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(54) WORKING GROUP AND MACHINE FOR WORKING A PANEL

(57) The present invention relates to a working group (1) for working a panel (P) made of wood and the like, wherein said panel (P) is movable along an advancing direction (D1), and wherein said working group (1) comprises: a frame (10), a working tool (11) for working said panel (P), an engine (12), coupled to said working tool (11), for activating said working tool (11), a support (13), on which said engine (12) is fixed, wherein said support (13) is coupled to said frame (10), and an actuator (14), associated to said frame (10), for moving said support (13), with respect to said frame (10), from a resting position to an operating position, wherein said support (13) is moved closer to said panel (P) along a direction (D2) having at least one component perpendicular to said advancing direction (D1) of said panel (P), allowing the working of said panel (P) by means of said working tool (11), wherein said working group (1) is characterized in that said support (13) is coupled to said frame (10) by means an elastic system (15) for driving the movement of said support (13) along said direction (D2).

The present invention also relates to a machine (M) for working a panel (P) made of wood and the like, comprising said working group (1).

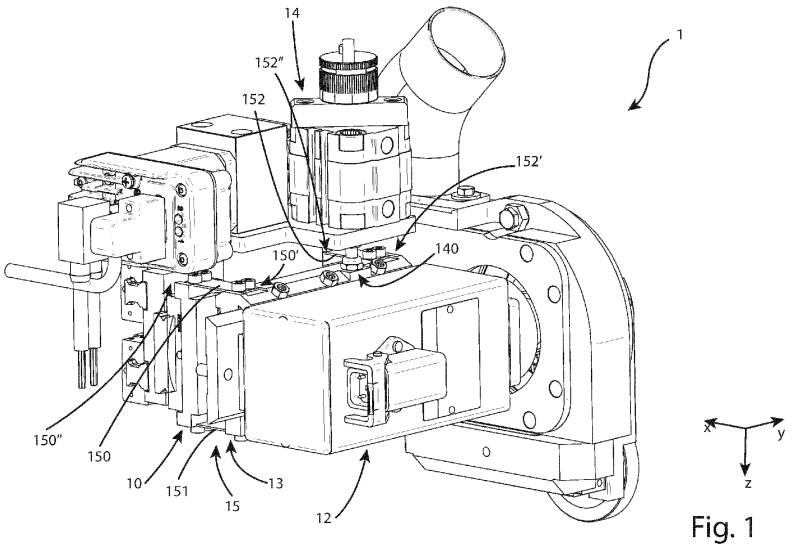

Fig. 1

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Description

[0001] The present invention relates to a working group for adjusting the finishing of surfaces of wooden panels and the like.

[0002] The present invention also relates to a machine for working wooden panels and the like.

Field of the invention

[0003] More in detail, the invention relates to a working group of the above type, designed and manufactured, in particular to allow a finishing or rounding of the edges of wooden panels and other materials.

[0004] In the following, the description will be directed to the working of the edges of panels made of wood, but it is clear that the same should not be considered limited to this specific use.

Prior art

[0005] As is known, currently, in the finishing of wooden panels, edge-banding tapes are applied to the lateral edges of the panels, by means of so-called edge-banding machines.

[0006] Said edge-banding machines generally comprise one or more rounding devices for rounding off the excess of the edging tapes previously applied typically by glue on the edges of each panel, while the panel itself is moving on a sliding plane.

[0007] Typically, said edge banding machines comprise a first rounding device for rounding a first horizontal edge or lower horizontal edge of the panel edge, and two portions of the respective vertical edges, and a second rounding device, different from the first rounding device, for rounding a second horizontal edge or upper horizontal edge, and the further two portions of the respective vertical edges.

[0008] Furthermore, in general, each rounding device, movable on a respective guide, comprises a first actuator, capable of moving the respective rounding device in such a way that it interferes with the panel, and a second actuator, different from the first actuator, capable of moving, towards said panel, a support (called head, in jargon), on which a motor is installed, to drive the tool to carry out the rounding or trimming operation on the edges of said panel.

[0009] Currently, the movement of said head and, therefore, of said tool, is carried out through the use of linear guides and respective skids coupled to said linear guides.

[0010] The presence of these linear guides and of the respective skids allow the head to be moved towards said panel to carry out the specific machining on said panel.

[0011] However, a drawback of these known solutions is that they do not allow the head to be moved effectively due to high weight and friction.

[0012] Furthermore, another drawback of these solutions according to the prior art is that they involve high costs and encumbrances.

Scope of the invention

[0013] In the light of the above, it is therefore an object of the present invention to overcome the limitations of the prior art described above by providing a working group for adjusting the finishing of the surfaces of wooden panels and the like.

[0014] Another object of the invention is to provide a working group for adjusting the finishing of surfaces of wooden panels and the like, which allows guiding the movement, towards the panel, of the support on which the motor is installed to drive the tool for machining the panel, and, therefore, guiding the movement of the respective tool coupled to said motor.

[0015] Another object of the invention is to provide a working group, which is highly reliable, relatively simple to manufacture, and at competitive costs if compared to the prior art.

Object of the invention

[0016] It is, therefore, specific object of the present invention a working group for working a panel made of wood and the like, wherein said panel is movable along an advancing direction, and wherein said working group comprises: a frame, a working tool for working said panel, an engine, coupled to said working tool, for activating said working tool, a support, on which said engine is fixed, wherein said support is coupled to said frame, and an actuator, associated to said frame, for moving said support, with respect to said frame, from a resting position to an operating position, wherein said support is moved closer to said panel along a direction having at least one component perpendicular to said advancing direction of said panel, allowing the working of said panel by means of said working tool, wherein said working group is characterized in that said support is coupled to said frame by means an elastic system for driving the movement of said support along said direction.

[0017] Advantageously according to the invention, said elastic system may comprise a first lamella arranged between said support and said frame, and a second lamella arranged between said support and said frame, wherein said first lamella and said second lamella are elastically deformable along said direction.

[0018] Still according to the invention, when said support is in said resting position, said first lamella may be arranged on a first plane, and said second lamella is arranged on a second plane, substantially parallel to said first plane.

[0019] Always according to the invention, said elastic system may comprise a third lamella arranged between said support and said frame, and a fourth lamella arranged between said support and said frame, wherein

said third lamella and said fourth lamella are elastically deformable along said direction, and wherein, when said support is in said resting position, said third lamella is arranged on a third plane and said fourth lamella is arranged on a fourth plane, said third plane and said fourth plane being substantially parallel to said first plane and said second plane respectively.

[0020] Conveniently according to the invention, said third plane may coincide with said first plane, and said fourth plane may coincide with said second plane.

[0021] Further according to the invention, when said support is in said operating position, each of said lamellae may form a respective angle with respect to said respective plane.

[0022] Still according to the invention, said direction may be perpendicular to said advancing direction of said panel.

[0023] Advantageously according to the invention, each of said lamellae may have a respective first and second end, said support may have a seat for housing the first end of a respective lamella, and said frame may have a seat for housing the second end of a respective lamella.

[0024] Further according to the invention, each first end and each of second end of said lamellae may be fixed, by means of fixing means, to said seat of said support and to said seat of said frame respectively.

[0025] Still according to the invention, each of said seats may be shaped so as to prevent the rotation of the respective lamella with respect to each of said seats.

[0026] Always according to the invention, said elastic system may comprise one or more elastomeric elements.

[0027] It is further object of the present invention, a machine for working a panel made of wood or the like, comprising a working bench for supporting said panel, wherein said panel is movable along an advancing direction, said machine being characterized in that it comprises at least one working group for working said panel.

Brief description of the drawings

[0028] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 shows, in a perspective view, an embodiment of a working group for adjusting the finishing of surfaces of wooden panels and the like, according to the present invention;
figure 2 shows, in a side view, the working group of figure 1;
figure 3 shows, in a side view, a detail of figure 2;
figure 4 shows, in a perspective view, a detail of the working group of the figure 1;
figure 5 shows, in a perspective view and partially in transparency, a detail of the working group of the figure 1;
figure 6 shows, in a perspective view, an embodiment of a machine for working wooden panels and the like, equipped with the working group of the figure 1;
figure 7 shows a side view of the machine of figure 6;
figure 8 shows, in perspective view, a further embodiment of the working group of the figure 1; and
figure 9 shows, in perspective view, another embodiment of the working group of the figure 1.

[0029] In the various figures, similar parts will be indicated with the same numerical references.

Detailed description

[0030] With reference to figures 1-5, the working group for adjusting the finishing of surfaces of wooden panels P and the like, generally indicated with the reference number 1, substantially comprises a frame 10, a working tool 11 for working each panel P movable along an advancement direction D1, a motor 12, coupled to said working tool 11, a support 13, coupled to said frame 10, and an actuator 14 for moving said support 13 with respect to said frame 10.

[0031] In particular, in the present embodiment, said frame 10 is substantially "L"-shaped. However, in other embodiments of the present invention, said frame 10 can also have a different shape.

[0032] Furthermore, as can be seen in particular from figure 4, in the embodiment that is described, the working tool 11 is a rounding cutter.

[0033] However, in other embodiments of the present invention, said working tool 11 can be a different tool for working said panel P, such as, for example, a bevel cutter. Furthermore, the working group 1 can provide a number of working tools greater than one, without departing from the scope of protection of the present invention.

[0034] As said, the working tool 11 is coupled to the motor 12. Therefore, said motor 12 allows, in use, to operate said working tool 11 to carry out the specific machining on said panel P.

[0035] Furthermore, with particular reference to figures 1, 2, and 4, said motor 12 is fixed to the support 13 by means of fixing means 16.

[0036] In the embodiment described, said fixing means 16 comprise fixing screws and/or bolts. However, in other embodiments of the present invention, said fixing means 16 can be of a different type from what has been described.

[0037] As will be better described below, said support 13 is coupled to said frame 10 by means of an elastic system 15.

[0038] Furthermore, as said, the working group 1 comprises an actuator 14, associated with said frame 10, to move said support 13, with respect to said frame 10.

[0039] In particular, said actuator 14 is able to move said support 13 with respect to said frame 10, from a rest

position to an operating position, in which said support 13 is approached to said panel P along a direction D2, having at least one component perpendicular to said advancement direction D1 of said panel P, to allow the working of said panel P by means of said working tool 11.

[0040] In the present embodiment, this direction D2 is parallel or substantially parallel to the Z-axis of a Cartesian reference system XYZ, while the advancement direction D1 of said panel P is parallel or substantially parallel to the X-axis of the Cartesian reference system XYZ.

[0041] However, in other embodiments of the present invention, the direction D2, along which the movement of the support 13 is guided, and the advancement direction D1 of said panel P may be different from what has been described.

[0042] Furthermore, said actuator 14 comprises movement means 140 for moving said support 13 from said rest position to said operating position.

[0043] In particular, said movement means 140 are capable of assuming a retracted position, in which they do not exert a pressure on said support 13, and an extracted position, exerts a pressure on said support 13.

[0044] In the embodiment described, said movement means 140 contacts said support 13 both in said retracted position, as well as in said extracted position.

[0045] Furthermore, in the present embodiment, said actuator 14 is an actuator of the pneumatic type.

[0046] However, this actuator 14 can be an actuator of a different type, such as, for example, an electric, hydraulic, or electromagnetic actuator, without departing from the scope of protection of the present invention.

[0047] As said, the elastic system 15 allows guiding the movement of said support 13, with respect to said frame 10, along said direction D2.

[0048] With particular reference to figure 5, in the present embodiment, said elastic system 15 comprises a first lamella 150, arranged between said support 13 and said frame 10, and a second lamella 151, different from said first lamella 150 and arranged between said support 13 and said frame 10.

[0049] More specifically, when said support 13 is in said rest position, said first lamella 150 is arranged on a first plane P1, and said second lamella 151 is arranged on a second plane P2, in which said second plane P2 is substantially parallel or parallel to said first plane P1.

[0050] In particular, said first lamella 150 and said second lamella 151 are arranged in such a way as to be elastically deformable along said direction D2.

[0051] Furthermore, said elastic system 15 comprises a third lamella 152, arranged between said support 13 and said frame 10, and a fourth lamella 153, different from said third lamella 152, and arranged between said support 13 and said frame 10.

[0052] In particular, when said support 13 is in said rest position, said third lamella 152 is arranged on a third plane P3 and said fourth lamella 153 is arranged on a fourth plane P4, in which said third plane P3 is substantially parallel or parallel to said first plane P1 and fourth plane P4 are substantially parallel or parallel to said first second P2.

[0053] As can be seen in figure 3, in the present embodiment of the present invention, said third plane P3 matches with said first plane P1, and said fourth plane P4 matches with said second plane P2.

[0054] However, in other embodiments, said third plane P3 may not match with said first plane P1 and said fourth plane P4 may not coincide with said second plane P2.

[0055] Similarly to what has been said above, also said third lamella 152 and said fourth lamella 153 are arranged in such a way as to be elastically deformable along said direction D2.

[0056] However, in other embodiments of the present invention, the arrangement and number of said lamellas 150, 151, 152, 153 may be different from what is described. For example, said elastic system 15 can provide two lamellas arranged parallel along said direction D2 or on said plane P1 or said plane P2.

[0057] In the embodiment that is described, each lamella 150, 151, 152, 153 is made of metal such as, for example, stainless steel. However, the material of each lamella 150, 151, 152, 153 can be different such as, for example, C75 hardened harmonic steel, which has a high degree of elasticity, or other harmonic steel with high carbon and silicon content, or plastics or composites.

[0058] Furthermore, in another embodiment of the present invention, said elastic system 15 comprises one or more elastomeric elements arranged between said support 13 and said frame 10.

[0059] Each of said lamellas 150, 151, 152, 153 has a respective first end 150', 151', 152', 153' and a respective second end 150", 151", 152", 153", opposite to said respective first end 150', 151', 152', 153'.

[0060] Furthermore, again as regards the support 13, said support 13 has a plurality of seats 130', 131', 132', 133' obtained on the ends of said support 13.

[0061] In particular, each first end 150', 151', 152', 153' of each lamella 150, 151, 152, 153 is housed in a respective seat 130', 131', 132', 133' of said support 13 and fixed to said respective seat 130', 131', 132', 133' by means of said fixing means 16.

[0062] Similarly, with reference to the frame 10, said frame 10 has a plurality of seats 100', 101', 102', 103' obtained on it and facing said seats 130', 131', 132', 133'.

[0063] Furthermore, each second end 150", 151", 152", 153" of said respective lamellas 150, 151, 152, 153 is housed in a respective seat 100', 101', 102', 103' of said frame 10, and fixed to said respective seat 100', 101', 102', 103' by means of said fixing means 16.

[0064] In particular, each seat 130', 131', 132', 133' is shaped in such a way as to prevent the rotation of the respective lamella 150, 151, 152, 153 with respect to it.

[0065] In the embodiment described, each seat 130', 131', 132', 133' is shaped in such a way as to prevent the rotation of said respective first end 150', 151', 152', 153' of said lamellas 150, 151, 152, 153 on said first plane

P1 and said second plane P2, or to prevent their rotation with respect to said support 13, and therefore only allow folding.

[0066] Similarly, each seat 100', 101', 102', 103' is shaped in such a way as to prevent the rotation of said respective second end 150", 151", 152", 153" of said lamellas 150, 151, 152, 153 along said first plane P1 and said second plane P2, or to prevent its rotation with respect to said frame 10 and therefore only allow folding.

[0067] As can be seen from figure 8, in another embodiment of the present invention, said machining assembly 1 comprises a damping member 160 for damping the vibrations produced by the movement of said support 13, with respect to said frame 10, along said direction D2.

[0068] In particular, said damping member 160 is arranged between said frame 10 and said support 13, in parallel to said elastic system 15.

[0069] More specifically, in the embodiment that is described, said damping member 160 has a cylindrical shape and is arranged around said means 140 for moving said actuator 14.

[0070] However, in other embodiments, the shape and arrangement of said damping member 160 may be different, without thereby departing from the scope of the present invention.

[0071] Furthermore, in the embodiment that is described, said damping member 160 is a bumper made of elastic material, preferably of rubber.

[0072] However, in other embodiments, the material of said damping member 160 may be different from what is described.

[0073] With reference to figure 9, in a further embodiment of the present invention, said working group 1 comprises an actuation device 17, operatively connected to said movement means 140, to actuate, by means of said movement means 140, said support 13 along the D2 direction.

[0074] Furthermore, said machining assembly 1 comprises an adjusting member 170, arranged between said actuator 14 and said actuation device 17, to adjust the movement of said support 13 between predetermined configurations or operating positions.

[0075] In the embodiment that is described, said adjusting member 170 is made of elastic material.

[0076] In other embodiments, the material of said adjusting member 170 can be different from what has been described.

[0077] Said adjusting member 17 allows increasing the number of operating configurations with respect to the operating configurations of the mechanical type defined by said actuation device 17.

[0078] In fact, in use, said adjusting member 170 is compressed proportionally to the pressure exerted by said adjusting device 17 along said direction D2, so as to adjust the movement of said support 13 along the same direction D2, allowing the return to the initial position at the restoration of the initial pressure.

[0079] Therefore, said adjusting member 170 allows regulating the movement of said motor 13 installed on said support 13, so as to actuate said working tool 11 to carry out the specific machining on said panel P.

[0080] In particular, in the embodiment that is described, said adjusting member 170 has a cylindrical shape and is arranged below said actuation device 17, in series with said elastic system 15 and said damping member 160.

[0081] However, in other embodiments, the shape and the arrangement of said adjusting member 170 can be different, without thereby departing from the scope of protection of the present invention.

[0082] In addition, in another embodiment of the present invention, said working group 1 can also comprise only said adjusting member 170, without the presence of said damping member 160.

[0083] The operation of the working group 1 described above is as follows.

[0084] Initially, the panel P is moved along said direction D1 towards said working group 1.

[0085] When said panel P is positioned in correspondence with said working group 1, said working group 1 is moved, by means of a further actuator (not shown in the figures), so as to be positioned, in use, near the edge of said panel P to work.

[0086] Subsequently, said support 13 is moved, by means of said actuator 14, from said rest position to said operating position, along said direction D2, with respect to said frame 10.

[0087] When said support 13 is in said rest position, said first lamella 150 and said third lamella 152 are parallel or substantially parallel to said first plane P1 or said third plane P3, while said second lamella 151 and said fourth lamella 153 are parallel or substantially parallel to said second plane P2 or said fourth plane P4.

[0088] Therefore, each of said lamellae 150, 151, 152, and 153 does not undergo any elastic deformation along the direction D2.

[0089] When, on the other hand, with particular reference to figure 3, said support 13 is in said operating position, each of said lamellae 150, 151, 152, 153 forms a respective angle α, β, γ, δ with respect to said respective plane P1, P2, P3, P4.

[0090] Each one of said angles α, β, γ, δ is comprised between 0° and 5°, preferably between 0° and 2°.

[0091] As can be seen from figure 3, in the embodiment described, said angles α, and γ are equal to each other, and said angles β and δ are equal to each other.

[0092] However, in other embodiments of the present invention, said angles α, β, γ, δ can assume different values.

[0093] Therefore, each of said lamellae 150, 151, 152, and 153 is elastically deformed along said direction D2.

[0094] In particular, the bending of each lamella 150, 151, 152, 153 allows to linearly guide the movement of said support 13 along said direction D2.

[0095] This allows said working group 1 to adjust the rounding or trimming operation, carried out by the work-

ing tool 11, without oscillations or undulating movements of the motor 12 and, therefore, of the working tool 11 itself, during the movement of the support 13, to which said motor 12 is fixed.

[0096] With reference to figures 6 and 7, an embodiment of the machine M for working wooden panels P and the like, according to the present invention, is shown.

[0097] In the embodiment that is described, said machine M is an edge-banding machine.

[0098] However, in other embodiments, the machine M can be a different type of machine than the one described here.

[0099] Said edge-banding machine M comprises a working bench 2, having a longitudinal development along the X-axis of the Cartesian reference system XYZ, to support said panel P.

[0100] In particular, said panel P is movable on said working bench 2 along the direction of advancement D1, in which, as said, the direction of advancement D1 is parallel or substantially parallel to said X-axis.

[0101] Said machine M comprises the working group 1 according to the present invention.

[0102] In particular, in the embodiment that is described, said working group 1 is movable along a sliding guide 3, so that said working group 1 has a component of motion parallel to said direction of advancement D1 of said panel P.

[0103] In fact, said working group 1 is moved along said sliding guide 3 by means of a further actuator (not shown in the figures), so as to be arranged, in use, near the edge of said panel P to be machined.

[0104] Therefore, since said sliding guide 3 has a predetermined inclination with respect to said work plane 2, said working group 1 has a speed component parallel to said advancement direction D1 of said panel P, or to said X-axis.

[0105] Subsequently, said support 13 is moved by said actuator 14, with respect to said frame 10 and towards said panel P, to allow said tool 11 working said panel P.

[0106] The movement along said direction D2 is guided by the elastic system 15, elastically deformable along said direction D2, and included in said working group 1.

Advantages

[0107] An advantage of the present invention is that of allowing to guide the movement of said support towards said panel by means of an elastic system having reduced costs and dimensions with respect to prior art systems.

[0108] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Working group (1) for working a panel (P) made of wood and the like, wherein said panel (P) is movable along an advancing direction (D1), and wherein said working group (1) comprises:

   a frame (10),
   a working tool (11) for working said panel (P),
   an engine (12), coupled to said working tool (11), for activating said working tool (11),
   a support (13), on which said engine (12) is fixed, wherein said support (13) is coupled to said frame (10), and
   an actuator (14), associated to said frame (10), for moving said support (13), with respect to said frame (10), from a resting position to an operating position, wherein said support (13) is moved closer to said panel (P) along a direction (D2) having at least one component perpendicular to said advancing direction (D1) of said panel (P), allowing the working of said panel (P) by means of said working tool (11),
   wherein said working group (1) is **characterized in that** said support (13) is coupled to said frame (10) by means an elastic system (15) for driving the movement of said support (13) along said direction (D2).

2. Working group (1) according to the preceding claim, **characterized in that** said elastic system (15) comprises

   a first lamella (150) arranged between said support (13) and said frame (10), and
   a second lamella (151) arranged between said support (13) and said frame (10),
   wherein said first lamella (150) and said second lamella (151) are elastically deformable along said direction (D2).

3. Working group (1) according to the preceding claim, **characterized in that**, when said support (13) is in said resting position, said first lamella (150) is arranged on a first plane (P1), and said second lamella (151) is arranged on a second plane (P2), substantially parallel to said first plane (P1).

4. Working group (1) according to anyone of claims 2 o 3, **characterized in that** said elastic system (15) comprises

   a third lamella (152) arranged between said support (13) and said frame (10), and
   a fourth lamella (153) arranged between said support (13) and said frame (10),
   wherein said third lamella (152) and said fourth lamella (153) are elastically deformable along

said direction (D2), and
wherein, when said support (13) is in said resting position, said third lamella (152) is arranged on a third plane (P3) and said fourth lamella (153) is arranged on a fourth plane (P4), said third plane (P3) and said fourth plane (P4) being substantially parallel to said first plane (P1) and said second plane (P2) respectively.

5. Working group (1) according to the preceding claim, **characterized in that** said third plane (P3) coincides with said first plane (P1), and **in that** said fourth plane (P4) coincides with said second plane (P2).

6. Working group (1) according to anyone of claims 4 o 5, **characterized in that**, when said support (13) is in said operating position, each of said lamellae (150, 151, 152, 153) forms a respective angle (α, β, γ, δ) with respect to said respective plane (P1, P2, P3, P4).

7. Working group (1) according to anyone of the preceding claims, **characterized in that** said direction (D2) is perpendicular to said advancing direction (D1) of said panel (P).

8. Working group (1) according to anyone of claims 4-7, **characterized**

in that each of said lamellae (150, 151, 152, 153) has a respective first (150', 151', 152', 153') and second (150", 151", 152", 153") end,
in that said support (13) has a seat (130', 131', 132', 133') for housing the first end (150', 151', 152', 153') of a respective lamella (150, 151, 152, 153), and
in that said frame (10) has a seat (100', 101', 102', 103') for housing the second end (150", 151", 152", 153") of a respective lamella (150, 151, 152, 153).

9. Working group (1) according to the preceding claim, **characterized in that** each first end (150', 151', 152', 153') and each of second end (150", 151 ", 152", 153") of said lamellae (150, 151, 152, 153) is fixed, by means of fixing means (16), to said seat (130', 131', 132', 133') of said support (13) and to said seat (100', 101', 102', 103') of said frame (10) respectively.

10. Working group (1) according to the preceding claim, **characterized in that** each of said seats (100', 101', 102', 103', 130', 131', 132', 133') is shaped so as to prevent the rotation of the respective lamella (150, 151, 152, 153) with respect to each of said seats (100', 101', 102', 103', 130', 131', 132', 133').

11. Working group (1) according to claim 1, **characterized in that** said elastic system (15) comprises one or more elastomeric elements.

12. Working group (1) according to any one of the preceding claims, **characterized in that** it comprises a damping member (160), arranged between said frame (10) and said support (13), to dampen the vibrations caused by the movement of said support (13) with respect to said frame (10) along said direction (D2).

13. Working group (1) according to any one of the preceding claims, **characterized**

in that it comprises an actuation device (17), operatively connected to said movement means (140), to actuate, by means of said movement means (140), said support (13) along said direction (D2), and
in that it comprises an adjusting member (170) arranged between said actuator (14) and said actuation device (17), to adjust the movement of said support (13) between predetermined operating configurations.

14. Machine (M) for working a panel (P) made of wood or the like, comprising a working bench (2) for supporting said panel (P), wherein said panel (P) is movable along an advancing direction (D1), said machine (M) being **characterized in that** it comprises at least one working group (1) for working said panel (P) according to anyone of claims 1-13.

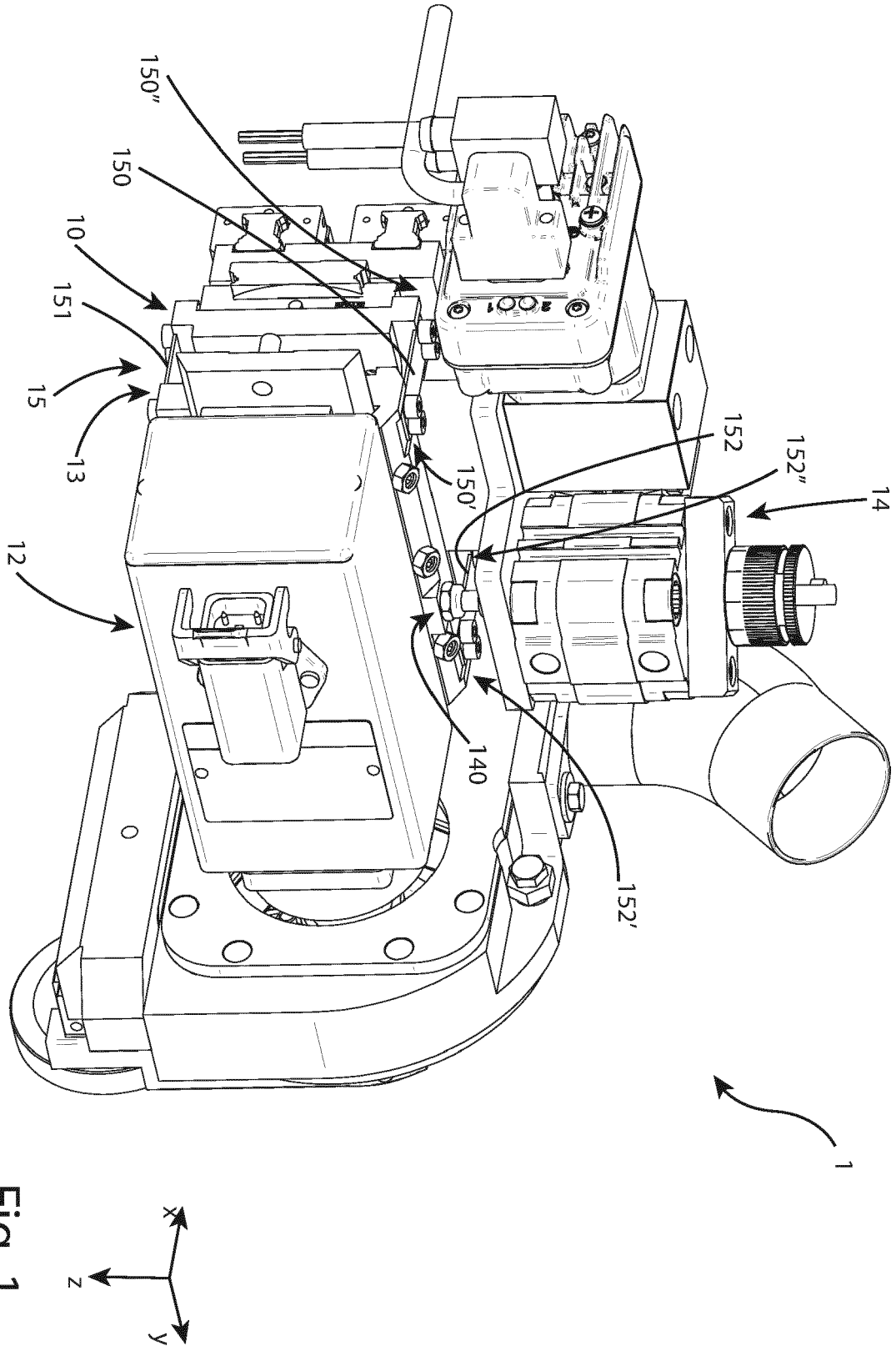


Fig. 1

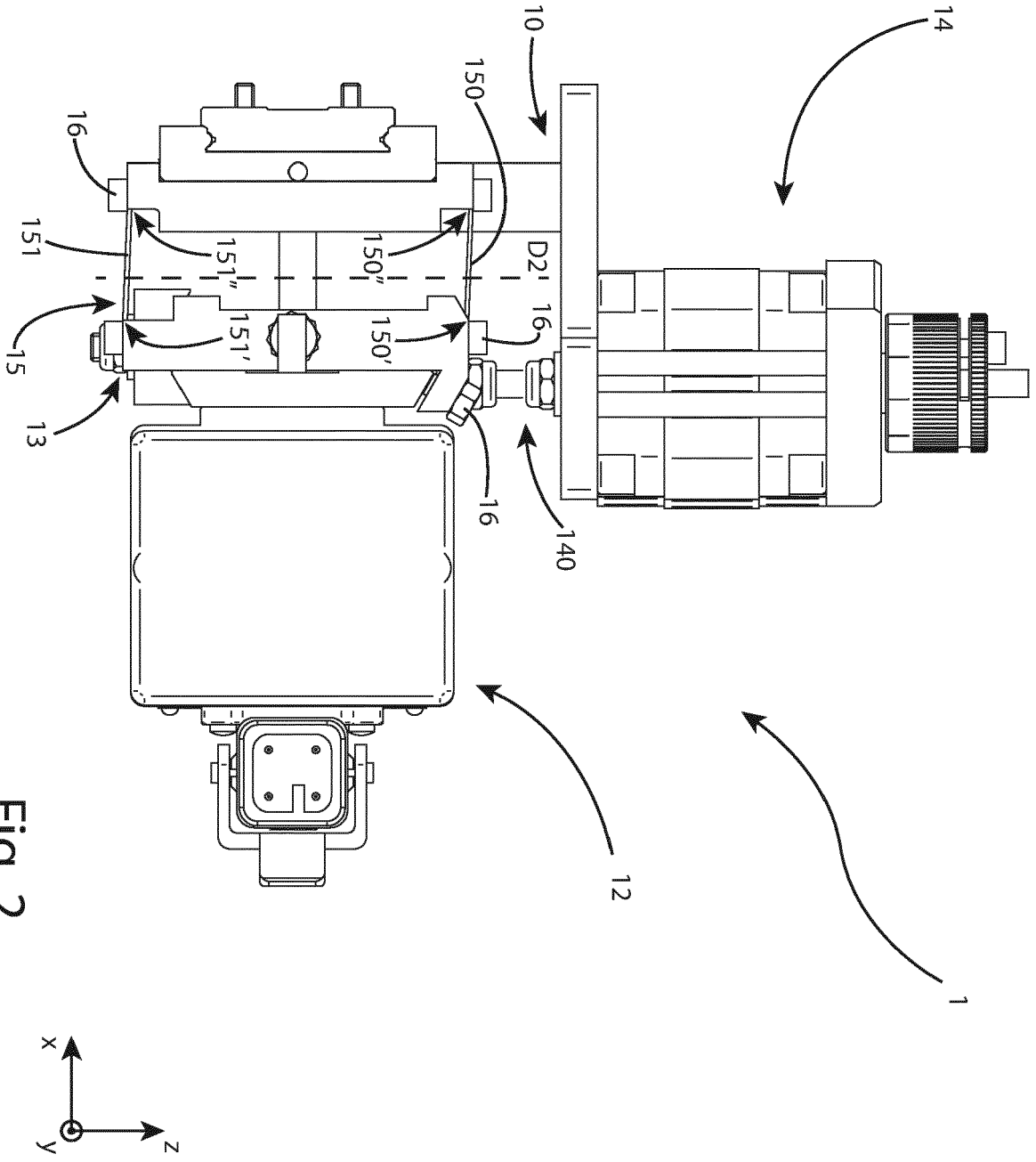


Fig. 2

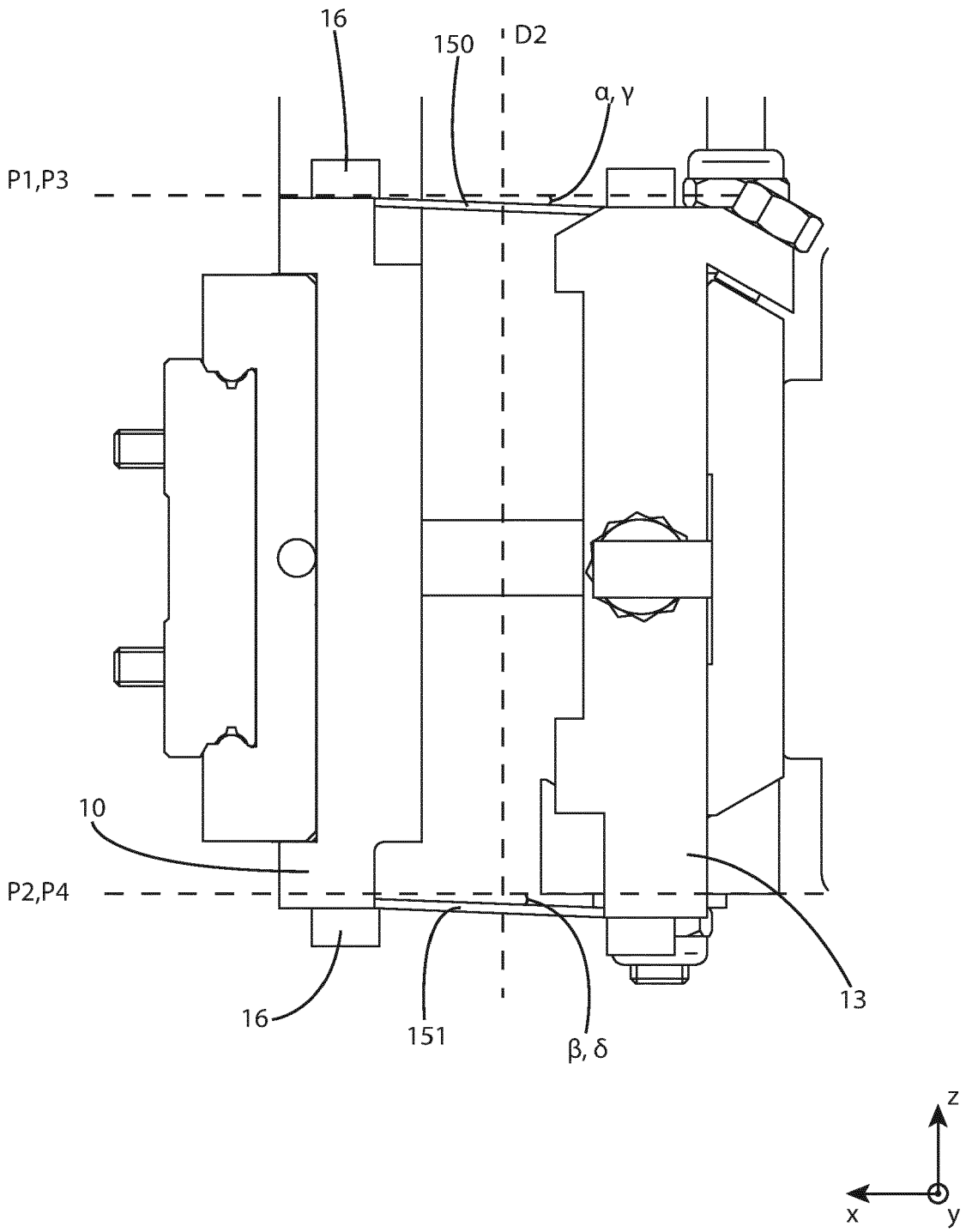


Fig. 3

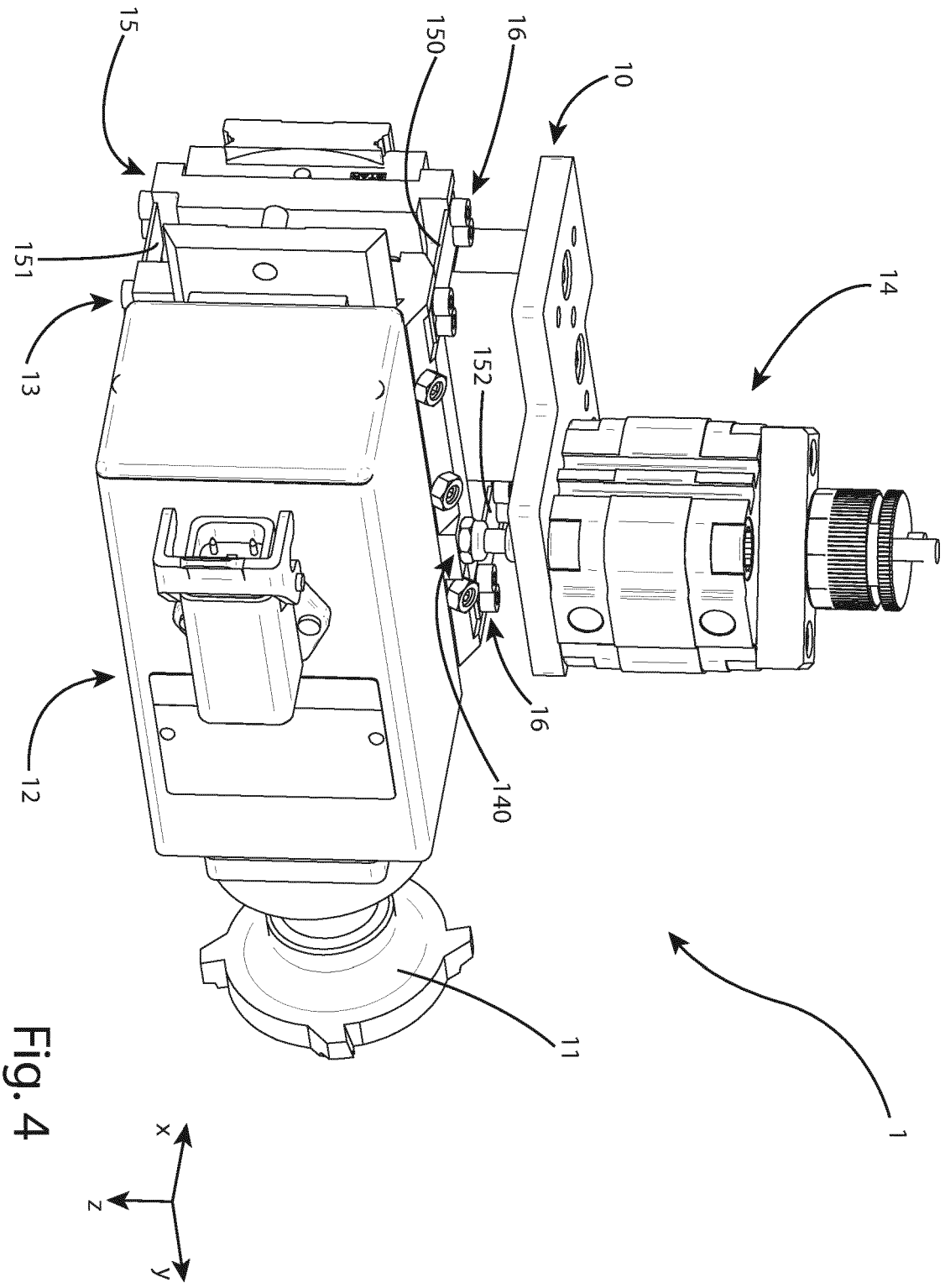


Fig. 4

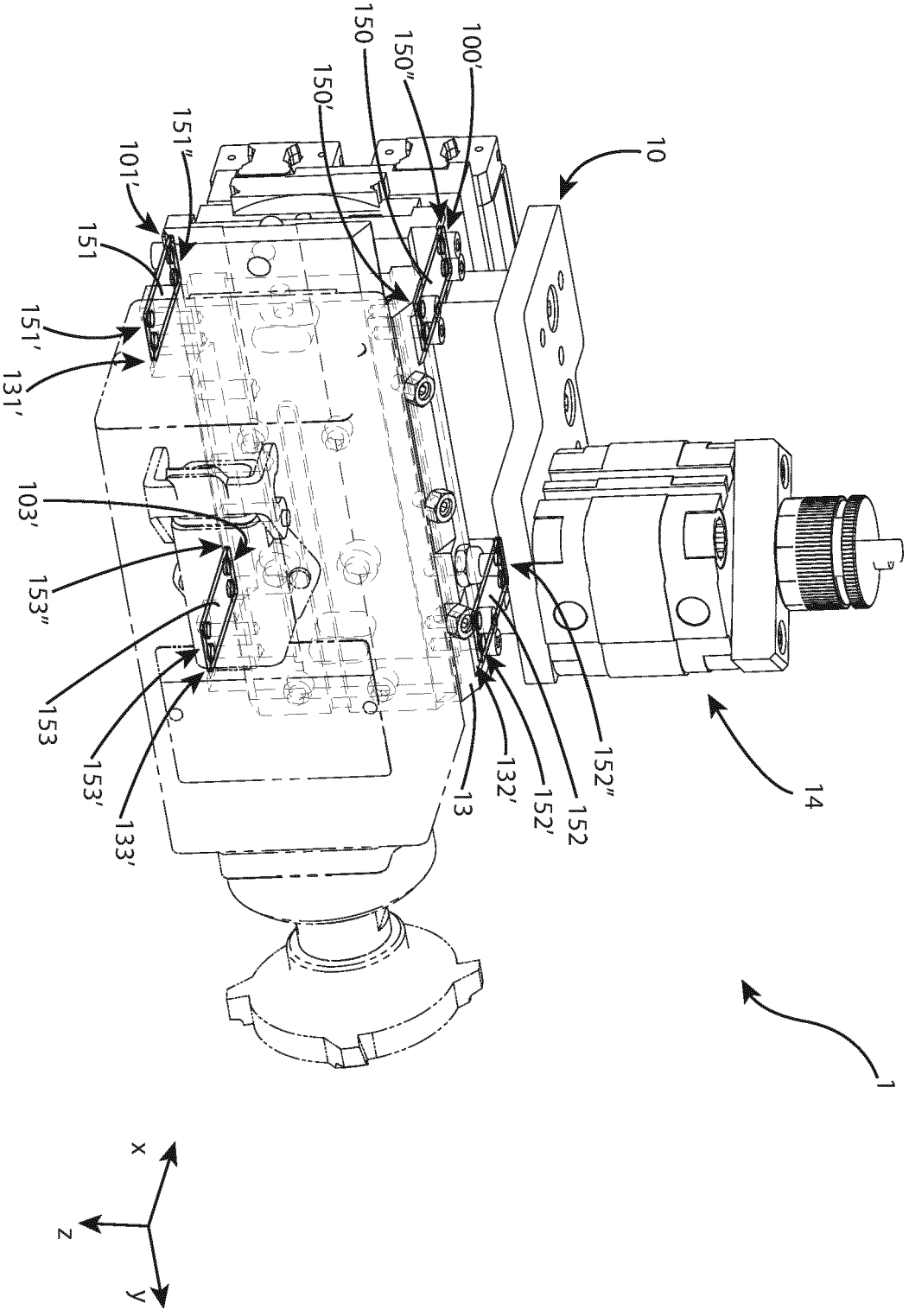
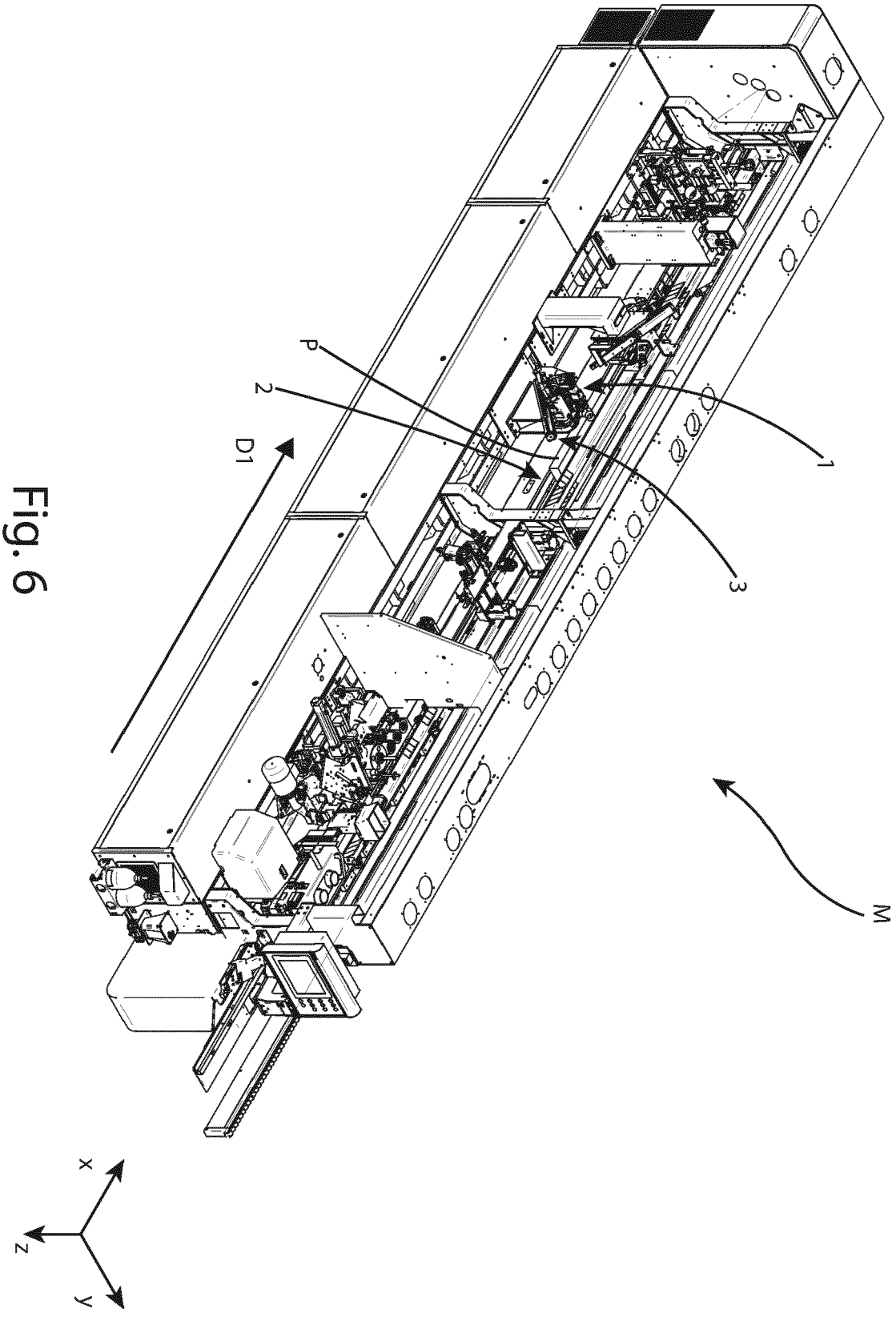

150
150″
100′
150′
151″
101′
10
151
151′
131′
103′
153″
153
153′
133′
13
132′
152′
152
152″
14
1
x
z
y

Fig. 5

Fig. 6



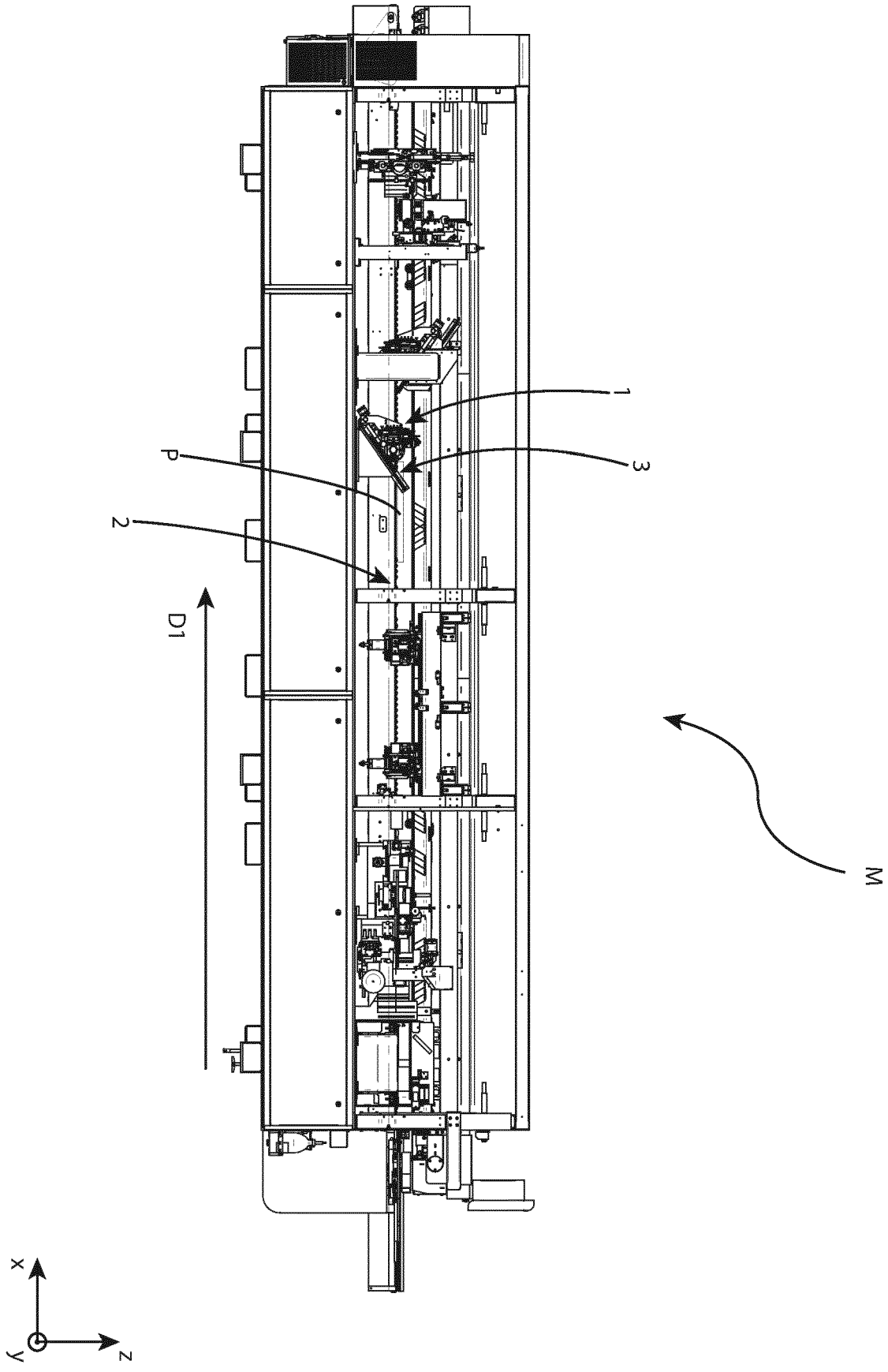


Fig. 7

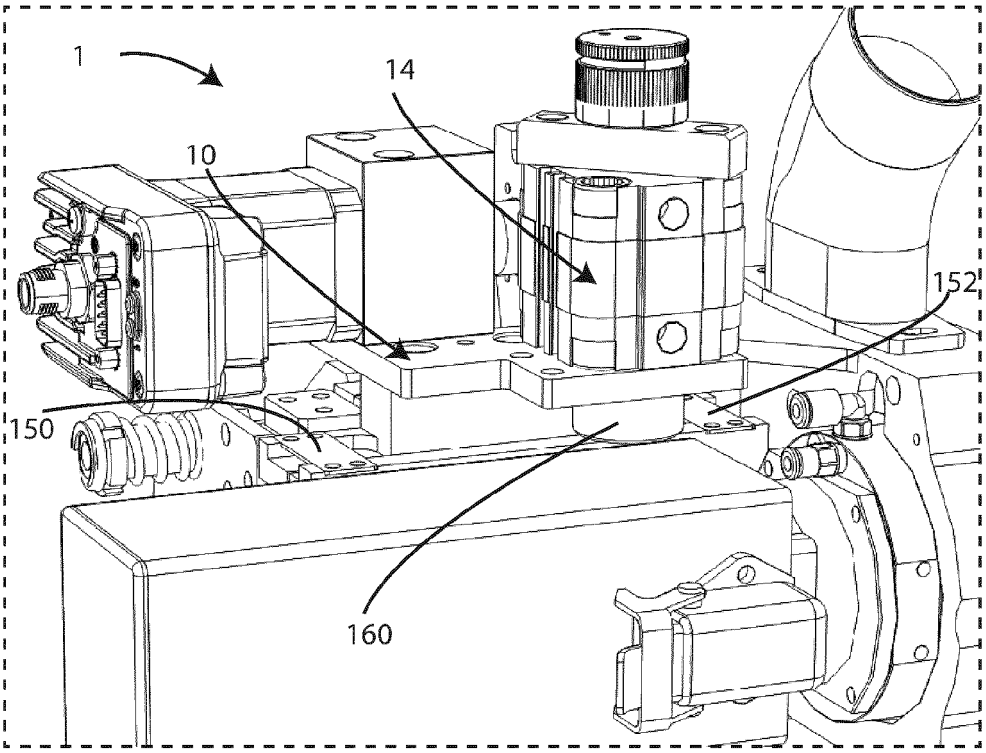


Fig. 8

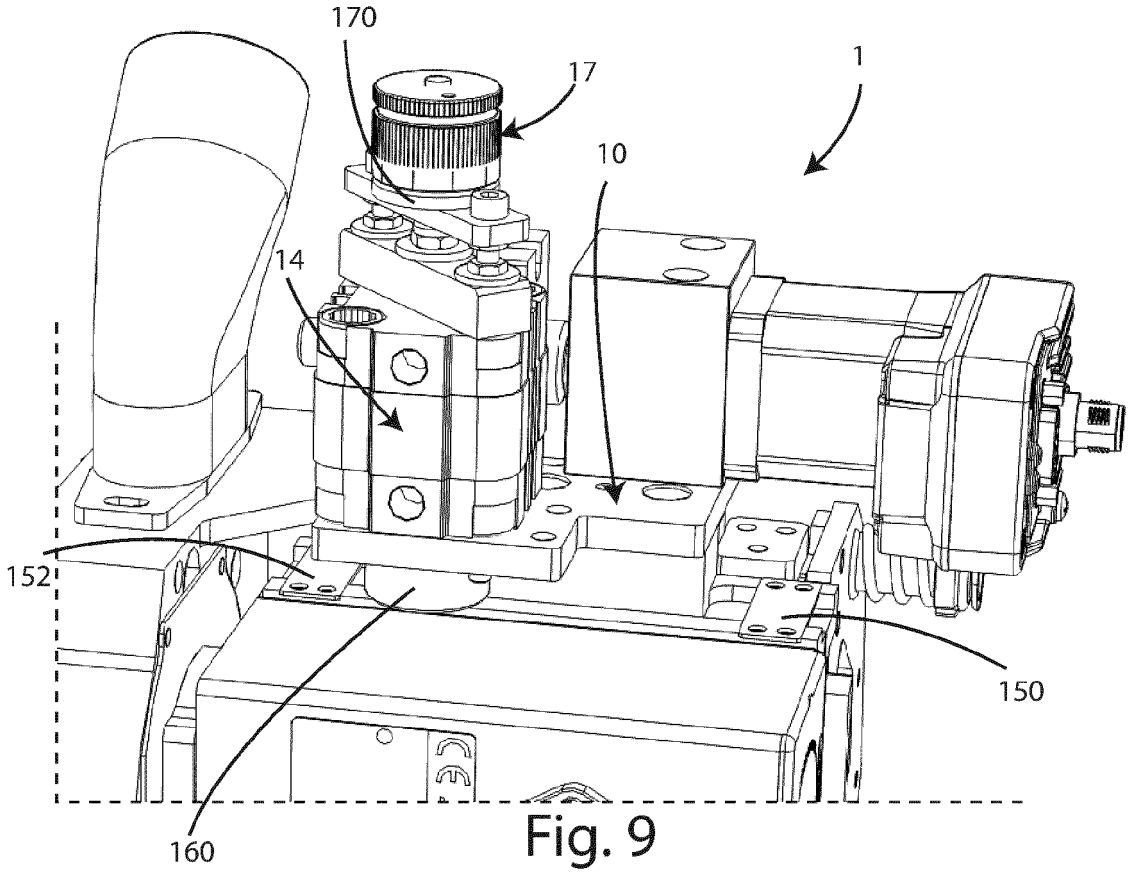


Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 21 18 9274

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Place of search	Date of completion of the search	Examiner
The Hague	21 December 2021	Hamel, Pascal

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