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(71) Applicant: **SCM Group S.p.A.**
47900 Rimini (IT)

(72) Inventors:
- **Baldacci, Marco**
  47900 Rimini (RN) (IT)
- **Spazzoli, Andrea**
  47814 Bellaria Igea Marina (RN) (IT)

(74) Representative: **Villanova, Massimo et al**
Luppi Crugnola & Partners S.r.l.
Viale Corassori, 54
41124 Modena (IT)

(54) Operating unit, in particular for edgebanding machines

(57) In an edgebanding machine for panels made of wood or of a material similar to wood, there is an operating unit having a copying device (6) that follows the edge of the panel to position a tool (4) in relation to the edge. The copying device has two feeling wheels (7) mounted on a movable supporting element (8), which is in turn mounted on an articulated parallelogram structure (12).

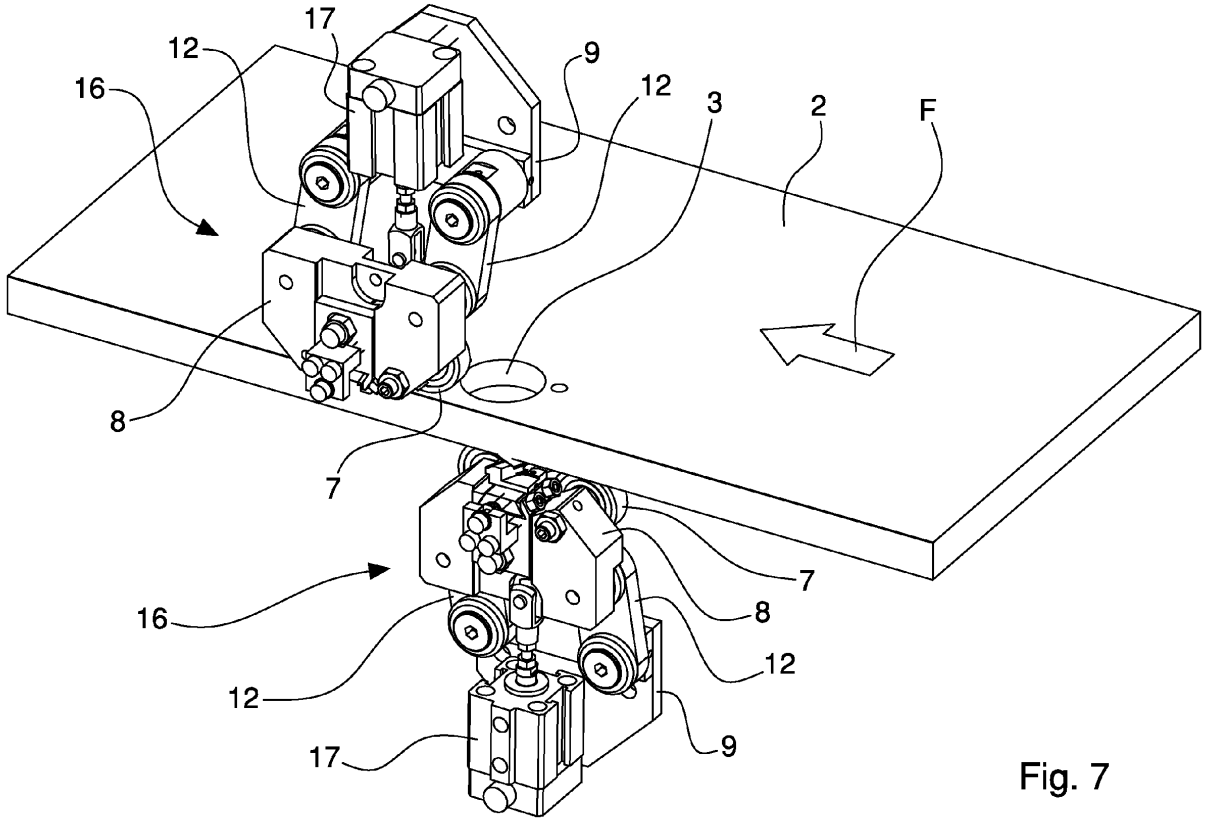

Fig. 7

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Description

Background of the invention

[0001] The invention relates to an operating unit, in particular for an edgebanding machine that is suitable for applying a laminar element to an edge of a piece of wood or material similar to wood. The invention further relates to an edgebanding machine comprising at least one operating unit made according to the invention.

[0002] Specially, but not exclusively, the invention can be advantageously used in an edgebanding machine for operating on a workpiece, for example in the shape of a panel. In particular, the invention can be used for performing at least one machining on an edge of a workpiece to which a laminar edge element has been applied (machining can comprise, for example, trimming the edge, scraping the edge, scraping the glue, etc), more in particular when a tool has to follow the edge of a panel provided with one or more recessed or lowered zone, such as, for example, the recessed seats for housing the hinges in a panel intended for forming a piece of furniture.

[0003] When edgebanding a workpiece - in particular a panel-shaped workpiece (such as, for example, a wall, a hatch, a door, a shelf) made of wood or a composite wood-based material or another material that is similar to wood - a laminar element is applied to one or more edges of this workpiece.

[0004] In general, after the laminar element has been applied to the edge of the workpiece by gluing, subsequent machinings are performed to remove material. Particularly, such machinings can be performed by a trimming unit for trimming the laminar element with respect to the workpiece by removing the excess material from the workpiece and/or by an edge-scraping unit to finish the connection between the laminar element and the workpiece and/or by a glue scraping unit to eliminate glue residues.

[0005] Each known operating unit is associated with an edgebanding machine - in particular a trimming unit or an edge scraping unit or a glue scraping unit - generally comprises a tool set up for removing material from the workpiece. For example, the tool of the trimming unit is in general a milling unit that can be, for example, of the radiating type, having a radius of curvature equal to the connecting radius of the trimmed laminar element.

[0006] Each operating unit further comprises a copying device that guides the tool to follow the profile of the element to be trimmed and/or scraped by means of contact between one or more surfaces of the copying device with the workpiece and/or with the laminar element.

[0007] In use, the trimming and scraping operations are performed during a workpiece edgebanding process. If the workpiece is, for example, a hatch, door or shelf, i.e. a workpiece that has to be mounted on other elements to form a piece of furniture, the workpieces can have a plurality of recesses or lowered zones arranged in an end portion of at least one face of the workpieces. Such zones can comprise holes made to receive fixing elements (for example threaded screws) and/or breaks for housing hinges. In general, the end portion that has the recessed or lowered zones is adjacent to one of the edges to which the laminar edge element has to be applied.

[0008] Generally, the plurality of recessed or lowered zones is arranged along the path of the copying device that operates on the workpiece. Thus, when a lowered zone is below the copying device, the latter can be lowered to cause consequently lowering of the entire operating unit, and thus also of the tool, with respect to the workpiece. This entails a risk of damage to the workpiece and of significant machining imprecision. The workpiece, for example, can be damaged because the cutting parts of the tool no longer operate on the connection between the laminar element and the workpiece, but in a lower position, thus removing an excessive quantity of material.

[0009] Italian patent application MO2009A000127, in the name of the applicant, discloses an operating unit made according to the preamble of the first claim, which offers a solution to the aforesaid problem. Certain aspects of this known operating unit can be improved.

Summary of the invention

[0010] One object of the invention is to make an operating unit with a copying device that is able to machine a workpiece with great precision.

[0011] One advantage is to provide an operating unit of great reliability and high productivity.

[0012] One advantage is to make available an operating unit, in particular for an edgebanding machine, of great flexibility, that is, for example, able to perform machinings, such as trimming and/or scraping the edges of a workpiece, also near zones of the workpiece in which there are holes, cavities, lowered zones or other recesses with respect to the flat surface of the workpiece.

[0013] One advantage is to enable the edge of a workpiece to be trimmed and scraped even after holes or cavities or lowered zones have been made on end portions of the workpiece, thus with the possibility of ample freedom in setting the desired machining cycle.

[0014] One advantage is to decrease the cost of producing workpieces having at least one edge to which a laminar element is applied to cover the edge itself.

[0015] One advantage is to provide an operating member and/or an edgebanding machine and/or a copying device that is able to machine a wide range of workpieces, including workpieces such as, for example, hatches, doors, shelves, panels, on which holes, cavities, lowered zones or other zones are obtained that are recessed with respect to a flat surface of the workpiece, near at least one edge thereof.

[0016] Such objects and advantages, and still others, are achieved by the operating unit, by the edgebanding machine or by the copying device according to one or more of the claims set out below.

[0017] The copying device according to the claim 10

set out below can comprise in optional and advantageous embodiments thereof the features disclosed in any one of claims 2 to 8 or in any possible combination of such claims.

Brief description of the drawings

[0018] The invention can be better understood and implemented with reference to the enclosed drawings that illustrate some embodiments thereof by way of non-limiting example.

[0019] Figure 1 is a perspective view of a copying device made according to the invention for an operating unit for machining a panel.

[0020] Figure 2 is a perspective view of an operating unit comprising the copying device in figure 1.

[0021] Figure 3 is the section view in figure 2.

[0022] Figure 4 is a side view of the section in figure 3.

[0023] Figure 5 is a perspective view of the operating unit in figure 2 without the copying device.

[0024] Figure 6 is a vertical raised side view of an edgebanding machine having a glue-scraping operating unit made according to the invention.

[0025] Figure 7 is a perspective view of the glue-scraping operating unit of the machine in figure 6.

[0026] Figure 8 is a side view of the glue-scraping operating unit in figure 7.

Detailed description

[0027] With reference to the aforesaid figures 1 to 5, with 1 an operating unit for machining a workpiece 2 made of wood or a similar material has been indicated overall. The operating unit 1 may comprise, as in this case, a trimming unit for trimming the edge of a workpiece to which a laminar covering element has been previously applied. The operating unit 1 may be included in an edgebanding machine for edgebanding the workpiece. The workpiece 2 being machined may comprise, as in this case, a panel having at least one flat (upper) surface that has one or more recessed or lowered zones such as, for example, a break 3 that defines a housing seat of a hinge for furniture.

[0028] The operating unit comprises at least one tool 4 for performing a machining on the workpiece. This tool 4 may comprise, as in this case, a trimming miller of the edge of the workpiece 2.

[0029] During the machining there is a relative supplying movement between the tool 4 and the workpiece 2 in a supplying direction F parallel to the flat surface of the workpiece 2. The edgebanding machine will be provided with movement means, of substantially known type (which is for this reason not disclosed in detail) to provide the aforesaid supplying movement. In the specific case, the supplying movement is supplied to the workpiece 2 that advances on a (horizontal) conveying or advancing plane in the direction F.

[0030] The operating unit 1 will be provided with supporting means, indicated overall with 5, for supporting the tool 4 during machining on the workpiece 2.

[0031] The operating unit 1 comprises a copying device 6 for following at least one profile of the workpiece 2 being machined. The supporting means 5 on which the tool 4 is fitted is connected to the copying device 6 in such a manner as to position the tool 4 in the desired work configuration in relation to the workpiece 2 being machined.

[0032] The copying device 6 may comprise, as in the case in point, two (or more) feeling wheels 7 that are able to interact simultaneously in contact with the flat surface of the workpiece 2 being machined.

[0033] The feeling wheels 7 are arranged substantially one after the other in the supplying direction F and rotate around two distinct rotation axes that are parallel and suitably spaced apart from one another in the supplying direction F. The distance between the two wheels 7 in direction F is preset. This distance has to be, in particular, greater than the dimension (considered in the supplying direction F) of a recessed or lowered zone on the flat surface of the workpiece being machined. In the case in point the wheels 7 are exactly aligned one after the other in the supplying direction F, although it is possible to provide a staggered arrangement. In this case, the wheels 7 are arranged above the conveying plane on which the workpiece 2 being machined advances in a direction F. The wheels 7 are arranged, in the case in point, for contact with the (flat) upper surface of the workpiece 2 being machined. The wheels 7 are rotatably coupled (in an idling manner) on the same supporting body. The two wheels 7 may have, as in the case in point, the same diameter.

[0034] The two wheels 7 are shaped and arranged in such a manner as to define a contact line (parallel to the supplying direction F of the workpiece 2 with respect to the tool 4), i.e. the line that units the lower edges of the two wheels 7 in which contact with the workpiece 2 occurs.

[0035] The copying device 6 comprises a movable supporting element 8 on which the feeling wheels 7 are rotatably mounted.

[0036] The supporting element 8 is connected to a (fixed) frame 9 with the constraint of performing straight movements with at least one (vertical) component of motion perpendicular to the (horizontal) flat surface of the workpiece 2 being machined. In particular, the supporting element 8 of the wheels 7 is in turn supported by the frame 9 by means of at least one articulated connection that is suitable for constraining the supporting element 8 to perform, with respect to the frame 9, movements (translations) both in a direction parallel to the supplying direction F, and in a direction perpendicular to the flat surface of the workpiece. The frame 9 may support, as in this case, the supporting element 8 of the wheels 7 by means of the interposition of an articulated parallelogram connecting structure that enables the supporting element 8 to perform the aforesaid movements (translations).

[0037] The supporting element 8 may comprise, as in this case, a contact surface 10 that is flat (horizontal) and parallel to the flat surface of the workpiece 2. The supporting element 8 will in particular be constrained to perform translations in such a manner as to maintain the contact surface 10 parallel (horizontal) to itself. The supporting means 5 of the tool 4 can comprise, as in this case, at least one contact element 11 arranged in a resting relationship on the contact surface 10. The tool 4 may adopt a preset work position with respect to the workpiece being machined when the contact element 11 interacts in contact with (resting on) the contact surface 10. The contact element 11 may be placed in contact above the contact surface 10. The contact surface 10 can thus have the function of being a reference element to enable the tool 4 to be positioned correctly (carried by the supporting means 5) with respect to the workpiece 2 (which is felt by contact by the feeling wheels 7).

[0038] In the case in point the (flat and horizontal) contact surface 10 is interposed between two connecting rods 12 that are opposite and parallel to one another that are part of the articulated parallelogram of the aforesaid connecting structure. With 13 the articulations of the articulated parallelogram have been indicated. The supporting element 8 is articulated at the two connecting rods 12 in such a manner that the contact surface 10 is parallel to the direction defined by the other two mutually opposite elements of the articulated parallelogram (articulated at the connecting rods 12) that are substantially constituted by the movable supporting element 8 and by the (fixed) frame 9.

[0039] The contact element 11 may comprise, as in the case in point, scraping means that can in turn comprise at least one sliding contact zone for scraping and brushing away dust or sawdust from the contact surface 10 through the (translation) movement of the supporting element 8. In the case in point the contact element 11 is rotationally coupled with the supporting means 5 around a pivot X with a, for example, horizontal rotation axis. The contact element 11 can have, for example, two sliding (scraping) contact zones arranged on opposite sides to the aforesaid pivot X. The contact element 11, that in the case in point is made in the shape of a slidable slide with one or two or more scraping blades 14 (two in this case), that can nevertheless be made in other shapes, for example in the shape of a bearing or of another rotatable element (which is possibly also provided with scraping means). The contact element 11 may be made of a material (for example in polyzene) that is suitable for ensuring over time effective sharpening of the scraping blades 14.

[0040] In use, the workpiece 2 is supplied in a direction F towards the operating unit 1, such that the tool 4 can machine the entire edge of the workpiece 2. During machining, the workpiece 2 is guided, in a known manner, along the (horizontal) conveying plane, whilst the tool 4 is maintained in the desired position with respect to the workpiece 2 (which in the meantime is supplied with the supply motion) owing to the copying device 6. In fact, the feeling wheels 7 touch (both simultaneously or almost simultaneously) the upper flat surface of the workpiece 2, so the contact surface 10 remains in a parallel position to the workpiece 2. The supporting means 5 interacts with the contact surface 10 (by means of the resting relation of the contact element 11) so that the tool 4 (connected to the supporting means 5) adopts the correct work position. When the break 3 (or other recess or lowered zone that the workpiece 2 may have) reaches the operating unit 1, the tool 4 maintains the correct work position, even if one wheel 7 loses contact with the upper flat surface of the workpiece 2 because it meets the break 3. There is in fact the other wheel 7 that, being arranged at the appropriate distance from the wheel that has lost contact, maintains contact with the workpiece 2. The supporting element 8, which thus always rests on the workpiece 2 with at least one feeling wheel 7, does not suffer movements such as to compromise correct positioning of the tool 4 with respect to the workpiece 2, because the supporting element is constrained to perform only translations according, in the case in point, to the coupling with the fixed frame 9 by means of the parallelogram articulated structure. In substance, the contact surface 10 does not suffer substantial movements.

[0041] With reference to figures 6 to 8 with 15 an edgebanding machine has been indicated overall comprising an operating unit 16 that, in this case, is a glue scraping unit that operates simultaneously both on an upper edge zone of the workpiece 2, and on a lower edge zone. The operating unit 16 is provided, in this case, with two copying devices 16 that are similar to those shown previously. For the sake of simplicity, the similar elements have been indicated by the same reference symbol. In this case the tool 4 will comprise a glue-scraping blade. Two tools 4 are provided of the glue-scraping type that are arranged on two sides (one above and the other below) of the workpiece 2. In this case each tool 4 is fitted on the movable supporting element 8 of the respective copying device.

[0042] The operating unit 16 comprises in this case an elastic element that is fixed to the frame 9 and which, in the case in point, comprises an elastic element of pneumatic type, like, for example, an actuator 17. The actuator 17 may comprise, as in the example, an actuator of linear type. It is possible to provide an elastic element of other type, for example an elastic element that uses the elasticity of a solid body. The elastic element (in this case the actuator 17) is connected to the movable supporting element 8 to make the above supporting element 8 perform movements having at least one motion component in a normal (vertical) direction to the (horizontal) flat surface of the workpiece 2. The glue-scraping blade will be mounted elastically with the possibility of slight movements so as to keep itself always in contact with the workpiece to follow scraping.

[0043] The edgebanding machine 15 will be provided with other elements (not disclosed in detail) with which

known edgebanding machines can be provided for edgebanding workpieces made of wood or similar material, such as for example a (substantially horizontal) conveying plane configured for receiving in a resting manner the workpiece and conveying the workpiece.

[0044] In use, the workpiece 2 will be supplied to the glue-scraping operating unit 16. Upon the arrival of the workpiece 2 the actuators 17 will move the respective supporting elements 8 that take the tools to the workpiece (the upper tool will be moved downwards and the lower tool will be moved upwards), until the two pairs of feeling wheels 7 (upper pair and lower pair), by meeting the (upper and lower) surfaces of the workpiece, indicate that the desired (upper and lower) work position of the glue-scraping tools has been reached.

[0045] It will be possible to provide the operating unit 16 with sensors that are suitable for indicating that the feeling wheels 7 have made contact (for example force or other types of sensors connected to the actuators 17).

[0046] Also in this case if a feeling wheel 7 meets a lowered zone of the (upper or lower) flat surface of the workpiece, the other feeling wheel 7 of the pair of wheels can remain in contact with this flat surface, so the movable tool-holding supporting element 8 is not moved and the glue-scraping tool remains in the correct work position.

Claims

1. Operating unit comprising:

- at least one tool (4) for performing a machining on a workpiece (2) having at least one flat surface, wherein during machining there is a relative supplying movement between said tool and the workpiece in a supplying direction (F) parallel to the flat surface of the workpiece;
- a copying device (6) for following a profile of the workpiece being machined, said at least one tool (4) being guided by said copying device to take up a desired position with respect to the workpiece being machined, said copying device (6) having at least two feeling wheels (7) that are able to interact in contact with the flat surface of the workpiece being machined;

characterised in that said copying device (6) comprises a movable supporting element (8) on which said at least two feeling wheels (7) are rotatably mounted, said supporting element (8) being guided to perform movements with at least a first motion component perpendicular to the flat surface of the workpiece (2) and at least a second motion component parallel to said supplying direction (F).

2. Operating unit according to claim 1, wherein said copying device (6) comprises a frame (9) to which said supporting element (8) is connected by an articulated parallelogram connecting structure that enables said supporting element (8) to perform said movements.

3. Operating unit according to claim 1 or 2, wherein said at least two feeling wheels (7) are arranged substantially one after the other in the supplying direction (F) and are rotatably mounted on said supporting element (8) around two distinct rotation axes that are parallel and spaced apart from one another in the supplying direction (F).

4. Operating unit according to any preceding claim, wherein said supporting element (8) comprises a contact surface (10) that is flat and parallel to the flat surface of the workpiece, said tool (4) being carried by supporting means (5) having at least one contact element (11) arranged in a contact relationship, for example in a resting relationship, with said contact surface (10), so that said tool (4) assumes a preset machining position in relation to the workpiece (2) being machined.

5. Operating unit according to claim 4 and according to claim 2 or 3, wherein said contact surface (10) is interposed between two connecting rods (12) of the articulated parallelogram of said connecting structure that are opposite and parallel one another, said supporting element (8) being articulated on said two connecting rods.

6. Operating unit according to claim 4 or 5, wherein said contact element (11) comprises at least one scraping contact zone (14) to eliminate dust or sawdust from said contact surface (10) through the effect of the sliding due to the movement of said movable supporting element (8).

7. Operating unit according to claim 6, wherein said contact element (11) is rotatably coupled with said supporting means (5) around a rotation axis (X), said contact element (11) having at least two scraping contact zones (14) arranged on opposite sides of said rotation axis.

8. Operating unit according to any preceding claim, wherein said tool (4) is carried by said movable supporting element (8) and wherein said copying device (6) comprises at least one elastic element (17) arranged for enabling said movable supporting element (8) to perform elastic movements in a direction that is perpendicular to the flat surface of the workpiece (2) being machined.

9. Edge-banding machine (15) comprising at least one operating unit for machining on a workpiece made of wood or of a material that is similar to wood, **char-**

acterised in that said operating unit is made according to any preceding claim.

10. Copying device for guiding an operating unit to follow a profile of a workpiece being machined, wherein during machining there is a relative supply movement between one tool (4) of the operating unit and the workpiece (2) in a supplying direction (F) parallel to a flat surface of the workpiece, said copying device (6) having at least two feeling wheels (7) that are able to interact in contact with the flat surface of the workpiece being machined, **characterised by** comprising a movable supporting element (8) on which said at least two feeling wheels (7) are rotatably mounted, said supporting element (8) being constrained to perform movements with at least a first motion component perpendicular to the flat surface of the workpiece (2) and at least a second motion component parallel to said supplying direction (F).

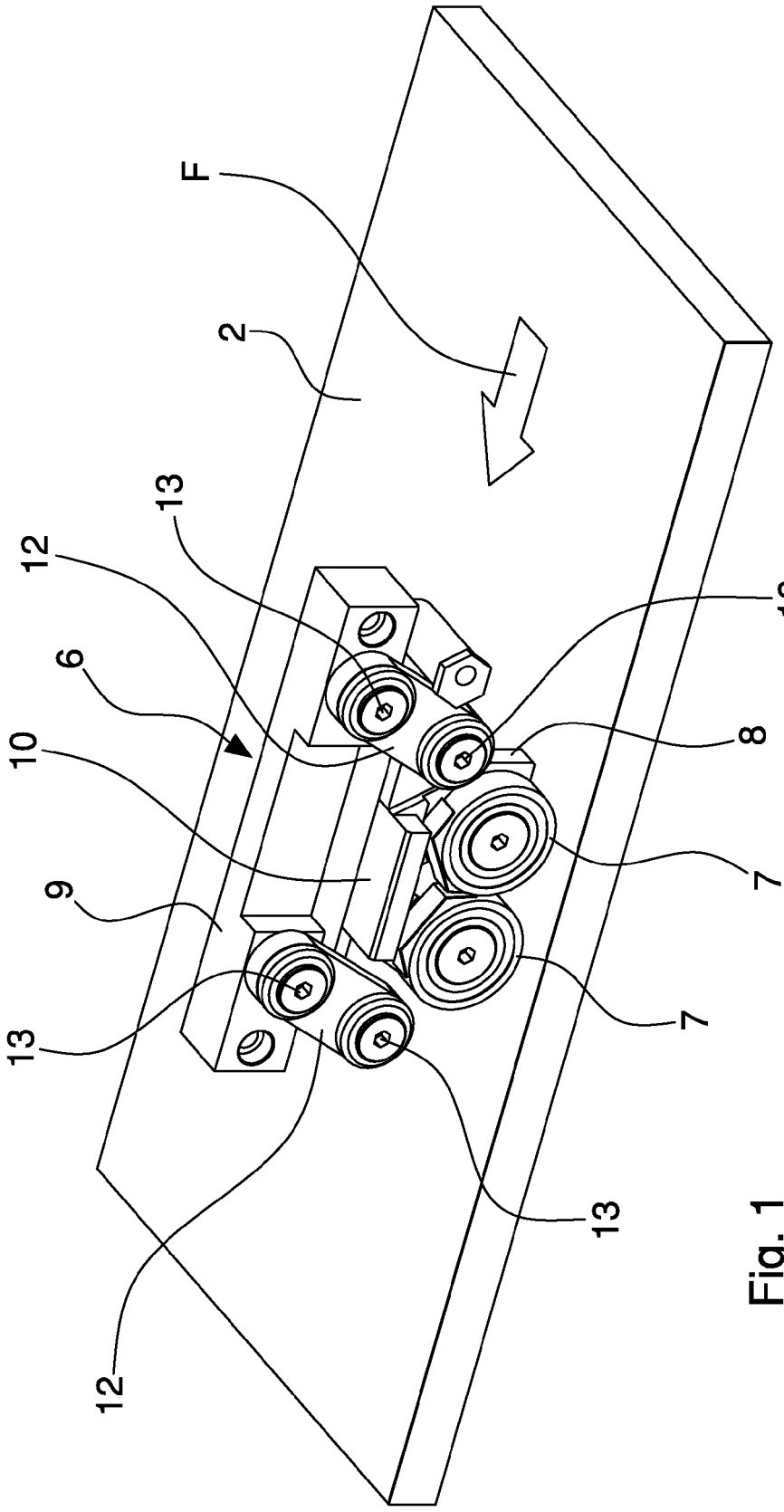


Fig. 1

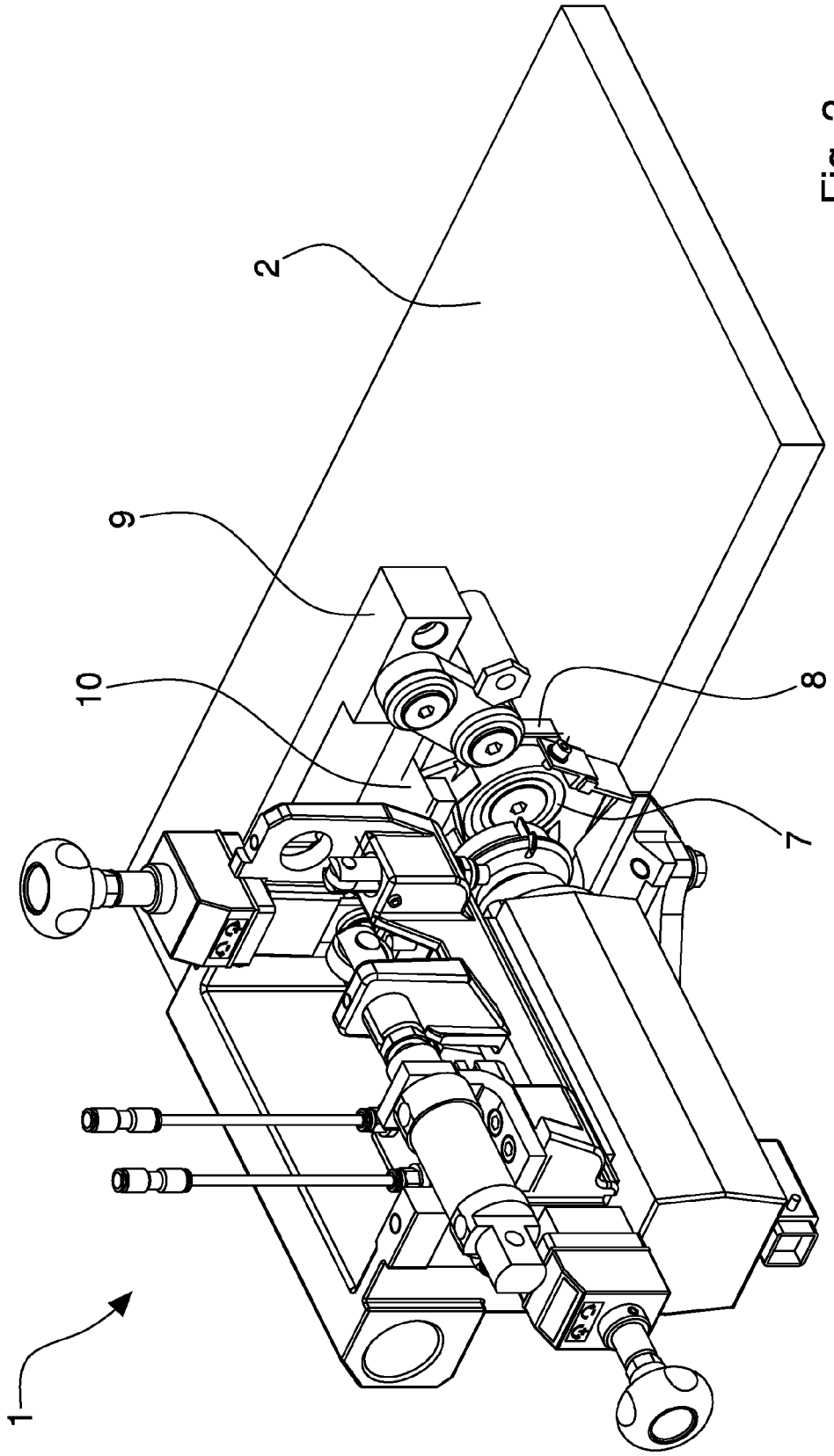


Fig. 2

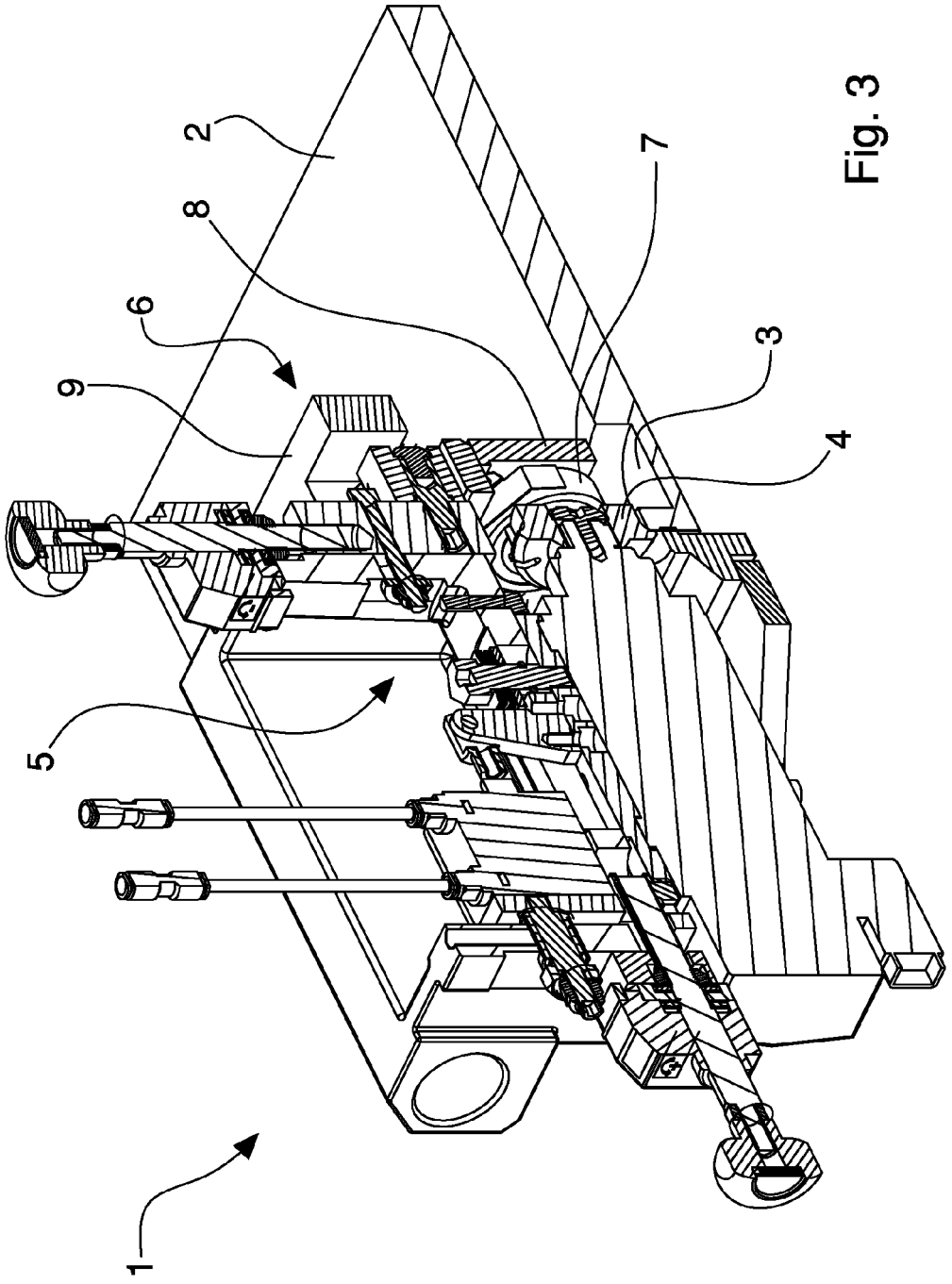


Fig. 3

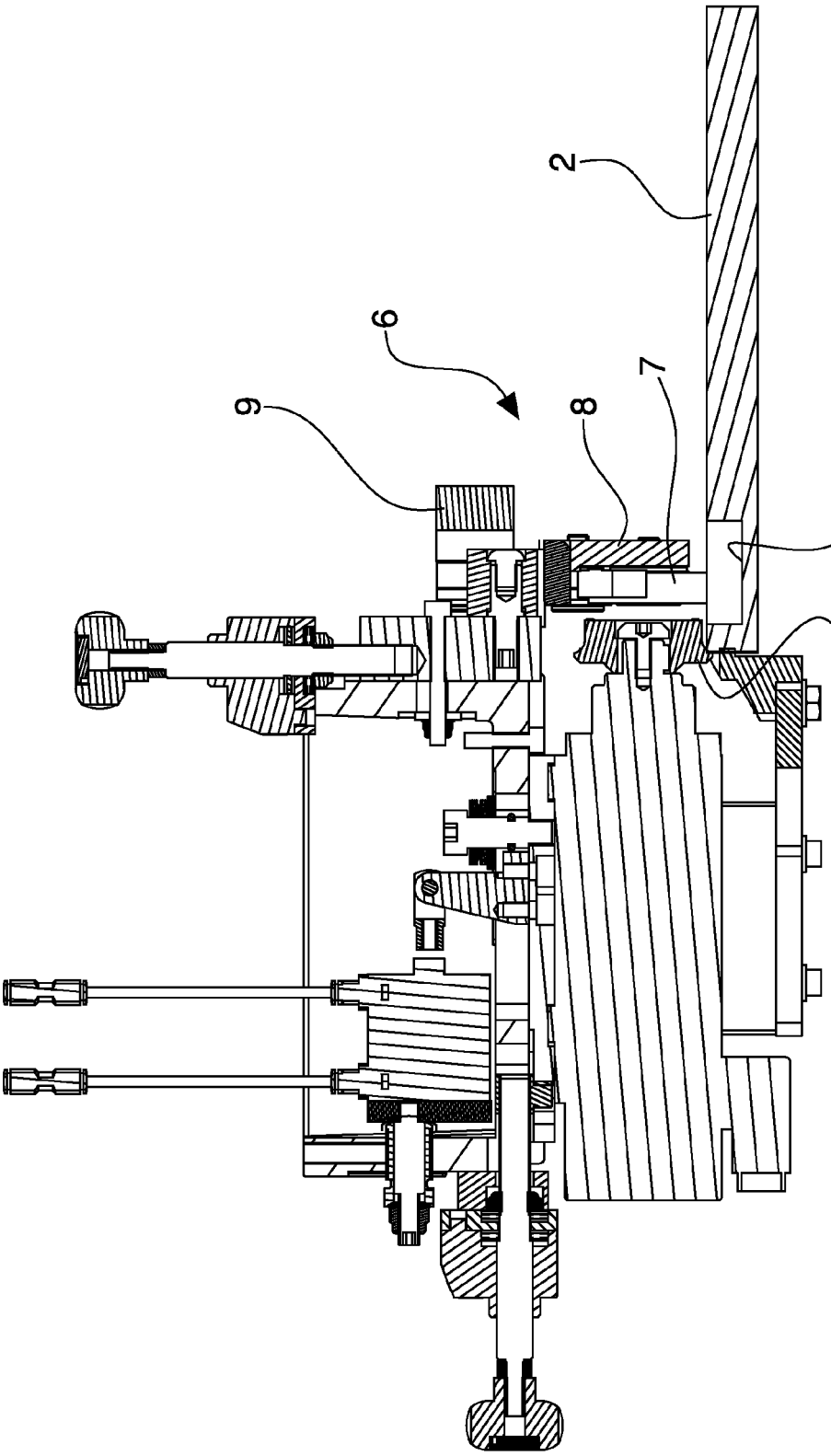
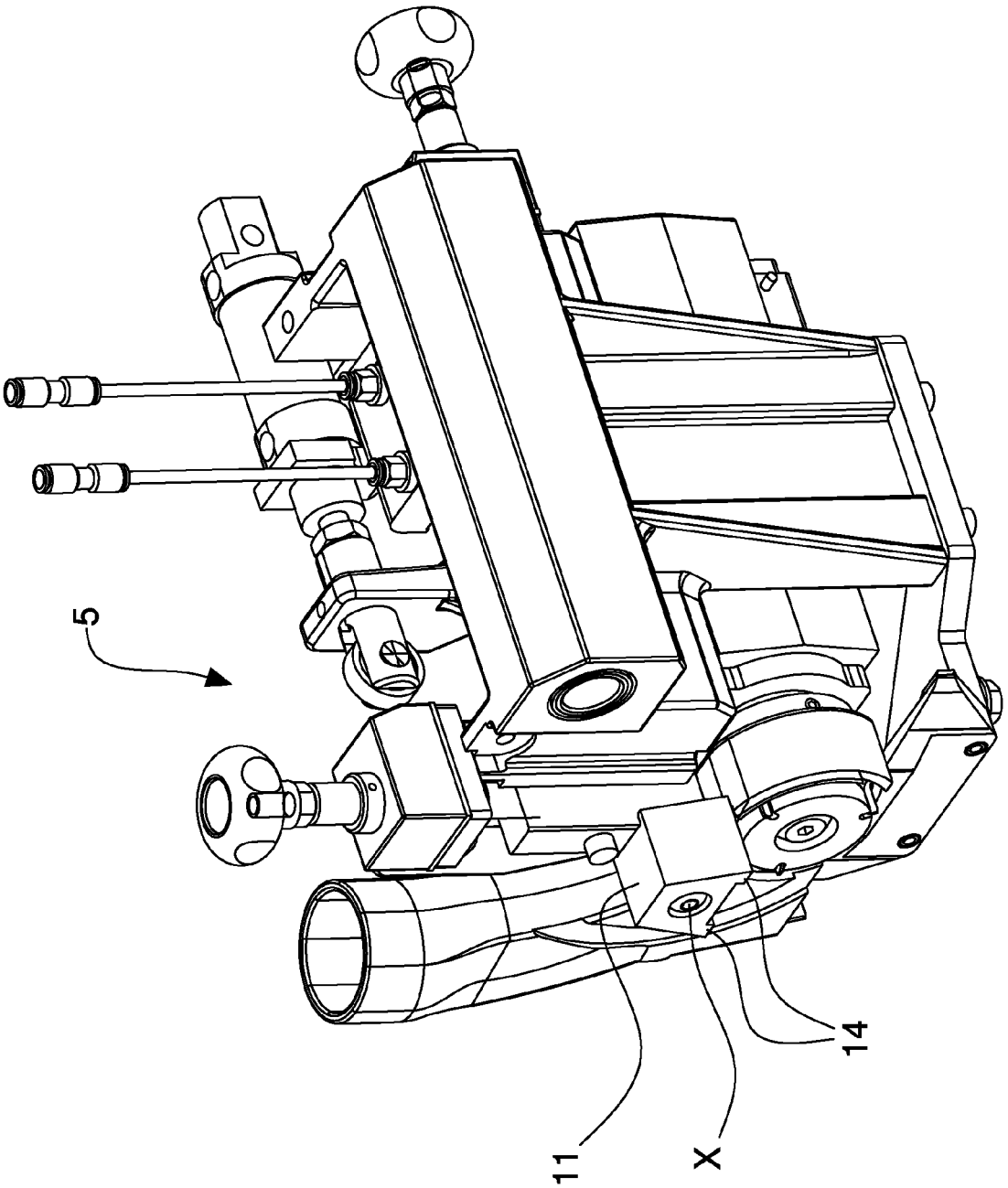


Fig. 4

Fig. 5



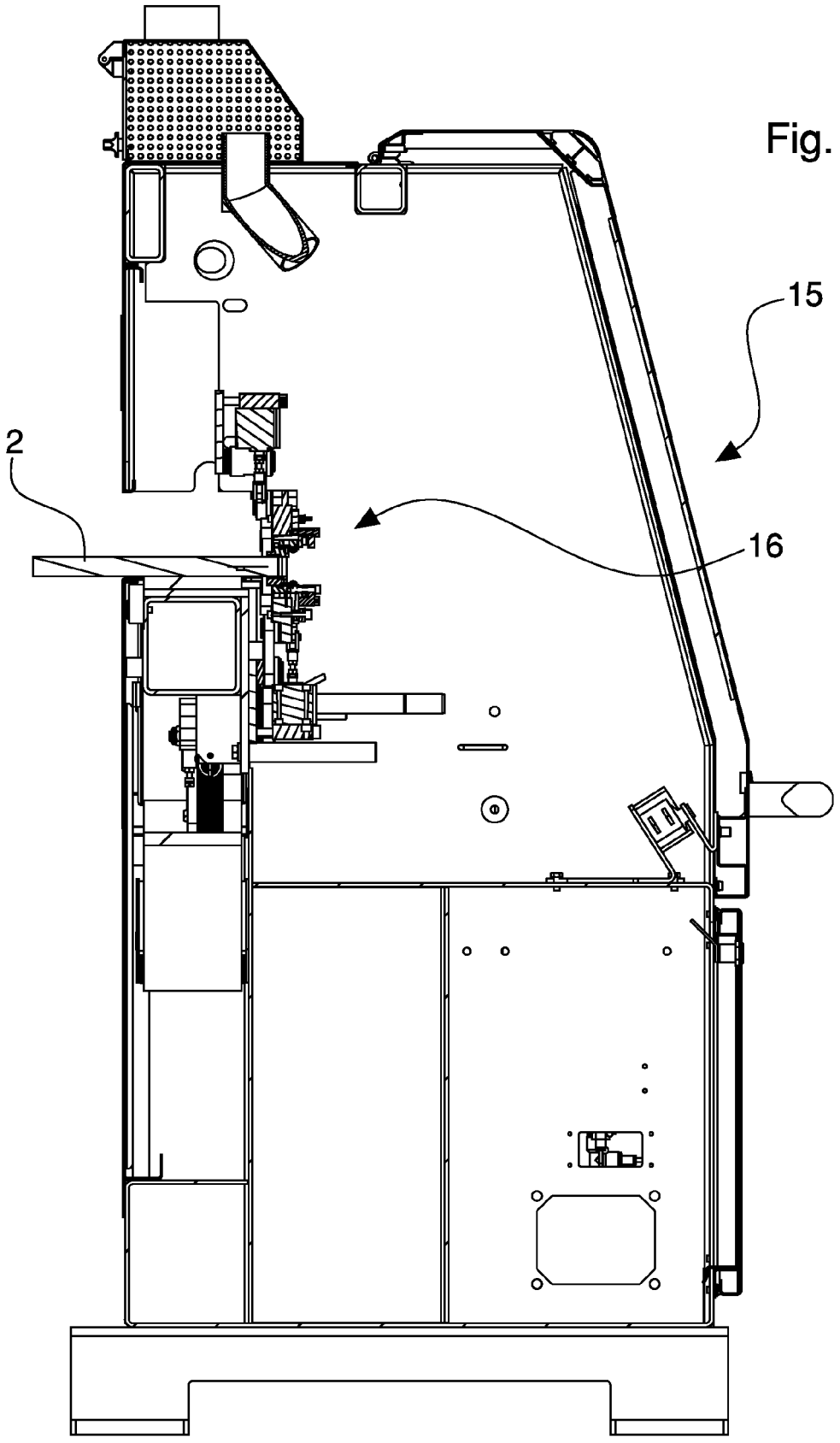


Fig. 6

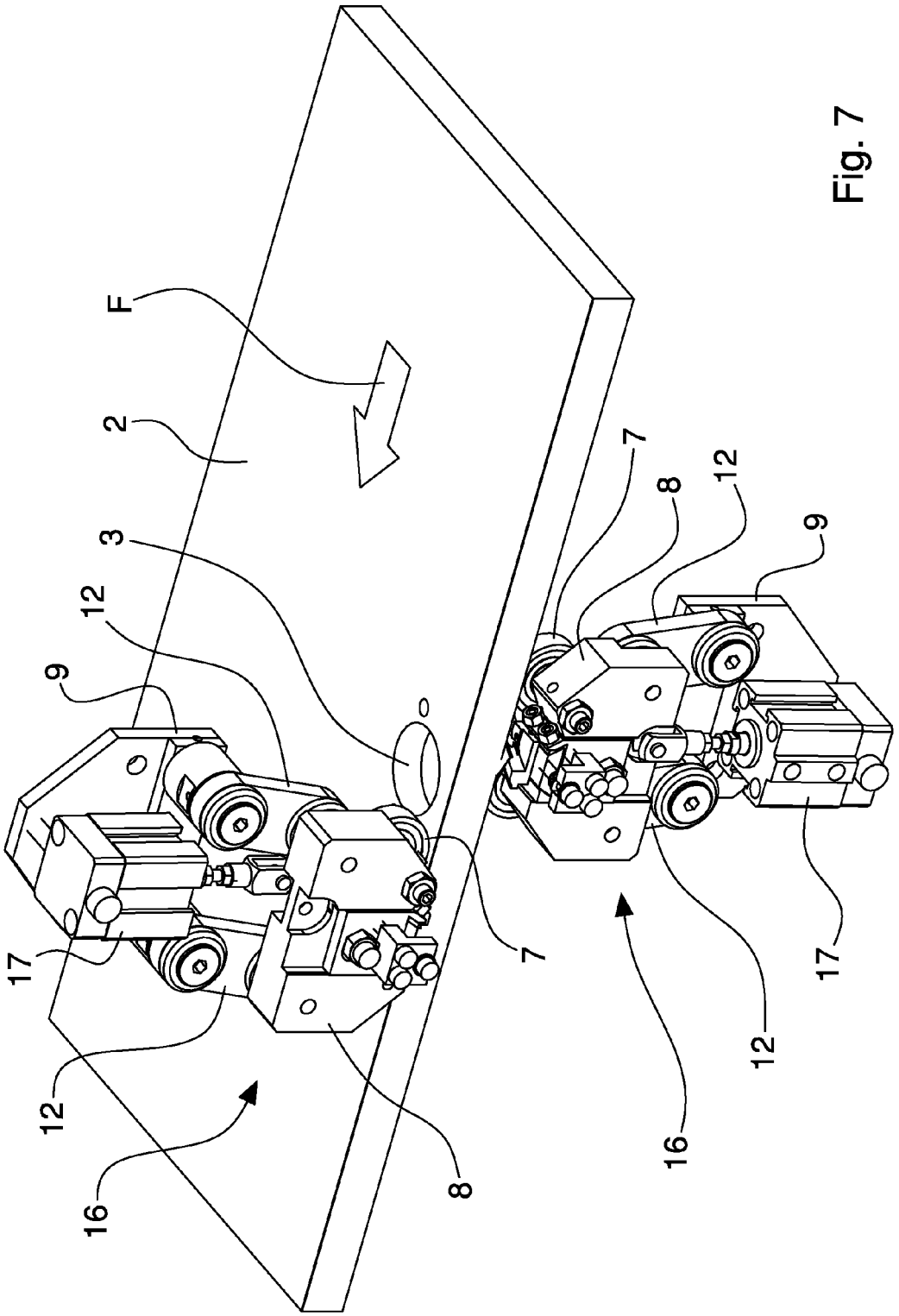


Fig. 7

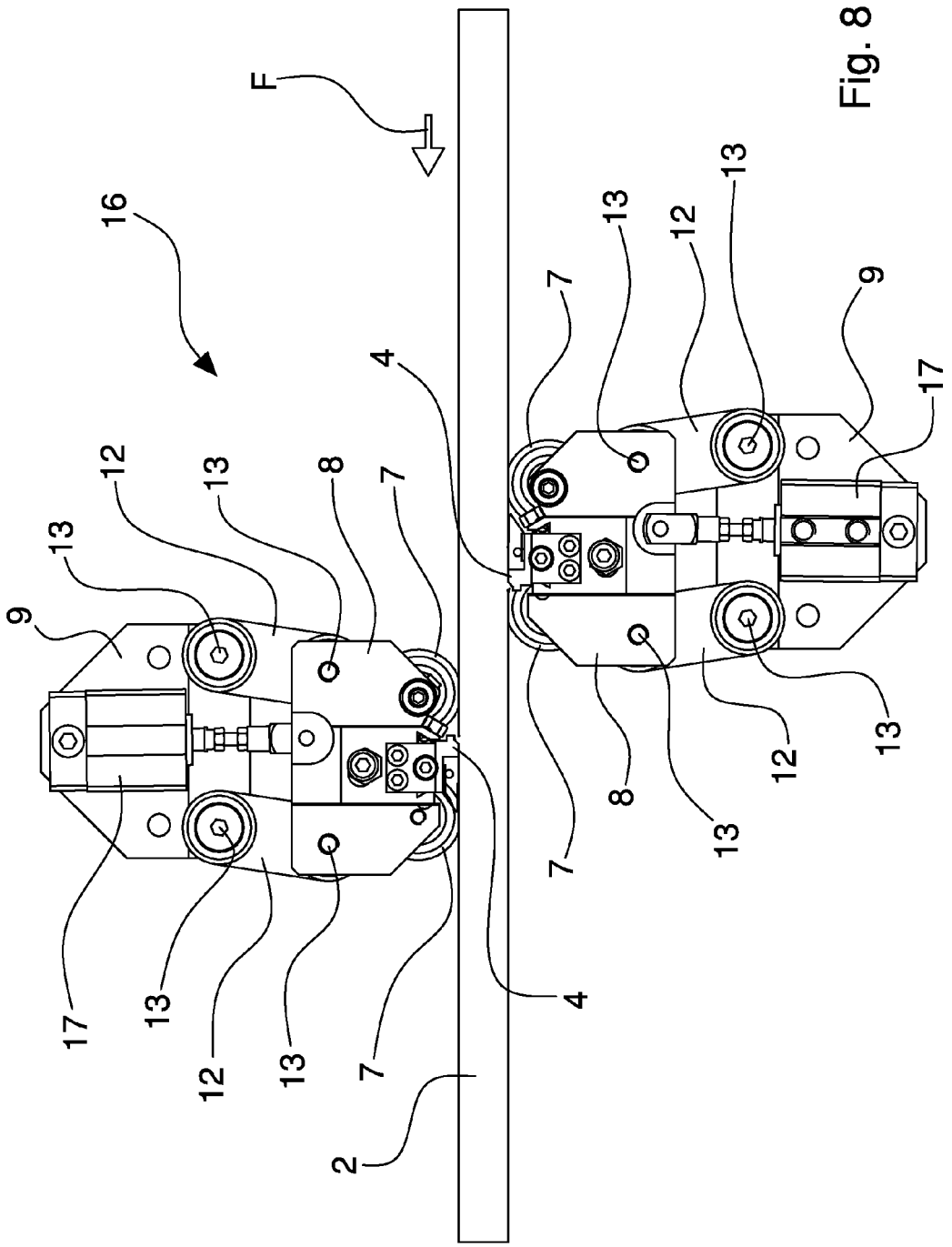


Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 9423

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	GB 1 044 483 A (KURT REICH) 28 September 1966 (1966-09-28) * page 1, line 87 - page 2, line 59 * * page 3, line 91 - line 112 * * figures 6,7,9 * -----	1-5,9,10 8	INV. B27D5/00
Y	DE 31 33 970 A1 (HEBROCK HORST) 10 March 1983 (1983-03-10) * figure 2 * -----	8	
A	EP 1 479 467 A1 (PAUL OTT GMBH [AT] OTT VERWALTUNGS GMBH [AT]) 24 November 2004 (2004-11-24) * figures * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

B27D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 August 2012	Huggins, Jonathan

CATEGORY OF CITED DOCUMENTS

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22-08-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1044483 A	28-09-1966	AT 263333 B	25-07-1968
		BE 644775 A	01-07-1964
		CH 435679 A	15-05-1967
		DE 1453214 A1	06-02-1969
		DE 1453215 A1	13-03-1969
		GB 1044483 A	28-09-1966
		NL 6401737 A	09-09-1964
DE 3133970 A1	10-03-1983	NONE	
EP 1479467 A1	24-11-2004	AT 336324 T	15-09-2006
		AT 375222 T	15-10-2007
		DE 20308037 U1	07-08-2003
		EP 1479467 A1	24-11-2004
		EP 1624989 A1	15-02-2006
		ES 2270378 T3	01-04-2007
		ES 2294394 T3	01-04-2008
		WO 2004103621 A1	02-12-2004

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- IT MO20090127 A **[0009]**