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(54) **MACHINE FOR ASSEMBLING CARDBOARD BOXES, WITH A FEEDING DEVICE**

(57) The invention relates to a machine for assembling cardboard boxes, with a feeding device for large-capacity sheets of cardboard. The feeding device (2) is adjustable and can be adapted to the different dimensions of the sheets of cardboard to be used. The plurality of sheets of cardboard are stacked vertically on drag chains and are supported on guiding means (10, 13) and on the

upper part of a frame (3) from which said sheets of cardboard are individually sucked by means of a sucking mechanism (18). At least the device (2) for feeding the sheets of cardboard, the guiding means (10, 13) and the sucking mechanism (18) are interconnected by means of the frame (3).

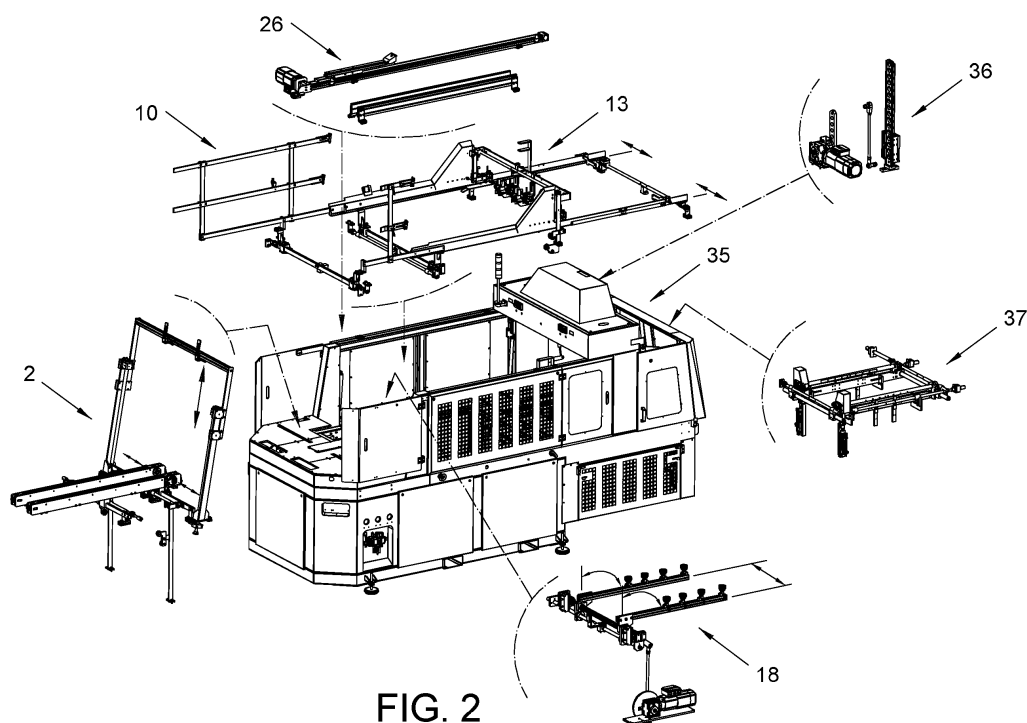


FIG. 2

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a machine for assembling cardboard boxes, with a feeding device for large-capacity sheets of cardboard. Said feeding device is adjustable and can be adapted to the different dimensions of the sheets of cardboard to be used. The plurality of sheets of cardboard are stacked vertically on drag chains and are supported on guiding means and on the upper part of a frame from which said sheets of cardboard are individually sucked by means of a sucking mechanism.

[0002] It is of particular use in the industry that manufactures cardboard boxes.

TECHNICAL PROBLEM TO ADDRESS AND BACKGROUND OF THE INVENTION

[0003] Currently there are numerous known machines designed to assemble cardboard boxes, some of which include machines incorporating a feeding device for sheets of cardboard; however, said feeding devices are designed for small productions and, moreover, their guides are adjusted independently.

[0004] It is also possible to find machines with independent feeding devices for large productions. However, the present invention describes a machine for assembling cardboard boxes with a feeding device for large-capacity sheets of cardboard already incorporated in the machine itself, so that it can operate more autonomously, which makes it easier to integrate it in automated industrial production lines. Another important feature is the smaller space required to install it. The machine takes up less space in comparison with a machine coupled to an independent feeding device.

DESCRIPTION OF THE INVENTION

[0005] The present invention refers to a machine for assembling cardboard boxes, with a feeding device, which comprises:

- a station for assembling cardboard boxes,
- a male former located in correspondence with the assembling station, which descends vertically into an assembling mould, where
- the assembling mould is facing the male former and arranged under said male former, and

it also comprises:

- a feeding device for sheets of cardboard that comprises: a frame, for supporting the sheets of cardboard, joined to two drag chains independent from each other,
- a first guiding means for guiding the sheets of card-

board along the feeding device, joined to a second guiding means for the sheets of cardboard in order to transport them to the assembling station, so that an adjusting means is able to completely control both guiding means in order to adapt them to the different dimensions of the sheets of cardboard to be used,

- a sucking mechanism for the sheets of cardboard on the adjustable frame in order to adapt it to the different dimensions of the sheets of cardboard to be used, and
- a pushing mechanism to push the sheets of cardboard towards the assembling station that identifies advancing and stopping positions in relation to the measurements of the sheet inserted by the user in the machine,

where the feeding device for sheets of cardboard, the first and second guiding means, the sucking mechanism and the pushing system are interconnected by means of the frame.

[0006] The drag chains, which are joined together on one end by means of a crossbar of the frame, are partially supported on the machine, leaving at least one third of said drag chains hanging and projecting from the machine, but forming an integral part of said machine, and said drag chains also have a total length of at least 1,000 mm, preferably 1,500 mm (being able to load 1,500 mm), which makes it possible to stack together a large number of sheets of cardboard, which constitutes one of the main advantages of the machine.

[0007] Each drag chain comprises:

- a closed loop sliding chain, and coupled to said sliding chain there are a pair of gears located at the ends thereof, which are coupled to transversal axes, where
- one of the transversal axes is joined to a ratchet actuated by a pneumatic cylinder,
- the ratchet comprises a free wheel that allows the sheets of cardboard to move towards the assembling station, blocking the movement in the opposite direction, and said free wheel is coupled to said transversal axis by means of a keyway, and it is inserted in a bushing that moves the pneumatic cylinder.

[0008] In addition, the drag chains are mounted on at least two spindles that independently regulate the distance between the two drag chains in order to adapt them to the dimensions of the sheet of cardboard. Said drag chains also comprise a load indicator cam in the ends connected to the crossbar of the frame, coupled to a positioning sensor to stop the movement of the drag chain when the sheet of cardboard reaches the required position and is supported by the frame.

[0009] The frame of the feeding device comprises an adjusting device to regulate the height of said frame in order to adapt it to the dimensions of the sheets of cardboard to be used.

[0010] The sucking mechanism comprises two parallel guides that comprise suction pads placed on the upper part of the parallel guides, where said parallel guides are joined in one of their ends by means of an axis. Said axis, together with the parallel guides with the suction pads, are actuated by means of a servomotor, where the turning of the servomotor moves the disk and a bushing that make contact with the axis, with said movement of the disk and the bushing resulting in an angular turning of the axis and the parallel guides with the suction pads from a horizontal position to a vertical position, where said suction pads suck the sheets of cardboard from the frame. Said suction pads can be chosen from independent electric valves or taps. Additionally, the sucking mechanism comprises at least one spindle that symmetrically regulates the distance between the parallel guides with the suction pads, in order to adapt them to the dimensions of the sheet of cardboard.

[0011] The first guiding means comprise a first parallel vertical supports that face each other and that are joined by means of a supporting bar.

[0012] The second guiding means comprise a second parallel vertical supports that face each other and that are joined by means of a guide with centred glue injectors and by means of the adjusting device.

[0013] The adjusting device of the first and second guiding means comprises at least two spindles that regulate the width of the second guiding means and the first guiding means in order to adapt them to the dimensions of the sheet of cardboard.

[0014] The pushing mechanism comprises a servomotor, which as it turns it causes a pushing element to push the sheets of cardboard horizontally over guides towards the assembling station.

BRIEF DESCRIPTION OF THE FIGURES

[0015] To complete the description and in order to give a better understanding of the characteristics of the invention, this descriptive report is accompanied by a series of drawings that are an integral part of the report, wherein, for illustration purposes and without limitation, the following has been represented:

Figure 1.- Shows a perspective view of the machine for assembling cardboard boxes, with a feeding device.

Figure 2.- Shows a perspective view of the components comprising the machine for assembling cardboard boxes, with a feeding device.

Figure 3.- Shows a perspective view of the assembly comprising the feeding device for sheets of cardboard, the first and second guiding means, the sucking mechanism and pushing system of the sheets of cardboard.

Figure 4a.- Shows a perspective view of the front part of the feeding device for sheets of cardboard. The way the drag chains are independently adjusted

is also shown.

Figure 4b.- Shows a perspective view of the rear part of the feeding device for sheets of cardboard, which shows the ratchets with the pneumatic cylinders and the device for adjusting the height of the frame.

Figure 4c.- Shows a perspective view of the drag chains, which shows, firstly on the figure on the left, the drag chain once it has been mounted, and secondly on the figure on the right, an exploded view of the components comprising the drag chain.

Figure 5.- Shows a perspective view of the connection of the first and second guiding means of the sheets of cardboard with the device for adjusting said guiding means.

Figure 6.- Shows a perspective view of the pushing mechanism in charge of transporting the sheets of cardboard towards the assembling station.

Figure 7.- Shows a perspective view of the sucking mechanism, which shows the servomotor and the bushing that actuates said sucking mechanism.

[0016] A list of the different components that have been represented in the figures and that comprise the invention is detailed below:

1. Machine for assembling cardboard boxes, with a feeding device
2. Feeding device for sheets of cardboard.
3. Frame.
4. Drag chains.
5. Adjusting device of the frame.
6. Crossbar of the frame.
7. Pneumatic cylinder.
8. Ratchets.
9. Spindles of the drag chains.
10. First guiding means for guiding the sheets of cardboard along the feeding device.
11. First vertical supports.
12. Supporting bar.
13. Second guiding means for the sheets of cardboard.
14. Second vertical supports.
15. Adjusting device of the guiding means.
16. Guide with centred glue injectors.
17. Spindles to adjust the first and second guiding means.
18. Sucking mechanism of the sheets of cardboard.
19. Guides of the sucking mechanism.
20. Suction pads.
21. Axis.
22. Disk.
23. Bushing.
24. Servomotor of the sucking mechanism.
25. Bushing of the sucking mechanism.
26. Pushing system of the sheets of cardboard.
27. Pushing element.
28. Guides of the pushing system.
29. Servomotor of the pushing system.

- 30. Gears.
- 31. Transversal axes.
- 32. Free wheel.
- 33. Bushing.
- 34. Telescopic lateral bars of the frame.
- 35. Assembling station.
- 36. Male former.
- 37. Assembling mould.
- 38. Load indicator cam.
- 39. Positioning sensor.

DETAILED DESCRIPTION

[0017] This innovative machine described in the present invention has a much simpler structure than the structures of the rest of the machines known in the state of the art.

[0018] Naturally, the machine is operated by means of software developed specifically for it.

[0019] The machine (1) for assembling cardboard boxes, with a feeding device (2) that is the object of the invention comprises a feeding device (2) for large-capacity sheets of cardboard, which can be regulated and adjusted, that is able to work even with asymmetric sheets of cardboard.

[0020] The feeding device (2) is able to load a large number of sheets of cardboard, making it especially suitable for large productions, so that the operator can place a large number of sheets of cardboard in each load so that the machine (1) can perform long operating cycles without needing to pay mind to the number of sheets, all of which is done with a very simple structure that has smaller dimensions than currently existing ones.

[0021] The machine (1) for assembling cardboard boxes, with a feeding device (2) comprises the main components of a conventional machine (1) for assembling cardboard boxes, that is, an assembling station (35) in which a male former (36) is lowered vertically on an assembling mould (37), and it also comprises:

- a feeding device (2) for sheets of cardboard that comprises: a frame (3) in order to support the sheets of cardboard, joined to two drag chains (4) independent from each other, where the distance between both drag chains (4) can be adjusted by means of spindles (9),
- a first guiding means (10) for guiding the sheets of cardboard along the feeding device (2), joined to a second guiding means (13) of the sheets of cardboard moving towards the assembling station (35), so that a single adjusting means (15) for both guiding means (10, 13) is able to completely control said guiding means (10, 13) in order to adapt them to the different dimensions of the sheets of cardboard to be used,
- a sucking mechanism (18) for the sheets of cardboard of the frame (3), which can be adapted to the

entire range of possible measurements of the sheets to be used in the feeding device (2), and

- a pushing mechanism (26) to push the sheets of cardboard towards the assembling station (35), that identifies advancing and stopping positions in relation to the measurements of the sheet inserted by the user in the machine (1).

[0022] The operator places the plurality of sheets of cardboard stacked vertically on the two drag chains (4) of the feeding device (2), so that they are always supported by the first guiding means (10) and the frame (3). Afterwards, the sheets of cardboard are sucked individually from the frame (3) by means of the sucking mechanism (18), so that once each sheet has been sucked, the drag chains (4) move forward in order to prepare the next sheet to be sucked.

[0023] The drag chains (4), which are joined together on one end by means of a crossbar (6) of the frame (3), are partially supported on the machine (1), leaving at least one third of said drag chains (4) hanging and projecting from the machine (1), but forming an integral part of said machine, and said drag chains (4) also have a total length of at least 1,000 mm, preferably 1,500 mm (being able to load 1,500 mm), which makes it possible to stack together a large number of sheets of cardboard, which constitutes one of the main advantages of the machine (1).

[0024] Each drag chain (4) basically comprises a closed loop sliding chain, and coupled to said sliding chain there are a pair of gears (30) located at the ends thereof, which are coupled to transversal axes (31). The transversal axis (31) closest to the crossbar (6) of the frame (3) is connected to the gear (30) by means of a keyway, and to a ratchet (8) actuated by a pneumatic cylinder (7). This ratchet (8) is comprised of a free wheel (32) (that can move forward towards the assembling station (35), blocking the movement in the opposite direction) coupled to the transversal axis (31) by means of a keyway, and it is inserted in a bushing (33) that moves the pneumatic cylinder (7).

[0025] As the drag chains (4) move forward and the sheet of cardboard reaches the desired position resting on the frame (3), said sheet pushes a load indicator cam (38) coupled to a positioning sensor (39) and the forward movement of the drag chain (4) is stopped.

[0026] Additionally, the drag chains (4) move independently, allowing them to correctly align the sheets of cardboard in the feeding device (2), advancing in parallel and without crossing each other, where each drag chain (4) is mounted on spindles (9) joined together (front spindle with rear spindle) by means of a chain (not shown in the drawings), where said spindles (9) turn by means of a handle, which can adjust the distance between the two drag chains (4) in order to adapt them to the dimensions of the sheets of cardboard, being able to separately move each drag chain (4) horizontally in order to place said chains (4) in the desired position so that, if a sheet is

asymmetrical, the chains (4) can be placed in the correct position in order to drag the sheet. Said adjustment is done manually.

[0027] The frame (3) also comprises an adjusting device (5) that regulates the height thereof, so that said adjusting device (5) can move lateral telescopic bars (34) comprising the frame (3), thus adapting the height of said frame (3) to the different dimensions of the sheets of cardboard to be used. The adjusting device (5) is any of the devices known in the state of the art.

[0028] The fact that the first guiding means (10) are connected to the second guiding means (13) significantly reduces the adjusting time required when the machine (1) is adapted to the dimensions of the sheets of cardboard, since this is done only once. If they were independent, such as the ones that exist currently, they would need to be adapted one by one, which is a time consuming process.

[0029] The first guiding means (10) and the second guiding means (13) are preferably joined together by means of screws, and they can be joined together by any other conventional mean.

[0030] The first guiding means (10), which help to guide sheets of cardboard along the two drag chains (4) of the feeding device (2) when they are stacked vertically, comprise first vertical supports (11) arranged in parallel and in front of each other, joined together by means of a support bar (12).

[0031] The second guiding means (13), which help to guide the sheets of cardboard towards the assembling station (35) once said sheets of cardboard are in the horizontal position over the suction pads (20) of the sucking mechanism (18), comprise second vertical supports (14) arranged in parallel and in front of each other, joined together by means of a guide with centred glue injectors (16) and by means of the adjusting device (15).

[0032] In addition, the support bar (12), the adjusting device (15) and the guide with centred glue injectors (16) are joined to the machine (1).

[0033] The adjusting device (15), comprising the second guiding means (13), is able by a single adjustment to adapt both guiding means (10,13) to the different dimensions of the sheets of cardboard to be used. In order to do so, the adjusting device (15) comprises spindles (17) that can regulate the width of said second guiding means (13) and therefore, in turn, of the first guiding means (10) (since both guiding means are joined together), in order to adapt them to the dimensions of the sheets of cardboard.

[0034] Therefore, the adjusting device (15) comprises 4 spindles (17), connected in twos, where from the middle point of the adjusting device (15) towards the right part there is a front spindle connected by means of a chain to a rear spindle, and there is another spindle towards the left part connected by means of another chain to another rear spindle, so that by turning the front spindle of each side by means of a handle, it is possible to move and adjust independently the second guiding means (13),

and therefore the first guiding means (10). Said adjustment is done manually.

[0035] The guide with centred glue injectors (16) has a twin function, firstly it is the support guide of the glue injectors and secondly it is the support of the rear spindles of the adjusting device (15).

[0036] In another embodiment, the adjusting device (15) can be located in the first guiding means (10) instead of the second guiding means (13).

[0037] The sucking mechanism (18) comprises two parallel guides (19) with suction pads (20) located on the upper part of the parallel guides (19), where said parallel guides (19) are joined together at the end thereof by means of an axis (21). Said sucking mechanism (18) is actuated by means of a servomotor (24), that turns and moves a disk (22) and a bushing (23) that are in contact with the axis (21) and the parallel guides (19) with the suction pads (20), with said movement causing the axis (21) with the parallel guides (19) with suction pads (20) to turn approximately 90° from a horizontal position to a vertical position, where the suction pads (20) suck the sheets of cardboard from the frame (3). Additionally, the sucking mechanism (18) comprises a spindle (25) that symmetrically regulates the distance between the parallel guides (19) with the suction pads (20) in order to adapt them to the dimensions of the sheet of cardboard. Said adjustment is done manually.

[0038] Moreover, depending on the measurements of the sheet, the operator selects the quantity and the type of suction pads (20) used, and their placement. Said suction pads (20) can be chosen from independent electric valves or taps.

[0039] The servomotor (24) of the sucking mechanism (18) moves according to a pre-set sequence that is able to suck each sheet of cardboard at different speeds.

[0040] Once said sheets of cardboard are in the horizontal position over parallel guides (19) with the suction pads (20), the pushing mechanism (26) transports the sheets of cardboard to the assembling station (35), placing them with precision. In order to do so, the pushing system (26) comprises a servomotor (29), which as it turns it causes a pushing element (27) to push the sheets of cardboard horizontally along guides (28), according to a pre-set sequence that is able to push each sheet of cardboard at different speeds. The operator introduces the dimensions of the sheets in the software installed in the machine (1) and the software calculates and controls the stop positions of the pushing system (26). The operator does not need to regulate the changes in measurements.

[0041] The male former (36) can either have double programming and operate in a full turn, or it can operate in a half turn (one position and then return to its starting position), so that a single male former (36) can operate on the entire range of heights of the boxes.

[0042] Operating at half turn (or between two positions) has two advantages:

- Starting position: this position can be adjusted in relation to the height of the male former (36), achieving higher cycle speeds and reducing the impact of the male former (36) on the sheet. In addition, it generates less noise, better box assembling and fewer chances that the sheet will be displaced as the male former (36) pushes it.
- Final position: the male former (36) descends only as far as necessary into the assembling mould (37) in order to assemble the box. This position is given by the user in relation to the height of the box, which makes it possible to use a single male former (36) for different box heights. Therefore, it reduces costs, changing times, etc.

[0043] When it operates making a full turn (the commonly known practice), the male former (36) always descends until the end of the stroke, which requires the position of the male former (36) to be regulated in relation to the height of the box, and even to use different heights of male former (36) depending on the height of the box to be manufactured.

[0044] The present invention is not limited by the embodiment disclosed herein. Other embodiments can be made by persons skilled in the art in light of this description. In consequence, the scope of the invention is defined by the following claims.

Claims

1. A machine (1) for assembling cardboard boxes, with a feeding device (2) comprising:

- an assembling station (35) for cardboard boxes,
- a male former (36) located in relation to the assembling station (35), which descends vertically into an assembling mould (37), where
- the assembling mould (37) is facing the male former (36) and arranged under said male former (36),

characterised in that the machine (1) comprises:

- a feeding device (2) for sheets of cardboard comprising: a frame (3) to support the sheets of cardboard, joined to two drag chains (4) independent from each other,
- a first guiding means (10) for guiding the sheets of cardboard along the feeding device (2), connected to a second guiding means (13) of the sheets of cardboard moving towards the assembling station (35), so that a single adjusting means (15) is able to completely control said guiding means (10, 13) in order to adapt them to the different dimensions of the sheets of cardboard to be used,

- a sucking mechanism (18) of the sheets of cardboard from the frame (3) in order to adapt it to the different dimensions of the sheets of cardboard to be used,
- a pushing system (26) to push the sheets of cardboard towards the assembling station (35) that identifies advancing and stopping positions in relation to the measurements of the sheet inserted by the user in the machine (1),

where the feeding device (2) for sheets of cardboard, the first (10) and second guiding means (13), the sucking mechanism (18) and the pushing system (26) are interconnected by means of the frame (3).

2. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the drag chains (4) are partially supported on the machine (1), leaving at least one third of said drag chains (4) hanging and projecting from the machine (1).

3. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claims 1 or 2, **characterized in that** each of the drag chains (4) comprises:

- a closed loop sliding chain, and coupled to said sliding chain there are a pair of gears (30) located at the ends thereof, which are coupled to transversal axes (31), where
- one of the transversal axes (31) is joined to a ratchet (8) actuated by a pneumatic cylinder (7),
- the ratchet (8) comprises a free wheel (32) that allows the sheets of cardboard to move towards the assembling station (35), blocking the movement in the opposite direction, and said free wheel (32) is coupled to said transversal axis (31) by means of a keyway, and it is inserted in a bushing (33) that moves the pneumatic cylinder (7).

4. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 3, **characterized in that** said drag chains (4) have a total length of at least 1,000 mm.

5. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 4, **characterized in that** each of the drag chains (4) have a total length of 1,500 mm.

6. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the drag chains (4) also comprise a load indicator cam (38) in the ends that are connected to the crossbar (6) of the frame (3), which is coupled to a positioning sensor (39) to stop the move-

ment of the drag chain (4) when the sheet of cardboard reaches the required position and is supported by the frame (3).

7. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the drag chains (4) are mounted on at least two spindles (9) that independently regulate the distance between the two drag chains (4) in order to adapt them to the dimensions of the sheet of cardboard. 5 10
8. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the frame (3) of the feeding device (2) comprises an adjusting device (5) to regulate the height of said frame (3) in order to adapt it to the dimensions of the sheets of cardboard to be used. 15
9. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the sucking mechanism (18) comprises two parallel guides (19) with suction pads (20) located on the upper part of the parallel guides (19), where said parallel guides (19) are joined together at the end thereof by means of an axis (21). 20 25
10. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 9, **characterized in that** the axis (21), together with the parallel guides (19) with the suction pads (20), are actuated by means of a servomotor (24), where the turning of the servomotor (24) moves a disk (22) and a bushing (23) that make contact with the axis (21), with said movement of the disk (22) and the bushing (23) resulting in an angular turning of the axis (21) and the parallel guides (19) with the suction pads (20) from a horizontal position to a vertical position, where said suction pads (20) suck the sheets of cardboard from the frame (3). 30 35 40
11. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 10, **characterized in that** the suction pads (20) are chosen between independent electric valves and taps. 45
12. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claims 1 or 9, **characterized in that** the sucking mechanism (18) comprises at least one spindle (25) that symmetrically regulates the distance between the parallel guides (19) with the suction pads (20), in order to adapt it to the dimensions of the sheet of cardboard. 50
13. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the first guiding means (10) comprise a first parallel vertical supports (11) that face each 55

other and that are joined by means of a supporting bar (12).

14. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the second guiding means (13) comprise a second parallel vertical supports (14) that face each other and that are joined by means of a guide with centred glue injectors (16) and by means of the adjusting device (15). 10
15. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the adjusting device (15) of the first (10) and second guiding means (13) comprises at least two spindles (17) that regulate the width of the second guiding means (13) and the first guiding means (10) in order to adapt them to the dimensions of the sheet of cardboard. 15
16. A machine (1) for assembling cardboard boxes, with a feeding device (2), according to claim 1, **characterized in that** the pushing system (26) comprises a servomotor (29), which as it turns it causes a pushing element (27) to push the sheets of cardboard horizontally along guides (28). 20 25

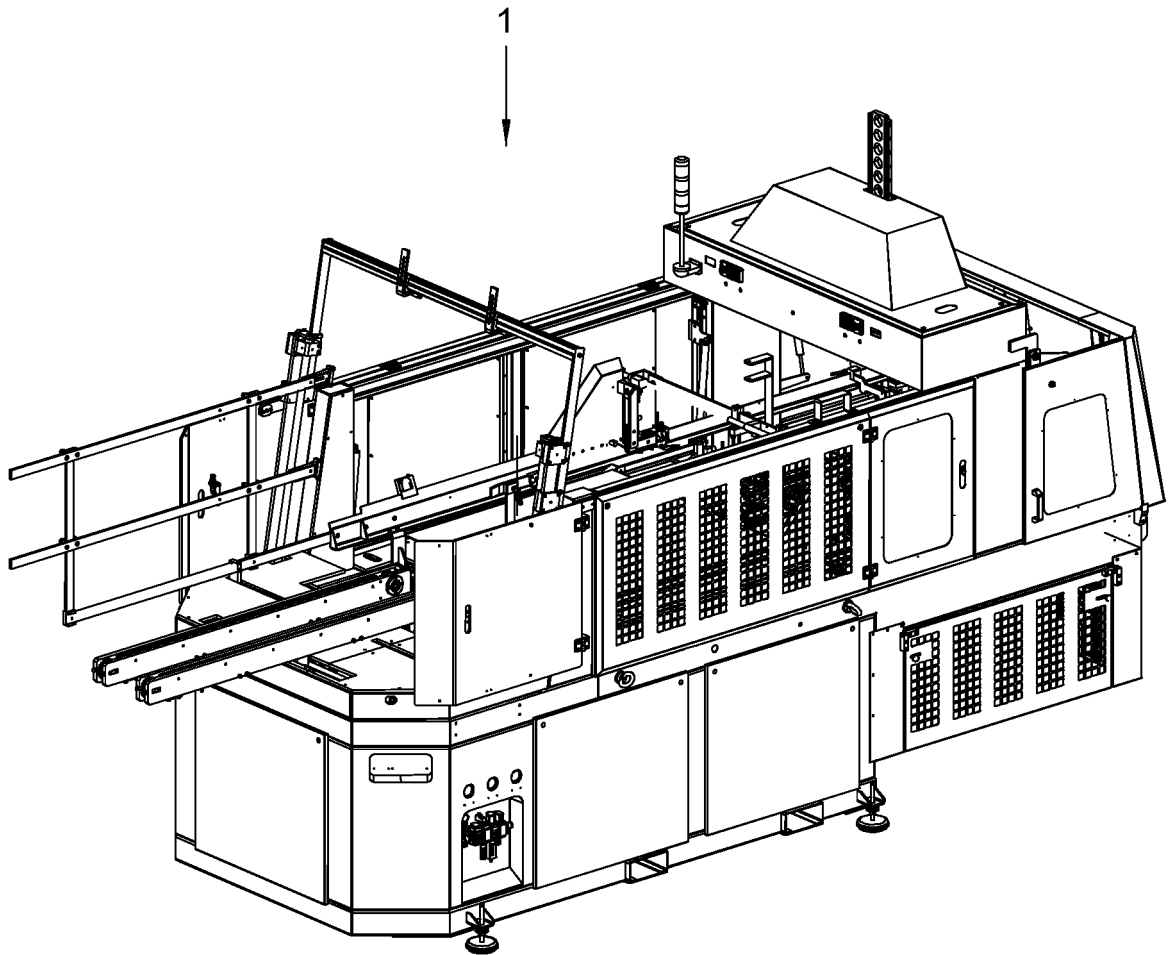


FIG. 1

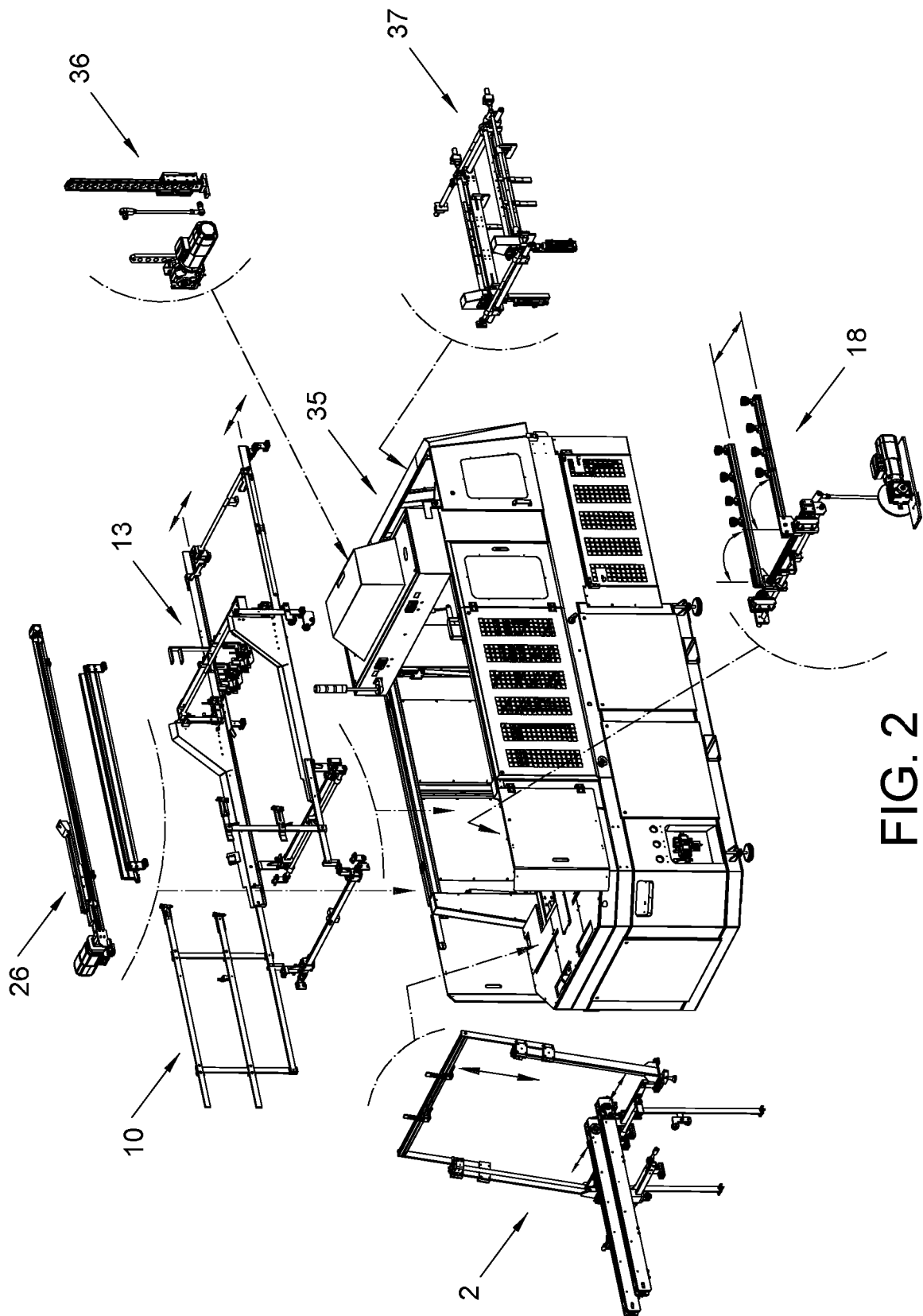


FIG. 2

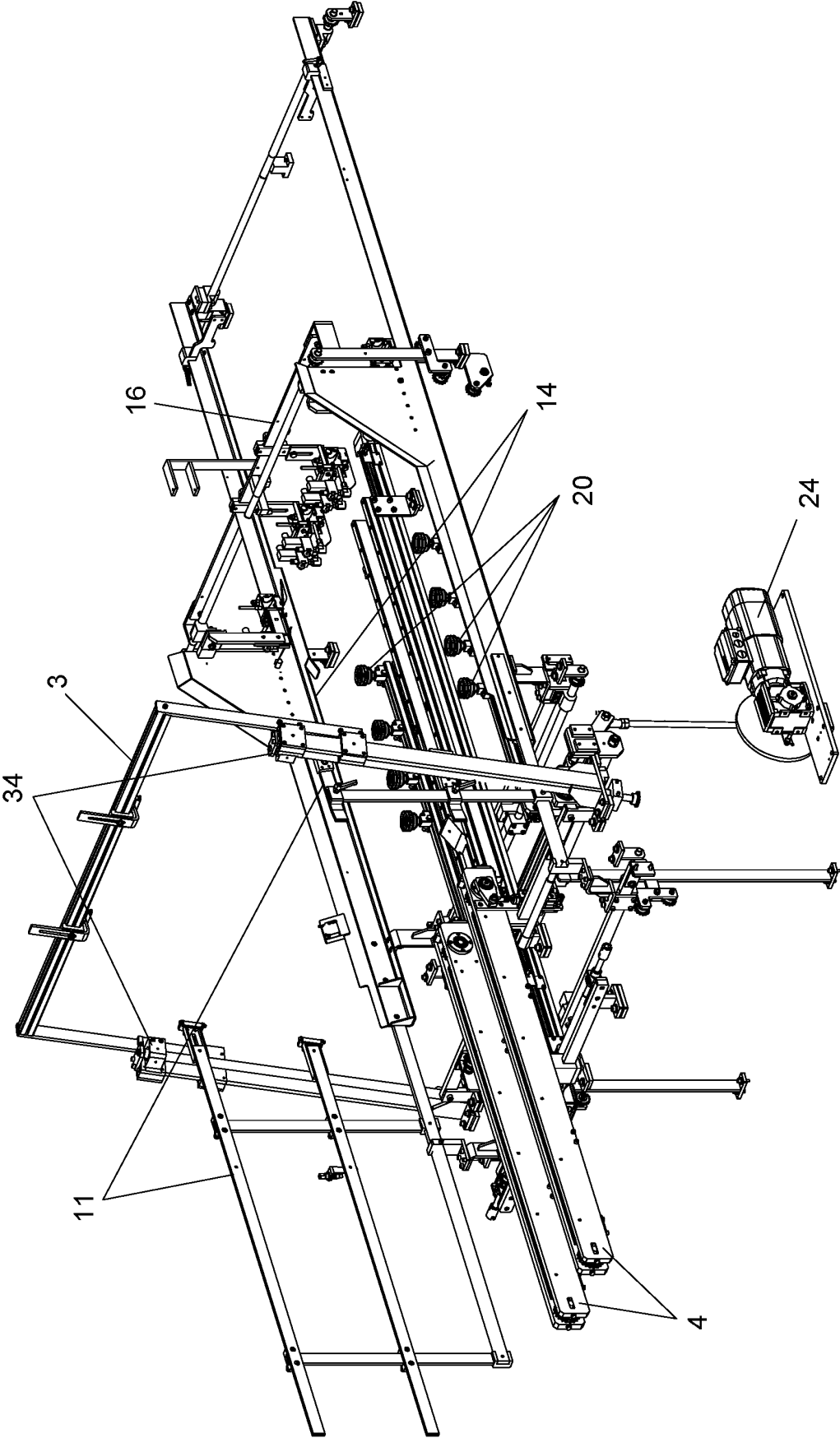


FIG. 3

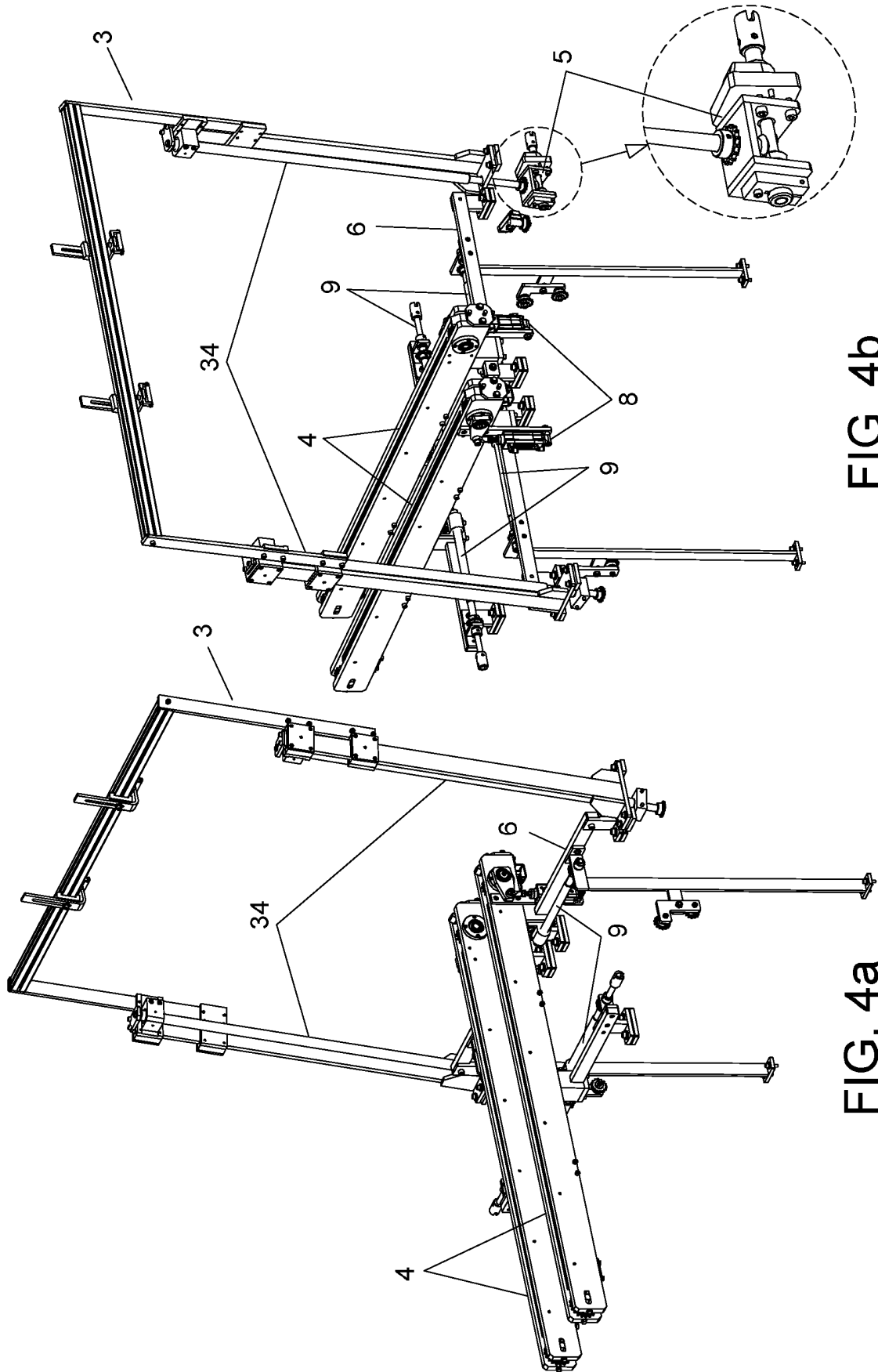


FIG. 4b

FIG. 4a

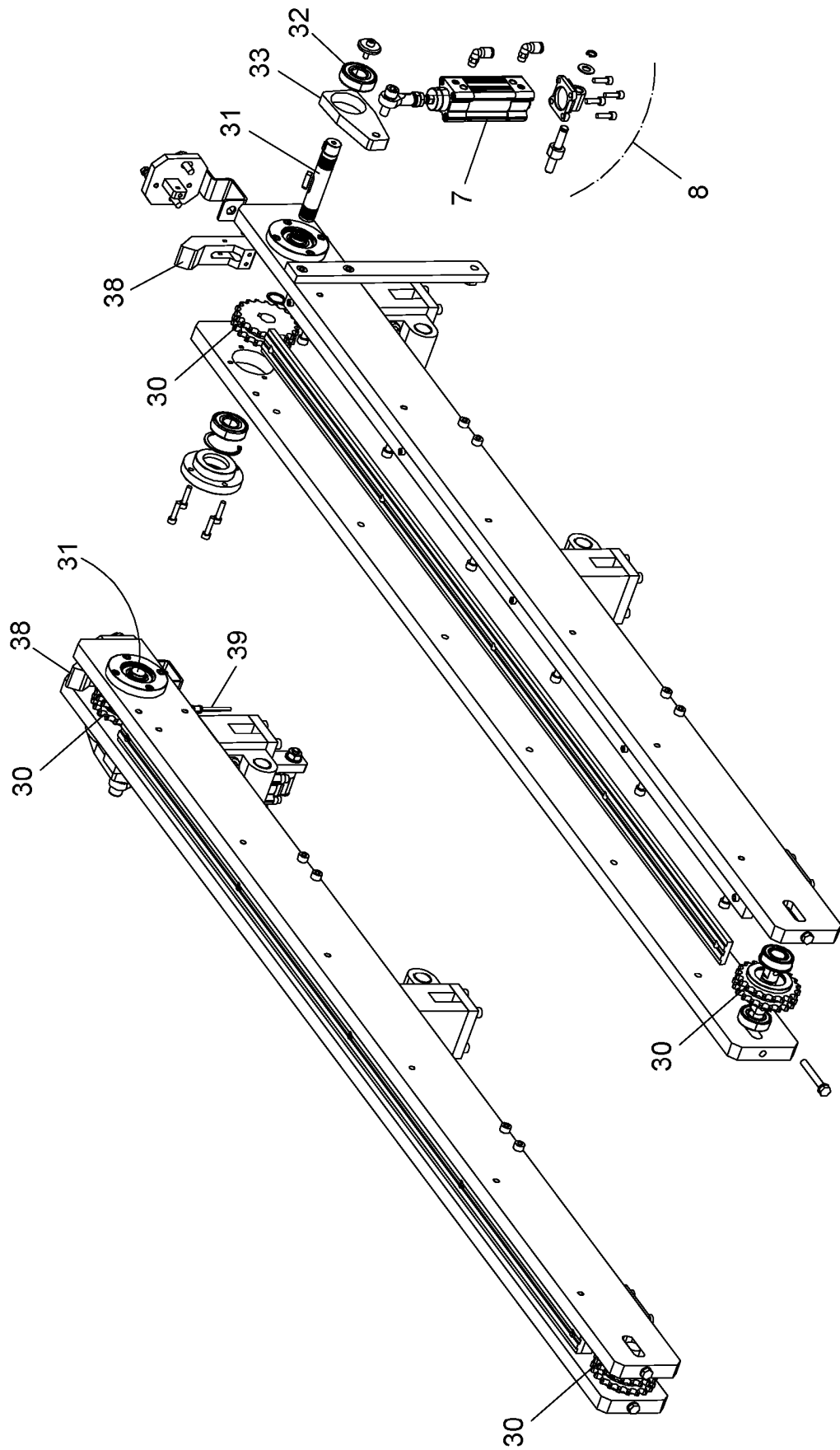


FIG. 4c

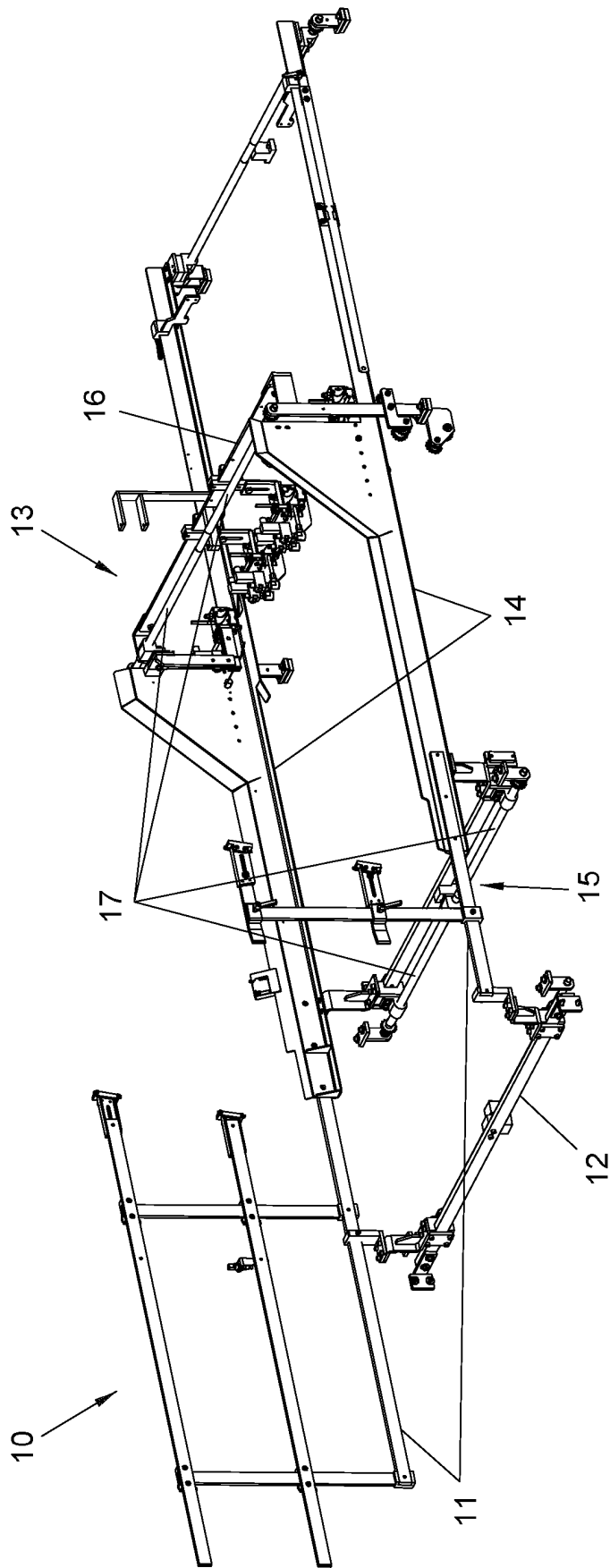


FIG. 5

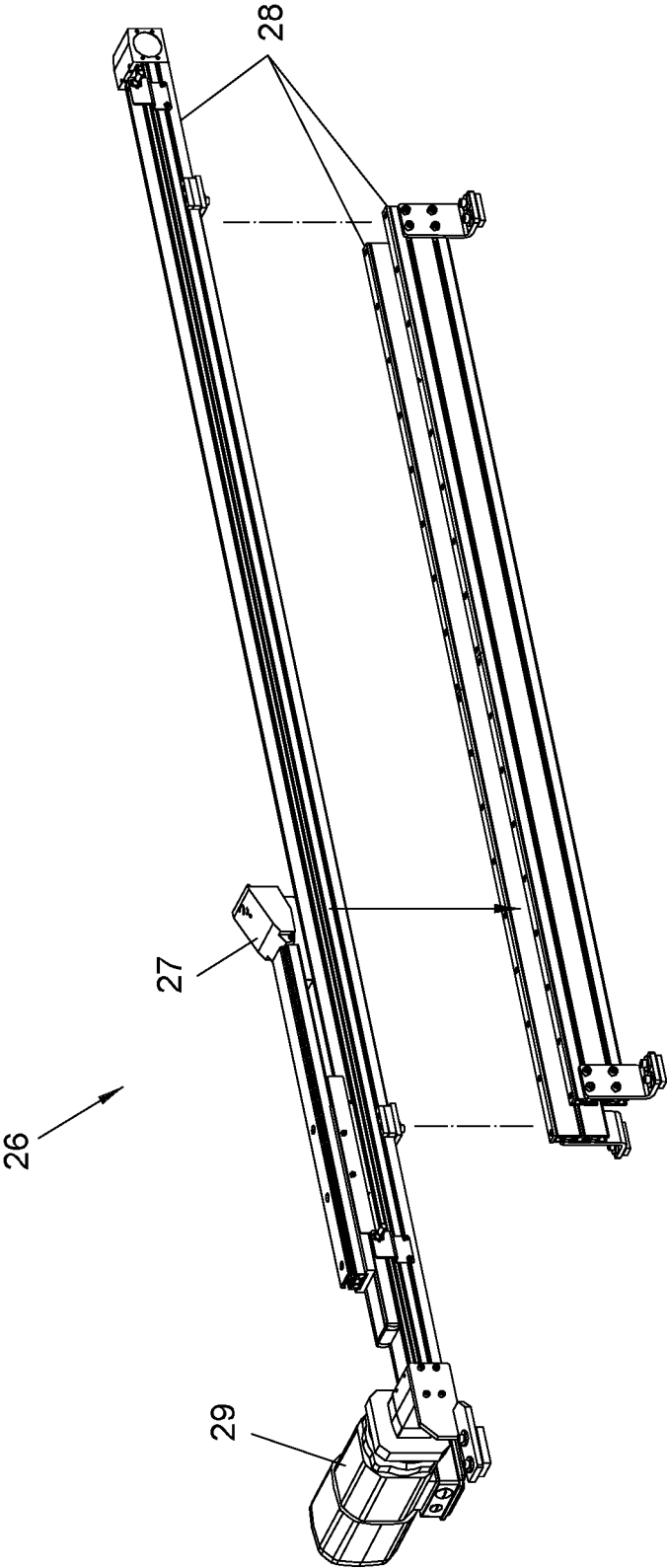


FIG. 6

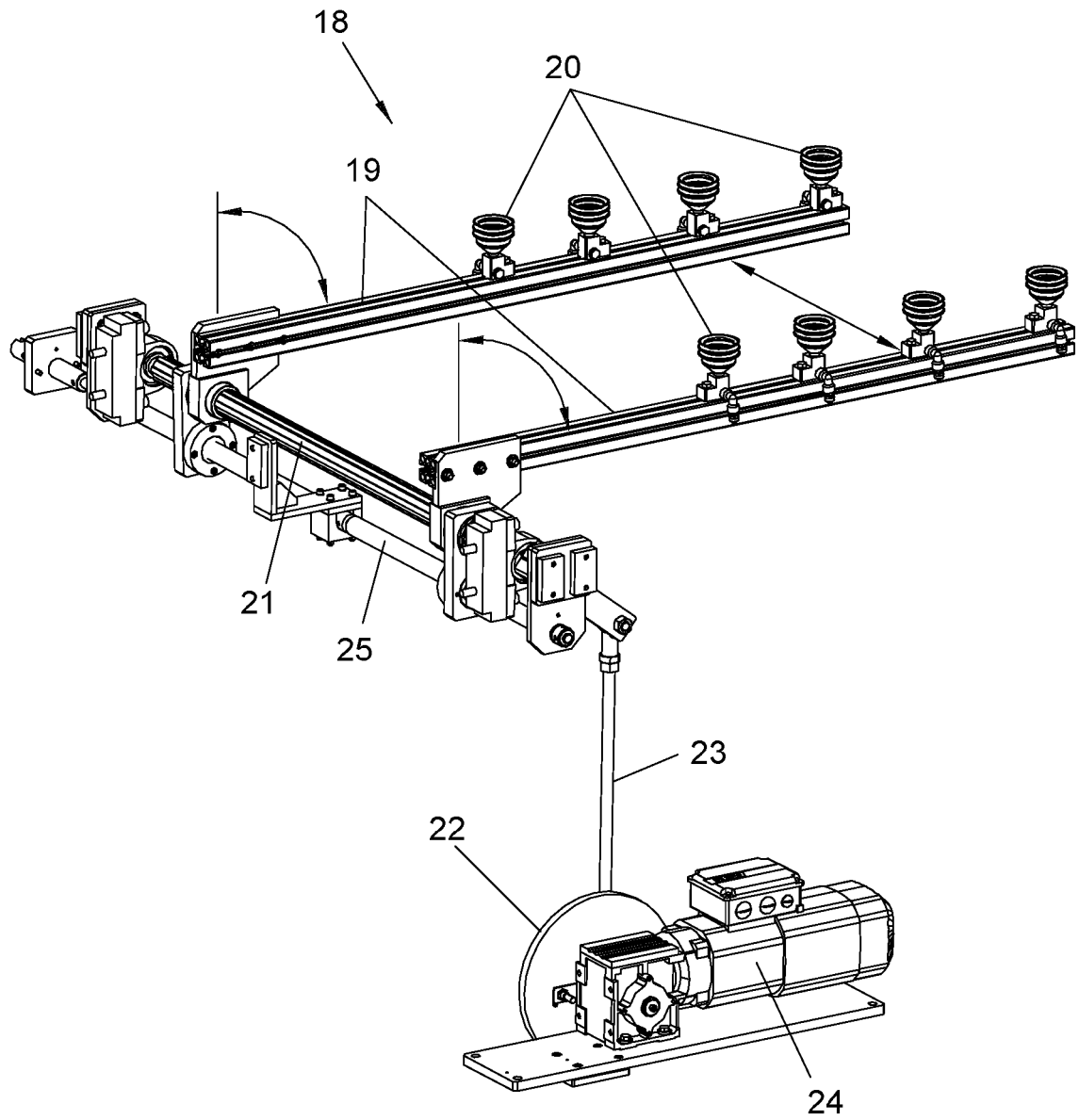


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2015/070660

A. CLASSIFICATION OF SUBJECT MATTER

B31B1/06 (2006.01)

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)

B31B

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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2011161287 A1 (BOIX MAQUINARIA S L ET AL.) 29/12/2011, Pages 5-12; figures 1-9	1-3, 9, 12-13
A	US 5290224 A (BOIX JAEN JOSE) 01/03/1994, Columnas 3-4; figures 1-11	1, 9
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A	EP 1359002 A1 (MOHRBACH MASCHINENFABRIK GMBH) 05/11/2003, claim 1; abstract; figure 1	1

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
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Name and mailing address of the ISA/

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C (continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
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A	WO 2011086213 A1 (BOIX MAQUINARIA S L ET AL.) 21/07/2011, Pages 11-13; figures 1-5	1, 9
A	ES 2100250T T3 (LAWRENCE PAPER CO) 16/06/1997, Pages 10-11; figures 1-5	1

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