable product before capping can be obtained, while avoiding the use of nitrogen and avoiding the need for complicated pressurizing means along the infed star wheel 5.

[0094] More in particular, the system is particularly advantageous when capping portion 12 is used as a piston within sleeve 14 to pressurize containers 2, since the capping movement of capping head 8 is used as pressurizing means.

[0095] Therefore, the pressurization process of containers 2 is widely simplified, thereby allowing for a stiffening of containers 2 in a much simpler way.

[0096] Clearly, changes may be made to capping device 6, 6' as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. A capping device (6; 6') for capping containers (2) filled with a pourable product, the capping device (6, 6') comprising:

- a support member (7) for supporting at least one container (2) to be capped by at least one cap (3);
- a tubular sleeve (14) having a longitudinal axis (A), a first axial opening (15) facing the support member (7) and a second axial opening (16) opposite the first axial opening (15); and
- a capping head (8) extending along said longitudinal axis (A) and slidably engaging the second axial opening (16) of the sleeve (14) thereby closing said second axial opening (16);

the capping head (8) comprising a capping portion (12) with a seat (12a) for receiving and retaining the cap (3), the capping portion (12) being arranged within the sleeve (14) and being axially movable through the sleeve (14) for applying said cap (3) to the supported container (2); wherein the sleeve (14) is axially movable towards and away from the support member (7) and between:

- a first position, in which the first axial opening (15) is open and axially spaced from the support member (7); and

- a second position, in which the sleeve (14) co-operates in contact with the support member (7) or with the container (2) for closing the first axial opening (15) and thereby delimiting a pressurization chamber (17), which chamber (17) is configured to be pressurized for pressurizing an inner environment of said supported container (2).
2. The capping device (6; 6') as claimed in claim 1, wherein the capping head (8) comprises a control rod (13) extending along said longitudinal axis (A), axially movable towards and away from said support member (7), carrying at one end portion thereof said capping portion (12) and engaging in a sliding manner said second axial opening (16) substantially in a fluid-tight manner so as to delimit, together with said sleeve (14), said pressurization chamber (17) open at said first axial opening (15) and closable substantially in a fluid-tight manner by the sleeve (14) being in said second position.
 3. The capping device (6) as claimed in claim 1 or 2, wherein the capping portion (12) radially extends up to an internal lateral wall (14a) of the sleeve (14) and is axially movable towards and away from the support member (7) in sliding contact with said internal wall (14a) to define a piston within the sleeve (14); and wherein the device (6; 6') is configured so that the capping portion (12) applies the cap (3) to the container (2) by means of an axial capping movement towards the support member (7); and wherein the device (6; 6') is configured so that the capping portion (12) pressurizes the chamber (17) by means of the same axial capping movement.
 4. The capping device (6) as claimed in claim 3, wherein the capping portion (12) is movable towards the support member (7) when the sleeve (14) is in said second position.
 5. The capping device (6) as claimed in claim 3 or 4, and comprising:
 - a duct (21) configured to pneumatically connect the sleeve (14) with a pressurized environment (22) which is at a predetermined pressure greater than atmospheric pressure; and
 - a one-way valve (23) arranged along the duct (21) and activatable for allowing a passage of pressurized gas from the pressurization chamber (17) to the pressurized environment (22);

the capping device (6) being configured so that the one way valve (23) allows the flow of pressurized gas from the chamber (17) to the pressurized environment (22) only when the pressure within the chamber (17) reaches a threshold physically correlated to said predetermined pressure (22).
 6. The capping device (6) as claimed in any of claims 3 to 5, and comprising a linear motor (20) configured to drive the capping movement of the capping portion (12).
 7. The capping device (6') as claimed in claim 1 or 2, and comprising:
 - a pressurization duct (21') configured to pneumatically connect the sleeve (14) with a pressure source (22') containing a pressurizing gas; and
 - a valve (23') arranged along the pressurization duct (21') and operable to selectively allow or prevent a flow of pressurization gas from the pressure source (22') towards the sleeve (14) and into the pressurization chamber (17).
 8. The capping device (6; 6') as claimed in any of the foregoing claims, wherein the support member (7) comprises a gripper (10) for gripping a neck portion (2a) of the container (2); the gripper (10) comprising a pair of arms (11) movable between an open position and a closed position for surrounding and gripping said neck portion (2a).
 9. The capping device (6; 6') according to claim 8, wherein each arm (11) carries at least one elastomeric pad (24, 25) at a free end thereof configured to cooperate in contact, in the closed position, with the at least one elastomeric pad (24, 25) carried by the other arm (11) of the same pair.
 10. A capping machine (1) for capping containers (2) filled with a pourable product, the machine (1) comprising:
 - a conveyor (4) configured for carrying a plurality of successive containers (2) to be capped along a capping path; and
 - a plurality of capping devices (6, 6'), each capping device (6; 6') being as claimed in any one of the foregoing claims and carried by the conveyor (4).

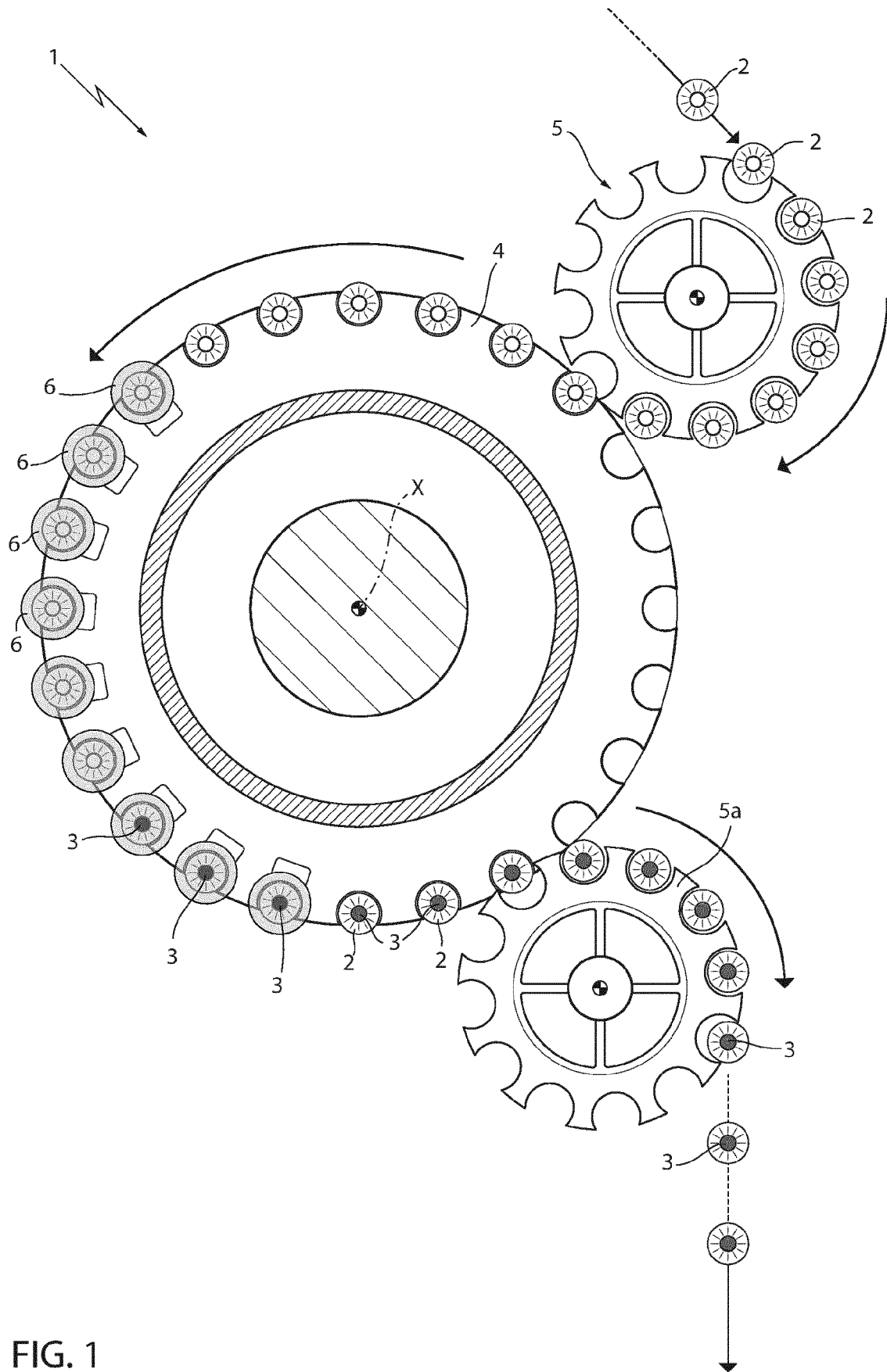


FIG. 1

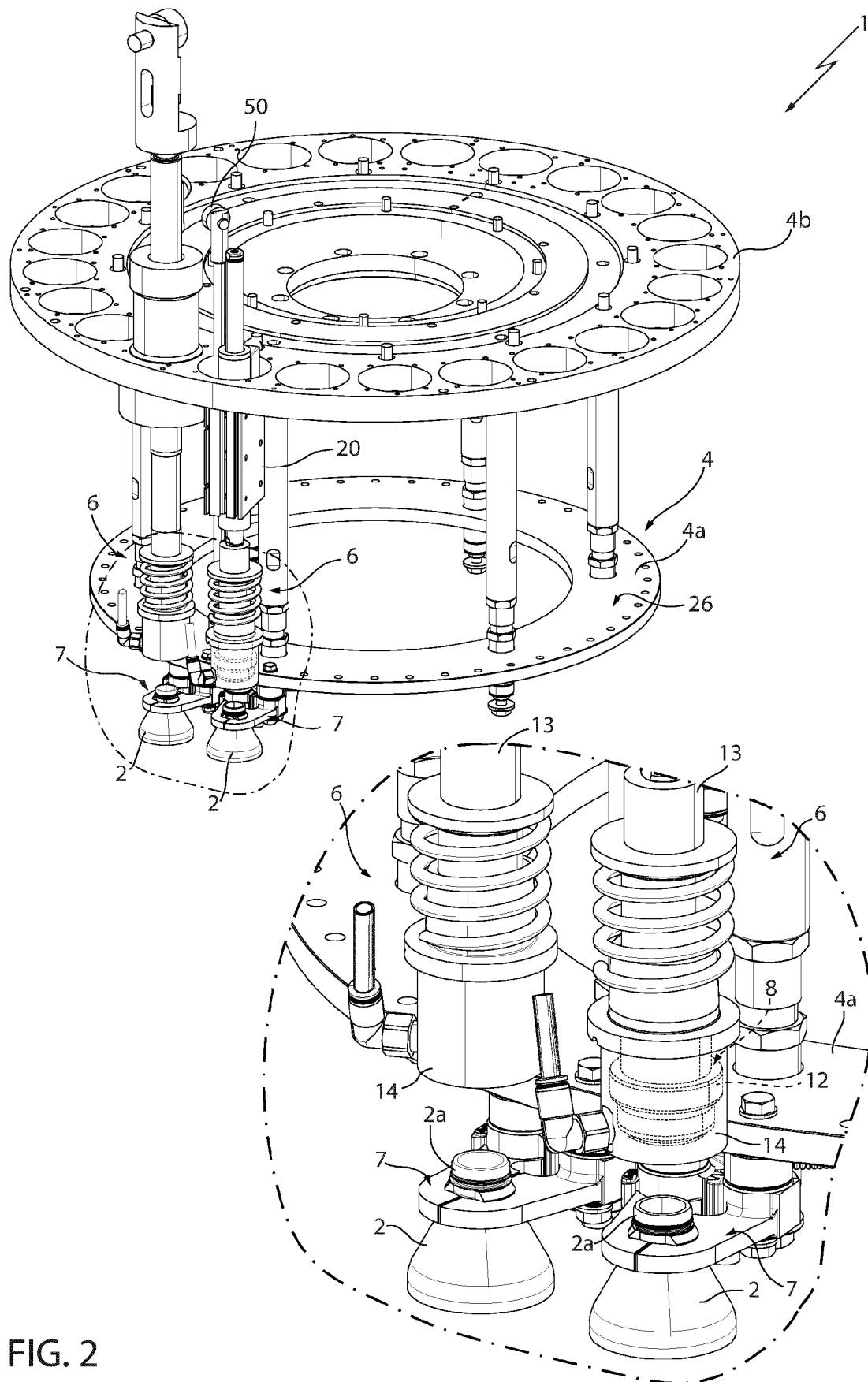


FIG. 2

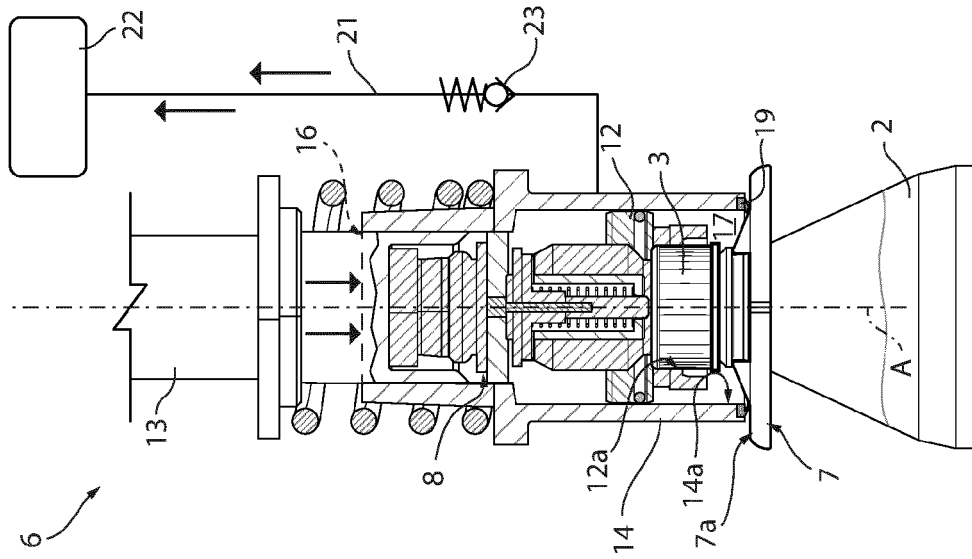


FIG. 3C

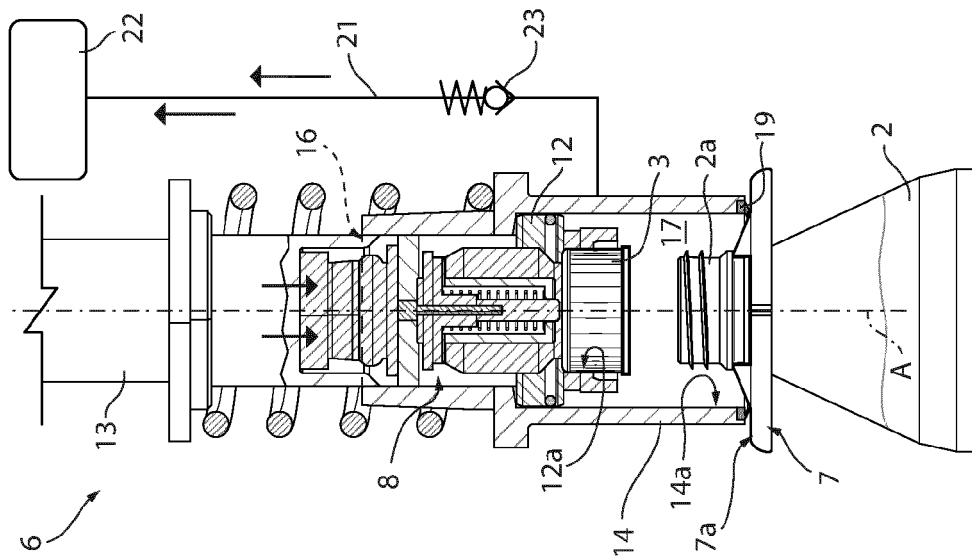


FIG. 3B

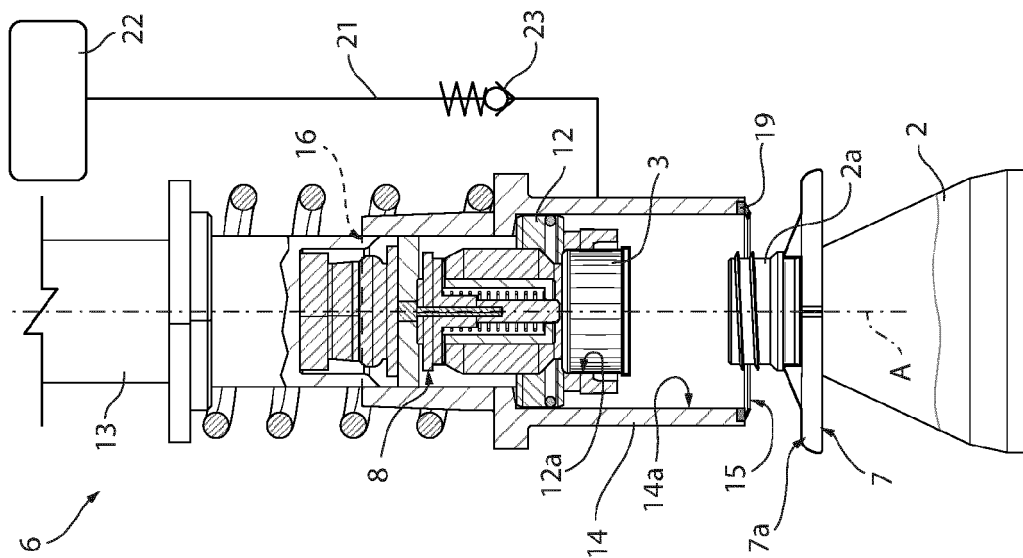


FIG. 3A

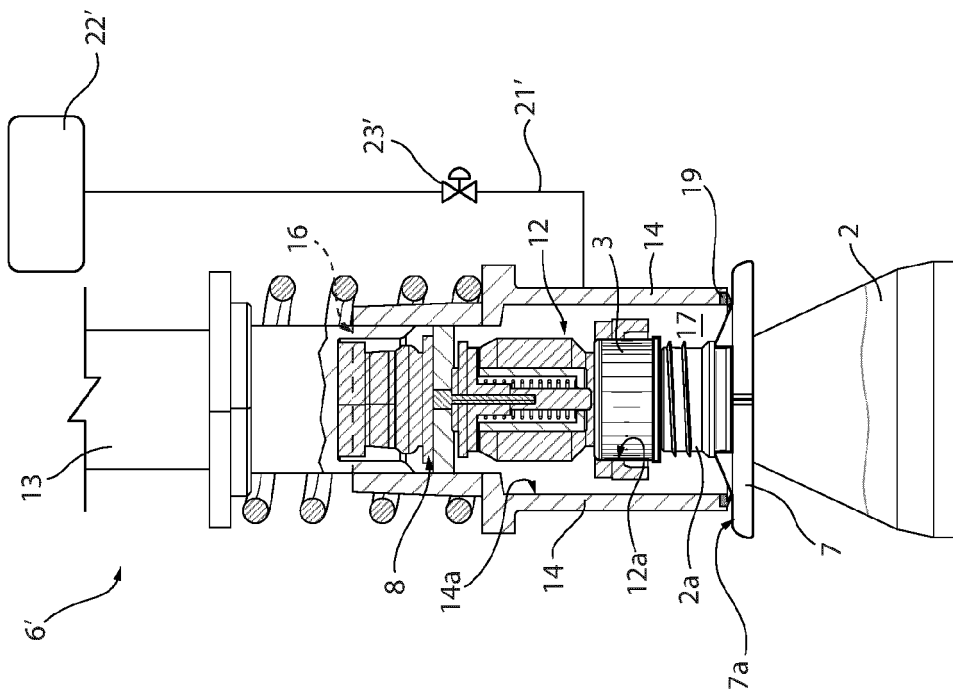


FIG. 4

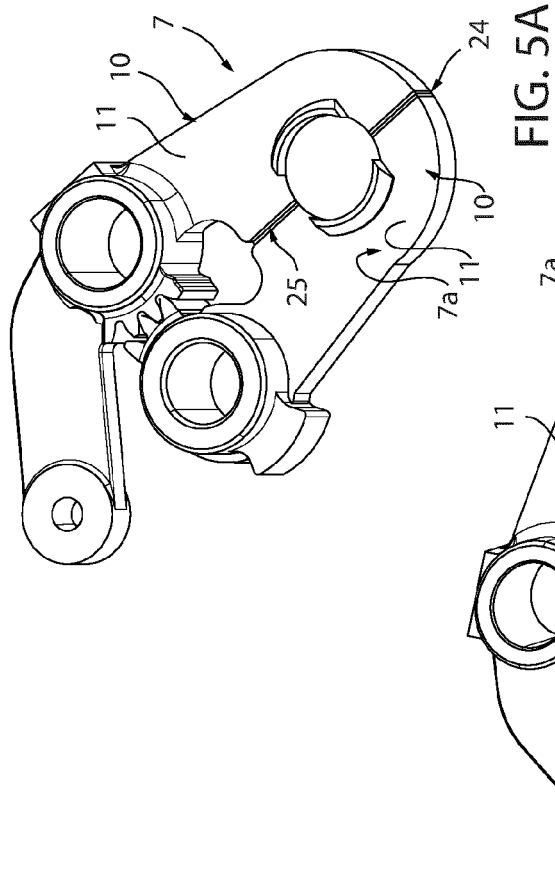


FIG. 5A

FIG. 5B



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Application Number
EP 21 16 7767

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