



(43) International Publication Date
17 November 2016 (17.11.2016)

- (51) International Patent Classification:
B21D 51/44 (2006.01) *B65D 55/06* (2006.01)
- (21) International Application Number:
PCT/IB2016/052665
- (22) International Filing Date:
10 May 2016 (10.05.2016)
- (25) Filing Language: Italian
- (26) Publication Language: English
- (30) Priority Data:
102015000014711 12 May 2015 (12.05.2015) IT
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- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

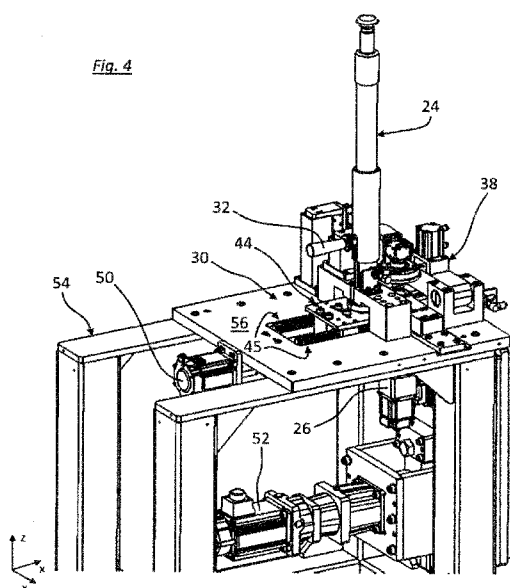
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

(54) Title: PROCESS AND MACHINERY FOR ORIENTING AND FORMING A PLATE FOR CORK CAGE



(57) Abstract: The process for orienting and forming a plate (2), preferably a metal one, for a cork cage comprises the following steps: detecting the orientation of a plate (2); comparing the detected orientation with a predefined orientation; if the orientation of the plate (2) differs from the predefined orientation, turning the plate (2) so that it will take the predefined orientation; impressing on the plate (2) a substantially cap-like shape having a plurality of recesses (4) at the edge (6) for housing the wires or legs (8) of a cork cage.

TITLE: "Process and machinery for orienting and forming a plate for a cork cage"

DESCRIPTION

5 Technical field

The present invention relates to a process and a machinery for orienting and forming a plate for a cage of a cork to be installed on a bottle. In particular, the cork is of the type generally used for closing bottles of champagne and sparkling wine.

Background art

It is known in the art to make cages for bottle corks, which cages include a cap, typically a metal one, having a plurality of slots on the edge for housing a metal grid. The grid and the cap house the cork, e.g. made of natural cork, and secure it to the neck of a bottle. The grid is secured to the neck of the bottle in order to hold the cork in said neck preventing it from undesirably coming out under the pressure of the gas developed by the beverage within the bottle. A typical example is represented by corks for bottles of champagne and sparkling wine. Often the cap has a logo and/or a writing that identifies the beverage producer. The cap is generally made by starting from a plate on which a cap-like shape is impressed for housing the cork, with slots at the edge for housing the grid.

This known process for the production of cages, however, suffers from a few drawbacks.

One drawback is that the plates on which the logo or writing is impressed are currently inserted into a press with a random orientation. Therefore, after the pressing of the plate, the logo on the cap will have a random

orientation with respect to the slots on the cap edge, and hence with respect to the metal grid. It follows that, when a batch of cork cages is produced, the cages will have an untidy appearance, since the logo on the cap of each cage will be oriented differently with respect to the grid.

Summary of the invention

It is one object of the present invention to provide a machinery and a process which can overcome this and other drawbacks of the prior art, while at the same time being simple and economical to manufacture.

In particular, it is one object of the present invention to provide the possibility of orienting a plate correctly before forming it.

According to the present invention, this and other objects are achieved through a process and a machinery for orienting and forming a plate for a cork cage having the features set out in the appended independent claim.

It is to be understood that the appended claims are an integral part of the technical teachings provided in the following detailed description of the invention. In particular, the appended dependent claims define some preferred embodiments of the present invention, which include some optional technical features.

Brief description of the drawings

Further features and advantages of the present invention will become apparent from the following detailed description, which is supplied by way of non-limiting example with particular reference to the annexed drawings, wherein:

- Figure 1 is a front view of a cage associated with a cap-shaped plate;
- Figure 2 is a perspective view of the plate shown in

Figure 2;

- Figures 3a and 3b are plan views of a plate with a logo, having different orientations;
- Figure 4 is a perspective view of the machinery according to a variant of the invention;
- Figure 5 is a sectional view of the machinery according to a variant of the invention;
- Figure 6 is a perspective view of some details of the machinery according to a variant of the invention.

10 Detailed description of the invention

In accordance with the present invention, the process for orienting and forming a plate, preferably a metal one, for a cork cage comprises the following steps:

- detecting the orientation of a plate 2;
- 15 - comparing the detected orientation with a predefined orientation;
- if the orientation of plate 2 differs from the predefined orientation, turning plate 2 so that it will take the predefined orientation;
- 20 - impressing on plate 2 a substantially cap-like shape having a plurality of recesses or slots 4 at edge 6 for housing wires or legs 8 of a cork cage.

Preferably, the step of detecting the orientation is carried out by detecting a distinctive mark 10, such as a piece of writing or logo, on a face of plate 2. The expression "piece of writing or logo" comprises any distinctive mark, in particular any graphic element, on plate 2 (in particular on a face of plate 2) and may be, for example, the trademark of the beverage producer. Merely
30 by way of example, Figures 3a, 3b show a plate 2 prior to processing, which in particular has a circular, flat shape.

For example, plate 2 shown in Figure 3a is oriented

correctly (piece of writing 10 is horizontal), whereas plate 2 shown in Figure 3b is oriented incorrectly (piece of writing 10 is oblique). Therefore, the orientation of Figure 3a can be set as a predefined orientation. If plate 2, which needs to be processed for making the cage assembly, is oriented according to the predefined orientation (horizontal piece of writing or logo 10), it will not be turned, and the next step of impressing on plate 2 a substantially cap-like shape with a plurality of recesses 4 on edge 6 will be carried out (also referred to as "forming step"). On the contrary, if plate 2 is oriented differently from the predefined orientation, plate 2 will be turned in order to give it the predefined orientation, and then the forming step will be carried out. Thanks to this process, piece of writing or logo 10 will have a precise and constant orientation with respect to recesses 4 formed on edge 6 of plates 2 (see Fig. 2).

Plates 2 used for making cork cages are preferably made of metal. Conveniently, before being given the cap-like shape, plates 2 have a substantially circular and flat shape.

With reference to the particular machinery illustrated in the drawings, the process comprises the steps of:

- placing plate 2 at a first unit where the following steps are carried out: detecting the orientation of said plate 2 and, if the orientation of plate 2 differs from the predefined orientation, turning plate 2 so that it will take the predefined orientation;
- moving plate 2 towards a forming unit for carrying out the step of impressing on plate 2 a substantially cap-like shape having a plurality of recesses 4 on edge 6.

In other words, in the first unit the orientation of

plate 2 is checked, possibly followed by the turning of the latter.

Preferably, the process comprises the steps of:

- creating a flow of plates 2 entering the first unit;
- 5 - creating a flow of plates 2 exiting the forming unit.

Conveniently, the process further comprises the steps of:

- prearranging a plate accumulation unit 24 for creating the flow of plates 2 entering the first unit;
- 10 - moving plates 2 towards the first unit.

According to a further variant of the invention, plate 2 can be moved between: a first unit, wherein the orientation of plate 2 is detected; a second unit, wherein plate 2 is turned, if necessary; and the forming unit.

- 15 The process of the invention is conveniently carried out by means of a machinery as described below and as illustrated by way of example in the drawings.

According to the invention, the machinery for orienting and forming a plate for a cork cage comprises:

- 20 - a forming unit for impressing on plate 2 a substantially cap-like shape having a plurality of recesses 4 on edge 6 for housing wires or legs 8 of a cork cage;
- detection means for detecting the orientation of plate 2;
- 25 - a control unit capable of comparing the detected orientation of plate 2 with a predefined orientation;
- a rotary system 26 for turning plate 2.

- 30 The detection means are adapted to detect a distinctive mark, preferably an image. Said detection means are, conveniently, image detection means, and preferably comprise a video camera 28; as an alternative, a photo camera or other *per se* known image detection means may be

used.

In one possible alternative embodiment, said detection means are adapted to detect a distinctive mark in the form of an electromagnetic signal emitted by plate 2, e.g. via magnetic paint. In such an embodiment, said detection means are electromagnetic sensors.

Advantageously, the detection means (in this example, video camera 28) and rotary system 26 belong to the first unit mentioned in the above-described process.

The machinery comprises a handling system 30 for handling plate 2.

Advantageously, the machinery comprises a plate accumulation unit 24 for containing a plurality of plates 2 directed towards the image detection means. In the illustrated example, said plate accumulation unit 24 is a substantially tubular container inside of which the plates that will have to be processed by the machinery are stacked. Said plate accumulation unit 24 is arranged in a substantially vertical position, and advantageously comprises a stop lever 32. By using stop lever 32, the user can allow/stop the flow of plates towards the lower part of plate accumulation unit 24 and then towards the image detection means. In general, handling system 30 can move the plates between: the image detection means; rotary system 26; the forming unit; and plate accumulation unit 24 (if present).

In the preferred example illustrated herein, rotary system 26 includes a gripping portion 34 capable of selectively holding (i.e. capable of holding or releasing) plate 2. Gripping portion 34 may comprise, for example, a magnet, or a suction cup, or an aspirating element.

The forming unit comprises a punch 36 susceptible of

moving for taking plate 2 and pushing it against a die 38, in order to give said plate 2 the desired cap-like shape with recesses 4 on edge 6.

Figure 6 shows a particular embodiment of handling system 30, which comprises a mobile portion 44 susceptible of translating, preferably in an alternate straight motion. In particular, the mobile portion includes: a first cavity 40, a second cavity 42, and a retaining zone 43 capable of receiving and retaining plate 2. In particular, cavities 40, 42 have a substantially circular shape, so that they can receive a circular plate 2; further different shapes may however be chosen. Such cavities 40, 42 are formed in mobile portion 44, in particular in the top face thereof. In the particular variant illustrated herein, mobile portion 44 has a substantially plate-like, e.g. parallelepiped, shape, the thickness of which is much smaller than the other two dimensions of mobile portion 44. Conveniently, handling system 30 further comprises a pair of gripping arms 46, located near retaining zone 43. Gripping arms 46 are movable and can hold and release plate 2 for expelling it from the machinery. As an alternative to gripping arms 46, other gripping elements may be used which are capable of holding and releasing plate 2.

Optionally, handling system 30 comprises a plurality of openings, and the machinery is provided with suction means for sucking air through said plurality of openings, so as to retain plate 2 more effectively while handling it. In particular, in the first cavity and second cavity there is a respective plurality of openings, through which the suction means can suck air.

With reference to Figures 4 and 6, mobile portion 44 is slidable relative to a support element via a system of

guides 45. In particular, the support element is a support plate 56.

Preferably, handling system 30 allows feeding plates 2 according to a pilgrim process, in other words handling system 30 operates as a "pilgrim process conveyor".

Because of the alternate motion of mobile portion 44, the first cavity 40 can move between plate accumulation unit 24 and the area where video camera 28 and rotary system 26 are located. On the contrary, the second cavity 42 can move between the area where video camera 28 and rotary system 26 are located and the forming unit.

Handling system 30 is adapted to move plates 2 from image detection means 28 and from rotary system 26 towards the forming unit. Preferably, handling system 30 takes plates 2 coming from plate accumulation unit 24, in particular by receiving them into the first cavity 40, and then carries them towards video camera 28 and rotary system 26, after which it carries them towards the forming unit. According to further variants, handling system 30 comprises, for example, a robot or a mechanical arm.

Advantageously, a jig or template 48 is arranged in proximity to video camera 28 (in general, in proximity to the detection means) and rotary system 26, which is useful for centering plate 2 in position while turning it. In particular, jig 48 is interposed between detection means 28 and handling system 30. As an alternative, the jig 48 may be associated with handling system 30.

Advantageously, the machinery includes drive means for operating at least one of: handling system 30, rotary system 26, the forming unit. Such drive means may include, for example, an electric motor. In particular, a first motor 50 operates handling system 30. A second motor 52

operates punch 36 and rotary system 26. *Per se* known transmission means may be comprised to allow the mechanical force to be transferred from the drive means to the various components of the machinery. Advantageously, the control
5 unit governs and controls the operation of motors 50, 52.

The machinery advantageously comprises a frame 54 to which the various components are removably constrained. With reference to the illustrated variant, support plate 56, to which video camera 28, plate accumulation unit 24,
10 die 38 and handling system 30 are (removably) secured, is fastened to the upper part of frame 54.

With reference to Figure 5, the detection means, in particular the image detection means (video camera 28), are located in a position opposite to rotary system 26 with
15 respect to handling system 30. Die 38 is located in a position opposite to punch 36 with respect to handling system 30.

By way of example, it will be described the operation of the machinery with reference to the preferred embodiment
20 illustrated herein.

After having received plate 2, coming from plate accumulation unit 24, into the first cavity 40, mobile portion 44 advances by a predetermined quantity to bring plate 2 into a position under the video camera 28. Video
25 camera 28 detects the image of logo or piece of writing 10 on plate 2, and the control unit compares the detected orientation of plate 2 with the predefined orientation and sends the data for effecting the turning operation, if necessary. At this point, rotary system 26 (located under
30 video camera 28) rises, it takes plate 2, raises it, and it inserts it into jig 48, and, if plate 2 needs to be turned, it arranges it according to the predefined orientation.

Meanwhile, mobile portion 44 moves back and then rotary system 26 goes down to position plate 2 (correctly oriented) into the second cavity 42; at the same time, a second plate 2 can be deposited into the first cavity 40, which is now empty. Afterwards, mobile portion 44 advances to bring plate 2 into the forming unit, where punch 36 rises, takes plate 2 and joins die 38 in order to give plate 2 the desired shape; meanwhile, the second plate 2 is brought into a position under video camera 28. Once plate 2 has been formed, mobile portion 44 moves back, punch 36 goes down and lays cap-shaped plate 2 in retaining zone 43; at the same time, the second plate 2 is placed into the second cavity 42, while a third plate 2, coming from plate accumulation unit 24, is received into the first cavity 40.

The machinery can thus work simultaneously on a plurality of plates.

Rotary system 26 can move transversally to handling system 30 (in particular, to mobile portion 44) in order to remove the plate from the first cavity 40 and then place it into the second cavity 42. For example, rotary system 26 may comprise a respective actuator, particularly a linear actuator, for moving a contact portion, preferably gripping portion 34, for holding plate 2. In this manner, rotary system 26 can both rotate and move the plate 2.

Also punch 36 can move transversally to handling system 30 to abut on die 38 and form in this way the plate.

Advantageously, the motion of handling system 30 is coordinated with that of punch 36, e.g. by means of a mechanical transmission or via the control unit. Likewise, also the rising and descending motions of rotary system 26 may be coordinated with that of handling system 30.

With particular reference to Figure 6, mobile portion

44 includes a slot 58 connecting the first cavity 40, the second cavity 42 and retaining zone 43. Slot 58 allows the translational motion of mobile portion 44 and also the transversal motion of rotary system 26 and/or of punch 36, 5 which can cross said mobile portion 44.

Of course, without prejudice to the principle of the invention, the embodiments and the implementation details may be extensively varied from those described and illustrated herein by way of non-limiting example, without 10 however departing from the scope of the invention as set out in the appended claims.

CLAIMS

1. Process for orienting and forming a plate (2), preferably a metal one, for a cork cage, comprising the following steps:

- 5 - detecting the orientation of a plate (2);
- comparing the detected orientation with a predefined orientation;
- if the orientation of said plate (2) differs from said predefined orientation, turning said plate (2) so that it
10 will take said predefined orientation;
- impressing on said plate (2) a substantially cap-like shape having a plurality of recesses (4) on the edge (6) for housing the wires or legs (8) of a cork cage.

2. Process according to claim 1, wherein the step of
15 detecting the orientation is carried out by detecting a distinctive mark (10) on a face of said plate (2).

3. Process according to claim 1 or 2, comprising the steps of:

- placing said plate (2) at a first unit where the
20 following steps are carried out: detecting the orientation of said plate (2) and, if the orientation of said plate (2) differs from said predefined orientation, turning said plate (2) so that it will take said predefined orientation;
- moving said plate (2) towards a forming unit for
25 carrying out the step of impressing on said plate (2) a substantially cap-like shape having a plurality of recesses (4) at the edge (6).

4. Process according to claim 3, comprising the steps of:

- creating a flow of plates (2) entering said first
30 unit;
- creating a flow of plates (2) exiting said forming unit.

5. Process according to claim 4, comprising the steps of:
- prearranging a plate accumulation unit (24) for creating said flow of plates (2) entering said first unit;
- moving said plates (2) towards said first unit.

5 6. Machinery for orienting and forming a plate (2) for a cork cage, comprising a forming unit for impressing on a plate (2) a substantially cap-like shape having a plurality of recesses (4) on the edge (6) for housing the wires or legs (8) of a cork cage;

10 characterized in that it comprises:

- detection means (28) for detecting the orientation of said plate (2);

- a control unit capable of comparing the detected orientation of said plate (2) with a predefined
15 orientation;

- a rotary system (26) for turning said plate (2).

7. Machinery according to claim 6, wherein said detection means (28) are image detection means.

8. Machinery according to claim 6 or 7, comprising a
20 handling system (30) capable of moving the plates (2) between:

- said detection means (28);

- said rotary system (26);

- said forming unit.

25 9. Machinery according to claim 8, wherein said handling system (30) includes a mobile portion (44) susceptible of moving in an alternate straight motion.

10. Machinery according to claim 9, wherein said mobile portion (44) includes: a first cavity (40), a second cavity
30 (42), and a retaining zone (43) capable of receiving and retaining the plate (2).

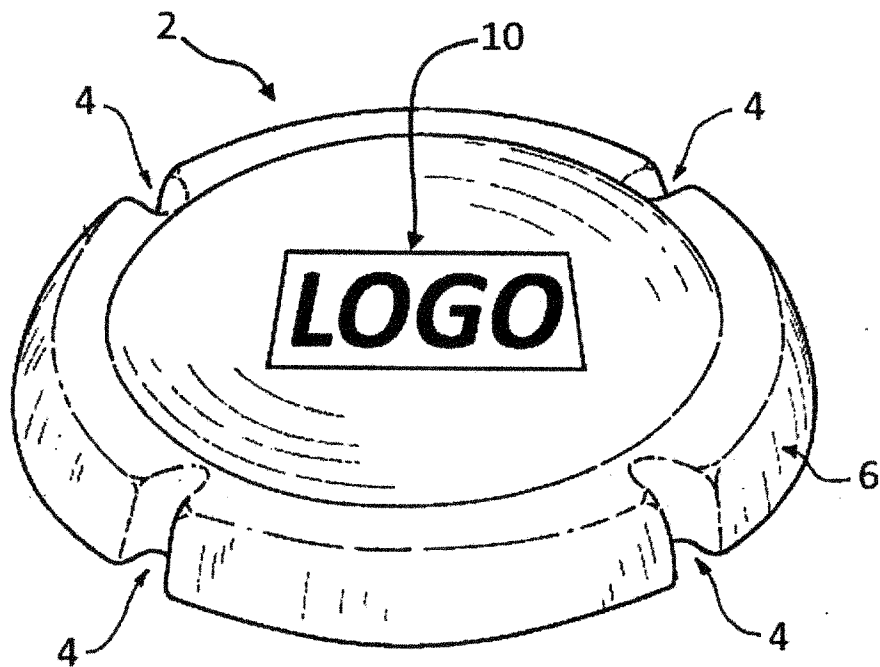
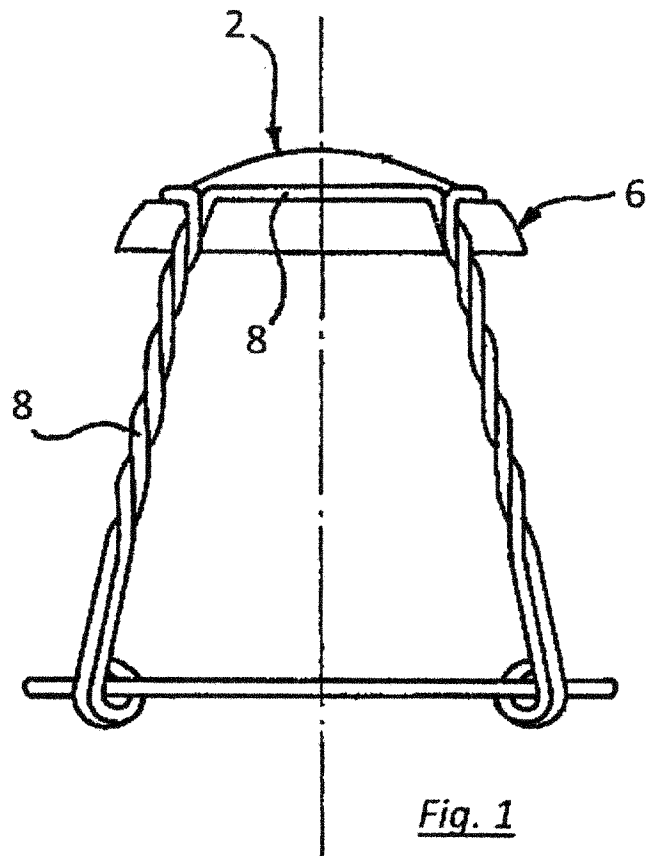
11. Machinery according to claim 10, wherein in said first

cavity (40) and said second cavity (42) there is a respective plurality of openings, through which suction means can suck air.

12. Machinery according to any one of claims 6 to 11,
5 wherein said rotary system (26) includes a gripping portion (34) capable of selectively holding the plate (2).

13. Machinery according to any one of claims 6 to 12,
wherein said detection means (28) are located in a position
opposite to said rotary system (26) relative to said
10 handling system (30).

14. Machinery according to any one of claims 6 to 13,
comprising a jig (48) located in proximity to said
detection means (28) and said rotary system (26), which is
useful for centering the plate (2) in position while
15 turning it.



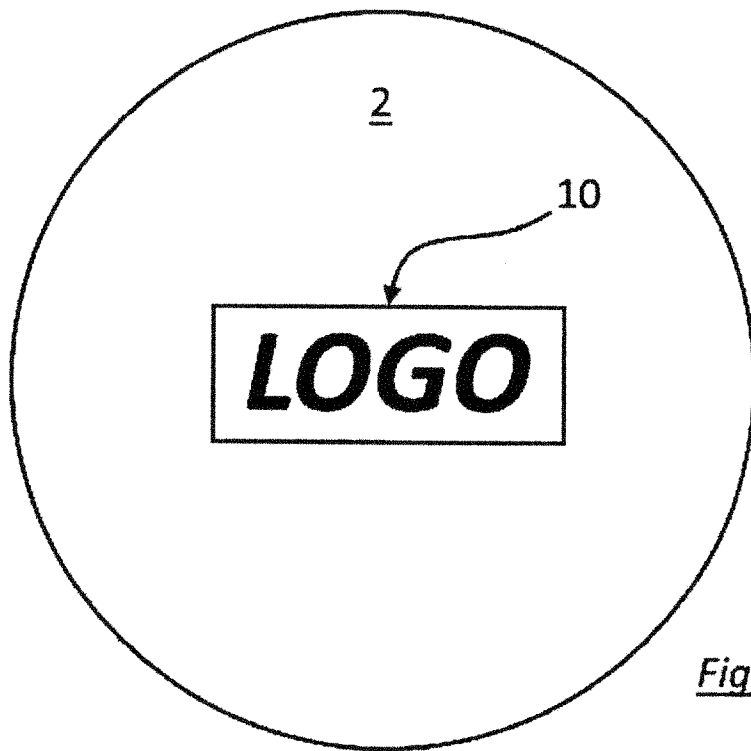


Fig. 3a

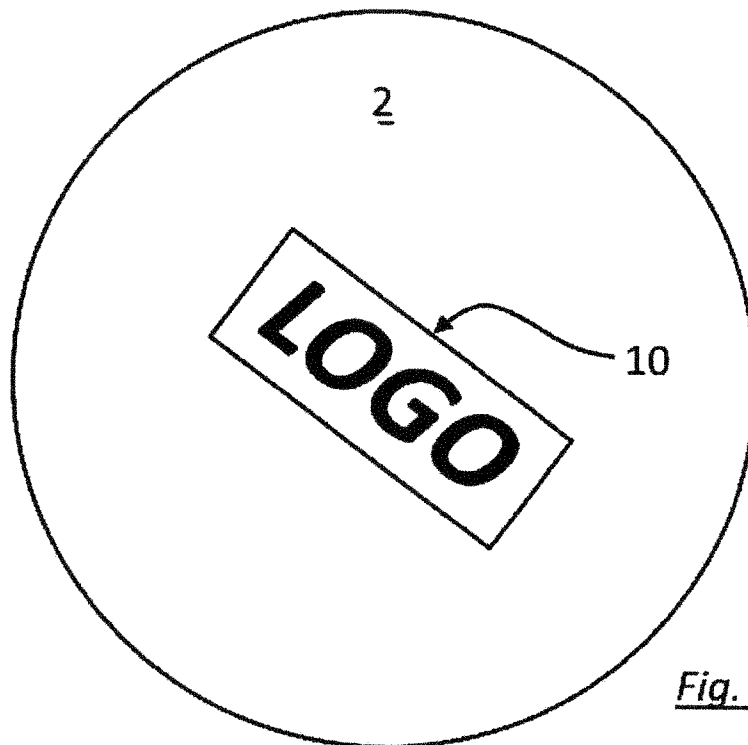
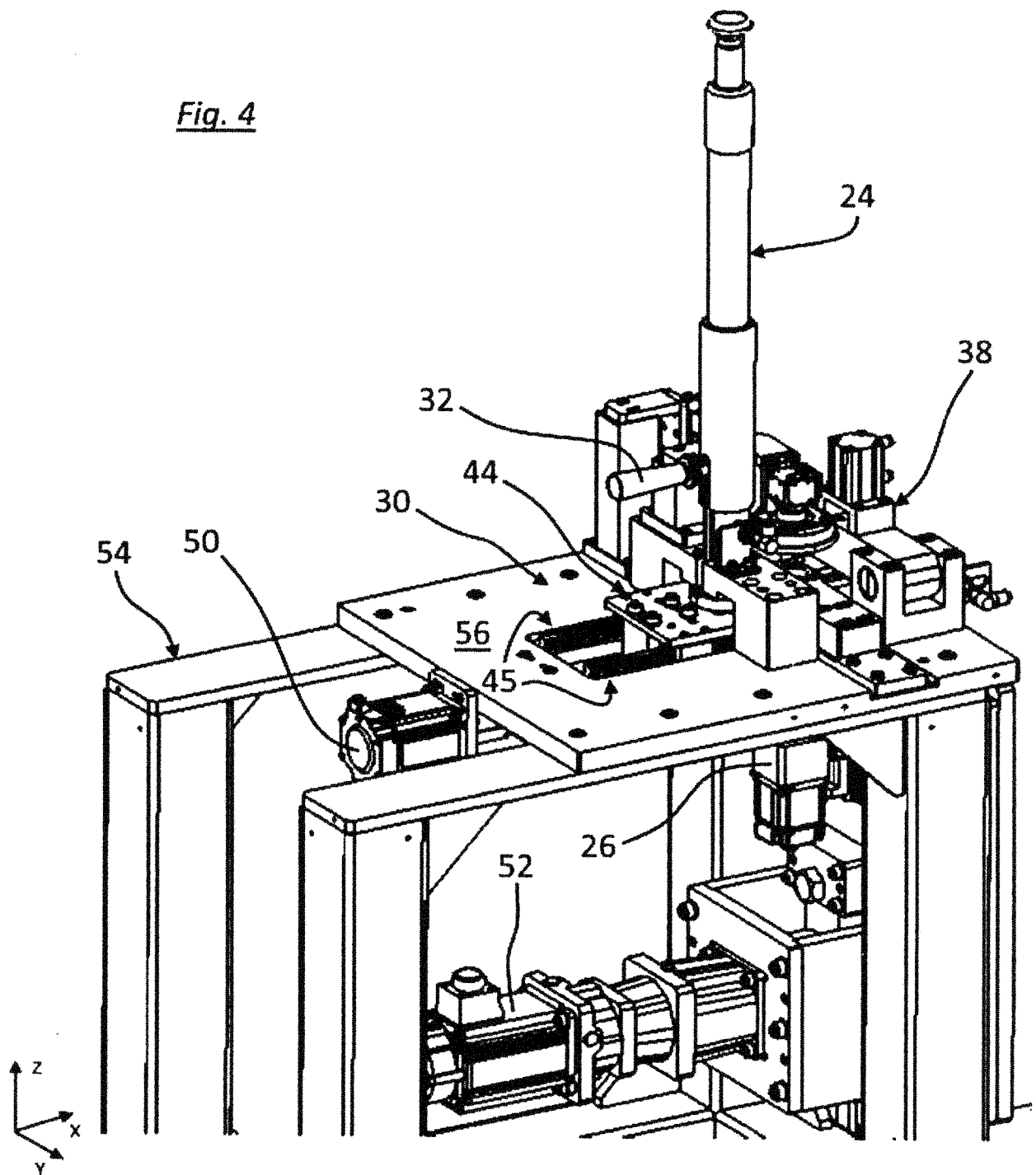
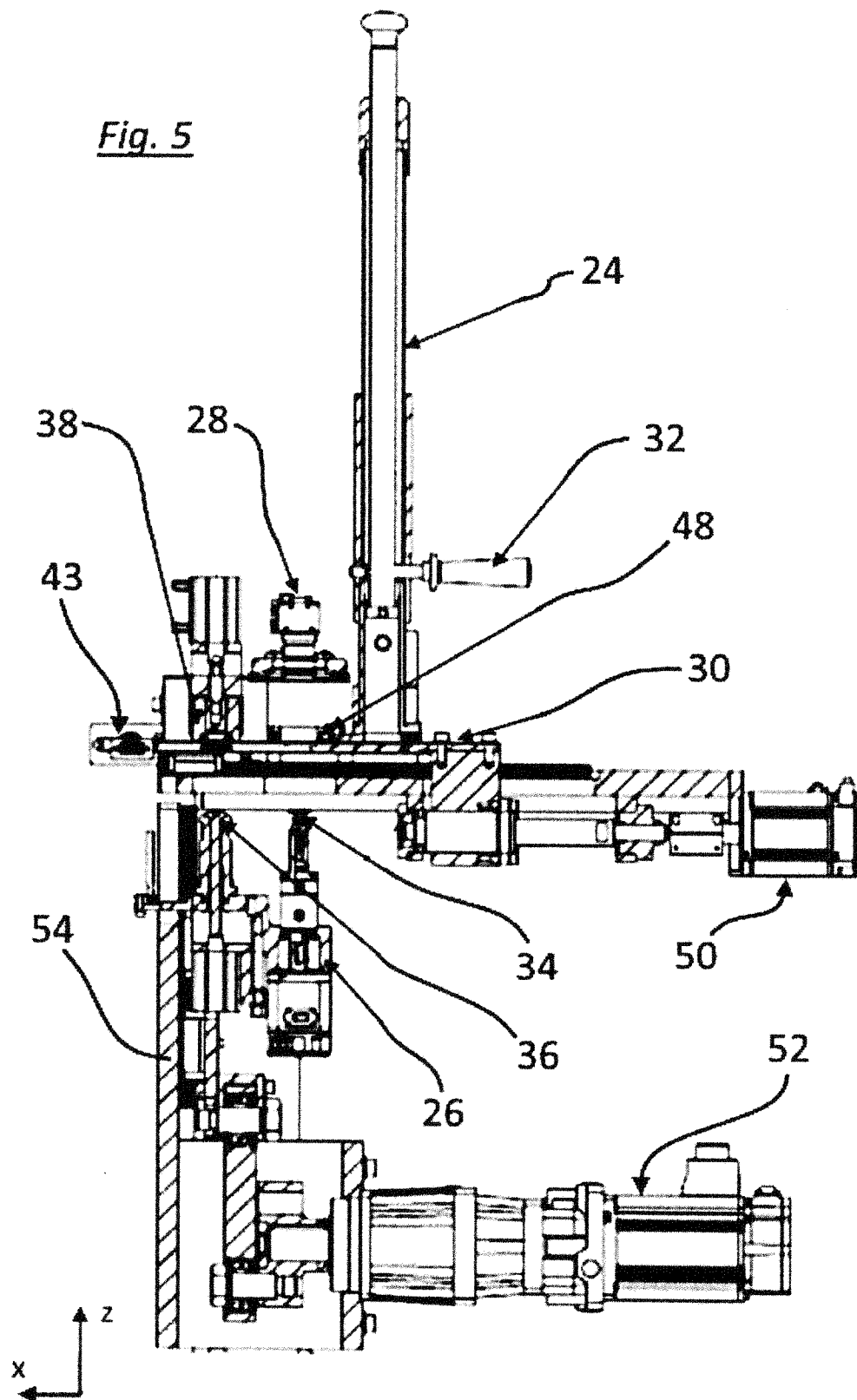


Fig. 3b

Fig. 4



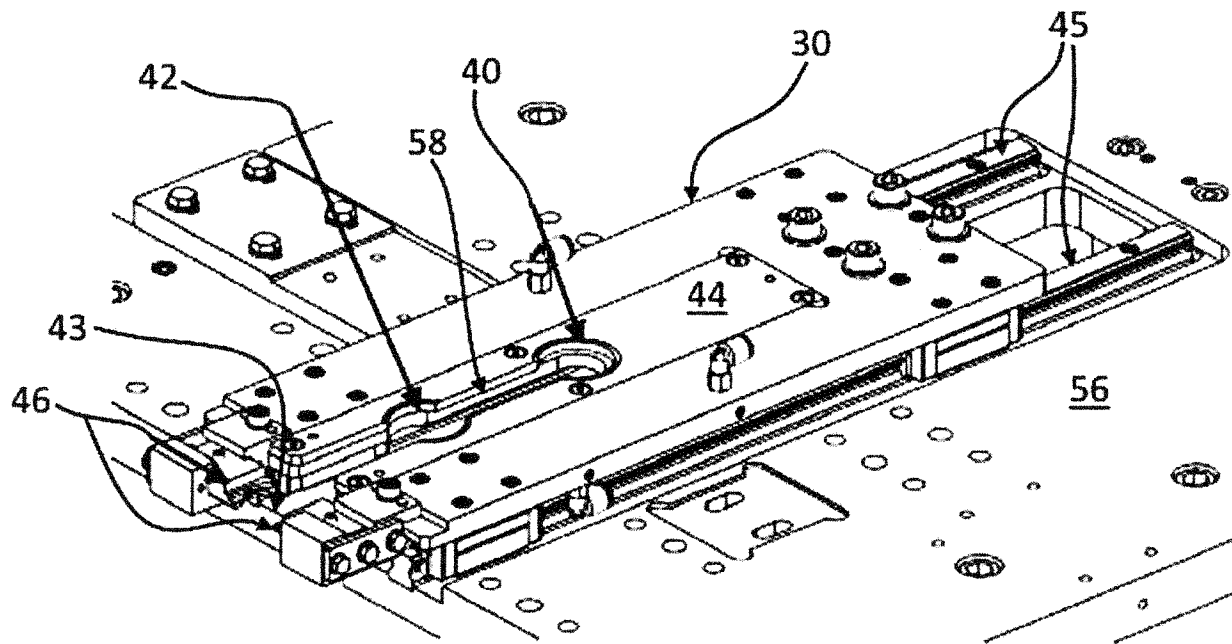


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/052665

A. CLASSIFICATION OF SUBJECT MATTER
INV. B21D51/44 B65D55/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B21D B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP 1 052 039 A1 (SHOWA SEIKI CO LTD [JP]) 15 November 2000 (2000-11-15) paragraph [0042] - paragraph [0044]; figure 7 -----	1-14
Y	EP 1 055 468 A2 (SHOWA SEIKI CO LTD [JP]) 29 November 2000 (2000-11-29) claim 1; figure 1 ----- -/-	1-14

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☒ See patent family annex.

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Date of the actual completion of the international search

2 September 2016

Date of mailing of the international search report

14/09/2016

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2016/052665

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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