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(71) Applicant: **BIESSE S.p.A.**
Pesaro (IT)

(72) Inventor: **Vichi, Alessandro**
61100 Pesaro (IT)

(74) Representative: **Jorio, Paolo et al**
Studio Torta S.p.A.
Via Viotti, 9
10121 Torino (IT)

(54) Machine for machining wooden frames or similar

(57) A machine for machining wooden frames (2) or similar has a supporting device (19) defining a first supporting surface (P2) for at least one frame (2); a machining head (14) for machining the frame (2); and a transfer assembly (25) for transferring the frame (2) to and/or from the first supporting surface (P2); the transfer assembly (25) having a second supporting surface (P3), which rotates between two work positions, in which the first and second supporting surface (P2, P3) are coplanar with each other, and tilted with respect to each other respectively.

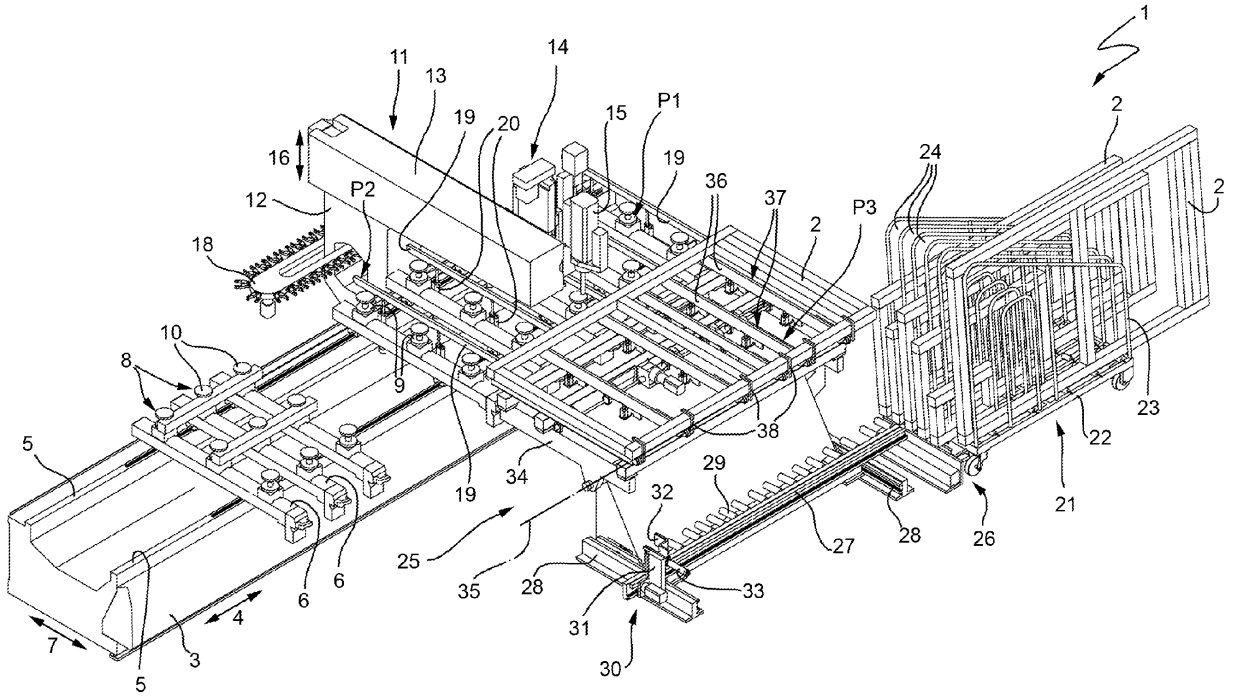

FIG. 1

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Description

[0001] The present invention relates to a machine for machining wooden frames or similar.

[0002] In the following description, the term 'frames' is intended to mean doors, windows, and furniture doors and/or relative supporting frames.

[0003] Wooden frames are worked on a machine comprising an elongated base with two longitudinal guide members parallel to a first substantially horizontal direction; a number of cross members mounted between the longitudinal guide members and parallel to a second substantially horizontal direction crosswise to the first; at least one clamp fitted to each cross member to secure at least one frame to a first given supporting surface; and a bridge crane, which extends over the base in the second direction, has a machining head, and is movable along the base in the first direction.

[0004] The machine usually also comprises a number of supporting bars, which extend between the cross members in the second direction, define a second substantially horizontal supporting surface parallel to the first, and are movable, in a substantially vertical third direction, between a raised position, in which the second supporting surface is positioned above the first, and a lowered position, in which the first and second supporting surface are coplanar.

[0005] When the supporting bars are in the raised position, the frame is transferred between the second supporting surface and a third horizontal supporting surface normally defined by a number of belt conveyors parallel to one another and to the second direction.

[0006] Known machines of the above type for machining wooden frames or similar have several drawbacks, mainly due to the frame being loaded and unloaded manually on and off the third supporting surface, i.e. a horizontal supporting surface a given height off the floor, which makes for hard work on the part of the machine operators, in proportion to the size and weight of the frame.

[0007] It is an object of the present invention to provide a machine for machining wooden frames or similar, designed to eliminate the above drawbacks, and which is also cheap and easy to produce.

[0008] According to the present invention, there is provided a machine for machining wooden frames or similar, as claimed in the attached Claims.

[0009] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which :

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of the machine according to the present invention;

Figures 2 to 4 show three schematic views in perspective, with parts removed for clarity, of the Figure 1 machine in three different operating positions.

[0010] Number 1 in Figure 1 indicates as a whole a machine for machining wooden frames 2 or similar, which are substantially flat and rectangular, are defined in the example shown by door, window and/or furniture door frames, and are assembled on a so-called clamping machine.

[0011] Machine 1 comprises an elongated, substantially U-shaped base 3, which extends in a horizontal direction 4, has two lateral longitudinal guide members 5 parallel to direction 4, and supports a number of cross members 6 - hereinafter referred to as 'work surfaces' - which extend between longitudinal members 5 in a horizontal direction 7 crosswise to direction 4, and are fitted to longitudinal members 5 to slide manually, or by means of respective known actuating devices (not shown), along longitudinal members 5 in direction 4.

[0012] Work surfaces 6 are fitted with a number of clamps 8 arranged substantially according to the size of and the work to be carried out on frames 2, and which comprise respective coplanar bottom jaws 9 defining a supporting surface P1 for at least one frame 2; and respective top jaws 10 movable between a lock position clamping frame 2, and a release position releasing frame 2.

[0013] Base 3 also supports a bridge crane 11 comprising an upright 12, which is fitted in known manner to base 3, is moved straight along base 3 in direction 4 by a known actuating device (not shown), and is fitted on its free end with a cross member 13 extending over base 3 in direction 7.

[0014] Bridge crane 11 supports a known machining head 14, which is fitted in known manner to cross member 13, is moved straight along cross member 13 in direction 7 by a known actuating device (not shown), and comprises an electrospindle 15, which is fitted in known manner to head 14, is movable straight with respect to head 14 in a vertical direction 16 perpendicular to directions 4 and 7, is designed to receive and retain at least one tool and/or aggregate 17 (Figure 4), and cooperates with a known tool store 18 looped through upright 12 to change tools and/or aggregates 17.

[0015] Base 3 is also fitted with a number of supporting bars 19, which extend in direction 7, alternate with work surfaces 6, are bounded at the top by respective coplanar flat surfaces, and define a horizontal supporting surface P2 for at least one frame 2.

[0016] By means of respective actuating cylinders 20, bars 19 are movable, with respect to base 3 and in direction 16, between a raised position (Figures 2 and 3) in which surface P2 extends above surface P1, a lowered position in which surface P2 extends below surface P1 to machine frames 2, and an intermediate position in which surface P2 is substantially coplanar with surface P1.

[0017] Machine 1 also comprises a store 21 comprising, in the example shown, a trolley 22 with a rack 23, which extends upwards from the bed of trolley 22 and defines a number of parallel pockets 24, each extending

in a substantially vertical plane perpendicular to direction 7, and each housing a frame 2 positioned on edge and projecting outwards of pocket 24 in direction 4.

[0018] Frames 2 are transferred between bars 19 and store 21 by a transfer assembly 25, which is connected to store 21 at an input station 26, faces base 3, and comprises a base 27 extending in direction 4 and fitted to two guides 28, parallel to direction 7, to slide straight in direction 7 with respect to base 3.

[0019] Assembly 25 may obviously be mounted on either of the sides of base 3 parallel to direction 4. And when assembly 25 is mounted on the rear side of base 3, i.e. the side bridge crane 11 is fitted to, the front side of base 3 is completely clear.

[0020] Base 27 supports a roller bed 29, which is fitted to the opposite side of base 27 from base 3, extends in direction 4 from station 26, and cooperates with a draw device 30 comprising a horizontal slide 31 fitted to base 27 to slide straight with respect to base 27 in direction 4; and a substantially S-shaped draw member 32 fitted to slide 31, and which is slid straight in direction 7, with respect to slide 31, between a withdrawn position and an extracted position by an actuating cylinder 33.

[0021] Assembly 25 also comprises a rotating frame 34, which is hinged to base 27 to rotate, with respect to base 27, about a hinge axis 35 parallel to direction 4, is mounted beneath surface P1, and supports a number of belt conveyors 36, which extend crosswise to axis 35 and have respective coplanar transportation branches 37 defining a supporting surface P3 for at least one frame 2.

[0022] Surface P3 is rotated by frame 34 between a first work position (Figure 2), in which surface P3 is substantially parallel to pockets 24 and therefore tilted at a given angle with respect to surfaces P1 and P2, and a second work position (Figures 3 and 4), in which surface P3 is parallel to surfaces P1 and P2 and coplanar with surface P2 when bars 19 are in the raised position.

[0023] Operation of machine 1 will now be described with reference to Figures 2 to 4, and as of the instant in which :

trolley 22 has been moved up to station 26, with pockets 24 parallel to direction 4;
surface P3 is in the first work position;
supporting bars 19 are in the raised position;
base 27 has been moved in direction 7 along guides 28 to align roller bed 29 and draw device 30 with the pocket 24 furthest from base 3; and
member 32 is in the withdrawn position in station 26.

[0024] As shown in Figure 2, member 32 is moved into the extracted position to latch onto frame 2 in the pocket 24 referred to; and slide 31 is moved in direction 4 to withdraw frame 2 from pocket 24 and onto roller bed 29.

[0025] At this point, member 32 is moved back into the withdrawn position to release frame 2; and frame 34 is rotated about axis 35 to move surface P3 from the first work position to the second work position (Figure 3). As frame 34 rotates about axis 35, frame 2 is held in position on surface P3 by a number of retainers 38 equal in number to conveyors 36, each associated with a respective conveyor 36, and which are mounted to the rear of respective conveyors 36 to prevent frame 2 from sliding off transportation branches 37 of conveyors 36.

[0026] As shown in Figure 4, frame 2 is then fed by conveyors 36 onto surface P2 of bars 19. This may be done entirely by conveyors 36, or may be commenced by conveyors 36 and completed by a draw pin 39 (Figure 3) fitted to electrospindle 15 and parallel to direction 16.

[0027] Once frame 2 is positioned on surface P2, and clamps 8 positioned inside the perimeter of frame 2, bars 19 are lowered to move surface P2 into position coplanar with surface P1; a tool and/or aggregate 17, in particular for milling the outer edge of frame 2, is substituted for pin 39; clamps 8 are moved along relative work surfaces 6 to engage frame 2; and jaws 10 are moved into the lock position (Figure 4) to secure frame 2 to surface P1 and machine it with tool and/or aggregate 17.

[0028] Obviously, frame 2 is unloaded off surface P1 and inserted into relative pocket 24 by performing the above operating sequence in reverse.

[0029] In variations not shown :

store 21 is eliminated, and frames 2 are fed successively straight from the clamping machine to input station 26 of transfer assembly 25;
draw device 30 is eliminated, and frames 2 are withdrawn from respective pockets 24 and fed onto roller bed 29 by hand;
conveyors 36 are replaced with respective pushers, in particular, pneumatic or linear actuators, to move frames 2 between surfaces P2 and P3;
conveyors 36 are eliminated, and frames 2 are transferred between surfaces P2 and P3 by pin 39; and
pin 39 is replaced with a gripper fitted to electrospindle 15 or bridge crane 11.

[0030] Transfer assembly 25 thus provides for handling relatively heavy, bulky frames 2, and for turning each frame 2 between a substantially vertical and a substantially horizontal position. When equipped with store 21, machine 1 can complete an entire production lot, defined by frames 2 in store 21, fully automatically, with no operator assistance required.

Claims

1. A machine for machining wooden frames (2) or similar, the machine comprising supporting means (19) defining a substantially horizontal first supporting surface (P2) for at least one frame (2); a machining head (14) for machining the frame (2); and a transfer assembly (25) for transferring the frame (2) to and/or from the first supporting surface (P2); the machine being **characterized in that** the transfer assembly

(25) comprises a rotating device (34) defining a second supporting surface (P3) for the frame (2), and which is movable between a first work position, in which said first and said second supporting surface (P2, P3) are substantially parallel and coplanar, and a second work position, in which the second supporting surface (P3) is tilted at a given angle with respect to the first supporting surface (P2).

2. A machine as claimed in Claim 1, wherein the transfer assembly (25) also comprises a first transfer device (36, 39) for moving the frame (2) between said first and said second supporting surface (P2, P3) when the rotating device (34) is in said first work position.

3. A machine as claimed in Claim 2, wherein the first transfer device (36, 39) comprises first transfer means (36) fitted to the rotating device (34).

4. A machine as claimed in Claim 2 or 3, and also comprising a base (3); and a bridge crane (11), which is movable along the base (3) in a given first direction (4), and extends over the base (3) in a second direction (7) substantially crosswise to the first direction (4); the first transfer device (36, 39) comprising second transfer means (39) fitted to the bridge crane (11) and movable along the bridge crane (11) in the second direction (7).

5. A machine as claimed in any one of Claims 2 to 4, wherein the rotating device (34) comprises a supporting frame (34) mounted to rotate about a given axis of rotation (35); and a number of belt conveyors (36) fitted to the supporting frame (34) to define the second supporting surface (P3) and at least part of the first transfer device (36).

6. A machine as claimed in any one of Claims 2 to 4, wherein the first transfer device (36, 39) comprises a number of thrust members, in particular, pneumatic or linear actuators.

7. A machine as claimed in any one of the foregoing Claims, wherein the transfer assembly (25) comprises at least one input and/or output station (26) for loading and/or unloading the frame (2) onto and/or off the transfer assembly (25); and a second transfer device (29, 30) for transferring the frame (2) between the input and/or output station (26) and the second supporting surface (P3) when the rotating device (34) is in the second work position.

8. A machine as claimed in Claim 7, and also comprising at least one store (21) connected to the transfer assembly (25) at the input and/or output station (26), and designed to house a number of frames (2) parallel to one another and to the second supporting surface (P3) when the second supporting surface (P3) is in said second work position.

9. A machine as claimed in Claim 8, wherein the second transfer device (29, 30) comprises engaging and transfer means (32) for engaging and transferring the frame (2), and which are movable in a first direction (4) to transfer the frame (2) between the input and/or output station (26) and the second supporting surface (P3) when the rotating device (34) is in said second work position.

10. A machine as claimed in Claim 9, wherein the store (21) comprises a number of pockets (24), each for receiving and retaining a respective frame (2); the transfer assembly (25) being movable in a second direction (7), substantially crosswise to the first direction (4), to selectively align the engaging and transfer means (32) with the pockets (24) in the first direction (4).

11. A machine as claimed in any one of the foregoing Claims, and also comprising locking means (8) for securing the frame (2) to a substantially horizontal third supporting surface (P1) parallel to the first supporting surface (P2); the supporting means (19) being movable, perpendicularly to the first supporting surface (P2), between a raised position, in which the first supporting surface (P2) is coplanar with the second supporting surface (P3), and an intermediate position, in which the first supporting surface (P2) is coplanar with the third supporting surface (P1).

12. A machine as claimed in Claim 11, wherein the supporting means (19) are also movable, perpendicularly to the first supporting surface (P2), into a lowered position, in which the first supporting surface (P2) extends beneath the third supporting surface (P1).

13. A machine as claimed in Claim 11 or 12, wherein the rotating device (34) is mounted to rotate about an axis of rotation (35) extending beneath and parallel to the third supporting surface (P1).

14. A machine as claimed in any one of the foregoing Claims, and also comprising a base (3); a bridge crane (11) movable along the base (3) in a given first direction (4); at least two cross members (6) fitted to the base (3) and parallel to a second direction (7) substantially crosswise to the first direction (4); and at least one clamp (8) fitted to each cross member (6); the supporting means (19) comprising at least two supporting bars (19) parallel to said cross members (6).

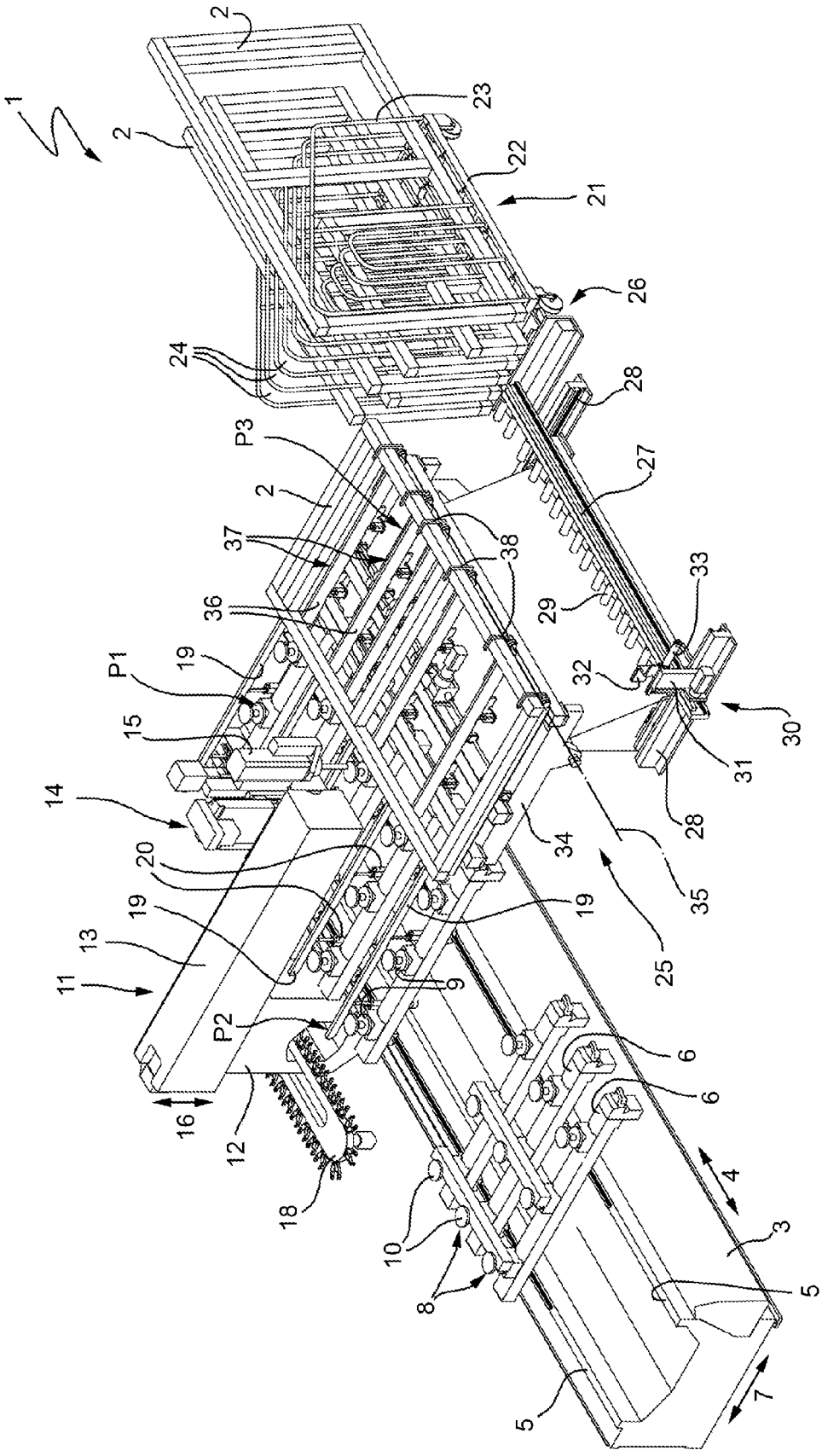
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FIG. 1

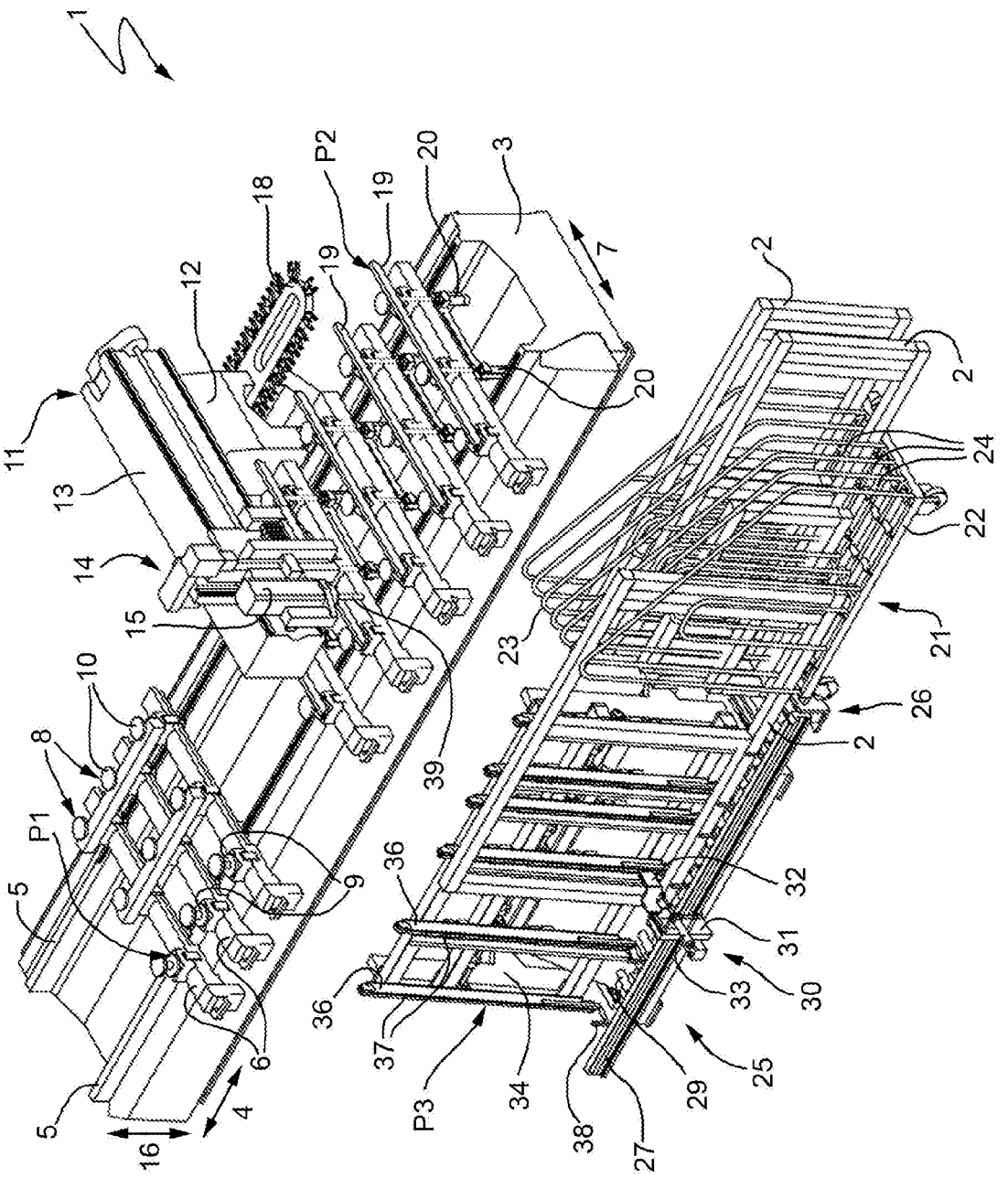
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FIG. 2

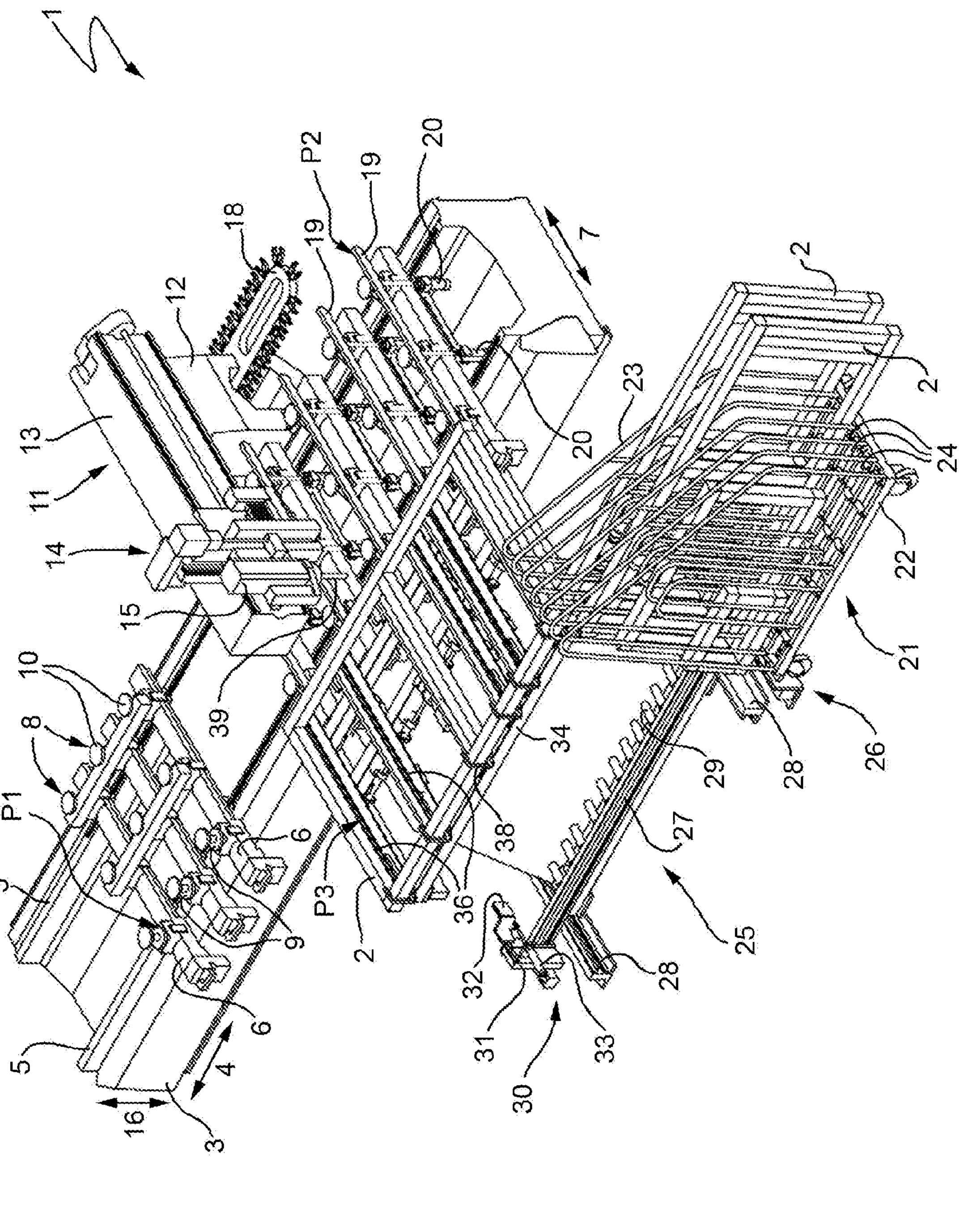
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FIG. 3

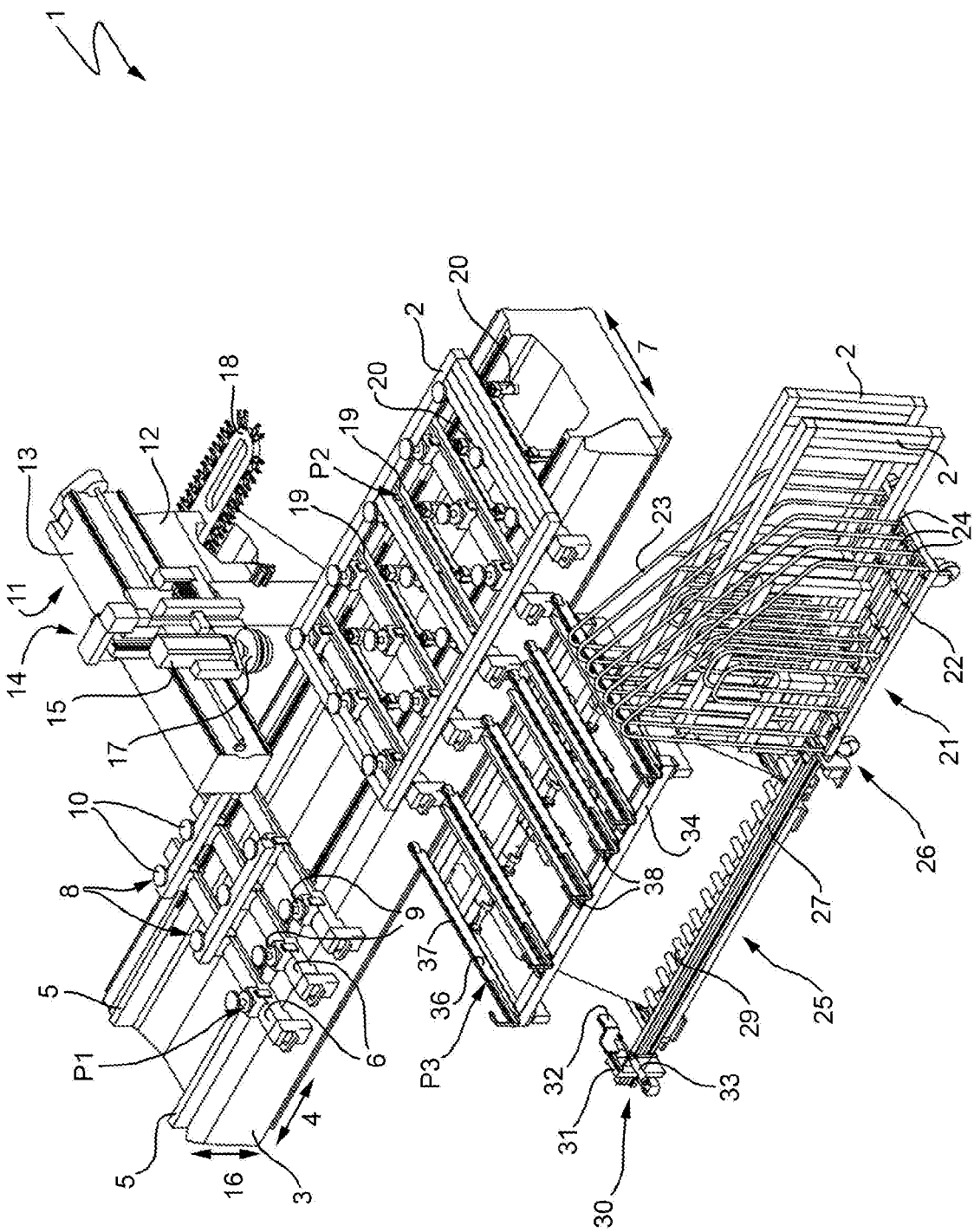
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FIG. 4