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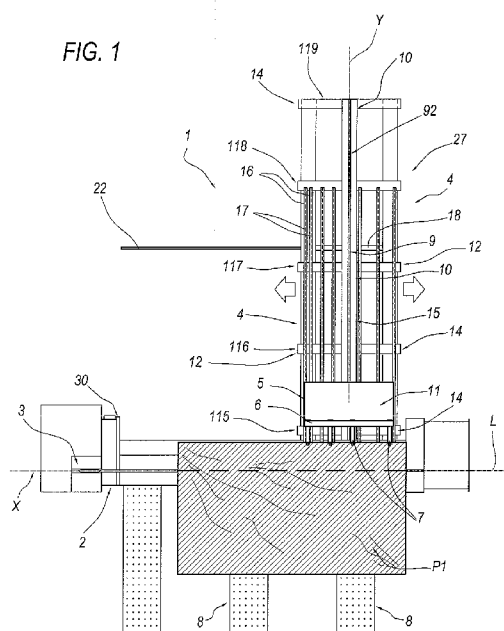
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(54) Title: PANEL SAW MACHINE



(57) Abstract: A panel saw machine (1) for cutting panels (P1, P2) comprises: a base (2); a cutting unit (3), forming a cutting line (L), mobile along the base (2) for dividing the panels into two or more sub-panels; a work table (4) for supporting the panels (P1, P2) and associated with the base (2); a pusher assembly (5) that moves towards and away from the cutting line (L) in a longitudinal direction (Y) transversal to the cutting line (L) to position the panels (P1, P2) at the cutting unit (3); a guide (9) for the mobile pusher assembly (5) comprising a beam (10) which extends centrally with respect to the work table (4).

Description

A panel saw machine

Technical Field

This invention relates to a panel saw machine and, in particular, to a panel saw machine comprising a horizontal work table to support the panels and on
5 which a mobile pusher assembly moves at least one panel.

The work table extends principally in a longitudinal direction Y and the mobile pusher assembly comprises a panel abutment element or fence extending in a direction X substantially perpendicular to the direction Y.

In the specification of this invention, reference is made by way of example
10 to panel saw machines in which the panel abutment or pushing fence (which also acts as a pushing element) is driven from below and through the work table; reference is also made to panel saw machines with a single cutting line.

Background Art

15 Prior art panel saw machines also comprise a cutting unit, for example a revolving blade unit, that moves in X and is designed to saw a panel or stack of panels.

The pusher moves towards and away from the cutting unit not only to drive the panels over the work table towards the cutting unit but also to define an
20 abutment to stop the panels at a predetermined distance from the cutting line.

The mobile pusher assembly may comprise a plurality of elements (normally referred to as gripper clamps) for picking up and holding the panels and suitably mounted on the abutment element.

The pick-up elements are designed to grip the stack of panels or the
25 individual panels in such a way as to move them towards and away from the cutting line.

On the part of the work table on the opposite side of the cutting line, these machines also comprise a plurality of low-friction tables for supporting and receiving the cut panels as they feed out of the cutting line.

30 The pusher of a panel saw machine of this kind moves along a straight guide usually mounted under the work table.

The guide, which basically comprises two parallel beams, each associated with respective systems for advancing the pusher unit, is usually anchored to the floor and extends in the direction Y.

5 The guide beams are substantially parallel to the two longitudinal sides of the work table and each supports a carriage for moving the mobile pusher assembly which extends for the full width of the machine and which is connected to the two carriages.

10 Prior art solutions thus comprise systems for advancing the carriages which in turn comprise a pair of racks, belts, cables and the like, each associated with one of the beams and with the respective carriage.

The means for feeding the carriages associated with the individual beams are driven independently of each another and suitably synchronized to keep the abutment fence parallel with itself and with the cutting line as it moves forward.

15 In short, therefore, the abutment fence abuts against and is moved by the two carriages, each mobile on the respective beam.

Synchronization is achieved, for example, by mechanical connections between separate parallel parts or by magnetic or electronic devices for monitoring the forward movement of the mobile pusher assembly and to control its drives accordingly.

20 If mechanical connections are used to link the drive parts or the carriages of the separate beams, the resulting guide structure becomes quite complex and requires painstaking assembly and set-up procedures.

25 Further, to be able to cut the panels precisely, the tolerances on the transmission parts must be very tight, for example, in the order of just a few hundredths, so that highly accurate measurements made directly with reference to the mobile pusher assembly can be accompanied by equally precise control of the feed motion of the pushing fence.

30 In the latter case, therefore, the use of highly sophisticated and inherently precise systems for measuring the positions of the drive parts and/or of the pushing fence and/or of the mobile pusher assembly and/or of the carriages in order to monitor the feed movements requires the use of drive systems which are also extremely precise. As a result, production costs are considerably increased.

In this context, the main purpose of this invention is to provide a simplified panel saw machine that is free of the above mentioned disadvantages.

Aim of the Invention

This invention has for an aim to provide a panel saw machine that makes it possible to optimize the movement of the panels towards the cutting line.

5 The stated technical purpose and aims of the invention are substantially achieved by a panel saw machine as described in claim 1 and in one or more of the claims dependent thereon.

Brief Description of the Drawings

10 Further characteristics and advantages of the invention are more apparent in the detailed description below, with reference to a preferred, non-limiting, embodiment of a panel saw machine, illustrated in the accompanying drawings in which:

- 15 - Figure 1 is a schematic top plan view, with some parts cut away for clarity, of a panel saw machine according to the invention in a first operating configuration;
- Figure 2 is a schematic top plan view, with some parts cut away for clarity, of the machine of Figure 1 in a second operating configuration;
- Figure 3 is a schematic side view, with some parts in blocks and others cut away for clarity, of the machine of Figure 1;
- 20 - Figure 4 is a schematic top plan view, with some parts cut away for clarity, of a second embodiment of the panel saw machine according to the invention;
- Figure 5 shows a detail of the machine of Figure 4 in a schematic view from A and with some parts cut away for clarity;
- 25 - Figure 6 shows the detail of Figure 5 in a schematic side view and with some parts cut away for clarity;
- Figure 7 is a schematic and suitably interrupted side view, with some parts cut away for clarity, of a third embodiment of the panel saw machine according to the invention;
- 30 - Figure 8 shows a detail of the machine of Figure 7 in a schematic front view from B and with some parts cut away for clarity.

Detailed Description of the Preferred Embodiments of the Invention

35 With reference to the accompanying drawings, the numeral 1 denotes in its entirety a panel saw machine according to this invention.

In particular, the panel saw machine 1 referred to in this specification is of substantially known type and therefore not described in detail and has a single sawing axis for cutting whole panels P1, P2 or portions or strips of panels.

The machine 1 comprises a base 2 which extends in a direction or axis X.

5 At the base 2, the machine 1 comprises a cutting unit 3, for example of the type with a revolving blade, that moves in X along a respective cutting line L to saw the panels P1, P2.

10 A horizontal work table 4 for supporting the panels and extending principally in a direction or axis Y perpendicular to the direction X is mounted on the base 2, as described below, substantially at the cutting unit 3.

To one side of the work table 4, for example on the left in Figures 1 and 2, the machine 1 comprises a contact element 30, commonly known as "fence", for abutting the panels being processed.

15 The machine 1 further comprises a mobile pusher assembly 5 for moving and positioning the panels on the table 4.

In particular, the pusher assembly 5 is mobile in Y between a position where it is away from the cutting line L, illustrated for example in Figures 4 and 7 (with a dashed line in the latter figure) and a position where it is close to the cutting line L, illustrated in Figures 1, 6 and 7.

20 The mobile pusher assembly 5 comprises an element or beam 6 for abutting the panels and extending in the direction X.

The mobile pusher assembly 5 also comprises a plurality of elements 7 for gripping and holding the panels P1, P2 and suitably mounted in known manner on the abutment element 6.

25 The pick-up elements 7, for example of the clamping type, are designed to grip the stack of panels or the individual panels in such a way that the panels can be moved towards and away from the cutting line L.

As illustrated in Figure 2, the pick-up elements 7 comprise a pick-up element 7a mounted on the beam 6 and mobile along the beam in the direction X.

30 Drive means of substantially known type and therefore not described here are associated with the element 7a and move the latter along the beam 6.

35 As illustrated in Figure 2, the mobile pusher assembly 5 comprises a pick-up element 7b mounted on the beam 6 and mobile between a position where it is close to the beam 6 and a position where it is away from the beam in the direction Y.

Drive means of substantially known type and therefore not described here are associated with the element 7a and move the latter along the beam 6.

Advantageously, the mobility of the pick-up element in X and Y as described above is combined in a single pick-up element 7c.

5 On the side opposite the work table 4 relative the cutting line L, the machine 1 comprises a plurality of low-friction tables 8 for supporting and receiving the cut panels as they feed out of the cutting line L.

10 The machine 1 comprises a guide 9 along which the pusher assembly 5 moves; the pusher assembly 5 is driven by substantially known drive means 90, described in more detail below.

The guide 9 extends in the direction Y and is located along a beam 10 and secured to the base 2.

The mobile pusher assembly 5 comprises a main body 11 slidably connected to the guide 9 that mounts the panel abutment beam 6.

15 Looking more closely at the constructional details of the guide 9, with reference in particular to Figures 4 to 9, it is important to note that, in the preferred embodiment of the invention, this guide comprises a structural member in the form, for example, of the beam 10, which extends longitudinally along the axis Y.

20 Preferably, the structural member 10 is located half way across the panel work table 4.

The guide 9 comprises a rail 92 attached to the structural member 10 and extending along the latter.

25 The mobile pusher assembly 5 comprises a first and a second slide shoe 93, 94, to which the body 11 is attached and which are aligned in Y and engaged with the rail 92.

30 Advantageously, the slide shoes 93, 94 are applied to a middle portion of the body 11 in such a way that the mobile pusher assembly 5 is centrally attached to the rail 92 along which it is moved by the drive means 90, as described in more detail below.

Alternatively, in an embodiment that is not illustrated, the structural member or beam 10 is provided with a pair of parallel rails 92 and respective slide shoes mounted parallel to the body 11.

This solution optimizes the precision of carriage 5 drive on the beam 10.

As shown in particular in Figures 5 and 8, the mobile pusher assembly 5 extends along the axis X on both sides of the rail 92 all the way across the horizontal panel work table 4.

5 In practice, advantageously, the mobile pusher assembly 5 is slidably connected to the beam 10 centrally with respect to the width of the work table 4 and is mobile on the latter along the axis Y.

In order to minimize oscillations of the mobile pusher assembly 5, especially about the axis Y, at the rail 92, the machine 1 comprises means 95 for opposing the oscillations and operating on the mobile pusher assembly 5.

10 In the preferred embodiment illustrated in Figure 5, the means 95 comprise a profile 96 or supporting guide, extending parallel to the structural member 10 and suitably spaced from the latter, and a carriage 97, attached to the mobile pusher assembly 5, engaged with the profile 96 and slidable along the latter.

15 The carriage 97, which opposes any oscillations caused by the mobile pusher assembly 5 and discharges them on the profile 96, is fixed at the bottom to the body 11 of the pusher assembly 5.

As illustrated, the profile 96 has a horizontal flange 98 which the carriage 97 is engaged with.

20 The latter has a first and a second roller 99, 100 having axes R1, R2 parallel to the axis X, vertically aligned and located on opposite sides of the flange 98.

In practice, as the mobile pusher assembly 5 moves along the guide 92, the rollers 99 and 100 roll on the flange 98, on opposite sides of it, in such a way as to oppose any upward or downward oscillations of the pusher assembly 5 at the carriage 97.

25 As shown in Figures 4, 5 and 6, the means 90 for driving the mobile pusher assembly 5 comprise a rack 101 and a power-driven pinion 102 that meshes with the rack.

The rack 101 extends along the axis Y and is rigidly attached to the structural member 10 that mounts the mobile pusher assembly 5.

30 In the embodiment illustrated, the mobile pusher assembly 5 comprises a unit 103, not described in detail, for driving the pinion 102. As illustrated, the pinion 102 has an axis of rotation Z perpendicular to the axes X and Y.

In use, the rotation of the pinion 102 meshed with the rack 101 causes the mobile pusher assembly 5, inclusive of the drive unit 103 and the pinion 102
35 itself, to move along the rail 92 towards and away from the cutting line L.

It should be noticed that the rack 101 extends in the proximity of the rail 92, thus optimizing the mobile pusher assembly 5. The action of the drive means 90 is thus concentrated at the rail 92, which means that the oscillations of the mobile pusher assembly 5 caused by the drive means 90 are substantially eliminated with a relatively simple architecture of the machine 1.

As shown in Figures 7, 8 and 9, the drive means 90 comprise an endless belt 104 trained around a plurality of pulleys 105, 106, 107 and 108, one of which, labelled 105, is power driven.

The axes R5, R6, R7, R8 of the respective pulleys 105, 106, 107 and 108 are parallel to the axis X.

Preferably, the belt 104 is fastened to the mobile pusher assembly 5, which is thus connected to the latter, in particular with its upper section 109, and extends along the axis Y substantially at the rail 92.

The mobile pusher assembly 5 comprises an element 110 for fastening the belt 104 to the pusher assembly 5 itself.

The element 110 meshes with the belt teeth and locks the belt to the mobile pusher assembly 5.

The upper section 109, which drives the mobile pusher assembly 5, is close to the rail 92 and thus, as in the example described above, the oscillations of the mobile pusher assembly 5 caused by the drive means 90 are substantially eliminated.

The drive means 90 comprise a unit 111 which drives the pulley 105 and which is of substantially known type and therefore not described.

Generally speaking, while maintaining the efficiency of mobile pusher assembly 5 drive in the machine 1, the drive means 90 are considerably simpler than the drive systems known in the prior art since there is no longer any need to coordinate a plurality of parallel drive parts.

The machine 1 comprises a chain 120 operating between the base 2 and the mobile pusher assembly 5 to support the means, not illustrated, that actuate the mobile pusher assembly 5 as the mobile pusher assembly 5 itself moves along the beam 10.

Preferably, the beam 10 is rigidly attached to the base 2. This solution is particularly advantageous for medium to small panel saw machines 1, guaranteeing a sufficient level of rigidity for them.

These panel saw machines are designed to cut panels that are not particularly large. Thanks not only to the single beam 10 that supports the carriage 5 but also to the special design of the drive means 90, the overall structure of the panel saw machine 1 is extremely simple and can be rapidly installed and set up.

5 The machine 1 comprises one or more work table 4 brackets 12 attached to the beam 10.

Each bracket 12 has a horizontal arm 14 for supporting the table 4.

It is important to note that the work table 4 has a longitudinal opening 15 to allow the mobile pusher assembly 5 to move towards and away from the cutting line L.

10 Preferably, the work table 4 is composed of a plurality of separate longitudinal members 16 supported by the arms 14 and fitted with low-friction running elements 17 such as wheels.

Figure 3 in particular shows how the beam 10 is mounted on a supporting leg 18.

15 More specifically, the machine 1 comprises a frame 112 for mounting the beam 10.

The frame 112 is in turn supported by the base 2 and leg 18.

20 In the preferred embodiment already mentioned, where the beam 10 is rigidly attached to the base 2, it is the frame 112 itself that is integral with the base 2.

The frame 112 comprises a pair of longitudinal beams 113, 114 that extend in the direction Y from the base 2 to the end of the machine 1 opposite the base 2.

25 The frame 112 comprises a plurality of crossbeams 115, 116, 117, 118 and 119 extending along the axis X and attached to the beams 113, 114.

Preferably, the crossbeams 115, 116, 117, 118 and 119 define the above mentioned horizontal arms 14 and therefore support the panel work table 4.

The beam 10 is attached to and supported by the crossbeams 115, 116, 117, 118 and 119 at a position half way along the crossbeams themselves.

30 In the embodiment illustrated in Figure 3, the leg 18 is provided with at least one wheel 20 that enables it to be moved so that the beam 10, the mobile pusher assembly 5 and the work table 4 can be moved in the direction X.

35 In this configuration, therefore, the beam 10 is not rigidly connected to the base 2 as described above with regard to a first preferred embodiment, not illustrated for simplicity, but is slidably connected to the base.

Preferably, the machine 1 comprises a guide 22 for the wheels 20 of the leg 18; it should be noticed that the guide 22 advantageously extends in the direction X.

Advantageously, one end 23 of the beam 10 is slidably connected to a
5 respective guide 24 located in the base 2 and extending in the direction X.

In this way, the beam 10 is supported by the leg 18 and at the guide 24.

The beam 10, the supporting leg 18, the mobile pusher assembly 5, the work table 4 and its brackets 12 together form a mobile structure 27.

More in detail, as shown in Figures 6 and 9, the beam 10 is slidably
10 connected to the guide 24 through the frame 112.

The frame 112 - and hence the beam 10 and the work table 4 - the mobile pusher assembly 5 and the respective drive means 90 thus constitute the mobile structure 27.

More specifically, the structure 27 is mobile between a first operating
15 position, illustrated in Figure 1, and a second operating position away from the first position in X, illustrated in Figure 2.

By way of example, Figure 1 shows the panel P1 while it is being cut longitudinally, whilst Figure 2 shows the panel P2 being cut transversally.

Preferably, at the first operating position, the structure 27 is located on the
20 right, looking at Figure 1, away from the abutment element 30, whilst in the second operating position, it is in abutment against said element.

Preferably, the machine 1 comprises means for driving the structure 27 in the direction X, schematically illustrated as a block 28 and not described in detail.

The drive means 28 are controlled by a computerized control unit 29 which
25 coordinates the movements of the structure 27.

Thus, the mobility of the structure 27 is suitably controlled and programmable through a succession of intermediate positions between the first and the second positions.

The invention, as described above, has important advantages.

30 The presence of a single structural member to form the guide on which the carriage runs makes it possible to apply extremely simple drive means that do not require any special system to keep the pushing beam, and hence the panels, parallel with the cutting line.

The single rack or chain or the like means that the methods of measuring
35 panel feed and sawing operations are more simple.

It will be understood that the invention can 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 panel saw machine for cutting panels (P1, P2) comprising:
a base (2);
a cutting unit (3) that moves along the base (2) to divide the panels into two or
5 more sub-panels, said cutting unit (3) forming a respective cutting line (L);
a work table (4) for supporting the panels (P1, P2) and associated with the base
(2);
a pusher assembly (5) that moves towards and away from the cutting line (L) in a
longitudinal direction (Y) transversal to the cutting line (L) to position at least one
10 panel (P1, P2) on the work table (4) at the cutting unit (3);
a guide (9) for the mobile pusher assembly (5);
means (90) for driving the mobile pusher assembly (5) along the guide (9);
the machine being characterized in that the guide (9) comprises a beam (10) which
extends centrally with respect to the work table (4).
15
2. The machine according to claim 1, characterized in that the mobile pusher
assembly (5) is slidably connected to the beam (10) at a substantially middle
portion of it.
- 20 3. The machine according to claim 1 or 2, characterized in that the drive means
(90) operate along a middle portion of the work table (4).
4. The machine according to any of the foregoing claims from 1 to 3,
characterized in that the drive means (90) operate at a middle portion of the
25 mobile pusher assembly (5).
5. The machine according to any of the foregoing claims from 1 to 4,
characterized in that the drive means (90) operate along the supporting beam (10).
- 30 6. The machine according to any of the foregoing claims from 2 to 4,
characterized in that the drive means (90) comprise at least one slide shoe (93, 94)
slidable along the beam (10), the mobile pusher assembly (5) being connected to
the beam (10) through the slide shoe (93, 94).

7. The machine according to any of the foregoing claims, characterized in that the drive means (90) comprise at least one first transmission element (102, 104), integral with the mobile pusher assembly (5), and a second transmission element (101, 105) that engages the first transmission element (102, 104).

5

8. The machine according to claim 7, characterized in that at least one of either the first or the second element (102, 104, 101, 105) extends parallel to and substantially at the beam (10).

10

9. The machine according to claim 7 or 8, characterized in that the first transmission element (102, 104) is in the form of a belt (104) which extends parallel to and at the beam (10), the mobile pusher assembly (5) being driven by the belt (104), the second element (101, 105) being in the form of a power-driven pulley (105).

15

20

10. The machine according to claim 7 or 8, characterized in that the second transmission element (101, 105) is in the form of a rack (101) associated and integral with the beam (10), the first element (102, 104) comprising a power-driven pinion (102) installed on the mobile pusher assembly (5) and meshed with the rack (101), the mobile pusher assembly (5) being driven along the beam (10) by the power-driven pinion (102).

25

11. The machine according to any of the claims from 1 to 10, characterized in that the mobile pusher assembly (5) comprises a beam (6) for abutting the panels (P1, P2) and at least one pick-up element (7) mounted on the abutment beam (6) for gripping the panels (P1, P2).

30

12. The machine according to any of the claims from 1 to 11, characterized in that the mobile pusher assembly (5) comprises a beam (6) for abutting the panels (P1, P2) and at least one first pick-up element (7a, 7c) mounted on the beam (6) and mobile along the latter.

35

13. The machine according to claim 12, characterized in that the first pick-up element (7a, 7c) is driven in the direction (X) parallel to the cutting line (L) by respective drive means.

14. The machine according to any of the claims from 1 to 13, characterized in that the mobile pusher assembly (5) comprises a beam (6) for abutting the panels (P1, P2) and at least one second pick-up element (7b, 7c) that moves between a position where it is close to the abutment beam (6) and a position where it is away from the latter.

15. The machine according to claim 14, characterized in that the second pick-up element (7b, 7c) is mobile in the direction (Y) transversal to the cutting line (L).

16. The machine according to any of the foregoing claims, characterized in that the guide (9) comprises at least one rail (92) associated with the beam (10), the mobile pusher assembly (5) being slidably connected to the beam (10) through the rail (92).

17. The machine according to any of the foregoing claims, characterized in that the second beam (10) is rigidly connected to the base (2).

18. The machine according to any of the foregoing claims from 1 to 16, characterized in that the mobile pusher assembly (5), the work table (4), the guide (9) of the mobile pusher assembly (5) and the drive means (90) form a structure (27) that moves in a direction parallel to the cutting line (L).

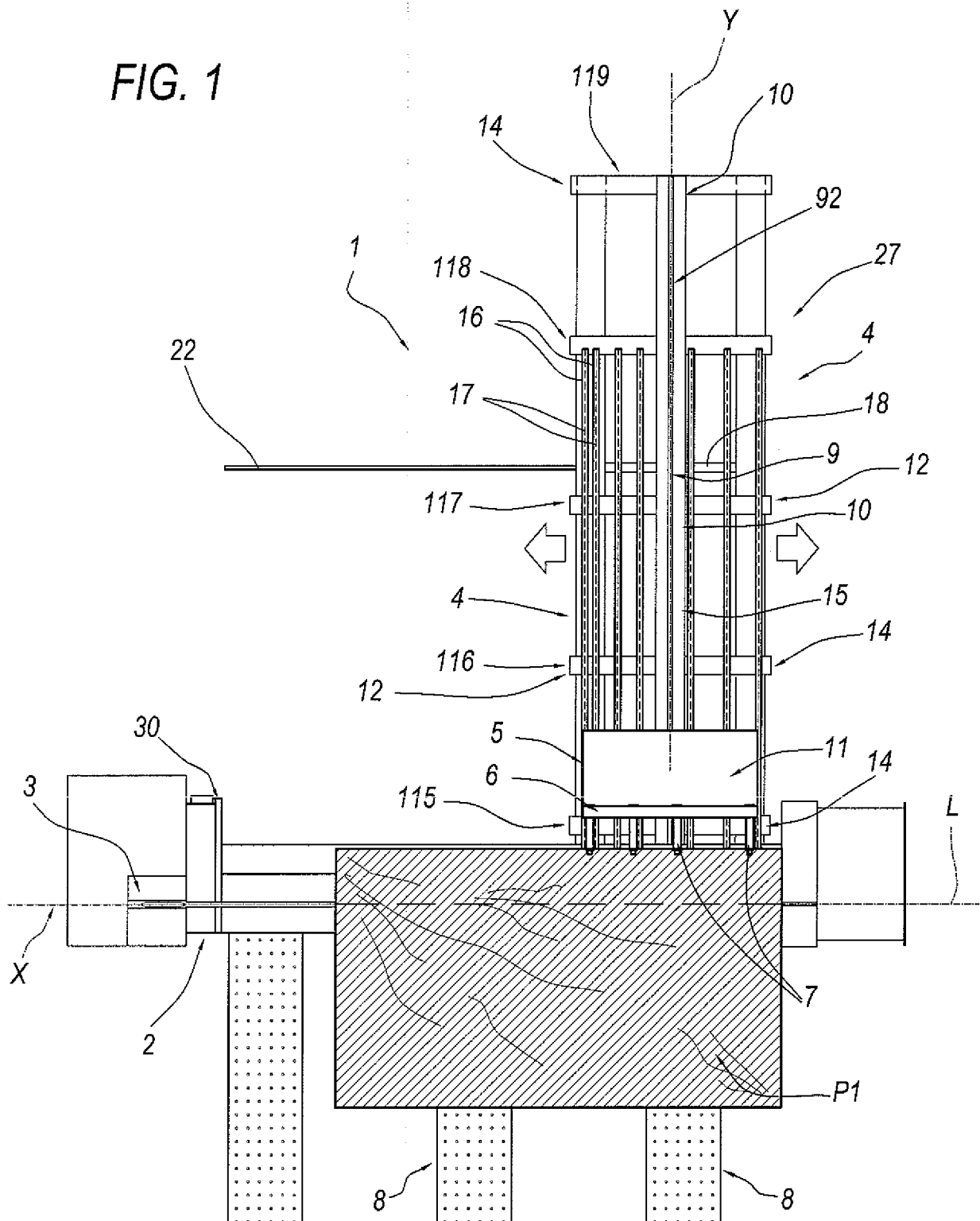
19. The machine according to claim 18, characterized in that the structure (27) which moves in a direction parallel to the cutting line (L) is slidably connected to the base (2).

20. The machine according to claim 18 or 19, characterized in that it comprises means (28) for driving the structure (27) in a direction parallel to the cutting line (L).

21. The machine according to claim 20, characterized in that it comprises a computerized control unit (29) for controlling the movement of the structure (27) in a direction parallel to the cutting line (L).

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FIG. 1



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FIG. 2

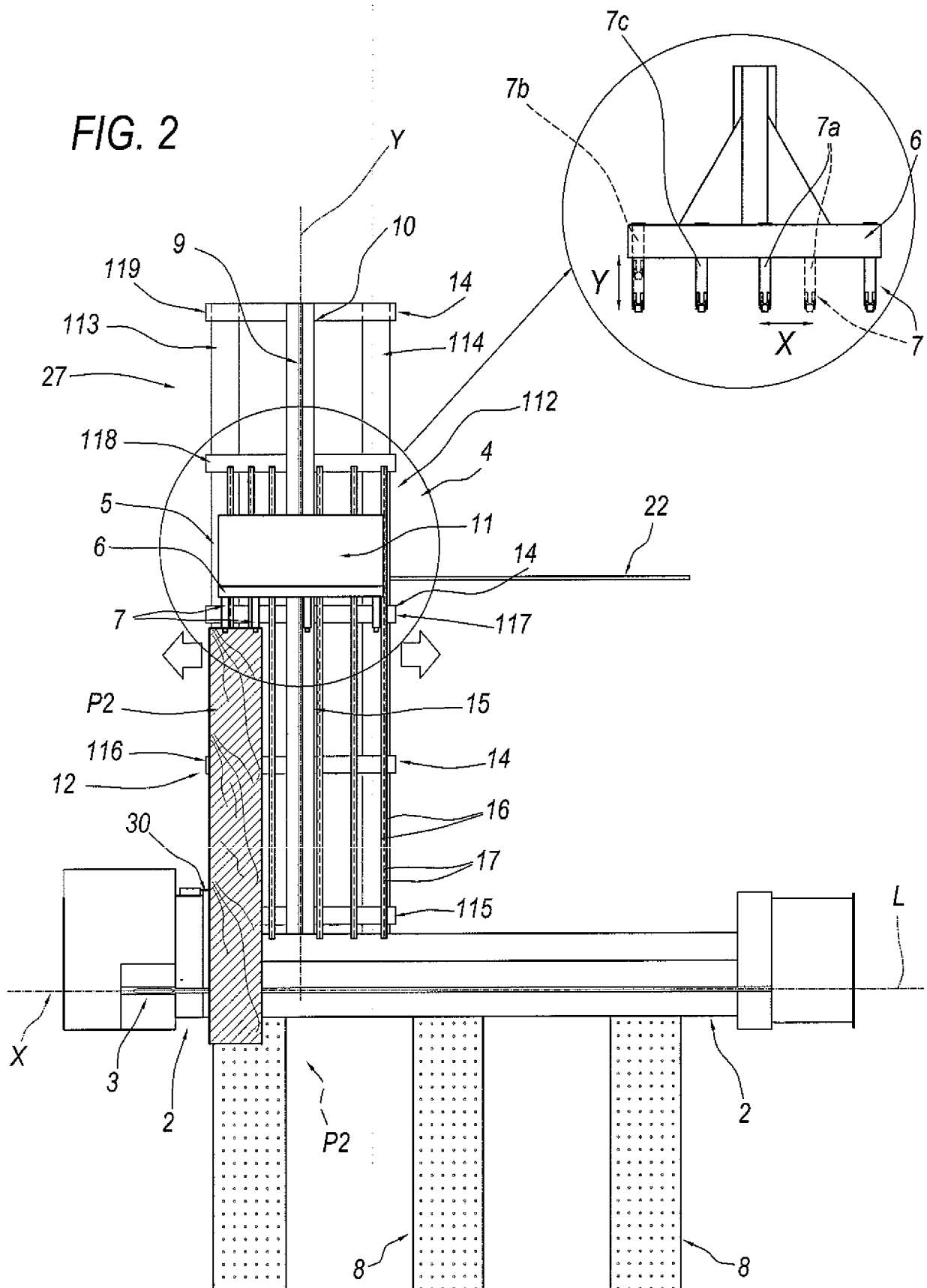
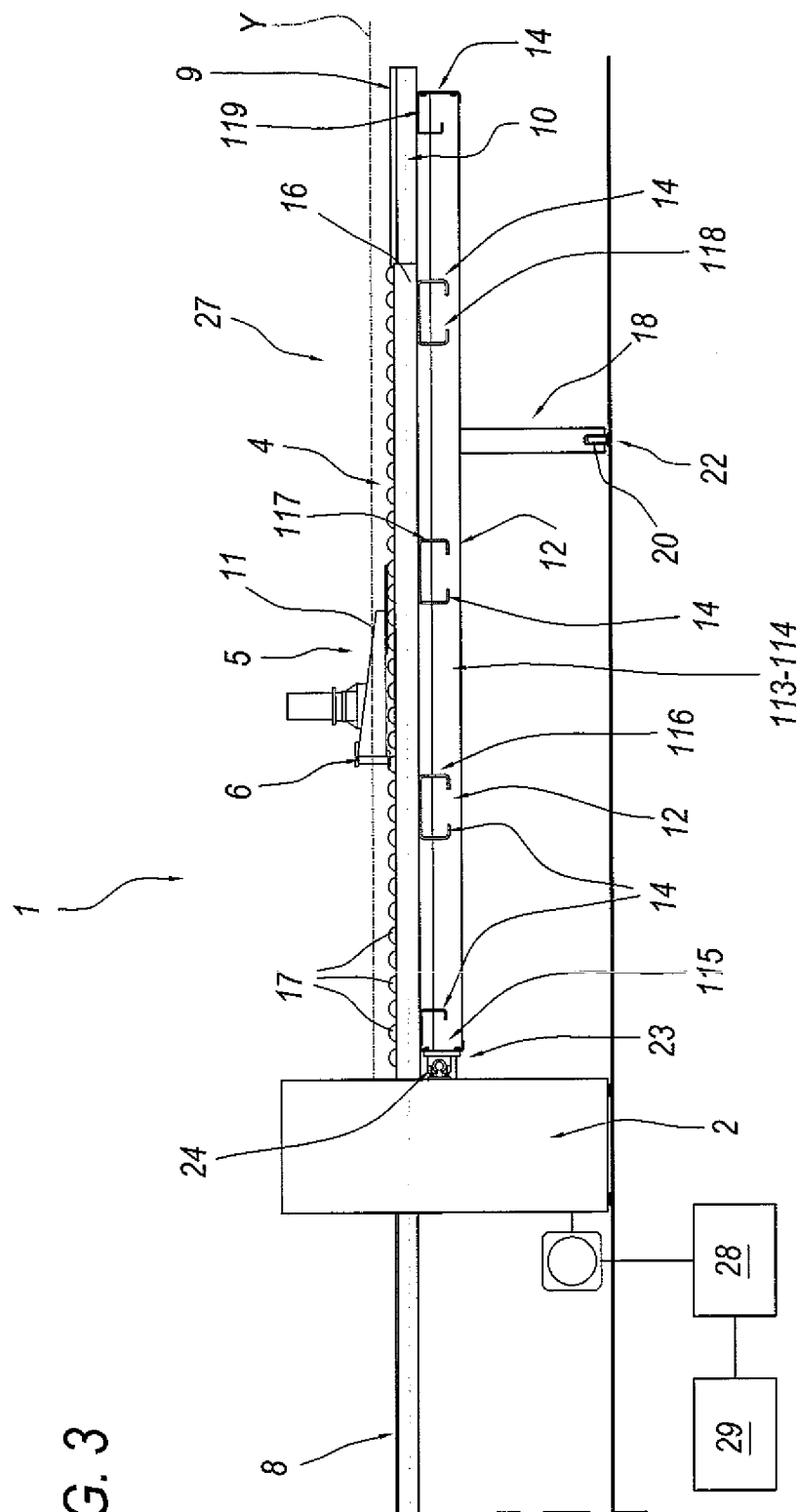
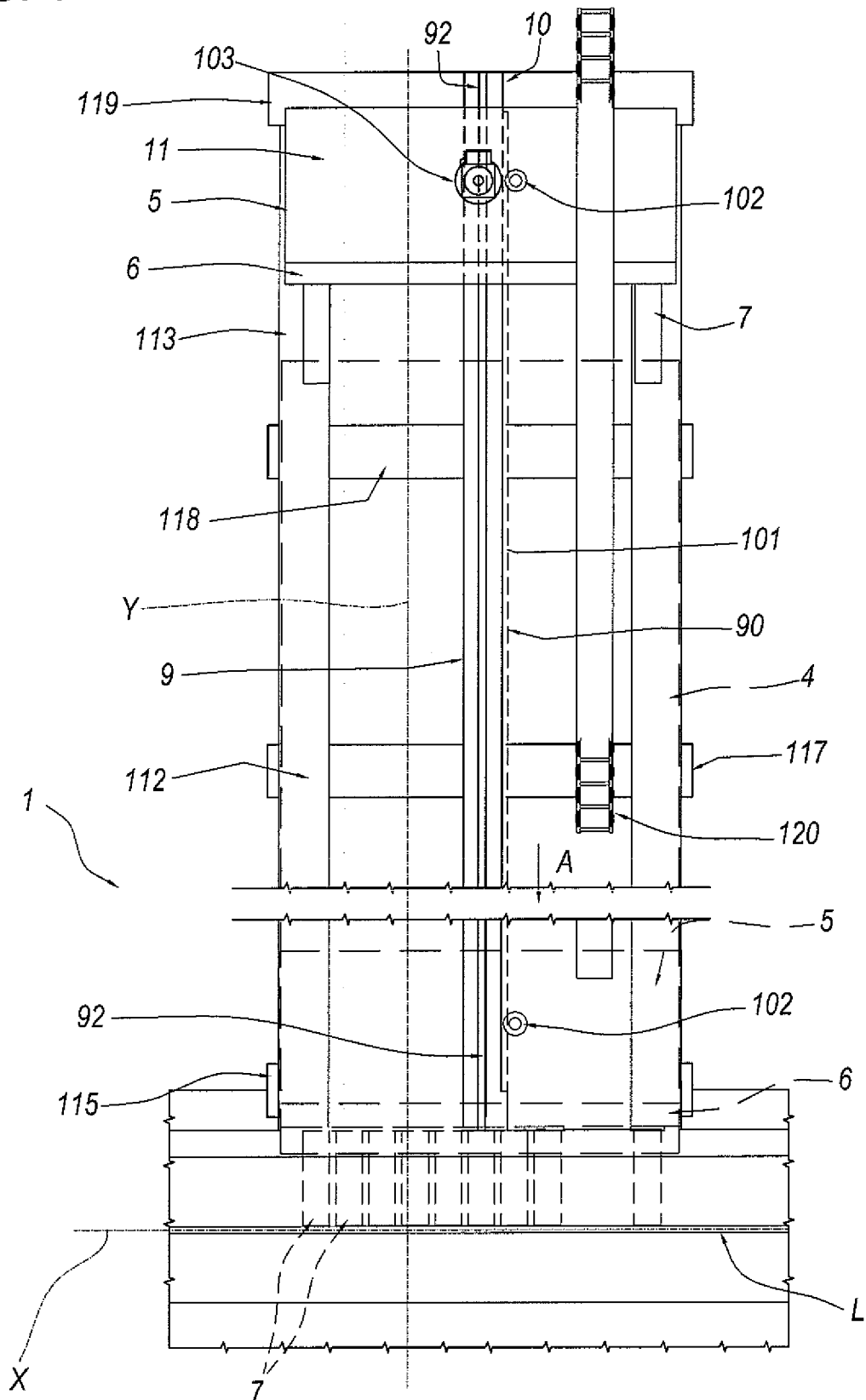


FIG. 3



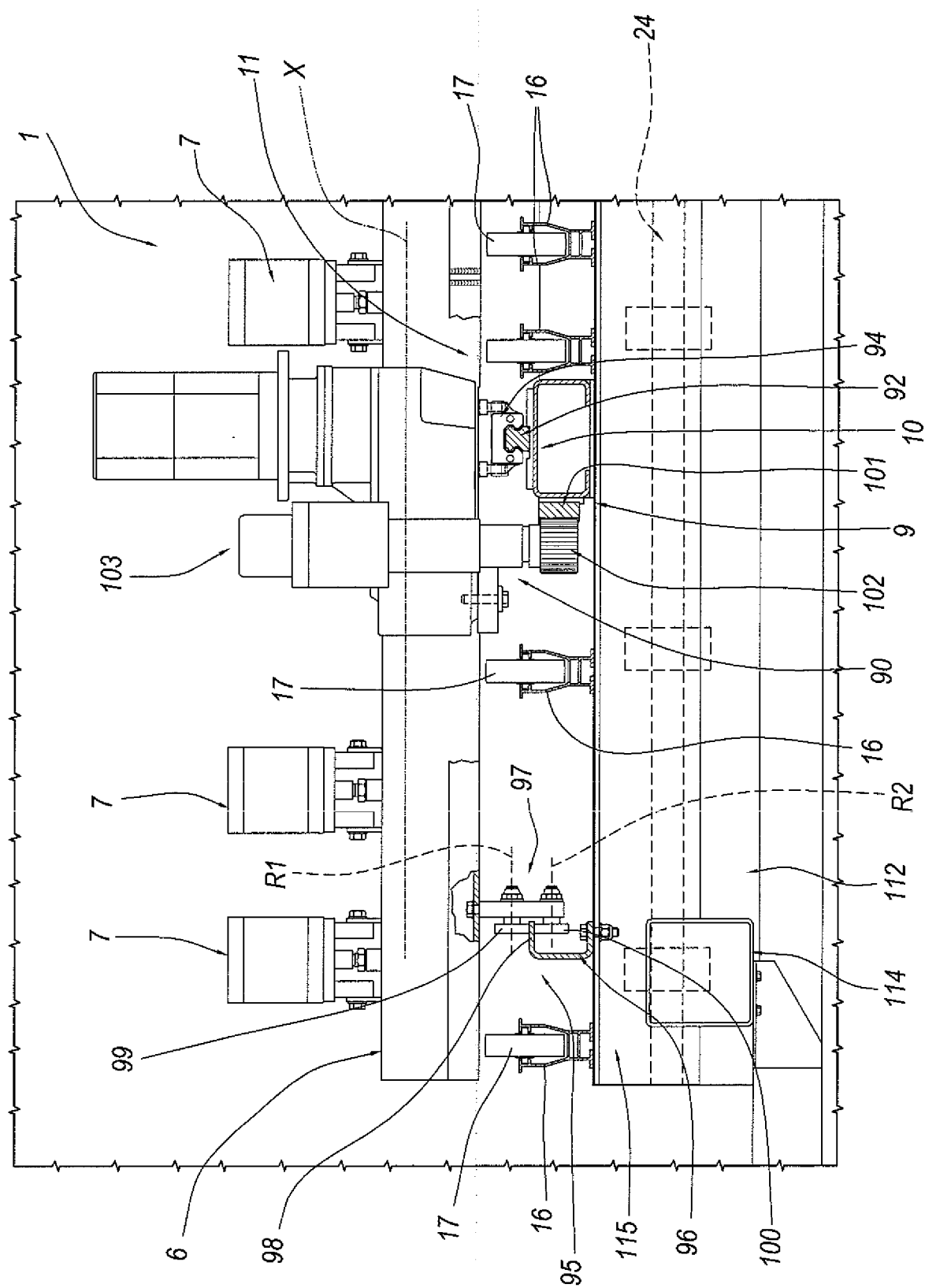
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FIG. 4



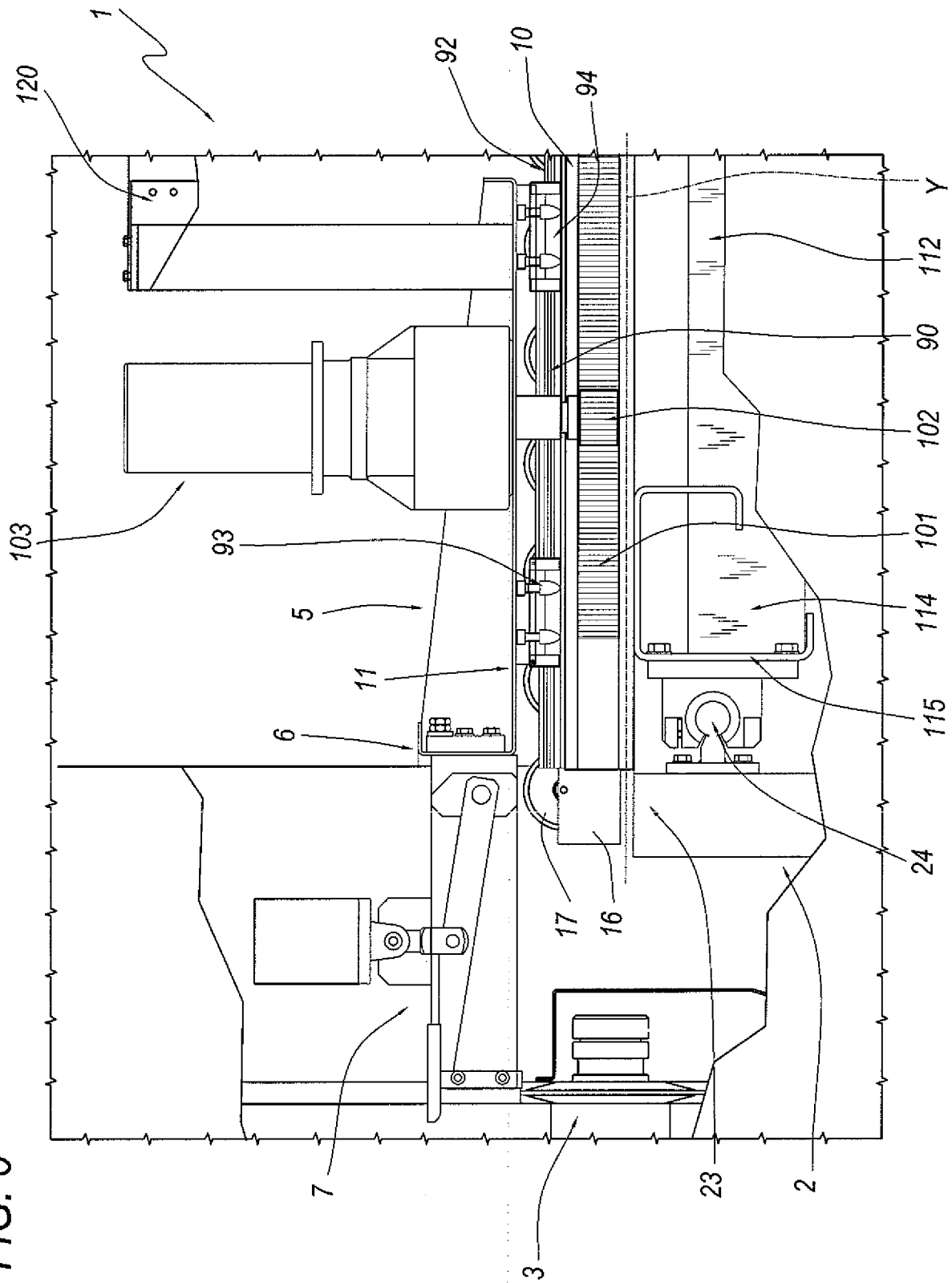
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FIG. 5

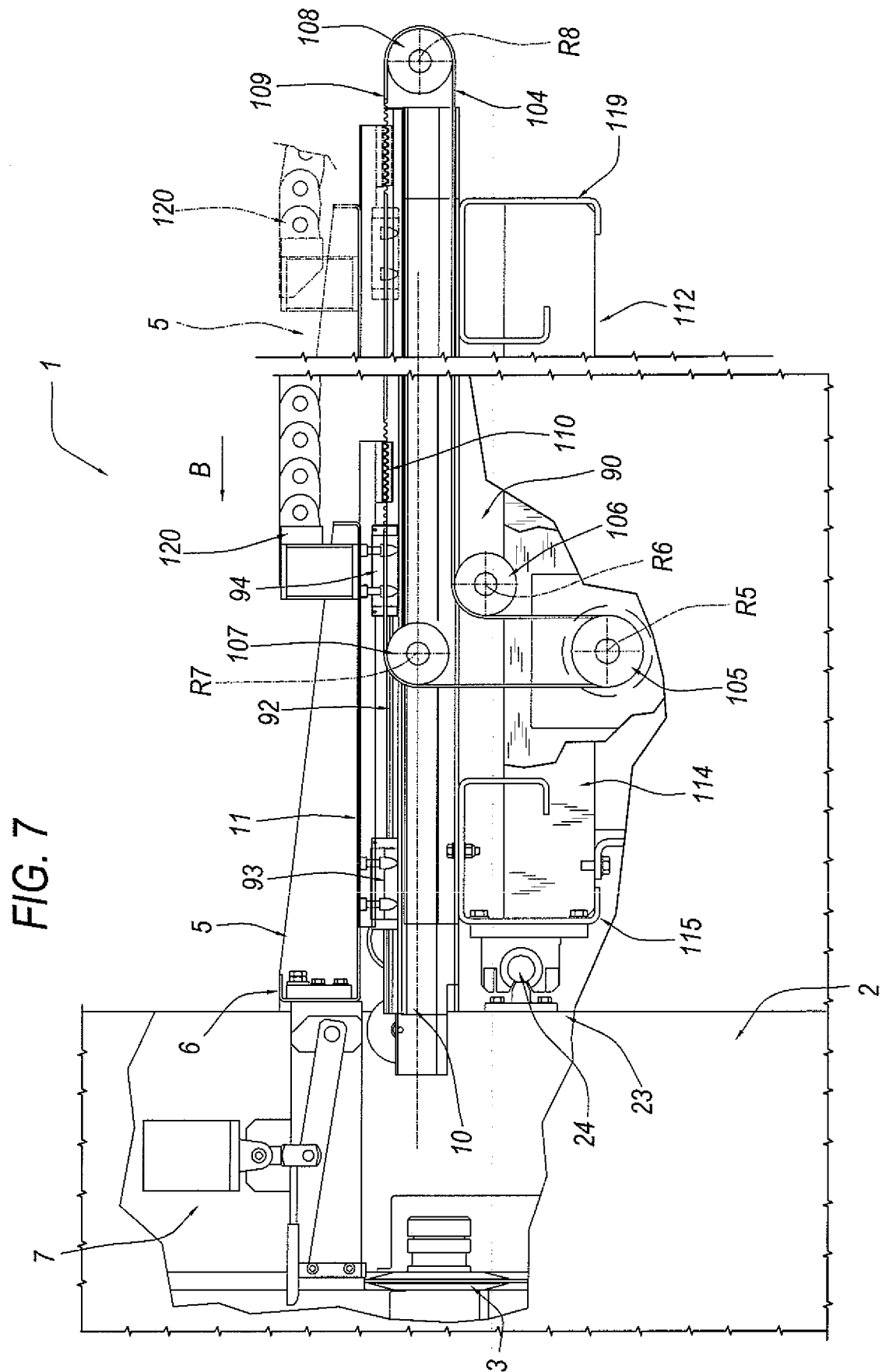


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FIG. 6

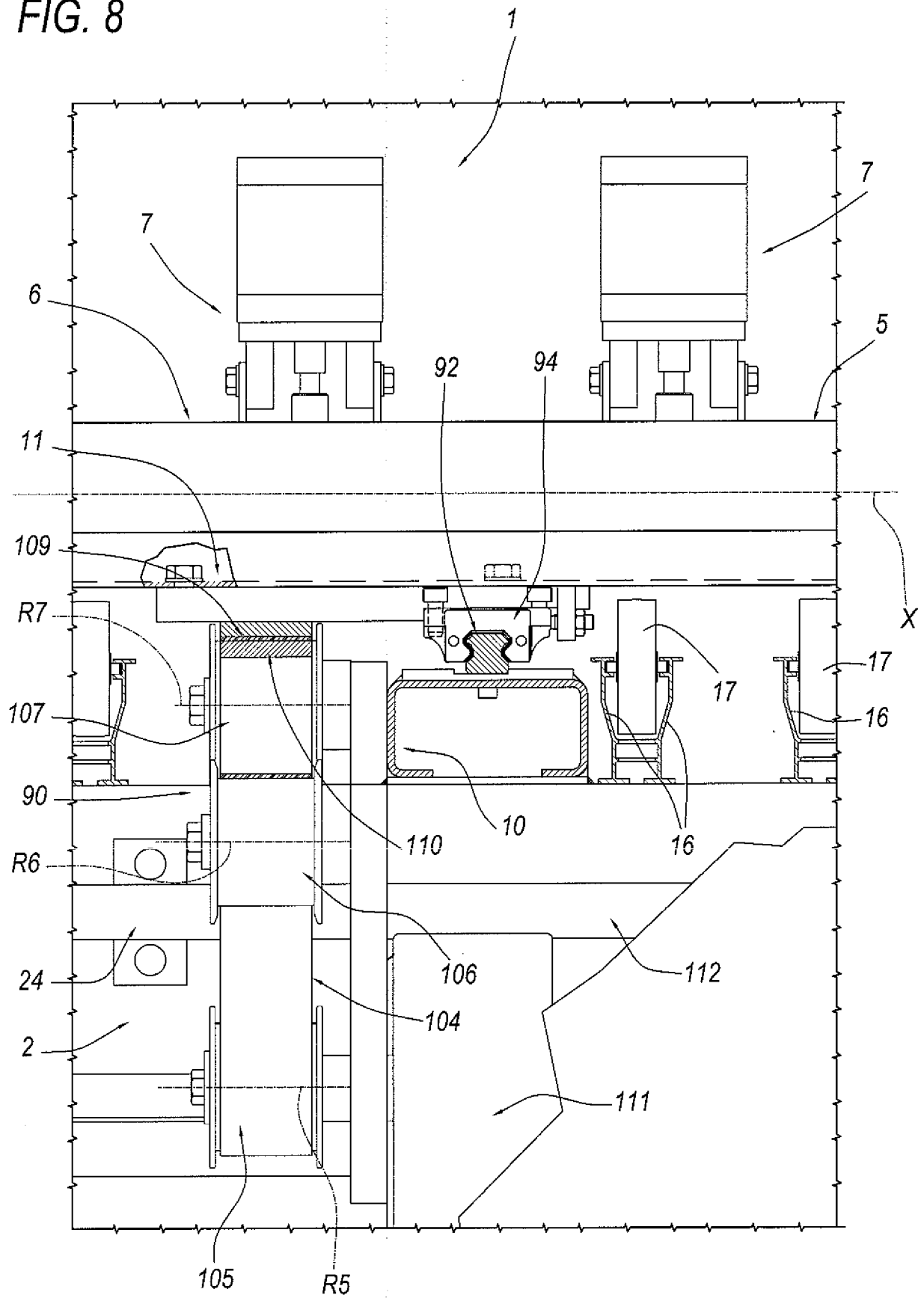


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FIG. 8



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2009/050798

A. CLASSIFICATION OF SUBJECT MATTER

INV. B23D45/02 B23D45/06 B23D47/04 B27B5/065 B27B25/00

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)

B23D B27B

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of Box C.

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Date of the actual completion of the international search

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