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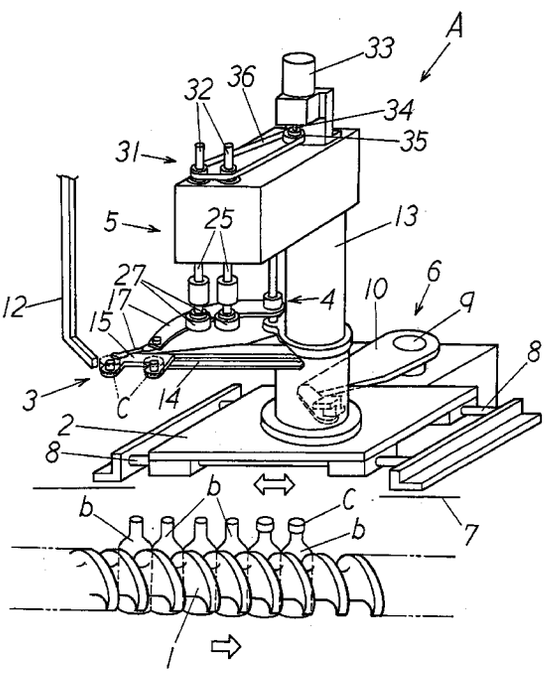
(54) Linearly following type capper and capping method thereof

(57) The linearly following type capper comprises a moving body (2) which is reciprocatingly moved in parallel with vessels b by an operation means (6) disposed in the vicinity of a transfer means (1) which linearly transfers the vessels b containing liquids charged thereinto, a delivery means (3) for receiving caps c and a capping means (5) provided with the moving body (2) for receiving and gripping the conveyed caps c and applying the caps c to the necks of the vessels b.

FIG.1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a linearly following type capper and a capping method thereof used in an industry for charging liquids and the like into vessels and packaging the liquids by the vessels.

Description of the Related Art

In an industry for charging liquids and the like into vessels and packaging the liquids by the vessels, there have been generally provided now various types of cappers according to the purpose for which the cappers are used and the processing capacity thereof so as to mechanically apply caps to vessels accommodating contents therein.

For example, when caps are to be applied to a lot of vessels at a time, a large rotary type capper is used to carry out capping operation in such a manner that vessels are continuously supplied to a rotational locus of the capper while the capper makes a rotational motion and the capping operation is finished before the vessels reach the outlet of the capper.

On the other hand, when liquid charging operation is to be carried out to a small lot of vessels or when liquid charging and packaging operation is to be carried out on a small scale, vessels containing liquids charged thereinto are transferred from a linear conveyer to a capper arranged as a single spindle or a plurality of spindles and when the vessels reach the capper, the conveyer for the vessels is temporarily stopped and a capping member which has received caps in this state applies the caps to the necks of the vessels.

Although the former rotary type capper can continuously carry out capping operation at a high speed, it is very expensive because many capping heads are provided with the rotary main body thereof as well as the capper is sophisticated and large in size. Thus, fields in the industry which can sufficiently utilize this type of the capper are very limited.

Further, there arise such drawbacks as that contents in a vessel are caused to spout out by the impact occurred when the vessel is put into a feed wheel or a feed screw and that the vessel bites into it.

On the other hand, although the latter capper is most suitable for charging and packaging operation effected on a small scale because it can be made at a less expensive cost with a small size as a whole, the capper has various problem as described below. Since a vessel must be temporarily stopped each time liquids are charged into it, that is, so-called intermittent processing is employed, not only a processing capacity cannot be increased but also contents charged into the vessel is caused to spout out by the shock occurred when the vessel is stopped and the contents become short of weight and further the vessel and its vicinity are made dirty by the contents.

Since a vessel is vibrated by the shock occurred when the a conveyer is stopped, a cap cannot be properly applied to the vessel.

A vessel is fallen down and contents are caused to overflow by the shock occurred when the conveyer is stopped or started and further the fallen-down vessel bites into the capper, by which trouble occurs to a job.

SUMMARY OF THE INVENTION

An object of the present invention achieved to solve the aforesaid problems is to provide a linearly following type capper and a capping method thereof capable of preventing the flowing-off of liquids in vessels which are charged thereinto and applying caps to the vessels transferred continuously without causing any adverse affect such as the vibration and falling-down of the vessels in such an arrangement that a moving body which is reciprocatingly moved in parallel with the vessels by an operation means is disposed in the vicinity of a transfer means which linearly transfers the vessels and a delivery means for receiving caps and capping means for receiving and gripping the conveyed caps and applying the caps to the necks of the vessels are provided with the moving body.

To achieve the above object, according to the present invention, there is provided a linearly following type capper which comprises a transfer means for continuously and linearly transferring vessels containing liquids charged thereinto in a direction at a predetermined pitch, a moving body reciprocatingly moved by an operation means in parallel with the vessels in the vicinity of the transfer means, a delivery means disposed to the moving body for receiving supplied caps, a moving means connected to the delivery means and a capping means provided with the moving body for receiving and gripping the caps conveyed by the moving means and applying the caps to the necks of the vessels transferred by the transfer means.

A plurality sets of the capping means are provided at intervals corresponding to the transfer pitch of the vessels in the transfer means.

Further, there is provided a linearly following type capping method effected by a linearly following type capper which comprises a transfer means for continuously and linearly transferring vessels containing liquids charged thereinto in a direction at a predetermined pitch, a moving body reciprocatingly moved by an operation means in parallel with the vessels in the vicinity of the transfer means, a delivery means disposed to the moving body for receiving supplied caps, a moving means connected to the delivery means and a capping means provided with the moving body for receiving and gripping the caps conveyed by the moving means and applying the caps to the necks of the vessels transferred by the transfer means, which method comprises by the steps of moving the capping means gripping the caps

conveyed by the delivery means through a going path by the operation means in synchronism with the transfer speed of the vessels, applying the caps to the vessels in the transfer means while the capping means is moved through the going-path and retracting the capping means through a return path after the completion of the capping operation to thereby cause the capping means to correspond to vessels to be transferred next.

The linearly following type capper of the present invention arranged as described above and the capping method thereof achieve operation as described below.

A lot of vessels containing liquids charged thereinto are continuously transferred by the transfer means at a predetermined speed.

Caps supplied to the delivery means are moved by the moving means to a position corresponding to the capping means and gripped by the capping means.

Thus, the capping means is moved by the operation means through the moving body through the going-path along the moving path of the vessels in synchronism with the transfer speed of the vessels.

Then, the capping means applies the caps to the vessels in the transfer means while the moving body is in the going path, and on the completion of the capping operation the capping means is retracted through the return path to a next job start position at once to prepare next capping operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a main portion of an embodiment of a linearly following type capper employing a capping method according to the present invention;

FIG. 2 is a longitudinal cross sectional view of the main portion in FIG. 1;

FIG. 3 is a plan view schematically showing a delivery means in FIG. 1; and

FIG. 4 is views explaining respective capping operations effected by the capper of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

An embodiment of a linearly following type capper and a capping method thereof according to the present invention will be described with reference to the drawings.

In FIG. 1 and FIG. 2, symbol A denotes the linearly following type capper as an apparatus of the embodiment of the present invention which is fundamentally composed of a transfer means 1 for vessels b, a moving body 2, a delivery means 3 for a cap c, a moving means 4 and a capping means 5.

The transfer means 1 is used to continuously and linearly transfer the vessels b containing liquids charged thereinto in a direction at a predetermined pitch by using a conveyer such as, for example, a screw conveyer, a belt conveyer or the like. Since the transfer means 1 is continuously rotated without being stopped, the vessels b are also continuously moved at a predetermined speed accordingly.

The moving body 2 is reciprocatingly moved adjacent to the transfer means 1 in parallel with the movement of the vessels b by an operation means 6 and engaged with a machine body 7 through lateral guides 8, 8 which are parallel with the transfer means 1 so that the moving body 2 can advance and retract with respect to the machine body 7.

Any arbitrary means may be employed as the operation means 6 so long as it can make a reciprocating motion at a certain operation timing and, for example, an oscillate drive and the like are suitable as the operation means 6. The extreme end of an arm 10 which is swingingly moved by being fixed to the output shaft 9 of the operation means 6 is connected to the moving body 2 through a support shaft 11.

The delivery means 3 is provided with the moving body 2 and receives the cap c supplied from a cap aligner (not shown) through a chute 12 and delivers the cap c to the capping means 5 to be described later.

The delivery means 3 is arranged such that a receiving member 15 is movably engaged with an advancing/retracting guide 14 extending from a support column 13 standing on the moving member 2 to the transfer means 1 side and moved in parallel with the transfer means 1 by a lever 17 connected to the moving means 4.

As shown in FIG. 2, the moving means 4 is arranged such that the roller 21 of an arm lever 20 rotatably connected to the support column 13 is engaged with a cam plate 19 rotated by a rotary shaft 18 which is rotated by a drive unit (not shown) and disposed in the support column 13, and a gear 22 rotated in association with the rotation of the arm lever 20 is meshed with the gear 24 of a connector shaft 23 supported by the support column 13.

Further, the connection of the connector shaft 23 to the above lever 17 permits the lever 17 to reciprocatingly move between the chute 12 where the cap is supplied and a cap grip position where the cap is gripped by the capping means 5 at a predetermined timing.

The capping means 5 is mounted on the support column 13 standing on the moving body 2, receives and grips the cap c conveyed by the receiving member 15 of the moving means 4 and applies the cap c to the neck of the vessel b transferred by the transfer means 1.

The capping means 5 is arranged such that a drive shaft 25 is upward/downward movably supported in a hanging fashion by a means 26 in the support column 13 so that the drive shaft 25 confronts the transfer means 1 and a gripper 27 is mounted to the lower end of the drive shaft 25, the gripper 27 being mechanically opened and closed by a hydraulic pressure, electrically or mechanically.

The lifting/lowering means 26 has a rotary cam member 28 fixed to the upper portion of the above rotary shaft 18 and the external end of a swing lever 29 connected to the rotary cam member 28 is coupled with

the drive shaft 25 having the gripper 27 mounted thereto. Thus, the drive shaft 25 is lifted and lowered between a cap grip waiting position and a position where a cap is applied to the neck of the vessel b in a support member 30 attached to the support column 13.

A turning means 31 for turning and tightening the cap c is connected to the drive shaft 25 to which the gripper 27 is mounted. The turning means 31 is arranged such that a connecting member 36 such as a belt or the like is stretched between a pulley 32 fixed to the drive shaft 25 and a pulley 35 mounted on the output shaft 34 of a drive unit 33 such as a motor or the like and the gripper 27 having the cap c gripped thereby is rotated by a driving force transmitted from the drive unit 33 so that the cap c is applied to the neck of the vessel b with a predetermined torque.

Note, one set or a plurality sets of the above grippers 25 can be provided with the support column 13 on the moving body 2 in the above capping means 5 and this embodiment shows an example having two sets of the grippers 25. In this case, two sets of the drive shafts 25, 25 are supported by the support column 13 in the hanging fashion and each of the drive shafts 25, 25 includes the gripper 27 and means 26 and 31 for lifting, lowering and turning it.

The drive shafts 25, 25 are disposed at intervals corresponding to a transfer pitch of the vessels b in the transfer means 1.

Although the above embodiment shows an example for turning and tightening the cap c, it is of course applicable to a capper for applying a cap to the vessel b by striking the cap and usual means can be employed as the arrangement of this case.

Consequently, when capping operation is carried out to the vessels b by means of the apparatus A arranged as described above, the vessels b, b ... containing liquids charged thereinto are continuously transferred by the transfer means 1 by being joined together at a predetermined pitch in a linear state at a predetermined speed.

On the other hand, the caps c supplied from the chute 17 with the directions thereof aligned by the cap aligner are placed on the receiving member 15 of the delivery means 3 as shown in FIG. 4(a).

Next, since the receive member 15 having the caps c placed thereon is moved to a position corresponding to the capping means 5 by the moving means 4, i.e., below the grippers 27 waiting for the caps c, the lifting/lowering means 26 is actuated to lower the drive shafts 25 so that the grippers 27 grip the caps c as shown in FIG. 4(b).

The capping means 5 is moved by the operation means 6 through the moving body 2 through a going-path along the moving path of the vessels b transferred by the transfer means 1 in synchronism with the transfer speed of the vessels b to cause the gripped caps c to correspond to the necks of the vessels b as shown in FIG. 4(c).

Then, the grippers 27 of the capping means 5 are lowered by the lifting/lowering means 26 while the moving body 2 moves through a going path to cause the caps c to be applied to the necks of the vessels which are being moved by the transfer means 1 by turning and tightening the caps c as shown in FIG. 4(d). On the completion of the capping, the moving body 2, i.e., the capping means 5 is retracted through a return path by the operation means 6 at once and returned to a next capping job start position, i.e., to a position of the delivery means 3 to which the caps c having been supplied to prepare the application of the caps c to the next vessels b in the transfer means 1. During this time, the vessels are continuously transferred by the transfer means 1 without being stopped and capping operation is continuously carried out to the vessels.

Although the capping means 5 may be retracted through the return path at the same speed as that in the going-path, it is preferable to retract the capping means 5 at a higher speed to increase a processing capacity and processing speed.

In FIG. 2, numeral 40 denotes a turning stop means for the vessels b to prevent the turning of the vessels b which is caused by the turning force of the capping means 5 when the caps c are turned and tightened by the capping means 5. Holding members 43, 43, which are opened and closed by a press member 42 such as a hydraulic cylinder, solenoid or the like, are disposed to a mounting member 41 provided with the moving body 2 on the both sides across the transfer path of the vessels b so that the holding members 43, 43 are actuated in synchronism with a timing at which capping operation is carried out by the capping means 5 to thereby temporarily hold the vessels b.

Note, any means may be employed as the means 40 so long as it is arranged to prevent the rash act of the vessels b at a time when capping operation is carried out to the vessels b.

According to the present invention arranged as described above, since caps are applied to vessels containing liquids charged thereinto without stopping the vessels in a series of transfer operation of the vessels effected from a time before the application of the caps to a time after the completion of the application thereof, the overflow of the contents in the vessels can be reduced to a possible minimum level, liquids can be charged with a high accuracy and the vessels and the vicinity thereof can be prevented from being made dirty by overflown liquids. In addition, since the vessels can be transferred at a transfer speed maintained to a certain level at all times, it is not necessary to accelerate or decelerate the transfer means when the vessels are stopped or started.

Since the vessels are not stopped while they are transferred and not started after they are stopped, the vibration and falling-down of the vessels caused by the stop and start thereof can prevented and such trouble that capping is insufficiently carried out and the vessels bite into the machine does not arise.

Since the apparatus can be made compact with a simple structure, there can be achieved particular advantages that only a small space is occupied to install the apparatus in a factory and the apparatus is available in a market at a price lower than that of a rotary type capper as well as an increased processing capacity can be obtained by the apparatus as compared with a conventional single spindle capper.

Claims

1. A linearly following type capper, characterized by comprising a transfer means (1) for continuously and linearly transferring vessels containing liquids charged thereinto in a direction at a predetermined pitch, a moving body (2) reciprocatingly moved by an operation means (6) in parallel with the vessels in the vicinity of said transfer means (1), a delivery means (3) disposed to said moving body (2) for receiving supplied caps, a moving means (4) connected to said delivery means (3) and a capping means (5) provided with said moving body (2) for receiving and gripping said caps conveyed by said moving means (4) and applying said caps to the necks of said vessels transferred by said transfer means (1).

2. A linearly following type capper according to claim 1, wherein a plurality sets of said capping means (5) are provided at intervals corresponding to the transfer pitch of said vessels in said transfer means (1).

3. A linearly following type capping method carried out by a linearly following type capper which comprises a transfer means (1) for continuously and linearly transferring vessels containing liquids charged thereinto in a direction at a predetermined pitch, a moving body (2) reciprocatingly moved by an operation means (6) in parallel with the vessels in the vicinity of said transfer means (1), a delivery means (3) disposed to said moving body (2) for receiving supplied caps, a moving means (4) connected to said delivery means (3) and a capping means (5) provided with said moving body (2) for receiving and gripping said caps conveyed by said moving means (4) and applying said caps to the necks of said vessels transferred by said transfer means (1), characterized by comprising the steps of moving said capping means (5) gripping said caps conveyed by said delivery means (3) through a going path by said operation means (6) in synchronism with the transfer speed of said vessels, applying said caps to said vessels in said transfer means (1) while said capping means (5) is moved through the going-path and retracting said capping means (5) through a return path after the completion of the capping operation to thereby cause said capping means (5) to correspond to vessels to be transferred next.

FIG.1

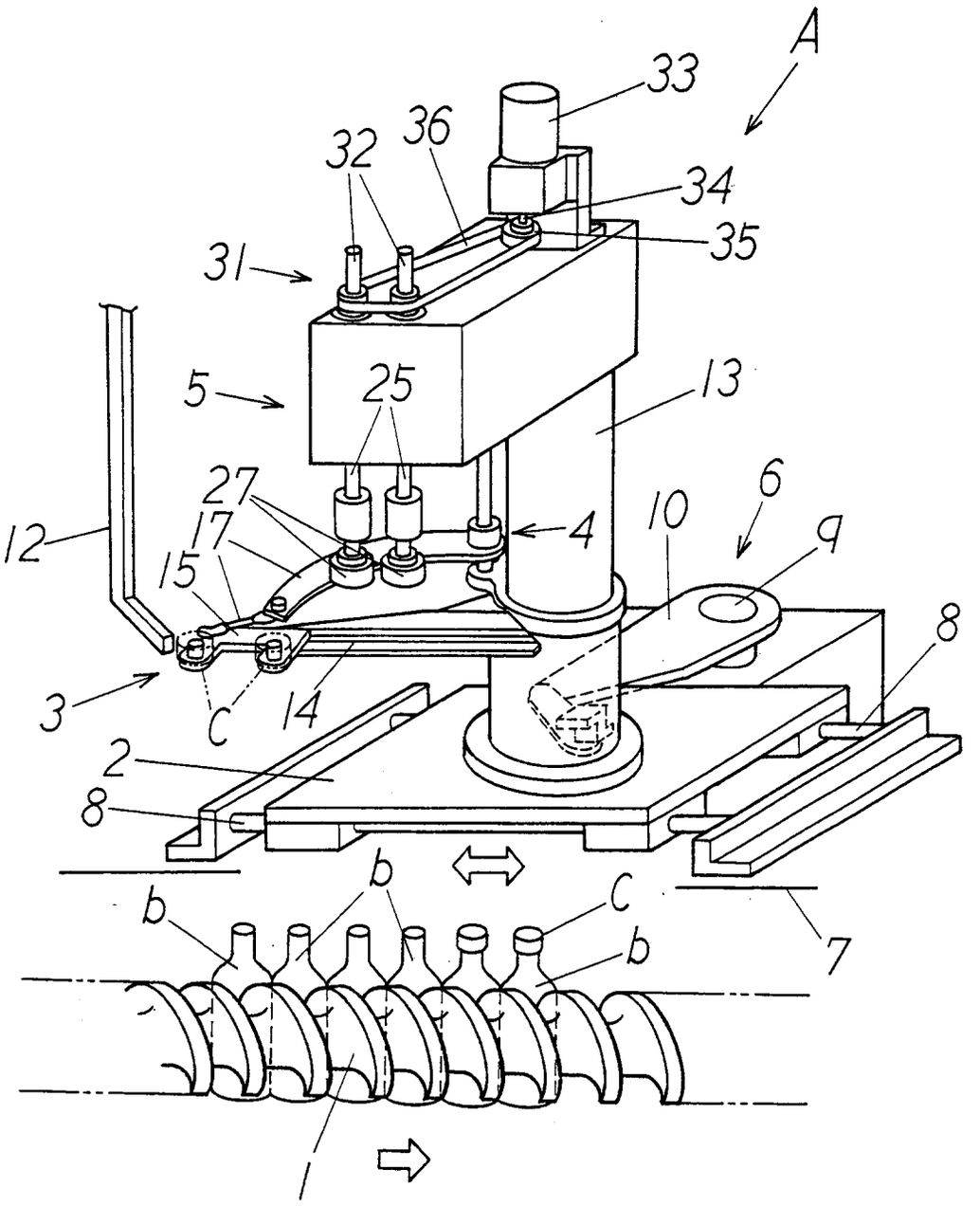

FIG.2

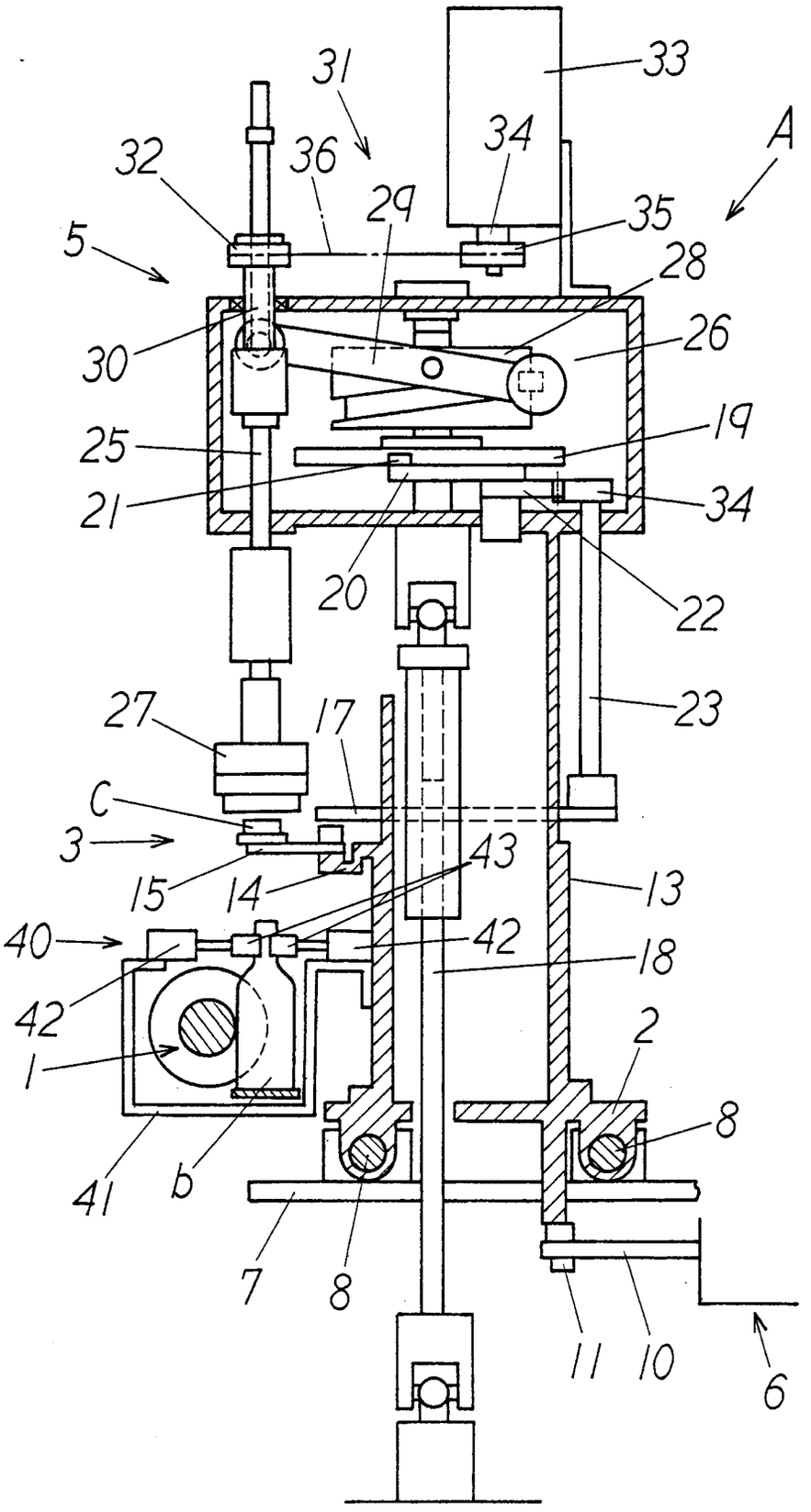
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FIG.3

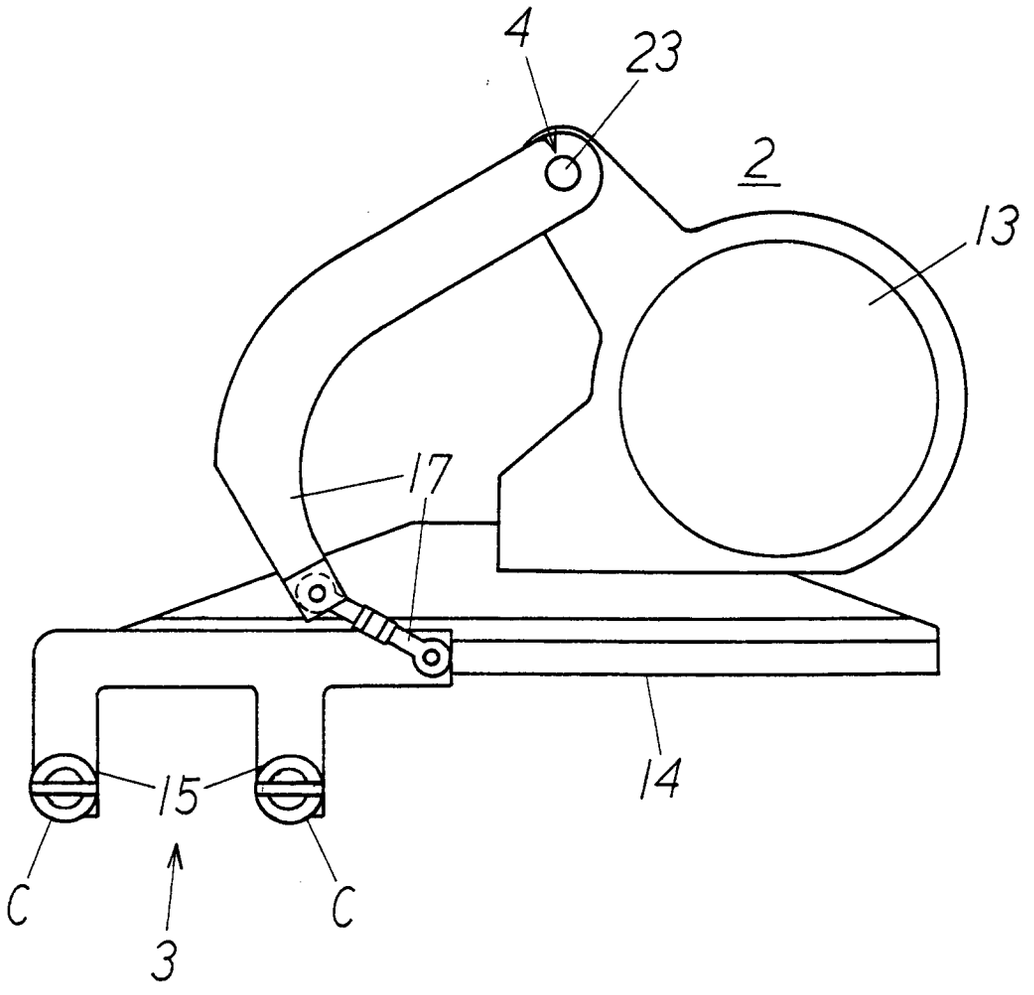
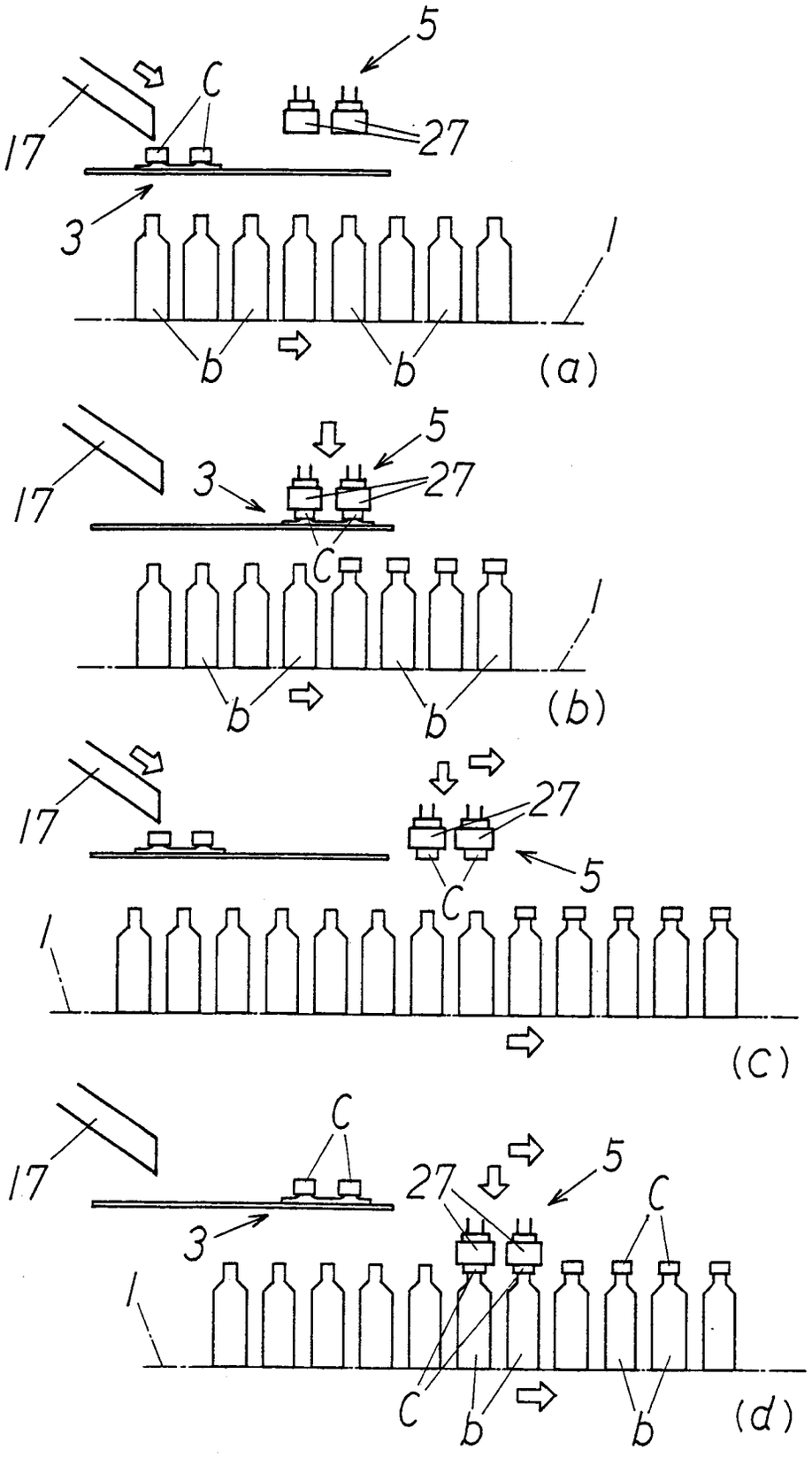


FIG.4



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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 0083

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	FR-A-2 606 006 (COMPAGNIE GENERALE D'AUTOMATISME CGA-HBS) * page 3, line 27 - page 8, line 8 * * figures 1,2 * ---	1-3	B67B3/20 B67B3/00
A	GB-A-2 280 428 (ROBERT BOSCH GMBH) * page 3, line 3 - page 6, line 26 * * figures 1,2 * -----	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B67B B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 August 1996	Smolders, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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