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

(11) EP 1 041 033 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.10.2000 Bulletin 2000/40

(51) Int. Cl.[7]: **B67B 5/03**

(21) Application number: **00105967.4**

(22) Date of filing: **24.03.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **31.03.1999 IT TO990250**

(71) Applicant:
ROBINO & GALANDRINO S.p.A.
I-14053 Canelli (Asti) (IT)

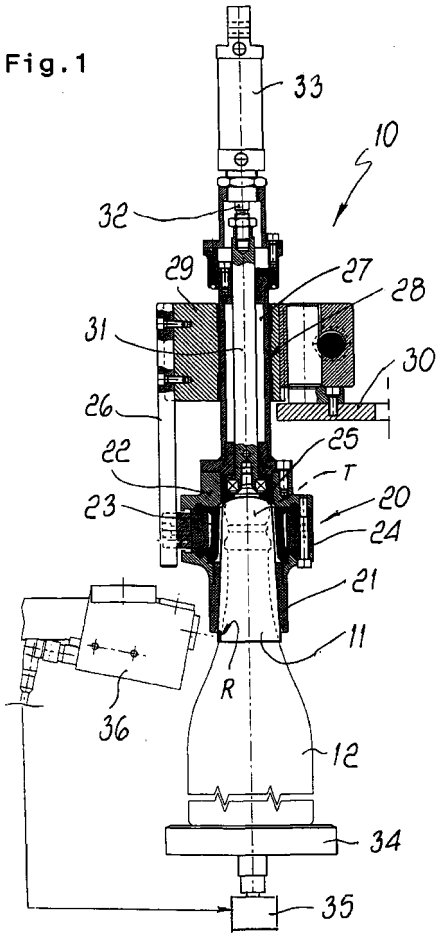
(72) Inventor: **Galandrino, Agostino**
14053 Canelli, Provence of Asti (IT)

(74) Representative:
Modiano, Guido, Dr.-Ing. et al
Spandonari & Modiano S.r.l.,
Corso Duca degli Abruzzi, 16
10129 Torino (IT)

(54) Method and apparatus for centering and orientating decorative covers for bottle necks

(57) A method and an apparatus by means of which a capsule (11) fitted onto a bottle (12-120) is rendered coaxial to the bottle (12-120) by means of a drop-down head (20-220) provided with a rigid centering sleeve (21-210) and with a pneumatic tightening sleeve (23-230), which is suitable to produce a preliminary partial coupling of the capsule (11) to the cork (T) of the bottle, after the capsule has been centered with respect to the bottle by the first sleeve. The partial and preliminary coupling of the capsule is achieved by compressing the end of the capsule onto the cork (T) of the bottle by means of the pneumatic tightening sleeve (23-230), into which compressed air is fed temporarily.

Fig.1



EP 1 041 033 A2

Description

[0001] The present invention relates to a method and an apparatus for centering and orientating capsules of bottles of sparkling wine and the like.

[0002] It is known to experts in the field that capsules made of metal or typically tin-based metal alloy are applied by fitting them over the cork and partially over the neck of the bottle, to which they are subsequently made to cling by means of pneumatic sleeves which form, on the capsules, a plurality of parallel and vertical folds, typically four, which take up the excess material of the capsule, causing its correct adhesion to the cork and bottle neck.

[0003] In order to correctly perform the operation for application by folding, the capsule must be perfectly axially aligned with the bottle, i.e., to put it briefly, it must be "centered" on the bottle.

[0004] Since the capsules at issue are normally frustum-shaped, so as to follow the tapering shape of the neck of the bottle at least as a first approximation, and since some of the capsules have a reduced axial extension and therefore an opening at the larger base which has a significantly larger diameter than the corresponding diameter of the neck of the bottle, also in order to facilitate fitting onto the neck, centering these capsules is not easy. Once they have been fitted onto the neck of the bottle, they in fact tend to oscillate and arrange themselves obliquely with respect to the axis of the bottle; this oscillation is caused by various factors, such as accidental impacts, mass-dependent actions (sudden accelerations or stops), localized air currents, and others.

[0005] Therefore, bottles on which capsules of the above-mentioned short type are fitted often arrive at the pneumatic sleeves for forming the folds with the capsules off-centered with respect to the bottles. This causes incorrect application of the capsules, on which the pneumatic sleeves form uneven and inclined folds which have mutually different widths, the folds formed at the region where the capsule lies furthest from the neck of the bottle being wider and, vice versa, the folds in the region where the capsule lies closest to the neck being narrower. The capsule further retains its inclined position with respect to the axis of the bottle.

[0006] These circumstances are a severe drawback in the application of capsules to bottles which is worsened if, as often occurs, the capsules bear lettering, inscriptions and/or emblems which, due to the irregular formation of the folds, can be fully or partially concealed and/or arranged at an angle and eccentrically with respect to the bottle, which is accordingly certainly rejected.

[0007] The aim of the present invention is to eliminate these severe drawbacks, and within the scope of this general aim an object is to provide a method and an apparatus capable of performing the preliminary and stable centering of the capsules with respect to the bottles, so that when the bottles reach the station where capsule application is completed by forming folds on the capsules, such capsules are perfectly centered with respect to the axis of the bottle, in order to ensure the correct formation of rigorously identical and vertical folds.

[0008] Another important object of the present invention is to provide a method and an apparatus which allow correct angular positioning or orientation of the bottles with the capsules partially rigidly coupled thereto beforehand, so as to ensure that in the subsequent step for completing application by forming the folds the pneumatic sleeve arranges the folds rigorously in the space assigned to them.

[0009] Another important object of the present invention is to allow the mutual angular positioning or orientation of both the capsule and the bottle, in order to align the lettering or emblems of the capsule with any raised portions (emblems, markings and the like) impressed on the bottle.

[0010] According to the invention, this aim, these objects and others which will become apparent from the detailed description that follows are achieved with a centering and orientation method and apparatus having the specific characteristics stated in the appended claims.

[0011] Substantially, the invention is based on the concept of producing, by means of a drop-down head which is provided with a rigid sleeve for centering the capsule which is surmounted by a pneumatic sleeve for partial tightening, the preliminary and corresponding partial compression only of the upper portion of the capsule and the substantial coupling thereof, in a centered position, to the mushroom-shaped cork that protrudes from the neck of the bottle.

[0012] After this preliminary centering and rigid coupling by partial compression, the bottle with the capsule rigidly coupled thereto is orientated angularly with respect to at least one reference provided by the capsule itself; such reference is rendered visible by the partial lifting of the drop-down head and is detected by an optical reader which produces the controlled angular movement of the bottle in order to feed, in the correct angular position, the capsule and the bottle, which are mutually centered and rigidly coupled, to the subsequent station for forming the folds that complete the application of the capsule to the neck of the bottle.

[0013] As an alternative, according to the invention it is possible to produce the angular orientation of the capsule and of the bottle with respect to each other. This is achieved by producing, before rigid coupling by partial compression of the upper part of the capsule, the preliminary lifting of the capsule from the bottle, the angular orientation of the former with respect to an optical reader which detects a reference on the capsule, and the simultaneous angular orientation of the latter with respect to a feeler which detects a reference on the bottle; after the orientations have been completed, the

capsule being lowered onto the bottle again and being partially pressed onto the cork of the bottle in order to rigidly couple the capsule and the bottle, which were centered and mutually angularly orientated beforehand.

[0014] Further characteristics and advantages of the method and the apparatus according to the present invention will become apparent from the detailed description that follows and with reference to the accompanying drawings, given only by way of non-limitative example and wherein:

Figure 1 is a sectional elevation view, taken along an axial plane, of the centering and orientation apparatus according to an embodiment of the invention which is suitable to center the capsule and simply orientate the bottle and the capsule that are mutually rigidly associated;

Figures 2 to 5 are simplified sectional views, similar to Figure 1, illustrating in succession respective steps of application, centering, partial coupling and orientation of the capsule and of the bottle, performed with the apparatus of Figure 1 and according to one way of performing the method according to the present invention;

Figure 6 is a sectional view, similar to Figure 1, of a second embodiment of the apparatus suitable to produce the centering of the capsules and the mutual orientation of the capsule and the bottle;

Figures 7 to 11 are simplified sectional views, similar to Figure 6, of respective steps for centering and mutual orientation of the capsules with respect to the bottles, performed with the apparatus of Figure 6 and according to a different way of performing the method according to the present invention.

[0015] Initially with reference to Figures 1 to 5, the reference numeral 10 generally designates the apparatus for centering and orientating capsules 11 of the metallic type, and the reference numeral 12 designates a bottle of sparkling wine or the like which is meant to receive a corresponding capsule 11. The capsule is then made to cling to the mushroom-shaped cork T and to the neck of the bottle, in a manner which is known and not shown, by virtue of a pneumatic sleeve which forms vertical folds which are parallel and evenly spaced and are suitable to take up the excess material of the capsules.

[0016] The apparatus 10 has the stated essential purpose of centering beforehand the capsule 11 on the bottle 12 and of producing the angular orientation of the capsule and the bottle so that they are correctly positioned when they arrive at the subsequent processing station (not shown), in which the vertical folds are formed and capsule fitting is completed.

[0017] For this purpose, the apparatus 10 comprises a drop-down head 20 which is provided with a rigid interchangeable sleeve 21 which substantially has the frustum-shaped profile of the capsule 11 and is meant to contain the capsule so as to center it, arranging it coaxially to the underlying bottle 12. The sleeve 21 is screwed, or otherwise detachably coupled, to a head body 22 which is provided with a pneumatic tightening sleeve 23 which is located directly above the rigid sleeve 21, can undergo radial deformation, is typically made of elastomeric material and into which a manifold 24 feeds compressed air. The pneumatic tightening sleeve 23 has a partial axial extension and protrudes above the centering sleeve 21 by an axial extent which is slightly greater than the axial extension of the mushroom-shaped cork T that protrudes from the upper edge of the neck of the bottle 12. The rigid sleeve 21 and the pneumatic sleeve 23 therefore delimit together, in the head 20, a cavity which is suitable to receive the capsule 11; the cavity is closed in an upward region by an end plate 25 which is suitable to press on the head surface of the capsule. The manifold 24 is rigidly coupled so as to prevent rotation by a lateral rod 26 and said head body 22 is rigidly coupled to a hollow vertical stem 27 which can move axially and rotationally in the bush 28 of a rigid support 29 to which the lateral rod 26 is rigidly coupled. In turn, the support 29 is supported by a disk 30 which can move vertically and which is further provided with the fold formation sleeve, which is not shown in the figure and is angularly shifted with respect to the head 20.

[0018] The cavity of the stem 27 contains a rigid rod 31 whose lower end is connected, with a rolling bearing interposed, to the end plate 25 and whose upper end is rigidly coupled to the stem 32 of a double-acting hydraulic or pneumatic cylinder 33 which is fitted at the upper end of the stem 27.

[0019] The apparatus is completed by a rotating pad 34 which is suitable to support the bottle 12 so that it is axially aligned with the head 20; the pad is turned by an electric motor 35, preferably of the step type, which is controlled by a fixed optical reader 36 which is arranged laterally to the bottle and substantially at the lower edge of the capsule 11.

[0020] The steps of the method for centering and orientating the capsule and the bottle performed with the above-described apparatus 10 are as follows:

-- step I (Figure 2): while the head 20 is kept in the raised position by the supporting disk 30, a bottle 12 on which the capsule 11 is fitted is fed, for example by means of a conventional feeder carousel (not shown), to the pad 34 in alignment with the head 20;

-- step II (Figure 3): the supporting disk 30 is lowered and the head 20 descends in the direction of the arrow C onto the capsule 11, engaging it with its rigid sleeve 21, which centers said capsule with respect to the axis of the bottle 12;

-- step III (Figure 4): while the head 20 is kept in the lowered position, compressed air AC is temporarily fed to the manifold 24, which radially deforms the

pneumatic tightening sleeve 23, making the upper part of the capsule 11 adhere to the mushroom-shaped cork T and to a reduced portion of the neck of the bottle, producing the substantial coupling of said capsule, correctly centered, to said cork T;

-- step IV (Figure 5); the hydraulic or pneumatic cylinder 33 is activated and, by reacting with its stem on the rod 31 that presses on the end plate 25 which rests on the capsule 11 and on the cork T, produces the partial lifting SP of the head body 22 and of the rigid sleeve 21 rigidly coupled thereto, exposing an angular reference R which is provided on the capsule 11 and is detected by the optical reader 36, which stops the pad 34, which in the meantime has started a rotation RO, when said reference and said optical reader are aligned;

-- step V: the head 20 is returned to the raised position of Figure 1 and the bottle 12, with the capsule 11 centered and rigidly coupled thereon, are removed, in the correct angular position, to the subsequent station, which forms the folds on the capsule, completing its application.

[0021] The embodiment of Figures 6 to 11, in which similar or corresponding parts are designated by the same reference numeral followed by the digit zero, relates to an apparatus 100 which allows, in addition to capsule centering, the mutual angular orientation of the capsule and of the bottle.

[0022] For this purpose, the apparatus 100 comprises a drop-down rotating head 200 with a head body 220 which is supported by a hollow vertical stem 270 which is accommodated, so that it can move axially, in contrast with a spring 271, in a corresponding bush 280. Said bush is contained so that it can rotate, with rolling bearings 281-282 interposed, in a tube 283 which is rigidly coupled to a disk-like support 300 which can move vertically by way of the axial movement of a supporting post 301. The bush 280 rigidly supports a gear 284 which meshes with the pinion 285 of an actuation motor 286 which is rigidly coupled to the supporting disk 300. The motor 286, preferably of the step type, is controlled by a fixed optical reader 360 (Figure 7) which is arranged laterally to the bottle and is supported by the post 301 at the lower edge of the capsule 11. The head body 220 contains, as in the first embodiment, a pneumatic tightening sleeve 230 to which compressed air is fed by means of a manifold 240 which turns rigidly with the head 200 and cooperates with a fixed distributor 241 which is rigidly coupled so as to prevent rotation by a lateral rod 260.

[0023] The head body 220 protrudes downward with a rigid sleeve portion 210 which lies directly below the tightening sleeve 230 and has the already-described function of centering element for the capsule 11. The cavity for containing the capsule 11, which is delimited in the head body 220 by the rigid sleeve 210 and the tightening sleeve 230, is provided, in an upward region, with a capsule gripping sucker 250 which, by means of a duct 251 arranged coaxially to the hollow stem 270, is connected to a source of vacuum, not shown.

[0024] Also in this case, the apparatus is completed by a rotating pad 340 which supports the bottle 120 so that it is axially aligned with the drop-down head 200 and is moved by a motor 350 which is controlled by a fixed feeler 290, typically a mechanical one, which is suitable to detect a notch 291, or an equivalent element, provided on the bottle 120; said bottle is of the type which bears an emblem, a marking or the like to be arranged in a preset angular relationship to the capsule 11.

[0025] The steps of the method for centering the capsule and for the angular positioning of said capsule with respect to the bottle, performed with the apparatus 100 according to the above-described second embodiment, are as follows:

-- step I (Figure 7): since the head 200 is kept in the raised position by the disk-like support 300, a bottle 120 on which the capsule 11 is fitted is fed onto the pad 340, which is kept motionless, in alignment with the head 200, which is also rotationally motionless;

-- step II (Figure 8): the head 200 is lowered onto the bottle, in the direction of the arrow C, until the sucker 250 is in contact with the capsule 11; at the same time, the duct 251 is connected to the source of vacuum that produces the suction AS, so that the end of the capsule 11 adheres tightly to the sucker 250;

-- step IV (Figure 9): the head 200 is raised, by way of the corresponding rise S of the post 301, and moves with it the capsule 11, partially removing it from the bottle 120: at the same time, the motor 286 is started, causing the rotation RT of the head body 220 and of the rigidly coupled capsule 11, and the motor 350 is started, producing the rotation RP of the pad 340; the first rotation is stopped by the optical reader 360, which stops the head body 220 when an angular reference R1 of the capsule aligns itself with said optical sensor; the second rotation being stopped by the feeler 290 when it detects the notch 291 of the bottle;

-- step V (Figure 10): since the capsule 11 and the bottle 120 are mutually angularly orientated by the preceding step, both said head body and said pad are kept motionless, and the head 200 is lowered onto the capsule, in the direction of the arrow C, so that the portion of rigid sleeve 210 centers said capsule on the bottle;

-- step VI (Figure 11): keeping the head 200 in the lowered position, compressed air AC is temporarily fed into the distributor 241 and the pneumatic sleeve 230 is deformed radially, tightening the capsule 11, which is centered and correctly orientated with respect to the bottle 120, onto the mushroom-

shaped cork of said bottle. After this, the head 200 is raised in order to allow to remove the bottle, and the cycle resumes as described with reference to Figure 7.

[0026] Without altering the concept of the invention, the details of execution of the apparatus and the embodiments of the method may of course vary extensively with respect to what has been described and illustrated by way of non-limitative example without thereby abandoning the scope of the invention.

[0027] The disclosures in Italian Patent Application No. TO99A000250 from which this application claims priority are incorporated herein by reference.

[0028] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A method for centering and orientating capsules for bottles of sparkling wine and the like, characterized in that it comprises the steps of: centering a capsule (11) fitted onto a bottle (12-120), rendering said capsule coaxial to said bottle (12-120) by means of a head (20-220) which has at least a drop-down action and is provided with a rigid centering sleeve (21-210) and with a pneumatic tightening sleeve (23-230), and producing a preliminary partial coupling of the capsule (11) to the cork (T) of the bottle, after said capsule has been at least centered with respect to said bottle (12-120), partially compressing the end of the capsule onto said cork (T) by means of said pneumatic tightening sleeve (23-230), into which compressed air (AC) is fed temporarily.

2. The method according to claim 1, characterized in that it comprises, after said preliminary steps of centering and rigidly coupling the capsule (11) by partial compression thereof, the step of angularly orientating the bottle (12) to which the capsule (11) is rigidly coupled with respect to at least one angular reference (R) which said capsule bears; said orientation being achieved by producing a controlled rotation of a pad-like support (34) of said bottle (12).

3. The method according to claim 2, characterized in that it comprises the step of partially lifting the drop-down head (20) in order to make said angular reference (R) visible to an optical reader (36) which controls the angular movement of the bottle (12) and of the capsule (11) centered thereon in order to feed, in a correct angular position, the mutually centered and rigidly coupled capsule and the bottle to a subsequent station which completes the application of said capsule (11).

4. The method according to claim 2, characterized in that it comprises the preliminary step of angularly orientating the capsule (11) and the bottle (120) with respect to each other by producing a relative rotation of both said pad-like support (34) of the bottle and said drop-down head (200).

5. The method according to claim 4, characterized in that it comprises, after the partial compression of the upper part of the capsule, the following sequence of operating steps: lifting of the capsule (11) from the bottle (120); angular orientation of the capsule (11) by rotation of the drop-down head (200) with respect to a fixed optical reader (360) which detects, for this purpose, an angular reference (R1) which the capsule bears; angular orientation of the bottle (120) by rotation of said pad-like support (34) with respect to a feeler (290) which detects a reference (291) which is provided on said bottle; the capsule (11), once the orientations have been completed, being lowered onto the bottle (120) again so as to be centered and partially compressed on the cork of said bottle, in order to rigidly couple the capsule and the bottle in the correct positions for mutual centering and orientation.

6. An apparatus for performing the method according to claim 1, characterized in that it comprises a head (20-200) which performs at least a drop-down motion and is provided with a head body (22) with a rigid sleeve (21-210) for centering the capsule (11) and with a pneumatic sleeve (23-230) for tightening the upper end of the capsule onto the cork (T) of the bottle; means (27-30-32-33-300-301) for the vertical movement of the drop-down head (20-200); means (34-340) for supporting the bottle (12-120) in alignment with said drop-down head; and means (35-36) for producing an angular and controlled movement of at least the means (34-340) for supporting the bottles.

7. The apparatus according to claim 6, characterized in that it comprises additional means (284-285-286-350) for performing the angular and controlled movement of said drop-down head (200) and also for allowing said head to rotate.

8. The apparatus according to claim 6, characterized in that the drop-down head (20) is supported at the lower end of a hollow vertical stem (27) which can move vertically and can rotate in a bush (28) of a rigid support (29) and contains a rigid rod (31) whose lower end is connected, with a rolling bear-

ing interposed, to an end plate (25) which closes, in an upward region, a cavity for containing the capsule (11) which is provided in the head (20); the upper end of the rigid rod (31) being rigidly coupled to the stem (32) of a double-acting hydraulic or pneumatic cylinder (33).

9. The apparatus according to claim 8, characterized in that said hydraulic or pneumatic cylinder (33) is preset in order to produce, by way of the reaction of its stem (32) on said rigid rod (31) and accordingly on said end plate (25), the partial lifting (SO) of the body (22) of the head (20) in order to expose an angular reference (R) provided on the capsule (11) and make it visible to an optical reader (36) which controls the angular movements of said means (34) for supporting the bottles (12).

10. The apparatus according to claim 8, characterized in that said rigid support (29) is supported by a disk (30) which is rigidly coupled to a post which can perform vertical movements.

11. The apparatus according to claim 7, characterized in that the drop-down rotating head (200) is supported by a hollow vertical stem (270) which is accommodated, so that it can move axially in contrast with a spring (271), in a corresponding bush (280) which is rotatably contained, with rolling bearings (281-282) interposed, in a rigid sleeve (283); said bush (280) being provided with a rigidly coupled gear (284) which meshes with the pinion (285) of an actuation motor (286) which is controlled by a fixed optical reader (360) and is suitable to produce controlled angular movements of said drop-down rotating head (200).

12. The apparatus according to claim 11, characterized in that said rigid sleeve (283) is rigidly coupled to a disk-like support (300) which is provided with a supporting post (301) which can perform vertical movements.

13. The apparatus according to claim 12, characterized in that said drop-down rotating head (200) is provided with a cavity for containing the capsule (11), at whose upper end a sucker (250) for gripping said capsule is arranged; said sucker being activated by a source of vacuum to which it is connected by means of a duct (251) which is contained in said hollow stem (270) that supports the head body (220), in order to lift said capsule (11) and allow it to turn with respect to the bottle (120) rigidly with said head body.

Fig.1

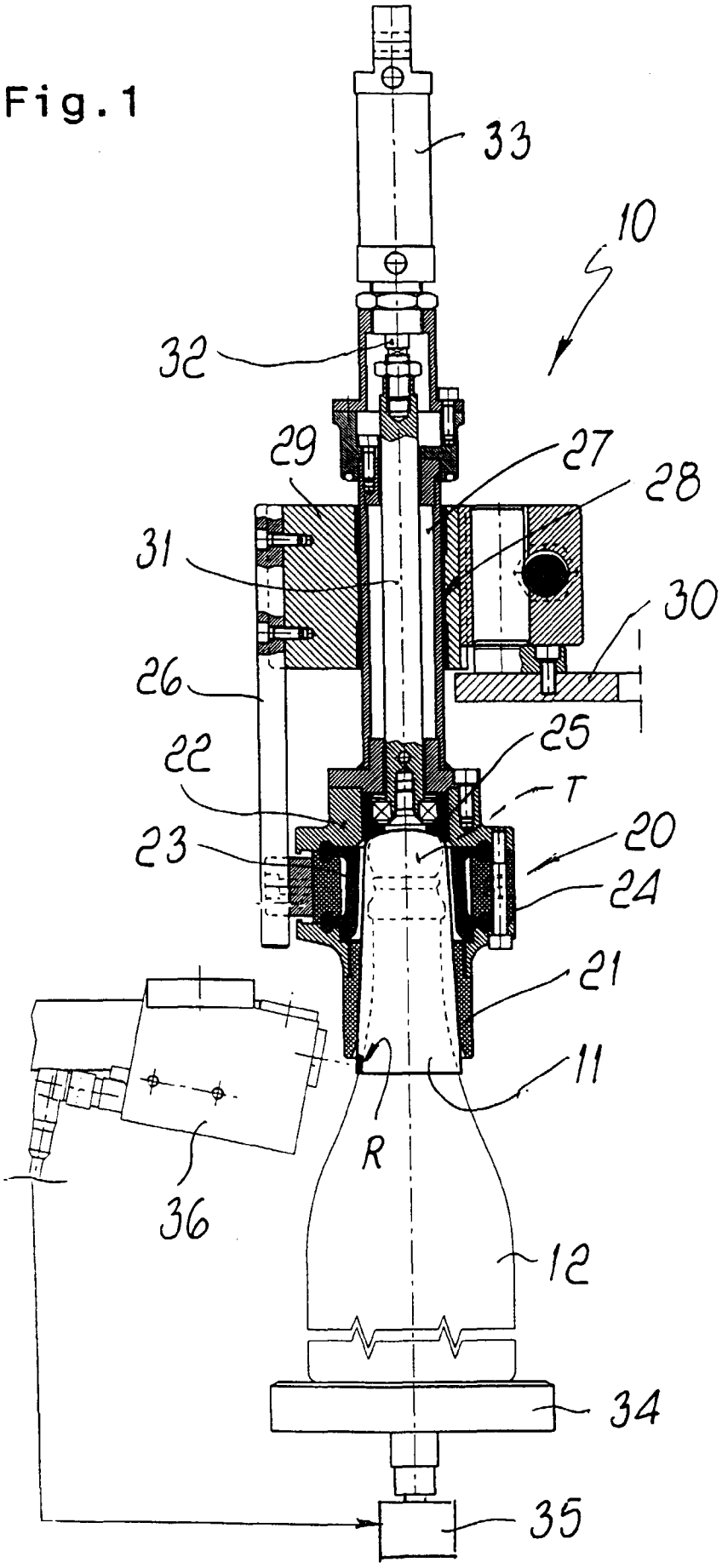


Fig.2

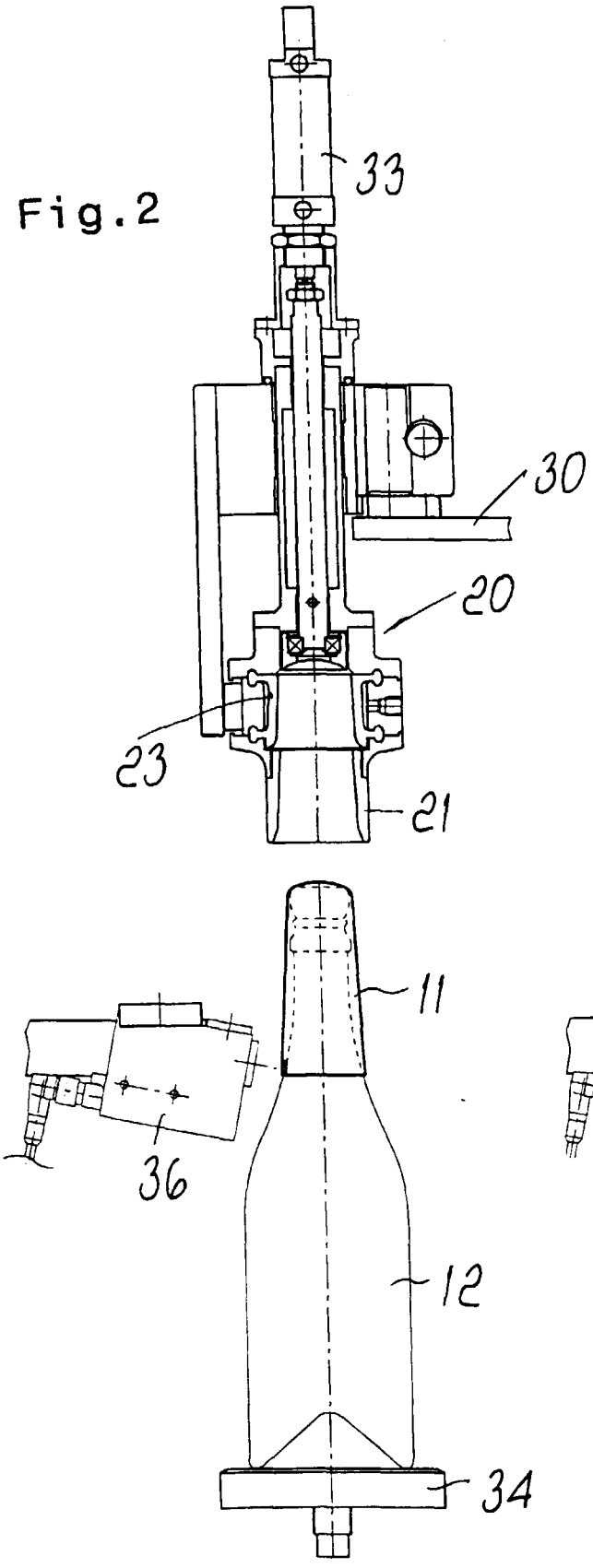


Fig.3

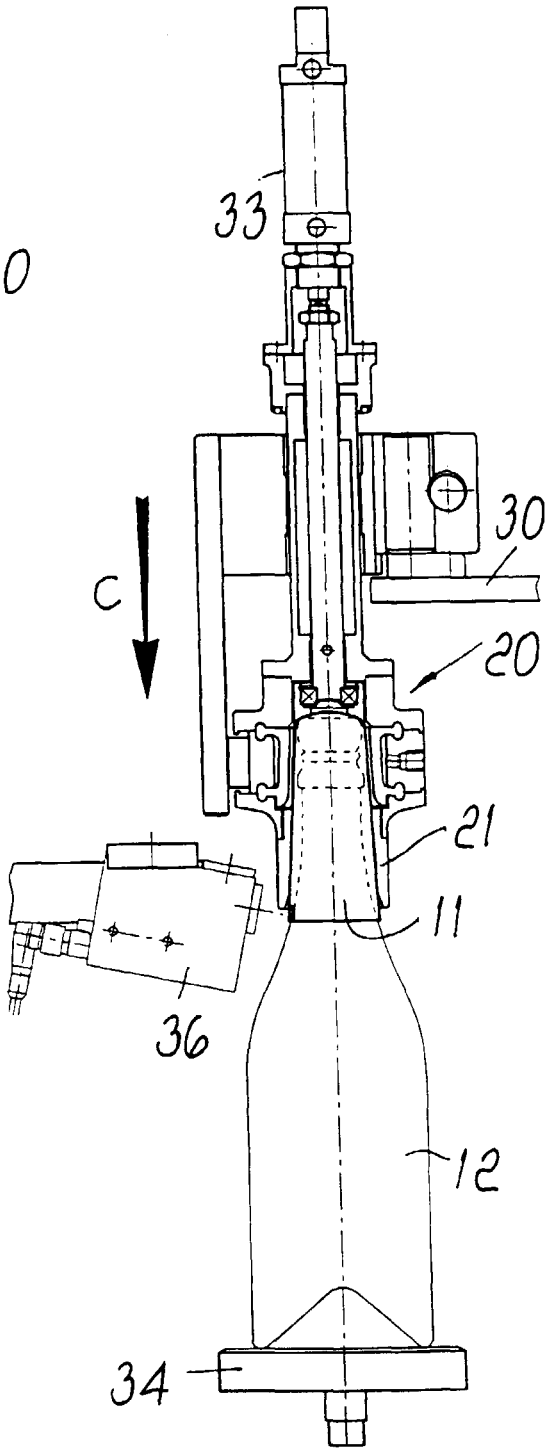


Fig.4

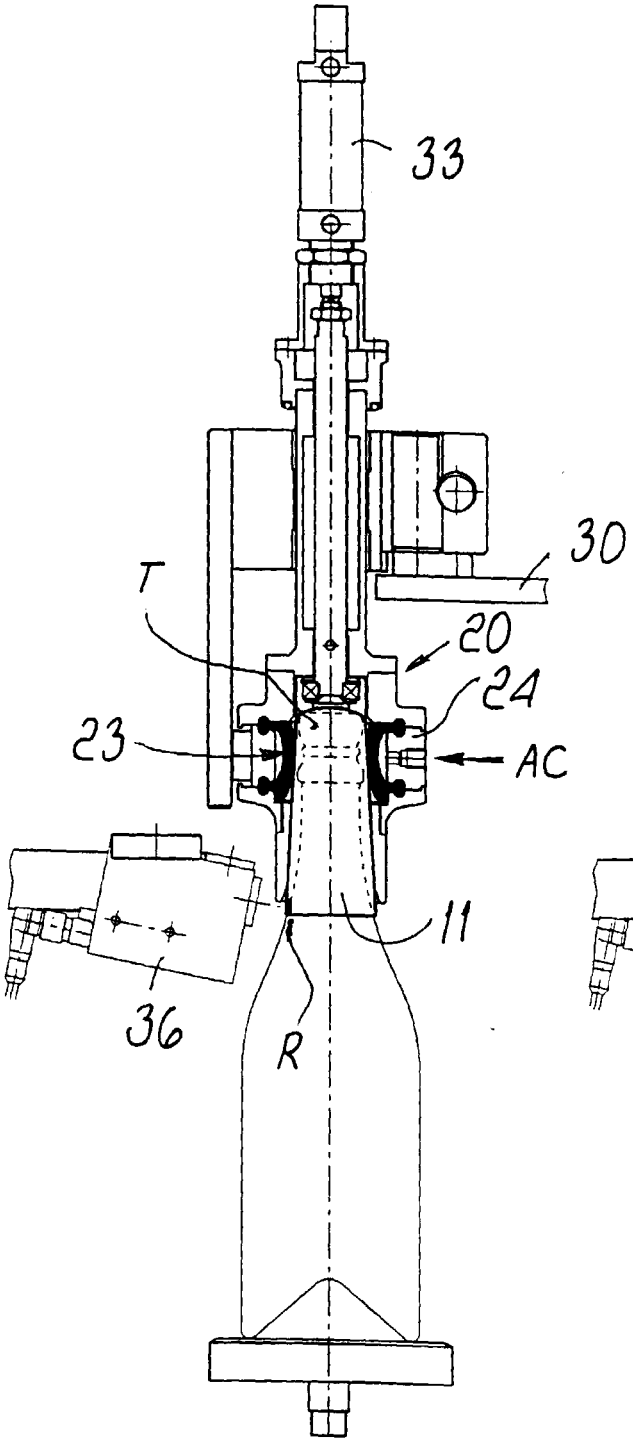


Fig.5

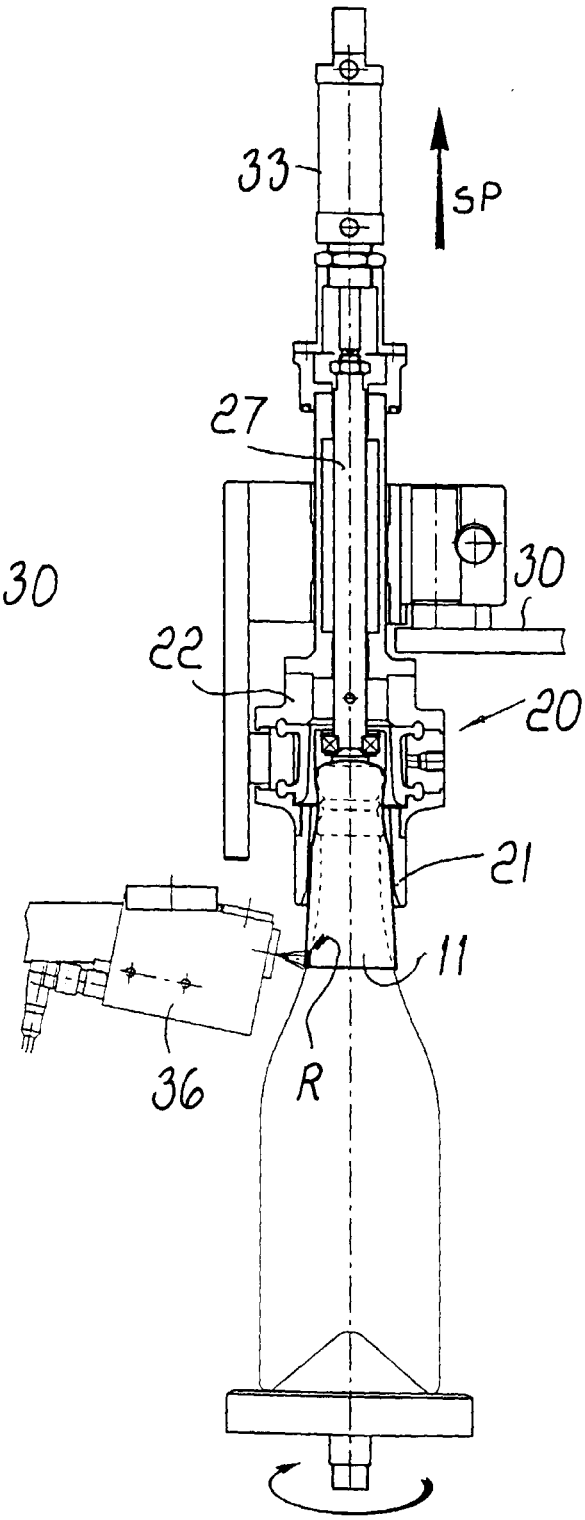


Fig.6

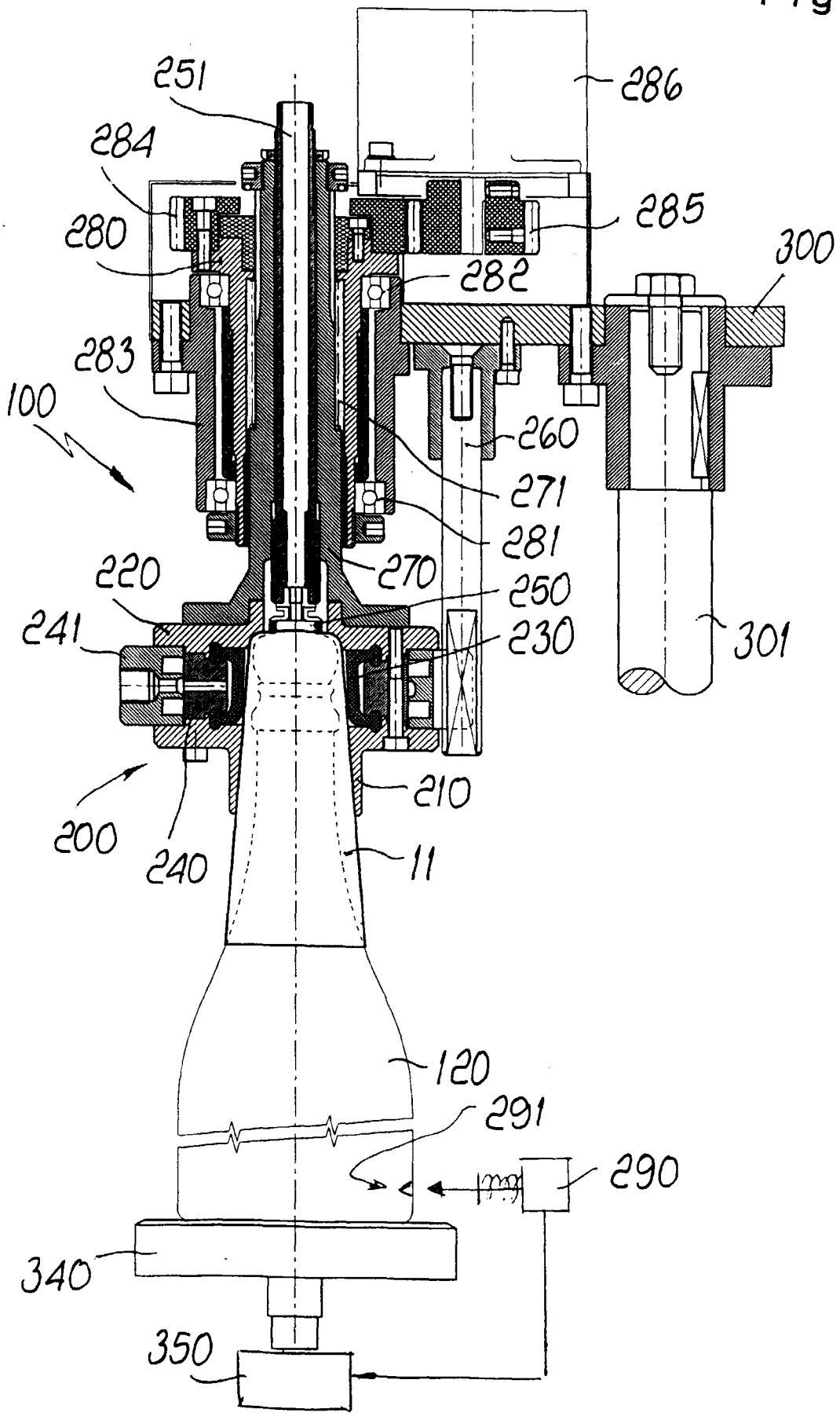

251
286
284
285
280
282
300
283
100
260
271
281
220
270
250
241
230
301
210
200
240
11
120
291
290
340
350

Fig.7

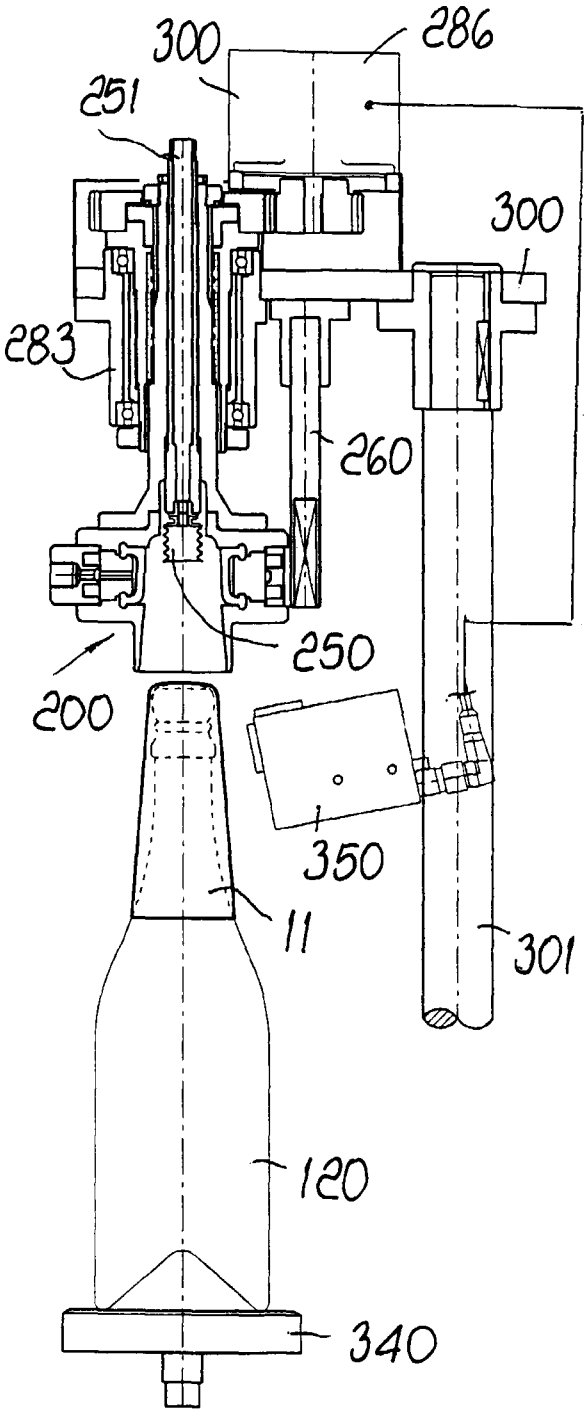

300
286
251
300
283
260
250
200
350
11
301
120
340

Fig.8

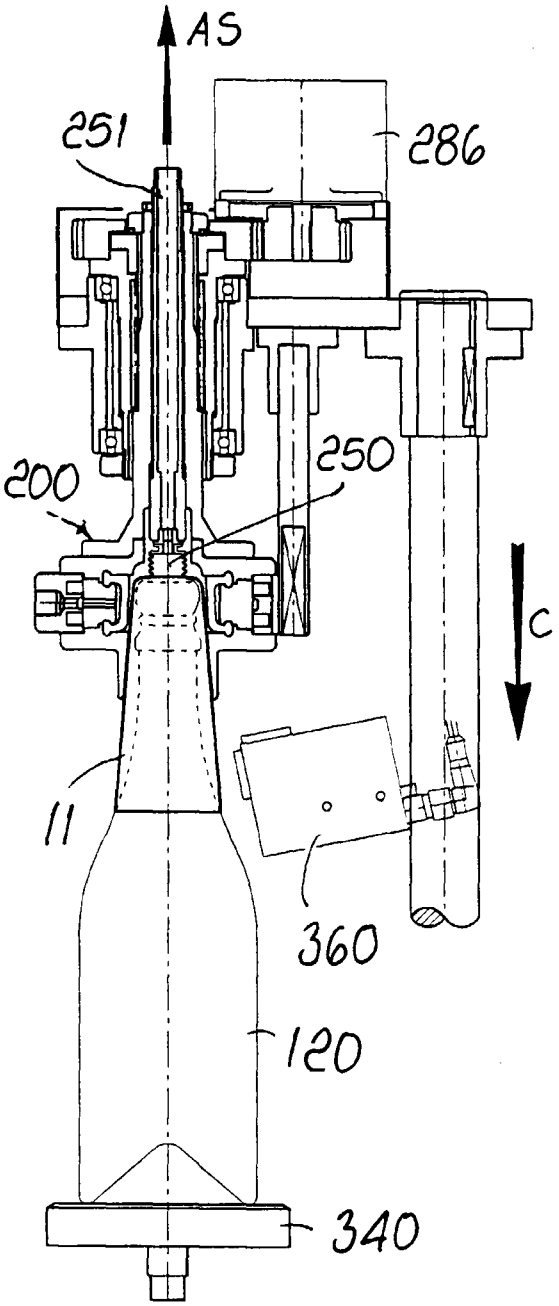

AS
251
286
250
200
C
11
360
120
340

Fig.9

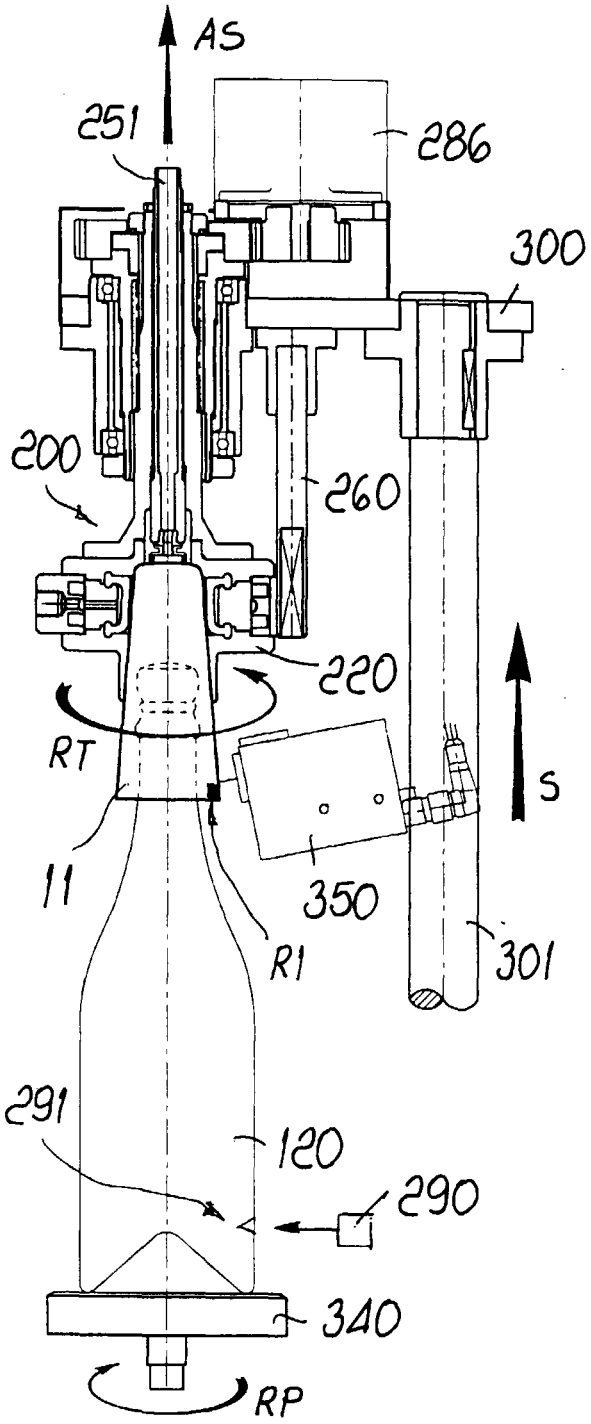

AS
251
286
300
200
260
220
RT
S
11
350
R1
301
291
120
290
340
RP

Fig.10

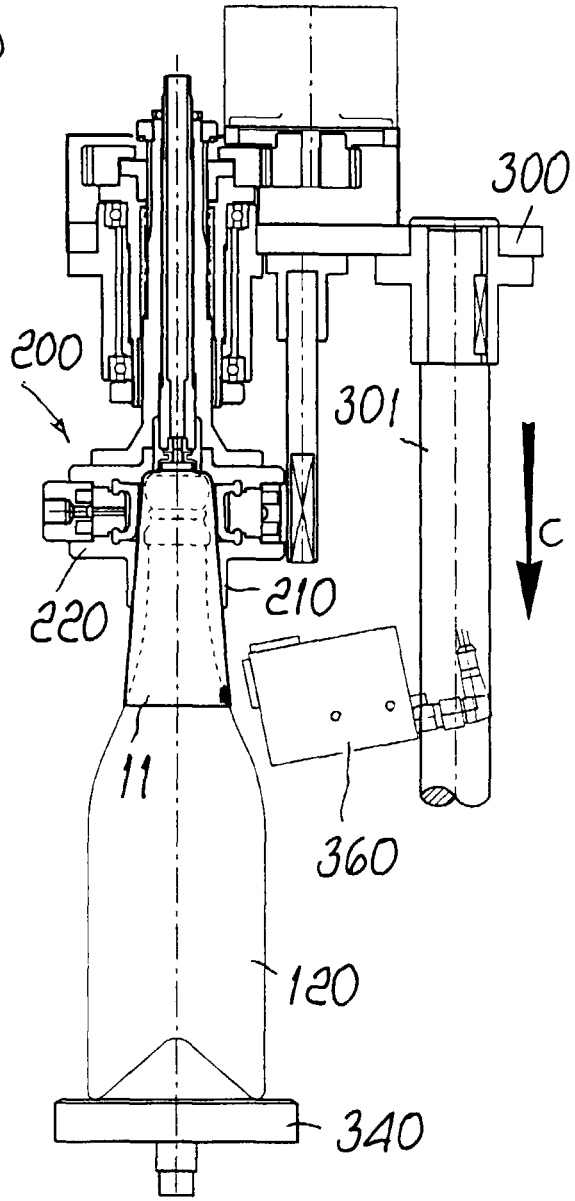

300
200
301
C
220
210
11
360
120
340

Fig.11