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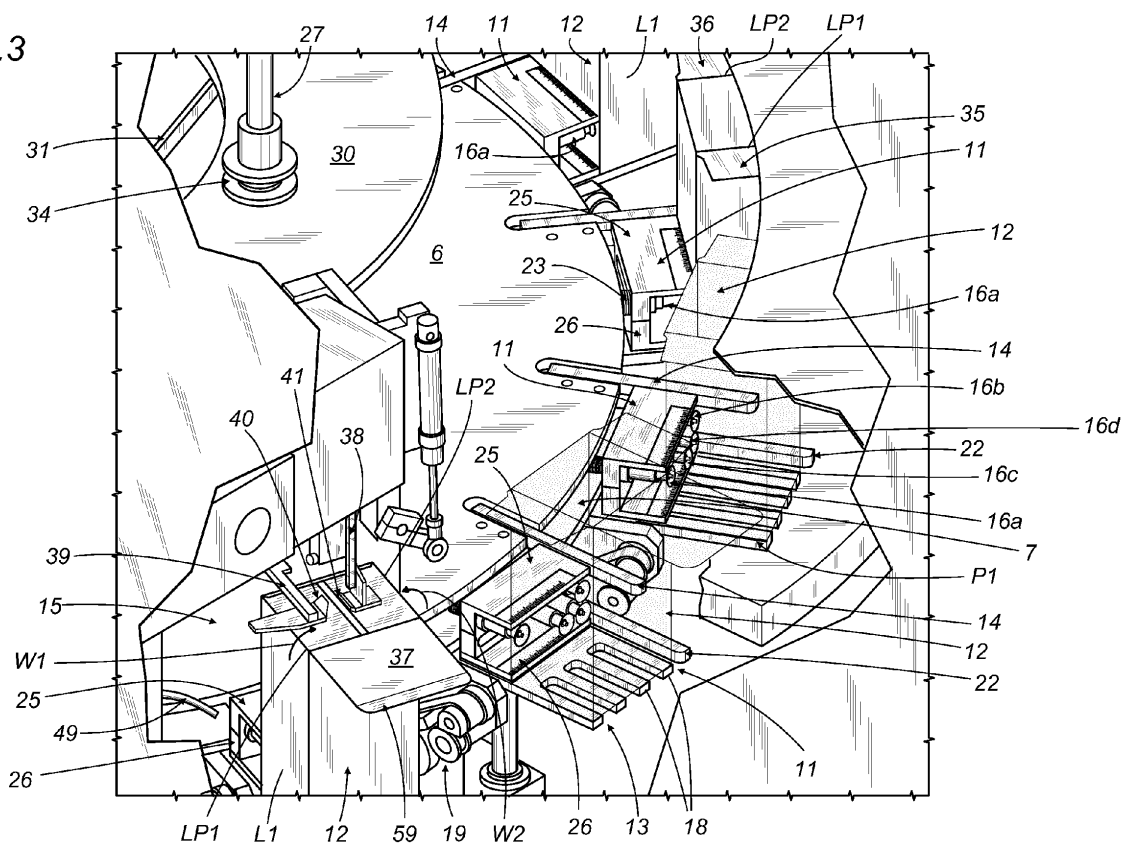
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(54) **Cartoning machine**

(57) A cartoning machine (1) comprises a conveyor (8) for feeding cartons (12) along a predetermined path and through a filling station (5), the conveyor (8) comprising at least one supporting unit (11) for a respective

carton (12) and the supporting unit (11) comprising: a bottom wall (13) for supporting a carton (12); at least one lateral abutment member (14) for the carton (12); suction holding means (16) which can be activated to hold the carton (12) in place relative to the supporting unit (11).

FIG.3



Description

[0001] This invention relates to a cartoning machine, that is to say, a machine designed to allow articles to be inserted into corresponding cartons.

[0002] Known in the prior art are cartoning machines comprising a station for feeding blanks (usually of cardboard), a station for folding the blanks and closing the bottoms of the blanks to form corresponding cartons, a station for filling the cartons with one or more articles and a station for closing the cartons containing the articles.

[0003] Some of the stations are arranged in a line (that is, according to an in-line configuration) whilst other stations are arranged round the periphery of a carousel which rotates about its own axis.

[0004] In light of this, the same cartoning machine may comprise in-line stations and stations arranged round the periphery of a rotary carousel.

[0005] With reference in particular to the filling stations, there are two different kinds of filling stations known in the prior art.

[0006] At these filling stations, an operator or an automatic system inserts articles into the cartons (whose bottoms have been closed previously).

[0007] In a first type of filling station, there are supporting units equipped with grippers whose jaws can be opened and closed to hold the cartons while they are being filled.

[0008] In a second type of filling station, the supporting units are furnished with recesses shaped to receive and hold the cartons during filling operations.

[0009] A first disadvantage of prior art machines is due to the fact that changeover to cartons of a different size involves relatively complex adjustment.

[0010] In particular in cartoning machines equipped with supporting units with grippers, changeover means adjusting the relative position of the gripper jaws in the closed configuration (where they hold the carton).

[0011] This is rather problematic especially in terms of setting the optimum force applied by the jaws to correctly hold the cartons.

[0012] In light of this, it should in effect be noted that if the gripper is not adjusted properly (that is, if the force they apply on the carton is not optimal) the carton is damaged when the jaws are closed on the carton, thus impairing the quality of the finished carton (to such an extent that the carton may even have to be scrapped).

[0013] In a cartoning machine equipped with a filling station of the second type, the shape of the recess, too, must be adjusted so that the carton fits into it closely (without excessive play or interference).

[0014] Besides lengthy set-up times, this leads to problems correctly adjusting the shape of the recess to avoid damaging the cartons.

[0015] Another disadvantage of prior art cartoning machines is that after the carton blank has been erected and the bottom closed, the carton held by gripper jaws or by a recess is dragged over a surface in contact with

it. This causes wear on the bottom of the carton scraping against that surface. Under some circumstances, that may impair the quality of the finished carton (leaving scratches or other visible marks on the bottom of the carton).

[0016] Document DE 39 30 844 A1 describes a packaging machine provided with a wheel with slit-like sockets.

[0017] Each socket has a support wall and suction means for retaining stably a package inside the socket itself.

[0018] In such machine a package is inserted into each socket in a configuration for receiving an article, that is in a box configuration.

[0019] This invention therefore has for an aim to overcome the above mentioned disadvantages by providing a cartoning machine capable of preventing damage to the cartons, especially during the operations of filling the cartons.

[0020] Another aim of the invention is to provide a cartoning machine that allows adjustment, particularly of the filling station, to be carried out quickly and easily during changeover to cartons of a different size.

[0021] In accordance with the invention, this aim is achieved by a filling station comprising the technical features described in one or more of the appended claims.

[0022] The technical features of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred non-limiting example embodiment of it, and in which:

- Figures 1A and 1B are, respectively, a plan view and a perspective view of a cartoning machine according to the invention;
- Figure 2 is a perspective view of a filling station forming part of the cartoning machine of Figures 1A and 1B;
- Figure 3 is another perspective view of the filling station of Figure 2;
- Figures 4 and 5 are perspective views of two details of the filling station of Figures 2 and 3;
- Figure 6 is a perspective view of a carton closing station forming part of the cartoning machine of Figures 1A and 1B;
- Figure 7 is a perspective view of a carton bottom closing station forming part of the cartoning machine of Figures 1A and 1B.

[0023] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a cartoning machine according to the invention and the numeral 5 denotes a filling station which is also an object of the invention.

[0024] The cartoning machine according to the invention comprises a plurality of stations, that is to say, regions equipped with one or more units to perform a specific function.

[0025] The machine 1, as is known, is designed to allow an article to be packed into a respective carton 12. More specifically, the article is inserted into the carton 12 at the filling station 5, which is described in more detail below.

[0026] Usually, the carton 12 is a carton 12 made of cellulose based material (for example, cardboard).

[0027] Figures 1A and 1B illustrate the machine 1 in its entirety and, more specifically, show the following stations forming part of the machine 1:

- a feed station 2 for feeding a blank (not shown in Figures 1A and 1B), from which the carton 12 will be erected (by folding the blank);
- a folding station 3 for erecting the carton 12 (that is to say, for giving it the shape of a box suitable for accommodating an article inside it);
- a closing station 4 for closing the bottom F of the carton 12;
- a filling station 5 for inserting an article into the carton 12;
- a closing station 15 where the carton containing the article is closed and which is positioned downstream of the filling station 5.

[0028] The filling station 5 is described in the course of this specification with reference to Figures 2 to 7.

[0029] The machine 1 comprises a first wheel 6 and a second wheel 7 configured to rotate as one about the same axis of rotation A.

[0030] In the drawings, the first wheel 6 and the second 7 rotate in the direction labelled W3.

[0031] The first wheel 6 and the second 7 together define a carousel 8 designed to rotate about the axis A.

[0032] It should be noted that according to the invention, the carousel 8 constitutes a conveyor 8 by which the cartons are fed along a certain path through the filling station 5.

[0033] Preferably, the axis of rotation A is a vertical axis.

[0034] With reference in particular to Figure 2 and without limiting the invention, it should be noted that the first wheel 6 is mounted above the second wheel 7.

[0035] The first wheel 6 and the second 7 together define a carousel 8 configured to rotate about the axis A. Also, it should be noted that the carousel 8 is surrounded by a guard 9 which advantageously prevents the operator from moving too close to the moving parts of the filling station 5 (and which thus constitutes a safety device).

[0036] As may be observed in Figure 2, the filling station 5 extends peripherally for approximately one hundred and eighty degrees round the carousel 8. That means three or four operators can work round the circumference of the carousel 8 to insert the articles into the cartons 12 as the latter move along the filling station 5.

[0037] In light of this, it should in effect be noted that the filling station 5 of the machine 1 is a preferably manual station (although in other embodiments which are not

illustrated the operators might be replaced with automatic inserting devices) and a plurality of operators can work at the filling station without interfering with each other.

[0038] The machine 1 comprises a plurality of supporting units 11 peripherally associated with the carousel 8.

[0039] The supporting units 11 are connected to the carousel 8 peripherally, preferably at regular angular intervals.

[0040] Preferably, the carousel 8 comprises approximately fifteen supporting units 11 for respective cartons 12.

[0041] The supporting units 11, clearly shown in Figure 3, comprise a bottom wall 13 for supporting the carton 12, a lateral abutment member 14 for the carton and one or more suction cups 16 designed to apply a negative pressure force on the lateral surface of the carton 12.

[0042] It should be noted that each supporting unit 11 is configured to accommodate one carton 12 only.

[0043] In the embodiment illustrated in the accompanying drawings, the bottom wall 13 is shaped like a comb, that is to say, it has a plurality of teeth 18.

[0044] The comb-like shape of the bottom wall 13 makes it easier for the bottom wall 13 to be engaged with, and disengaged from, the bottom F of the carton 12. More specifically, as described below, the bottom wall 13 engages the bottom F of the carton 12 at the carton 12 bottom F closing station 4 and disengages it downstream of the carton 12 closing station 15.

[0045] The bottom wall 13 is preferably movable between a position P1 where it supports the carton 12 (illustrated in Figures 3 to 5) and a position P2 where it is disengaged from the carton 12 (illustrated in Figure 7).

[0046] It should be noted that at the supporting position P1, the bottom wall 13 supports the bottom of the carton 12.

[0047] It should also be noted that the bottom wall 13 is in the disengaged position P2 when the supporting unit 11 is in the part of the path of the carousel 8, extending between the closing station 15 and the carton 12 bottom closing station 4, that is, the stretch labelled T1 in Figure 1A.

[0048] It should be noted that the bottom wall 13 is in the supporting position P1 in the part of the path extending between the station 3 and the closing station 15, that is to say, the part of the path not comprising the stretch T1.

[0049] Preferably, the bottom wall 13 is horizontally disposed when it is in the supporting position P1 and vertically disposed or inclined with respect to a horizontal plane when it is in the disengaged position P2.

[0050] The bottom wall 13 is supported rotatably relative to the second wheel 7. In effect, the bottom wall 13 is configured to rotate about a horizontal axis B.

[0051] Each supporting unit 11 has associated with it a drive unit 19 configured to allow the bottom wall 13 to rotate between the supporting position P1 and the carton 12 disengaged position P2.

[0052] Preferably, the drive unit 19 comprises a motor which is kinematically connected to the bottom wall 13

through kinematic drive mechanisms (preferably a belt 20 and one or more idler wheels 21).

[0053] It should be noted that the drive unit 19 is preferably supported by the second wheel 7.

[0054] The abutment member 14, clearly visible in Figure 5, protrudes radially from the carousel 8.

[0055] The abutment member 14 is preferably fixed to the first wheel 6.

[0056] The abutment member 14 is a part against which a carton 12 resting on the bottom wall 13 can abut. In the preferred embodiment, each supporting unit 11 also comprises a further abutment member 22. Preferably and advantageously, the further abutment member 22 is fixed to the second wheel 7.

[0057] The further abutment member 22 acts in conjunction with the abutment member 14 to provide an additional lateral abutment for the carton 12.

[0058] In a variant embodiment not illustrated, each supporting unit 11 does not have the further abutment member 22 and only comprises a single abutment member 14.

[0059] It should be noted that the abutment members 14, 22 are preferably covered by a layer of spongy material (felt or other material) to prevent damage to the carton as a result of direct contact with the selfsame abutment members 14, 22 (since the abutment members 14, 22 are usually made of steel, or a rigid material).

[0060] In the preferred embodiment, the supporting unit 11 also comprises a first rear lateral abutment member 53 for the carton 12 (clearly visible in Figures 4 and 5).

[0061] The first rear lateral abutment member 53 is mounted to abut the rear lateral face of the carton 12.

[0062] The first rear lateral abutment member 53 is preferably fixed to the first wheel 6.

[0063] It should be noted that according to this aspect, the abutment member 14 forms with the first rear lateral abutment member 53 an L-shaped abutment.

[0064] In the preferred embodiment, the supporting unit 11 also comprises a second rear lateral abutment member 54 for the carton 12 (clearly visible in Figures 4 and 5).

[0065] The second rear lateral abutment member 54, too, is mounted to abut the rear lateral face of the carton 12.

[0066] The second rear lateral abutment member 54 is preferably fixed to the second wheel 7.

[0067] It should be noted that according to this aspect, the further abutment member 22 forms with the second rear lateral abutment member 54 an L-shaped abutment.

[0068] In the preferred embodiment, each supporting unit 11 also comprises four suction cups, labelled individually 16a, 16b, 16c and 16d.

[0069] Generally speaking, however, it should be noted, that the supporting unit 11 may comprise any number of suction cups 16a, 16b, 16c, 16d.

[0070] The suction cups 16a, 16b, 16c, 16d constitute in their entirety suction holding means 16 which, when activated, hold the carton 12 against the supporting unit

11.

[0071] In effect, each suction cup 16a, 16b, 16c, 16d is configured to abut the lateral surface of the carton 12 in such a way as to apply a negative pressure force on the carton 12.

[0072] That way, the carton 12 is held to the supporting unit 11 by a negative pressure force.

[0073] The suction cups 16a, 16b, 16c, 16d are preferably arranged peripherally relative to the carousel 8. In a preferred embodiment, each supporting unit 11 is equipped with adjustment means 23 for the suction cups (preferably only some of them).

[0074] In effect, it should be noted, with reference to Figures 4 and 5, that the suction cups labelled 16a and 16c are slidably housed inside slots 24 and can be fixed at a certain position using customary fastening means (for example, a threaded coupling). Thus, the position of the suction cups 16a and 16c relative to the slot 24 can be adjusted quickly and easily.

[0075] In light of this, the means for fastening the suction cups 16a and 16c to the carousel 8 and the slot 24 constitute means for adjusting the position of the suction cups 16a and 16c.

[0076] As will become clearer as this description continues, the means 23 for adjusting the position of the suction cups 16a and 16c make it possible to adapt the position of the suction cups quickly and easily to the size of the carton 12 being used.

[0077] In effect, the position of the suction cups 16a and 16c can be quickly modified in such a way that the suction cups hold the lateral surface of the carton 12 when the latter rests on the bottom wall 13 and is in contact with the abutment member 14.

[0078] It should, however, be noted that some carton sizes do not require adjustment of the suction cups 16a and 16c.

[0079] The suction cups 16b and 16d are preferably fixed to the carousel 8. The position of the suction cups 16b and 16d is not therefore adjustable.

[0080] More specifically, in this regard, it should be considered that the suction cups 16b and 16d are located close to the abutment member 14 and, therefore, irrespective of the carton size in use, the suction cups 16b and 16d are always in a position to hold the lateral surface of the carton. With reference in particular to the preferred embodiment, it may be observed that the suction cups 16a and 16b are connected to the first wheel 6 while the suction cups 16c and 16d are connected to the second wheel 7.

[0081] More specifically, it should be noted that the suction cups 16a and 16b are fixed to a first plate 25 (which is connected to the first wheel 6) while the suction cups 16c and 16d are fixed to a second plate 26 (which is connected to the second wheel 7).

[0082] In light of this, it should be noted that the slot 24 which houses the suction cup 16a (and allows adjustment of the position of the suction cup 16a as described above) is formed on the first plate 25, and the slot 24

which houses the suction cup 16c (and allows adjustment of the position of the suction cup 16c as described above) is formed on the second plate 26.

[0083] In short, attention is drawn to the following with regard to the suction cups 16a, 16b, 16c, 16d as contemplated in the preferred embodiment which, it is stressed, must be considered only as a non-limiting example.

[0084] Preferably, some of the suction cups (16b, 16d) are connected in a predetermined position relative to the carousel 8 whilst other suction cups (16a, 16c) are associated with means 23 for adjusting their position relative to the carousel 8.

[0085] Also, preferably, some of the suction cups (16a, 16b) are connected to the first wheel 6 and other suction cups (16c, 16d) are connected to the second wheel 7.

[0086] According to another aspect of the invention, the carousel 8 is provided with a plurality of threaded rods 27 adapted to engage the first wheel 6.

[0087] More specifically, as shown clearly in Figure 2, the rods 27 are fixed at the top to a plate 30 which is connected to the frame of the machine 1. In the preferred embodiment, the machine 1 comprises three threaded rods 27.

[0088] Each rod 27 engages a threaded through hole 42 made in the first wheel 6.

[0089] More specifically, it should be noted that the rod 27 preferably comprises a threaded lower portion for engaging the hole 42 in the first wheel 6 and a smooth upper portion.

[0090] Each rod 27 bears a rotatable pulley 32.

[0091] The rods 27 are also connected to each other by a belt 31 which is trained around the pulleys 32 and around pulleys 33 which are connected to the frame (preferably to the plate 30).

[0092] More specifically, it should be noted that the machine 1 comprises a handwheel 28 connected to one of the rods 27 and able to be turned by the user to allow the position of the first wheel 6 relative to the second wheel 7 to be adjusted.

[0093] In effect, turning the handwheel 28 drives the belt 31 and in turn causes the rods 27 to turn.

[0094] The rotational movement of the rods 27 causes the first wheel 6 to move along the axial direction of extension of the selfsame rods 27 (that is to say, along the axis labelled A).

[0095] In effect, it should be noted that each rod 27 and the respective threaded hole 42 made in the wheel 6 constitute a drive mechanism 43 of the lead screw type where the rod 27 is the lead screw which is screwably engaged in the hole 42.

[0096] The pulleys 32, 33, the belt 31, and the handwheel 28 together constitute means for driving the rods 27 in rotation.

[0097] It should be noted that the rods 27, the threaded holes 42 in the first wheel 6 in which the rods 27 are coupled and the means for driving the rods 27 in rotation together constitute means 34 for adjusting the position

of the first wheel 6 relative the second wheel 7.

[0098] In the preferred embodiment, changing the position of the first wheel 6 relative to the second wheel 7 has the following effects:

it changes the position of the suction cups 16a, 16b, which are connected to the first wheel 6, relative to the suction cups 16c, 16d, which are connected to the second wheel 7;

it changes the position of the abutment member 14, which is connected to the first wheel 6, relative to the bottom wall 13, which is connected to the second wheel 7.

[0099] In more general terms, it should be noted that upon changeover to cartons 12 of a different size the user acts on the means 27 for adjusting the position of the first wheel 6 relative to the second wheel 7.

[0100] In effect, this adjustment makes it possible to vary the position, relative to the bottom wall 13, of both the abutment member 14 and the group of suction cups (16a, 16b) connected to the first wheel 6.

[0101] In light of this, the purpose of this adjustment is to move the abutment member 14 into contact with the side wall of the carton 12 of the new size in use and optimizes contact with the lateral surface of the selfsame carton.

[0102] In effect, it should be noted that the fact of changing the position of the suction cups 16a, 16b connected to the first wheel 6 makes it possible to distribute the action of the suction cups in optimum manner over the lateral surface of the carton 12 (one group of suction cups 16c and 16d acts on the lower portion of the lateral surface of the carton 12, while another group of suction cups 16a and 16b acts on the upper portion of the lateral surface of the carton 12).

[0103] Preferably, the machine 1 also comprises a display unit connected to the handwheel 28 and configured to indicate the distance between the first wheel 6 and the second 7.

[0104] It should also be noted that each of the suction cups 16a, 16b, 16c, 16d is furnished with a pin 44 movable longitudinally in order to turn the negative pressure of the suction cup 16a, 16b, 16c, 16d on and off.

[0105] The pin 44 is moved radially between an on position, proximal to the axis A, and an off position, distal from the axis A.

[0106] Below is a description of how the machine 1 works, with reference in particular to the filling of a carton 12 at the filling station 5.

[0107] It should be noted that the feed station 2 is equipped with a feeder 10 where the carton blanks are stacked.

[0108] A blank is transferred by the feed station 2 to the folding station 3 where the blank is erected to form a box-shaped configuration.

[0109] The box-shaped configuration is the final configuration of the carton 12.

[0110] At the folding station 3, the machine comprises folding elements which interact with the blank to fold parts of it in such a way as to form the box-shaped configuration.

[0111] The folding station 3 is located peripherally in a region R1 of the carousel 8 and at the folding station 3, the blank is held by the suction cups 16a, 16b, 16c, 16d of the respective supporting unit 11 located in the folding station 3.

[0112] In light of this, it should be noted that the carousel 8 is preferably driven with intermittent motion, that is to say, stepwise. At each step, therefore, a supporting unit 11 is moved to a position where it receives a carton from the feed station.

[0113] Downstream of the folding station 3, at the bottom F closing station 4, the bottom F of the blank, which now has the shape of a box, is closed.

[0114] It should be noted that the carton bottom F closing station 4 is located in the region labelled R2 in Figure 1.

[0115] In light of this, the carton bottom F closing station 4 comprises first means 50 (clearly visible in Figure 7) for closing the side flaps of the carton 12.

[0116] In the preferred embodiment, the means 50 comprise a first element 51 for folding one of the two bottom side flaps (the left-hand one in Figure 7) and a second element 52 for folding the other of the two bottom side flaps (the right-hand one in Figure 7).

[0117] It should be noted that the second folding element 52 is movable along a direction D between a non-operating position and an operating position where it closes the right-hand flap of the carton 12.

[0118] In light of this, it should be noted that at its operating position, the second folding element 52 is close to the first folding element 51.

[0119] The first folding element 51 is preferably fixed relative to the frame 90 and folds the bottom left-hand flap towards the inside of the box-shaped blank during the rotation of the carousel 8. In effect, as the carousel 8 rotates, the bottom left-hand flap strikes the first folding element 51. Once the bottom right-hand and left-hand flaps of the carton 12 have been folded, the bottom wall 13 of the supporting unit 11 is moved from the disengaged position P2 to the carton 12 supporting position P1.

[0120] In light of this, in the preferred embodiment, that means the wall 13 is now positioned horizontally. It should be noted that according to the invention the bottom wall 13 constitutes a means of closing the bottom F of the carton 12.

[0121] It should be noted, in effect, that the bottom wall 13 allows the rear bottom flap of the carton 12 to be folded, thereby closing the bottom F of the carton.

[0122] The term "rear" applied to a flap is used to indicate a flap whose fold line is proximal to the axis A, whilst the term "front" applied to a flap is used to indicate a flap whose fold line is distal from the axis A.

[0123] Also, it should be noted that if the carton did not have bottom right-hand and left-hand flaps but only a

single rear flap, the bottom closing station 4 would only comprise the first closing means 50 (in light of this, the wall 13 alone would close the bottom F).

[0124] In light of this, the bottom wall 13 has a twofold function: it allows the carton 12 to be supported as the latter moves along the filling station 5 and it allows the bottom F of the carton 12 to be closed at the carton bottom F closing station 4.

[0125] The fact that the bottom wall 13 constitutes a supporting surface for the carton 12 as it moves as one with the carton 12 (along the stretch of the path labelled T2 in Figure 1 where the filling station 5 is located) advantageously prevents damage of any kind to the underside F (or bottom F) of the carton, unlike what happens in the prior art solutions, where the carton at the filling station is dragged over a smooth surface (after the bottom of the carton has been closed).

[0126] The carton 12, held by the respective supporting unit 11, is therefore made to follow a circular trajectory corresponding to the circular path of the carousel 8.

[0127] In effect, it should be noted that the carton 12 is held firmly on the supporting unit 11 because the carton 12 laterally abuts the abutment member 14 (and also, in the preferred embodiment, the abutment member 22), is supported from below by the bottom wall 13 and is held by the suction applied by the suction cups 16a, 16b, 16c, 16d.

[0128] In light of this, the suction cups 16, the abutment member 14 (and the further abutment member 22, if present) and the bottom wall 13 hold the carton 12 firmly relative to the carousel 8 and prevent any damage to the carton 12.

[0129] In effect, it should be noted that the carton 12 is not held relative to the carousel 8 by interference between a pair of jaws or by interference between the walls of a recess, as in prior art solutions, but by the combined action of the suction cups 16a, 16b, 16c, 16d, of the abutment member 14 and of the bottom wall 13, thereby preventing damage to the carton 12 itself.

[0130] The operator, or more usually, the operators, can insert an article into each carton 12 at the filling station 5.

[0131] In the filling station 5, the operator can insert the article directly into the carton 12 or, more preferably, can secure the article to a further support configured to be inserted firmly into the internal space of the carton 12 and then insert the support containing the article into the carton 12. The carousel 8 is driven in rotation in such a way that carton 12, with the article inside it, is fed to the station 15 where the carton 12 is closed.

[0132] At the closing station 15, the carton 12 is closed or, more specifically, the top side flaps 35, 36 and the top front flap 37 are closed.

[0133] In light of this, it should be noted that the closing station 15 comprises a pair of movable arms 38, 39, clearly visible in Figure 3, adapted to fold the top side flaps 35, 36 of the carton.

[0134] More specifically, a first arm 39 is configured to

fold a first top side flap 35 and a second arm 38 is configured to fold a second top side flap 36.

[0135] Preferably, the first arm 39 and the second 38 are furnished with respective folding members 40, 41 shaped in such a way that the respective top side flap 35, 36 is folded upon being engaged by it. More specifically, as shown in Figure 3, the folding elements 40, 41 are hook shaped.

[0136] It should be noted that the first arm 39 is configured to rotate about a vertical axis, while the second arm 38 is configured to rotate about a horizontal axis.

[0137] In light of this, the elements 40, 41 move along circular arcs between a non-operating position (not illustrated) and an operating position (illustrated in Figure 3).

[0138] Advantageously, the hooked shape of the elements 40, 41 allows the side flaps 35, 36 to be folded inwards. In effect, thanks to their shape and movement, the side elements 40, 41, apply on the top side flaps 35, 36 a twisting moment W1, W2 relative to the fold lines LP1, LP2 of the top side flaps 35, 36, which allows the selfsame top side flaps 35, 36 to be closed.

[0139] The machine 1 comprises a further guide 49 which, as the carousel 8 rotates, interacts with the top front flap 37 of the carton 12 in such a way as to lift and fold the flap inwards.

[0140] The closing station 15 also comprises a first closing means 45 for the top front flap 37 (clearly visible in Figure 6) by which the top front flap 37 is closed after being lifted by the guide 49.

[0141] It should be noted that the first closing means 45 comprises an element 47 driven in rotation about the axis labelled C between a non-operating position (not illustrated) and an operating or closing position (illustrated in Figure 6).

[0142] More specifically, it should be noted that the element 47 is horizontally disposed when it is in the closing position and vertically disposed or inclined when it is in the non-operating position. Preferably, the element 47 has a comb-like shape. The closing station 15 further comprises a second closing means 46.

[0143] The second closing means 46 comprises an element 48 which is movable between an operating or closing position (illustrated in Figure 6) and a non-operating position (not illustrated).

[0144] More specifically, it should be noted that the element 48 of the second closing means 46 is movable vertically between the two positions and that the non-operating position is a raised position, while the operating position is a lowered position.

[0145] It should also be noted that the element 48 has a comb-like shape and is formed in such a way that the element 47 can rotate about the axis C without interfering with the element 48.

[0146] The first closing means 45 allows the front flap 37 to be placed in a substantially horizontal position (it should be noted that in this configuration, the top side flaps 35 and 36 have already been folded. The second closing means 46 folds the tab 59 (which defines an end

portion of the front flap 37) inwards in such a way as to close the carton 12. Thus, the closing means 45 and the second closing means 46 act in conjunction to close the front flap 37 of the carton 12.

[0147] More generally speaking, it should be noted that the machine 1 might comprise a closing station 15 configured differently from that described above and therefore that the closing station 15 described above must be considered only as an example.

[0148] The invention described is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A cartoning machine (1) comprising a conveyor (8) for feeding cartons (12) along a predetermined path and through a filling station (5), the conveyor (8) comprising at least one supporting unit (11) for a respective carton (12), wherein the supporting unit (11) comprises:

- a bottom wall (13) for supporting a carton (12);
- at least one lateral abutment member (14) for the carton (12);
- suction holding means (16) which can be activated to hold the carton (12) in place relative to the supporting unit (11), said machine (1) being **characterized in that** the bottom wall (13) for supporting the carton (12) is movable between a supporting position (P1) where it supports the carton (12) and a disengaged position (P2) where it is free of the carton (12) and **in that** the bottom wall (13) is driven from the disengaged position (P2) to the supporting position (P1) to close at least one bottom flap (F) of the carton (12).

2. The machine according to claim 1, **characterized in that** the conveyor (8) comprises a carousel adapted to rotate about an axis (A).

3. The machine according to claim 1 or 2, **characterized in that** the supporting unit (11) comprises at least one rear lateral abutment member (53) positioned to form, together with the lateral abutment member (14), an L-shaped abutment for the carton (12).

4. The machine according to any of the claims from 1 to 3, **characterized in that** the suction holding means (16) are positioned to abut the carton (12) at a lateral surface (L1) of it proximal to the axis (A).

5. The machine according to any of the claims from 1 to 4, **characterized in that** it comprises adjustment means (23) for adjusting the position of at least a part (16a, 16c) of the suction holding means (16) relative to the bottom wall (13). 5
6. The machine according to any of the claims from 1 to 5, **characterized in that** it comprises adjustment means (23) for adjusting the height of the lateral abutment member (14) relative to the bottom wall (13). 10
7. The machine according to any of the claims from 3 to 6, wherein the conveyor (8) comprises a carousel adapted to rotate about an axis (A) and equipped with. 15
 - a first wheel (6) which the lateral abutment member (14) is peripherally fixed to;
 - a second wheel (7) which the bottom wall (13) is peripherally connected to, the first wheel (6) and the second wheel (7) being configured to rotate as one about the rotation axis (A). 20
8. The machine according to claim 7, **characterized in that** it comprises adjustment means (34) for adjusting the height of the first wheel (6) relative to the second wheel (7). 25
9. The machine according to claim 8, wherein the adjustment means (34) comprise at least one lead screw (27) mechanism (43) connected to a frame (90) of the machine and to the wheel (6) in order to translate the first wheel (6) relative to the second wheel (7) along the axis (A). 30
10. The machine according to claim 9, wherein the adjustment means (34) comprise a plurality of lead screw (27) mechanisms (43), the screws (27) of the mechanisms (43) being kinematically linked to each other so as to be rotationally driven simultaneously by the respective drive means. 35 40
11. The machine according to any of the claims from 7 to 10, **characterized in that** it comprises a further lateral abutment member (22) for the carton (12), the abutment member (14) being fixed to the first wheel (6) and the further abutment member (22) being fixed to the second wheel (7). 45
12. The machine according to any of the claims from 7 to 11, **characterized in that** a first group (16a, 16b) of the suction holding means (16) is connected to the first wheel (6) and a second group (16c, 16d) of the suction holding means (16) is connected to the second wheel (7). 50 55
13. The cartoning machine (1) according to any of the claims from 1 to 12, **characterized in that** it further

comprises:

- a feed station (2) for feeding a blank shaped to form the carton (12);
- a folding station (3) for folding the blank to form the carton (12) and positioned in a peripheral portion of the carousel (8);
- a closing station (4) for closing the bottom (F) of the carton (12);
- a closing station (15) for closing the carton (12) containing the article and positioned downstream of the filling station (5) for closing the carton (12).

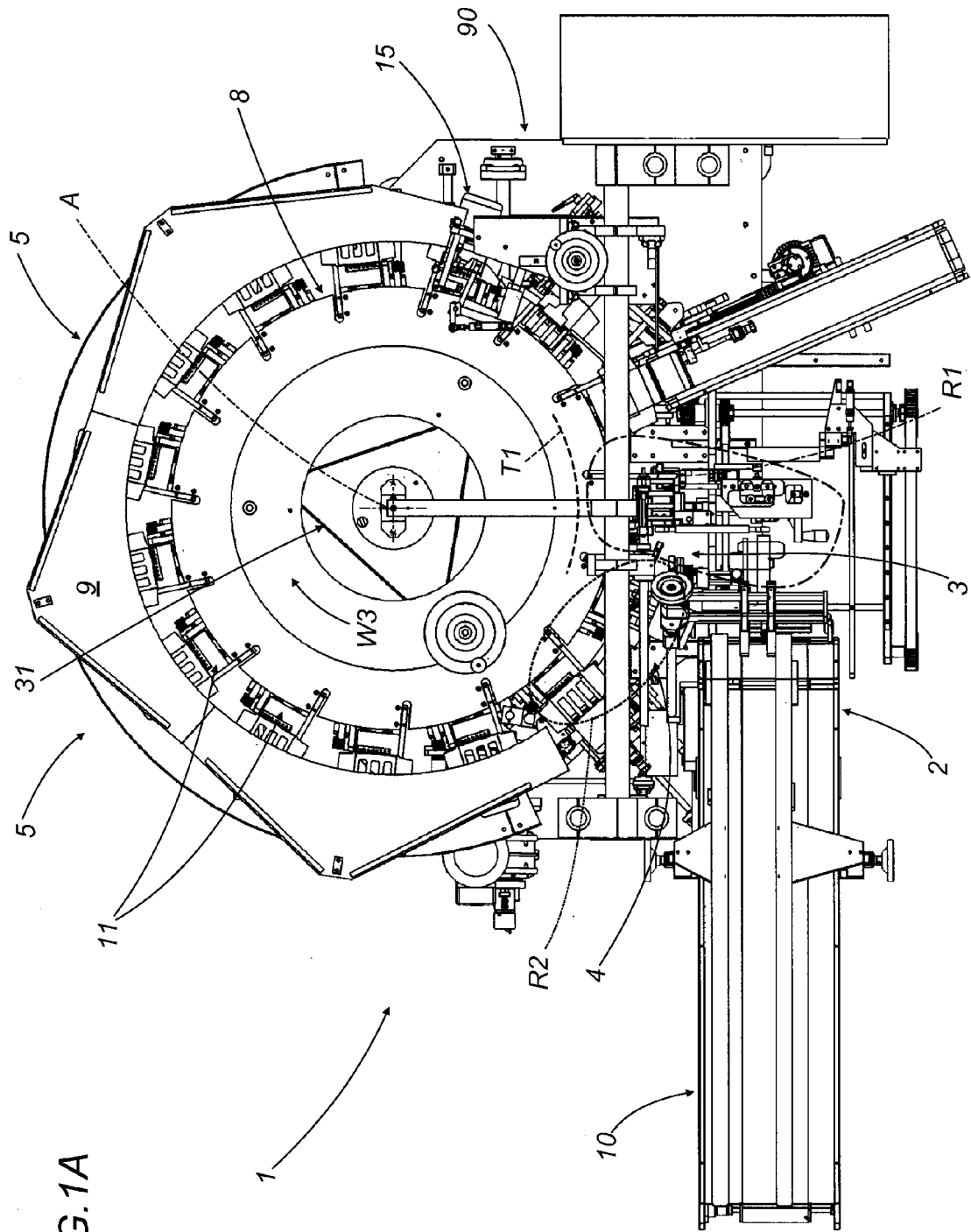
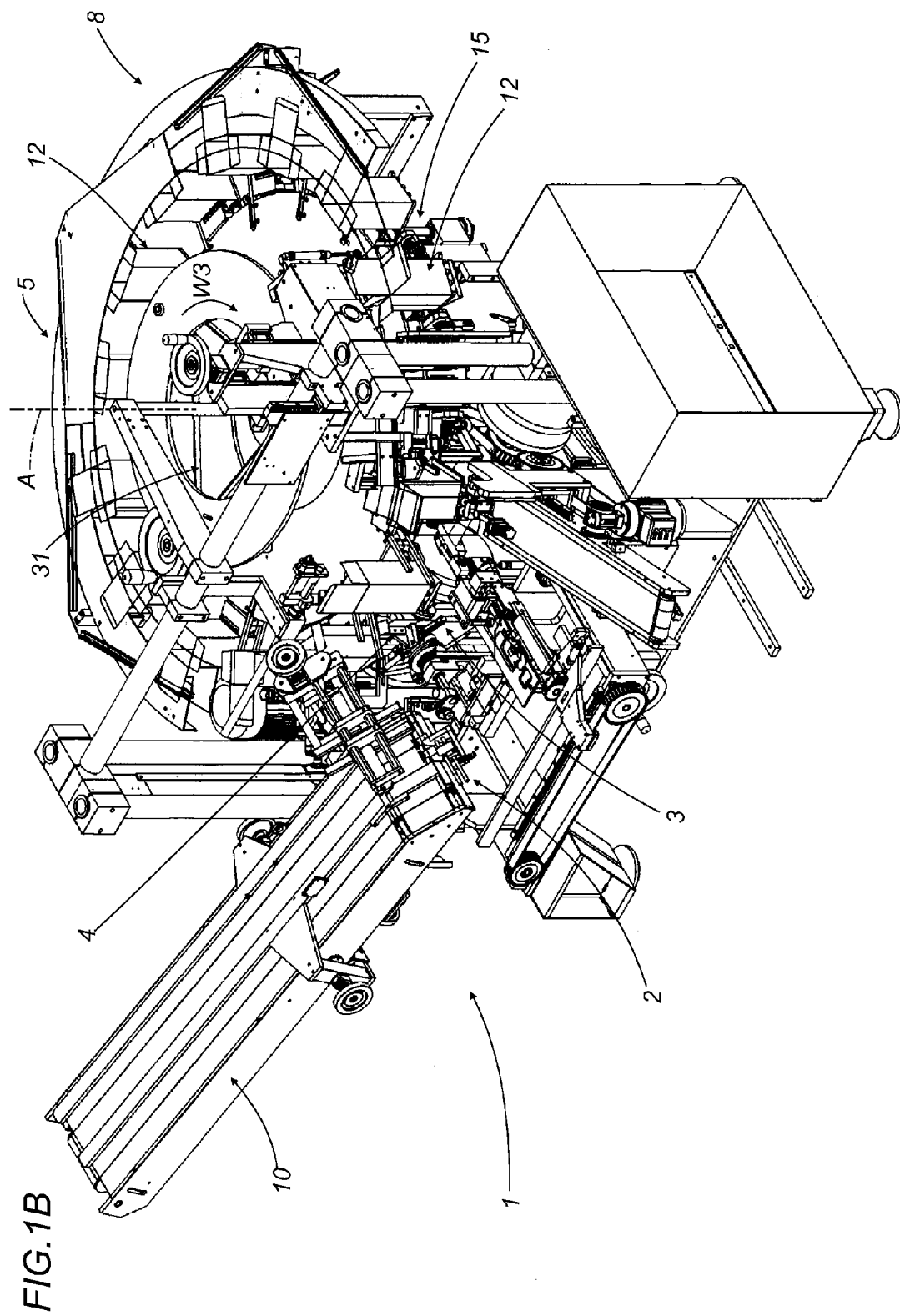
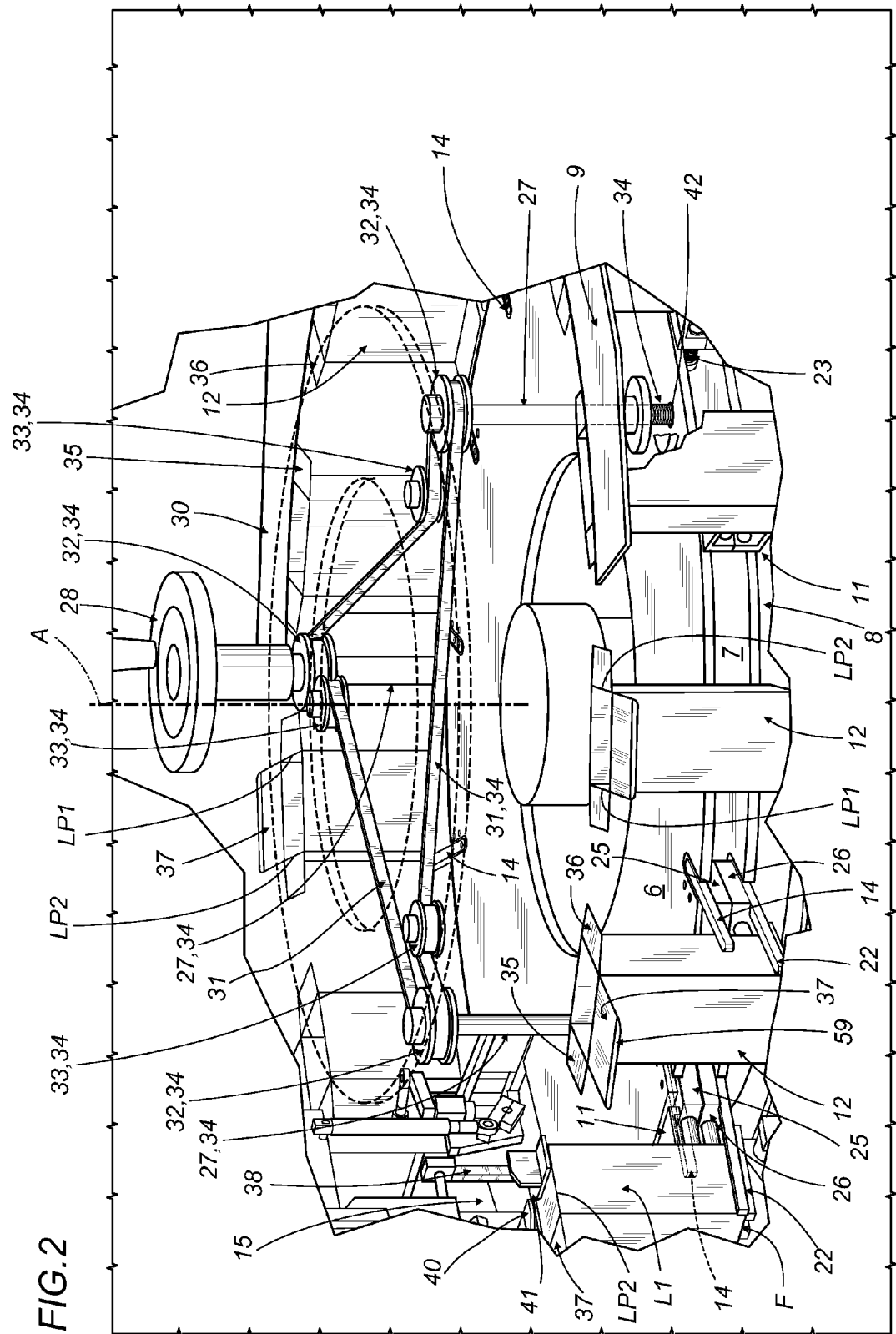
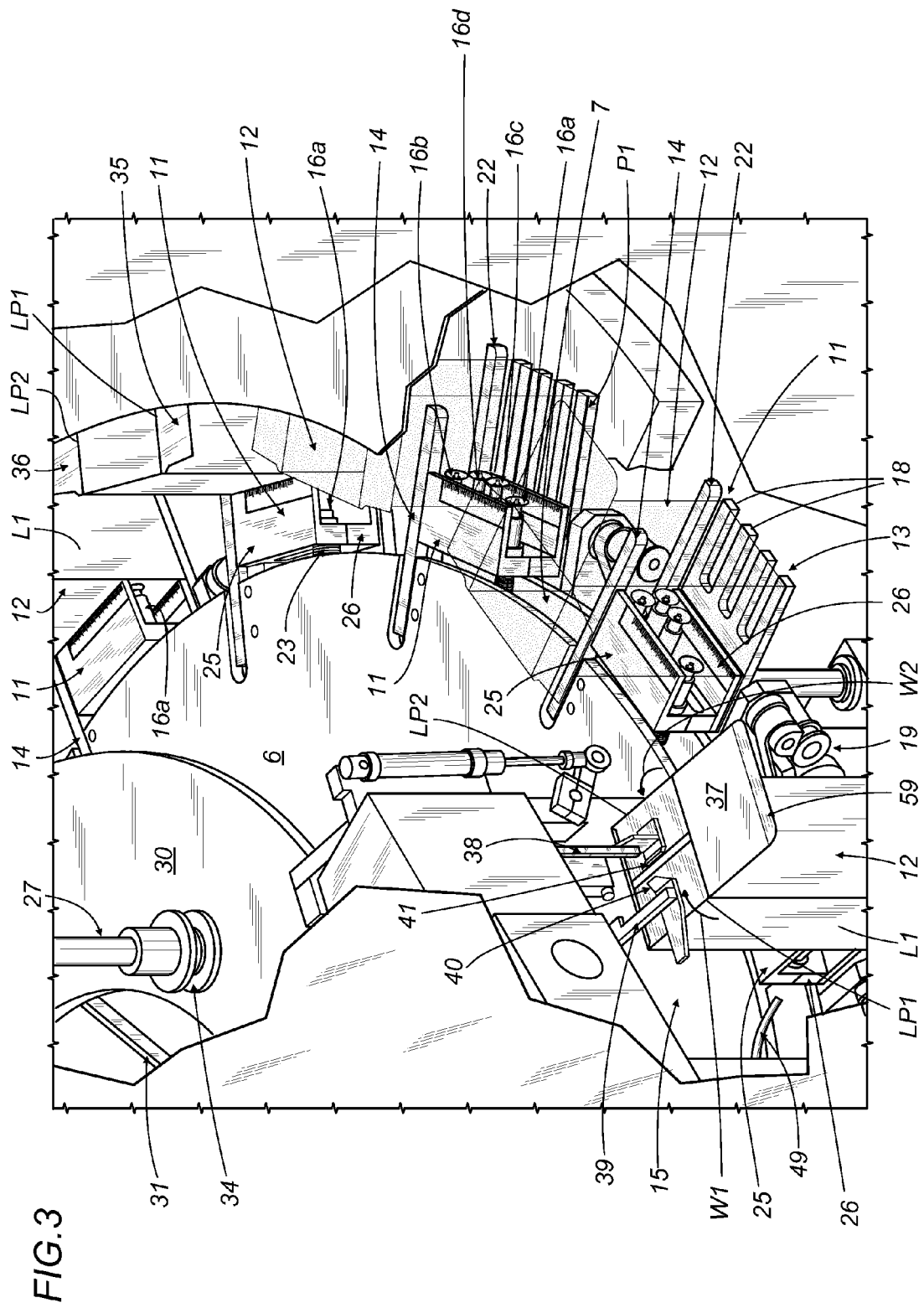


FIG. 1A







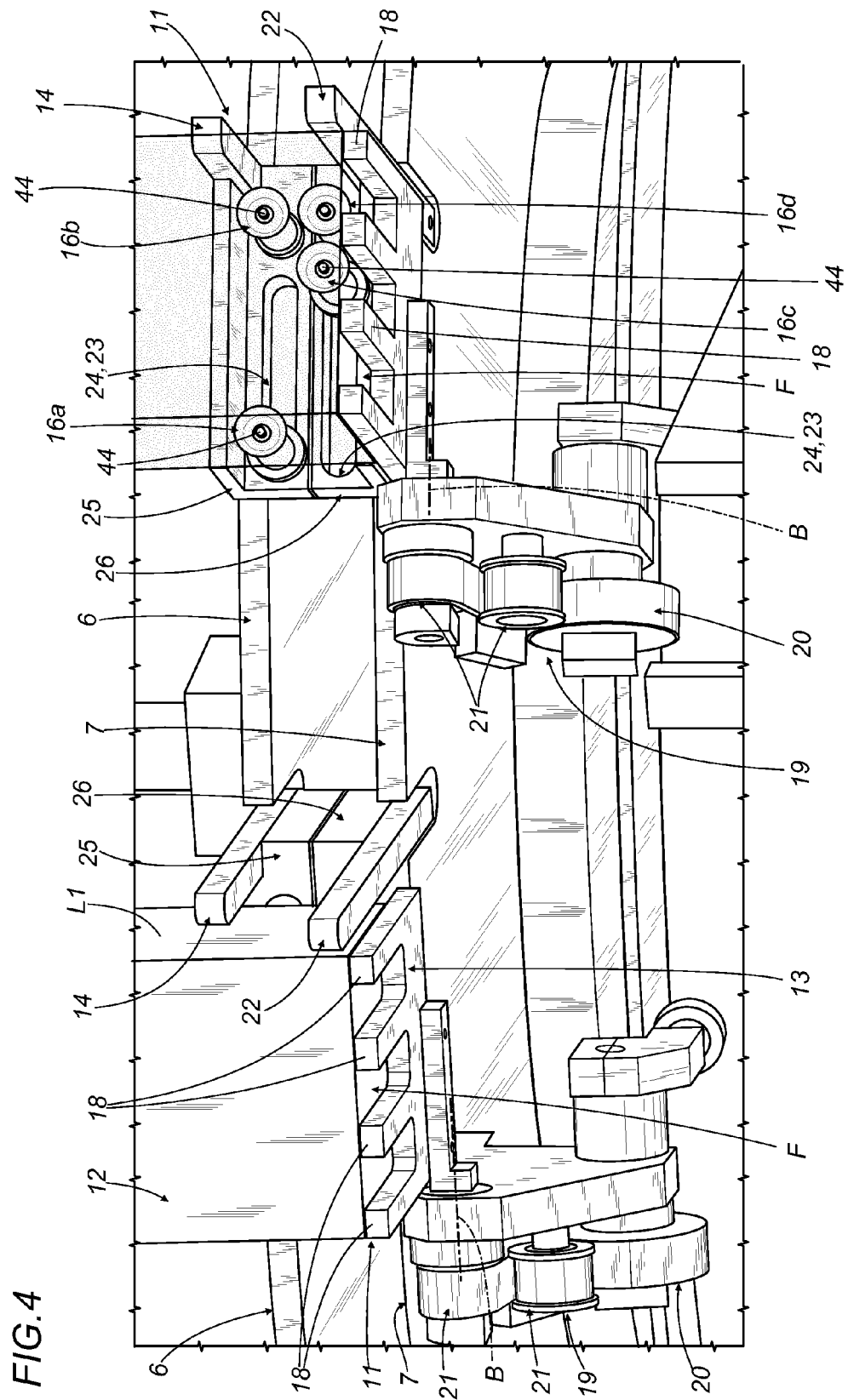
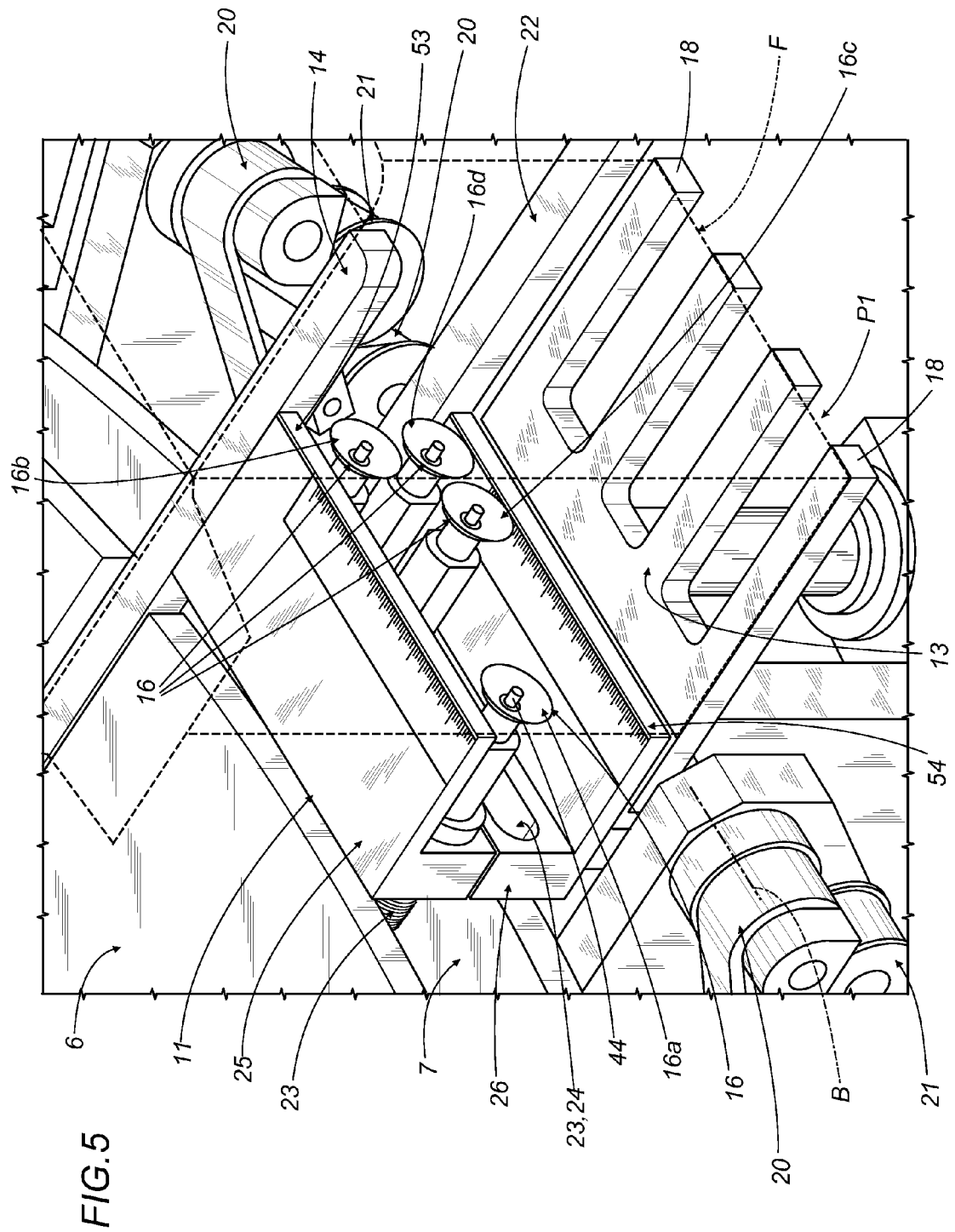


FIG. 4



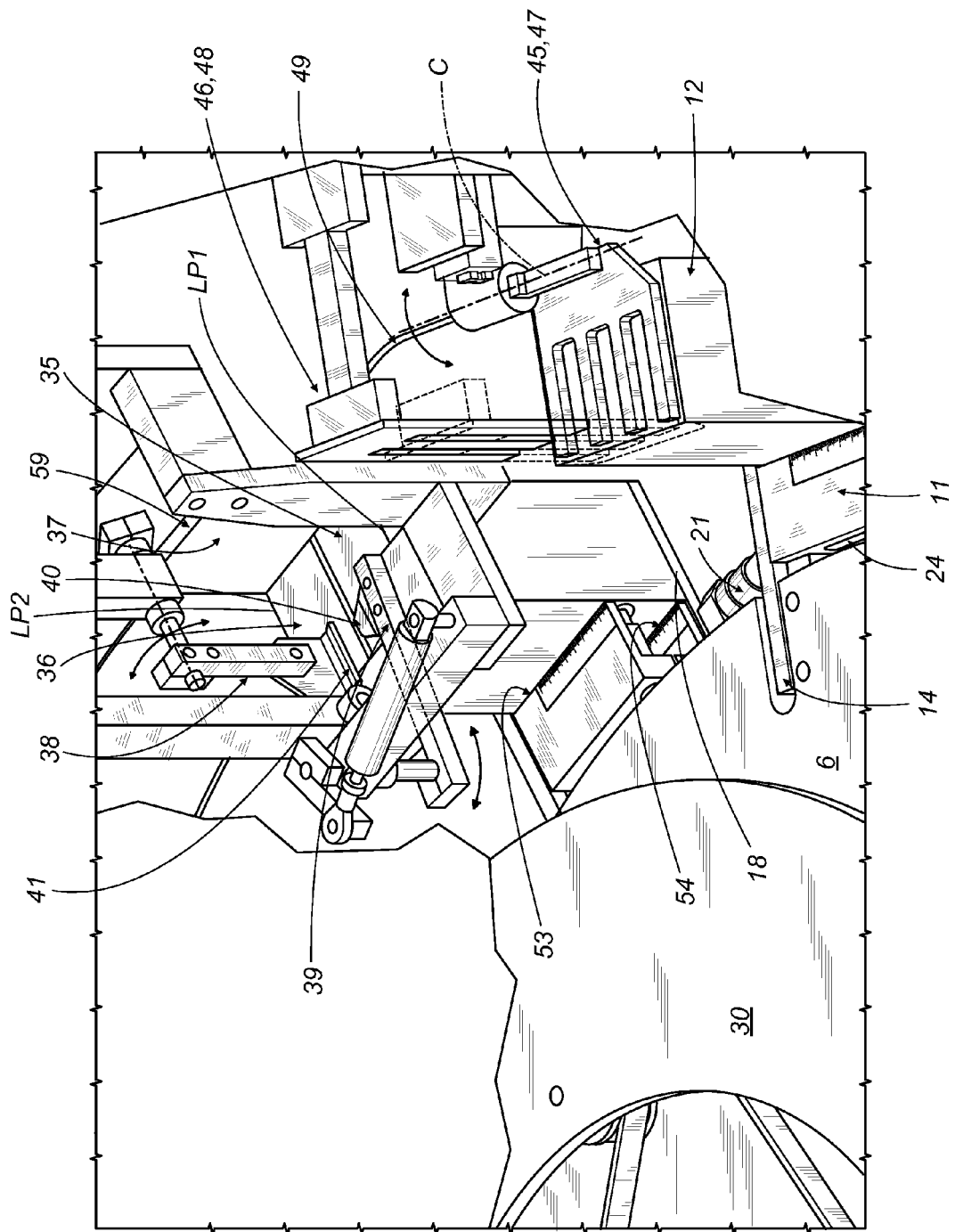
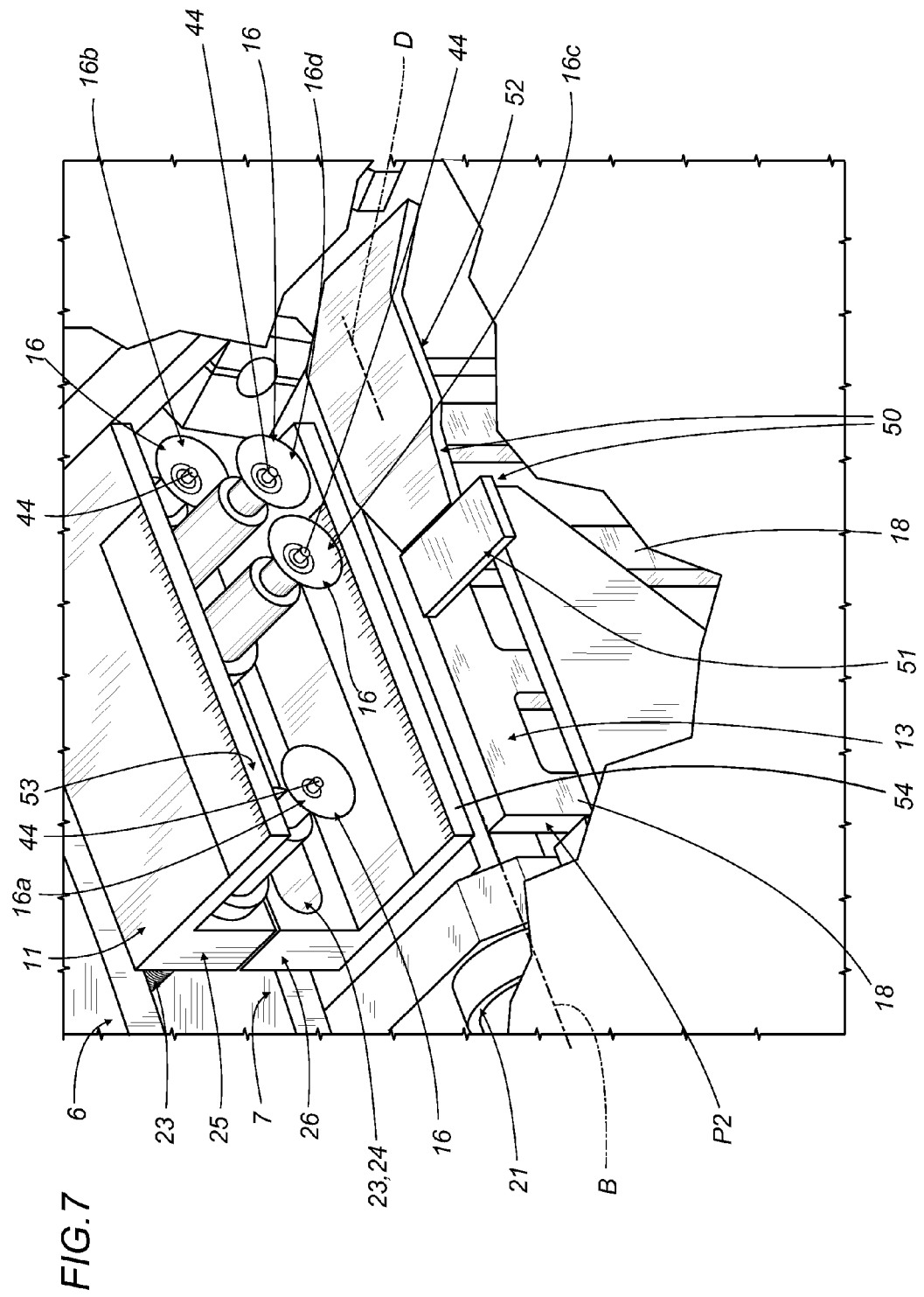


FIG. 6





EUROPEAN SEARCH REPORT

Application Number
EP 11 18 5545

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	DE 39 30 844 A1 (BENZ & HILGERS GMBH [DE]) 28 March 1991 (1991-03-28) * column 3, line 55 - column 5, line 15; figures 3-6 *	1-13	INV. B65B43/50 B65B43/60
A	----- JP 53 011920 B (N.A.) 25 April 1978 (1978-04-25) * figures 1,2 *	1-13	
A	----- JP H03 60210 U (N.A.) 13 June 1991 (1991-06-13) * figures 3-10 *	1-13	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) B65B
Place of search Munich		Date of completion of the search 24 January 2012	Examiner Johne, Olaf
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	

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24-01-2012

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REFERENCES CITED IN THE DESCRIPTION

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