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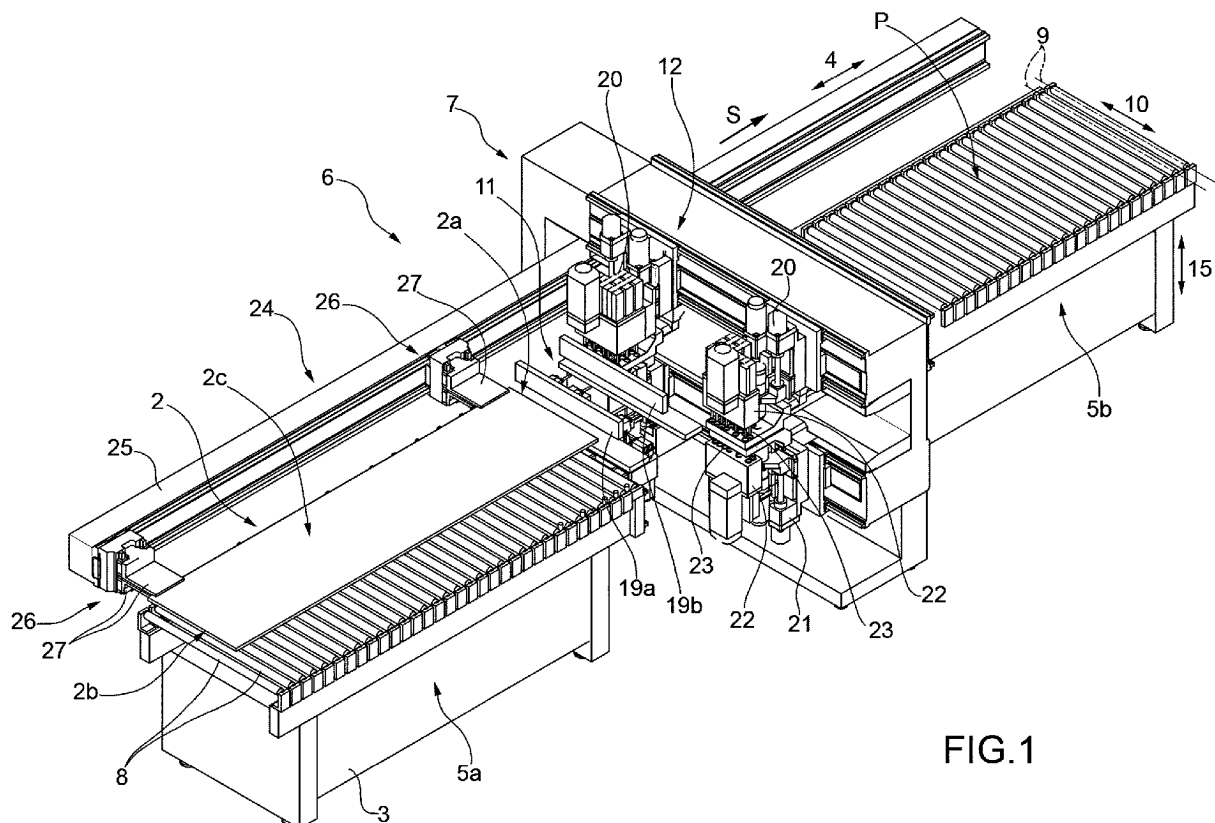
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KH MA MD TN(71) Applicant: **BIESSE S.p.A.****61122 Pesaro (IT)**(72) Inventor: **BERNARDI, Paolo****47841 CATTOLICA (RN) (IT)**(74) Representative: **Manconi, Stefano et al****Studio Torta S.p.A.****Via Viotti, 9****10121 Torino (IT)**(30) Priority: **25.06.2020 IT 202000015361****(54) DRILLING METHOD AND MACHINE TO DRILL INTO PANELS MADE OF WOOD OR THE LIKE**

(57) Method and machine to drill into panels (2) made of wood or the like, wherein each panel (2) is drilled into in two drilling stations (6, 7), which are arranged one after the other along a feeding path (S) of the panel (2) and are provided one with at least one horizontal drill bit (18)

and the other with at least one vertical drill bit (23); the horizontal drill bit (18) being movable parallel to a feeding direction (4) of the panel (2) in order to drill into at least one side face (2a, 2b) of the panel (2).

**FIG.1****EP 3 928 938 A1**

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102020000015361 filed on 25/06/2020.

TECHNICAL FIELD

[0002] The present invention relates to a machine to drill into panels made of wood or the like.

[0003] In particular, the present invention relates to a machine to drill into panels made of wood or the like of the type comprising an elongated base extending in a first, substantially horizontal direction; a roller support device, which is mounted on the base so as to define a support surface for the panels; a feeding device to feed the panels along a feeding path extending between a panel loading station to load the panels onto the roller support device and a panel unloading station to unload the panels from the roller support device; and a drilling station obtained along the panel feeding path.

BACKGROUND ART

[0004] The feeding device generally comprises at least one clamp member, which is mounted and configured so as to grab and hold the panels in the area of a side of theirs parallel to the first direction and is movable along the base in order to feed the panels on the roller support device and through the drilling station.

[0005] The drilling station is normally provided with at least one drilling head comprising a plurality of lower vertical drill bits, which are mounted under the support surface, a plurality of upper vertical drill bits, which are mounted above the support surface, and a plurality of horizontal drill bits.

[0006] The horizontal and vertical drill bits generally are movable in a second, substantially horizontal direction, which is transverse to the first direction, and in a third, substantially vertical direction, which is orthogonal to the panel support surface.

[0007] In use, holes are vertically drilled into each panel by moving the vertical drill bits in the third direction and holes are horizontally drilled into each panel by moving the panel in the first direction.

[0008] Machines to drill into panels made of wood or the like of the type described above are affected by some drawbacks, which are mainly due to the fact that the configuration of the drilling head and the combination of the movements of the panel in the first direction and of the horizontal and vertical drill bits in the aforesaid second and third directions allow users to drill into one single panel at a time, hence ensuring a relatively small productivity.

[0009] Furthermore, since horizontal drilling is carried out by moving the panels in the first direction and, hence,

without locking the panels on the support surface, machines to drill into panels made of wood or the like of the type described above feature a relatively limited precision.

DISCLOSURE OF INVENTION

[0010] The object of the present invention is to provide a machine to drill into panels made of wood or the like, which is designed to eliminate the aforementioned drawbacks in a straightforward, relatively low-cost manner.

[0011] According to the present invention, there is provided a machine to drill into panels made of wood or the like according to claims 1 to 9.

[0012] The present invention further relates to a method to drill into panels made of wood or the like.

[0013] According to the present invention, there is provided a method to drill into panels made of wood or the like according to claims 10 to 15.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention will now be described with reference to the accompanying drawings showing a nonlimiting embodiment thereof, wherein:

figure 1 is a schematic perspective view, with parts removed for greater clarity, of a preferred embodiment of the machine according to the present invention;

figure 2 is a schematic perspective view, with parts removed for greater clarity, of a detail of the machine of figure 1; and

figure 3 is a schematic side view, with parts removed for greater clarity, of the detail of figure 2.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] With reference to figures 1, 2 and 3, number 1 indicates, as a whole, a machine to drill into flat panels 2 substantially having the shape of a parallelepiped.

[0016] The machine 1 comprises an elongated base 3, which extends in a horizontal direction 4 and supports two roller devices 5a, 5b arranged on opposite sides of two drilling stations 6, 7 in the direction 4 itself.

[0017] Each device 5a, 5b has a plurality of rollers 8, which are mounted so as to rotate around respective rotation axes 9 parallel to one another and to a horizontal direction 10 transverse to the direction 4 and define a support surface P for the panels 2.

[0018] The stations 6, 7 are mounted one after the other in the direction 4 and are provided with a horizontal drilling head 11 and with a vertical drilling head 12, respectively.

[0019] The head 11 comprises a first horizontal slide 13, which is coupled to the base 3 in a sliding manner so as to make, relative to the base 3, straight movements in the direction 4; a vertical slide 14, which is coupled to

the slide 13 in a sliding manner so as to make, relative to the slide 13, straight movements in a vertical direction 15, which is orthogonal to the directions 4 and 10 and to the plane P; and a second horizontal slide 16, which is coupled to the slide 14 in a sliding manner so as to make, relative to the slide 14, straight movements in the direction 10.

[0020] The slide 16 supports a plurality of electrospindles 17 next to one another, which extend in the direction 4 and each carry, fitted into them, a respective pair of horizontal drill bits 18 opposite one another.

[0021] The bits 18 cooperate with two pressing devices 19a, 19b, which extend in the direction 10 and are arranged on opposite sides of the head 11 in the direction 4.

[0022] Each pressing device 19a, 19b is movable in the direction 15, independently of the other pressing device 19a, 19b, between a locking position to lock the panels 2 on the support surface P and a release position.

[0023] The head 12 comprises two upper drilling units 20, which are mounted above the surface P, and two lower drilling units 21, which are mounted under the surface P.

[0024] Each unit 20, 21 is mounted on the base 3 so as to move in the directions 10 and 15 and comprises a plurality of electrospindles 22, which are arranged parallel to the direction 15 and each carry, fitted into them, a respective vertical drill bit 23.

[0025] The machine 1 is further provided with a feeding device 24 to feed the panels 2 in the direction 4 along a feeding path S extending through the stations 6 and 7.

[0026] The device 24 comprises a longitudinal guide member 25, which extends along the base 3 in the direction 4, is mounted beside the roller devices 5a, 5b and supports a pair of clamp members 26.

[0027] Each member 26 is coupled to the longitudinal member 25 in a sliding manner so as to make straight movements in the direction 4 and comprises two substantially flat jaws 27, which are perpendicular to the direction 15.

[0028] The jaws 27 project from the longitudinal member 25 in the direction 10, are oriented and configured so as to grab and hold a side of the panels 2 parallel to the direction 4 and are movable relative to one another in the direction 15 between a clamping position and a release position to clamp and release the panels 2.

[0029] In use, a first panel 2 is loaded, either manually or by means of a known feeding device, onto the roller device 5a upstream of the head 11 in the direction 4 and is locked on the surface P by means of the pressing device 19a.

[0030] After having moved the bits 18 in the directions 10 and 15, the head 11 drills into a front side face 2a of the panel 2 by moving the slide 13 and, hence, the bits 18 in the direction 4.

[0031] Subsequently, the pressing device 19a is lifted and the panel 2 is grabbed by the clamp members 26 of the feeding device 24, is moved onto the roller device 5b downstream of the head 11 in the direction 4 and is locked

on the surface P by means of the pressing device 19b.

[0032] After having moved the bits 18 in the directions 10 and 15, the head 11 drills into a rear side face 2b of the panel 2 by moving the slide 13 and, hence, the bits 18 in the direction 4.

[0033] During the drilling of the face 2b, a second panel 2 is loaded, either manually or by means of a known feeding device, onto the roller device 5a upstream of the head 11 in the direction 4 and is locked on the surface P by means of the pressing device 19a.

[0034] Once the drilling of the face 2b of the first panel 2 has ended, the head 11 drills into the face 2a of the second panel 2 and, simultaneously, the head 12 drills into the upper and lower faces 2c of the first panel 2.

[0035] Since the drilling of the faces 2a and 2b of each panel 2 is carried out by locking the panel 2 on the surface P and by moving the bits 18 in the direction 4, the head 11 has a relatively high precision.

[0036] Furthermore, the locking of the panels 2 on the surface P and the movement of the bits 18 in the direction 4 allow users to simultaneously carry out the drilling of the face 2a of a panel 2 through the head 11 and the drilling of the faces 2c of another panel 2 through the head 12, ensuring the machine 1 a relatively high productivity.

Claims

1. A drilling machine to drill into panels (2) made of wood or the like comprising a base (3) defining a support surface (P) for at least one panel (2); a feeding device (24) to feed the panel (2) on the support surface (P) along a given path (S) and in a given first direction (4); and a first drilling station (6) and a second drilling station (7), which are obtained along the path (S); the first drilling station (6) comprising at least one horizontal drill bit (18), which is substantially parallel to the first direction (4), and the second drilling station (7) comprising at least one vertical drill bit (23), which is substantially parallel to a second direction (15), which is perpendicular to the support surface (P) and transverse to the first direction (4); and **characterized in that** the horizontal drill bit (18) is movable in the first direction (4).
2. A machine according to claim 1, wherein said first and second drilling stations (6, 7) are arranged one after the other along the path (S).
3. A machine according to claim 1 or 2, wherein the horizontal drill bit (18) is movable in the second direction (15) between a lifted operating position and a lowered rest position.
4. A machine according to any one of the preceding claims, wherein the horizontal drill bit (18) is movable in a third direction (10), which is parallel to the sup-

port surface (P) and is orthogonal to said first and second directions (4, 15).

5. A machine according to any one of the preceding claims, wherein the first drilling station (6) is further provided with a first pressing device (19a), which is mounted upstream of the horizontal drill bit (18) in the first direction (4) and is movable between a locking position, in which the panel (2) is locked on the support surface (P), and a release position.
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 6. A machine according to any one of the preceding claims, wherein the first drilling station (6) is further provided with a second pressing device (19b), which is mounted downstream of the horizontal drill bit (18) in the first direction (4) and is movable between a locking position, in which the panel (2) is locked on the support surface (P), and a release position.
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 7. A machine according to any one of the preceding claims, wherein the first drilling station (6) comprises a first slide (13), which is movable in the first direction (4), a second slide (14), which is movable in the second direction (15), and a third slide (16), which is movable in a third direction (10), which is parallel to the support surface (P) and orthogonal to said first and second directions (4, 15); the horizontal drill bit (18) being carried by one of said first, second and third slides (13, 14, 16).
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 8. A machine according to any one of the preceding claims, wherein the feeding device (24) comprises at least one clamp member (26), which is movable along the base (3) in the first direction (4) and is mounted and configured so as to grab and hold a side of the panel (2) parallel to the first direction (4).
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 9. A machine according to any one of the preceding claims, wherein the first drilling station (6) comprises at least two horizontal drill bits (18), which are parallel and opposite one another.
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 10. A drilling method to drill into panels (2) made of wood or the like in a machine comprising a base (3) defining a support surface (P) for the panels (2); a feeding device (24) to feed the panels (2) on the support surface (P) along a given path (S) and in a given first direction (4); and a first drilling station (6) and a second drilling station (7), which are obtained along the path (S); the first drilling station (6) comprising at least one horizontal drill bit (18), which is substantially parallel to the first direction (4), and the second drilling station (7) comprising at least one vertical drill bit (23), which is substantially parallel to a second direction (15), which is perpendicular to the support surface (P) and transverse to the first direction (4); the method comprising the steps of:
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- placing a panel (2) upstream of the horizontal drill bit (18) in the first direction (4);
 drilling into a first side face (2a) of the panel (2);
 feeding the panel (2) downstream of the horizontal drill bit (18) in the first direction (4); and
 drilling into a second side face (2b) of the panel (2), which is opposite the first side face (2a);
 and being **characterized in that** it further comprises the step of:
 moving each horizontal drill bit (18) in the first direction (4) so as to drill into said first and second side faces (2a, 2b).
11. A method according to claim 10, wherein said first and second side faces (2a, 2b) are drilled by means of two horizontal drill bits (18), which are parallel to and opposite one another.
 12. A method according to claim 10 or 11 and further comprising the step of:
 locking the panel (2) on the support surface (P) by means of a first pressing device (19a) during the drilling of the first side face (2a).
 13. A method according to any one of the claims from 10 to 12 and further comprising the step of:
 locking the panel (2) on the support surface (P) by means of a second pressing device (19b) during the drilling of the second side face (2b).
 14. A method according to claim 13, when it depends on claim 12, and further comprising the step of:
 moving said first and second pressing devices (19a, 19b) independently of one another between respective lifted rest positions and respective lowered operating positions.
 15. A method according to any one of the claims from 10 to 14 and further comprising the step of:
 drilling into a first panel (2) with the vertical drill bit (23) and, at the same time, drilling into the first side face (2a) of a second panel (2) with the horizontal drill bit (18).

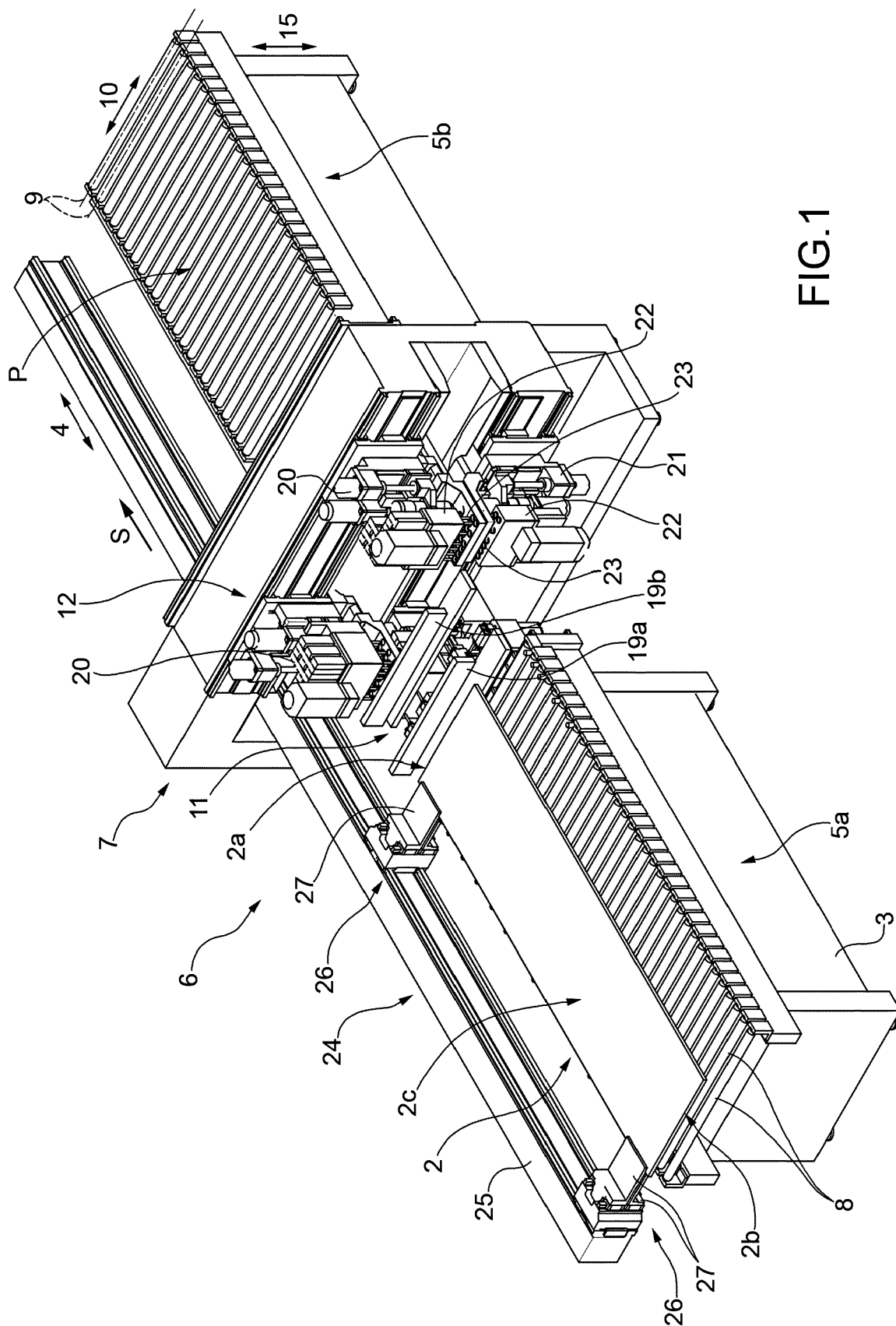


FIG.1

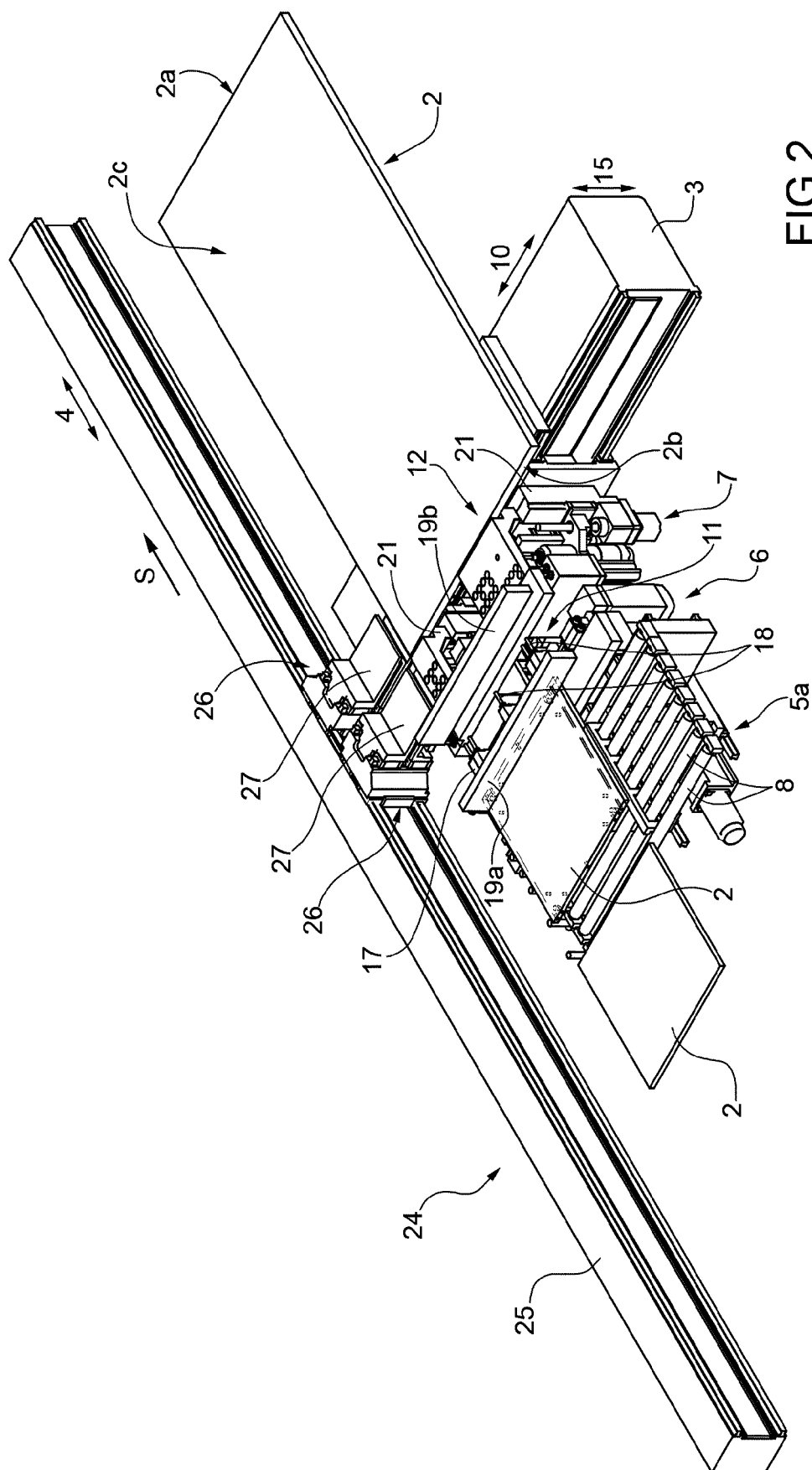


FIG. 2

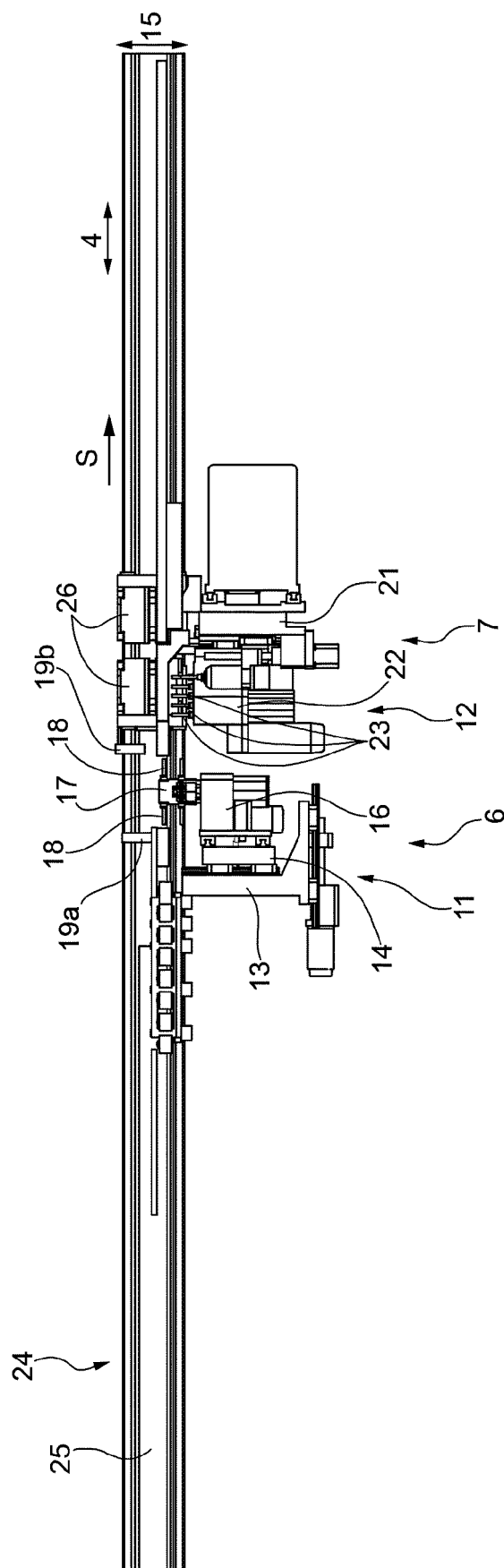


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 November 2021	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	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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