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(54) **Plant for processing panels made of wood or the like**

(57) A plant for processing panels (2) made of wood or the like is provided with an edging machine (5), having a grip and transfer unit (29), moving between a loading station (25) of at least one panel (2) and an edging station

(44a) of the panel (2) itself, and is provided with a plurality of sucking gripping elements (40), at least some of which move between a working position, locking the panel (2), and a resting position, releasing the panel (2) itself.

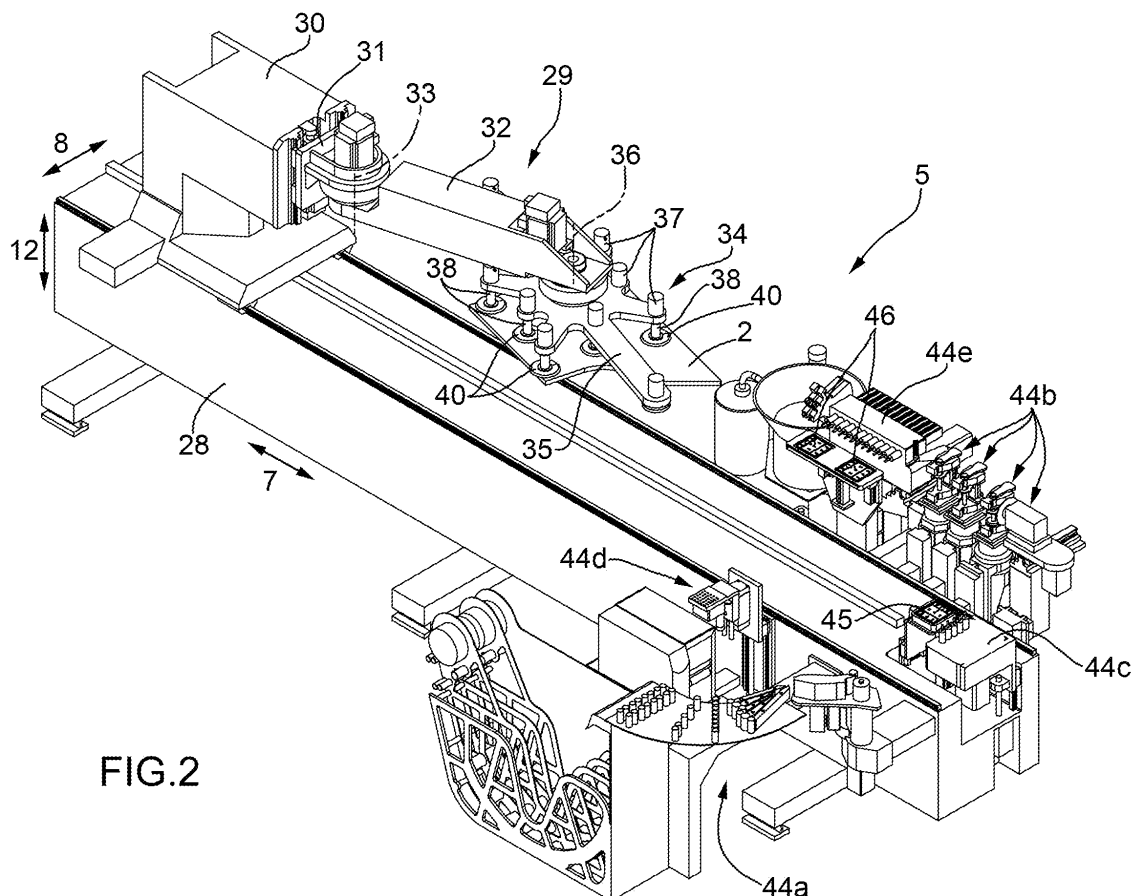


FIG.2

Description

[0001] The present invention relates to a plant for processing panels made of wood or the like.

[0002] In the wood panel processing field, it is known to provide a plant comprising an edging machine comprising, in turn, a grip and transfer unit for at least one panel having a shaped or at least partially rectilinear contour; a loading station of the panel onto the grip and transfer unit; an edging station provided with an edging assembly adapted to apply an edging strip along the contour of the panel; a finishing station provided with at least one finishing element of the edging strip applied to the panel; and an unloading station of the panel from the grip and transfer unit itself.

[0003] The grip and transfer unit is mobile between the loading, edging, finishing and unloading stations, and normally comprises a gripping head, which is provided with a plurality of sucking gripping elements, adapted to engage an upper face of the panel, and is mounted to rotate about a longitudinal axis thereof so as to allow the edging element to edge the panel and the finishing assembly to process the edge.

[0004] Since the sucking gripping elements may interfere with the edging assembly and/or the finishing assembly when the gripping head is rotating about the longitudinal axis thereof, the known plants for processing panels made of wood of the above-described type have some drawbacks mainly deriving from that these systems have a relatively low flexibility and are capable of only edging and finishing panels having given contours and/or size.

[0005] It is an object of the present invention to provide a plant for processing panels made of wood or the like which is free from the above-described drawbacks and which is simple and cost-effective to be implemented.

[0006] According to the present invention, there is provided a plant for processing panels made of wood or the like as claimed in the appended claims.

[0007] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limitative embodiment thereof, in which:

figure 1 is a diagrammatic perspective view of a preferred embodiment of the plant of the present invention;

figure 2 is a diagrammatic perspective view of an edging machine defining part of the plant in figure 1;

figure 3 is a diagrammatic side view, with parts removed for clarity purposes, of a detail in figure 2; and

figure 4 is a diagrammatic side view, with parts in section for clarity purposes, of a detail in figure 3.

[0008] With reference to figure 1, numeral 1 indicates as a whole a plant for processing panels 2 made of wood or the like, comprising a working centre 3 for separating a plurality of variously shaped panels 2 from a sheet 4 of wood or the like being substantially rectangular in

shape, and an edging machine 5 for at least edging the panels 2 obtained from the sheet 4 itself.

[0009] The working centre 3 comprises an elongated base 6, which extends in a horizontal direction 7, defines a substantially horizontal supporting plane P1 for at least one sheet 4, and is laterally delimited in a horizontal direction 8 transversal to direction 7 by two substantially vertical faces 9 orthogonal to direction 8 itself.

[0010] The base 6 supports a first bridge crane 10, which is substantially C-shaped with a concavity facing downwards and comprises two vertical uprights 11, which are arranged on opposite sides of the base 6 in direction 8, extend upwards from the base 3 in a vertical direction 12 orthogonal to directions 7 and 8, and are slidingly coupled to respective guides 13 mounted to the faces 9 to allow the bridge crane 10 to perform straight movements in the direction 7 with respect to the base 6 and under the bias of an actuating device (known and not shown).

[0011] The bridge crane 10 further comprises a horizontal crosspiece 14, which is fixed to the free ends of the uprights 11, extends over the base 6 in the direction 8, and is laterally delimited in direction 7 by two substantially flat faces 15 orthogonal to direction 7 itself.

[0012] In this case, the crosspiece 14 supports a working head 16 which is coupled to one of the faces 15 in a known manner, to perform rectilinear movements in direction 8 with respect to the crosspiece 14 and under the bias of an actuating device of known type (not shown), and comprises at least one electrospindle 17, which is coupled to the head 16 in a known manner to perform rectilinear movements in direction 12 with respect to the head 16 itself and under the bias of an actuating device (known and not shown), and is adapted to receive and hold a milling tool (not shown) adapted to successively separate a plurality of panels 2 from the sheet 4 arranged each time on the plane P1.

[0013] According to a variant (not shown), the number of working heads 16 mounted to the crosspiece 14 is different from one, and the working heads 16 are selectively coupled to the faces 15, i.e. on the same face 15 or on the two faces 15, according to the size and/or shape of panels 2 and/or sheets 4.

[0014] The base 6 further supports a second bridge crane 18, which is substantially C-shaped with a concavity facing downwards, and comprises two vertical uprights 19 which are arranged on opposite sides of base 6 in the direction 8, extend upwards from the base 6 in the direction 12, and are slidingly coupled to the guides 13 to allow the bridge crane 18 to perform straight movements in the direction 7 with respect to the base 6 and under the bias of an actuating device (known and not shown).

[0015] The bridge crane 18 further comprises a horizontal crosspiece 20, which is fixed to the free ends of the uprights 19, extends over the base 6 in direction 8, and is laterally delimited in direction 7 by two substantially flat faces 21 orthogonal to the direction 7 itself.

[0016] In this case, the crosspiece 20 supports a plurality of sucking grip and transfer elements 22 (in this case, four elements 22), which are adapted to take the panels 2 from the plane P1, are coupled to the faces 21 in a known manner to perform rectilinear movements in direction 8, with respect to the crosspiece 20 and under the bias of an actuating device of known type (not shown), are mobile in direction 12 between corresponding raised positions and lowered positions, and are connected to a sucking pneumatic device of known type (not shown).

[0017] The panels 2 are unloaded from the elements 22 in an unloading station 25 defined, in this case, by a bed 26 which is aligned with the base 6 in direction 7, defines a substantially horizontal supporting plane P2 parallel to the plane P1, and comprises two longitudinal guide members 27 parallel to each other, each of which extends in direction 7, and is aligned and connected to a corresponding guide 13 to allow the bridge crane 18 to move through the station 25.

[0018] With regard to the above, it is worth noting that the panels 2 may be locked on plane P2, e.g. by means of a pneumatic sucking locking device.

[0019] According to a variant (not shown), the bridge cranes 10 and 18 are mounted to different guides and are shaped so as to allow the bridge crane 18 to move through the bridge crane 10.

[0020] With reference to figures 1, 2, and 3, the edging machine 5 comprises an elongated base 28 which extends in direction 7, is partially adjacent to the base 6 so as to face the unloading station 25 of the working centre 3, and supports a grip and transfer unit 29 comprising, in turn, a horizontal slide 30 coupled to the base 28 in a known manner to perform rectilinear movements in direction 7 with respect to the base 28 and under the bias of an actuating device (known and not shown), a vertical slide 31 coupled to slide 30 in a known manner to perform rectilinear movements in direction 12 with respect to the slide 30 and under the bias of an actuating device (known and not shown), and a supporting arm 32, which protrudes from the slide 31 and is pivotally mounted to the slide 31 to rotate about a rotation axis 33 parallel to direction 12, with respect to the slide 31 itself and under the bias of an actuating device (known and not shown).

[0021] The arm 32 supports a gripping head 34 comprising a supporting plate 35, which is substantially star-shaped, is pivotally coupled at a central portion thereof to a free end of the arm 32 to rotate about a rotation axis 36 parallel to the axis 33 with respect to the arm 32 and under the bias of an actuating device (known and not shown), and is provided with a plurality of pneumatic cylinders 37, which protrudes upwards from the plate 35 in direction 12 and are distributed on the plate 35 itself according to the size and/or shape of the panels 2 and/or to the processing to be carried out on the panels 2 themselves.

[0022] As shown in figures 3 and 4, each cylinder 37 is slidably engaged by a respective piston 38, which extends in direction 12, separates two variable volume

chambers 39 inside the cylinder 37 which are connected to a compressed air, pneumatic device (known and not shown), and carries a sucking gripping element 40 connected, which is fixed to a lower free end of the piston 38 protruding outwards from the piston 37, extends transversally to direction 12, and is adapted to be connected to a pneumatic sucking device (known and not shown) according to modes which will be disclosed in greater detail below.

[0023] The piston 38 moves between a raised resting position, in which the element 40 is arranged at a given distance from the panel 2 taken each time by the unit 29, and a lower operative position, in which the element 40 is arranged in contact with the panel 2 and is connected to the mentioned pneumatic sucking device (not shown) by means of a pneumatic circuit 41 comprising a first segment 42 obtained through the plate 35 and a second segment 43 obtained through the piston 38 and connected to segment 42.

[0024] The edging machine 5 is further provided with a plurality of working assemblies 44, which are distributed about one end of the base 28 opposite to the end of base 28 facing the unloading station 25 of the working centre 3, and in this case are defined by an edging assembly 44a adapted to apply an edging strip (not shown) along a side contour of each panel 2, by a plurality of edge finishing assemblies 44b (not shown) aligned with one another in direction 7 and mounted to the opposite side of the base 28 with respect to the assembly 44a, by a vertical drilling assembly 44c mounted to the end of base 28 and provided with a sucking locking plane 45, by a labeling assembly 44d adjacent to the edging assembly 44a, and by a horizontal drilling assembly 44e adjacent to the finishing assemblies 44b and provided with a sucking locking plane 46.

[0025] According to a variant (not shown), the panels 2 are supported at the working assemblies 44 by an auxiliary supporting plane coated with a low-friction material, for example, and/or provided with a pneumatic, air cushion device, for example, adapted to facilitate the sliding of the panels 2 themselves.

[0026] With regards to the above, it is worth noting that the distance D1 from the ground of the gripping elements 40 arranged each time in their raised resting positions is at least greater than the maximum height D2 from the ground of the finishing assemblies 44b, so as to allow the elements 40 to move over the finishing assemblies 44b themselves (figure 3). The distance D1 is preferably greater than the distance D2 of each working assembly 44.

[0027] In use, each panel 2 is firstly separated from the sheet 4 by means of the working head 16 of the bridge crane 10, is then taken from the plane P1 by the grip and transfer elements 22 of the bridge crane 18, and accurately released onto the plane P2 of the unloading station 25, and is finally taken from the station 25 by the grip and transfer unit 29 of the edging machine 5.

[0028] At this point, by combining the movements of

the slide 30 in direction 7 with the movements of the slide 31 in direction 12, of the supporting arm 32 about the axis 33, and of the gripping head 34 about the axis 36, the panel 2 is edged by the edging assembly 44a, is finished by the finishing assemblies 44b, is vertically drilled, in this case from the bottom, by the vertical drilling assembly 44c, is horizontally drilled by the horizontal drilling assembly 44e, and is labeled, in this case from the bottom, by the labeling assembly 44d.

[0029] During the processing carried out on the edging machine 5, in particular those performed by the finishing assemblies 44b, the gripping elements 40 are selectively moved to their raised resting positions to allow the elements 40 arranged each time in their raised working positions to not knock against the assemblies 44b themselves during the rotations of the supporting arm 32 about the axis 33 and of the gripping head 34 about the axis 36 (figure 3).

[0030] According to a variant (not shown), the edging machine 5 is anchored to the ceiling upturned by 180° with respect to the figures from 1 to 4. In this case:

the panel 2 directly rests on the gripping elements 40 by means of the grip and transfer elements 22 of the bridge crane 18;

the gripping elements 40 are selectively moved between corresponding lowered resting positions and raised operative positions, and

the distance D1 from the ceiling of the gripping elements 40 arranged each time in their lowered resting positions is greater than the maximum height D2 from the ceiling of the finishing assemblies 44b, preferably of each working assembly 44.

Claims

1. Plant for processing panels (2) made of wood or the like, the plant comprising an edging machine (5), comprising on its turn an edging station (44a) to apply an edging strip on at least a part of a panel (2); and a grip and transfer unit (29) comprising a supporting plate (35) provided with a plurality of sucking gripping elements (40) to keep the panel (2) in the edging station (44a); and being **characterized in that** at least a first said gripping element (40) is mobile with respect to the supporting plate (35) between a working position, locking the panel (2), and a resting position, releasing the panel (2).
2. Plant according to Claim 1, wherein the edging machine (5) further comprises a loading station (25) of the panel (2) and a finishing station (44b) provided with at least a finishing assembly (44b) of said edging strip; the grip and transfer unit (29) being mobile between said loading, edging and finishing stations (25, 44a, 44b).

3. Plant according to Claim 2, wherein, when it is in its resting position, each said first gripping element (40) is mobile above or below each said finishing assembly (44b).
4. Plant according to Claim 2 or 3, wherein, when it is in its resting position, each said first gripping element (40) is placed at a certain distance (D1) from a determined reference plane bigger than a maximum height (D2) of each finishing assembly (44b) from the reference plane.
5. Plant according to any one of the preceding Claims, wherein the supporting plate (35) is provided with a plurality of pneumatic cylinders (37) whose number corresponds to the one of said first gripping elements (40); each first gripping element (40) being slidably coupled to the relative pneumatic cylinder (37) in order to move between its working and its resting position.
6. Plant according to Claim 5, wherein the grip and transfer unit (29) further comprises a sucking pneumatic circuit (41) at least partially supported by said supporting plate (35); each first gripping element (40) being connected to the sucking pneumatic circuit (41) when it is in its working position.
7. Plant according to any one of the preceding Claims, wherein the edging machine (5) further comprises at least a drilling station (44c, 44e) and/or a labelling station (44d); the grip and transfer unit (29) being mobile between said drilling station (44c, 44e) and/or labelling station (44d).
8. Plant according to Claim 7 when it depends on Claim 2, wherein the edging machine (5) comprises a first elongated base (28) which extends in a first determined direction (7) and is slidably engaged by the grip and transfer unit (29); said loading, edging, finishing, drilling and/or labelling stations (25, 44a, 44b, 44c, 44e, 44d) being arranged around the first base (28).
9. Plant according to Claim 8, wherein the finishing station (44b) comprises a plurality of finishing assemblies (44b) mutually aligned around the first base (28).
10. Plant according to Claim 8 or 9, wherein the grip and transfer unit (29) comprises a first slide (30) mobile along the first base (28) in the first direction (7), a second slide (31) mobile in a second direction (12) substantially transversal to the first direction (7), a supporting arm (32) mounted to rotate around a first axis (33) parallel to the second direction (12), and a gripping head (34) which is mounted to rotate around a second axis (36) parallel to the first axis (33) and

supports said gripping elements (40).

11. Plant according to Claim 7 when it depends on Claim 2 or according any one of Claims 8-10, wherein said loading, edging, finishing, drilling and/or labelling stations (25, 44a, 44b, 44c, 44e, 44d) comprise each at least a respective operating assembly (44); each said first gripping element (40), when it is in its resting position, being placed at a certain distance (D1) from a determined reference plane bigger than a maximum height (D2) of each operating assembly (44) from the reference plane. 5
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12. Plant according to any one of the preceding Claims, and further comprising a working centre (3) comprising, on its turn, a second base (6) defining a supporting plane (P1) for at least a sheet (4) of wood or the like; a working head (16) to separate each panel (2) from the sheet (4); and a grip and transfer assembly (22) to take each panel (2) from the supporting plane (P1) and unload it in said loading station (25). 15
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13. Plant according to Claim 12, wherein the working centre (3) comprises a first bridge crane (10), which is slidably coupled to the second base (6), and supports said working head (16). 25
14. Plant according to Claim 12 or 13, wherein the working centre (3) comprises a second bridge crane (18) which is slidably coupled to the second base (6), and supports said grip and transfer assembly (22). 30
15. Plant according to any one of Claims 12-14, wherein the edging machine (5) comprises a first base (28) parallel to the second base (6). 35
16. Plant according to any one of Claims 12-15, wherein the grip and transfer assembly (22) comprises at least a further sucking gripping element. 40
17. Plant according to any one of the preceding Claims, wherein each said first gripping element (40) is mobile between said working position and said resting position in a direction (12) substantially orthogonal to the panel (2). 45

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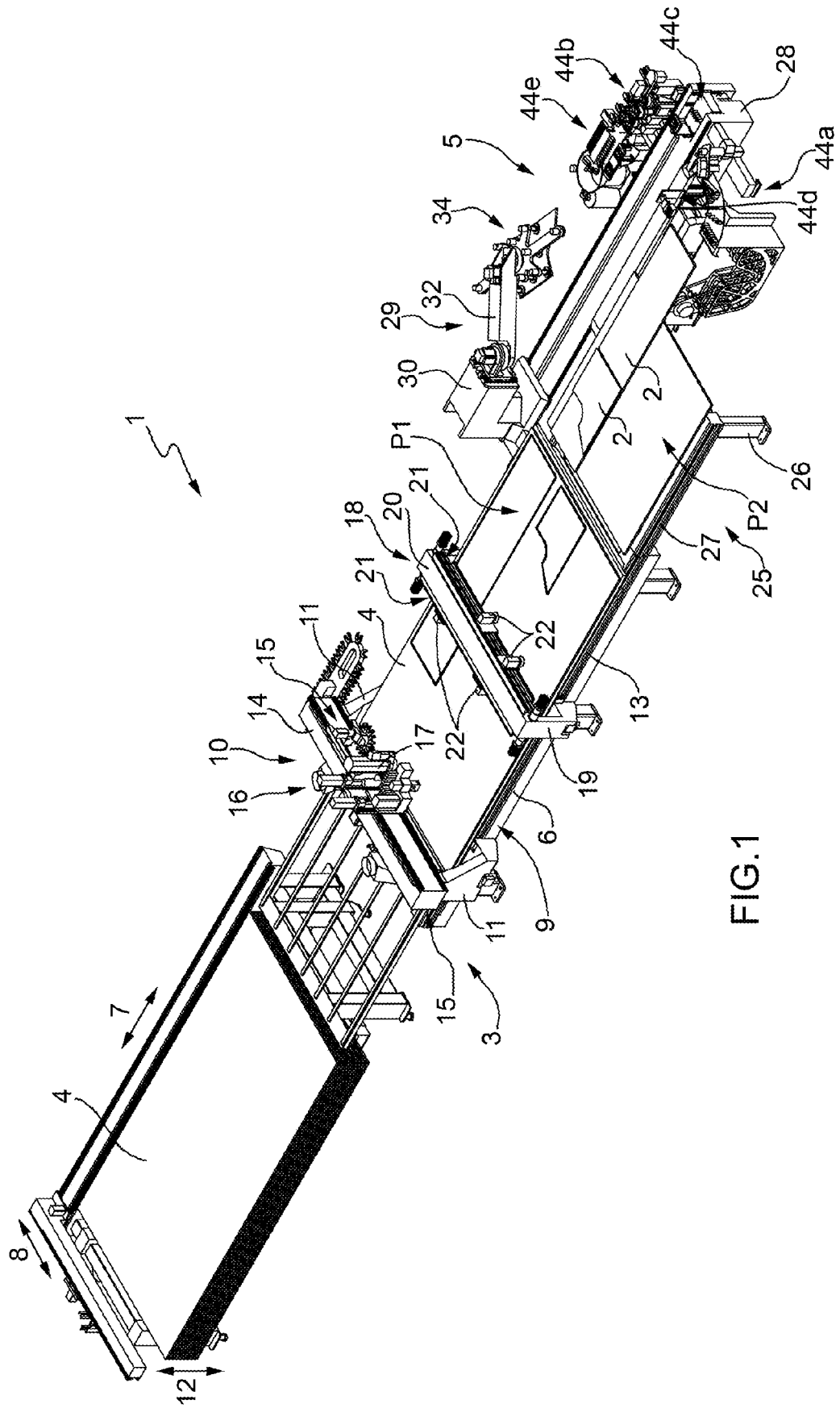


FIG.1

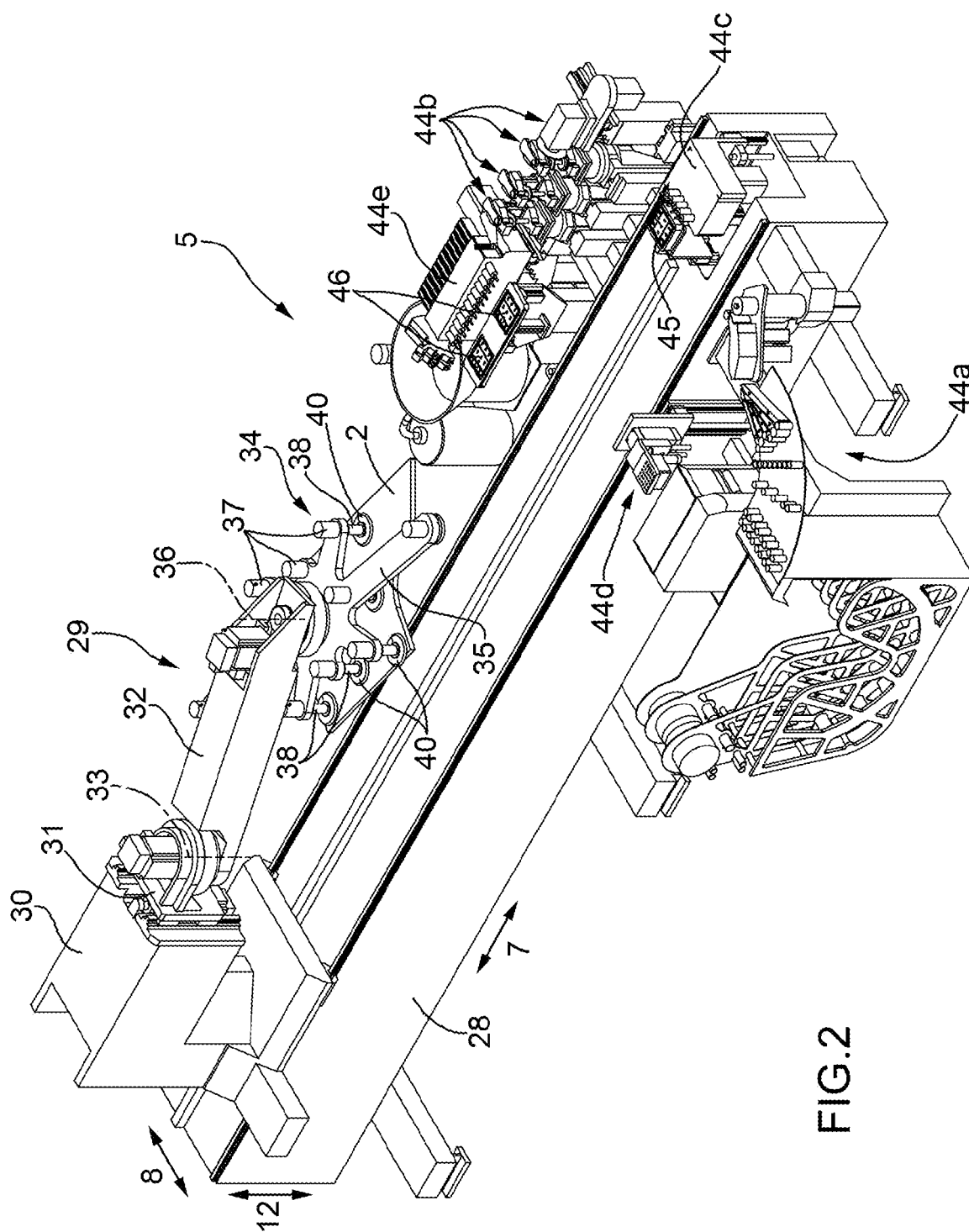


FIG. 2

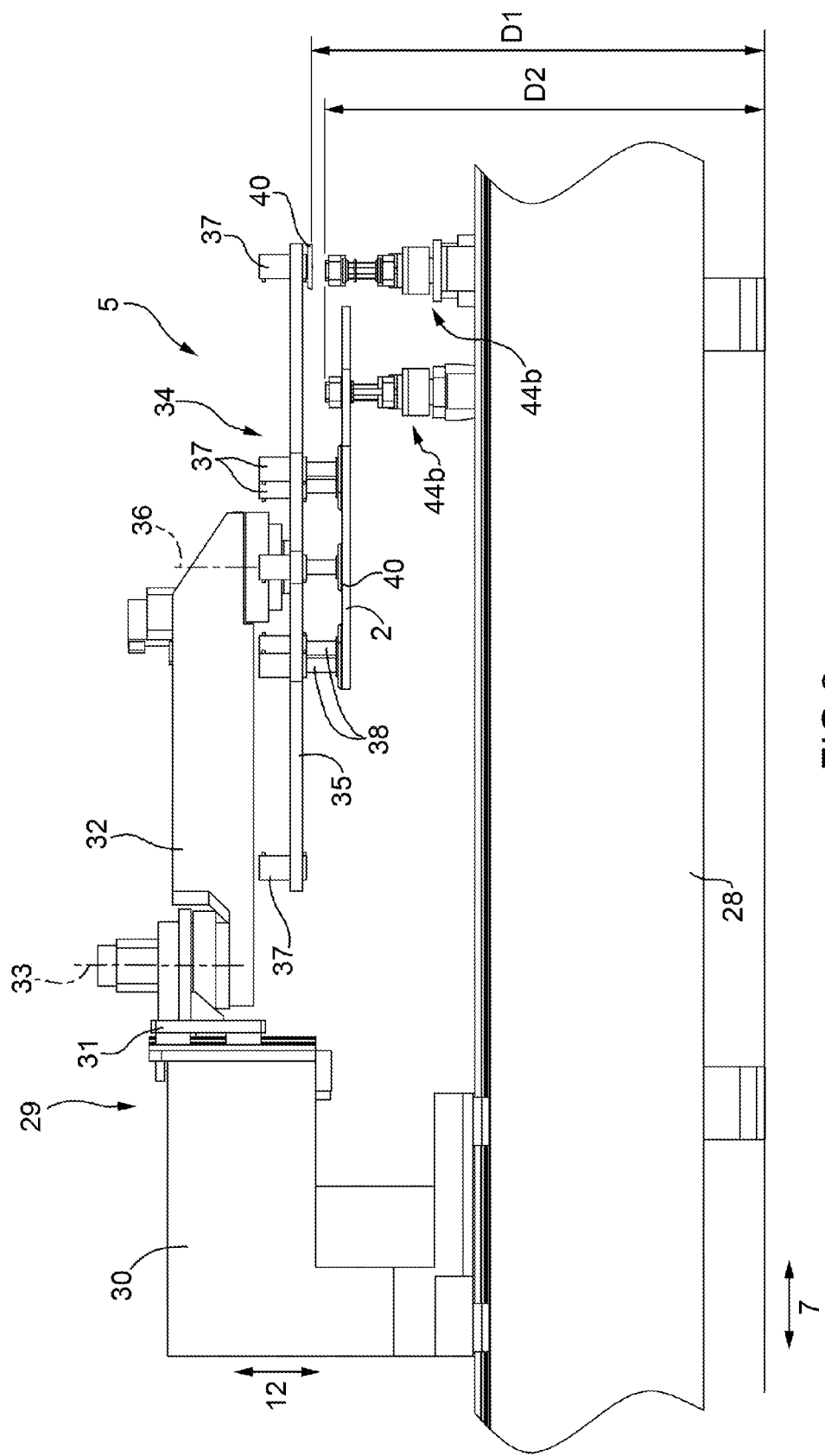


FIG.3

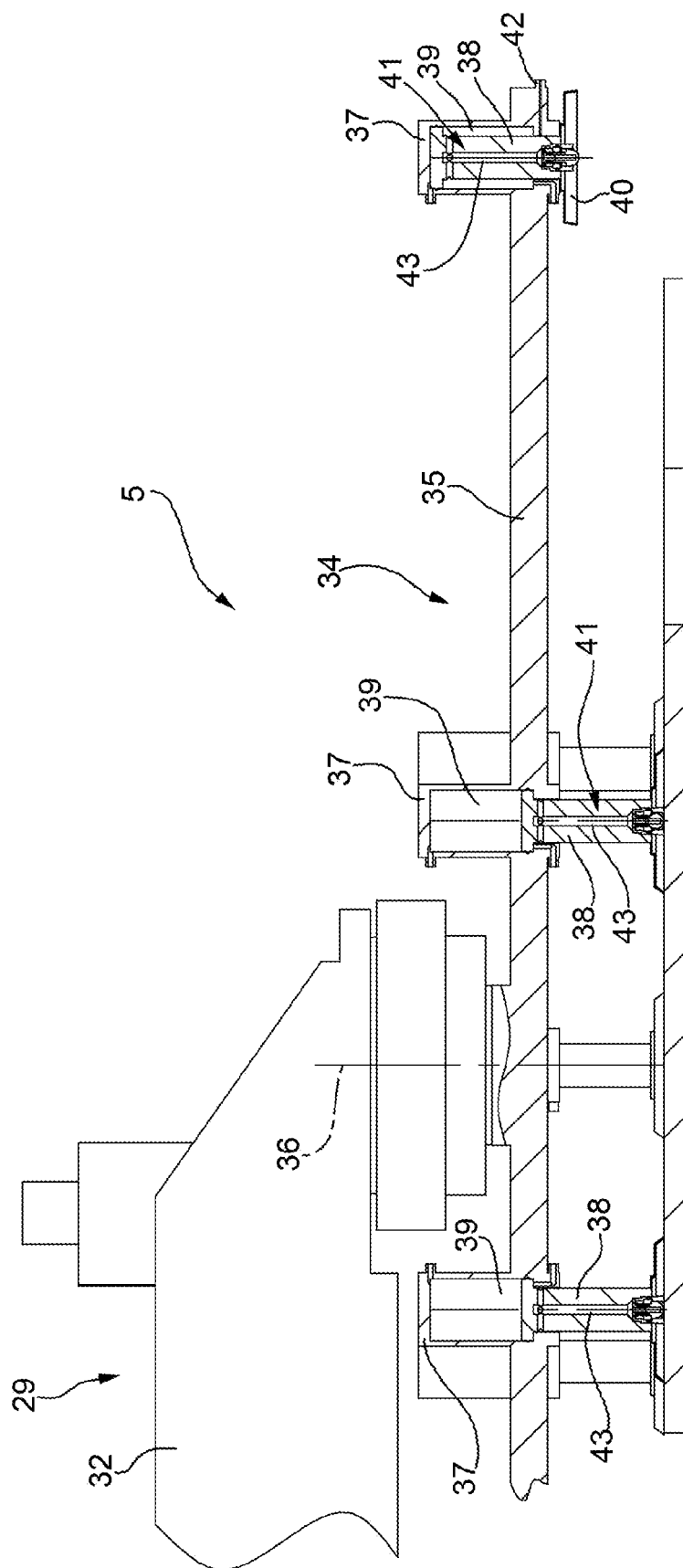


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 0480

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 198 26 342 A1 (BIESSE SPA [IT]) 17 December 1998 (1998-12-17)	1-9,17	INV. B27M1/08 B27D5/00
Y	* abstract * * column 1, line 3 - line 10 * * column 2, line 14 - line 32 * * column 2, line 44 - line 49 * * column 3, line 16 - line 32 * * column 3, line 38 - line 40 * * column 3, line 53 - line 60 * * column 3, line 66 - column 4, line 6 * * column 4, line 20 - line 36 * * column 4, line 50 - line 51 * * column 4, line 67 - column 5, line 3 * * column 5, line 8 - line 10 * * column 5, line 14 - line 18 * * figures *	12-16	
A	EP 0 512 126 A1 (LIGMATECH MASCHB GMBH [DE]) 11 November 1992 (1992-11-11) * abstract * * column 8, line 36 - line 40 * * figure 3 *	1	TECHNICAL FIELDS SEARCHED (IPC)
Y	DE 201 07 745 U1 (HESLER CHRISTOPH [DE]) 24 October 2002 (2002-10-24) * abstract * * page 2, line 17 - line 27 * * page 3, line 6 - line 15 * * page 3, line 23 - page 4, line 3 * * page 4, line 20 - page 5, line 4 * * page 5, line 9 - page 6, line 19 * * page 7, line 5 - line 28 * * page 8, line 1 - line 14 * * figures *	12-16	B27M B27D B27C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 August 2010	Examiner Hamel, Pascal
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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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-08-2010

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