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

(11) **EP 3 907 173 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.11.2021 Bulletin 2021/45

(51) Int Cl.:
B67B 3/00 *(2006.01)*

(21) Application number: **21170557.9**

(22) Date of filing: **26.04.2021**

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **08.05.2020 JP 2020082861**

(71) Applicant: **Shibuya Corporation**
Kanazawa-shi, Ishikawa 920-8681 (JP)

(72) Inventors:
- **NISHINO, Yukinobu**
  Kanazawa-shi, 920-8681 (JP)
- **NISHIDE, Yasuto**
  Kanazawa-shi, 920-8681 (JP)
- **TSUJITA, Kazuhiko**
  Kanazawa-shi, 920-8681 (JP)
- **MASUMOTO, Satoshi**
  Kanazawa-shi, 920-8681 (JP)
- **KAMORI, Shinya**
  Kanazawa-shi, 920-8681 (JP)
- **HIGASHIZAKI, Takashi**
  Kanazawa-shi, 920-8681 (JP)

(74) Representative: **Mewburn Ellis LLP**
Aurora Building
Counterslip
Bristol BS1 6BX (GB)

(54) **CAPPING DEVICE**

(57) A content contaminating an inner side of a cap and an outer side of a neck portion of a container caused by spill of the content during conveyance is enabled to be removed as much as possible. The present invention relates to a capping device 6 comprising: a second rotary member R2 (conveying means) that conveys a container 2 filled with a liquid content; and a capping head 11 that moves in synchronization with the container 2 being conveyed by the second rotary member R2 while holding a cap 5 above the container 2. A cap cleaning nozzle 31 that sprays a cleaning liquid onto an inner side of the cap 5 held by the capping head 11 is provided on a moving trajectory of the container 2 conveyed by the second rotary member R2, on an upstream side of an attachment position of the cap 5 by the capping head 11. The cap cleaning nozzle 31 sprays the cleaning liquid onto the inner side of the cap 5, and subsequently the capping head 11 attaches the cap 5 to the container 2.

EP 3 907 173 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a capping device, in particular to a capping device comprising: conveying means that conveys a container filled with a liquid content; and a capping head that moves in synchronization with the container being conveyed by the conveying means while holding a cap above the container.

Description of the Related Art

[0002] Conventionally, a beverage filling line for filling a container such as a PET bottle with a liquid content has been provided with a capping device for attaching a cap to the container filled with the content.

[0003] As such a capping device, a capping device including: conveying means that conveys the aforementioned container; and a capping head that moves in synchronization with the container being conveyed by the conveying means while holding a cap above the container, as disclosed in Japanese Laid-Open Patent Application No. 2004-131132, has been known.

[0004] With the capping device disclosed in Japanese Laid-Open Patent Application No. 2004-131132, it is necessary to convey the container at a high rate in order to process a large number of containers in a short period of time, and consequently the content may spill from the container being conveyed due to vibration, and contaminate an inner side of the cap and an outer side of a neck portion of the container.

[0005] Attaching the cap to the container in the state in which the inner side of the cap or the outer side of the neck portion of the container is contaminated with the content would leave the content between the inner side of the cap and the outer side of the neck portion of the container, leading to difficulty in opening of the cap and deterioration of quality of the content due to contact with air.

[0006] In view of the aforementioned problems, an objective of the present invention is to provide a capping device that is capable of removing as much as possible the content contaminating the inner side of the cap and the outer side of the neck portion of the container caused by spill of the content during conveyance.

SUMMARY OF THE INVENTION

[0007] A capping device according to claim 1 of the invention includes: conveying means that conveys a container filled with a liquid content; and a capping head that moves in synchronization with the container being conveyed by the conveying means while holding a cap above the container, characterized in that: a cap cleaning nozzle that sprays a cleaning liquid onto an inner side of the cap held by the capping head is provided on a moving trajectory of the container conveyed by the conveying means, on an upstream side of an attachment position of the cap by the capping head; and the cap cleaning nozzle sprays the cleaning liquid onto the inner side of the cap, and subsequently the capping head attaches the cap to the container.

[0008] According to the present invention, spraying the cleaning liquid from the cap cleaning nozzle onto the inner side of the cap enables: removal of the content spilled from the container and contaminating the inner side of the cap; and dilution of the content contaminating the neck portion of the container by the cleaning liquid applied onto the cap, thus leading to the solution of the aforementioned problems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 is a plan view of a beverage filling line according to the present embodiment;
FIG. 2 is a lateral view of the vicinity of a handover position between an intermediate wheel and a capping device;
FIG. 3 is an enlarged plan view of the vicinity of the handover position between the intermediate wheel and the capping device; and
FIG. 4 is an explanatory view of a positional relationship between the cap and the container in the handover position and in a neck portion cleaning zone.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] The embodiment illustrated in the drawings is described hereinafter. FIG. 1 shows a plan view of a beverage filling line 1 provided with: a filling device 3 that fills a container 2 with a liquid content; an intermediate wheel 4 as feeding means for handing over the container 2; a capping device 6 that attaches a cap 5 to the container 2; and an ejection wheel 7 and an ejection conveyor 8 that eject the container 2 with the cap 5 attached, in this order from an upstream side.

[0011] Among these, the filling device 3, the intermediate wheel 4, the capping device 6, and the ejection wheel 7 each have a rotary member R as conveying means for conveying the container 2, the rotary member R being provided with a plurality of grippers G at regular intervals for holding the container 2 on an outer periphery. The container 2 is handed over in the handover position P where the two adjacent rotary members R are closest to each other.

[0012] As shown in FIG. 2, the container 2 has a main body portion 2a to be filled with beverage, and a neck portion 2b provided above the main body portion 2a. The neck portion 2b has a helical threaded portion (not illustrated) formed on an outer side thereof, onto which the

cap 5 having a threaded portion formed on an inner side thereof is to be screwed.

[0013] In addition, two flange portions 2c are formed to protrude toward the outer periphery from a lowermost part of the neck portion 2b. During conveyance of the container 2, the gripper G provided on the rotary member R grips a lower side of any one of the two flange portions 2c.

[0014] The filling device 3 is conventionally well-known and therefore detailed description thereof is omitted herein. The filling device 3 includes: the rotary member R provided with the grippers G on the outer periphery thereof; and a filling nozzle that is provided above each of the grippers G and fills the container 2 with the content.

[0015] When filled with the content by the filling nozzle, the container 2 gripped by the gripper G on the rotary member R of the filling device 3 is handed over to a first gripper G1 on the intermediate wheel 4, in the handover position P to the intermediate wheel 4.

[0016] FIG. 3 is an enlarged plan view of the vicinity of the handover position P between the intermediate wheel 4 and the capping device 6, while FIG. 2 is a lateral view for explanation of the handover position P and the vicinity thereof. In FIG. 2, the intermediate wheel 4 is shown in a left side of the diagram, while the capping device 6 is shown in a right side of the diagram.

[0017] In FIG. 3, a first rotary member R1 constituting the intermediate wheel 4 is rotated counterclockwise, while a second rotary member R2 constituting the capping device 6 is rotated clockwise. The handover position P is where the first rotary member R1 and the second rotary member R2 are closest to each other.

[0018] The intermediate wheel 4 includes: the first rotary member R1 that is rotated by driving means (not illustrated); the first gripper G1 provided at regular intervals on the outer periphery of the first rotary member R1; and an open/close mechanism (not illustrated) that opens and closes the first gripper G1.

[0019] The first gripper G1 is provided with two openable and closable gripping members, and the open/close mechanism has a mechanism for opening and closing the gripping members in the handover position P. For example, conventionally well-known means with a cam and a cam follower may be employed as the open/close mechanism, and therefore detailed description thereof is omitted herein.

[0020] In its closed state, the first gripper G1 grips the neck portion 2b of the container 2, in the present embodiment a lower side of the upper flange portion 2c.

[0021] The intermediate wheel 4 keeps the first gripper G1 in the closed state to grip the container 2 until reaching the handover position P, and once the second gripper G2 of the second rotary member R2 constituting the capping device 6 grips the container 2 in the handover position P, the first gripper G1 gradually opens to be in an open state to release the container 2.

[0022] The capping device 6 includes: the second rotary member R2 that is rotated in synchronization with the first rotary member R1 of the intermediate wheel 4; a plurality of second grippers G2 provided at regular intervals on the outer periphery of the second rotary member R2; a capping head 11 provided above each of the second grippers G2; and elevating means 12 that raises and lowers the capping head 11.

[0023] The capping device 6 according to the present embodiment is further provided with: cap cleaning means 13 that sprays a cleaning liquid onto the cap 5 held by the capping head 11; and neck portion cleaning means 14 that sprays the cleaning liquid onto the neck portion 2b of the container 2 held by the second gripper G2.

[0024] Since the content may spill from the container 2 being conveyed and contaminate the outer side of the neck portion 2b and the cap 5 held by the capping head 11 for the reason described later in detail, the capping device 6 according to the present embodiment is configured to remove the content by the cap cleaning means 13 and the neck portion cleaning means 14.

[0025] The second rotary member R2 is installed so as to rotate in synchronization with the first rotary member R1 of the intermediate wheel 4. The second gripper G2 provided on the second rotary member R2 includes two gripping members that grip the neck portion 2b of the container 2, and biasing means such as a spring for biasing the gripping members to maintain the closed state.

[0026] The second gripper G2 is configured to grip the lower side of the lower flange portion 2c in the neck portion 2b of the container 2. When the second gripper G2 receives the container 2 from the intermediate wheel 4 in the handover position P, the container 2 held by the gripper G1 is inserted between two gripping members of the second gripper G2.

[0027] The gripping members of the second gripper G2 are thus forced to be in the open state against the biasing force of the biasing means, and then closed by the biasing means, to thereby hold the container 2 and complete the handover.

[0028] The capping heads 11 are provided at regular intervals on an outer peripheral portion of a rotary member (not illustrated) installed above the second rotary member R2, and are configured to move above the container 2 gripped by the second gripper G2, in synchronization with the container 2.

[0029] The capping head 11 includes: an outer cylinder 21 provided so as to be vertically movable by the elevating means 12; a servomotor 22 fixed to the rotary member; and a chuck 23 that is provided below the outer cylinder 21 and holds the cap 5.

[0030] The outer cylinder 21 is a cylindrical member provided so as to be vertically movable with respect to the rotary member R, and an inner cylinder 24 is rotatably provided inside the outer cylinder 21 via a bearing or the like (not illustrated).

[0031] A driving shaft 22a of the servomotor 22 is slidably inserted into an upper portion of the inner cylinder 24, while a spindle 23a provided on the chuck 23 is slidably inserted into a lower portion of the inner cylinder 24.

[0032] The inner cylinder 24 has a spline formed on the inner peripheral surface thereof in an axial direction, while the driving shaft 22a of the servomotor 22 and the spindle 23a of the chuck 23 each have a spline formed on the outer peripheral surface thereof that fits the spline on the inner cylinder 24.

[0033] Such a configuration enables vertical movement of the outer cylinder 21 and the chuck 23 with respect to the servomotor 22, and transmission of a driving force from the servomotor 22 to the chuck 23 via the inner cylinder 24.

[0034] The chuck 23 is configured to be able to hold the cap 5 in a lower portion thereof, and has a cap 25 fixed to the spindle 23a provided in the upper part, so as to cover a lower end portion of the outer cylinder 21. In addition, a spring 26 is elastically mounted inside the cap 25 against the lower end portion of the outer cylinder 21, whereby the chuck 23 is constantly biased downward with respect to the outer cylinder 21. With such a configuration, when the capping head 11 is lowered to bring the cap 5 into contact with the neck portion 2b of the container 2 from above, a biasing force of the spring 26 presses the cap 5 against the neck portion 2b, while the vertical movement of the chuck 23 is permitted with respect to the outer cylinder 21 until the respective threaded portions formed on the cap 5 and the neck portion 2b are screwed together. Note that the capping head 11 is conventionally well-known, and in addition to the configuration disclosed in the present embodiment, the conventionally well-known configurations may also be employed. For example, a motor other than the aforementioned servomotor 22 may be employed as driving means for driving the chuck 23.

[0035] The elevating means 12 comprises: a cam follower 27 provided on the outer cylinder 21 of the capping head 11; and a cam 28 provided to surround the second rotary member R2, the cam follower 27 moving vertically along the cam 28 to raise and lower the capping head 11.

[0036] FIG. 4 shows a cam curve in the vicinity of the handover position P between the intermediate wheel 4 and the capping device 6 shown in FIG. 3, and a positional relationship between the container 2 and the cap 5 held by the capping head 11.

[0037] As shown in FIG. 4, the capping head 11 in the handover position P holds the cap 5 at an upper position defined above the container 2, and keeps holding the cap 5 at the upper position until reaching a downstream end of a neck portion cleaning zone B described later.

[0038] And then, having passed through the neck portion cleaning zone B, the capping head 11 descends from the upper position to a lower position along the cam 28 to attach the cap 5 onto the neck portion 2b of the container 2 in a predetermined attachment position.

[0039] The cap cleaning means 13 comprises: a cap cleaning nozzle 31 provided adjacent to the outer side of the first rotary member R2 of the capping device 6; and a partition plate 32 provided below the cap cleaning nozzle 31.

[0040] As shown in FIG. 3, the cap cleaning nozzle 31 is installed in a cap cleaning position A adjacent to a downstream side of the handover position P between the intermediate wheel 4 and the capping device 6, and connected to cleaning liquid supply means (not illustrated) that supplies the cleaning liquid such as purified water.

[0041] In addition, as shown in FIG. 2, the cap cleaning nozzle 31 is curved such that a fore end thereof is oriented upward, whereby the cleaning liquid is sprayed from below the cap 5 held by the chuck 23 of the capping head 11, toward the inner side of the cap 5.

[0042] The cleaning liquid may be sprayed from the cap cleaning nozzle 31 either constantly or only when the cap 5 passes through the cap cleaning position A.

[0043] As shown in FIG. 2, the partition plate 32, which is formed to have a mound-like cross section, is provided between the cap cleaning nozzle 31 and the container 2 being conveyed by the second gripper G2, such that an orientation of its inclined face intersects with the moving trajectory of the container 2.

[0044] As shown in FIG. 3, the partition plate 32 is provided along the moving trajectory of the container 2 being conveyed by the second gripper G2, from the handover position P to the neck portion cleaning zone B of the neck portion cleaning means 14 described later.

[0045] Alternatively, the partition plate 32 may also be configured with, for example, one inclined face provided obliquely downward from the inner peripheral side to the outer peripheral side of the second rotary member R2, and can be in any shape as long as the cleaning liquid falling onto the partition plate 32 can be discharged without wetting the container 2.

[0046] The neck portion cleaning means 14 comprises: a plurality of neck portion cleaning nozzles 33 provided along the moving trajectory of the container 2 being conveyed by the second rotary member R2 of the capping device 6; and the partition plate 32 provided above the neck portion cleaning nozzles 33.

[0047] As shown in FIG. 2, the neck portion cleaning nozzles 33 are provided on an inner peripheral side and an outer peripheral side across the container 2 being conveyed, and are configured to spray the cleaning liquid from obliquely above toward the neck portion 2b.

[0048] The neck portion cleaning nozzles 33 are also configured to spray the cleaning liquid such as purified water, and, in the present embodiment, are connected to the cleaning liquid supply means that supplies the cleaning liquid to the cap cleaning nozzle 31 of the cap cleaning means 13.

[0049] In addition, as shown in FIG. 3, the plurality of neck portion cleaning nozzles 33 are provided in a position adjacent to a downstream side of the cap cleaning means 13. The zone in which the plurality of neck portion cleaning nozzles 33 spray the cleaning liquid toward the container 2 is referred to as the neck portion cleaning zone B.

[0050] The neck portion cleaning nozzles 33 are oriented such that the cleaning liquid is sprayed to the whole

periphery of the neck portion 2b of the container 2 being conveyed through the neck portion cleaning zone B.

[0051] In the present embodiment, the partition plate 32 of the neck portion cleaning means 14 is formed integrally with the partition plate 32 of the cap cleaning means 13, and thus the partition plate 32 is provided continuously from the handover position P with the downstream end portion thereof being in line with the downstream end portion of the neck portion cleaning zone B.

[0052] As described above, due to the partition plate 32 having the mound-like cross section and the orientation of the inclined face thereof intersecting with the moving trajectory of the container 2, the cleaning liquid sprayed from the neck portion cleaning nozzles 33 and then splashing back from the neck portion 2b of the container 2 adheres to a lower face of the partition plate 32 and flows down the inclined face toward the inner peripheral side or the outer peripheral side, to thereby prevent as much as possible the cleaning liquid from pouring into the container 2.

[0053] In addition, due to the partition plate 32 spanning over the neck portion cleaning zone B, as shown in FIG. 4, the elevating means 12 that raises and lowers the capping head 11 is provided in a position corresponding to the downstream end portion of the partition plate 32, i.e., the downstream end of the neck portion cleaning zone B, to lower the capping head 11 from the upper position to the lower position.

[0054] A procedure, from liquid filling to capping, in the beverage filling line 1 having the aforementioned configuration is described hereinafter. An operation of handing over the container 2 filled with the content from the intermediate wheel 4 to the capping device 6 is primarily described.

[0055] The beverage filling line 1 according to the present embodiment is capable of so-called high-speed filling, for example capable of processing about 1000 containers 2 per minute, with the first rotary member R1 and the second rotary member R2 of the intermediate wheel 4 and the capping device 6 rotating at a high rate to convey the containers 2.

[0056] The container 2 filled with the content by the filling device 3 is fed to the intermediate wheel 4, and then the first gripper G1 on the intermediate wheel 4 conveys the container 2 while gripping the neck portion 2b thereof.

[0057] Here, a centrifugal force generated by the rotation of the first rotary member R1 is applied to the container 2, and the first gripper G1 grips the neck portion 2b of the container 2, whereby the container 2 is in a slanted state with the neck portion 2b being a pivot point and the bottom portion of the container 2 swinging toward the outer peripheral side.

[0058] The container 2 is conveyed in this state by the intermediate wheel 4, and then handed over from the first gripper G1 to the second gripper G2 in the handover position P to the capping device 6.

[0059] Until the container 2 reaches the handover position P, the centrifugal force toward the outer peripheral side of the first rotary member R1 is applied to the container 2. Once the container 2 is handed over to the second rotary member R2 in the handover position P, a centrifugal force toward the outer peripheral side of the second rotary member R2 is applied to the container 2.

[0060] As a result, the container 2 slants to the opposite direction in the handover position P while the first rotary member R1 and the second rotary member R2 rotate at a high rate, resulting in a sudden change in the attitude.

[0061] Such a sudden change in the attitude of the container 2 causes splash at the liquid surface of the content inside the container 2, and the splash of the content may contaminate the outer side of the neck portion 2b or jump out upward from the container 2.

[0062] Attaching the cap 5 to the container 2 in the state in which the inner side of the cap 5 or the outer side of the neck portion 2b of the container 2 is contaminated with the splash of the content would leave the content between the inner side of the cap 5 and the outer side of the neck portion 2b.

[0063] For example, in the case of the content containing sugar, the sugar may fix the cap 5 firmly onto the neck portion 2b of the container 2, leading to difficulty in opening of the cap 5. In addition, deterioration of quality of the content is likely due to contact with air.

[0064] Given this, in the present embodiment, the cap cleaning means 13 and the neck portion cleaning means 14 are provided in the handover position P in the capping device 6, to thereby solve the aforementioned problems caused by spill of the content from the container 2. First, when the container 2 is handed over in the handover position P between the intermediate wheel 4 and the capping device 6, the capping head 11 stands by while holding the cap 5 above the second gripper G2 of the capping device 6, the cap 5 being held at the upper position as shown in FIG. 4.

[0065] Subsequently, the container 2 held by the second gripper G2 is moved along the second rotary member R2, and the cap 5 held by the capping head 11 is moved in synchronization with the container 2.

[0066] The cap cleaning means 13 is provided in a position adjacent to the downstream side of the handover position P. The cap cleaning means 13 sprays the cleaning liquid from the cap cleaning nozzle 31 toward the inner side of the cap 5, enabling wetting of the inner side of the cap 5 with the cleaning liquid.

[0067] Even in the case in which the content of the container 2 contaminates the outer side of the neck portion 2b, wetting the inner side of the cap 5 with the cleaning liquid enables dilution of the concentration of the content with the cleaning liquid on the inner side of the cap 5, when the cap 5 is attached to the container 2. The aforementioned problems can thus be prevented as much as possible.

[0068] In addition, although the cleaning liquid sprayed onto the cap 5 falls downward from the cap 5, the partition plate 32 provided below the cap cleaning nozzle 31 pre-

vents the cleaning liquid from pouring into the container 2.

[0069] Since the partition plate 32 has the mound-like cross section and the orientation of the inclined face thereof intersects with the moving trajectory of the container 2, the partition plate 32 causes the cleaning liquid fallen from the cap 5 to flow down to the inner peripheral side or the outer peripheral side of the moving trajectory of the container 2.

[0070] After the container 2 and the cap 5 have passed through the cap cleaning means 13 as described above, the neck portion 2b of the container 2 is cleaned by the neck portion cleaning means 14.

[0071] Once the container 2 moves into the neck portion cleaning zone B, the cleaning liquid is sprayed from the plurality of neck portion cleaning nozzles 33 constituting the neck portion cleaning means 14, whereby the outer side of the neck portion 2b of the container 2 gripped by the second gripper G2 is cleaned with the cleaning liquid.

[0072] Here, since the neck portion cleaning nozzles 33 spray the cleaning liquid from obliquely above toward the neck portion 2b, the cleaning liquid is prevented from pouring into the container 2 as much as possible. In addition, since the plurality of neck portion cleaning nozzles 33 are installed at various angles, cleaning of the entire outer side of the neck portion 2b is enabled.

[0073] Even in the case in which the content spilled from the container 2 contaminates the outer side of the neck portion 2b, cleaning of the outer side of the neck portion 2b with the cleaning liquid in this manner enables removal of the content, whereby the aforementioned problems caused by the content can be prevented as much as possible.

[0074] The cleaning liquid collides with, and then is scattered at, the neck portion 2b of the container 2. The cleaning liquid scattered upward is blocked by the partition plate 32 and prevented from adhering to the cap positioned above.

[0075] Consequently, even if the cleaning liquid having removed the content contaminating the neck portion 2b contains the content, components of the content is prevented from contaminating the cap 5, thus preventing the aforementioned problems.

[0076] Meanwhile, in the neck portion cleaning zone B, the capping head 11 is positioned at the upper position as shown in FIG. 4, whereby the cap 5 held by the capping head 11 does not interfere with the partition plate 32.

[0077] Once the cap 5 passes through the neck portion cleaning zone B, the elevating means 12 lowers the capping head 11 to bring the cap 5 into contact with the neck portion 2b of the container 2 in the attachment position, whereby the cap 5 is attached to the neck portion 2b.

[0078] Thereafter, the container 2 with the cap 5 attached is handed over from the capping device 6 to the ejection wheel 7, and then ejected to the subsequent process via the ejection conveyor 8.

[0079] Purposes and effects of wetting the inner side of the cap 5 by the cap cleaning means 13 and cleaning the outer side of the neck portion 2b of the container 2 by the neck portion cleaning means 14 have been described; however, a change in the shape of the container 2 constitutes another reason.

[0080] More specifically, a vertical slit has been formed in the threaded portion on the neck portion 2b of the container 2 for facilitating discharge of the content contaminating the threaded portion; however, a container without the vertical slit is recently employed for cost reduction and the like.

[0081] Elimination of the vertical slit makes it more difficult to discharge the content contaminating the threaded portion, resulting in a higher likelihood of the content remaining between the cap 5 and the neck portion 2b than in the case of the conventional container.

[0082] The configuration of the present embodiment enables sufficient dilution of the content remaining in the threaded portion on the outer side of the neck portion with the cleaning liquid applied to the inner side of the cap 5 by the cap cleaning means 13; and removal of the content contaminating the outer side of the neck portion 2b by the neck portion cleaning means 14.

[0083] Note that, although the capping device 6 according to the present embodiment is provided with: the cap cleaning means 13 that sprays the cleaning liquid onto the cap 5; and the neck portion cleaning means 14 that sprays the cleaning liquid onto the neck portion 2b of the container 2, any one of the cap cleaning means 13 and the neck portion cleaning means 14 may be omitted.

[0084] In the case in which only the cap cleaning means 13 is provided, wetting the cap 5 with the cleaning liquid as described above enables dilution of the content remaining between the cap 5 and the neck portion 2b, thus solving the aforementioned problems.

[0085] In addition, in such a configuration, the partition plate 32 is required only in the position where the cap cleaning nozzle 31 of the cap cleaning means 13 is provided.

[0086] As for the cap cleaning means 13, the cap cleaning nozzle 31 and the partition plate 32 may also be provided in the handover position P, or on an upstream side of the handover position P in the rotational direction of the second rotary member.

[0087] On the contrary, in the case in which only the neck portion cleaning means 14 is provided, the content can be removed by the neck portion cleaning means 14 and the aforementioned problems do not occur, if the neck portion cleaning zone B is on the downstream side of the handover position P, and no further spill of the content is likely due to the stable attitude of the container 2.

[0088] In addition, in such a configuration, the partition plate 32 is required only in the neck portion cleaning zone B.

[0089] Furthermore, although the configuration of conveying the container 2 by means of the plurality of rotary members R has been described in the present embodi-

ment, the cap cleaning means 13 and the neck portion cleaning means 14 may be provided also in conveying means that conveys a container linearly on a conveyor, if the spill of the content due to vibration and the like of the container is likely.

Reference Signs List

[0090]

1	Beverage filling line
2	Container
2b	Neck portion
4	Intermediate wheel
5	Cap
6	Capping device
11	Capping head
12	Elevating means
13	Cap cleaning means
31	Cap cleaning nozzle
32	Partition plate
A	Cap cleaning position

Claims

1. A capping device comprising: conveying means that conveys a container filled with a liquid content; and a capping head that moves in synchronization with the container being conveyed by the conveying means while holding a cap above the container, **characterized in that**:

   a cap cleaning nozzle that sprays a cleaning liquid onto an inner side of the cap held by the capping head is provided on a moving trajectory of the container conveyed by the conveying means, on an upstream side of an attachment position of the cap by the capping head; and
   the cap cleaning nozzle sprays the cleaning liquid onto the inner side of the cap, and subsequently the capping head attaches the cap to the container.

2. The capping device according to claim 1, **characterized in that** a partition plate is provided between the cap cleaning nozzle and the container being conveyed by the conveying means.

3. The capping device according to any one of claim 1 or claim 2, **characterized in that**: the conveying means comprises a rotary member provided with a plurality of grippers that each grip a neck portion of the container; and
   the cap cleaning nozzle is provided in a handover position where the container is fed to the gripper on the rotary member, or in a position adjacent to the upstream side or a downstream side of the handover position on the moving trajectory of the capping head.

Fig. 1

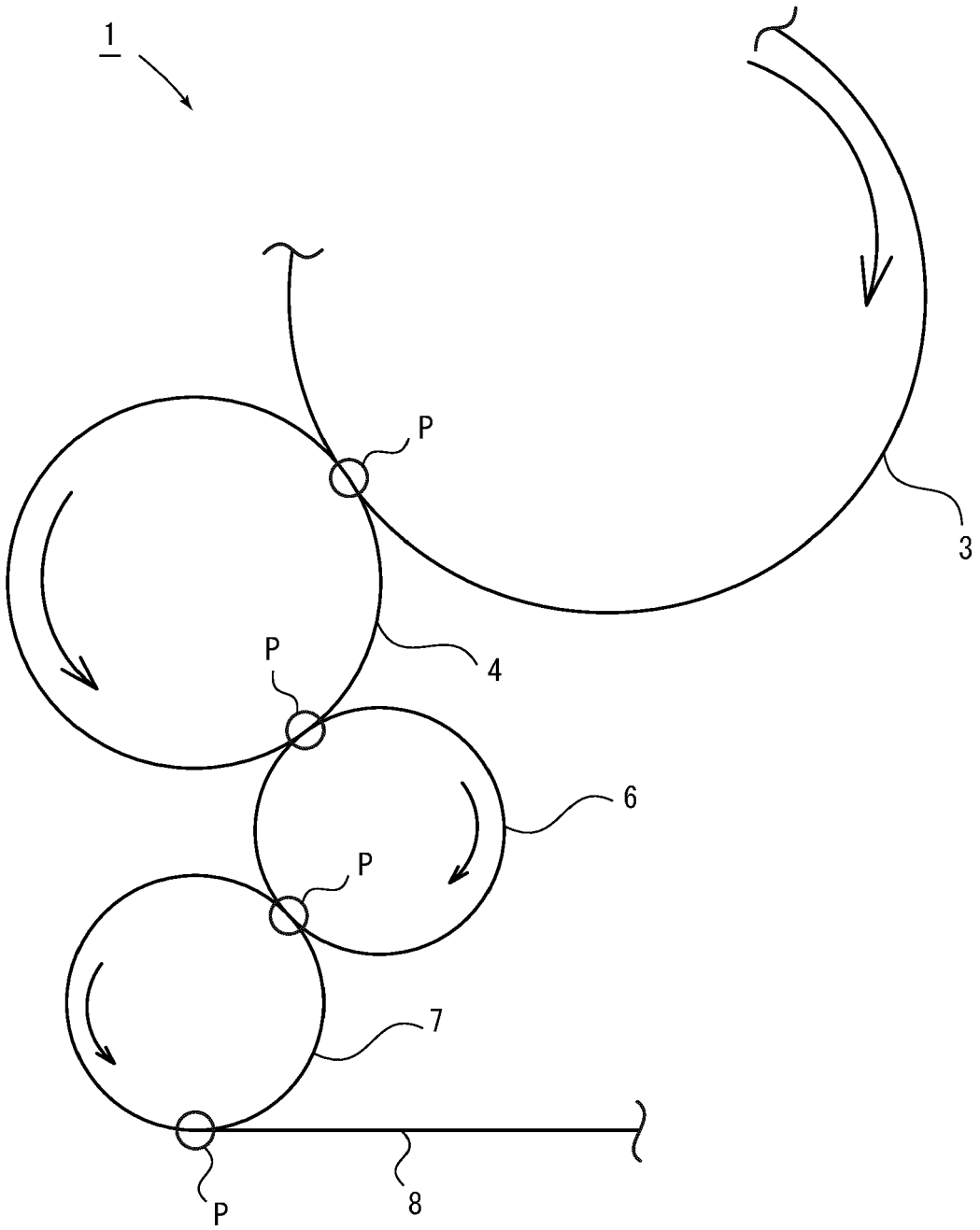


Fig. 2

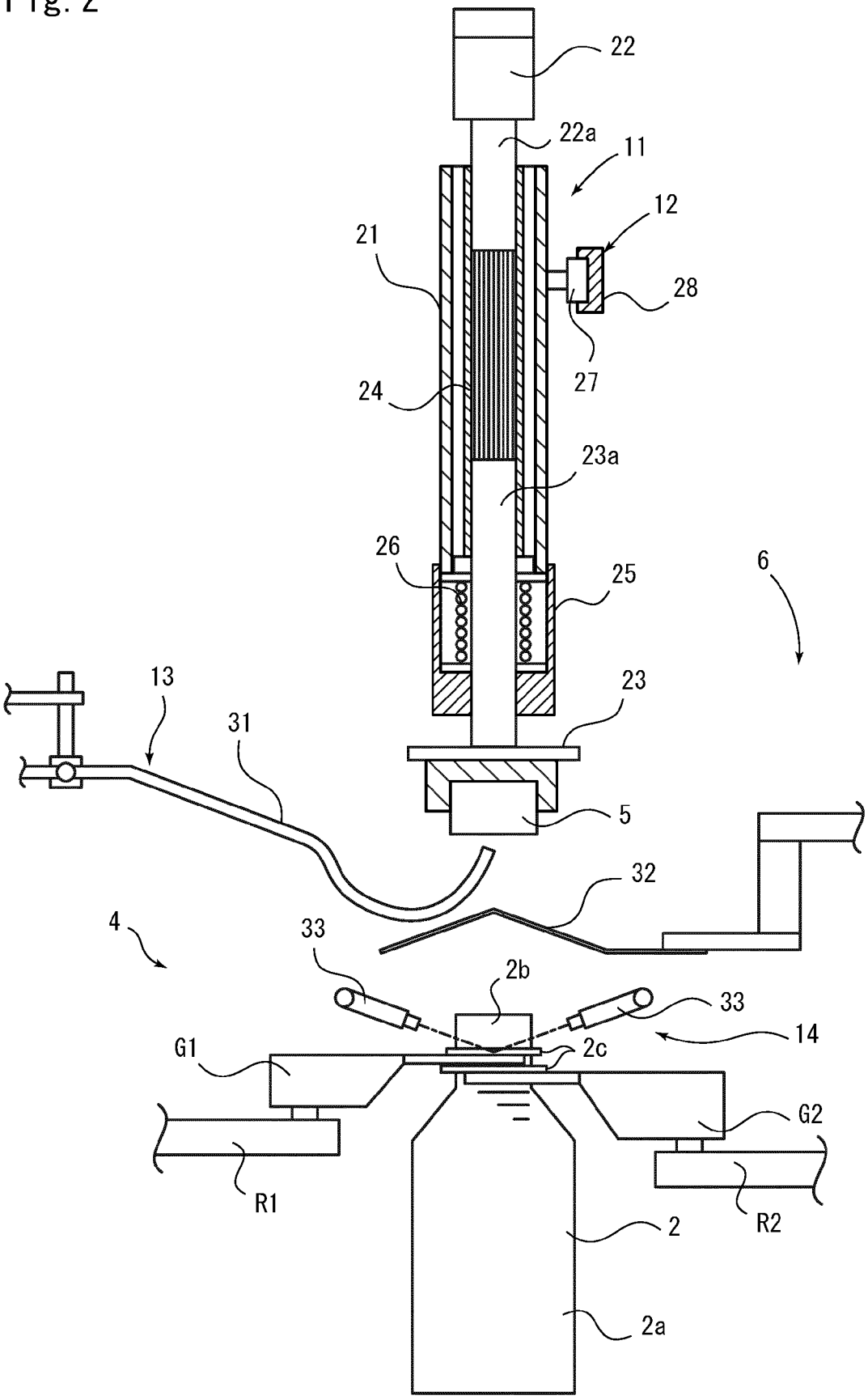

22
22a
11
12
21
28
27
24
23a
26
25
6
13
31
23
5
32
4
33
2b
33
14
G1
2c
G2
R1
R2
2
2a

Fig. 3

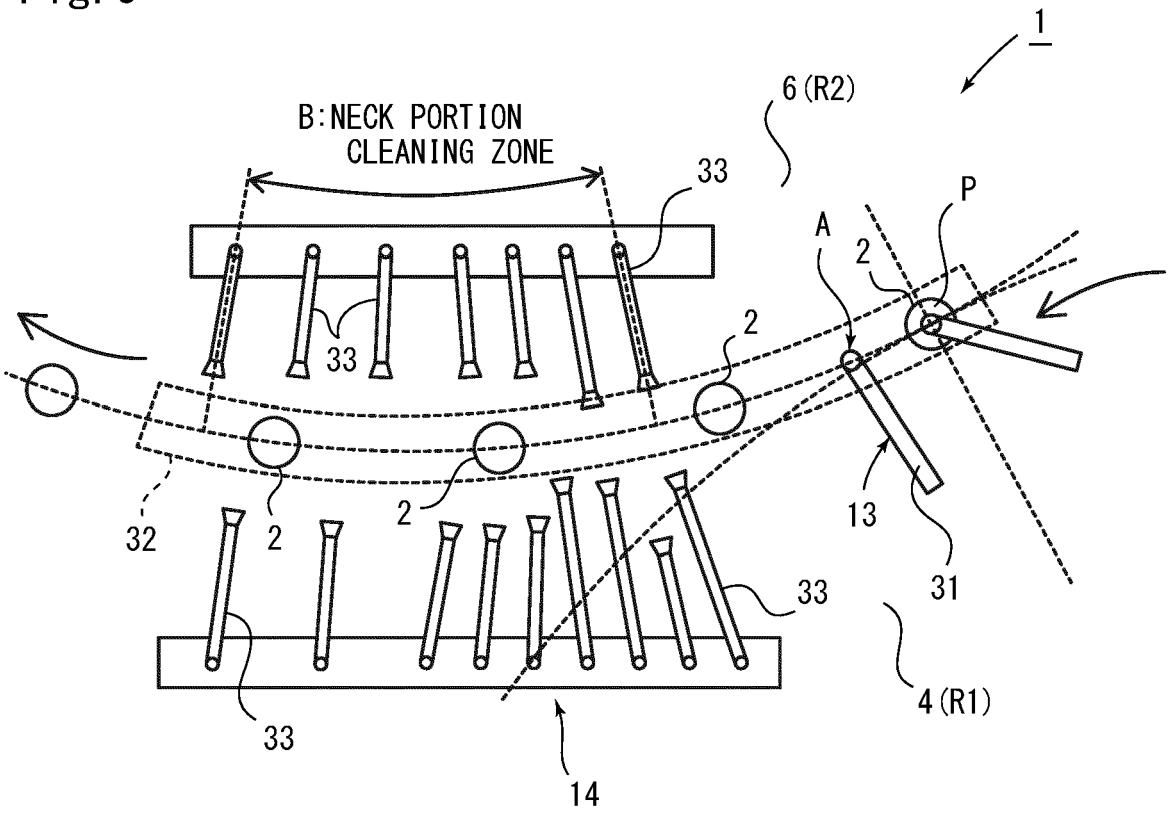
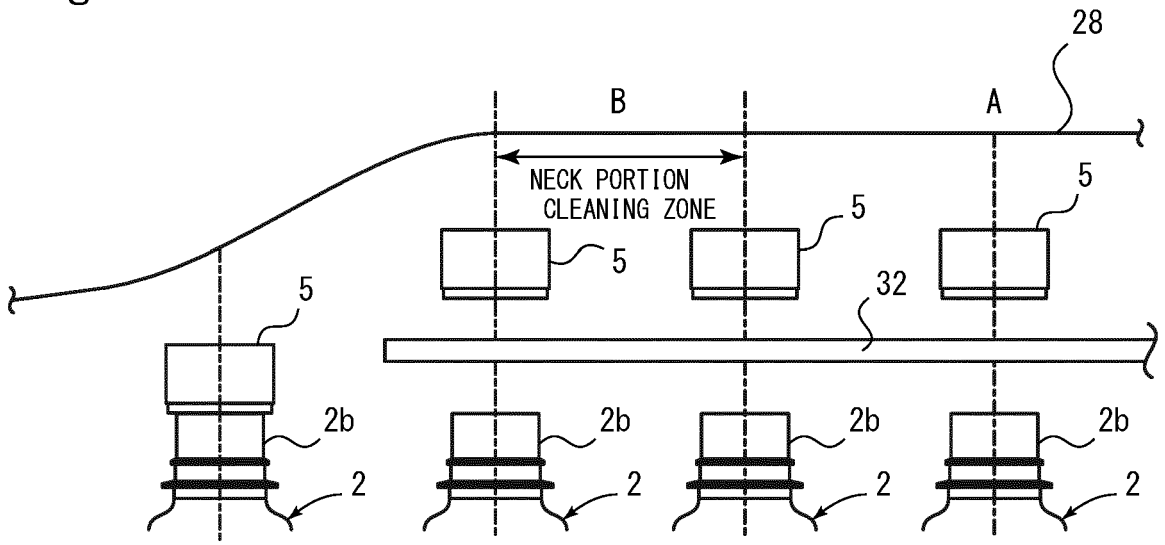

1
6(R2)
B:NECK PORTION
CLEANING ZONE
33
P
A
2
33
2
32
2
2
13
31
33
4(R1)
33
14

Fig. 4


28
B
A
NECK PORTION
CLEANING ZONE
5
5
5
5
32
2b
2b
2b
2b
2
2
2
2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 0557

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 197 27 942 A1 (GEA FINNAH GMBH [DE]) 7 January 1999 (1999-01-07) * figures 1,2 *	1,2 3	INV. B67B3/00
X Y	DE 24 32 276 A1 (ENZINGER UNION WERKE AG) 22 January 1976 (1976-01-22) * figure 1 *	1,2 3	
Y	JP 2018 172134 A (SHIBUYA KOGYO CO LTD) 8 November 2018 (2018-11-08) * figure 8 *	3	
A,P	EP 3 670 429 A1 (KRONES AG [DE]) 24 June 2020 (2020-06-24) * figure 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B67B
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 September 2021	de Miscault, Xavier

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 21 17 0557

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.

27-09-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19727942 A1	07-01-1999	AT 205168 T	15-09-2001
		BR 9809682 A	11-07-2000
		DE 19727942 A1	07-01-1999
		EP 0993418 A1	19-04-2000
		ES 2163882 T3	01-02-2002
		JP 2002507176 A	05-03-2002
		US 6341472 B1	29-01-2002
		WO 9901374 A1	14-01-1999
DE 2432276 A1	22-01-1976	NONE	
JP 2018172134 A	08-11-2018	JP 6874480 B2	19-05-2021
		JP 2018172134 A	08-11-2018
EP 3670429 A1	24-06-2020	CN 111333008 A	26-06-2020
		DE 102018132625 A1	18-06-2020
		EP 3670429 A1	24-06-2020

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2004131132 A **[0003] [0004]**