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

(11) **EP 2 733 112 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.05.2014 Bulletin 2014/21

(51) Int Cl.:
B67B 5/03 *(2006.01)*

(21) Application number: **13004684.0**

(22) Date of filing: **26.09.2013**

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

(30) Priority: **16.11.2012 IT TO20120999**

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

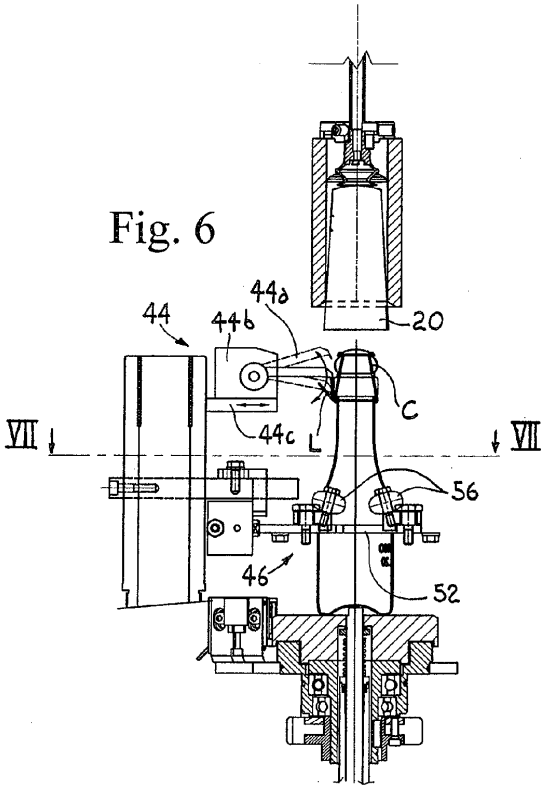
(72) Inventor: **Rosselli, Lorenzo**
I-15010 Ponti (AL) (IT)

(74) Representative: **Spandonari, Carlo et al**
Spandonari & Modiano s.r.l.
Corso Duca degli Abruzzi 16
10129 Torino (IT)

(54) **Method and apparatus for applying sealing capsules to bottle necks provided with a retaining cage of metal wire.**

(57) The bottles are fed to a capsule dispenser (16) which is adapted to place a capsule (20) having a slot (22) on its lateral wall upon each of the bottle necks (N). The capsuled bottles are fed to a carousel (28) provided with a plurality of peripheral stations (30), each of which is adapted to receive a respective bottle (B) and to perform the following operations upon it: raising the capsule (20) from the neck (N) by a pick-up device (38); opening outwards the tab (L) of the cage (C), at least partially, by an opening device; aligning the tab (L) to the slot (22) by axially rotating at least one of the bottle (B) and the capsule (20); re-laying the capsule (20) on the bottle neck. The tab (L) will insert into the slot (22) and protrude outside the capsule.

Fig. 6



EP 2 733 112 A1

Description

[0001] The present invention relates to a method of applying sealing capsules to bottle necks provided with a retaining cage of metal wire, and to an apparatus for carrying out such method.

[0002] As known, sparkling wines, champagne, and the like, nowadays are bottled in series by apparatuses which receive the bottles in sequence and carry out all the bottling operations upon them, from the filling step to the sealing step.

[0003] In particular, after the filling step, the mouth of the bottle is corked by a plug consisting of an agglomerate of cork or synthetic material, which is plugged into the bottle neck in a corking station. Then, in a wirehooding station, the closure is secured by fastening a wirehood, i.e., a cage of metal wire, about the bottle neck, which wirehood retains the cork from being expelled by the pressure inside the bottle. The whole thing is finally sealed by a capsule of a deformable material, typically a thin metal sheet, which is applied to the bottle neck. The capsule, which initialy has a slightly tapered frustoconical shape, is loosely fitted on the bottle neck by a capsule dispenser, and then it is made to adhere to the bottle wall by a capsule-folding/smoothening machine.

[0004] The base of the wirehood typically consists of a ring made of the same metal wire, which is fastened about the bottle neck, below the neck finish, by twisting a portion of the wire in such a way as to form a locking tab which terminates with a loop. In order to open the bottle, the loop is grasped and untwisted, thereby opening the base of the wirehood and allowing the latter to be removed.

[0005] With standard productions, the locking tab of the wirehood is bent against the bottle wall and is hidden by the capsule, which completely covers the bottle neck with the cork and the wirehood.

[0006] However, certain high quality productions require that the locking tab protrudes from the capsule, in order to make it easier to access it for opening the bottle. To this purpose, capsules have been made which are provided with an I-shaped slot, through which the locking tab protrudes.

[0007] These particular applications require specific bottling plants in which the capsule, according to the prior art, before being placed on the bottle neck is properly oriented so that the slot of the capsule is aligned to the locking tab of the wirehood; moreover, after that a portion of the base has been twisted to form the locking tab, the latter is not bent against the bottle neck but is maintained in its configuration protruding outwards - i.e., the configuration of the portion of metal wire of the wirehood base immediately after that it has been twisted - in order to facilitate the correct insertion of the locking tab through the slot when the capsule is placed on the bottle neck.

[0008] All the above preliminary operations, which are performed in line before placing the capsule on the bottle neck, have the drawback that they considerably slow down the process, with a reduction of up to 30% in the production yield with respect to standard productions, in which the locking tab is covered by the capsule.

[0009] A further drawback of the above-mentiond, known bottling plants is that, even when used for standard productions, the bottles and the capsules must always pass through all the above-cited preliminary operations which, although disabled, inevitably slow down the process.

[0010] In addition, in case of failure, jamming, or any other need for maintenance in one of the stations in which the preliminary operations are carried out, all the production line must inevitably be stopped until the problem has been solved, and can not even be used for standard productions which do not require any preliminary operation.

[0011] Therefore, it is a main object of the present invention to provide a method of applying sealing capsules to bottle necks provided with a retaining cage of metal wire, and to an apparatus for carrying out such method, which overcome the above mentioned drawbacks of the conventional systems.

[0012] The above object and other advantages, which will clearly appear from the following description, are achieved by a method having the features recited in claim 1 and by an apparatus having the features recited in claim 6, while the dependent claims state other advantageous, though secondary features of the invention.

[0013] The invention will be now described in more detail, with reference to a preferred, non-exclusive embodiment, shown by way of non-limiting example in the attached drawings, wherein:

- Fig. 1 is a diagrammatical plan view of an apparatus for applying sealing capsules to bottle necks according to the invention;
- Fig. 2 is a view in side elevation of a corked bottle neck conventionally provided with a wirehood;
- Fig. 3 is a view in side elevation of a sealing capsule of a conventional type provided with an I-shaped slot;
- Fig. 4 is a view in axial cross section of a bottle supported by the apparatus according to the invention in a first step of the method;
- Fig. 5 is a view in axial cross section of a bottle supported by the apparatus according to the invention in a second step of the method;
- Fig. 6 is a view in axial cross section of a bottle supported by the apparatus according to the invention in a third step of the method;
- Fig. 7 is a view in cross section of Fig. 6 along axis VII-VII;
- Fig. 8 is a view in axial cross section of a bottle sup-

ported by the apparatus according to the invention in a fourth step of the method;

- Fig. 9 is a view in axial cross section of a bottle supported by the apparatus according to the invention in a fifth step of the method;

- Fig. 10 is a view in axial cross section of a bottle supported by the apparatus according to the invention in a sixth step of the method, which is shown to an enlarged scale with respect to the preceding steps.

[0014] Fig. 1 illustrates an apparatus 10 for applying sealing capsules to bottle necks N in the configuration of Fig. 2, in which the mouth M of the bottle is closed by a cork P, which is retained in its position by a retaining cage of metal wire, or wirehood, C. The base of the wirehood conventionally consists of a ring R made of the same metal wire, which is fastened about bottle neck N, below the neck finish Q, by twisting a portion of the base to form a locking tab L. With standard productions, i.e., those productions in which locking tab L is to be covered by a capsule, before receiving the capsules the bottles are configured as shown in Fig. 2, with locking tab L bent against the bottle wall. Moreover, in the embodiment described herein, wirehood C is assumed to have a predetermined alignment with respect to the bottle, e.g., with locking tab L rotated by 90° in the counter-clock direction (when the bottle is wached from above) with respect to a label (not shown); Therefore, the opener who holds the bottle with her/his left hand and grasps the locking tab with her/his right hand, will have the label in front of her/him. The corking/aligning/wirehooding operations may be carried out conventionally by standard processes and machines which do not fall within the scope of the present invention and therefore are not discussed herein.

[0015] Having particular reference to the apparatus 10 of Fig. 1, bottles B in the above-described configuration shown in Fig. 2 are carried by a conveyor belt 12 flanked by an auger 14, which is adapted to maintain the bottles equally spaced from each other. A capsule dispenser 16 is arranged at the inlet end of auger 14 for laying a sealing capsule on each of the bottles carried by conveyor belt 12. An expulsion starwheel 18 is arranged immediately downstream of capsule dispenser 16 for removing any bottles to be discarded from the line, where necessary.

[0016] The foregoing is all known and conventional in the field in relation to standard productions, except that capsules 20 placed on the bottle necks are of the known type shown in Fig. 3, having a I-shaped slot 22 on its lateral wall which is adapted to be passed though by locking tab L of wirehood C. However, the capsules will have a random orientation with respect to the respective bottles and to the wirehoods C associated to the latter.

[0017] A first transfer starwheel 26 arranged downstream of expulsion starwheel 18 draws the bottles from conveyor belt 12 and, according to the invention, transfers them to an encapsulating carousel 28 having a plurality of peripheral stations such as 30, e.g., twenty stations, each of which is equipped to carry out the operations described in detail below.

[0018] The various operations engage respective portions of the rotation of the station, which are depicted by arched lines A1, A2, A3, A4, A5, A6 in Fig. 1. Certain operations are carried out simultaneously, at least partially; therefore, in some cases, the arched lines are overlapped.

[0019] With particular reference to Figs. 4-10, a turntable 32 supports bottle B in each of the stations.

[0020] In a first step, as shown in Fig. 4 and depicted by arched line A1 in Fig. 1, turntable 32 is rotated in such a way as to provide locking tab L of wirehood C with a predetermined orientation with respect to the station. Since, as mentioned above, wirehood C in this embodiment is assumed to have a predetermined orientation with respect to bottle B, a reference on bottle B, e.g., a recess S as typically formed on the base of the bottle, can be used for orienting the wirehood. A detector 34, e.g., a mechanical probe or a photoelectric cell, in a way known per se detects recess S, thereby allowing the bottle to be oriented on the basis of it, as mentioned above.

[0021] In this first step, neck N of bottle B is engaged by a capsule-centering head 36, which comprises a sucker-based, pick-up device 38 mounted at the lower end of a vertical suction duct 39, which is operatively connected to conventional suction means (not shown). Vertical suction duct 39 can both shift vertically and rotate axially. A sleeve 40 is axially slidable on vertical suction duct 39 and is suitably sized to surround the capsule with a close fit. In this first step, sleeve 40 is lowered about the bottle neck, while pick-up device 38 is stationary near the top of the capsule.

[0022] In the next step, as shown in Fig. 5 and depicted by arched line A2 in Fig. 1, pick-up device 38 is enabled to catch capsule 20, and then is raised, along with sleeve 40, so that capsule 20 is disengaged from neck N of bottle B. Pick-up device 38 is then rotated to provide slot 22 of capsule 20 with the same alignment of locking tab L with respect to the station, whereby slot 22 is aligned to locking tab L. A reference notch T, which is conventionally printed on the capsule (Fig. 3) and can be detected by an optical sensor 42 in a way known per se, is used for orienting the capsule.

[0023] The next step (Figg. 6 and 7) is depicted in Fig. 1 by arched line A3. As shown, arched line A3 is partially overlapped to arched line A2 as the two steps are partially simultaneous. In this step (Fig. 6), while capsule 20 is raised, a motorized opening device 44 partially bends locking tab L of wirehood C outwards to an oblique position forming an angle of about 45° with respect to the vertical direction; however, the optimum angle for the locking tab can be determined experimentally on the basis of the real shapes of the capsule and the locking tab, as well as on the position of the slot. In the embodiment described herein, the opening device consists of a hook

44a hinged to a slide 44b which is slidable horizontally on a guide 44c.

[0024] While locking tab L is opened, the bottle is held laterally by a locking device 46, which comprises a support 48 having two counterposed jaws 50, 52 hinged thereto, which are provided with respective pairs of rollers 54, 56 via which they clamp the bottle on respective opposite sides thereof.

[0025] The next step (Fig. 8) is depicted in Fig. 1 by arched line A4. As shown, arched line A4 is overlapped to the end portion of arched line A3, thereby indicating that the two steps may be carried out simultaneously. In this step, sleeve 40 of capsule-centering head 39 is raised with respect to pick-up device 38, so that capsule 20 is uncovered.

[0026] In the next step (Fig. 9) depicted in Fig. 1 by arched line A5, a pneumatically driven punch 57 hits the lateral wall of capsule 20 at slot 22, so that the two fins 23a, 23b (Fig. 3) defined between the horizontal segments of the I-shape are slightly bent inwards.

[0027] In the last step (Fig. 10) depicted in Fig. 1 by arched line A6, the capsule is laid on the bottle again, with sleeve 40 remaining in its raised position. During the descent of the capsule, locking tab L of wirehood C slips under the lower edge of fins 22a, 22b of slot 22, which have been previously bent inwards in order to facilitate this insertion, and leans out from capsule 20.

[0028] Having now reference to Fig. 1, after the last step the bottle is returned to conveyor belt 12 by a second transfer starwheel 58, and then is conveyed to succesive stations 60, in which capsule-bending/smoothening operations are carried out in a traditional manner; these final operations, which are well known per se and can be carried out in a conventional manner, will not be described herein.

[0029] Of course, the various movable parts of the apparatus can be driven by conventional electrical and/or pneumatic and/or hydraulic motors/actuators (not shown for simplicity) controlled by a control unit, the programming of which falls within the normal knowledge of a skilled person and therefore will not be disclosed herein.

[0030] As the person skilled in the art will easily appreciate, a considerable advantage of the method according to the invention, as well as of the apparatus for carrying out the method, is that the operations of pulling the locking tab out of the slot are all performed on a carousel arranged beside a traditional line; the capsuled bottles are received by the carousel with a random orientation of the capsules with respect to the bottles - i.e., the same configuration at this stage of a standard production - and are returned in the same condition but with the locking tab projecting outwards from the capsule. Therefore, having a carousel properly sized and provided with an adequate number of stations, all the above-described steps can be carried out without reduction of the production yield with respect to standard productions.

[0031] In addition, in order to use the apparatus of the invention for standard productions, it is sufficient to disable carousel 28, so that the bottles are directly transferred from capsule dispenser 16 to final stations 60.

[0032] Similarly, if carousel 28 must be stopped for maintenance, the apparatus can still be used for standard productions, so that the continuity of the production is not affected.

[0033] In addition, the apparatus of the invention can be easily integrated in a traditional bottling plant, by simply relocating the various stations in such a way as to make room for carousel 28, with normal changes for a person skilled in the art.

[0034] A preferred embodiment of the invention has been described herein, but of course many changes may be made by a person skilled in the art within the scope of the claims. For instance, with the embodiment described herein the locking tab and the slot are aligned to each other indirectly, i.e., both the wirehood and the capsule are oriented on the basis of another fixed reference. However, the method can be changed so that the position of the locking tab is detected and the capsule is oriented as a function of the detected position of the locking tab, or vice versa. Moreover, the sequence of the operations carried out on the carousel, in certain cases, can be modified. For instance, the capsule can be oriented after that the locking tab has been bent, rather than before, and the bottle and the capsule can be aligned at the same time (second step, A2). In addition, depending on the real shape of the slot and the locking tab, as well as on the conicity of the capsule, a preforming of the capsule at the slot could be not necessary (fifth step, A5). Moreover, with the above-described embodiment, the wirehood is assumed to have a predetermined orientation with respect to the bottle; therefore, the capsule is oriented on the basis of a reference on the bottle. However, if the wirehood has a random orientation, the locking tab of the wirehood could be used as a reference for the alignment or, as mentioned above, the position of the locking tab can be detected and the capsule aligned directly to it. Of course, the number of stations of the carousel can be changed and optimized as a function of the desired production yield.

Claims

1. A method of applying sealing capsules to the necks of corked bottles provided with a cork-retaining cage made of metal wire (C) and having a locking tab (L) bent towards the wall of the bottle, **characterized in that** it comprises the steps of:

   - feeding the bottles to a capsule dispenser (16) which is adapted to place a capsule (20) having a slot (22) on its lateral wall upon each of the bottle necks (N),
   - feeding the capsuled bottles to a carousel (28) provided with a plurality of peripheral stations (30), each of which is adapted to receive a re-

spective bottle (B) and to perform the following operations upon it:

- raising the capsule (20) from the neck (N) by a pick-up device (38),
- opening outwards the tab (L) of the cage (C) at least partially, by an opening device,
- aligning said tab (L) to said slot (22) by axially rotating at least one of said bottle (B) and capsule (20),
- re-laying said capsule (20) on the bottle neck, said tab (L) inserting into the slot (22) and protruding outside the capsule.

2. The method of claim 1, **characterized in that**, before laying the capsule (20) on the bottle neck, the lateral wall of the capsule is deformed at the slot (22) by deforming means (57) adapted to suitably shape the slot (22) for receiving said tab (L).

3. The method of claim 1, **characterized in that** said opening device (44) opens the tab (L) outwards at an angle of about 45° with respect to the vertical direction.

4. The method of claim 1, **characterized in that** said operation of aligning said tab (L) to said slot (22) on the capsule (20) comprises the steps of:

- rotating the bottle (B) about its axis in such a way as to arrange the tab (L) of the cage at a predetermined orientation with respect to the respective station (30), and
- rotating the capsule (20) about its axis in such a way as to arrange the slot (22) with the same predetermined orientation with respect to the station (30).

5. An apparatus for applying sealing capsules to the necks of corked bottles provided with a cork-retaining cage made of metal wire (C) and having a locking tab (L) bent towards the wall of the bottle, **characterized in that** it comprises a capsule dispenser (16) which is adapted to place a capsule having a slot (22) on its lateral wall upon each of the bottle necks, and a carousel (28) provided with a plurality of peripheral stations (30) each adapted to receive a respective bottle and provided with:

- pick-up means (40) operable to raise the capsule (20) from the bottle neck (N) at a position such that the access to said tab (L) is not obstructed, and successively re-laying it,
- opening means (44) operable to open the tab (L) outwards at least partially, while said capsule (20) is at its raised position,
- orienting means (32, 34, 38, 42) operable to axially rotate at least one of said bottle (B) and capsule (20), in such a way as to align said tab (L) of the cage (C) to said slot (22) of the capsule (20), before the latter is re-laid.

6. The apparatus of claim 5, **characterized in that** it comprises deforming means (57) operable to deform the lateral wall of the capsule at the slot (22) in such a way as to suitably shape the latter for receiving said tab (L) before said capsule (20) is re-laid on the bottle neck.

7. The apparatus of claim 6, **characterized in that** said slot (22) is shaped as a "I" and said deforming means comprise a punch (57) operable to hit the lateral wall of the capsule (20) at said I-shaped slot (22), in such a way as to bent inwards the two fins (23a, 23b) defined between the horizontal segments of the I-shape.

8. The apparatus of any of claims 5 to 7, **characterized in that** it comprises a retaining device (46) for laterally retaining the bottle while the tab is opened.

9. The apparatus of claim 5, **characterized in that** said orienting means comprise:

- a turntable (32) supporting the bottle (B) in the respective station (30), which is operable to rotate for arranging the tab (L) of the cage (C) with a predetermined orientation in relation to the respective station, on the basis of first reference means (R) integral to the cage and detectable by first sensor means (34),
- a capsule-holding device (40), which is rotatable about the axis of the capsule (20), and is operable to rotate for arranging said slot (22) with the same predetermined orientation in relation to the respective station (30), on the basis of second reference means (T) integral with the capsule and detectable by second sensor means (42).

10. The apparatus of claim 9, **characterized in that** said capsule-holding means (40) are housed within a vertical sleeve (38) which surrounds the capsule (20) at rest and is vertically movable to a position not interfering with said deforming means (57), before the activation of the latter.

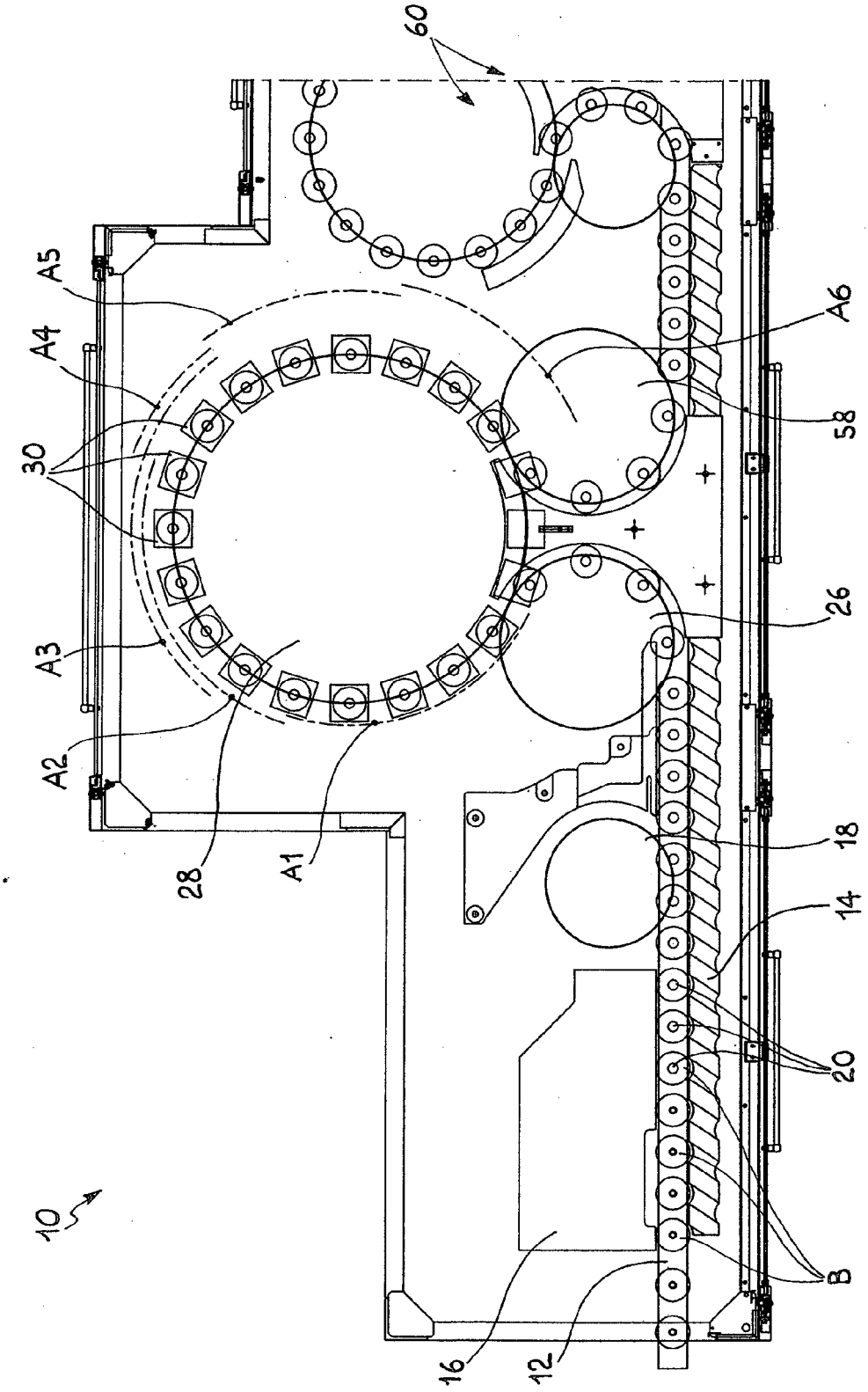


Fig. 1

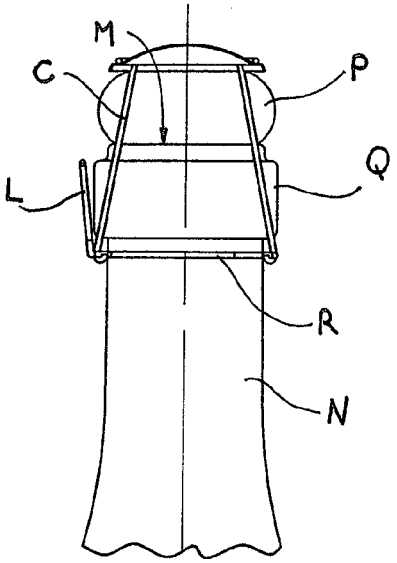


Fig. 2

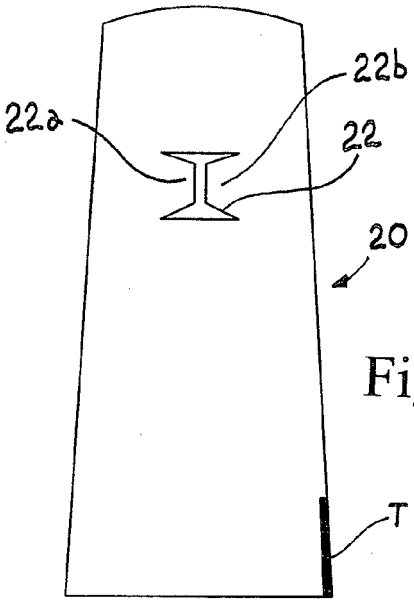


Fig. 3

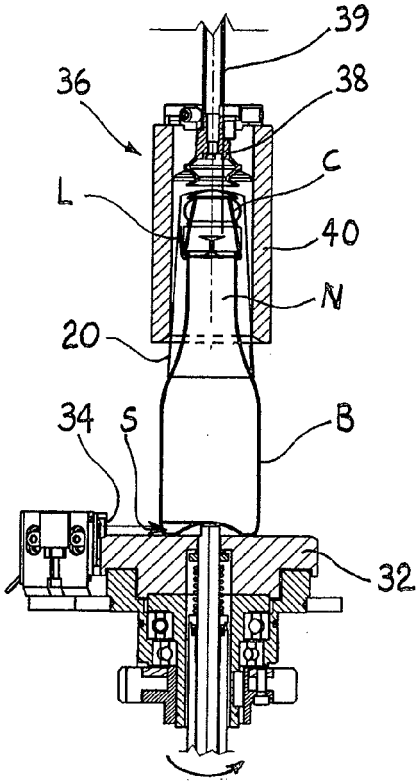


Fig. 4

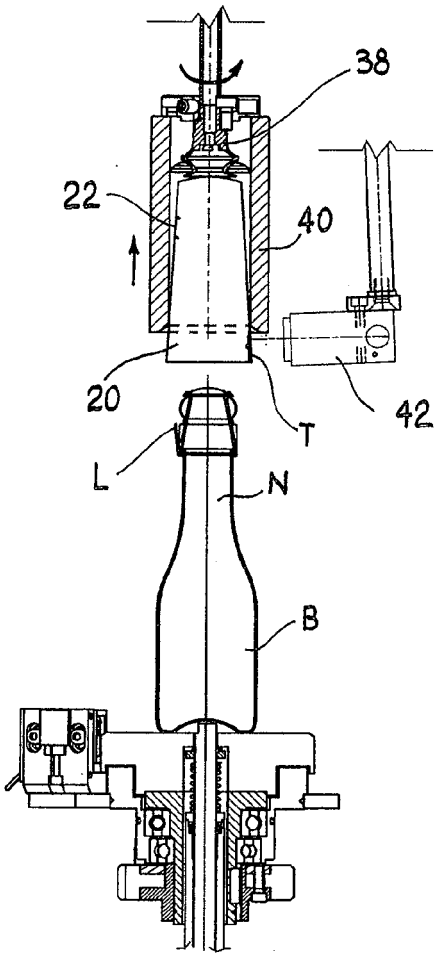
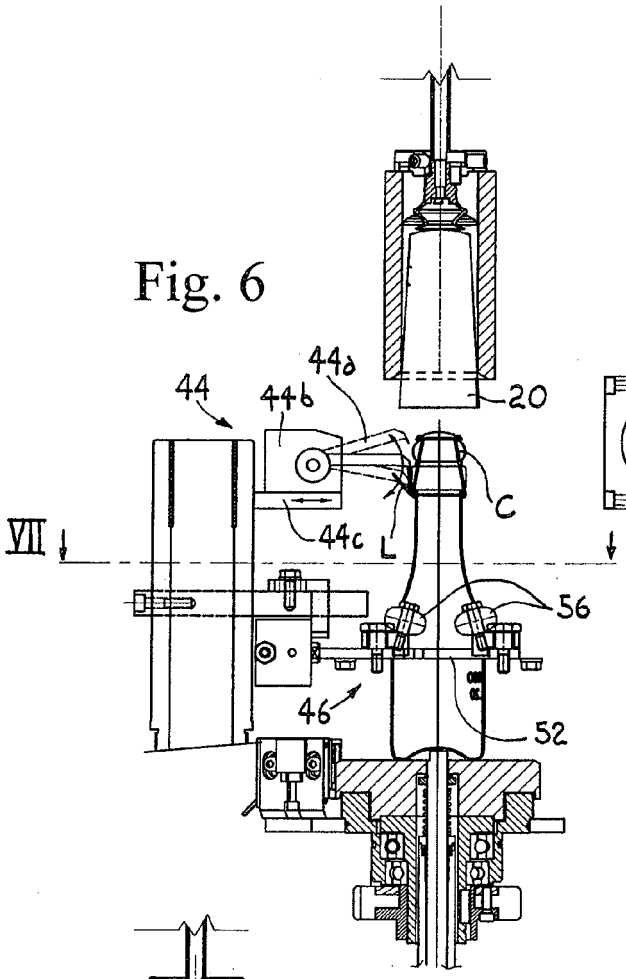


Fig. 5

Fig. 6



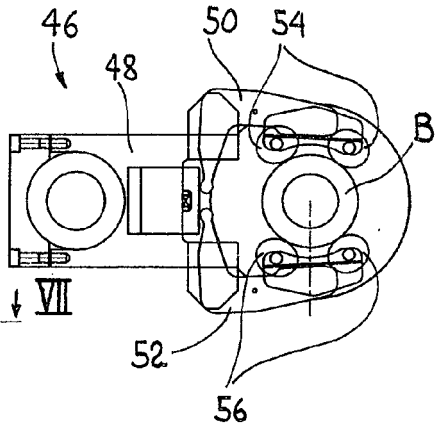


Fig. 7

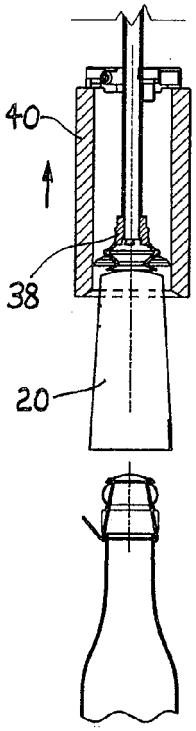


Fig. 8

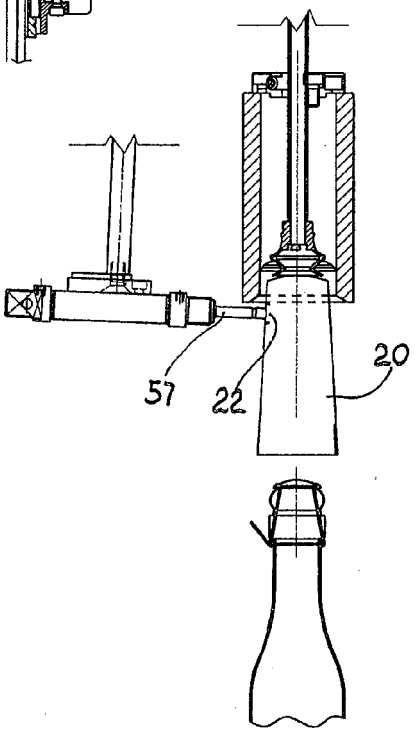


Fig. 9

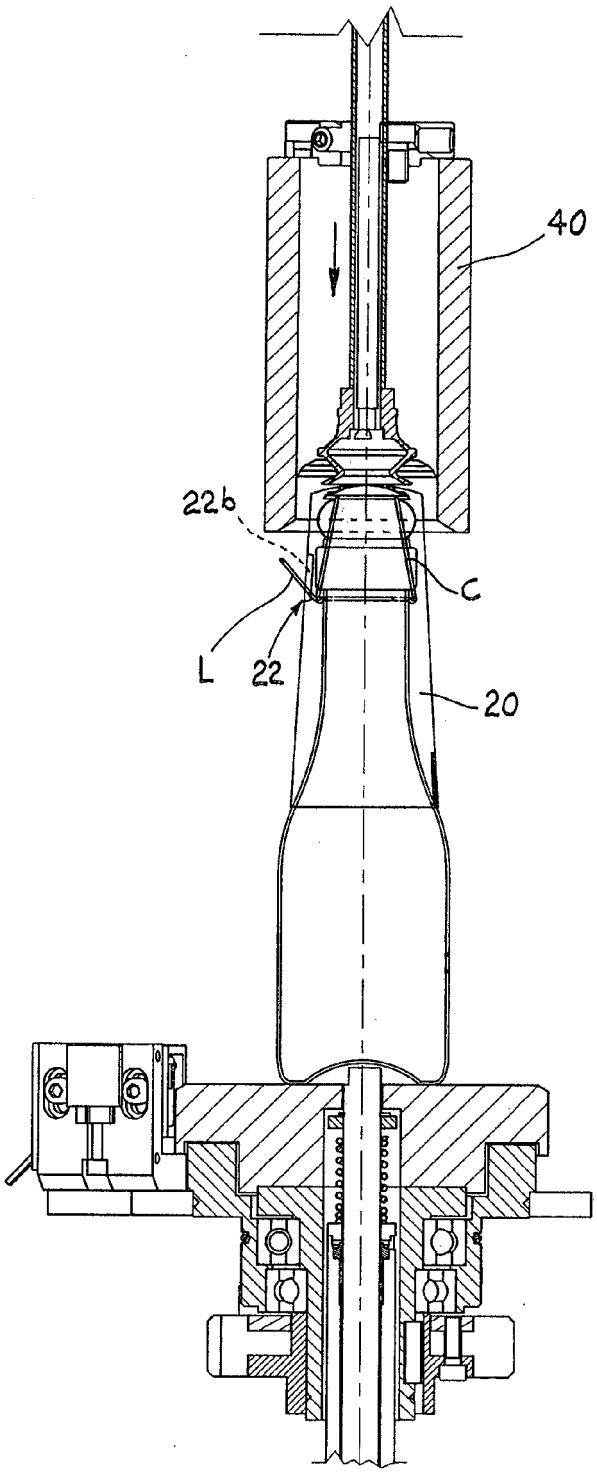


Fig. 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 13 00 4684

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	FR 2 005 132 A1 (NACKENHEIM VER KAPSELFAB) 5 December 1969 (1969-12-05) * figures 1-3 * * page 7, lines 14-25 * * page 9, line 7 - page 11, line 14 * * page 13, lines 12-38 *	1,5	INV. B67B5/03
A	EP 1 041 033 A2 (ROBINO & GALANDRINO SPA [IT]) 4 October 2000 (2000-10-04) * figures 6-11 * * paragraph [0013]; figures 21-25 *	1,5	
A	EP 1 197 468 A1 (ROBINO & GALANDRINO SPA [IT]) 17 April 2002 (2002-04-17) * figure 8 * * paragraphs [0023] - [0024] *	1,5	
A	FR 2 482 575 A1 (DEKOMAT SARL [FR]) 20 November 1981 (1981-11-20) * figures 1-6 * * page 2, line 6 - page 10, line 12 *	1,5	TECHNICAL FIELDS SEARCHED (IPC)
A	EP 0 012 659 A1 (DESOM ALBERT) 25 June 1980 (1980-06-25) * figures 1-2 * * page 2, line 37 - page 5, line 1 *	1,5	B67B B65C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 February 2014	Pardo, Ignacio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 00 4684

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-02-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2005132 A1	05-12-1969	NONE	
EP 1041033 A2	04-10-2000	AT 316510 T	15-02-2006
		EP 1041033 A2	04-10-2000
		IT TO990250 A1	02-10-2000
EP 1197468 A1	17-04-2002	EP 1197468 A1	17-04-2002
		IT TO20000958 A1	15-04-2002
FR 2482575 A1	20-11-1981	NONE	
EP 0012659 A1	25-06-1980	DE 2852192 B1	13-09-1979
		EP 0012659 A1	25-06-1980
		ES 486480 A1	16-05-1980
		US 4285186 A	25-08-1981

EPO FORM P0459

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