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(54) Capping head for applying caps on containers

(57) Capping head (1) for applying caps (5) on containers, which is intended to be mounted on a capping machine and comprises transmission means (12) interposed between an actuator pin (10) and an ejection pin (9) for opening gripping devices (8) for screwing the cap. Such transmission means (12) do not interfere with the movements of the ejection pin (9) during the capping operations like those for screwing and flanging the cap (5), and, at the moment of opening of the gripping devices (8), coupled in withholding relation with the ejection pin (9) in response to the descent action onto them of the actuator pin (10) to transmit the movement of the actuator pin to the ejection pin in order to determine the opening of the gripping devices.

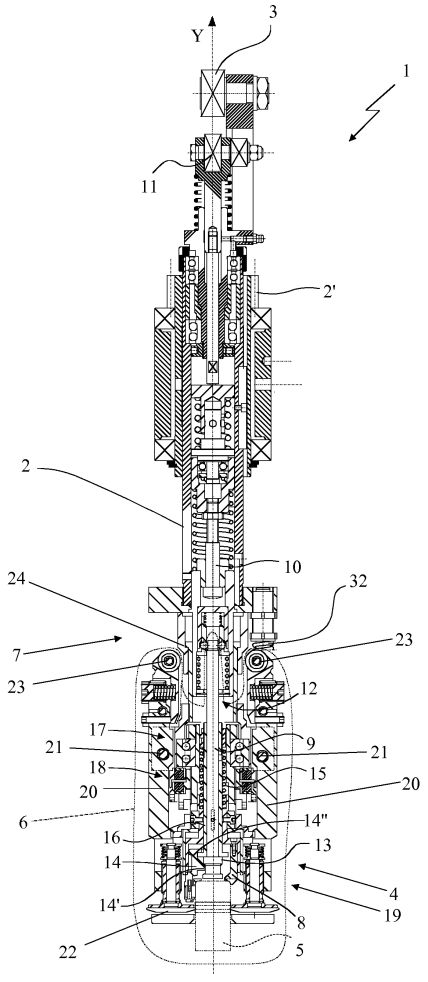

Fig. 1

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Description

Field of application

[0001] The present invention concerns a capping head for applying caps on containers, in particular bottles or the like, according to the preamble of the main independent claim.

[0002] The head in question is intended to be mounted on capping machines advantageously used in industrial bottling lines and units of fluids and in particular of beverages such as wine, whisky, mineral water, fruit juices or other, in order to close the mouth of the containers with caps generally held on the same containers by screwing.

State of the art

[0003] A conventional industrial bottling unit available on the market carries out the different packaging steps of the fluid product into the containers in sequences through dedicated operating machines that usually, as known, comprise at least one rinsing machine, a filling machine and a capping machine. The containers are transported through the machines assigned to carry out the individual functions of cell wheels, Archimedean screws or conveyor belts.

[0004] Capping machines automatically close containers conventionally through a rotary turntable on which numerous capping heads are mounted, equally spaced apart and suitable for closing the containers while they transit around the turntable.

[0005] Capping machines close the containers through different types of capping heads, each equipped with specific mechanical solutions, researched according to the cap intended to be applied and the container to be closed.

[0006] For example, a first type of capping head, referred to as a "capper", is known, which takes care of screwing caps consisting of screw caps, in general made from plastic or metallic material, on the threaded top of containers.

[0007] For this purpose, each head of this type is usually provided with gripping devices to firstly grip onto the caps and then screw them onto the containers by rotating around the axis of the head as is, for example, described and illustrated in patents EP 248,145 and DE 3912324.

[0008] A second type of capping head is also known that is used to apply caps onto the threaded top of containers through rolling. In this case, the capping head makes threadings or just notches on a flange, usually metallic, of the caps, by means of deformation against a finishing of the mouth of the containers.

[0009] For this purpose, each head of this type is usually provided with forming rollers, moved in rotary motion by the head itself against the caps to form threadings in their flanges as described and illustrated, for example in patents US 4,086,747 and US 3,303,955.

[0010] In any case, the capping heads are supported all around the turntable of the machine through corresponding connectors in turn generally mechanically connected to the machine through chucks capable of setting them in rotation.

[0011] Each head is controlled in the capping operations through the controlled descent onto the container.

[0012] For example, international patent WO 2004/005181 foresees controlling the descent of the capping head with a first travel suitable for controlling the screwing of the crowns on the mouth of the bottle and with a second travel suitable for controlling the rolling of the crowns below the ring of the neck of the bottle to make the guarantee seal.

[0013] The descent of the head on the bottle that operatively determines the actuation of the different capping steps through suitable operative means, like for example gripping screwing devices, flanging and/or crimping rollers, is controlled by a first cam formed fixed on the capping machine and in which a first cam-following wheel engages mounted on the support connector of the capping head.

[0014] A second cam is also foreseen, also arranged fixed on the capping machine, in which a second cam-following wheel of the capping head engages, having the task, once the closing operations of the cap have finished, of actuating an actuator pin that, by pushing on an ejection pin, determines the opening of the gripping devices for withholding the crown.

[0015] The actuator pin acts upon the ejecting roller to open the gripping device and for this purpose it is controlled to slide in the head by the second cam-following roller by varying the distance of the latter from the first cam-following roller. By increasing the distance between the two rollers, the actuator pin slides in the capping head and, acting upon the ejection pin, controls the opening of the gripping device.

[0016] Currently, the descent of the actuating roller must cover the entire operative travel that is made while shortening between a lower part and an upper part of the capping head and that is necessary to control the capping steps of the cap on the bottle (and in particular the screwing and rolling steps) and it must also cover the actuation travel necessary to act upon the ejection pin until the gripping devices are made to open.

[0017] The length of the operative travel as a sum of the travels of the different capping steps of the capping head influences the actuation travel of the actuator pin. Indeed, the distance between the actuator pin and the ejector pin must be sufficiently large so that, during the capping steps, the two pins do not interact with one another determining the undesired opening of the gripping devices, i.e. the breaking of the head itself.

[0018] Currently, therefore, the ejection pin receives from the actuator pin the impulse to open the gripping device with a quite long travel able to vary according to the different operative capping methods (or adjustment of the capping operations for example according to the

caps used) which can lead to a modification in shape of the cams.

[0019] The ejection pin, substantially fixedly connected to the gripping device during the capping operations, must be free to slide rising in the head during the shortening thereof concurrently with the operative closing steps of the cap, without interfering with the actuator pin that, on the other hand, is fixedly connected to the first cam in these capping steps.

[0020] In order to avoid the two pins meeting, in current known capping heads it is necessary to foresee a substantial actuation travel for the actuator pin so that it can reach the ejection pin to open the gripping device.

[0021] The length of the operative travel depends, as well as upon the capping operations to be carried out, also upon the type of caps that are used, i.e. for example upon the methods with which the load must be exerted on the cap during screwing or during flanging. For example, it is possible to foresee an initial screwing step without load of the cap by the gripping device so as to avoid the threads riding over one another.

[0022] Consequently, currently whenever concurrently with various operative capping possibilities, i.e. in different capping methods due for example to the use of different caps, it is necessary to vary the operative travel to take into account the different shortening of the head, it is necessary to adjust, or rather adapt, the actuation travel of the actuator pin.

[0023] This circumstance currently limits the versatility of current capping machines, i.e. it obliges onerous adaptations in the shape of the cams to take into account any variation in operative travel that it is wished to make to respond to the different capping requirements.

[0024] Such circumstances obviously have a negative impact upon the bottling yield of the entire industrial unit.

Presentation of the invention

[0025] In this situation the task set that forms the basis of the present invention is to eliminate the drawbacks of the prior art quoted above, by providing a capping head for applying caps on containers, in particular bottles or the like, which allows it to be adjusted, modified in its operative possibilities, or even in part replaced, without modifying the travel of an actuator pin to open gripping devices for withholding crowns.

[0026] Another purpose of the present finding is to provide a capping head, which allows extremely versatile use of the capping machine.

[0027] Another purpose of the present finding is to provide a capping head, which allows it to be adjusted to respond to the different capping requirements in a quick an easy manner.

[0028] A further purpose of the present finding is to make a capping head that is constructively simple, and operatively totally reliable.

[0029] These purposes and other are all accomplished by a capping head for applying caps on containers, in particular bottles or the like, according to the attached claims.

[0030] Thanks to this capping head it is possible to quickly adapt the capping machine to operate according to different capping modes according to the production requirements, i.e. according to the caps that it is wished to use.

Brief description of the drawings

[0031] The technical characteristics of the finding, according to the aforementioned purposes, can be clearly found in the content of the claims presented below and its advantages will become clearer in the following detailed description, made with reference to the attached drawings, which represent two embodiments given purely as examples and not for limiting purposes, in which:

- Fig. 1 shows a side section view of a first example of capping head according to the present invention;
- Fig. 2 shows an enlarged detail of the capping head of figure 1;
- Fig. 3 shows a side section view of a second example of capping head according to the present invention.

Detailed description of a preferred example embodiment

[0032] With reference to the attached drawings a capping head for applying caps on containers, in particular bottles or the like object of the present invention has been wholly indicated with 1.

[0033] The capping head object of the present invention is intended to be mounted individually on a single-headed capping machine or else together with other analogous ones on a multi-head capping machine of the rotary turntable type, to which we shall mainly refer in the embodiment given as an example and not for limiting purposes described hereafter.

[0034] With reference to the attached drawings, therefore, a plurality of capping heads 1 of the type illustrated is intended to be mounted, in a *per sé* totally conventional way, around the periphery of the rotary turntable of a capping machine (not illustrated) and is thus used in the final step of industrial bottling processes to cap containers through caps or crowns.

[0035] As known, such units usually comprise a rinsing machine, a filling machine and a capping machine, each of which is provided with a plurality of operative heads mounted circumferentially on its own turntable, respectively to rinse, fill and cap the containers in transit through the unit.

[0036] The passage of the containers from one machine to the as well as between the unit and the feeding and ejection means, generally takes place through motorised cell wheels, Archimedean screws or conveyor belts.

[0037] The turntable of the capping machine rotates around its own substantially vertical central rotation axis

and picks up the containers coming from the filling machine to then release them, once capped during the journey around the aforementioned central rotation axis, to an Archimedean screw or conveyor belt that directs them outside of the unit or else to another operative machine arranged farther downstream, like for example a labelling machine.

[0038] Each capping head 1 is equipped with a support structure, which is transported to rotate around the rotation axis of the capping machine and is equipped with a connector 2 actuated to rotate around its own central axis Y by a gear wheel 2' on which suitable motorisation means mounted on the machine act.

[0039] Therefore, each capping head 1, as well as rotating around the axis of the machine, also rotates around its own central axis Y.

[0040] The connector 2 is rotatably supported by first actuator means 3 suitable for moving the capping head 1 along a vertical descent travel onto the containers and along an upward travel going away from the containers. With reference to the example shown in the attached drawings, such first actuator means 3 consists of a first cam-following wheel, to which we shall refer in the following description.

[0041] The downward travel foresees firstly an approach section to the underlying container and then, once this has been reached, a further operative travel for the actuation of capping means 4 intended to apply a cap 5 onto the top of a container, usually a bottle, according to the typical methods of the type of capping head 1 used or the type of cap.

[0042] The cap 5 can consist, according to the specific application, of a metallic crown for example made from aluminium or tin, entirely coupled with a threaded plastic sleeve, or else of a threaded cap made entirely from plastic, or even of a metallic crown to be deformed by crimping on the projecting thread in relief from the neck of the bottle.

[0043] The aforementioned capping means 4 are mounted on a lower part 6 of the capping head 1, elastically supported by an upper part 7 as better specified hereafter.

[0044] The capping means 4 comprise, in accordance with the example of figure 1, a gripping device 8 adapted to grip the crown or the cap 5 at the top and screw it onto the threaded neck of the container, or they also comprise binding rollers 22 suitable for making a guarantee seal under the ring projecting out from the neck of the bottle by plastically deforming the side flange of the crown. Otherwise, the capping means can foresee other mechanical solutions to close a cap 5 on the mouth of the bottle like for example presser means or even crimping means to make a threading, which is countershaped with respect to that projecting onto the neck of the bottle, by deformation on the flange of the crown.

[0045] The aforementioned capping means 4 are active for at least one operating section of the downward travel of the head 1 during which they determine a relative upward sliding of the lower part 6 of the capping head 1 on the upper part 7.

[0046] Means for controlling the gripping devices 8 are also foreseen comprising at least one ejection pin 9, mounted on the lower part 6 of the capping head 1, adapted to operate opening the gripping devices 8, and at least one actuator pin 10 mounted on the upper part 7 of the capping head 1 aligned with respect to the ejection pin 9, and controlled by second actuator means 11 to move with an actuation travel in abutment with its lower end against the upper end of the ejection pin 9 until it determines, through the axial sliding thereof, the opening of the gripping devices 8.

[0047] With reference to the example shown in the attached drawings, such second actuator means 11 consist of a second cam-following wheel, to which we shall refer in the following description.

[0048] According to the idea forming the basis of the present invention between the ejection pin 9 and the actuator pin 10 transmission means 12 are interposed, which do not interfere with the ejection pin 9 during its upward sliding together with the lower part 6 of the capping head 1 on which it is mounted, and instead couple in withholding relation with the same ejection pin 9 in response to the descent action onto them of the actuator pin 10.

[0049] Therefore, when the second cam-following wheel 11 controls the descent of the actuator pin 10, the latter acts upon the transmission means 12 until they are disengaged from the ejection pin 9, determining their mechanical coupling with the same ejection pin 9 to transmit the movement of the actuator pin 10 to the ejection pin 9 until the gripping devices 8 are opened with it.

[0050] Operatively, at the start of the capping cycle, the head 2 descends towards the bottle guided by the engagement of the two cam-following wheels 3 and 11 in the tracks of the relative cams that preferably remain an equal distance apart during all of the capping operations.

[0051] The ejection pin 9 is initially in an equilibrium position with respect to its possibility for axial sliding, in which it holds the gripping devices 8 open. For this purpose, it is provided, at its lower end, with a widened annular portion 13 that, when the ejection pin 9 is in the aforementioned equilibrium position, stays in abutment against a flat face 14' of a thrusting element 14 of the gripping devices 8. In this position the ejection pin 9 stays still in equilibrium between the axial return force of a return spring 15 and the force holding the gripping devices 8 closed.

[0052] During the descent of the capping head 1 the lower end of the ejection pin 9 comes into contact with the upper part of the crown 5 resting on the head of the bottle. This contact disrupts the equilibrium state and causes the immediate return of the ejection pin 9 vertically upwards by the return spring 15 determining the instant closing of the gripping devices 8 on the crown 5, preferably crimped at a side part located in the vicinity of

the upper part of the crown.

[0053] At this point, the gripping devices 8 transported in rotation by the capping head 1, drive the crown 5 to screw onto the top of the neck of the bottle. During this step, the capping head 1 goes down slowly, for example by 8 mm, driven by the first cam-following wheel 3.

[0054] The gripping device 8 is hinged with its arms to a mounted casing 16 of the lower part 6 of the capping head 1. Such a casing 16 is fitted onto the inner disc of a first bearing 17 and takes the motion through a magnetic clutch 18 formed by two opposite discs.

[0055] When the crown 5 is completely screwed into the end of the thread, closed on the mouth of the bottle, a predetermined torque value is passed between the two discs of magnetic clutch 18, and the casing 16 stops spinning. Consequently, all of the mechanical parts fixedly connected to the casing, including the gripping devices and the inner ring of the first bearing, become static, whereas those of the lower part 6 of the capping head 1 connected to the outer part of the bearing continue to spin.

[0056] In accordance with the embodiment illustrated in figure 1, on the lower part 6 of the capping head 1 that continues in its rotation even after the gripping devices have stopped, there are flanging means 19 to make a guarantee seal under the ring of the bottle with a permanent deformation of the flange of the crown. During the opening of the container, the seal thus obtained separates from the remaining upper portion of the crown 5 along a weakened line, remaining fixedly connected under the ring.

[0057] In greater detail, the aforementioned flanging means 19 comprise at least two levers 20 connected with hinges 21 with horizontal axis, on the lower part 6 of the capping head 1 that is fixedly connected to the outer ring of the aforementioned first bearing 17. Each lever 20 has a binding roller 22 mounted at its lower end in a rotatable manner, said binding roller 22 being free to rotate with a vertical or slightly inclined axis with respect to the vertical, and it also has an idle wheel 23 mounted at its upper end in a rotatable manner, said idle wheel 23 being free to rotate around a substantially horizontal axis.

[0058] After the descent of the capping head 1 for a further operative section after that necessary to screw the crown with the gripping devices 8, the idle wheel 23 rises back up along the head 1 and goes over a closing cone 24 foreseen around the periphery in the upper portion 7 of the capping head 1, making the levers 20 rotate around the hinge 21 and thus bringing the binding rollers 22 into contact with the flange of the crown to determine, through a deformation thereof, the guarantee seal.

[0059] In figure 1 the idle wheel 23 is brought back below the closing cone 24 and nevertheless it is illustrated artificially rotated in a position separated from the profile of the bearing structure 2 for the sake of clarity of representation, although, in accordance with what has been illustrated above, it should be understood that the binding rollers 22 are open in such a position and not closed in contact with the crown 5 as is, on the other hand, illustrated.

[0060] In accordance with the embodiment illustrated in figure 3, the upper part 7 is in turn removably partitioned into two bodies 7' and 7" by a quick attachment device 25 of the type described from page 8 line 7 to page 15 line 5 of patent application no. PD2008A000137 to the same applicant that is considered included here for reference.

[0061] The device 25 is obtained with two elements snap-couplable to each other in a removable manner, of which a first element 26 is mechanically fixed at the lower part to the upper body 7' of the upper part 7 of the capping head 1 through first fixing means such as screws, and a second element 27 is mechanically fixed at the upper part against the lower body 7" of the upper part 7 of the capping head 1, through second fixing means such as screws, or rather it is formed in a single body with the aforementioned upper part of the capping head 1.

[0062] The two elements 26 and 27 are adapted to advantageously mechanically snap-couple in a removable manner, through two first appendages 28 formed on the first element 26 that engage in withholding relation in two first seats 29 formed in the second element 27.

[0063] The first element 26 is also provided with at least one second appendage 30, which is radially mobile with respect to the same first element 26 between a projecting position and a withdrawn position. On the aforementioned second appendage 30 elastically yielding means act (not illustrated in the attached figures but clearly described in application PD2008A000137 included for reference) adapted to push it towards the projecting position.

[0064] Preferably, there are two second appendages 30, which project radially in diametrically opposite directions with the aforementioned elastically yielding means interposed.

[0065] In turn, the second element 27 is provided with a substantially axially centred shaped cavity, which is adapted to receive the lower end of the first element 26. From the inner face of such a cavity extend the first seats 29 in which the first appendages 28 are formed and two second seats 31 for receiving the second appendages 30.

[0066] In greater detail, the first seats 29 have a radial component so as to take up an undercut, blind and axially closed configuration.

[0067] The aforementioned first seats 29 are intended to receive the first appendages 28 after a relative rotation between the two elements 26 and 27 of the quick attachment device 25, in particular by 90 degrees.

[0068] The second element 27 is provided with two second seats 31 diametrically facing opposite one another having an extension in the second element 27 going from the aforementioned inner face of the central cavity with a radial component.

[0069] Such second seats 31 receive, preferably with snap-engagement, by means of the action exerted by

the elastically yielding means, the respective second appendages 30 at the end of the relative rotation travel between the two elements 26 and 27 of the device 25.

[0070] Functionally, the capping head 1, descends onto the bottle during the operative travel in which there is screwing of the crown 5 and possibly flanging of its edge determining a shortening of the head 1.

[0071] With reference to the examples of the attached figures, in a first section of the operative travel relative to the screwing step, the lower part 6 slides over the upper part 7 overcoming the resistive force of first elastically yielding means interposed between the two parts 6 and 7. With reference to the example of figure 1, in a further second section of the operative travel the lower part 6 slides further for another section over the upper part 7 overcoming the resistive force of second elastically yielding means interposed between the two parts 6 and 7.

[0072] The head 1 continues to descend in the different sections of the operative travel while it remains rested through the gripping devices 8 at the crown mounted on the bottle.

[0073] In a per sé conventional way, and therefore not described in detail because it is known to a man skilled in the art, the first and second elastically yielding means, not illustrated in detail, are respectively obtained with two pins concentrically carrying two respective springs (indicated with 32 in figures 1 and 2) mounted on them that are preloaded according to a predetermined screwing load, and four pins concentrically carrying four respective springs mounted on them that are preloaded according to a predetermined flanging load, which only work in the screwing step to load the levers 20. Since it is necessary to differentiate the load in the two screwing and flanging steps, the pins have strikers to actuate the relative springs at different moments of the descent of the head 1.

[0074] For example, the load for the screwing will preferably be no more than 100 N, so as not to risk cutting the sealing gasket of the cap also taking into account the impulse due to the descent speed of the head.

[0075] With reference to the example of figure 3, springs 33 are foreseen mounted between the lower body 7" of the upper part 7 of the capping head 1 and the lower part 6 of the capping head 1 to make the screwing load.

[0076] In both of the illustrated embodiment, it is in any case possible for it to be foreseen not to load the gripping devices 8 in a first part of the operative travel (for example of about 5 mm) intended to carry out the screwing in order to avoid the threads riding over one another.

[0077] Once the screwing and the flanging are finished, the head 1 rises back up again causing firstly the binding rollers 22 to open through the descent of the idle wheel 23 from the closing cone 24 and then the gripping devices 8 to open. In order to open the gripping devices 8, the actuator pin 10 is controlled by the second cam-following wheel 11 to move away from the first cam-following wheel 3 to determine an axial sliding adapted to produce, through the interference with the transmission means 12, the consequent movement of the ejection pin 9 and thus overall the opening of the gripping device 8.

[0078] The ejection pin 9 acts with its widened annular portion 13 against a chute 14" of the thruster element 14 on which the gripping devices 8 are mounted. Such interference with the chute 14" produces a widening of the ends of the arms of the gripping devices 8 and a consequent rotation thereof around the pin on which they are hinged, in a *per sé* known way, until the gripping devices 8 are completely open, which is maintained when the aforementioned widened portion 13 of the ejection pin goes past the chute 14" making contact and stopping in contact with the flat face 14' quoted earlier, of the thrusting element 14.

[0079] In this position the ejection pin 9 stays still in equilibrium until the subsequent descent of the capping head 1 makes it once again meet the upper part of the crown 5 resting on the head of a bottle.

[0080] The transmission means 12 quoted earlier are obtained in accordance with a preferred but not limiting embodiment of the present invention as specified hereafter. They comprise a bushing 34, having a tubular shape with axial cavity aligned with the axis of the connector 2 and on opposite parts with the actuator pin 10 and the ejection pin 9. The aforementioned bushing 34 is open on the bottom part to receive, in the aforementioned axial cavity, the upper end of the ejection pin 9 that goes back up during the capping operations, along the cavity and goes back down again once such operations have ended.

[0081] At its lower end the aforementioned bushing 34 carries - housed in a seat formed in its thickness - at least one diametrically projecting element in particular consisting of a plurality of balls 44. Such balls 44 have a diameter that is greater than the thickness of the bushing 34 in which they are housed so as to project inwards, outwards or on both sides of the bushing 34 according to the operative conditions explained hereafter.

[0082] Outside of the bushing 34 an insert 35 is slidably mounted, also having a tubular shape and centrally hollow, which is shaped at the top part to receive, in abutment, the lower end of the actuator pin 10 for example with a closed upper wall 36 (provided with an extension appendage 36' in the case of the example of figure 3).

[0083] The insert 35 with the bushing 34 internally inserted is in turn housed in a guide sleeve 37, which is closed at the lower part by a bottom 38 that is centrally perforated to allow the ejection pin 9 to pass and is provided at the upper part with a first shoulder 39 adapted to define a stop element for the axial sliding of the insert 35.

[0084] A first spring 40 is interposed between the upper wall 36 of the insert 35 and a second shoulder 41 formed circumferentially on the inner wall of the bushing 34 and is preloaded to move axially apart the same insert 35 and bushing 34.

[0085] A second spring 42, more rigid than the first, is interposed between the bottom 38 of the guide sleeve 37 and a lower lip 43 of the bushing 34 arranged at the

lower end thereof. Such a second spring 42 is preloaded to axially push the bushing 34 against the insert 35.

[0086] During the capping operations, i.e. for example during the screwing and the flanging, respectively, through the gripping devices 8 and the binding rollers 22, the insert 35 is in a raised position separate from the actuator pin 10, so that the ejection pin 9 is free to slide upwards in the axial cavity of the bushing 34 without the balls offering any resistance to its axial sliding. Indeed, during such operations the insert 35 does not interfere with the balls 44 allowing the ejection pin 9 to move them externally towards the insert 35 during its sliding in the axial cavity of the bushing 34.

[0087] Once the capping operations have ended and after the head 1 by lifting up has finished stretching out allowing the levers 20, which support the binding rollers 22, to open and after the thrusting pin 9 has reached its lowest position inside the axial cavity of the bushing 34, it is necessary to also open the gripping devices 8. For this purpose, the second cam-following wheel 11 moves away from the first 3 and controls the axial descent into the head 1 of the actuator pin 10.

[0088] The latter goes into abutment against the upper wall 36 of the insert 35 moving it into a lowered position, in which it interferes with the balls 44 through a chute 45 formed at the lower end of the same insert 35. The chute 45 by descending pushes the balls 44 towards the inside of the bushing 34, until they a brought into engagement against a narrowed portion 46 of the ejection pin 9 formed with a step-fitting preferably at its upper end.

[0089] In the first descent step in contact with the insert 35, the actuator pin 10 overcomes the resistive force of the first spring 40 that, since it is smaller than that of the second spring 42, allows the insert 35 to descend sliding over the bushing 34 without moving the latter along the sleeve 37.

[0090] In this configuration, the balls 44 housed in the thickness of the bushing 34 are blocked in the radial direction on the outside by the insert 35 and on the inside by the ejection pin 9. Therefore, by doing this the balls 44 by axial descent movements of the actuator pin 10, rigidly connect the actuator pin 10 itself to the ejection pin 9 by means of the insert 35 that pushes the balls 44 housed in the thickness of the bushing 34 engaged against the narrowed portion 46 of the ejection pin 9.

[0091] Consequently, the subsequent actuation travel of the actuator pin 10 ensures that the resistive force of the second spring 42 is overcome and thus causes the downward movement of the insert 35 of the bushing 34 and of the ejection pin 9 with the consequent opening of the gripping device 8.

[0092] Thanks to the capping head 1 according to the present invention, the actuator pin 10 is able to control the opening of the gripping devices 8 with a very small actuation travel that is less than the operative travel of the ejection pin 9 during the capping operations. Moreover, the aforementioned actuation travel of the actuator pin 10 to open the gripping devices 8 is freed from the operative travel of the ejection pin 9 to control the capping allowing the capping operations to be modified, i.e. allowing the travels of the relative operative steps to be adjusted for example according to the different types of caps, without modifying the cams of the capping machine.

[0093] As indicated earlier, the capping head object of the present invention can be of the type screwing with controlled torque, for example through a magnetic clutch, with or without formation of the guarantee seal, in accordance with the embodiment given in the attached figures 1 and 2 or else it can be of the screw type for the formation of the thread on the cap through rolling. The means assigned to the individual operations should be considered to be of the type already known and for this reason they are not described in detail.

[0094] The finding thus conceived therefore achieves the preset purposes.

[0095] Of course, it can, in its practical embodiment, also take on different shapes and configurations to the one illustrated above without, for this reason, departing from the present scope of protection. Moreover, all of the details can be replaced by technically equivalent elements and the sizes, shapes and materials used can be whatever according to the requirements.

Claims

1. Capping head for applying caps on containers, in particular bottles or the like, intended to be mounted on a capping machine, comprising:

   - a support structure actuated to rotate around its own central axis and rotatingly supported by first actuator means adapted to move it along a downward travel on said containers, and along an upward travel moving away from said containers;
   - capping means mounted on a lower part of said capping head mechanically supported by an upper part of said capping head and operating on said cap with at least one gripping device screwing on the neck of said container, for at least one operating section of said downward travel, thus determining an upward sliding of said lower part on said upper part of said capping head;
   - means for controlling said gripping devices comprising at least one ejection pin mounted on the lower part of said capping head, adapted to operate opening said gripping devices, and at least one actuator pin mounted on the upper part of said capping head and controlled by second actuator means to move with an actuation travel in abutment on said ejector pin up to determining - through the latter - the opening of said gripping means;

characterised in that it comprises transmission means, mounted on said upper part of the capping head, interposed between said ejector pin and said actuator pin, the means being disengaged from said ejector pin at upwards movements of the lower part of said capping head, and they are coupled in withholding relation with said ejector pin in response to the descent action of the actuator pin thereon controlled by said second actuator means, to transmit the movement of said actuator pin to said ejector pin.

2. Head according to claim 1, **characterised in that** said transmission means comprise:

- a bushing with axial cavity aligned on opposite parts with said actuator pin and said ejector pin, open at the lower part to receive the upper end of said ejector pin along said cavity and therein bearing accommodated in the thickness thereof, preferably at its lower end, at least one diametrically projecting element;
- an insert mounted slidingly externally on said bushing, shaped at the upper part to receive the lower end of said actuator pin in abutment;
- a guide sleeve inside which said insert is slidingly accommodated, such sleeve is provided at the lower part with a centrally perforated bottom, passed through by said ejector pin and at the upper part with a shoulder adapted to define a stop element for said insert;
- a first spring interposed between said bushing and said insert operating in the direction of an axial separation thereof;
- a second spring, more rigid than the first, operating between said bottom of said guide sleeve and said bushing, in the direction of axially pushing said bushing against said insert;

said insert being actuated to operate to move from said actuator element between a lowered position, wherein it pushes said projecting element in engagement against said ejector pin rigidly connecting said ejector pin to said actuator pin in a downward actuation of said actuator pin, and consequently of said ejector pin, to determine the opening of said gripping device, and a raised position, wherein it does not interfere with the upward sliding of said ejector pin inside the axial cavity of said bushing during the capping operation.

3. Head according to claim 2, **characterised in that** said first spring lies at the lower part against a second shoulder provided on the internal wall of said bushing and at the upper part against the upper wall of said insert.

4. Head according to claim 2, **characterised in that** said second spring lies at the upper part against a lip provided for at the lower end of said bushing.

5. Head according to claim 1, **characterised in that** the upper end of said ejector pin is narrowed with a step-fitting on which said projecting element is adapted to operate in engagement.

6. Head according to claim 2, **characterised in that** the lower end of said bushing is tapered with a chute adapted to operate with a thrust, provided by means of a radial component, against said projecting element.

7. Head according to claim 2, **characterised in that** said projecting element is obtained with two or three balls.

8. Head according to any one of the preceding claims, **characterised in that** the upper part of said capping head is removably partitioned into two bodies - an upper and a lower body - by means of quick attachment device.

9. Head according to claim 8, **characterised in that** said quick attachment device comprises two elements snap-couplable to each other in a removable manner, whose first element, provided with first two appendages, is mechanically fixed at the lower part against the upper body of the upper part of said capping head by means of first fixing means, and a second element, provided with two first seats, is mechanically fixed at the upper part against the lower body of the upper part of said capping head by means of second fixing means, said two first appendages being removably fitted in a withholding relation into said to first seats.

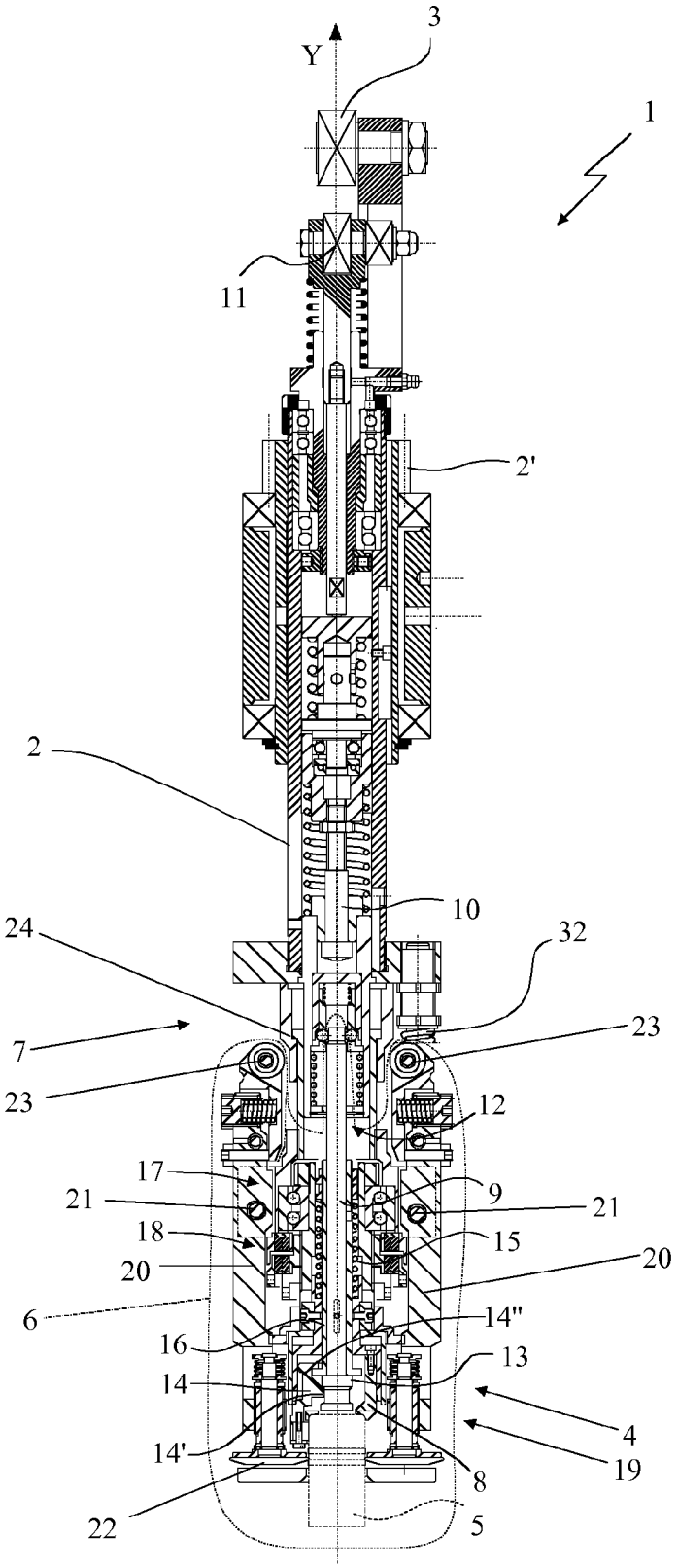
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Fig. 1

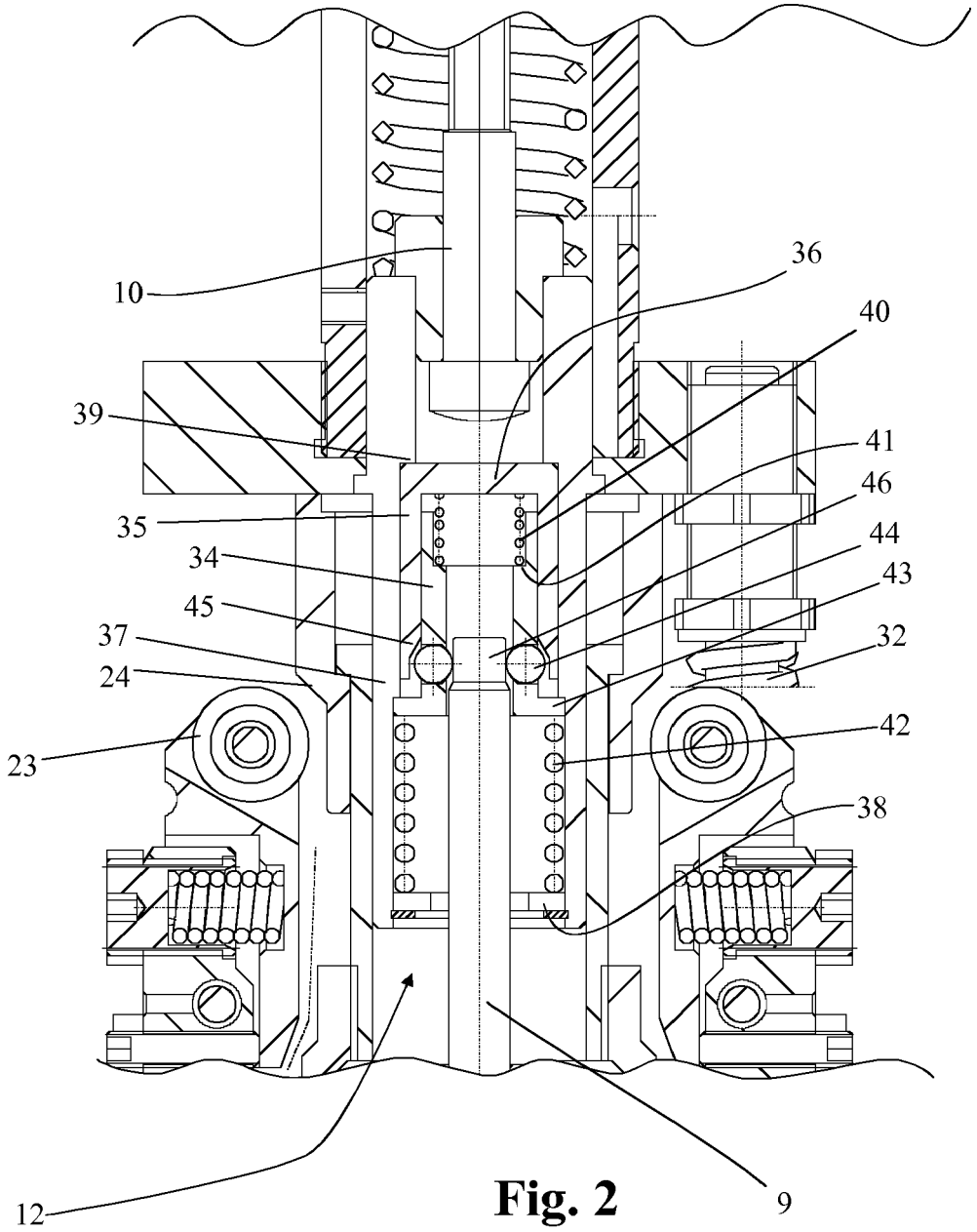

Fig. 2

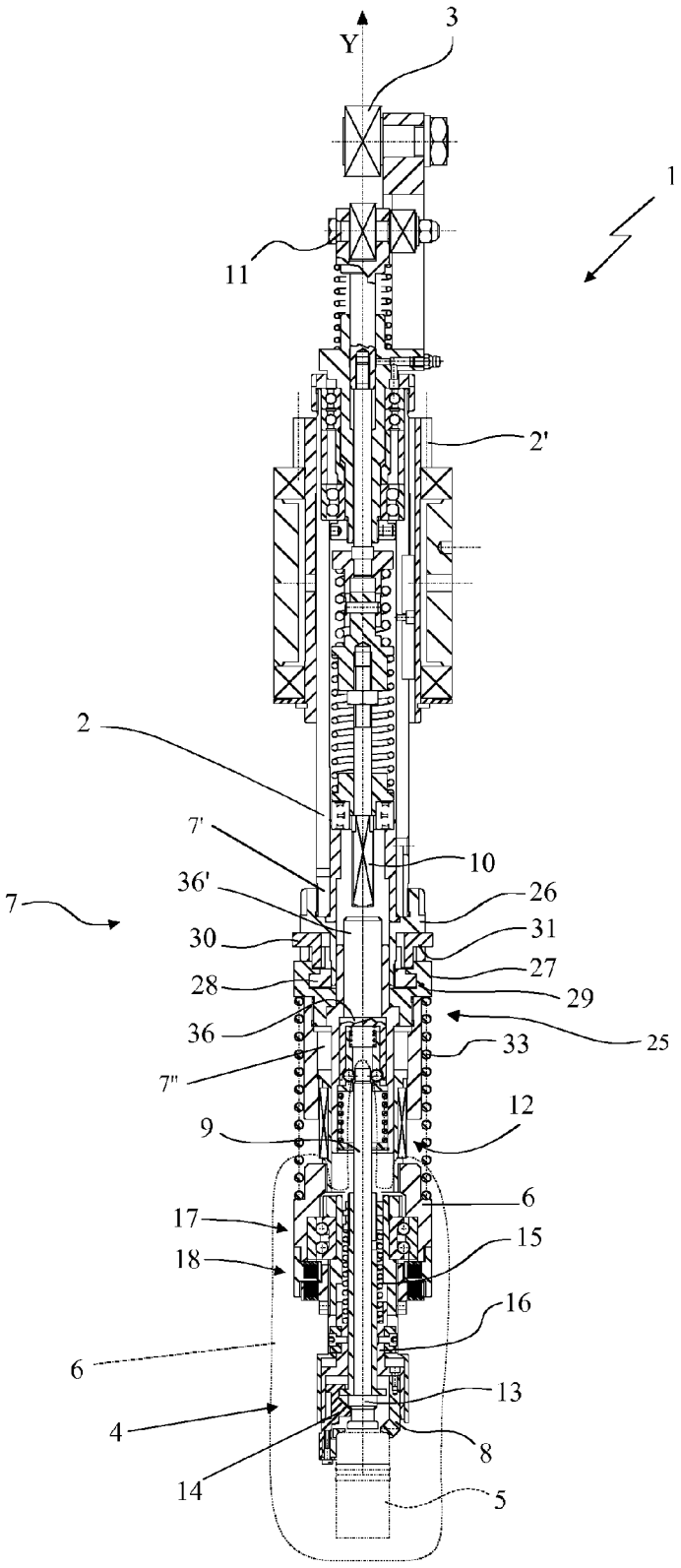
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 09 18 0777

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Place of search	Date of completion of the search	Examiner
The Hague	22 April 2010	Martínez Navarro, A

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