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(54) A SANDING MACHINE FOR SANDING/FINISHING/BRUSHING COMPONENTS MADE OF WOOD, METAL OR THE LIKE

(57) A sanding machine is provided with a feeding device (7), which defines a support surface (A) for at least one component (2) to be sanded and is designed to move the component (2) through at least one sanding unit (12, 13) having two conveyor assemblies (21, 22), which define a feeding channel (23) for the components (2) and are mounted on respective rotary platforms (31, 47), which are movable around respective fulcrum axes (32, 48) perpendicular to the support surface (A) due to the thrust exerted by the component (2) upon the two conveyor assemblies (21, 22) depending on a profile of the side faces (6) of the component (2); at least one conveyor assembly (21, 22) being provided with a sanding device (53) to sand/finish a side face (6) of the component (2).

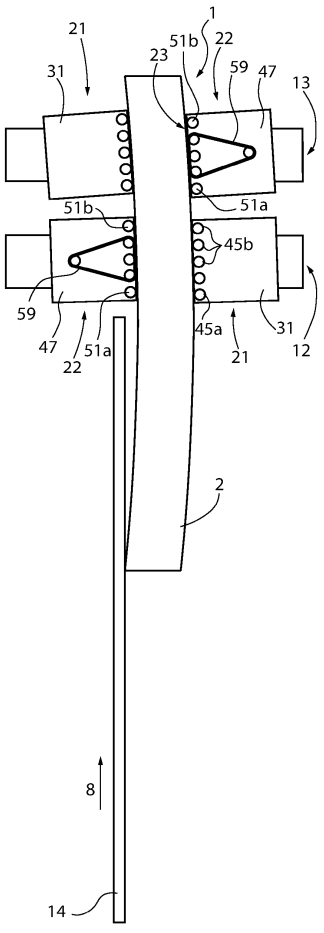


FIG.1b

EP 4 011 551 A1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102020000030551 filed on December 11, 2020.

TECHNICAL FIELD

[0002] The invention relates to a sanding machine for sanding/finishing/brushing components made of wood, metal or the like.

[0003] The invention especially finds advantageous application in the sanding/finishing/brushing of bars with an elongated shape used as beams or columns in the building industry, to which explicit reference will be made in the description below without because of this loosing in generality.

PRIOR ART

[0004] When dealing with the sanding/finishing/brushing of bars for the building industry, each having an elongated shape and being delimited by an upper face and by a lower face, which are substantially parallel to one another, by a front end face and by a rear end face as well as by two side faces, which are substantially parallel to one another, a sanding machine is known, which comprises a base; at least one sanding unit; and a transport device defining a horizontal support surface for at least one bar.

[0005] The bars are moved by the transport device in a first direction, which is parallel to the support surface and perpendicular to the front and rear end faces, and along a path extending through the sanding unit.

[0006] Generally speaking, the sanding unit comprises two conveyor assemblies, which are mounted on opposite sides of the path in a second direction, which is parallel to the support surface and transverse to the first direction, define a feeding channel feeding the bar through the sanding unit and are movable relative to one another in the second direction depending on a width of the bar measured parallel to the second direction.

[0007] Each conveyor assembly normally comprises a plurality of feeding rollers, which are aligned with one another in the first direction and are motor-driven so as to rotate around respective rotation axes, which are substantially perpendicular to the bar support surface.

[0008] At least one conveyor assembly is provided with a sanding tool, for example an abrasive belt or a brush, which extends between two adjacent feeding rollers and is configured to sand/finish a corresponding side face of the bar.

[0009] Known sanding machines of the type described above suffer from some drawbacks, which are mainly due to the fact that, when the side faces of the bar are not flat and have a curved profile or are flat and have an uneven profile because of production tolerances of the bar itself, the two conveyor assemblies are incapable of correctly moving the bar through the sanding unit and the sanding tool is incapable of correctly carrying out the sanding/finishing of the corresponding side face.

SUBJECT-MATTER OF THE INVENTION

[0010] The object of the invention is to provide a sanding machine for sanding/finishing/brushing components made of wood, metal or the like, which does not suffer from the drawbacks described above and is simple and economic to be manufactured.

[0011] According to the invention, there is provided a sanding machine for sanding/finishing/brushing components made of wood, metal or the like according to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The invention will now be described with reference to the accompanying drawings showing a non-limiting embodiment thereof, wherein:

figures 1a and 1b are two schematic plan views, with parts removed for greater clarity, of a preferred embodiment of the sanding machine of the invention, which is shown in two different operating positions;

figures 2, 3 and 4 are three schematic perspective view, with parts on a larger scale and parts removed for greater clarity, of a detail of the sanding machine of figures 1a and 1b;

figure 5 is a schematic side view, with parts removed for greater clarity, of the detail of figures 2, 3 and 4;

figure 6 is a schematic perspective view, with parts removed for greater clarity, of a first detail of figures 2, 3 and 4;

figure 7 is a schematic plan view, with parts removed for greater clarity, of a second detail of figures 2, 3 and 4;

figures 8 and 9 are two schematic perspective views, with parts removed for greater clarity, of a third detail of figures 2, 3 and 4;

figures 10 and 11 are two schematic perspective views, with parts on a larger scale and parts removed for greater clarity, of a variant of the detail of figures 2, 3 and 4;

figures 12 and 13 are two schematic perspective views, with parts removed for greater clarity, of a detail of figures 10 and 11;

figure 14 is a schematic perspective view, with parts removed for greater clarity, of a detail of figures 12 and 13; and

figure 15 is a schematic perspective view, with parts removed for greater clarity, of a detail of figure 14.

PREFERRED EMBODIMENT OF THE INVENTION

[0013] With reference to figures 1, 2, 3, 4 and 5, number 1 indicates, as a whole, a sanding machine for sanding/finishing/brushing components 2 made of wood, metal or the like, especially beams or columns for the building industry.

[0014] Each component 2 has an elongated shape and is delimited by an upper face 3 and by a lower face 4, which are substantially parallel to one another, by two end faces 5, which are substantially parallel to one another and perpendicular to the faces 3, and by two side faces 6, which are parallel to one another and perpendicular to the faces 3.

[0015] The sanding machine 1 comprises a roller conveyor device 7, which extends in a horizontal direction 8 and comprises, in turn, a plurality of motor-driven transport rollers 9, which define a support surface A for the components 2 and are mounted so as to rotate around respective rotates axes 10, which are parallel to one another and to a horizontal direction 11, which is transverse to the direction 8.

[0016] The components 2 are moved by the device 7 along a path P extending through a plurality of operating units, especially two operating units 12, 13, which are mounted between the rollers 9 and are each designed to process a relative face 6.

[0017] The sanding machine 1 is provided with a limit stop device 14, which is arranged upstream of the unit 12, extends in the direction 8 and allows the components 2 to be correctly positioned in the direction 11.

[0018] The unit 12 comprises an elongated frame 15, which extends in the direction 11 and supports an intermediate slide 16, which extends in the direction 11 and is coupled to the frame 15 in a sliding manner through the interposition of a shock absorber device 17 (figure 6) so as to make, relative to the frame 15, straight movements in the direction 11.

[0019] The device 17 comprises, in particular, a pneumatic cylinder 18, which is fixed to the frame 15 parallel to the direction 11, a pneumatic cylinder 19, which is fixed to the slide 16 parallel to the direction 11 and faces the cylinder 18, and an output rod 20, which is coupled to the cylinders 18, 19 in a sliding manner.

[0020] The slide 16 supports two conveyor assemblies 21, 22, which are arranged on opposite sides of the path P in the direction 11 and define a feeding channel 23 feeding the components 2 through the unit 12.

[0021] The assembly 21 is arranged on the side of the path P opposite the one of the device 14 and comprises a horizontal slide 24 with a substantially rectangular shape, which is mounted on the slide 16 is coupled to the slide 16 in a sliding manner and is further coupled, by means of a screw-nut screw coupling, to a screw 25 of a relative operating device 26 (figure 7), a motor 27 thereof causing the rotation of the screw 25 in order to cause the slide 24 to make straight movements along the slide 16 in the direction 11.

[0022] The device 26 further comprises a nut screw 28, which is coupled to the screw 25 and is engaged by the slide 24 in a sliding manner through the interposition of a shock absorber device 29 (figure 7) comprising two pneumatic cylinders 30, which are mounted between the slide 24 and the nut screw 28 parallel to the direction 11.

[0023] The assembly 21 is further provided with a rotary platform 31, which is coupled to the slide 24 in a rotary manner so as to rotate, relative to the slide 24, around a fulcrum axis 32, which is parallel to a vertical direction 33 orthogonal to the directions 8 and 11 and is obtained at the entrance of the components 2 into the unit 12 and into the channel 23.

[0024] The platform 31 is connected to the slide 24 through the interposition, in particular, of a shock absorber device 34 and of three coupling devices 35.

[0025] The device 34 comprises, in particular, a pneumatic cylinder 36, which is connected to the slide 24, a pneumatic cylinder 37, which is connected to the platform 31 and faces the cylinder 36, and an output rod 38, which is coupled to the two cylinders 36, 37 in a sliding manner.

[0026] Each device 35 comprises a guide 39, which is fixed to the slide 24 parallel to the direction 11, a recirculating ball slider 40, which is coupled to the guide 39 in a sliding manner, a guide 41, which is obtained on the slider 40 parallel to the direction 8, a recirculating ball slider 42, which is coupled to the guide 41 in a sliding manner, and a rolling bearing 43, which is interposed between the platform 31 and the slider 42 so as to allow the platform 31 and the slider 42 to rotate relative to one another around a rotation axis 44, which is parallel to the direction 33.

[0027] The platform 31 supports a plurality of motor-driven conveyor rollers 45 (in this case, five rollers 45), which are aligned with one another, face the path P and laterally delimit the channel 23. One of the rollers 45 (hereinafter indicated with 45a) is an input roller mounted so as to rotate around the axis 32 and the other rollers 45 (hereinafter indicated with 45b) are mounted so as to rotate around respective rotation axes 46, which are parallel to one another and to the direction 33.

[0028] The assembly 22 is integral to the slide 16 in the direction 11 and is mounted downstream of the limit stop device 14 in the direction 8.

[0029] The assembly 22 is provided with a rotary platform 47, which is coupled to the slide 16 in a rotary manner so as to rotate, relative to the slide 16, around a fulcrum axis 48, which is parallel to the direction 33 and is obtained at the entrance of the components 2 into the unit 12 and into the channel 23.

[0030] The platform 47 is connected to the slide 16 through the interposition, in particular, of a shock absorber device 49, which is completely equivalent to the device 34, and of four coupling devices 50, which are completely equivalent to the devices 35.

[0031] The platform 47 supports a plurality of motor-driven conveyor rollers 51 (in this case, three rollers 51), which are aligned with one another, face the path P and

laterally delimit the channel 23. One of the rollers 51 (hereinafter indicated with 51a) is an input roller mounted so as to rotate around the axis 48 and the other rollers 51 (hereinafter indicated with 51b) are mounted so as to rotate around respective rotation axes 52, which are parallel to the direction 33.

[0032] According to figures 8 and 9, the assembly 22 is further provided with a sanding device 53 comprising three pulleys 54, which are mounted on the platform 47 with a triangle-like arrangement and are coupled to the platform 47 so as to rotate, relative to the platform 47, around respective rotation axes 55, which are parallel to one another and to the direction 33.

[0033] Two pulleys 54 (hereinafter indicated with 54a) are motor-driven drive rollers, which are mounted between the rollers 51b and are moved around the relative axes 55 by an operating device 56 comprising an electric motor 57, which is mounted on the platform 47, and a belt transmission 58, which is interposed between the motor 57 and the pulleys 54a.

[0034] The third pulley 54 (hereinafter indicated with 54b) is a stretching roller, which is coupled to the platform 47 in a sliding manner so as to move crosswise to the relative axis 55 and stretch an abrasive belt 59 wound around the pulleys 54a, 54b in a ring shape.

[0035] The belt 59 is caused to come into contact with the relative face 6 to be sanded - and held there - by a pushing roller 60, which is mounted between the pulleys 54a so as to rotate around a longitudinal axis 61 of its parallel to the axes 55 and, furthermore, is movable around a rotation axis (which is not shown herein), which is eccentric relative to the axis 61, from and to an operating position, in which the roller 60 pushes the belt 59 against the relative face 6.

[0036] The device 53 further comprises a synchronizing roller 62, which is arranged within the belt 59 and is mounted so as to rotate around a longitudinal axis 63 of its, which is parallel to the axes 55, 61.

[0037] When the roller 60 is in its operating position, the roller 62 is moved crosswise to the axis 63, due to the thrust of a pneumatic operating device 64, so as to come into contact with the roller 60 and with one of the pulleys 54a in order to synchronize the peripheral speeds of the pulleys 54a and of the roller 60 and avoid friction of the belt 59 on the roller 60.

[0038] The unit 13 is completely similar to the unit 12 and the only difference from the unit 12 lies in the fact that:

- the assembly 21 of the unit 13 is arranged downstream of the assembly 22 of the unit 12 in the direction 8 and the assembly 22 of the unit 13 is arranged downstream of the assembly 21 of the unit 12 in the direction 8; and
- the assembly 21 is integral to the slide 16 in the direction 11, the slide 24 is interposed between the slide 16 and the platform 47 of the assembly 22 and the assembly 22 is movable relative to the assembly 21 in the direction 11.

[0039] In use, the component 2 is caused to come into contact with the limit stop device 14 and, then, is moved by the roller conveyor device 7 and by the conveyor assemblies 21, 22 of the operating units 12, 13 in the direction 8 and along the path P.

[0040] The sanding machine 1 has two operating modes of the operating units 12, 13 depending on the profile of the side faces 6 of each component 2.

[0041] According to a first operating mode, when the faces 6 of the component 2 are flat:

- the output rod 20 of the pneumatic cylinders 18, 19 of each unit 12, 13 is locked in an operating position of its, in which the rod 20 is extracted on the outside of the relative cylinder 18 and retracted on the inside of the relative cylinder 19;
- the output rod 38 of the pneumatic cylinders 36, 37 of the conveyor assembly 21 of each unit 12, 13 is locked in an operating position of its, in which the rod 38 is retracted on the inside of the relative cylinder 36 and extracted on the outside of the relative cylinder 37;
- the output rod 38 of the pneumatic cylinders 36, 37 of the conveyor assembly 22 of each unit 12, 13 is locked in an operating position of its, in which the rod 38 is retracted on the inside of the relative cylinder 36 and extracted on the outside of the relative cylinder 37;
- the assembly 21 of the unit 12 is moved along the relative slide 16 in the direction 11, so that the distance between the relative rollers 45a and 51a is substantially equal to a width of the component 2 measured parallel to the direction 11; and
- the assembly 22 of the unit 13 is moved along the relative slide 16 in the direction 11, so that the distance between the relative rollers 45a and 51a is substantially equal to the width of the component 2.

[0042] In this way, the rollers 45a, 45b of the unit 12 and the rollers 51a, 51b of the unit 13 are aligned with one another in the direction 8, the rollers 51a, 51b of the unit 12 and the rollers 45a, 45b of the unit 13 are aligned with one another and with the limit stop device 14 in the direction 8 and the feeding channel 23 has a constant width, which is equal to the width of the component 2.

[0043] The cylinders 19 fixed to the slides 16 of the two units 12, 13 are supplied with a pressure which, in any case, is smaller than the thrust exerted by the component 2 upon the assemblies 21, 22 of the two units 12, 13 so as to make up for possible changes in the shape of the faces 6 of the component 2.

[0044] The cylinders 30 of the shock absorber devices 29 of the two units 12, 13 are supplied with a pressure which, in any case, is smaller than the thrust exerted by the component 2 upon the assemblies 21, 22 of the two units 12, 13 so as to make up for possible changes in the width of the component 2 due to production size tolerances.

[0045] According to the other one of the two operating modes mentioned above, when the two faces 6 of the component 2 are not flat and have a curved profile:

the cylinder 18 of each unit 12, 13 is supplied so as exert, upon the relative rod 20, a thrust which, in any case, is smaller than the thrust exerted by the component 2 upon the assemblies 21, 22 of the two units 12, 13;
the cylinders 36, 37 of the assemblies 21, 22 of each unit 12, 13 are supplied so as exert, upon the relative rods 38, a thrust which, in any case, is smaller than the thrust exerted by the component 2 upon the assemblies 21, 22 of the two units 12, 13;
the assembly 21 of the unit 12 is moved along the relative slide 16 in the direction 11, so that the distance between the relative rollers 45a and 51a is substantially equal to the width of the component 2; and
the assembly 22 of the unit 13 is moved along the relative slide 16 in the direction 11, so that the distance between the relative rollers 45a and 51a is substantially equal to the width of the component 2.

[0046] In this way, the slide 16 and, hence, the assemblies 21, 22 of each unit 12, 13 are movable in the direction 11 depending on the profile of the faces 6 of the component 2 and the platforms 31, 47 and, hence, the assemblies 21, 22 of each unit 12, 13 are movable around the relative fulcrum axes 32, 48 depending on the profile of the faces 6 of the component 2.

[0047] With reference to what described above, it should be pointed out that:

the rotation of the assembly 21 of each unit 12, 13 around the relative axis 32 allows the relative roller 45a and at least one relative roller 45b to keep engaging the relative face 6 of the component 2; and
the rotation of the assembly 22 of each unit 12, 13 around the relative axis 48 both allows the relative roller 51a and at least one relative roller 51b to keep engaging the relative face 6 of the component 2 and allows the relative belt 59 to always be in contact with the relative face 6 of the component 2 with a constant thrust.
When the faces 3, 4 and 6 are connected to one another by means of relative bevelled edges 65 (figure 10), the path P extends through two further operating units, one of them (hereinafter indicated with 66) being shown in figures 10 and 11 and being configured to sand the bottom left edge 65 and the top right edge 65 and the other one (which is not shown herein) being configured to sand the bottom right edge 65 and the top left edge 65.

[0048] The unit 66 comprises a frame 67, an intermediate slide 68 and a shock absorber device 69, which are completely equivalent to the frame 15, to the intermediate slide 16 and to the shock absorber device 17 of the units 12, 13.

[0049] The slide 68 supports two conveyor assemblies 70, 71 arranged on opposite sides of the path P in the direction 11.

[0050] The assembly 70 is integral to the slide 68 in the direction 11, is aligned with the limit stop device 14 in the direction 8 and is provided with a vertical upright 72 projecting upwards from the slide 68 in the direction 33.

[0051] The upright 72 supports a plurality of motor-driven conveyor rollers 73 (in particular, two rollers 73), which are aligned with one another and with the device 14 in the direction 8, face the path P, laterally delimit the channel 23 and are mounted so as to rotate around respective rotation axes 74, which are parallel to the direction 33.

[0052] With reference to figures 12 and 13, the assembly 70 further comprises a sanding device 75 provided with a first support plate 76, which is mounted on the upright 72 and is inclined relative to the surface A so as to be substantially perpendicular to the relative edge 65, with a second support plate 77, which is coupled to the plate 76 in a sliding manner so as to move, relative to the plate 76, in the direction 8, and with a bracket 78, which is coupled to the plate 76 in a rotary manner so as to rotate, relative to the plate 76 and due to the thrust of an operating device 79, which is better described below, with an oscillatory reciprocating motion around a fulcrum axis 80, which is parallel to the plate 76.

[0053] The device 75 has three pulleys 81, which are mounted on the plate 76 with a triangle-like arrangement, and an abrasive belt 82 wound around the pulleys 81 in a ring shape.

[0054] A first pulley 81 (hereinafter indicated with 81a) is a motor-driven roller mounted on the plate 76 so as to rotate around a longitudinal axis 83 of its, which is perpendicular to the plate 76, due to the thrust of an operating device 84 comprising an electric motor 85, which is fixed to the plate 76, and a belt transmission 86, which is interposed between the roller 81a and the motor 85.

[0055] A second pulley 81 (hereinafter indicated with 81b) is a stretching roller, which is mounted on the plate 77 so as to rotate around a longitudinal axis 87 of its parallel to the axis 83 and is moved by the plate 77 in the direction 8 so as to stretch the belt 82.

[0056] A third pulley 81 (hereinafter indicated with 81c) is mounted on the bracket 78 so as to rotate around a longitudinal axis 88 of its, whose orientation depends on the position of the bracket 78 around the axis 80.

[0057] The oscillatory reciprocating motion of the bracket 78 and, hence, of the pulley 81c around the axis 80 generates a straight reciprocating motion of the belt 82 along the pulleys 81a, 81b, 81c and, hence, a relatively even wear of the belt 82.

[0058] According to figures 14 and 15, the device 79 comprises a reduction unit 89, which is fixed to the bracket 78 and has an input shaft 90, which is mounted so as to rotate around a longitudinal axis 91 of its parallel to

the axis 88 and is connected to the pulley 81c through the interposition of a belt transmission 92.

[0059] The reduction unit 89 is further provided with an output shaft 93 comprising a first portion 94, which is coupled to the shaft 90 so as to rotate around a longitudinal axis 95 of its transverse to the axis 91, and a second portion 96, which has a longitudinal axis 97 parallel to the axis 95, is coupled to the portion 94 in an angularly fixed manner ans is further coupled to the portion 94 in a sliding manner so as to be moved, during a set-up phase for setting up the sanding device 75, crosswise to the axis 97.

[0060] The portion 96 is axially locked on the portion 94 by means of a fastening screw (not shown herein), which extends through a slot 98 obtained in the portion 96, is screwed into the portion 94 and allows the eccentricity of the axis 97 relative to the axis 95 to be selectively controlled.

[0061] The portion 96 is engaged in a rotary manner, through the interposition of a rolling ball bearing which is not shown herein, through a first free end of a connecting rod 99, whose second free end is connected, through the interposition of a ball joint which is not shown herein, to a coupling pin 100, which projects, crosswise to the axis 80, from a support bracket 101 fixed to the plate 76 perpendicularly to the plate 76.

[0062] In use, the rotary motion of the pulley 81c around the axis 88 is transmitted by the belt transmission 92, first of all, to the input shaft 90 and, then, to the output shaft 93 of the reduction unit 89 so as to move the portion 94 around the axis 95 and the portion 96 around the axis 97.

[0063] Since the portion 96 is engaged through the connecting rod 99, which, in turn, is connected to the bracket 101 and, hence, to the plate 76, the portion 94 is caused to rotate around the eccentric axis 97, thus generating the oscillatory reciprocating motion of the bracket 78 around the axis 80.

[0064] The oscillatory reciprocating motion of the pulley 81c around the axis 80 generates a straight reciprocating motion of the belt 82 along the pulleys 81a, 81b, 81c parallel to the relative axes 83, 87, 88 and a substantially even wear of the belt 82 over a relatively large width of the belt 82.

[0065] The straight reciprocating motion of the belt 82 along the pulleys 81a, 81b, 81c has a back stroke and a forth stroke, which are independent of the speed of movement of the belt 82 around the pulleys 81a, 81b, 81c, depend on the width of the oscillation of the bracket 78 around the axis 80 and, hence, on the eccentricity between the axes 95 and 97 and are selectively controlled by changing the eccentricity between the axes 95 and 97.

[0066] The device 75 further comprises a pushing element 102, which is mounted between the pulleys 81b and 81c and is movable, due to the thrust of a pneumatic actuator cylinder 103 fixed to the plate 76, between a forward operating position, in which the element 102 causes the belt 82 to come into contact with the relative edge 65, and a retracted rest position, in which the belt 82 disengages the edge 65.

[0067] With reference to figures 10 and 11, the assembly 71 is arranged on the side of the path P opposite the one of the device 14 and comprises a horizontal slide 104, which is mounted on the slide 68 and is coupled to the slide 68 in a sliding manner so as to make straight movements along the slide 68 in the direction 11 due to the thrust of an operating device, which is completely equivalent to the operating device 26, and through the interposition of a shock absorber device, which is completely equivalent to the shock absorber device 29.

[0068] The slide 104 extends upwards in the direction 33 and supports a plurality of motor-driven conveyor rollers 105 (in particular, two rollers 105), which are aligned with one another in the direction 8, face the path P, laterally delimit the channel 23 and are mounted so as to rotate around respective rotation axes 106, which are parallel to the direction 33.

[0069] The slide 104 is engaged in a sliding manner by a vertical slide 107, which, during a set-up phase for setting up the assembly 71, is moved by an operating device 108 along the slide 104 in the direction 33 depending on a height of the component 2.

[0070] The slide 107 supports a sanding device 109, which is completely equivalent to the sanding device 75 and is hinged to the slide 107 so as to rotate, relative to the slide 107 and due to the thrust of a pair of actuator cylinders 110, around a fulcrum axis 111, which is substantially parallel to the direction 8, between an operating position, in which the device 109 sands the relative edge 65, and a rest position, which is suited to allow the belt 82 to be replaced.

[0071] The operating unit (not shown) mounted downstream of the unit 66 in the direction 8 is completely equivalent to the unit 66 and the only difference from the unit 66 lies in the fact that:

- the assembly 71 of the operating unit (not shown) is arranged downstream of the assembly 70 of the unit 66 in the direction 8 and the assembly 70 of the operating unit (not shown) is arranged downstream of the assembly 71 of the unit 66 in the direction 8; and
- the assembly 71 is integral to the slide 68 in the direction 11, the slide 104 is interposed between the slide 68 and the upright 72 of the assembly 70 and the assembly 70 is movable relative to the assembly 71 in the direction 11.

[0072] According to some embodiments that are not shown:

- the sanding devices 53 and/or 75 and/or 109 are eliminated and replaced by alternative sanding tools, for example brushes; and
- the pneumatic cylinders 18, 19, 36, 37 are eliminated and replaced by alternative shock absorber devices, for example hydraulic actuators, electric cylinders,

brushless servo-motors.

Claims

1. A sanding machine for sanding/finishing/brushing components (2) made of wood, metal or the like; each component (2) having an upper face (3) and a lower face (4), which are substantially parallel to one another, a front face (5) and a rear face (6) as well as two side faces (6); the sanding machine comprising a support structure (15, 16; 15, 16, 24); at least one sanding unit (12, 13); and a feeding device (7), which defines a support surface (A) for at least one component (2) and is designed to feed the component (2) in a first direction (8), which is parallel to the support surface (A), and along a path (P) extending through the sanding unit (12, 13); the sanding unit (12, 13) comprising, in turn, two conveyor assemblies (21, 22), which are mounted on opposite sides of the path (P) in a second direction (11) parallel to the support surface (A) and transverse to the first direction (8), define a feeding channel (23) feeding the component (2) through the sanding unit (12, 13) and are movable relative to one another in the second direction (11) depending on a width of the component (2) measured parallel to the second direction (11); at least one conveyor assembly (21, 22) being provided with a sanding device (53) for sanding/finishing/brushing a side face (6) of the component (2); and being **characterized in that** at least one conveyor assembly (21, 22) comprises a rotary platform (31, 47), which is mounted so as to rotate around a rotation axis (32, 48), which is perpendicular to the support surface (A), due to the thrust exerted by the component (2) upon the conveyor assembly (21, 22) depending on a profile of the side faces (6) of the component (2).

2. The sanding machine according to claim 1, wherein each conveyor assembly (21, 22) comprises a rotary platform (31, 47), which is mounted so as to rotate around a rotation axis (32, 48), which is perpendicular to the support surface (A), and a conveyor assembly (45, 51), which is mounted on the rotary platform (31, 47); the sanding device (53) being mounted on the rotary platform (47) of the relative conveyor assembly (22).

3. The sanding machine according to claim 2, wherein each conveyor assembly (45, 51) comprises an input roller (45a, 51a), which is mounted to as to rotate around the rotation axis (32, 48) of the relative rotary platform (31, 47) .

4. The sanding machine according to claim 3, wherein each conveyor device (45, 51) further comprises an output roller (45b, 51b) and at least one intermediate roller (45b, 51b), which is mounted between the input roller (45a, 51a) and the output roller (45b, 51b).

5. The sanding machine according to claim 4, wherein the sanding device (53) comprises a sanding tool (82), which is mounted between the intermediate roller (45b, 51b) and the input roller (45a, 51a) or the output roller (45b, 51b) .

6. The sanding machine according to any one of the preceding claims and further comprising, for each rotary platform (31, 47), a respective first shock absorber device (34, 49) to allow the rotary platform (31, 47) to move around the relative rotation axis (32, 48) due to the thrust exerted by the component (2) upon the relative conveyor assembly (21, 22) depending on the profile of the side faces (6) of the component (2).

7. The sanding machine according to claim 6, wherein the first shock absorber device (34, 49) is interposed between the support structure (15, 16; 15, 16, 24) and the rotary platform (31, 47).

8. The sanding machine according to any one of the preceding claims, wherein each rotary platform (31, 47) is coupled to the support structure (15, 16; 15, 16, 24) through the interposition of at least one coupling device (35) comprising a first slider (40), which is coupled to the support structure (15, 16; 15, 16, 24) in a sliding manner so as to move in the second direction (11), a second slider (42), which is coupled to the first slider (40) in a sliding manner so as to move in the first direction (8), and a rolling bearing (43) to couple to second slider (42) and the rotary platform (31, 47) to one another in a rotary manner.

9. The sanding machine according to any one of the preceding claims, wherein the support structure (15, 16; 15, 16, 24) comprises a base (15) and an intermediate slide (16), which is interposed between the base (15) and the two conveyor assemblies (21, 22), supports the two conveyor assemblies (21, 22) and is coupled to the base (15) in a sliding manner so as to move in the second direction (11) due to the thrust exerted by the component (2) upon the two conveyor assemblies (21, 22) depending on a profile of the side faces (6) of the component (2).

10. The sanding machine according to claim 9, wherein the sanding unit (12, 13) further comprises a second shock absorber device (17), which is interposed between the base (15) and the intermediate slide (16) so as to allow the intermediate slide (16) to move in the second direction (11) due to the thrust exerted by the component (2) upon the two conveyor assemblies (21, 22) depending on the profile of the side faces (6) of the component (2).

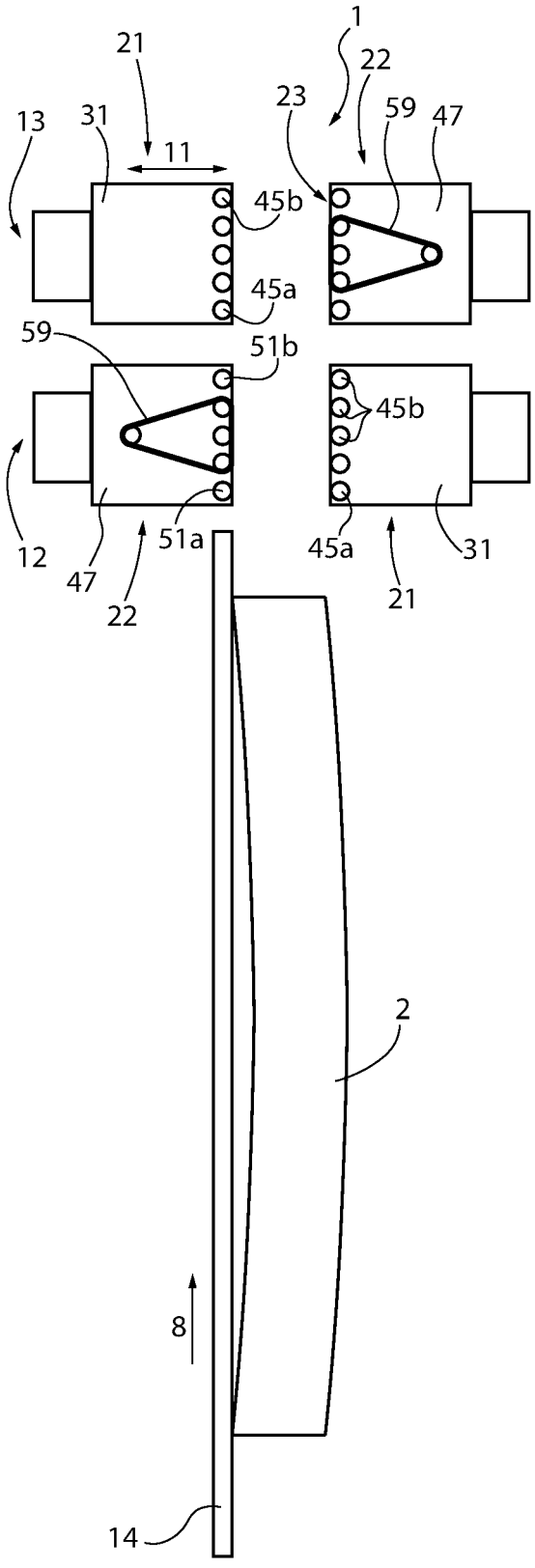
11. The sanding machine according to claim 9 or 10, wherein a first conveyor assembly (22) is fixed on the intermediate slide (16) in the second direction (11) and a second conveyor assembly (21) is movable along the intermediate slide (16) in the second direction (11) depending on the width of the component (2).

12. The sanding machine according to claim 11, wherein the sanding unit (12, 13) further comprises an operating device (26) to move the second conveyor assembly (21) along the intermediate slide (16) in the second direction (11); the operating device (26) comprising an actuator member (28), which is movable in the second direction (11) .

13. The sanding machine according to claim 12, wherein the second conveyor assembly (21) is coupled to the actuator member (28) in a sliding manner so as to move, relative to the actuator member (28), in the second direction (11) due to the thrust exerted by the component (2) upon the two conveyor assemblies (21, 22) depending on the profile of the side faces (6) of the component (2).

14. The sanding machine according to claim 13, wherein the sanding unit (12, 13) further comprises a third shock absorber device (29), which is interposed between the second conveyor assembly (21) and the actuator member (28).

15. The sanding machine according to any one of the claims from 11 to 14, when they depend on claim 6 or 7, wherein the first shock absorber device (49) of the first conveyor assembly (22) is interposed between the intermediate slide (16) and the relative rotary platform (47) and the first shock absorber device (34) of the second conveyor assembly (21) is interposed between the relative rotary platform (31) and a support slide (24), which is mounted between the intermediate slide (16) and the rotary platform (31) and is coupled to the intermediate slide (16) in a sliding manner.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47
13
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51a
45a
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31
2
8
14

FIG.1a

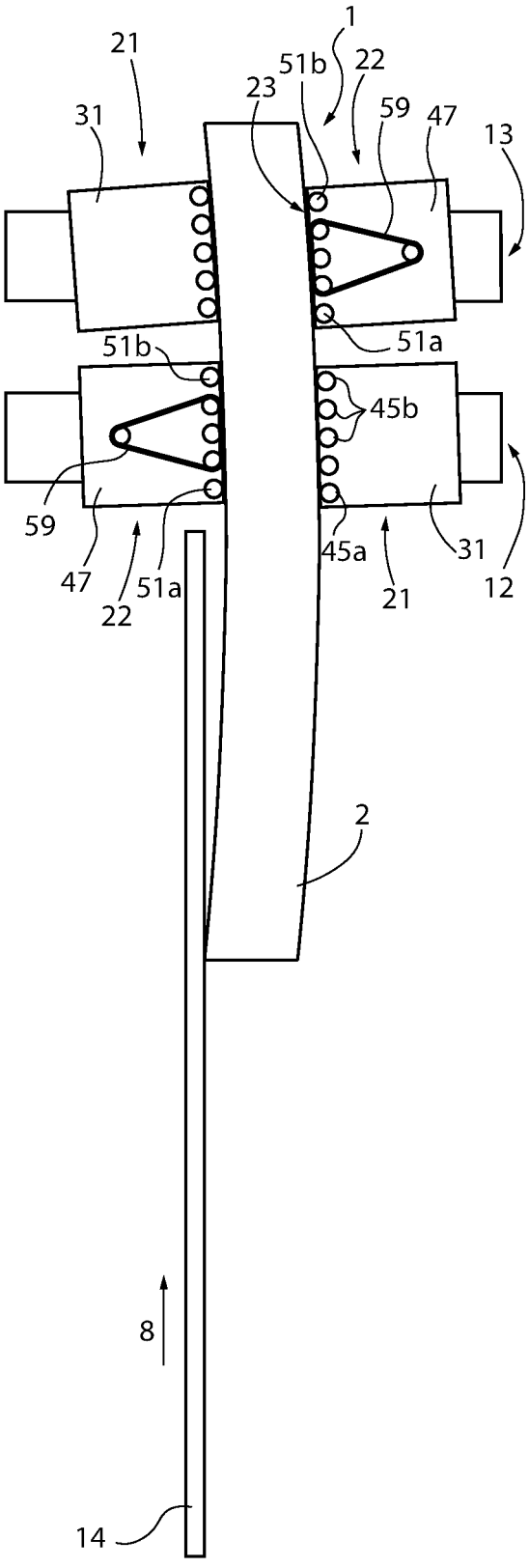
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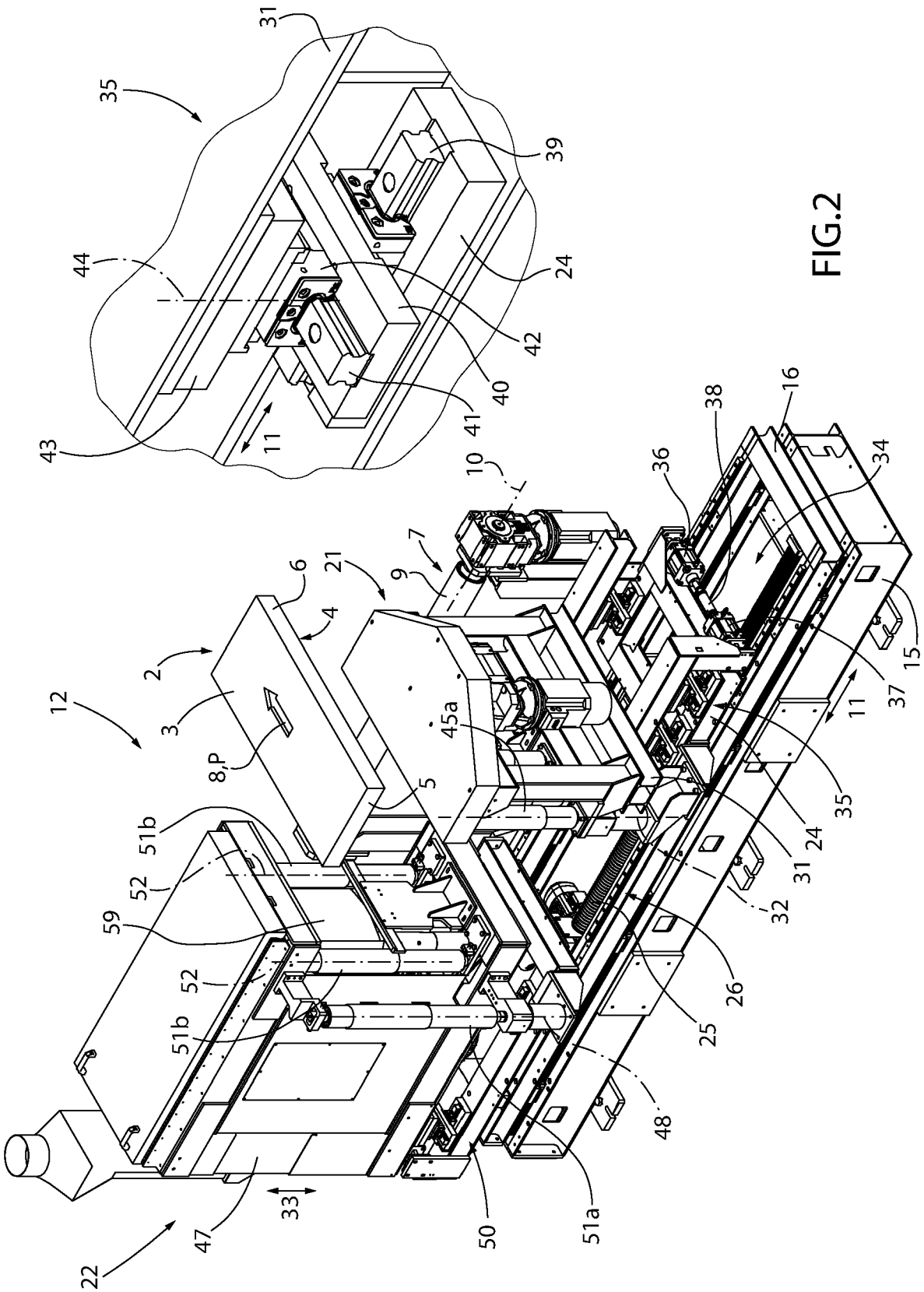
FIG.1b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3
8,P
45a
5
37
15
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52
26
51b
25
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22
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33
50
51a

FIG.2

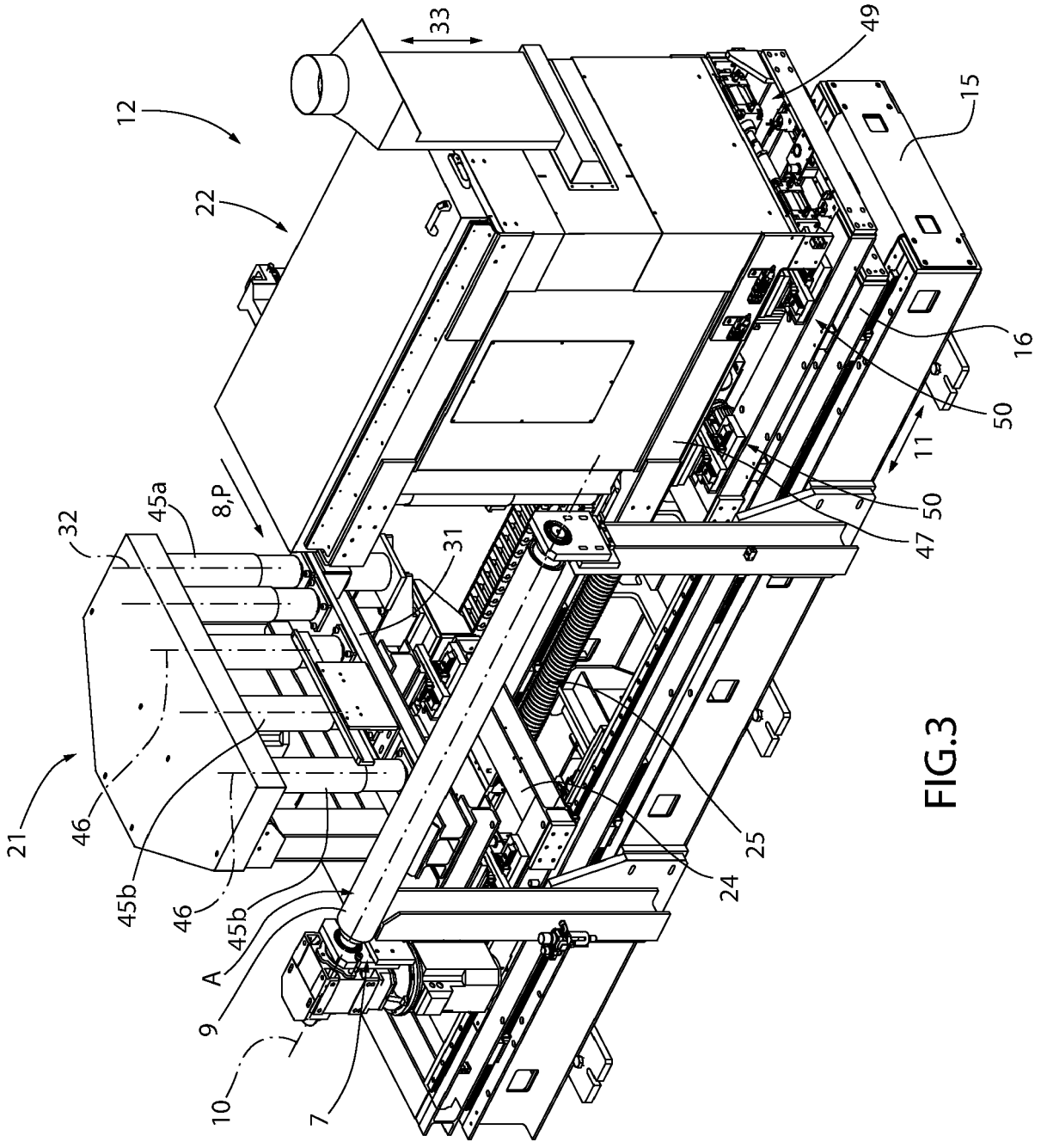
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FIG.3

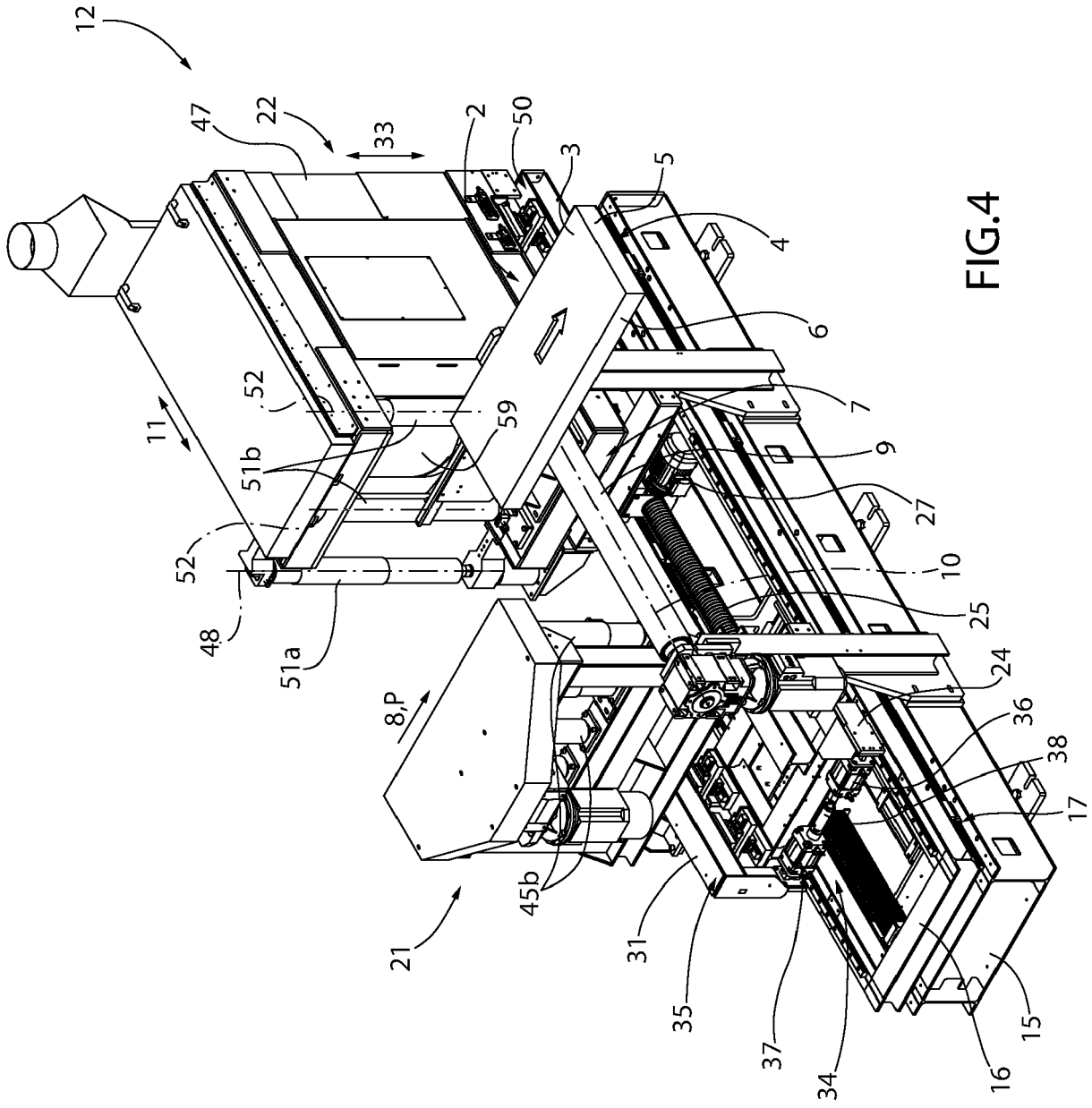
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FIG.4

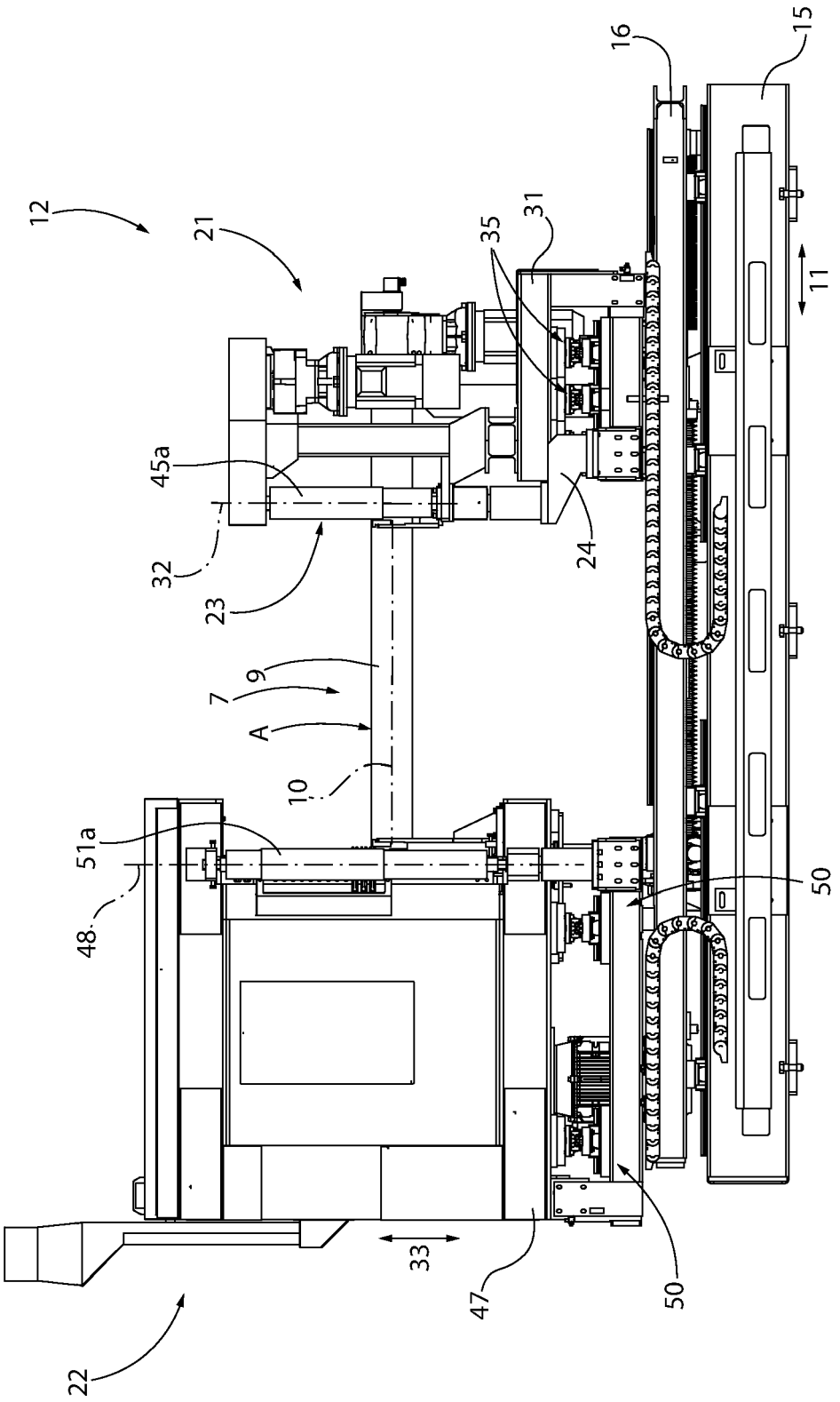

FIG.5

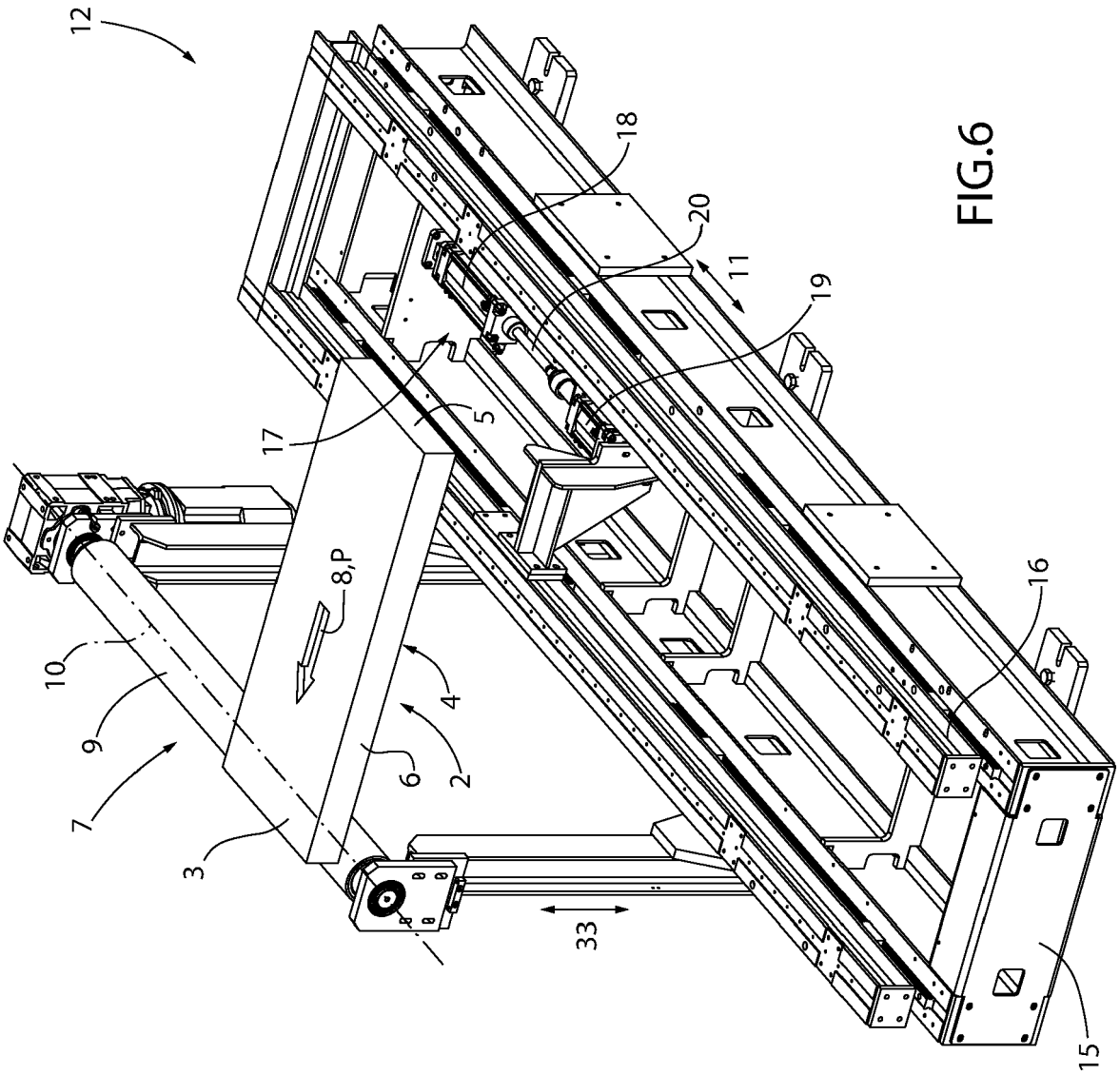

FIG.6

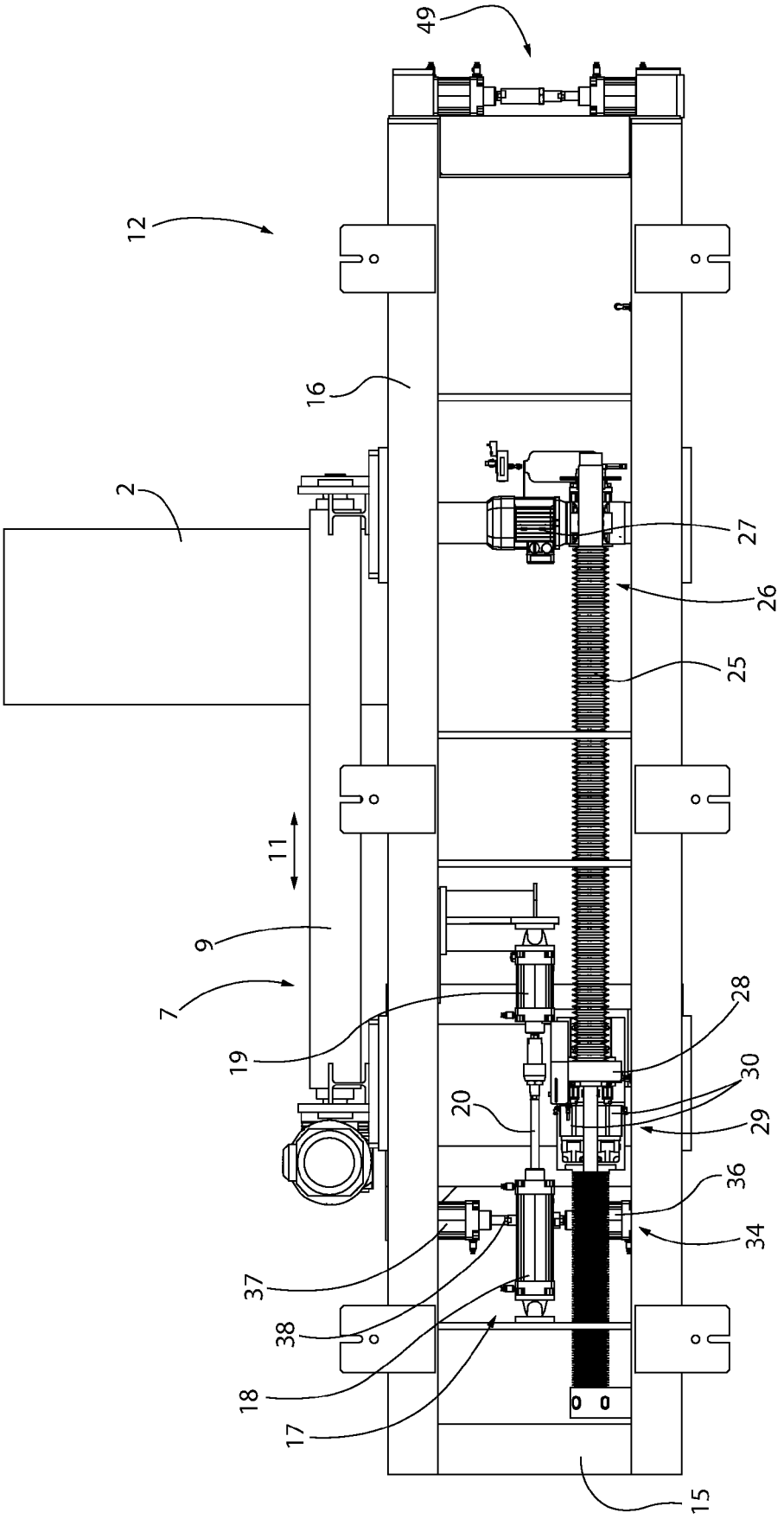

FIG.7

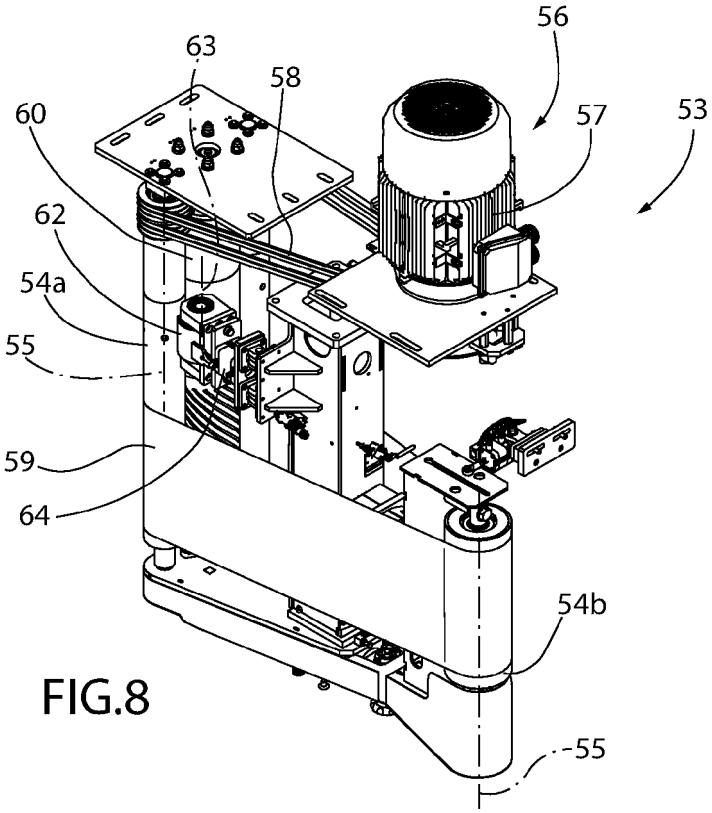
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FIG.8

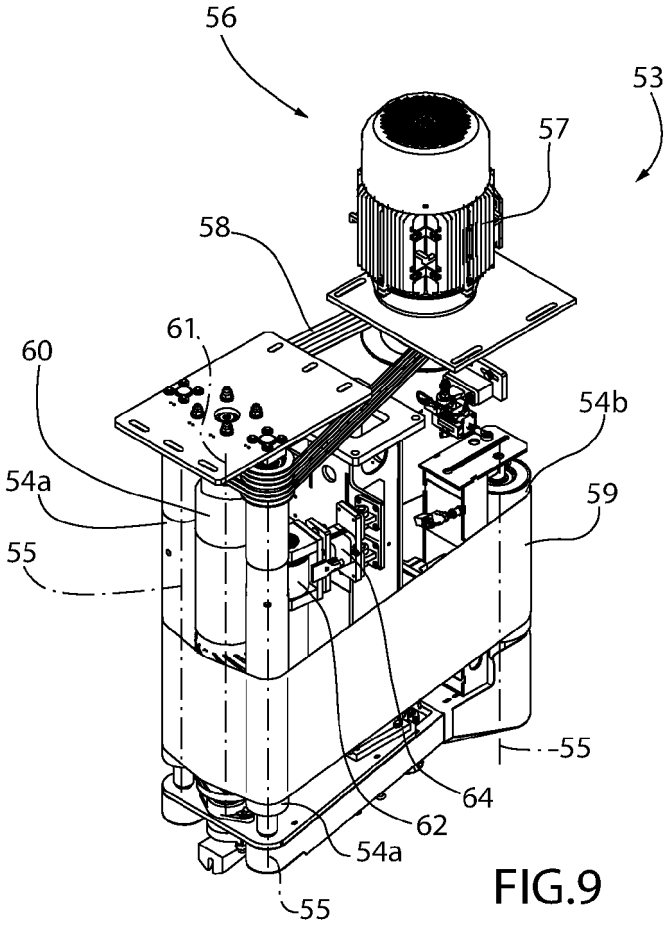
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FIG.9

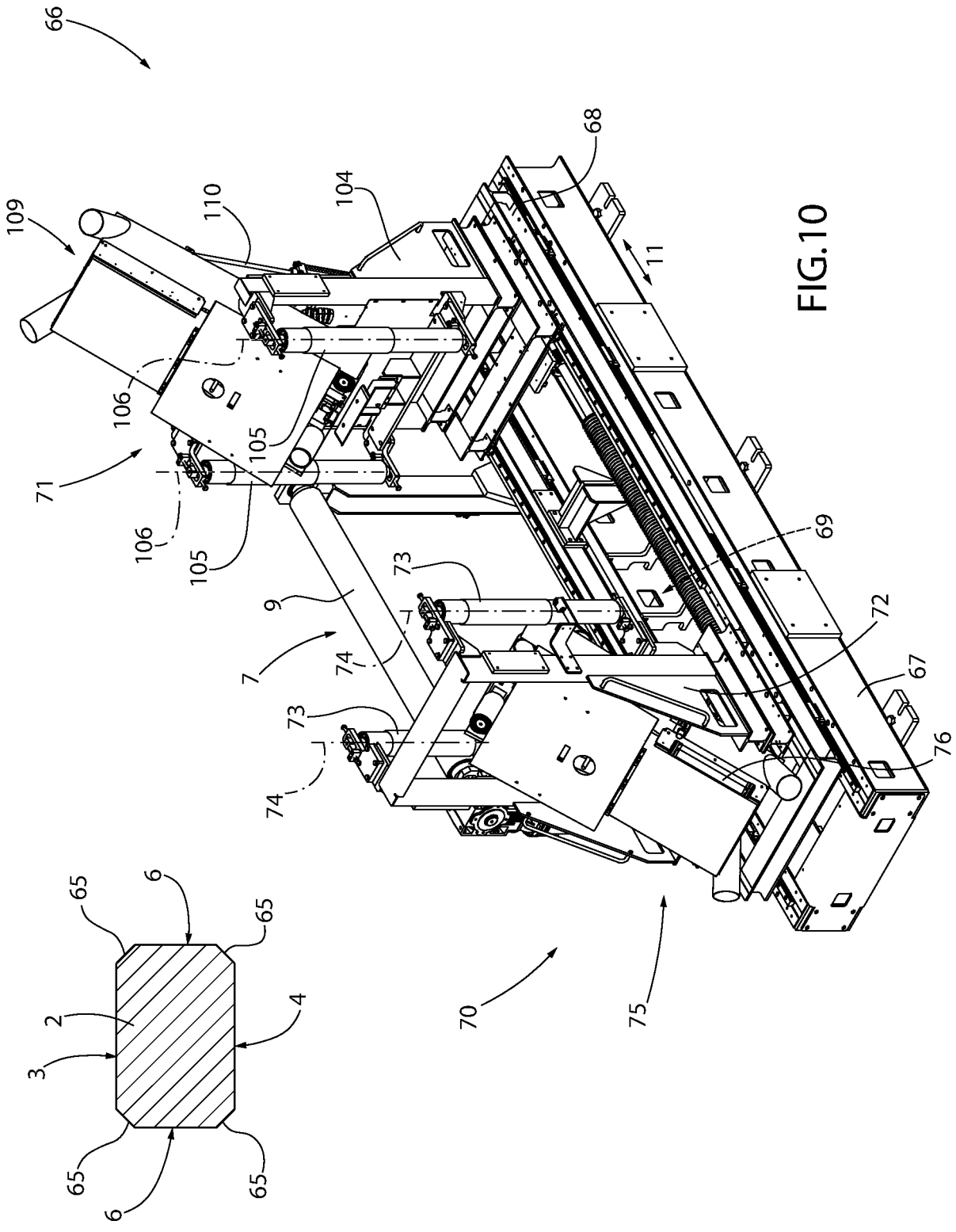
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FIG.10

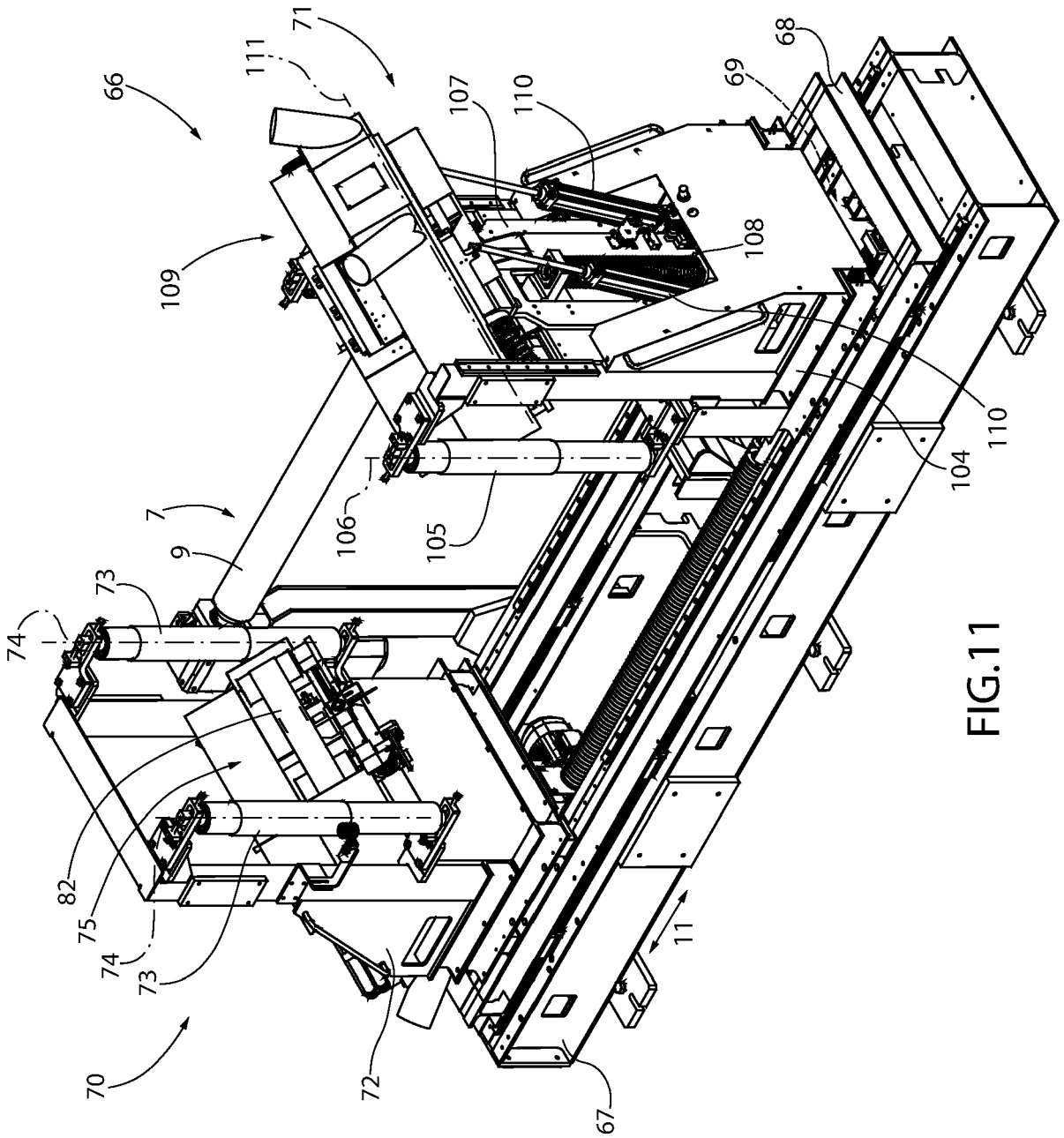
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FIG.11

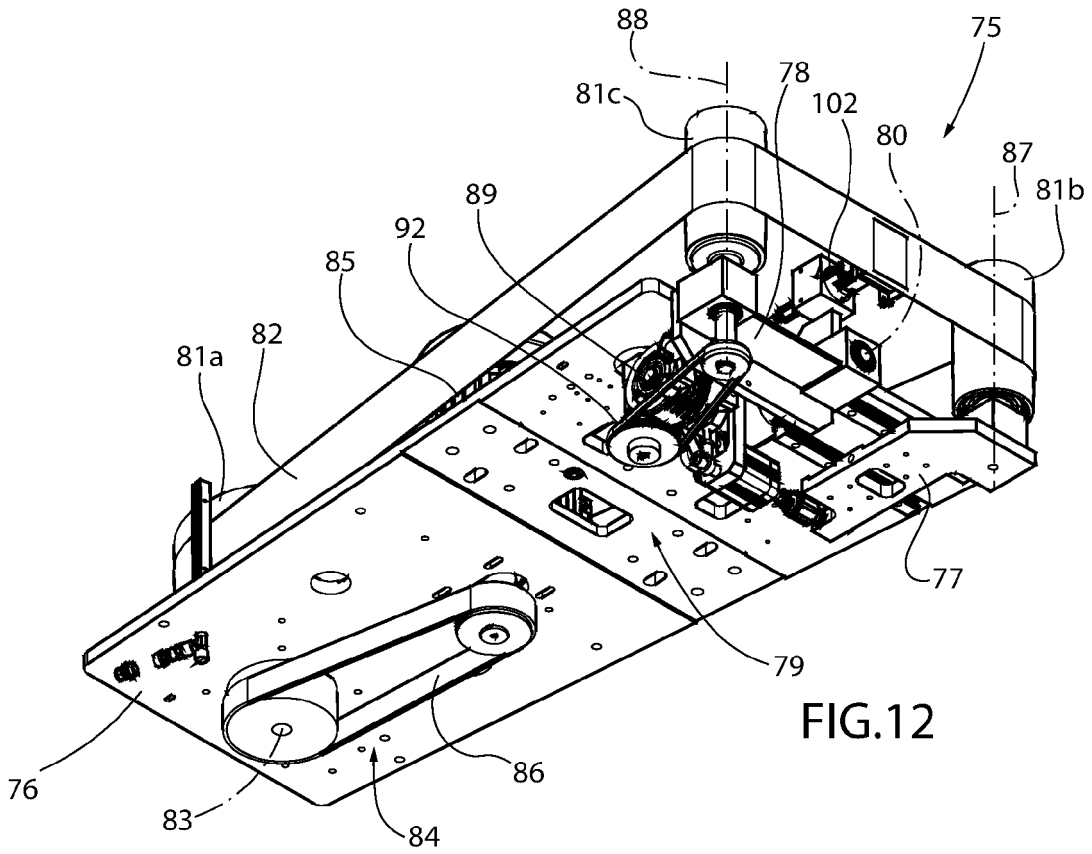
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FIG.12

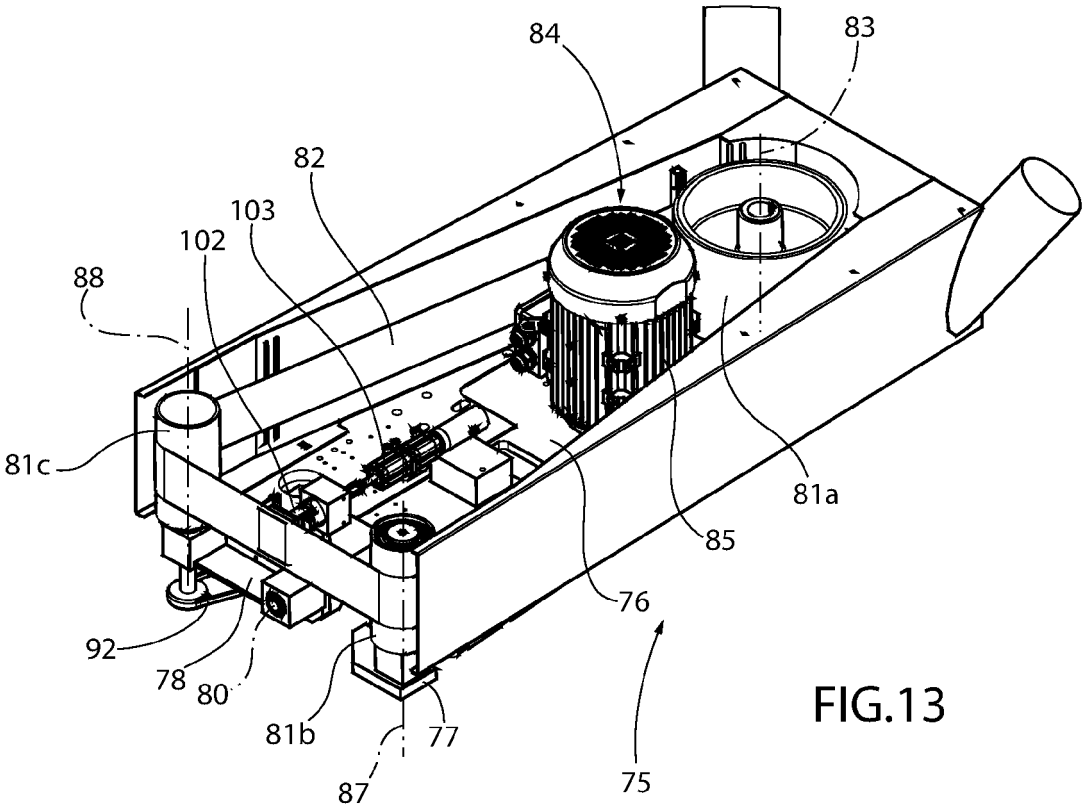
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FIG.13

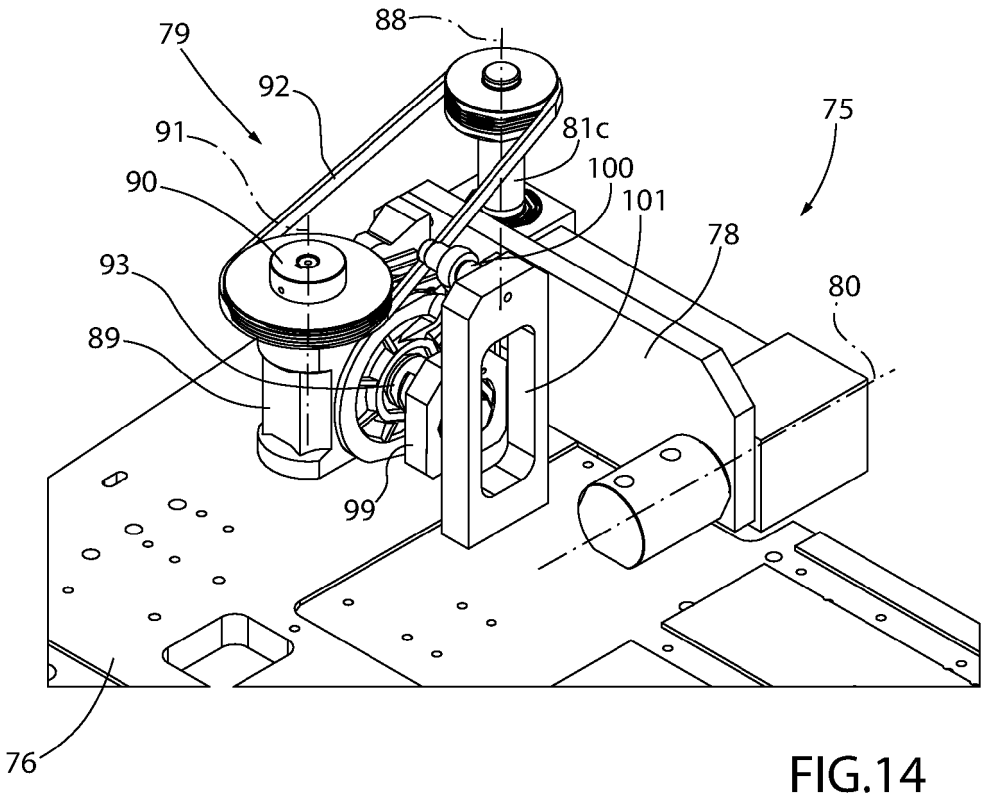

FIG.14

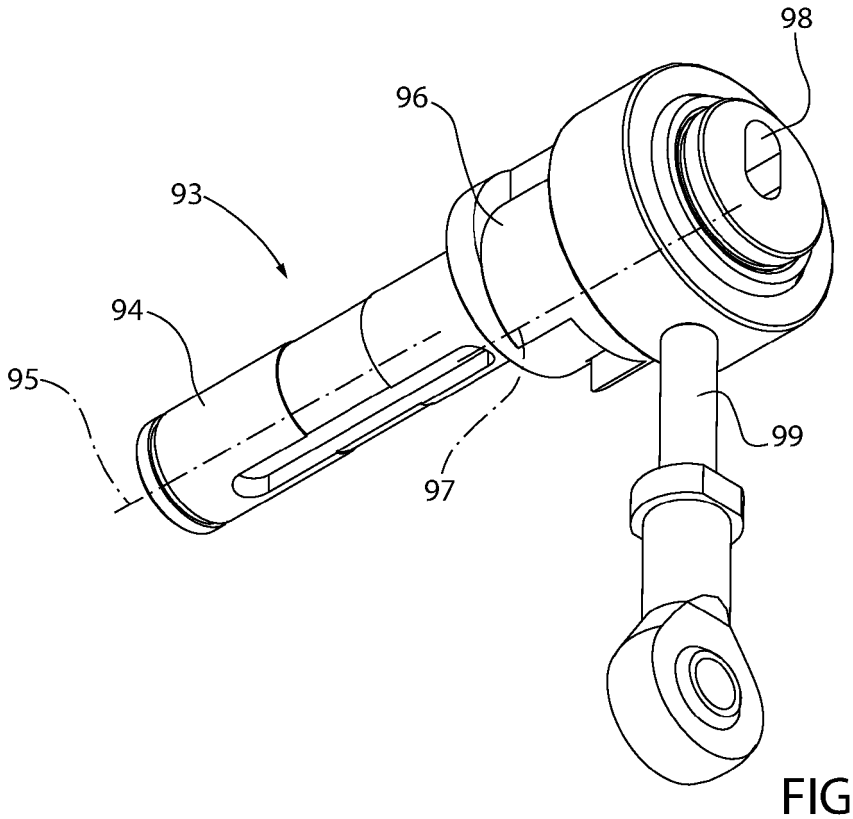

FIG.15

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EUROPEAN SEARCH REPORT

Application Number
EP 21 21 3637

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 597 881 A (OLTON DIRCK J ET AL) 10 August 1971 (1971-08-10) * column 7, line 53 - column 8, line 42; figures 1-4, 10, 12, 13, 17 *	1-15	INV. B24B7/28 B24B7/26 B24B41/00 B24B27/00
A	US 3 566 546 A (LINDMARK KARL L) 2 March 1971 (1971-03-02) * column 14, lines 30-46; figures 1, 2, 14, 18 *	1-15	B24B7/12
A	DE 485 535 C (ANDREAS JOPP FA) 25 January 1930 (1930-01-25) * figures 2, 3 *	1-15	
A	DE 16 52 072 A1 (JOSEFY FRANZ) 8 January 1970 (1970-01-08) * figures 1-5 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 April 2022	Vassoille, Philippe

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04-04-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3597881 A	10-08-1971	AT 306570 B	10-04-1973
		CA 946160 A	30-04-1974
		DE 1954978 A1	23-12-1970
		FR 2024860 A1	04-09-1970
		GB 1292986 A	18-10-1972
		GB 1292987 A	18-10-1972
		GB 1292988 A	18-10-1972
		US 3597881 A	10-08-1971
US 3566546 A	02-03-1971	NONE	
DE 485535 C	25-01-1930	NONE	
DE 1652072 A1	08-01-1970	NONE	

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- IT 102020000030551 **[0001]**