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(54) MACHINE FOR CAPPING CONTAINERS

(57) Machine for capping containers with caps intended to be placed along a bottling line (A) comprising a first capping group (3), susceptible to insert first caps made of deformable material within the mouths of the heads of the containers along a first capping axis (Z1) and provided with narrowing means (31), pusher means (32) actuated da a first cam (321) and lifting means (33), and a second capping group (4) different from the first, susceptible of applying second caps to the head of the containers along a second capping axis (Z2) and provided with a capping head (41) actuated by a second cam (42). In addition, the machine (1) comprises transport means (5) arranged for moving the containers between an inlet position, a first capping position (PT1) aligned with the first capping axis (Z1), a second capping position (PT2) aligned with the second capping axis (Z2) and an outlet position (PU). The machine (1) is also provided with a feed group (6), which comprises a tank (61) of first or second caps and conveyance means (62) which selectively feed the first capping group (3) or the second capping group (4) with the first or the second caps. More in detail, the first cam (321) and the second cam (42) are mechanically and integrally connected to each other and are jointly moved in rotation around a first rotation axis (R1) by first motorization means (7).

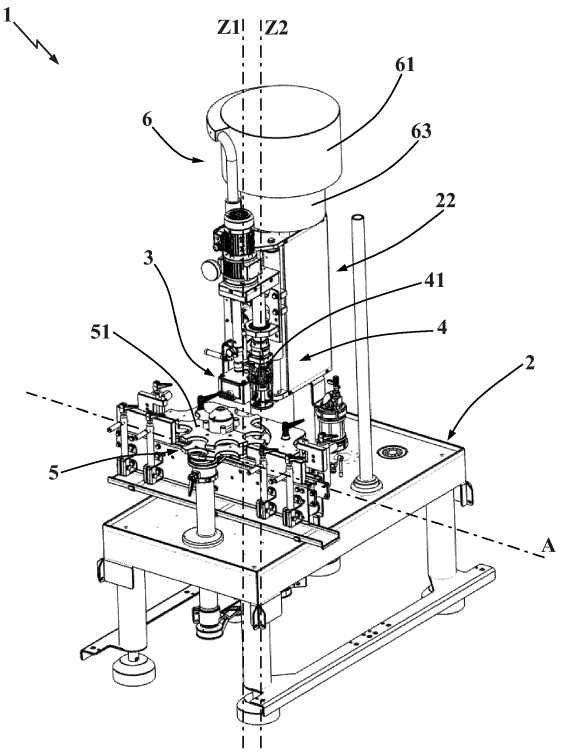

Fig. 1

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Description

Field of application

[0001] The present invention regards a machine for capping containers according to the preamble of independent claim 1.

[0002] The present machine is advantageously intended to be employed in the bottling industry where it is necessary to carry out the capping of containers in an automatic manner with a plurality of different cap types, such as for example caps made of deformable material and screw caps.

[0003] The present invention is therefore inserted in the technical field of attainment of industrial plants for bottling drinks such as wine, whisky, mineral waters, juices or other drinks, for the purpose of closing the mouth of containers, e.g. bottles made of glass or plastic, both with caps which are positioned on the head of the container by means of pressure, and with caps which are positioned on the neck of the container via screwing.

State of the art

[0004] The industrial bottling plants conventionally available on the market provide for moving the containers, e.g. bottles or jars made of glass or plastic, (by means of for example wheels with cavities, screws or conveyor belts) along a bottling line along which multiple operating machines placed in series and usually comprising at least one rinsing machine, a filling machine and a capping machine.

[0005] More in detail, capping machines exist on the market which are known in the technical jargon with the term "single-head", which are arranged for capping one container at a time and generally are used in bottling plants characterized by a medium-low production volume (in particular defined in terms of containers/hour).

[0006] The single-head capping machines note comprise a support frame intended to be abutted against the ground, and a capping group arranged for capping containers, which is fixed to the support frame and is extended along a substantially vertical capping axis.

[0007] In addition, the capping machine comprises transport means, which intercept the aforesaid bottling line and are susceptible of moving the containers at least between an inlet position, in which the containers (in particular lacking cap and coming from a machine upstream, e.g. a filling machine) are picked up from the bottling line, a capping position, in which the containers are placed below the aforesaid capping group along the capping axis and are susceptible of being capped by the capping group itself, and an outlet position, in which the capped containers are newly introduced into the bottling line in order to be sent to a machine downstream, e.g. a labeling machine.

[0008] For example, the transport means comprise a star conveyor which is provided with multiple lobes, is moved in an intermittent manner and is susceptible of picking up a container lacking cap from the inlet position, receiving it in one lobe thereof, moving it up to the capping position, maintaining it in such position for a pre-established time interval necessary for executing the capping of the container itself, and, following the capping, moving it up to the outlet position.

[0009] Generally, such single-head capping machines are arranged for capping containers with a first type of caps, which are at least partially deformable and therefore require being compressed (transverse to the longitudinal extension direction thereof) before being inserted in the neck of the container. For example, constituting part of such first type of caps are caps made of cork or of another deformable material, whether of "shaved" type or of "sparkling" type.

[0010] Alternatively, the single-head capping machines are arranged for capping containers with a second type of caps, which do not require being transversely compressed, but are applied to the mouth of the container, exerting only one force thereon along the capping axis and possibly placing them in rotation with respect to the container itself around the capping axis. For example, constituting part of such second type of caps are the screw caps, crown caps or the pressure caps.

[0011] In particular, the capping group of the capping machine comprises components that are specific for the type of cap to be applied to the containers.

[0012] For example, in the event in which the machine is arranged for capping containers, for example bottles made of glass, with the first type of caps, the capping group generally comprises narrowing means, which receive the caps to be applied from a provided feed group, and are arranged for preliminarily compressing them up to narrowing the section thereof to a size slightly smaller than the mouth of the container, and vertical pusher means actuatable downward in order to push the cap compressed by the narrowing means along the capping axis up to bringing it within the neck of the container to be capped.

[0013] In addition, the capping group of the machine for capping containers with the first type of caps comprises lifting means adapted to vertically move the container to be capped, bringing the mouth thereof in abutment below the narrowing means in order to allow the pusher means to push the cap through the mouth of the container up to reaching the desired depth in the neck of the container itself.

[0014] In the event in which the capping machine is instead arranged for capping containers, for example bottles or jars made of glass or plastic, with the second type of caps, the capping group generally comprises a capping head, which is slidably connected to the support frame along the capping axis and is susceptible of being rotated around the latter.

[0015] For such purpose, the capping group comprises a slide slidably connected to the support frame parallel to the capping axis and actuated to be moved along the

latter, for example by a cam. In addition, the capping group comprises an actuation shaft, which is rotatably connected to the slide and is actuated in rotation around the capping axis by motor means. In particular, the capping head is fixed at the lower end of the aforesaid actuation shaft.

[0016] More in detail, there are different types of capping heads, each provided with specific mechanical solutions, designed as a function of the cap that one intends to apply to the containers.

[0017] For example, a first type of capping heads is known, so-called "capping machines", which provide for screwing caps constituted by screw capsules, generally made of plastic or metallic material, on the threaded top of the containers. For such purpose, each head of this type is usually provided with grippers in order to first grip on the capsules and then screw them onto the containers by rotating around the capping axis.

[0018] Also known is a second type of capping heads which is employed for applying caps onto the threaded top of containers by means of rolling. In this case, the capping head attains the threads or only notches on a flange, usually metallic, of the caps by means of deformation against a finish of the mouth of the containers. For such purpose, each capping head of this type is usually with forming rollers, moved in rotary motion by the capping head itself against the caps in order to form threads on their flanges.

[0019] The machines for capping containers described briefly up to now have shown that in practice they do not lack drawbacks.

[0020] The main drawback lies in the fact that the single-head machines of known type have a reduced operative flexibility, since it is not possible to employ them for capping containers both with the first type of caps (e.g. corks) and with the second type of caps (e.g. screw caps) based on the production requirements of the bottling line in which the machine is inserted.

[0021] Indeed, the components of the capping group configured for capping containers with the first type of caps and the components of the capping group configured for capping containers with the second type of caps are incompatible with each other, since in particular they must be placed along the capping axis, and therefore they cannot coexist and operate on the same same capping group.

[0022] For example, the narrowing means are fixed to the support frame and intercept the capping axis. Nevertheless, the trajectory of the capping head along the same capping axis would come to interfere with the narrowing means themselves, actually rendering the two components incompatible with each other.

[0023] A further drawback lies in the fact that the single-head machines of known type are not easily reconfigurable in the event in which it is desired to change the type of cap to be applied to the containers, requiring complex and costly operations.

[0024] Known from the document EP 0382161 A1 is a capping machine provided with multiple capping groups, placed side-by-side each other and arranged for capping containers with different types of caps. Nevertheless, also such capping machine of known type has shown in practice that it does not lack drawbacks, both structurally and operationally.

Presentation of the invention

[0025] In this situation, the problem underlying the present invention is that of overcoming the drawbacks manifested by the prior art known up to now, by providing a machine for capping containers, which allows capping containers with a wide range of caps that are different from each other.

[0026] Further object of the present invention is to provide a machine for capping containers, which ensures a high precision on the capping of containers, in particular even with a wide range of caps that are different from each other.

[0027] Further object of the present invention is to provide a machine for capping containers, which ensures high operative flexibility.

[0028] Further object of the present invention is to provide a machine for capping containers, which is simple and entirely reliable in operation.

Brief description of the drawings

[0029] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen from the contents of the below-reported claims and the advantages thereof will be more evident in the following detailed description, made with reference to the enclosed drawings, which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 shows a perspective view of the machine for capping containers, object of the present invention;
- figure 2 shows a front view of the machine of figure 1;
- figure 3 shows a side section view of the machine of figure 1;
- figure 4 shows a detail of the side section of the machine of figure 1;
- figure 5 shows a sectional view of a detail of lifting means of a first capping group of the machine of figure 1 with several components hidden in order to better illustrate other components;
- figure 6 shows a perspective view of a detail of a first cam and of a second cam of the machine of figure 1;
- figure 7 shows a perspective view of a detail of lifting means of a first capping group of the machine of figure 1;
- figure 8 shows a top view of the machine of figure 1 with several components hidden in order to better illustrate other components.

Detailed description of a preferred embodiment

[0030] With reference to the enclosed drawings, reference number 1 overall indicates an embodiment of a machine for capping containers, object of the present invention.

[0031] The present machine 1 is intended to be employed in an industrial bottling plant, in particular in the final step of the bottling process in order to cap the containers by means of caps.

[0032] As is known, the bottling plants generally consist of at least one rinsing machine, at least one filling machine and at least one capping machine. The aforesaid machines are generally placed in such bottling plants along a bottling line A, and are susceptible of pick-up up one or more containers from the bottling line A itself, of executing, on the container picked up from the bottling line A, respectively the operation of rinsing, filling and capping, and of newly introducing the processed container processed on the bottling line A.

[0033] Hereinbelow, by "container" it will be intended any one hollow body capable of containing, at its interior, a product that is at least partially liquid and susceptible of being capped by means of a cap. For example, by container it can be intended a bottle made of glass or plastic, susceptible of containing an alimentary liquid such as wine or non-alcoholic drink at its interior, or a jar susceptible of containing, at its interior, a food product that is at least partially in liquid form, such as for example a jam.

[0034] In a per se known manner, the containers, generally made of glass or plastic, e.g. PET, comprise a lower enlarged body and a head provided with a mouth through which the product is susceptible of entering or exiting from the container itself. In addition, in the event in which this is a bottle, e.g. made of glass and intended to contain wine, it comprises an elongated neck placed to connect between the enlarged lower body and the head.

[0035] The machine 1 for capping containers with caps, object of the present invention, is intended to be placed along the aforesaid bottling line A and comprises a support frame 2 intended to be abutted against the ground.

[0036] Advantageously, the machine 1 is intended to be placed along the bottling line A downstream of a filling machine (not represented in the enclosed figures) and upstream of a labeling machine (not represented in the enclosed figures). In this manner, the machine 1 is susceptible of receiving, from the filling machine, containers filled with a food product in fluid form (such as for example a non-alcoholic drink, liquors, wine, sparkling drink, etc.) without cap, and of sending such containers to a labeling machine after having placed a cap on the mouth of the neck of the same containers.

[0037] In the present discussion, for greater descriptive simplicity, the spatial indications "above", "below", "upper/above" and "lower/below" will be intended with reference to the relative position with respect to the ground. In particular, with the term "above" it will be intended more distant from the ground and with the term "below" it will be intended closer to the ground.

[0038] The machine 1 comprises a first capping group 3, which is mechanically mounted on the support frame 2, is susceptible to insert first caps made of deformable material within the mouths of the containers along a first capping axis Z1, preferably vertical.

[0039] In such context, by "first caps" made of deformable material, it is a type of cap intended to be inserted at least partially within the neck of the container, and for such purpose, it is necessary to compress it transversely with respect to the longitudinal extension direction thereof, so as to reduce the width thereof and allow the insertion thereof through the mouth of the container itself.

[0040] For example, the containers are glass bottles, and the first caps are shaved corks or have mushroom shape, made for example of cork, of synthetic material, or they are technical caps comprising parts made of cork and parts made of synthetic material.

[0041] Preferably, the first capping group 3 is selected at least from among capping with shaved corks and capping with mushroom-shaped corks.

[0042] More in detail, the first capping group 3 comprises narrowing means 31, pusher means 32 and lifting means 33.

[0043] The narrowing means 31 are placed at the first capping axis Z1, and are susceptible of compressing a first cap from an enlarged form to a compressed form, in which it is susceptible of inserting in the mouth of a container.

[0044] Such narrowing means 31 comprise, in a per se known manner, at least one compression case 311 mechanically mounted on the support frame 2 and defining at least one housing seat. In addition, the narrowing means 31 comprise a compression group intended to be at least partially housed within the housing seat of the compression case 311 and comprising at least two blocks. Advantageously, when the compression group is placed at least partially in the housing seat, the blocks are actuatable in mutually approaching and moving apart in order to define at least one compression configuration, in which the first cap is compressed by the blocks themselves.

[0045] The narrowing means 31 are of advantageously known type, and for this reason are not described in more detail hereinbelow.

[0046] The pusher means 32 are mounted above the narrowing means 31, are actuated, in particular during use, by a first cam 321 to be moved along the first capping axis Z1 and are susceptible of moving the first cap retained in compressed form by the narrowing means 31 at least partially within the container, advantageously through its mouth, due to their movement along the first capping axis Z1 itself.

[0047] The lifting means 33 are slidably connected to the support frame 2 along the first capping axis Z1 and are susceptible of moving the container between a low-

ered position, in which it is placed spaced from the narrowing means 31, and a raised position, in which the mouth of the container is placed adjacent to the narrowing means 31 so as to receive a corresponding first cap in compressed form vertically thrust by the pusher means 32.

[0048] Advantageously, the first capping group 3 is susceptible of taking on a first capping configuration, in which, in operation, the lifting means 33 move a container placed aligned with the first capping axis Z1 along the latter between the lowered position and the raised position. In this manner, when the first capping group 3 takes on the first capping configuration, the lifting means 33 place the container adjacent to the narrowing means 31 and the pusher means 32 push the first cap retained in compressed form by the narrowing means 31 themselves at least partially within the container in order to cap it.

[0049] Alternatively, the first capping group 3 is preferably susceptible of taking on a first by-pass configuration, in which the lifting means 33 do not move the container along the first capping axis Z1. In this manner, with the first capping group 3 in the first by-pass configuration, a container placed aligned with the first capping axis Z1 remains in the lowered position and consequently spaced from the narrowing means 31 and from the pusher means 32, preventing the latter from being able to cap the container with a first cap.

[0050] The machine 1 also comprises a second capping group 4, different from the first, which is mechanically mounted on the support frame 2 and is susceptible of applying second caps to the head of the containers along a second capping axis Z2.

[0051] Advantageously, the second capping axis Z2 is parallel to the first capping axis Z1. Preferably, the first and the second capping axis Z1, Z2 are substantially vertical.

[0052] In such context, by "second caps" it is intended a wide range of caps that are different from each other, which nevertheless - unlike the above-described first caps - do not require being compressed transverse to their longitudinal extension direction before being applied at the mouth of the container to be capped.

[0053] Advantageously, the second capping group 4 is selected at least from among capping with screw caps, capping with crown caps, capping with capsules, capping with pressure caps.

[0054] The second capping group 4 comprises a capping head 41, which is mechanically connected, preferably removably, to the support frame 2 and is actuated, in particular during use, by a second cam 42 to be moved along the second capping axis Z2 between a disengagement position, in which it is placed spaced from the head of the container, and an operative position, in which it is susceptible of exerting a force substantially parallel to the second capping axis Z2 on the second cap to be applied to the container.

[0055] As is known, the capping head 41 is structurally and functionally designed in order to operate with a corresponding second cap type, for example from among those reported above.

[0056] For example, the capping heads 41 for screw caps can be of the type arranged for applying pre-threaded screw caps, or they can be of the type arranged for applying screw caps that are initially non-threaded, in particular attaining on the latter the thread necessary for engaging them with the mouth of the container.

[0057] In particular, such capping heads 41 are per se known to the man skilled in the art and therefore will not be described with greater detail hereinbelow.

[0058] Advantageously, the capping head 41 is removably mechanically connected to the support frame 2 by means of a quick coupling device 411. In this manner, an operator can quickly connect or disconnect the capping head 41 from the second capping group 4 without the use of tools and with an extremely limited machine stop time. Advantageously, the quick coupling device 411 is of the type well-known to the man skilled in the art and therefore will not be described with greater detail hereinbelow.

[0059] Advantageously, the second capping group 4 is susceptible of taking on a second capping configuration, in which the capping head 41 is mechanically connected to the support frame 2. In this manner, in operation, with the second capping group 4 in the second capping configuration, the capping head 41, when it is placed in the operative position by the second cam 42, exerts a force (parallel to the second capping axis Z2) on the second cap placed at the mouth of the container in order to cap it with the second cap itself.

[0060] Alternatively, the second capping group 4 is preferably susceptible of taking on a second by-pass configuration, in which the capping head 41 is removed from the support frame 2. In this manner, with the second capping group 4 in the second by-pass configuration, this does not interact with a container placed aligned with the second capping axis Z2, which, consequently, is not capped with a second cap.

[0061] Advantageously, in accordance with the embodiment variant represented in the enclosed figures, the support frame 2 of the machine 1 comprises a support element 22 extended with elongated shape along a substantially vertical direction, which is known in the technical jargon with the name "tower". Advantageously, the first capping group 3 and the second capping group 4 are mechanically mounted on the support element 22, preferably side-by-side each other.

[0062] The machine 1, object of the present invention, also comprises transport means 5, which are mechanically connected to the support frame 2 and are arranged for moving the containers at least between an inlet position PI, at which the containers are picked up from the bottling line A, a first capping position PT1, in which the containers are placed below the first capping group 3 aligned with respect to the first capping axis Z1, a second capping position PT2 in which the containers are placed below the second capping group 4 aligned with respect

to the second capping axis Z2, and an outlet position PU, at which the containers are introduced in the bottling line A.

[0063] Preferably, the transport means 5 are susceptible of moving the containers along a movement trajectory T, along which the containers sequentially pass by the above-reported positions, in particular in the order with which they have been described. In other words, all the containers picked up from the bottling line A, in order to be capped, are moved by the transport means 5 from the inlet position PI to the outlet position PU, passing by both the first capping position PT1 and the second capping position PT2.

[0064] Without departing from the protective scope of the present invention, the first capping position PT1 and the second capping position PT2 can be reversed with respect to each other.

[0065] Advantageously, the transport means 5 are susceptible of maintaining the containers in the first capping position PT1 for a first capping time T1, in a manner such to ensure that the first capping group 3, preferably when the latter takes on the first capping configuration, has the time necessary for the application of the first caps on the containers themselves.

[0066] Preferably, the transport means 5 are susceptible of maintaining the containers in the second capping position PT2 for a second capping time T2, in a manner such to ensure that the second capping group 4, advantageously when the latter takes on the second capping configuration, has the time necessary for the application of the second caps on the containers themselves.

[0067] In addition, the machine 1 comprises a feed group 6, which is mounted on the support frame 2, comprises at least one tank 61 of first or second caps and conveyance means 62 which receive the first or the second caps from the tank 61 and selectively feed the first capping group 3 or the second capping group 4 respectively with the first or second caps.

[0068] Advantageously, with the conveyance means 62 of the feed group 6 which feed the first capping group 3 with first caps, the capping head 41 is removed from the second capping group 4, in particular since the second capping group 4 takes on the aforesaid second by-pass configuration. Preferably, the machine 1, object of the present invention, is susceptible of taking on a first operative configuration, in which the first capping group 3 takes on the first capping configuration and the second capping group 4 takes on the second by-pass configuration and the conveyance means 62 of the feed group 6 exclusively feed the first capping group 3 with first caps. In this manner, when the machine 1 takes on the first operative configuration, this caps with first caps, by means of the first capping group 3, exclusively the containers placed in the first capping position PT1, and simultaneously the second capping group 4 does not interact with the containers placed in the second capping position PT2, which, consequently, are not capped with second caps.

[0069] Advantageously, the machine 1 is susceptible of taking on a second operative configuration, in which the first capping group 3 takes on the first by-pass configuration, the second capping group 4 takes on the second capping configuration and the conveyance means 62 of the feed group 6 exclusively feed the second capping group 4 with second caps. In this manner, when the machine 1 takes on the second operative configuration, this caps with second caps, by means of the second capping group 4, exclusively the containers placed in the second capping position PT2, and simultaneously the first capping group 3 does not interact with the containers placed in the first capping position PT1, which, consequently, are not capped with first caps.

[0070] In this manner, the machine 1, object of the present invention, is employable in a bottling plant in order to selectively cap containers with first caps or with second caps depending on the production requirements of the bottling plant.

[0071] The aforesaid first cam 321 and second cam 42 are mechanically and integrally connected to each other, and the machine 1 comprises first motorization means 7 arranged for jointly moving the first cam 321 and the second cam 42 in rotation around a substantially vertical first rotation axis R1.

[0072] Advantageously, the profile of the first cam 321 and of the second cam 42 are different from each other, and are geometrically designed as a function of the type of movement that the pusher means 32 and the capping head 41 must respectively carry out.

[0073] More in detail, the profile of the first cam 321 and of the second cam 42 are optimized as a function of the capping operation that the first capping group 3 and the second capping group 4 must respectively carry out, but the first cam 321 and the second cam 42 are moved around the first rotation axis R1 by the same motorization means 7. In this manner, with the machine 1, object of the present invention, it is possible to obtain high precision for the capping of the containers, both with the first caps and with the second caps, simultaneously reducing the number of components, leading to a considerable reduction of the production and operating costs of the machine 1 itself.

[0074] Preferably, the first cam 321 comprises at least one first descending section, at which the pusher means 32 are actuated, in particular during use, to progressively descend towards the narrowing means 31, and at least one first flat section in which the pusher means 32 remain stopped with respect to the first capping axis Z1 in particular at the lower end of their trajectory along the first capping axis Z1 itself.

[0075] Advantageously, the second cam 42 comprises at least one second descending section, at which the capping head 41 is actuated, in particular during use, to progressively descend towards the neck of the container placed in the second capping position PT2, and at least one second flat section, in which the capping head 41 remain stopped with respect to the second capping axis

Z2 in particular at the lower end of its trajectory along the second capping axis Z2 itself.

[0076] Preferably, the second flat section of the second cam 42 is longer than the first flat section of the first cam 321. In this manner, the capping head 41 remains lowered at the lower end of its trajectory for a greater time than the pusher means 32 remain lowered at the lower end of their trajectory.

[0077] In accordance with the preferred embodiment of the present invention, the feed group 6 comprises a vibrating base 63, which is fixed to the support frame 2, and to which the aforesaid tank 61 is removably fixed. More in detail, the vibrating base 63 is susceptible of vibrating the tank 61 itself with first or second caps at the interior.

[0078] In a per se known manner, the tank 61 is internally shaped in a manner such that, due to its vibration induced by the vibrating base 63, it feeds the conveyance means 62 with first or second caps correctly oriented for capping containers. For example, in the case of capping glass bottles with mushroom-shaped corks, the tank 61 orients the caps in a manner such that the narrow base is directed towards the mouth of the bottle, in particular downward, and the enlarged head is directed upward.

[0079] In accordance with the embodiment represented in the enclosed figures, the feed group 6 comprises a tank 61 removably fixed to the vibrating base. Preferably, when the machine 1 takes on the first operative configuration, only first caps are placed within the tank 61, and when the machine 1 takes on the second operative configuration, only second caps are placed within the tank 61.

[0080] Preferably, the conveyance means 62 comprise a feed duct 621 connected to the tank 61 and susceptible of receiving, from the latter, the first or second caps and of conveying them at the narrowing means 31 of the first capping group 3, preferably aligned with the first capping axis Z1, advantageously within the housing seat of the compression case 311. In this manner, the first or second caps coming from the tank 61 are placed by the aforesaid conveyance means 62 substantially aligned with the neck of the containers when these are placed at the first capping position PT1.

[0081] Preferably, with the first capping group 3 in the first capping configuration, the narrowing means 31 are susceptible of taking on a compression configuration, in which they are adapted to compress the first caps that are placed within the compression case 311 by the conveyance means 62. Advantageously, with the narrowing means 31 in the compression configuration, the blocks are positioned within the compression case 311 and are actuated, in particular during use, in order to compress the first caps themselves.

[0082] In this manner, with the machine 1 in the first operative configuration, the first caps coming from the tank 61 by means of the conveyance means 62 are compressed by the narrowing means 31 and are thrust by the pusher means 32 at least partially into the neck of the containers placed in the first capping position PT1, capping them with the aforesaid first caps.

[0083] Advantageously, with the first capping group 3 in the first by-pass configuration, the narrowing means 31 are susceptible of taking on a passage configuration, in which they allow the transit of the second caps which are placed within the compression case 311 by the conveyance means 62, in particular without compressing them. Preferably, with the narrowing means 31 in the passage configuration, the blocks are removed from the compression case 311.

[0084] In this manner, with the machine 1 in the second operative configuration, the second caps coming from the tank 61 by means of the conveyance means 62 are not compressed by the narrowing means 31 and fall (by gravity) in abutment against the head of the containers placed in the first capping position PT1. Preferably, such containers are intended to be capped with the second cap placed in abutment against their head by the capping head 41 when they are placed by the transport means in the second capping position PT2.

[0085] According to a different embodiment, not represented in the enclosed figures, the feed group 6 can comprise two tanks 61, including one containing first caps and the other containing second caps. Preferably, the conveyance means comprise two feed ducts 621, each of which fed from a corresponding tank 61 in order to convey corresponding caps towards the narrowing means 31 of the first capping group 3.

[0086] Advantageously, the machine 1 comprises a first support body 21, which is substantially cylindrical, is rotatably connected to the support frame 2 around the first rotation axis R1 and on which the first cam 321 and the second cam 42 are preferably made in a depression.

[0087] Preferably, the machine 1 comprises a shaft 23, which is rotatably connected to the support frame 2 around the first rotation axis R1, and is actuated, in particular during use, in rotation around the latter by the first motorization means 7.

[0088] Advantageously, the aforesaid first support body 21 is fit on the shaft 23. In this manner, the first motorization means 7 actuate, in rotation around the first rotation axis R1, the first cam 321 and the second cam 42 by means of a rotation of the shaft 23 around the first rotation axis R1 itself.

[0089] Preferably, the first motorization means 7 comprise a first electric motor mechanically connected to the shaft 23 in order to rotate it around the aforesaid first rotation axis R1. Advantageously, the lifting means 33 comprise a piston 34, which is slidably connected to the support frame 2 along the first capping axis Z1 for a lifting travel CS, advantageously between a lower position and an upper position.

[0090] Advantageously, the piston 34 is extended with elongated shape along an main extension axis X between an upper end 34' directed towards the narrowing means 31, and an opposite lower end 34". Preferably, the main extension axis X coincides with the first capping

axis Z1.

[0091] Advantageously, the support frame 2 comprises a guide body 24, which is placed substantially aligned with the first capping axis Z1. Advantageously, the guide body 24 is provided with a passage channel 241 extended along the first capping axis Z1, and the piston 34 is placed to traverse the passage channel 241 itself. In this manner, the passage channel 241 of the guide body 24 guides the movement of the piston 34 along the first capping axis Z1 for its lifting travel CS.

[0092] Preferably, the piston 34 is actuated, in particular during use, along the first capping axis for the lifting travel CS by a third cam 332.

[0093] Advantageously, the lifting means 33 comprise a rocker arm 35, which is longitudinally extended between a first end 35', at which is rotatably connected to the support frame 2 around a fixed pin 251, and a second end 35", at which it is hinged to the piston 34, preferably at the lower end 34" of the latter. Advantageously, the rocker arm 35 carries, fixed thereto, a lifting cam follower 351, which is placed in an intermediate position between the first end 35' and the second end 35" of the rocker arm 35 itself, and is coupled to the third cam 332. In this manner, the third cam 332 acts on the rocker arm 35 by making it oscillate around the fixed pin 251 and determining a consequent movement of its second end 35", and consequently of the piston 34, along the first capping axis Z1 for the lifting travel CS between the aforesaid lower position and upper position.

[0094] Advantageously, the third cam 332 is actuated, in particular during use, in rotation around the first rotation axis R1 jointly with the first cam 321 and the second cam 42.

[0095] Advantageously, the machine 1 comprises a second support body 26, which is substantially cylindrical, is rotatably connected to the support frame 2 around the first rotation axis R1 and on which the third cam 332 is made, preferably in a depression.

[0096] Preferably, the second support body 26 is fit on the shaft 23, in a manner such that the rotation of the shaft 23 around the first rotation axis R1 actuated by the first motorization means 7 involves a joint rotation of the first cam 321, the second cam 42 and the third cam 332. In this manner, with the machine 1, object of the present invention, the pusher means 31 and the lifting means 33 of the first capping group 3 and the capping head 41 of the second capping group 4 are actuated by the same first motorization means 7, and the relative motions are consequently mechanically synchronized.

[0097] Preferably, the lifting means 33 comprise a spacer element 36, which is removably fixed to the piston 34 and is provided with an abutment surface 361 on which a container is susceptible of being placed in order to move it from the lowered position to the raised position.

[0098] Advantageously, the support frame 2 comprises a support plate 27, which is extended below at least the first capping group 3 and the second capping group 4 and defines a slide surface 271 on which the containers moved by the transport means 5 are susceptible of sliding, preferably between the first capping position PT1 and the second capping position PT2. In addition, the containers are preferably susceptible of sliding at least partially on the slide surface 271 in the movement from the inlet position PI to the first capping position PT2 and in the movement between the second capping position PT2 and the outlet position PU.

[0099] Preferably, the support plate 27 is provided with a through opening 272 aligned with the first capping axis Z1.

[0100] Advantageously, when the first capping group 3 takes on the first capping configuration, the spacer element 36 is fixed to the piston 34, in particular to its upper end 34', in a manner such that the movement of the piston 34 itself along its lifting travel CS induces a consequent movement of the spacer element 36 along the first capping axis Z1.

[0101] Preferably the spacer element 36 is susceptible of being placed to traverse the through opening 272 itself during its movement along the first capping axis Z1.

[0102] In such situation, with the piston 34 in the lower position, the abutment surface 361 of the spacer element 36 is advantageously coplanar with the slide surface 271 defined by the support plate 27. In this manner, for example during the movement from the inlet position PI to the first capping position PT1, the transport means 5 are susceptible of sliding the container at least partially on the slide surface 271 up to positioning it on the abutment surface 361 without interruptions or jumps.

[0103] Preferably, with the piston 34 in the upper position, the abutment surface 361 of the spacer element 36 is placed raised with respect to the slide surface 271 defined by the support plate 27. Advantageously, with the piston 34 in the lower position, the container placed on the abutment surface 361 of the spacer element 36 is in the aforesaid lowered position, and with the piston 34 in the upper position, the container placed on the abutment surface 361 of the spacer element 36 is in the aforesaid raised position.

[0104] In this manner, when the first capping group 3 takes on the first capping configuration, the containers placed by the transport means 5 in the first capping position PT1, are placed in abutment against the abutment surface 361 of the spacer element 36 and are moved, in particular due to the movement of the piston 34 along its lifting travel CS, between the lowered position and the raised position, in which they are susceptible of being capped with first caps. Preferably, when the first capping group 3 takes on the first by-pass configuration, and in particular with the conveyance means 62 of the feed group 6 which feed the second capping group 4 with second caps (as described above), the spacer element 36 of the lifting means 33 is removed from the piston 34.

[0105] Advantageously, with the piston 34 in the lower position, the distance (in particular measured along the first capping axis Z1) between the slide surface 271 defined by the support plate 27 and the upper end 34' of

the piston 34 itself is greater than its displacement travel CS. In other words, the upper end 34' of the piston 34 always remains below the slide surface 271 defined by the support plate 27.

[0106] Preferably, when the first capping group 3 takes on the first by-pass configuration, the lifting means 33 comprise a closure element (not shown in the enclosed figures) placed to close the through opening 272.

[0107] Advantageously, the closure element is substantially coplanar with the aforesaid slide surface 271. In this manner, without the spacer element 36, the containers moved by the transport means 5 are susceptible of sliding on the slide plane 271, in particular moving on the closure element itself, without falling into the through opening 272 of the support plate 27.

[0108] In this manner, when the first capping group 3 takes on the first by-pass configuration, the containers are moved by the transport means 5 from the inlet position PI to the first capping position PT1, at which they are placed on the closure element. In such situation, since as reported above the piston 34 always remains below the slide plane 271 for its entire lifting travel CS, this does not interact with the containers placed in the first capping position PT1, which consequently are not moved along the first capping axis Z1 towards the narrowing means 31 and, therefore, they are not capped with first caps.

[0109] In accordance with the preferred embodiment illustrated in figure 5, the spacer element 36 comprises an internal tube 362, which is extended along an extension direction between a first end 362', at which it is provided with an abutment surface 363 and with a coupling hole 364 extended along the extension direction, and an opposite second end 362".

[0110] Advantageously, the piston 34 is provided with a narrow section 341 extended starting from its upper end 34' up to a shoulder 342.

[0111] Preferably, the internal tube 362 is susceptible of being placed coaxial with the piston 34, with the narrow section 341 of the latter at least partially placed within the coupling hole 364 of the internal tube 362, in particular with the abutment surface 363 of the internal tube 362 placed in abutment against the shoulder 342 of the piston 34.

[0112] Preferably, the internal tube 362 is susceptible of being fixed to the piston 34 by means of removable fixing means 365. For example, the removable fixing means 365 comprise one or more ball pressers placed in coupling with suitable seats made on the piston 34 in a per se known manner.

[0113] As illustrated in figure 5, the spacer element 36 also comprises an outer sleeve 366 that is internally hollow, which is provided with an upper wall 367, which is mechanically connected to the second end 362" of the internal tube 362, and a lateral wall 368 extended projectingly from the upper wall 367 along the aforesaid extension direction. Preferably, the upper wall 367 defines the abutment surface 361 of the spacer element 36.

[0114] Advantageously, the internal tube 362 is placed inside the outer sleeve 366 coaxial with the extension direction.

[0115] Preferably, the outer sleeve 366 is susceptible of being slidably associated, in particular in shape coupling, with the guide body 24, in particular outside the latter.

[0116] In this manner, when the first capping group 3 takes on the first capping configuration, the internal tube 362 is fixed to the piston 34 and is moved by the latter along the first capping axis Z1. In such situation, the outer sleeve 366 slides outside the guide body 24, in particular guided by the latter along the first capping axis PT1, and is susceptible of moving a container, placed on the abutment surface 361 defined by the upper wall 367 of the outer sleeve 366 itself, between the lowered position and the lowered position.

[0117] Advantageously, the outer sleeve 366 comprises elastically pliable means 369 (such as for example a helical metal spring), placed to connect between the internal tube 362 and the upper wall 367 of the outer sleeve 366 itself.

[0118] Advantageously, the pusher means 32 of the first capping group 3 comprise a first slide 322 slidably connected to the support frame 2 along a first movement direction substantially parallel to the first capping axis Z1. In addition, the pusher means 32 preferably comprise a punch 323 fixed to the first slide 322 and susceptible of acting on the first cap retained in compressed form by the narrowing means 31 in order to push it vertically at least partially within the container. Preferably, the support frame 2 comprises at least one guide column 28, which is extended along a direction that is substantially vertical and to which the first slide 322 is slidably connected. Advantageously, the support frame 2 comprises two guide columns 28, which are placed spaced from and parallel to each other.

[0119] Preferably, the first slide 322 comprises two first slide bodies 325, each of which slidably connected to a corresponding guide column 28, and a first support body 326 placed to connect between the two first slide bodies 325. Advantageously, the first support body 326 and the first slide bodies 325 are made in a single body.

[0120] Preferably, the punch 323 is fixed to the first support body 326 aligned with the first capping axis Z1.

[0121] Advantageously, the first slide 322 comprises a first cam follower 324 coupled to the aforesaid first cam 321 in order to move the first slide 322 along the first movement direction, consequently moving the punch 323 along the first capping axis Z1.

[0122] Preferably, the first cam follower 321 is mechanically connected to the first support body 326 of the first slide 322.

[0123] Advantageously, the second capping group 4 comprises a second slide 43 slidably connected to the support frame 2 along a second movement direction substantially parallel to the second capping axis Z2, and the aforesaid capping head 41 is removably mechanically connected to such second slide 43.

[0124] Preferably, the second slide 43 is slidably connected at least to a guide column 28 of the support frame 2.

[0125] Preferably, the second slide 43 comprises two second slide bodies 432, each of which slidably connected to a corresponding guide column 28, and a second support body 433 placed to connect between the two second slide bodies 432. Advantageously, the second support body 433 and the second slide bodies 432 are made in a single body.

[0126] Preferably, the operative head 41 is removably connected to the second support body 433 aligned with the second capping axis Z2.

[0127] Advantageously, the second slide 43 comprises a second cam follower 431 coupled to the second cam 42 in order to move the second slide 43 itself along the second movement direction, consequently moving the capping head 41 along the second capping axis Z2.

[0128] Preferably, the second cam follower 431 is mechanically connected to the second support body 433 of the second slide 43.

[0129] Advantageously, the second capping group 4 comprises an actuation shaft 44, which is rotatably connected to the second slide 43 around the second capping axis Z2 and to which the capping head 41 is removably fixed in order to be actuated in rotation around the aforesaid second capping axis Z2.

[0130] Advantageously, the actuation shaft 44 is rotatably connected, in particular around the second capping axis Z2, to the second support body 433 of the second slide 43.

[0131] Preferably, the second capping group 4 also comprises second motorization means 45 susceptible of actuating the actuation shaft 44 in rotation around the second capping axis Z2. Advantageously, the second motorization means 45 comprise a second electric motor 451, which is fixed to the second support body 433 and is mechanically connected to the actuation shaft 44 in order to rotate it around the aforesaid second capping axis Z2.

[0132] Preferably, when the second capping group 4 takes on the second capping configuration, the capping head 41 is mechanically connected to the second slide 43, and is moved by the latter along the second capping axis Z2 between the disengagement position, in which it is placed spaced from the mouth of the container placed in the second capping position PT2, and the operative position, in which it exerts, on a second cap placed at the mouth of the container, a force parallel to the second capping axis Z2 in order to cap the same container.

[0133] In addition, the capping head 41 is susceptible of being rotated around the second capping axis Z2 by the aforesaid second motorization means 45 at least when it is in the operative position.

[0134] For example, for capping containers with pre-threaded screw caps, it is necessary that the capping head 41, in addition to imparting a vertical force on the cap, also rotates it around the second capping axis Z2 in order to screw it to the thread attained on the head of the container. Alternatively, for example for capping containers with pressure caps, it is sufficient for the capping head 41 to exert the vertical force on the cap itself, without however rotating it around the second capping axis Z2.

[0135] Advantageously, when the second capping group 4 takes on the second by-pass configuration, as reported above, the capping head 41 is removed from the second slide 43. However, the second slide 43 is still actuated along the second movement direction by the second cam 42. More in detail, when the machine 1 is configured according to the first operative configuration, this caps, with first caps coming from the feed group 6, the containers placed in the first capping position PT1. Subsequently, the capped containers with first caps are moved by the transport means 5 into the second capping position PT2. In such situation, if the capping head 41 were present on the machine 1, this would come to interfere with the capped containers with first caps placed in the second capping position PT2, possibly ruining the aforesaid first cap or the container itself.

[0136] Preferably, the transport means 5 comprise a star conveyor 51 rotatably connected to the support frame 2 around a second rotation axis R2, preferably parallel to the first rotation axis R1 and advantageously vertical.

[0137] As is known, the star conveyor 51 is provided with multiple lobes placed equidistant from each other around the second rotation axis R2, each of which susceptible of receiving a container in order to move it around the second rotation axis R2.

[0138] Preferably, the movement trajectory T, along which the star conveyor 51 of the transport means 5 moves the containers, is extended with circumference arc form around the second rotation axis R2, advantageously on a horizontal plane.

[0139] Preferably, the star conveyor 51 is actuated, in particular during use, in rotation around the aforesaid second rotation axis R2 with intermittent rotary motion.

[0140] In a per se known manner, the intermittent rotary motion alternates, advantageously in a regular manner, a step of rotation of the star conveyor 51 around the second rotation axis R2, and a waiting step in which the star conveyor 51 remains stopped with respect to the second rotation axis R2.

[0141] Preferably, the aforesaid intermittent rotary motion is synchronized in a manner such that, during each waiting step, a first lobe of the star conveyor 51 is placed at the inlet position PI, a second lobe of the star conveyor 51 is placed at the first capping position PT1, a third lobe of the star conveyor 51 is placed at the second capping position PT3, a fourth lobe of the star conveyor 51 is placed at the outlet position PU.

[0142] In this manner, the star conveyor 51 moves the containers between the various above-described positions during the rotation step, and keeps them stopped, in particular in the aforesaid positions, during the waiting step, ensuring the correct alignment of the containers

themselves with respect to both the first capping axis PT1 and the second capping axis PT2.

[0143] Preferably, the aforesaid first capping time T1 and the second capping time T2 have duration substantially equal to the waiting step of the intermittent rotary motion of the star conveyor 51. Advantageously, the machine 1 comprises a transmission shaft 52, which is rotatably connected to the support frame 2 around a third rotation axis R3 substantially parallel to the second rotation axis R2.

[0144] Preferably, the machine 1 comprises transmission means 53, which are mechanically connected to the transmission shaft 52 and to the star conveyor 51. Advantageously, the aforesaid transmission means 53 are arranged for receiving, from the transmission shaft 52, a rotary motion around the third rotation axis R3 and for imparting, to the star conveyor 51, a corresponding intermittent rotary motion around the second rotation axis R2.

[0145] Preferably, the transmission means 53 comprise a Maltese cross mechanism, which is well-known to the man skilled in the art and therefore will not be described with greater detail hereinbelow.

[0146] Advantageously, the transmission shaft 52 is mechanically connected, preferably by means of belt transmission means 54, to the first motor means 7 and is actuated by the latter in rotation around the third rotation axis R3.

[0147] In this manner, with the machine 1, object of the present invention, the first motor means 7 simultaneously actuate the transport means 5, the pusher means 32, the lifting means 33 of the first capping group 3 and the capping head 41 of the second capping group 4, in a manner such that the corresponding movements are mechanically synchronized with each other.

[0148] The invention thus conceived therefore attains the pre-established objects.

Claims

1. Machine for capping containers with caps intended to be placed along a bottling line (A) **characterized in that** it comprises:

    - a support frame (2), which is intended to be abutted against the ground;
    - a first capping group (3), which is mechanically mounted on said support frame (2), is susceptible to insert first caps made of deformable material within the mouths of the heads of said containers along a first capping axis (Z 1) and comprising:

        - narrowing means (31), which are placed at said first capping axis (Z1), are susceptible of compressing a first cap from an enlarged form to a compressed form, in which it is susceptible of insertion in the mouth of a container;
        - pusher means (32) mounted above said narrowing means (31), which are actuated by a first cam (321) to be moved along said first capping axis (Z1) and are susceptible of pushing said first cap, retained in compressed form by said narrowing means (31), at least partially within said container;
        - lifting means (33), which are slidably connected to said support frame (2) along said first capping axis (Z1) and are susceptible of moving said container between a lowered position, in which said container is placed spaced from said narrowing means (31), and a raised position, in which the mouth of said container is placed adjacent to said narrowing means (31);

    - a second capping group (4), different from said first capping group (3), which is mechanically mounted on said support frame (2), is susceptible of applying second caps to the head of said containers along a second capping axis (Z2) and comprises a capping head (41), which is mechanically connected to said support frame (2) and is actuated by a second cam (42) to be moved along said second capping axis (Z2) between a disengagement position, in which it is placed spaced from the head of said container, and an operative position, in which it is susceptible of exerting a force substantially parallel to said second capping axis (Z2) on said second cap to be applied to said container;
    - transport means (5), mechanically connected to said support frame (2) and arranged for moving said containers at least between:

        - an inlet position (PI), at which said containers are picked up from said bottling line (A);
        - a first capping position (PT1), in which said containers are placed below said first capping group (3) and are aligned with respect to said first capping axis (Z1);
        - a second capping position (PT2), in which said containers are placed below said second capping group (4) and are aligned with respect to said second capping axis (Z2);
        - an outlet position (PU), at which said containers are introduced in said bottling line (A);

    - a feed group (6), which is mounted on said support frame (2), comprises at least one tank (61) of first or second caps and conveyance means (62) which receive said first or second caps from said at least one tank (61) and selec-

tively feed said first capping group (3) or said second capping group (4) with said first or second caps;
said first cam (321) and said second cam (42) being mechanically and integrally connected to each other;
first motorization means (7) being provided for jointly moving said first cam (321) and said second cam (42) in rotation around a first rotation axis (R1) that is substantially vertical.

2. Machine for capping containers according to claim 1, **characterized in that** it comprises a first support body (21), which is substantially cylindrical, is rotatably connected to said support frame (2) around said first rotation axis (R1) and on which said first cam (321) and said second cam (42) are made.

3. Machine for capping containers according to claim 1 or 2, **characterized in that** said lifting means (33) comprise a piston (34), which is slidably connected to said support frame (2) along said first capping axis (Z 1) for a lifting travel (CS).

4. Machine for capping containers according to claim 3, **characterized in that** said piston (34) is actuated along said first capping axis for said lifting travel (CS) by a third cam (332).

5. Machine for capping containers according to claim 4, **characterized in that** said third cam (332) is actuated in rotation around said first rotation axis (R1) jointly with said first cam (321) and with said second cam (42).

6. Machine for capping containers according to any one of the claims 3 to 5, **characterized in that** said lifting means (33) comprise a spacer element (36), which is removably fixed to said piston (34) and is provided with an abutment surface (361) on which said containers are susceptible of being placed in order to move them between said lowered position and said raised position.

7. Machine for capping containers according to any one of the preceding claims, **characterized in that** the pusher means (32) of said first capping group (3) comprise a first slide (322) slidably connected to said support frame (2) along a first movement direction substantially parallel to said first capping axis (Z1), and a punch (323) fixed to said first slide (322) and susceptible of acting on said first cap retained in compressed form by said narrowing means (31) in order to push it vertically at least partially within said container;
said first slide (322) comprises a first cam follower (324) coupled to said first cam (321) in order to move said first slide (322) along said first movement direction.

8. Machine for capping containers according to any one of the preceding claims, **characterized in that** said second capping group (4) comprises a second slide (43) slidably connected to said support frame (2) along a second movement direction substantially parallel to said second capping axis (Z2), and said capping head (41) is removably mechanically connected to such second slide (43);
said second slide (43) comprising a second cam follower (431) coupled to said second cam (42) in order to move said second slide (43) along said second movement direction.

9. Machine for capping containers according to claim 8, **characterized in that** said second capping group (4) comprises:

- an actuation shaft (44), which is rotatably connected to said second slide (43) around said second capping axis (Z2), and said capping head (41) is removably fixed to such actuation shaft (44);
- second motorization means (45) susceptible of actuating said actuation shaft (44) in rotation around said second capping axis (Z2).

10. Machine for capping containers according to any one of the preceding claims, **characterized in that** said transport means (5) comprise a star conveyor (51) rotatably connected to said support frame (2) around a second rotation axis (R2).

11. Machine for capping containers according to claim 10, **characterized in that** said star conveyor (51) is actuated, during use, in rotation around said second rotation axis (R2) with intermittent rotary motion.

12. Machine for capping containers according to any one of the preceding claims, **characterized in that**, with the conveyance means (62) of said feed group (6) which feed said first capping group (3) with said first caps, said capping head (41) is removed from said second capping group (4).

13. Machine for capping containers according to any one of the claims 6 to 12, **characterized in that**, with the conveyance means (62) of said feed group (6) which feed said second capping group (4) with said second caps, the spacer element (36) of said lifting means (33) is removed from said piston (34).

14. Machine for capping containers according to any one of the preceding claims, **characterized in that** said first capping group (3) is selected at least from among: capping with shaved corks and capping with mushroom-shaped corks.

15. Machine for capping containers according to any one of the preceding claims, **characterized in that** said second capping group (4) is selected at least from among: capping with screw caps, capping with crown caps, capping with capsules, capping with pressure caps.

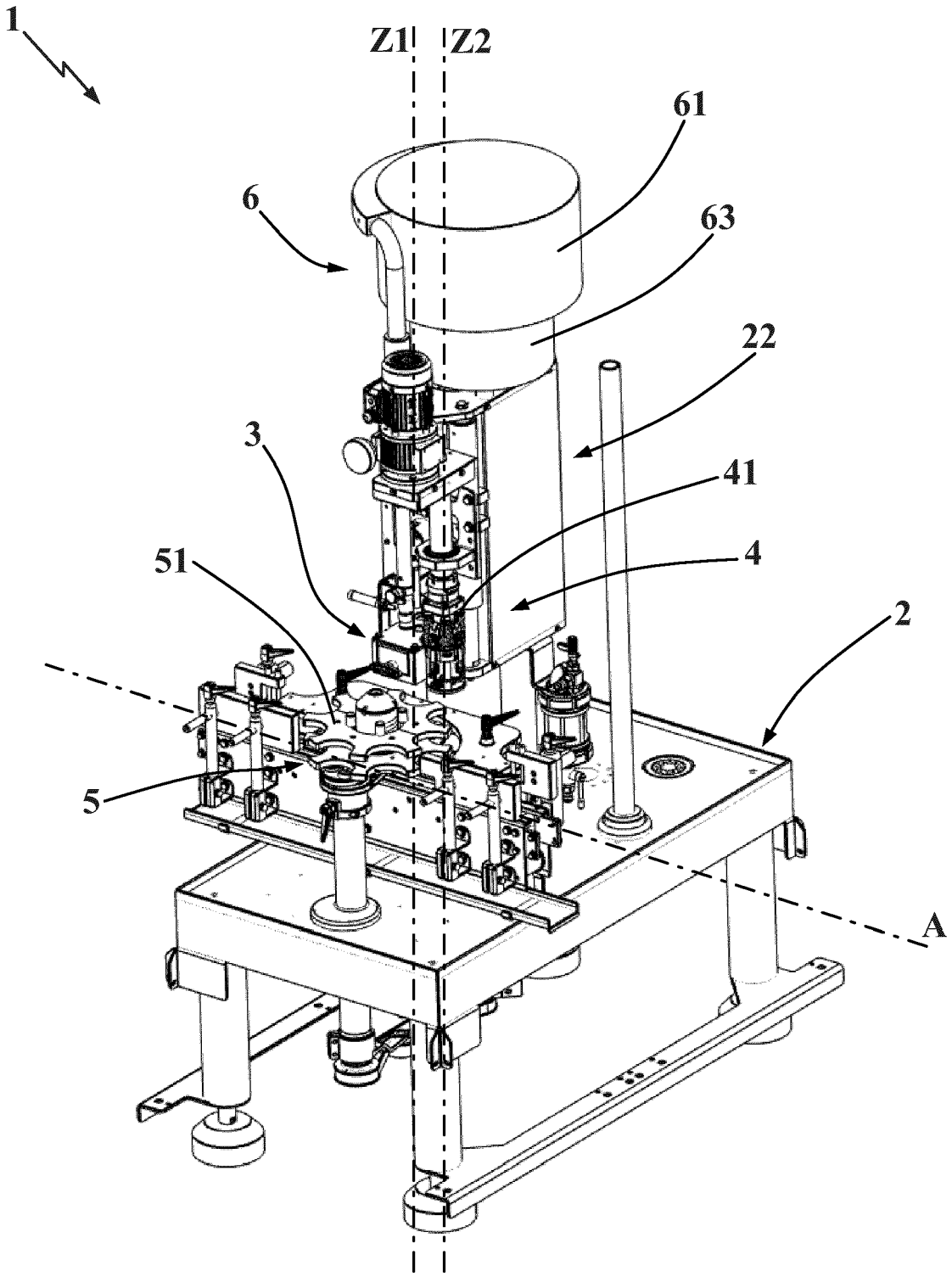

Fig. 1

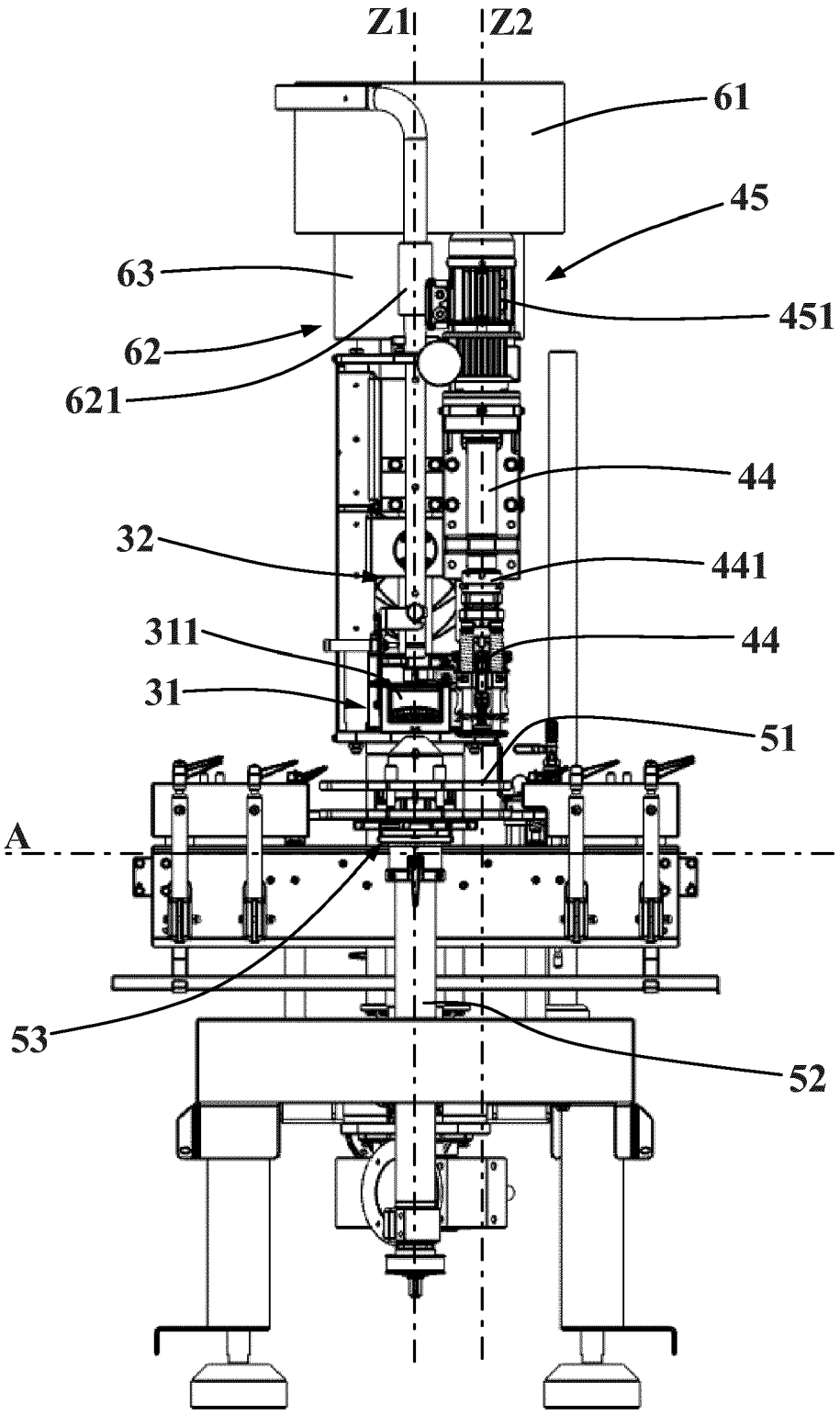

Fig. 2

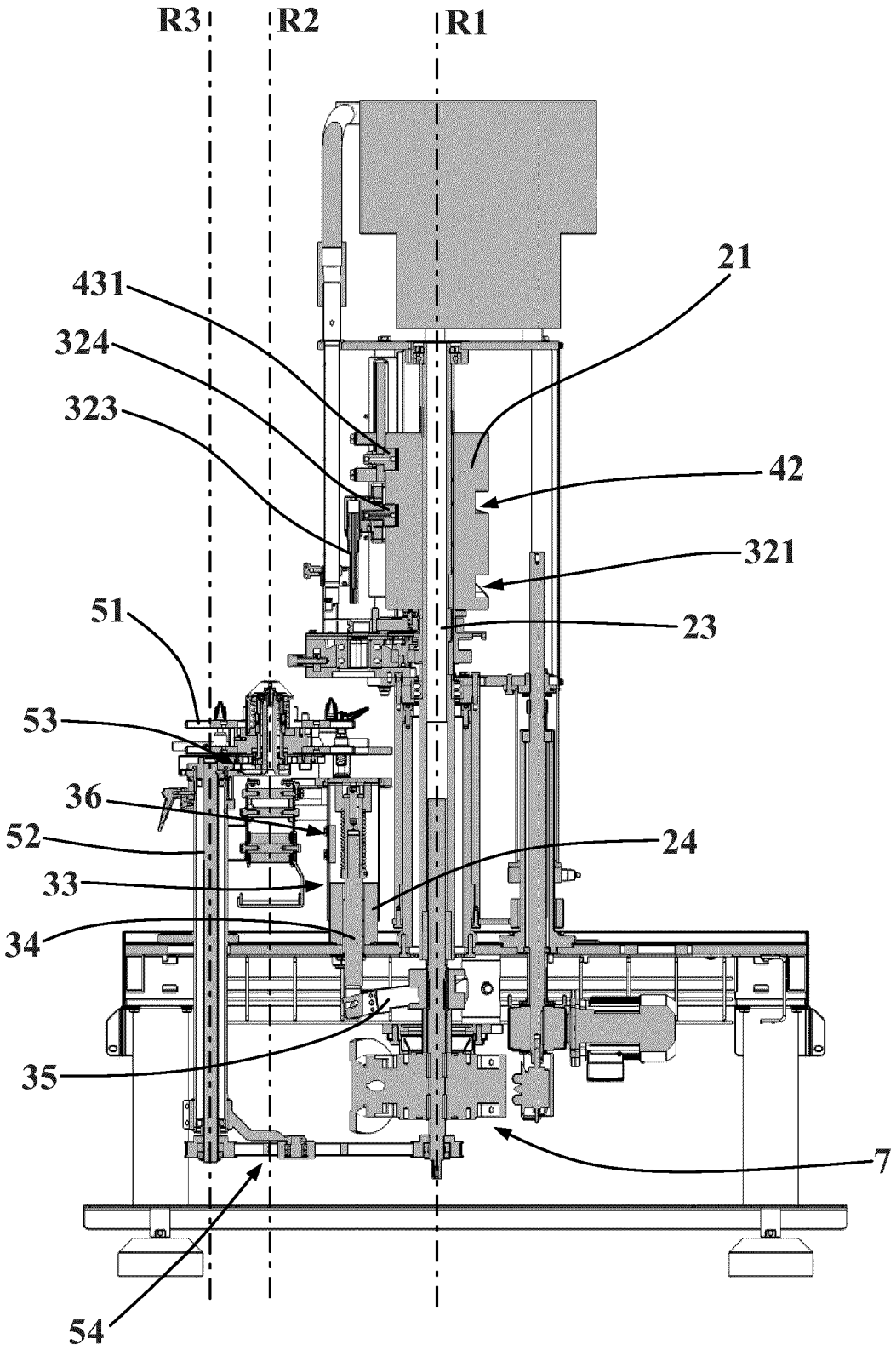

Fig. 3

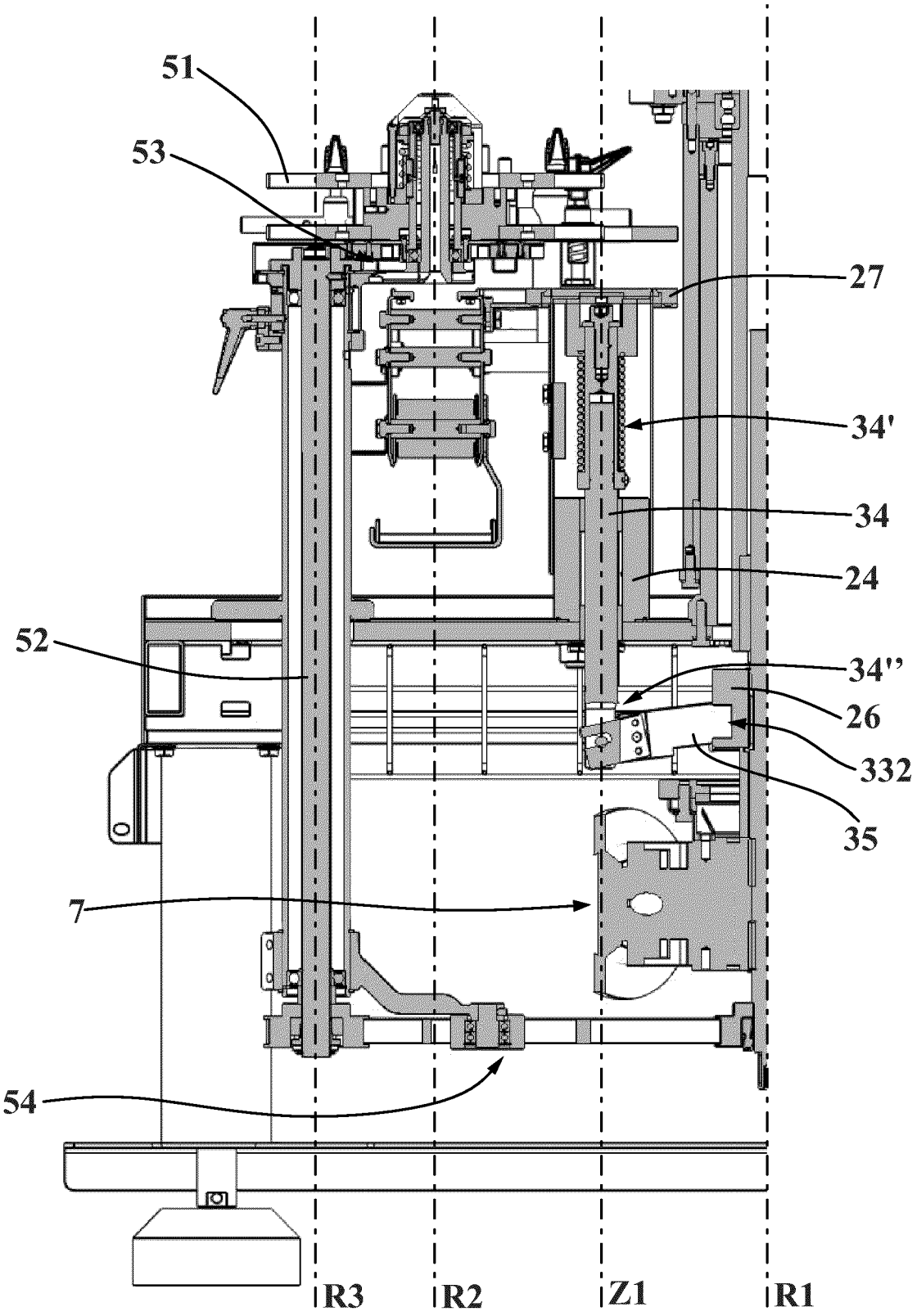

Fig. 4

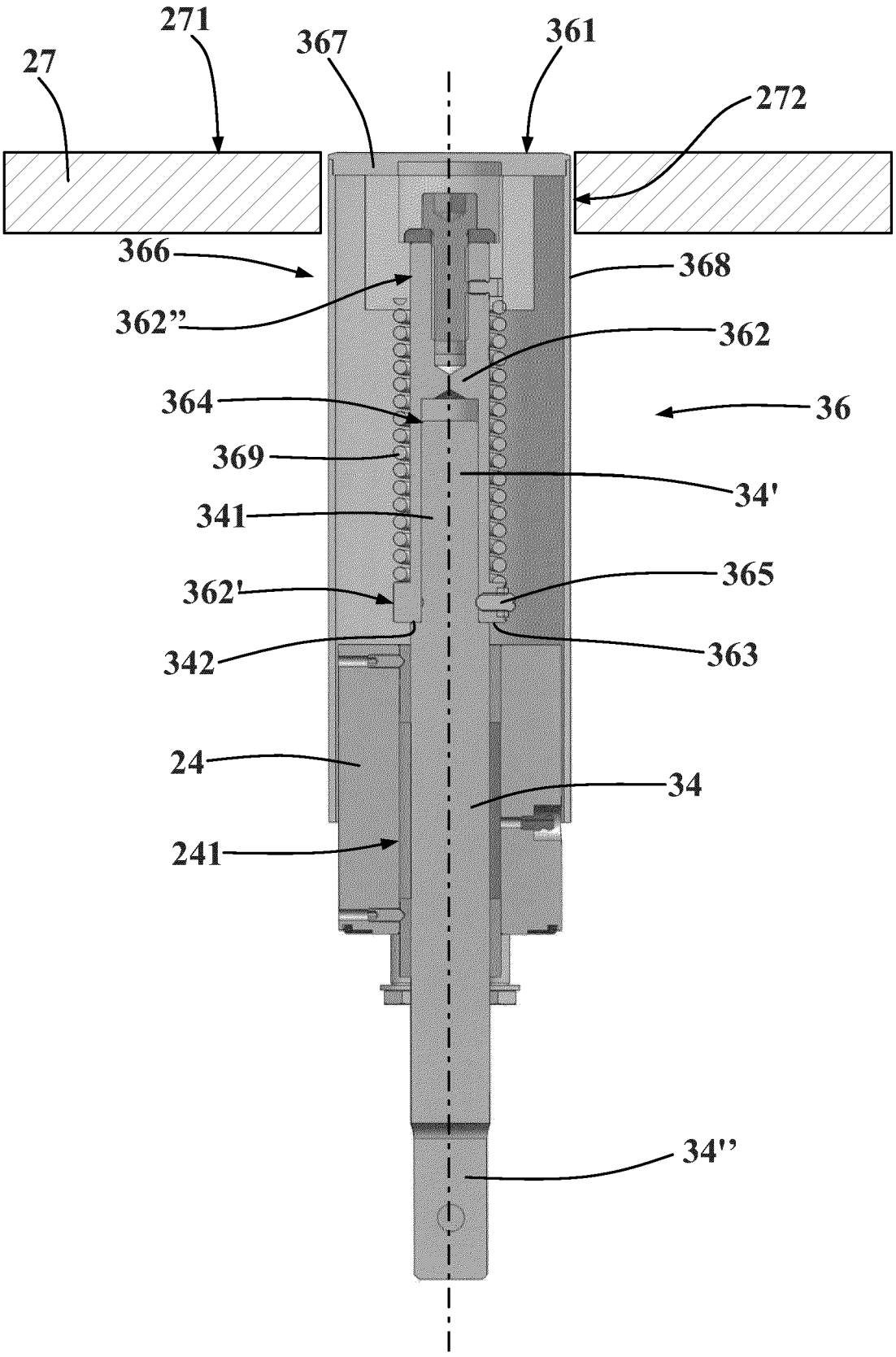
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Fig. 5

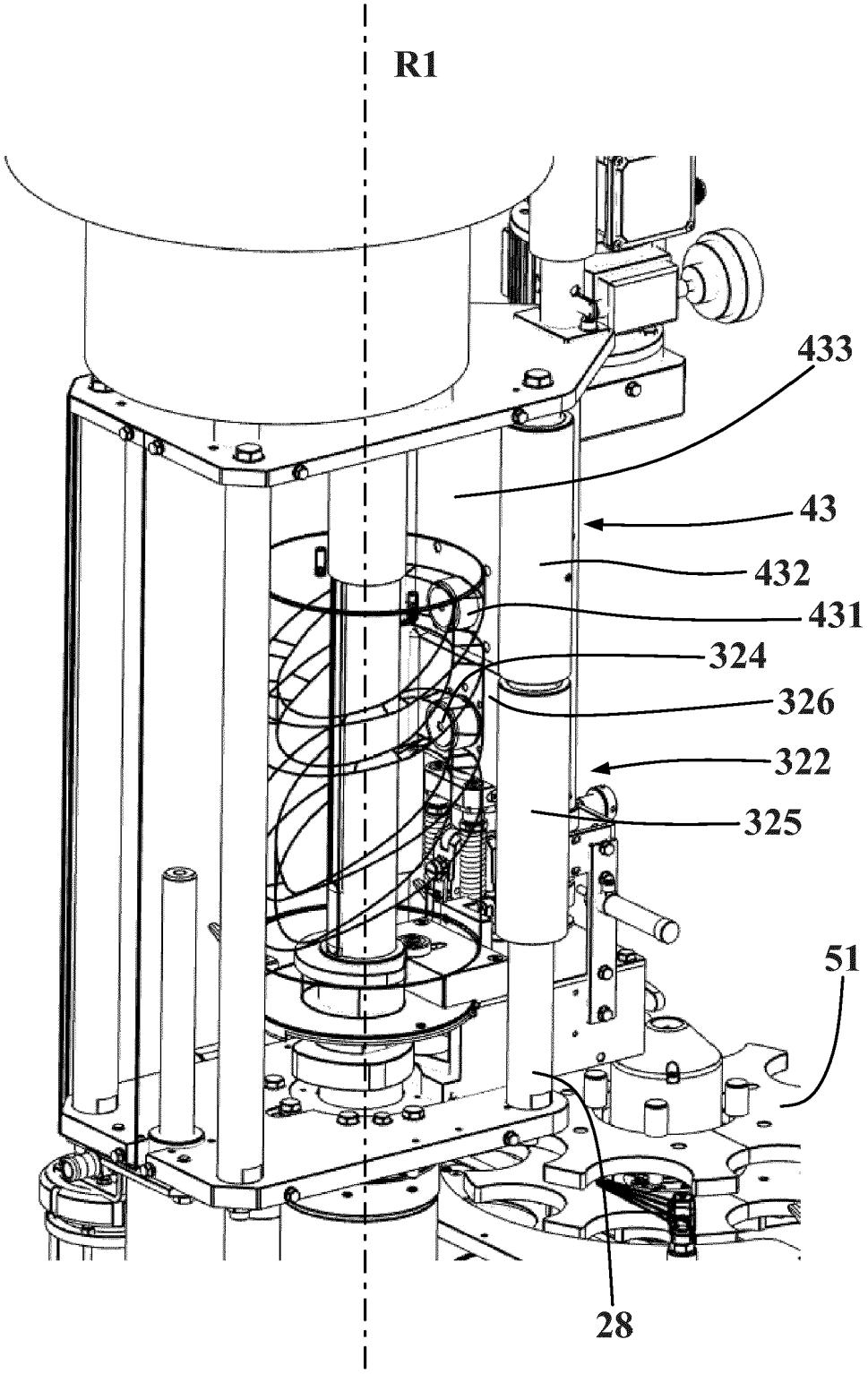

Fig. 6

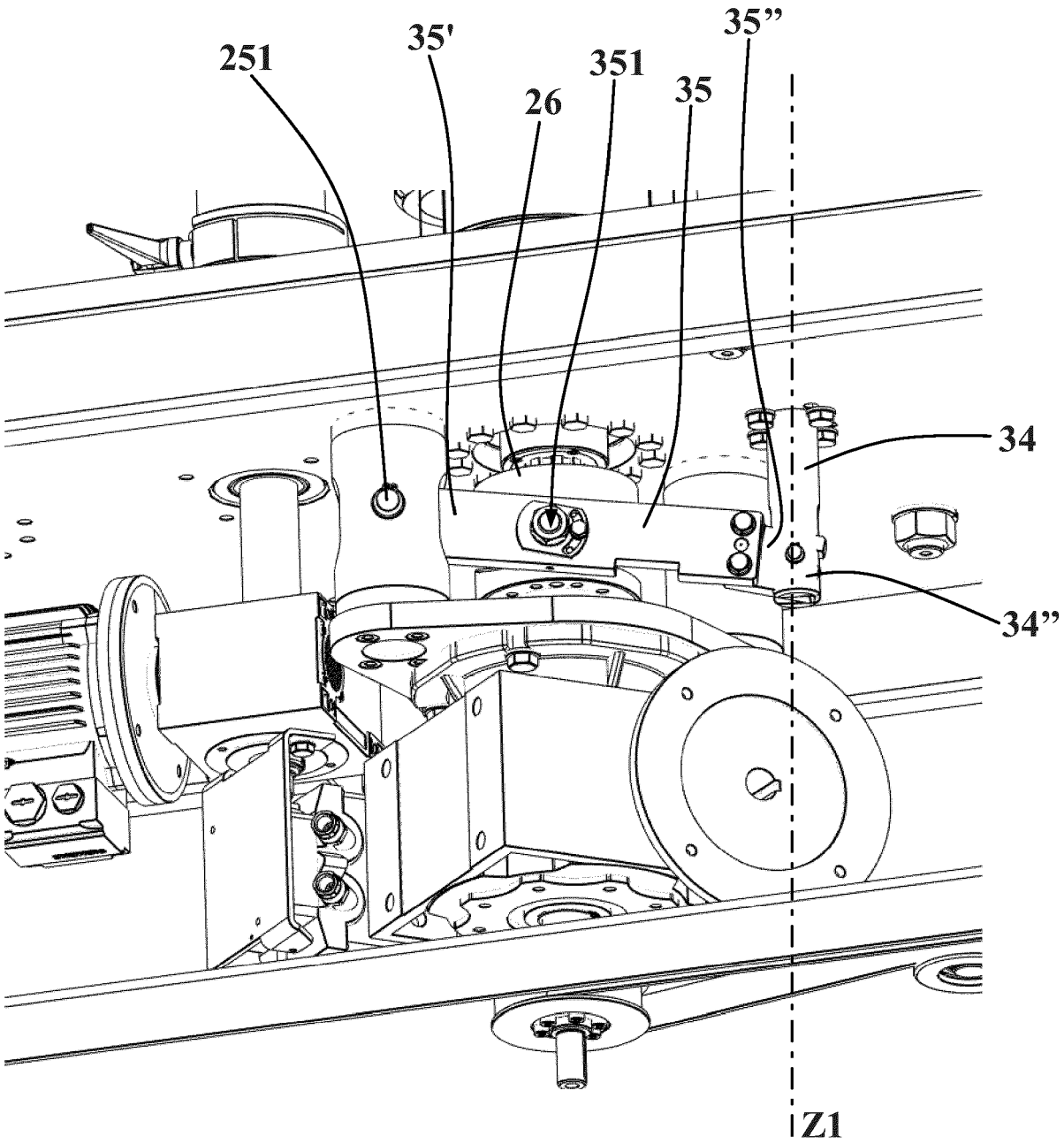

Fig. 7

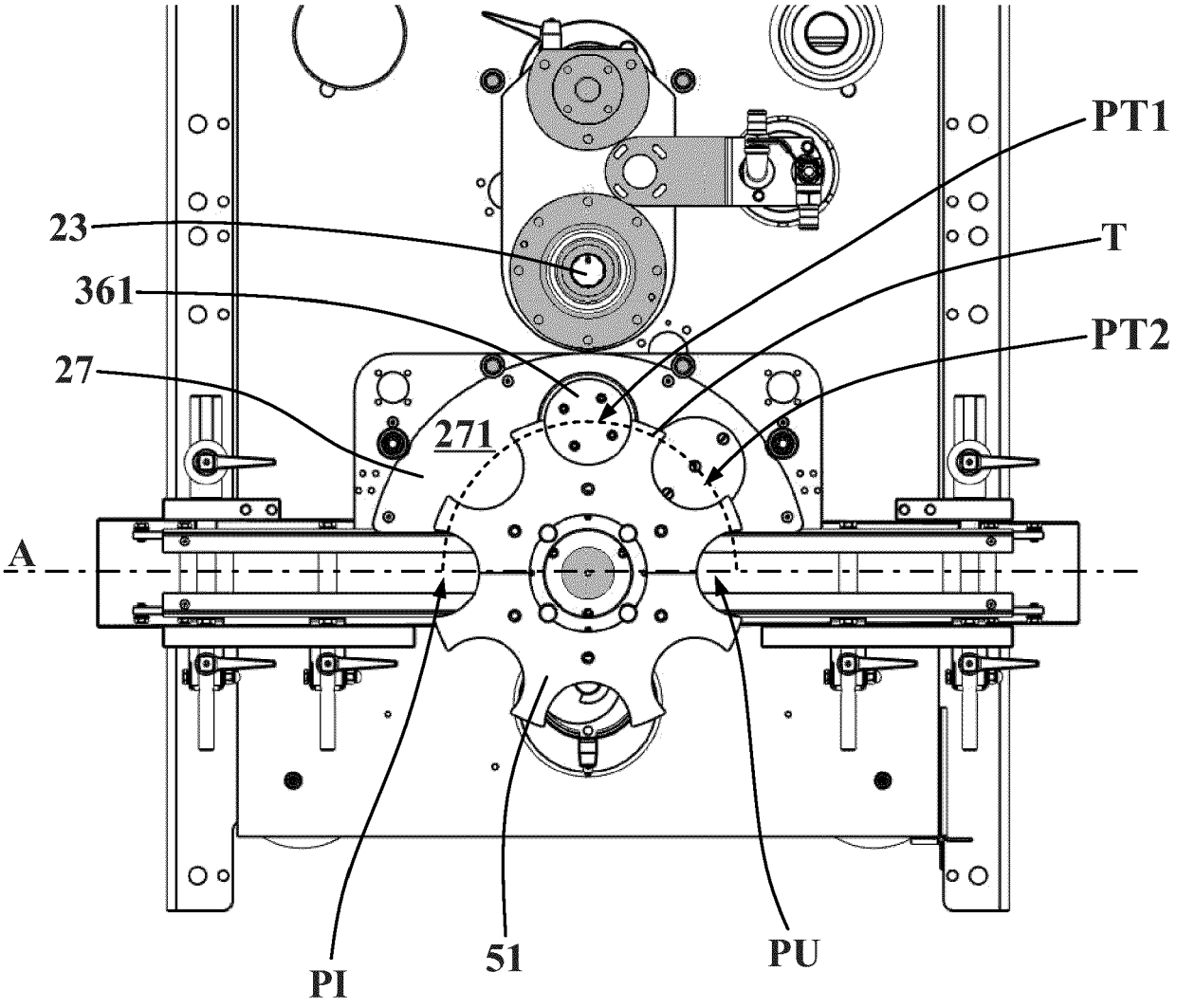

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 24 16 7167

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 382 161 A1 (SEITZ ENZINGER NOLL MASCH [DE]) 16 August 1990 (1990-08-16) * figures 1-5 * * column 2, line 46 - column 9, line 21 *	1-15	INV. B67B1/04 B67B3/20
A	US 2 359 932 A (NEWEY WILLIAM H) 10 October 1944 (1944-10-10) * figures 1-9 * * page 1, right-hand column, line 15 - page 4, left-hand column, line 62 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 July 2024	Pardo Torre, Ignacio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-07-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0382161 A1	16-08-1990	DD 291972 A5	18-07-1991
		DE 3903933 A1	16-08-1990
		EP 0382161 A1	16-08-1990
US 2359932 A	10-10-1944	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0382161 A1 **[0024]**