



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**26.08.2020 Bulletin 2020/35**

(51) Int Cl.:  
**B65C 3/22** (2006.01) **B65C 9/06** (2006.01)  
**B67B 5/03** (2006.01)

(21) Application number: **20158561.9**

(22) Date of filing: **20.02.2020**

(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**

(71) Applicant: **PRIMA INDUSTRIES S.r.l.**  
**42015 Correggio (RE) (IT)**

(72) Inventor: **ALBERTI, Silvio**  
**42015 CORREGGIO (IT)**

(74) Representative: **Casadei, Giovanni**  
**Bugnion S.p.A.**  
**Via Vellani Marchi, 20**  
**41124 Modena (IT)**

(30) Priority: **25.02.2019 IT 201900002655**

(54) **DEVICE FOR POSITIONING A CAPSULE ON THE NECK OF A BOTTLE**

(57) A device for positioning a capsule on the neck of a bottle, comprising:

a cup-like element (2), which has a longitudinal axis (X) and is provided with a cavity (21), conformed to house a capsule (C), and a bottom (22);

a suction means, connected to the cup-like element (2) for creating a depression in the cavity (21);

a main body (3), associated with the cup (2), and connected to a motor means, arranged to rotate the main body (3) about an axis of oscillation (Y), perpendicular to the longitudinal axis (X), and to translate the main body (3) on a perpendicular plane to the axis of oscillation (Y).

The cup-like element (2) is connected to a stem (4), concentric to the longitudinal axis (X), which has an internal conduit (41), placed in communication with the cavity (21) of the cup-like element (2), at least a first opening (42) and a second opening (43).

The stem (4) is sealingly inserted in a seat (31) of the main body (3), rotatably about the longitudinal axis (X).

The seat (31) has a toroidal cavity (32), placed in communication with the suction means and with the second opening (43) of the stem (4).

The stem (4) is connected to a rotor (5) for rotation about the longitudinal axis (X).

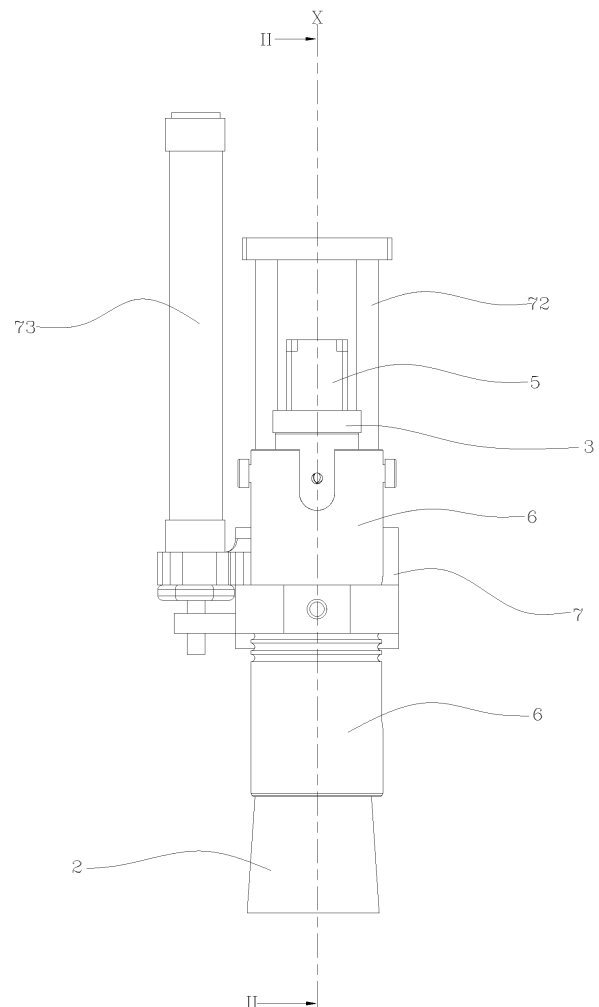


Fig.1

## Description

**[0001]** The present invention relates to a device for positioning a capsule on the neck of a bottle.

**[0002]** It is increasingly necessary to orient the bottle prior to the labelling operations, so that the plane passing through the two closing signs of the mould that forms the bottle creates an angle of about 90° with the plane passing through the centre-line of the label. The same operation is necessary if on the glass of the bottle there is a logo that is to be oriented with respect to the centre-line of the label.

**[0003]** Solutions currently exist that envisage inserting the capsule onto the neck of the bottle without any orientation. Subsequently, a pneumatic device comprising a suction cup lifts the capsule by a few millimetres and rotates it through an angle such as to align it with the bottle in the desired way. This solution has a drawback connected with the fact that, if the ring of the metal cage that retains the cap is not perfectly pressed against the cap itself but projects slightly, the capsule, when it rotates, impacts against it and is ripped, causing the machine to stop.

**[0004]** Solutions are also available in which a cup-like element is used to pick up a capsule. The cup-like element is solidly constrained to a toothed crown that meshes with a second gear moved by a relevant motor which makes the cup rotate about its own axis by an angle necessary to bring a reference notch, provided on the capsule, at a photocell, which detects the presence thereof.

**[0005]** Inside the cup-like element there is a suction cup fixed to a hollow shaft placed in depression, concentric with the cup-like element, conformed to retain the shell of the capsule. Such shaft moves vertically pushing the capsule out of the cup-like element onto the neck of the bottle below. A subsequent blow of air makes the capsule detach from the suction cup.

**[0006]** The solution described is very complex and expensive, especially because of the kinematic mechanism necessary for making the cup-like element rotate and due to the pneumatic circuit necessary to bring the suction cup for picking the capsules into depression.

**[0007]** The aim of the present invention is to offer a solution that makes it possible to overcome the limits and drawbacks of currently available solutions.

**[0008]** Characteristics and advantages of the present invention will more fully emerge from the following detailed description of an embodiment of the invention, as illustrated in a non-limiting example in the accompanying figures, in which:

- figure 1 illustrates a schematic and vertical elevation view of the device according to the present invention;
- figure 2 shows a sectional view of the device of figure 1, on the plane II-II of figure 1;
- figures 3 to 6 schematically show a vertical elevation of some operating stages of the device according to the present invention.

**[0009]** The device (1) for positioning a capsule on the neck of a bottle according to the present invention comprises a cup-like element (2), which has a longitudinal axis (X) and is provided with a cavity (21), conformed to house a capsule (C). The cup-like element (2) is further provided with a bottom (22) positioned at the end of the chamber (21).

**[0010]** A capsule (C) can be inserted into the cavity (21) with the top thereof turned towards the bottom (22).

**[0011]** A suction means, not illustrated in detail as it is known to a person skilled in the art, is connected to the cup-like element (2) for creating a depression in the cavity (21). Through the suction means it is therefore possible to retain a capsule (C) in the cavity (21), also in the event in which the cavity (21) is turned with its bottom (22) upwards. As will be mentioned below, this allows the capsule (C) to be positioned with precision around the longitudinal axis (X) before inserting it onto the neck of the bottle (B).

**[0012]** The cup-like element (2) is associated with a main body (3). The main body (3) is connected to a motor means, known to a person skilled in the art, which is arranged to rotate the main body (3) about an axis of oscillation (Y), perpendicular to the longitudinal axis (X), and to translate the main body (3) on a perpendicular plane to the axis of oscillation (Y).

**[0013]** Through the motor means, the main body (3), and the cup-like element (2) associated therewith, can be moved between a picking position, shown in figure 4, in which the cup (2) can be inserted onto a capsule (C) arranged in a warehouse, for picking the capsule (C) itself, and an alignment position, shown in figure 5, in which the capsule (C) is positioned above a bottle (B), aligned with the neck of the bottle (B) itself, i.e. with the longitudinal axis (X) of the cup (2) substantially aligned with the longitudinal axis of the bottle (B).

**[0014]** In the embodiment shown, which is preferred but not exclusive, the main body (3) is associated with an attachment body (6). The attachment body (6) comprises a first housing (61) into which the cup-like element (2) is at least partially inserted, from the side of the bottom (22). In substance, the cup-like element (2) projects at least partially from the attachment body (6). The attachment body (6) further comprises a second housing (62) into which the main body (3) is inserted.

**[0015]** The position of the main body (3) with respect to the attachment body (6) can be adjusted along the longitudinal axis (X), so as to adjust the portion of the cup-like element (2) that projects from the attachment body (6). This allows the device to be able to adapt to different sized cavities.

**[0016]** The attachment body (6) is associated with the motor means by means of a shaped plate (7). Such shaped plate (7) is rotatable about the axis of oscillation (Y) with respect to the motor means. A rotor, not illustrated as it is known to a person skilled in the art, is associated with the shaped plate (7) to actuate the rotation about the axis of oscillation (Y).

**[0017]** The attachment body (6) is slidable with respect to the shaped plate (7), and therefore with respect to the motor means along the longitudinal axis (X) between the alignment position, in which the cup-like element (2) is distanced from the neck of a bottle (B) (figure 5), and an insertion position, in which the cup-like element (2) is adjacent to the neck of the bottle (B) for inserting a capsule (C) on the neck of the bottle (B) (figure 6). For that purpose, the attachment body (6) is connected to the shaped plate (7) by means of a bracket (71) in turn associated with a guide (72) parallel to the longitudinal axis (X). In the form represented, the guide (72) is in the form of a pair of stems parallel to the longitudinal axis (X). The sliding of the attachment body (6) with respect to the shaped plate (7) is controlled by means of an actuator (73) of the known type, e.g. a pneumatic cylinder.

**[0018]** The motor means cyclically moves the cup-like element between the picking position, shown in figure 4, and the alignment position, shown in figure 5. In the picking position, the cup-like element (2) is inclined upwards, for being turned and aligned with the warehouse (M) of the capsules (C). Obviously, the arrangement and orientation of the warehouse (M) of the capsules could be different from those shown, and in that case also the picking position would be different from the one shown. In the alignment position, the cup-like element (2) is instead oriented vertically and facing downwards. The movement cycle operated by the motor means is known in the state of the art, and shall not be described in further detail. The various actuators responsible for the movements summarised above are governed by a control unit of the known type.

**[0019]** The cup-like element (2) is connected to a stem (4), concentric with the longitudinal axis (X). Advantageously, the stem (4) has an inner conduit (41) placed in communication with the cavity (21) of the cup-like element (2). As will be explained better below, the inner conduit (41) places in communication the suction means with the cavity (21), for producing the depression able to retain a capsule (C).

**[0020]** The inner conduit (41) has a first opening (42), placed on the bottom (22) of the cavity (21). The first opening (42) is substantially placed at an end of the stem (4), and is arranged on a perpendicular plane to the longitudinal axis (X). Starting from the first opening (42), the inner conduit (41) extends along the stem (4) concentrically to the longitudinal axis (X).

**[0021]** The inner conduit (41) is further provided with a second opening (43). Such second opening (43) is arranged transversally to the longitudinal axis (X), i.e. it is arranged on the side surface of the stem (4). Preferably, the second opening (43) is double, i.e. it comprises two openings aligned with one another arranged through the side wall of the stem (4). In other words, the second opening (43) is in a T arrangement with respect to the inner conduit (41). The inner conduit (41) is closed at a second end, opposite the first opening (42).

**[0022]** The stem (4) is sealingly inserted in a seat (31)

of the main body (3), rotatably about the longitudinal axis (X). In the embodiment shown, the seat (31) has two collars (33,34), conformed to house the stem (4) in a precise coupling with very little clearance. The coupling between the stem (4) and the collars (33,34) is defined with clearance such as to allow the rotation of the stem (4) about the longitudinal axis (X), but also to limit any leaks of air to negligible values. For that purpose, the outer surface of the stem (4), in the zones intended for coupling with the collars (33,34), can be rectified, as can the surfaces of the collars (33,34) themselves.

**[0023]** The seat (31) has a toroidal cavity (32), placed in communication with the suction means and with the second opening (43) of the stem (4). In substance, the toroidal cavity (32) surrounds the stem (4) at the portion on which the second opening (43) is located. In this way, the inner conduit (41), through the second opening (43) and the toroidal cavity (32), can be placed in communication with the suction means, to place the cavity (21) of the cup-like element (2) in depression.

**[0024]** The toroidal cavity (32) is delimited by collars (33,34). The precise coupling with little clearance between the stem (4) and the two collars (33,34) maintains the depression in the toroidal chamber (32), and therefore in the cavity (21), at a sufficient value to retain the capsules (C) without needing to provide any further gaskets which, given the continuous rotary movement of the stem (4), would quickly get worn. In the solution according to the invention, the seal between the stem (4) and the collars (33,34) is kept effective and durable over time, thanks to the precise coupling with little clearance.

**[0025]** To maintain the centring between the stem (4) and the collars (33,34) it is possible to arrange one or more bearings (45) arranged concentric to the stem (4). In the embodiment shown, two bearings (45) are used, fitted onto a respective collar (33,34) on the opposite side with respect to the toroidal chamber (32). The bearings are kept in position by means of known elements, e.g. Seeger rings, which further contribute to keeping the stem (4) in position with respect to the sliding along the longitudinal axis (X) with respect to the main body (3).

**[0026]** The stem (4) is connected to a rotor (5) for rotation about the longitudinal axis (X). The rotor (5), in turn, is mounted onto the main body (3), substantially in an opposite position with respect to the cup-like element (2). For example, the rotor (5) is in the form of an electric stepper motor. Thanks to the conformation of the inner conduit (41), which is closed at the opposite end with respect to the first opening (42), the rotor (5) can be directly connected to the stem (4), without the need to use any transmission kinematic mechanism.

**[0027]** The rotor (5) is connected to a control unit, arranged to control the activation of the rotor (5) for a preset angle of rotation. Such control unit is also connected to an angular position sensor, known in the sector, provided to detect a preset angular position, with respect to the longitudinal axis (X), of a capsule (C) inserted into the cup-like element (2). The angular position sensor is for

example an optical sensor, provided to detect and identify an orientation notch which is normally applied to the lower edge of the capsule (C). The angular position sensor is located in a position such as to be able to observe the lower edge of the capsule (C) when the latter is in the alignment position, shown in figure 5. In such position, the control unit activates the rotor (5) to bring the capsule (C) into rotation, by means of the cup-like element (2), up to the angular position in which the orientation notch faces the angular position sensor. In such angular position, the sensor sends the control unit a positive notch detection signal, so that the control unit stops the rotor (5) and the capsule (C) remains in the angular position reached, an angular position in which it is envisaged that the capsule (C) is inserted onto the neck of the bottle (B), activating the attachment body (6) slidingly downwards by means of the actuator (73). In turn, the bottle (B) has been previously oriented in a preset angular position with means and techniques known in the state of the art, e.g. by means of the detection of labels or other markings on the bottle itself.

**[0028]** After the positioning of the capsule (C) on the neck of the relative bottle (B), the cup-like element, by means of the motor means, is brought into the picking position of figure 4, for picking a new capsule (C) and performing a subsequent cycle of alignment operations, as described above.

**[0029]** The device according to the present invention is particularly useful in a machine for labelling bottles.

**[0030]** A machine for labelling bottles is known overall in the sector and will only be described briefly, with reference to figures 3 to 6.

**[0031]** The machine comprises a bottle supplier (101) arranged to translate a plurality of bottles (B) along an advancement direction (A). As is known, the bottles are standing up, i.e. oriented vertically and resting on the bottom. For example, the supplier (101) comprises a movable transport surface, on which the bottles are in a resting arrangement. At the end of the supplier (101) a carousel is arranged, rotating step-by-step about a vertical axis of rotation and provided with a plurality of housings, each of which is configured to house a bottle (B) for one or more rotation steps of the carousel. Between the supplier (101) and the carousel a spacer is arranged, i.e. a device (known in the state of the art) provided to distance the bottles from one another by a step so as to allow the correct supply to the carousel.

**[0032]** A plurality of operating stations are arranged around the carousel, each of which is active on at least one of the angular positions of the carousel for performing an operation on a bottle (B). Such operating stations are known in various forms and functions in the sector, and will not therefore be described in further detail. The figures only depict only the operating station comprising the device according to the present invention, placed at a first angular position of the carousel. At the same angular position of the carousel, or at a previous angular position, the bottle can be oriented angularly in a predefined po-

sition, so that the capsule (C), in turn oriented in the envisaged way by means of the device according to the present invention, is positioned on the neck of the bottle in the predefined angular position.

**[0033]** The possibility to activate in rotation the cup-like element (2) about the longitudinal axis (X), along with the possibility to maintain the depression within the cavity (21) of the cup-like element (2), enables the correct orientation of the capsule (C) to be performed in a single operating station, enabling the overall dimensions of the carousel (2) to be reduced. Furthermore, the orientation of the capsule (C) about the longitudinal axis (X) can be performed maintaining the capsule (C) raised from the neck of the bottle, i.e. before inserting the capsule onto the neck of the bottle. This excludes the risk of damaging the capsule in contact with the cap sealing cage.

## Claims

1. A device for positioning a capsule on the neck of a bottle, comprising:

a cup-like element (2), which has a longitudinal axis (X) and is provided with a cavity (21), conformed to house a capsule (C), and a bottom (22);

a suction means, connected to the cup-like element (2) for creating a depression in the cavity (21);

a main body (3), associated with the cup (2), and connected to a motor means, arranged to rotate the main body (3) about an axis of oscillation (Y), perpendicular to the longitudinal axis (X), and to translate the main body (3) on a perpendicular plane to the axis of oscillation (Y);

## characterised in that:

the cup-like element (2) is connected to a stem (4), concentric to the longitudinal axis (X), which has an internal conduit (41), placed in communication with the cavity (21) of the cup-like element (2), at least a first opening (42) and a second opening (43);

the stem (4) is sealingly inserted in a seat (31) of the main body (3), rotatably about the longitudinal axis (X);

the seat (31) has a toroidal cavity (32), placed in communication with the suction means and with the second opening (43) of the stem (4);

the stem (4) is connected to a rotor (5) for rotation about the longitudinal axis (X).

2. The device according to claim 1, wherein the seat (31) has two collars (33,34), conformed to house the stem (4) in a precise coupling with little clearance, which delimit and isolate the toroidal cavity (32).

3. The device according to claim 1, wherein the rotor (5) is connected to a control unit, arranged to control the activation of the rotor (5) for a preset angle of rotation. 5
4. The device according to claim 3, comprising an angular position sensor, arranged to detect a preset angular position, with respect to the longitudinal axis (X), of a capsule (C) inserted in the cup-like element (2), said angular position sensor being connected to the control unit which activates the rotor (5) for rotating the cup (2) in said preset angular position. 10
5. The device according to one of the preceding claims, wherein the main body (3) is connected to a motor means, arranged to rotate the main body (3) about an axis of oscillation (Y), perpendicular to the longitudinal axis (X), and to translate the main body (3) on a perpendicular plane to the axis of oscillation (Y). 15 20
6. The device according to claim 5, wherein the motor means is arranged to move the main body (3), and the cup-like element (2) associated therewith, between a picking position, in which the cup (2) can be inserted onto a capsule (C) arranged in a warehouse, for picking the capsule (C) itself, and an alignment position, in which the capsule (C) is positioned above a bottle (B), aligned with the neck of the bottle (B) itself, i.e. with the longitudinal axis (X) of the cup (2) substantially aligned with the longitudinal axis of the bottle (B). 25 30
7. The device according to claim 5, wherein the main body (3) is slidable with respect to the motor means along the longitudinal axis (X) between an alignment position, in which the cup-like element (2) is distanced from the neck of a bottle (B), and an insertion position, in which the cup-like element (2) is adjacent to the neck of the bottle (B) for inserting a capsule (C) on the neck of the bottle (B). 35 40
8. 8. A machine for labelling bottles, comprising:
- a bottle supplier (101) arranged to translate a plurality of bottles (B) along an advancement direction (A); 45
  - a carousel, rotating step-by-step about a vertical axis of rotation and provided with a plurality of housings, each of which is configured to house a bottle (B) for one or more rotation steps of the carousel; 50
  - a plurality of operating stations, each of which is active on at least one of the angular positions of the carousel for performing an operation on a bottle (B); 55
- characterised in that** one of said operating stations comprises a device (1) for positioning a capsule on the neck of a bottle according to at

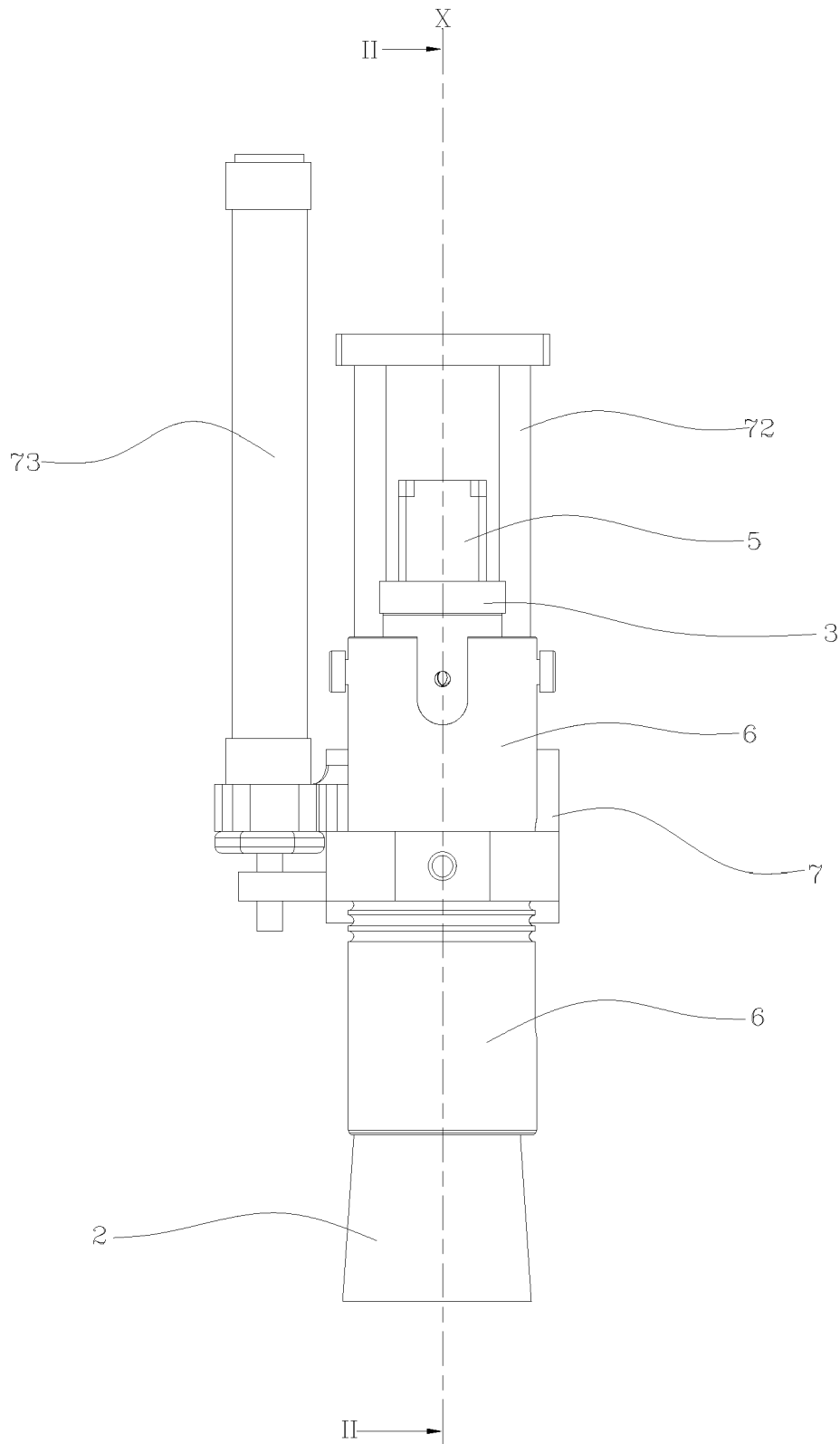


Fig.1

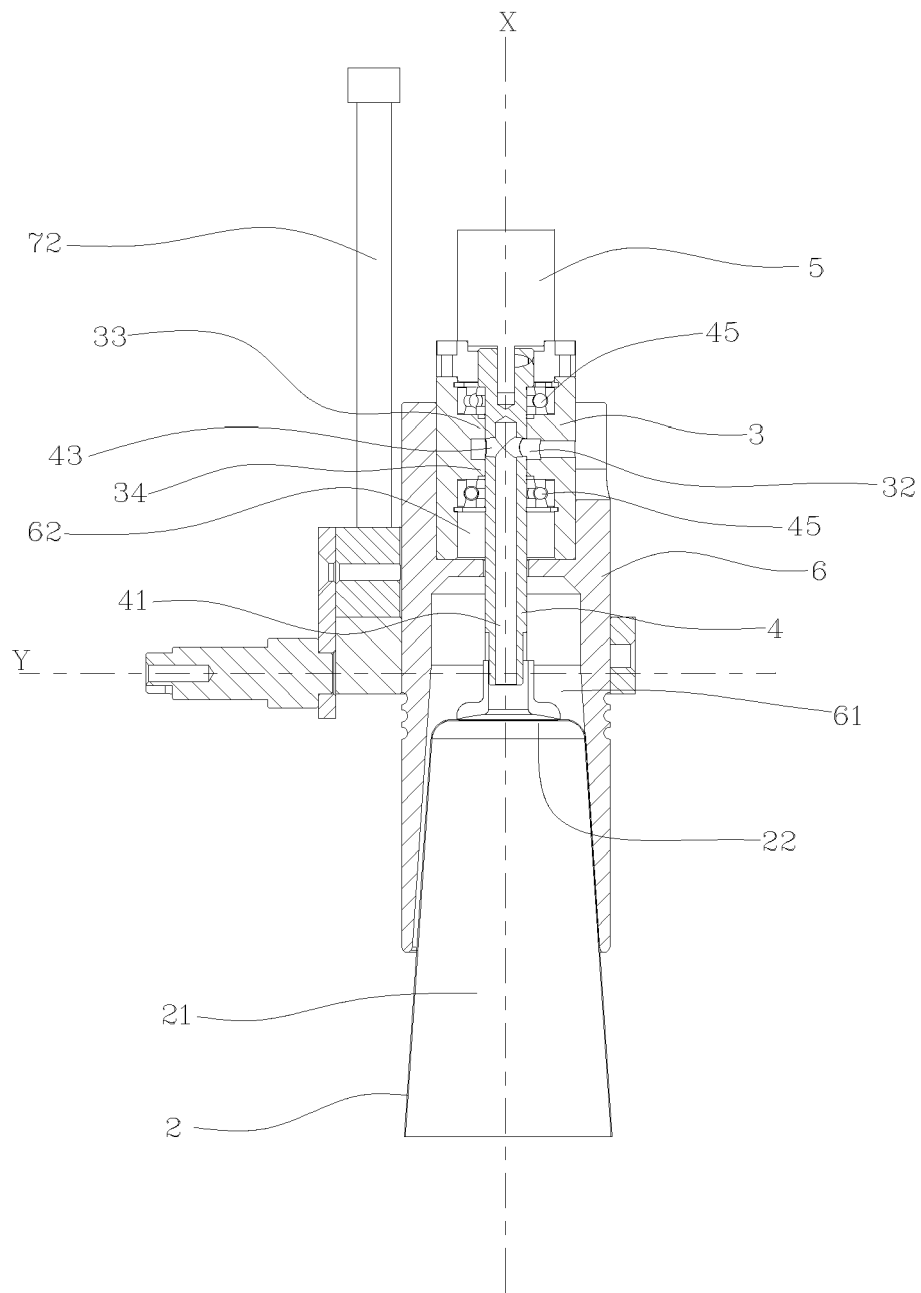


Fig. 2

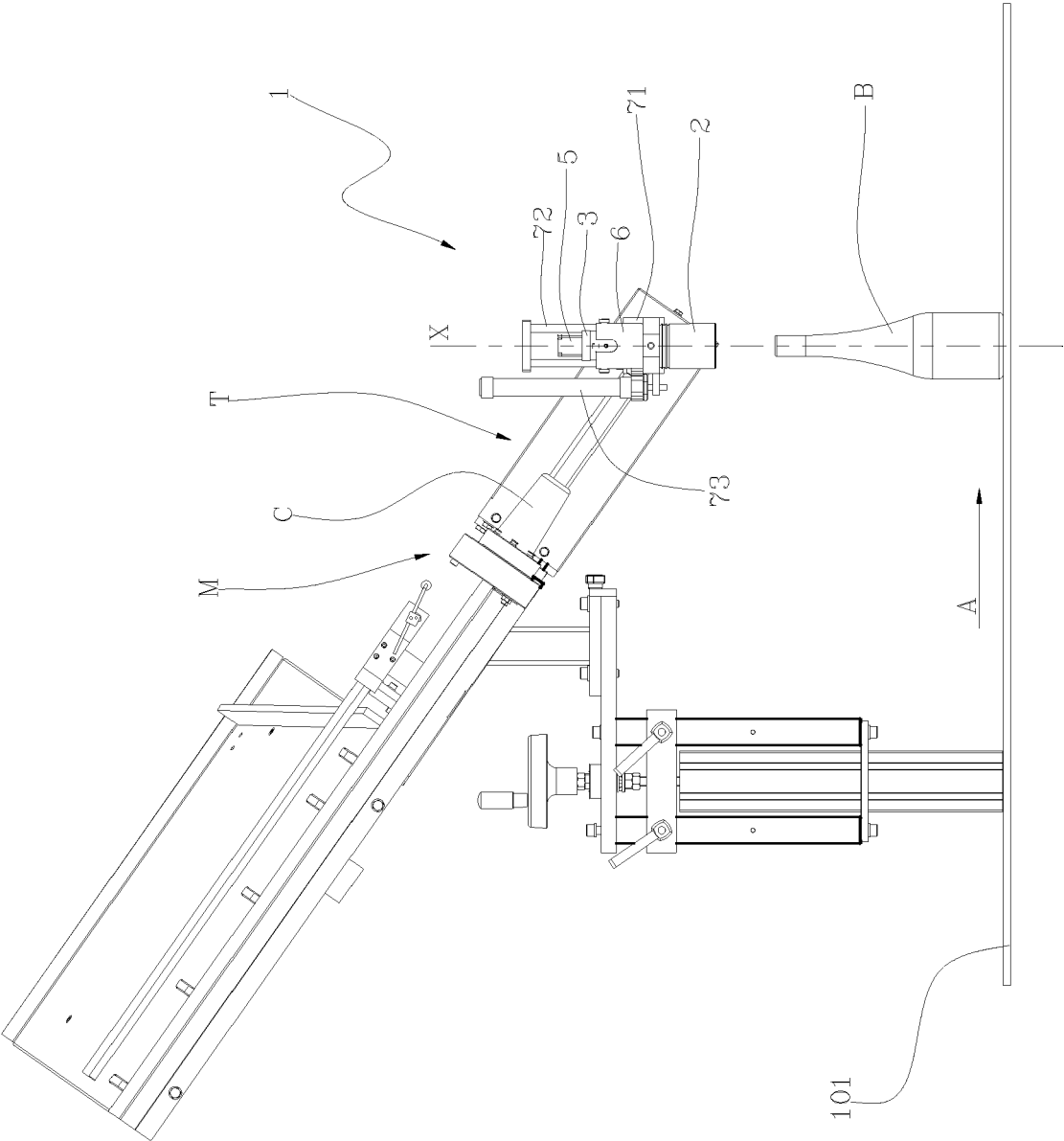


Fig.3



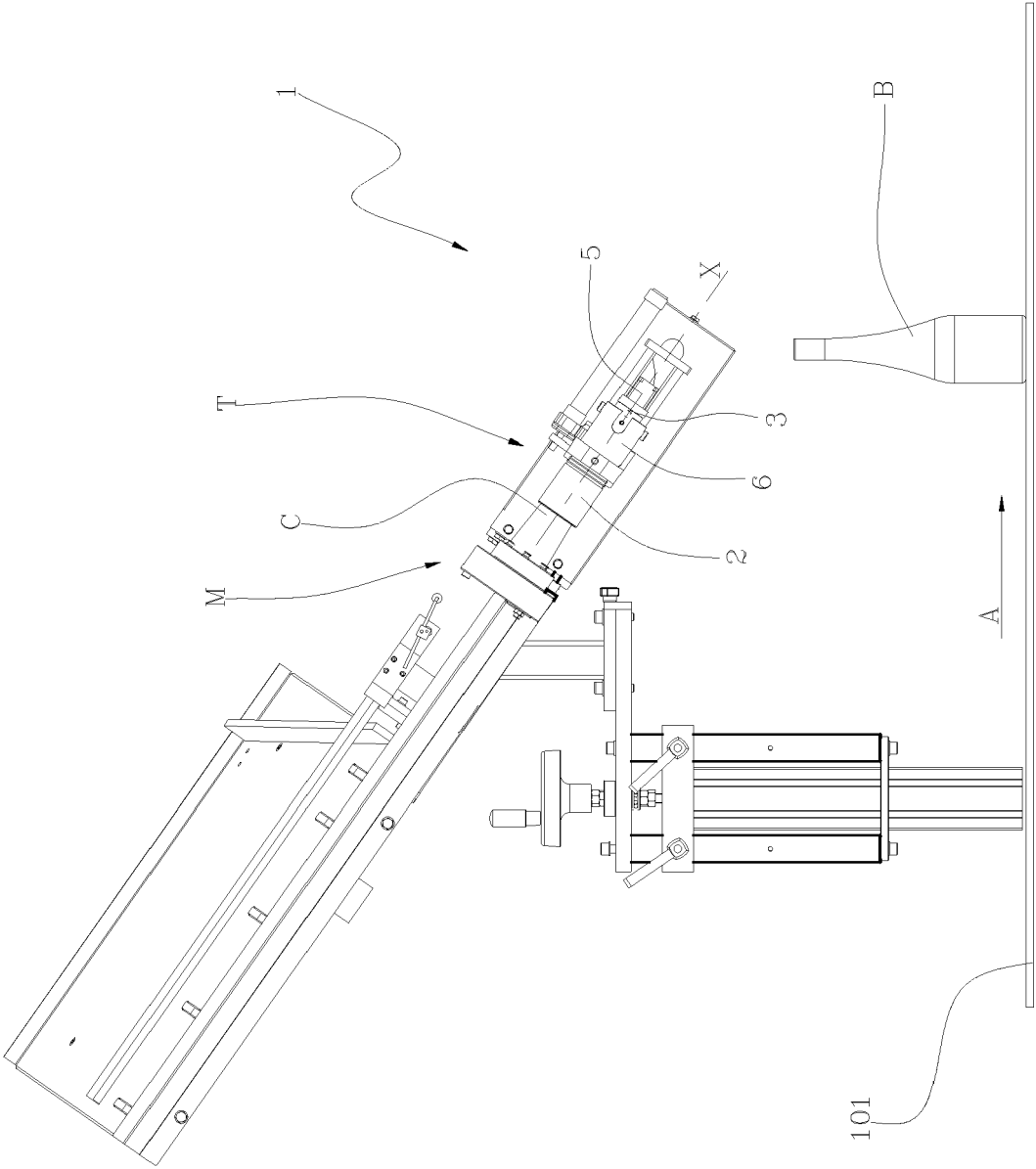


Fig. 4

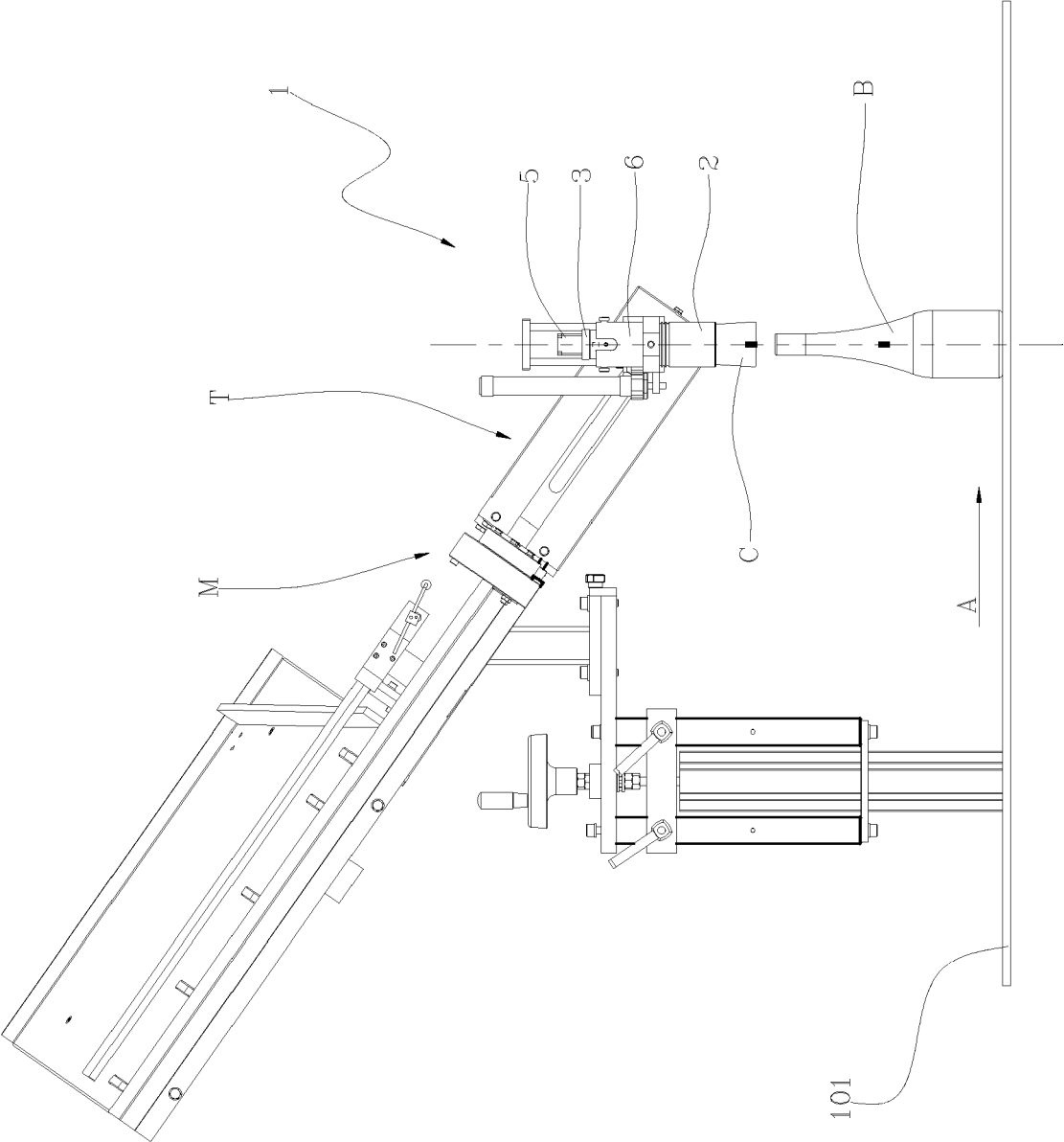
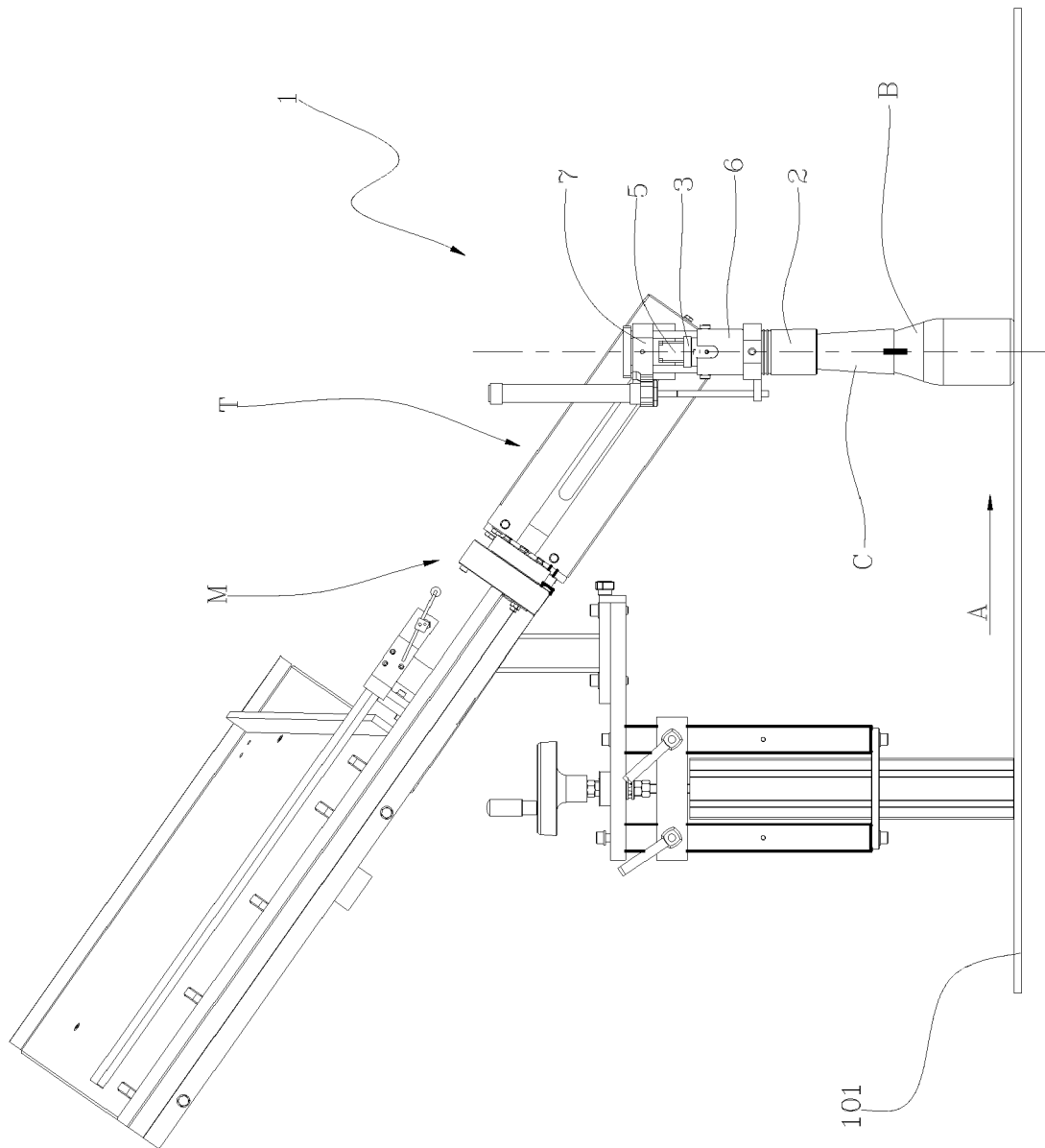


Fig.5



File 6



## EUROPEAN SEARCH REPORT

Application Number  
EP 20 15 8561

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 041 033 A2 (ROBINO & GALANDRINO SPA [IT]) 4 October 2000 (2000-10-04) * figures 6-11 * * paragraphs [0021] - [0025]; claims 6-13 *	1-8	INV. B65C3/22 B65C9/06 B67B5/03
Y	FR 1 182 515 A (OWENS ILLINOIS GLASS CO) 25 June 1959 (1959-06-25) * figure 3 * * page 3, left-hand column, lines 12-56 *	1-8	
Y	EP 2 492 238 A1 (UHLMANN PAC SYSTEME GMBH & CO [DE]) 29 August 2012 (2012-08-29) * figure 1 * * paragraphs [0022] - [0027] *	1-8	
A	EP 2 733 112 A1 (ROBINO & GALANDRINO SPA [IT]) 21 May 2014 (2014-05-21) * figures 1-10 * * paragraphs [0014] - [0034] *	1-8	
A	EP 1 038 827 A1 (SCHNEIDER PH DRAHT & METALLFAB [DE]) 27 September 2000 (2000-09-27) * figure 11 * * paragraphs [0022] - [0026] *	1-8	TECHNICAL FIELDS SEARCHED (IPC) B65C B67B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 March 2020	Examiner Pardo Torre, 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 20 15 8561

5

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.

19-03-2020

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1041033 A2	04-10-2000	AT 316510 T EP 1041033 A2 IT T0990250 A1	15-02-2006 04-10-2000 02-10-2000
FR 1182515 A	25-06-1959	NONE	
EP 2492238 A1	29-08-2012	NONE	
EP 2733112 A1	21-05-2014	EP 2733112 A1 ES 2569197 T3	21-05-2014 09-05-2016
EP 1038827 A1	27-09-2000	AT 228098 T DE 19912534 C1 EP 1038827 A1 ES 2187405 T3	15-12-2002 27-07-2000 27-09-2000 16-06-2003

15

20

25

30

35

40

45

50

55

EPO FORM P0459

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