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(54) **Machining center for machining panels made of wood and the like**

(57) A machining center (10) for machining panels made of wood and the like, comprising a panel supporting platform (11) with which a guide (12) is associated on which three working units are arranged so that they can

move:

- a unit (13) for cutting and grinding a panel (14) arranged on the platform (11),
- a unit (15) for edge banding and lower trimming,
- and an upper trimming unit (16).

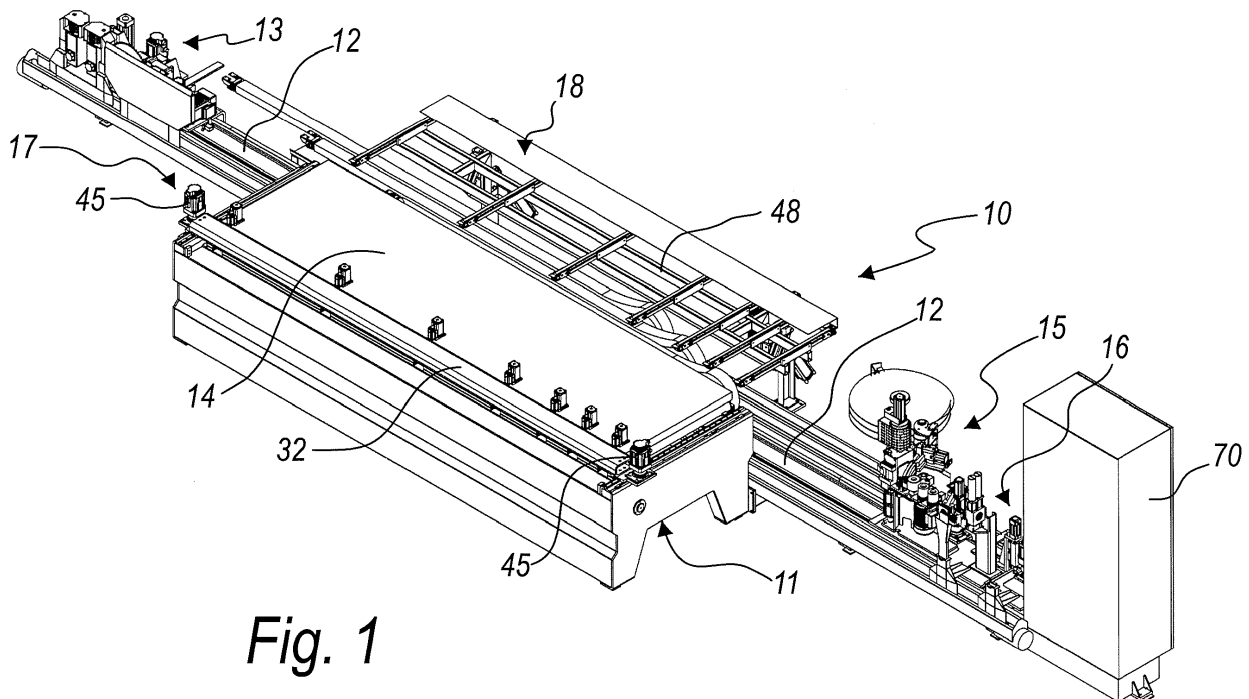


Fig. 1

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Description

[0001] The present invention relates to a machining center for machining panels made of wood and the like.

[0002] Currently, in the field of machining panels made of wood for making furniture for kitchens, living rooms, bookcases, or other types of furnishings such as wardrobes, wall-mounted furniture and the like, machining apparatuses are known which are constituted by a plurality of machines arranged in islands inside an industrial building or other equivalent space.

[0003] A first type of these machines, each forming a work island within the same workspace, is designed to cut to size a panel to be machined, and to grind the freshly cut surface.

[0004] A second type of machine is constituted by machines for edge banding the thickness affected by the cut of the panel.

[0005] A third type of machine is adapted to perform the trimming of the edge of the edge banded thickness, or to provide another type of finish.

[0006] Usually, a semi-finished product, for example the cut-to-size panel, is moved manually from one machine to the one designed for subsequent working.

[0007] In particular, the semi-finished product is loaded in sequence on the cutting and grinding machine and then moved on the edge banding and trimming machine.

[0008] As mentioned above, these apparatuses typically occupy many square meters of space, because these machines are generally arranged in sequence, i.e., one after the other, extending in a linear fashion over as much as 30 meters.

[0009] One need that is felt commonly in the field of furniture makers and furniture factories is to reduce the space occupation of machining apparatuses without renouncing the technical tools that allow the greatest flexibility in the supply of the parts requested by customers.

[0010] In fact, particularly for the production of furniture for kitchens, bedrooms or other furniture sets, the buyer, according to the specific space occupation and style requirements dictated by his home, can require particular dimensional adaptations to be provided on the proposed models.

[0011] Accordingly, the furniture maker feels the need to have at his disposal machines which, despite a reduced space occupation, still make it possible to perform all the machining needed to provide the product with the required characteristics.

[0012] Moreover, moving a panel from one machine to another, despite being semi-automated by the use of trolleys or roller ways, still requires the use of labor, which is inevitably taken away from other tasks.

[0013] The aim of the present invention is to provide a machining center for machining panels made of wood and the like that makes it possible to obviate the space occupation drawbacks caused by the set of known machines.

[0014] Within this aim, an object of the invention is to

provide a machining center for machining panels made of wood and the like which is compact and has a greatly reduced volume with respect to machine sets and machine lines of the known type.

[0015] Another object of the invention is to provide a machining center that allows savings in terms of labor.

[0016] Another object of the invention is to provide a machining center that can be automated.

[0017] Another object of the invention is to provide a machining center that is safe for operators.

[0018] Another object of the invention is to propose a machining center that is simple in structure and easy to use and can be produced at competitive costs with known plants and technologies.

[0019] This aim and these and other objects that will become better apparent hereinafter are achieved by a machining center for machining panels made of wood and the like, characterized in that it comprises a panel supporting platform with which a sliding guide is associated on which three working units are arranged so that they can translate:

- a unit for cutting and grinding the panel,
- a unit for edge banding and lower trimming,
- and an upper trimming unit,

said platform having automated means for gripping and moving a panel being machined, and means for the automated unloading of the waste produced by the cutting of the panel being machined.

[0020] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of the machining center for machining panels made of wood and the like according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a machining center according to the invention;

Figure 2 is a view of a detail of Figure 1;

Figure 3 is a sectional view of a detail of the means for gripping and moving a panel being machined;

Figure 4 is a partially sectional view of another detail of the means for gripping and moving a panel being machined;

Figure 5 is a transverse sectional view of the machining center according to the invention during a machining step;

Figure 6 is the same transverse sectional view of Figure 4 in a subsequent machining step;

Figure 7 is a perspective view of a detail of the means for the automated unloading of waste;

Figure 8 is a perspective view of the working units of the machining center according to the invention.

[0021] With reference to the figures, a machining center for machining panels made of wood and the like ac-

according to the invention is designated in Figure 1 by the reference numeral 10.

[0022] The machining center 10 comprises a panel supporting platform 11 with motorized rollers, with which a guide 12 is associated on which three working units are arranged so that they can translate:

- a unit 13 for cutting and grinding a panel 14 arranged on the platform 11,
- a unit 15 for edge banding and lower trimming,
- and a unit 16 for upper trimming.

[0023] The platform 11 has means 17 for automatically gripping and moving the panel 14 being machined, which are clearly visible in Figures 2, 3 and 4, and means 18 for the automated unloading of the waste 19 caused by the cutting of the panel 14 being machined, which are illustrated in particular in Figures 6 and 7.

[0024] In the embodiment of the invention described here by way of non-limiting example of the invention, the guide 12 is formed by a longitudinally elongated tubular body provided with two rails, a first lateral rail 20 and a second upper rail 21, which are visible in particular in the cross-sections shown in Figures 5 and 6.

[0025] The supporting sliders 22, 23 and 24 and, respectively, the first slider 22 for the cutting and grinding unit 13, the second slider 23 for the edge banding and lower trimming unit 15, and the third slider 24 for the upper trimming unit 16 are arranged so that they can slide on the rails 20 and 21.

[0026] Each slider is provided in a lower region with corresponding sliding blocks 25 for sliding on the rails 20 and 21.

[0027] Each slider 22, 23 and 24 is provided on the guide 12 with means for independent movement which can be automated.

[0028] These movement means for each slider are constituted, by way of non-limiting example, by a motor drive 26, for example an electric motor, mounted on the respective slider 22 as well as 23 and 24, and adapted to actuate a pinion 27, which in turn engages a rack 28 jointly connected to the guide 12.

[0029] The grip and movement means 17 for a panel 14 being machined are constituted by a series of clamp-like gripping devices 30 adapted to grip in a perimetric region the panel 14 being machined, on the side opposite to the portion to be cut (the waste 19) and to the edge 31 to be machined.

[0030] The clamp-like gripping devices 30 are carried, in a spaced arrangement, by a longitudinally elongated element 32 for pushing the panel 14 laterally in a transverse direction with respect to the direction of translation of the working units 13, 15 and 16 on the guide 12.

[0031] A clamp-like gripping device 30 is clearly visible in Figure 3.

[0032] The clamp-like gripping device 30 is constituted by two jaws 33 and 34, a first lower jaw 33 and a second upper jaw 34.

[0033] Each jaw is arranged so that it can slide vertically, by means of a respective sliding block 35 and 36 associated with a vertical guide 37 that is fixed to the longitudinally elongated lateral pushing element 32.

[0034] The jaws 33 and 34 are moved vertically by an associated actuator, for example a fluid-operated actuator 39 as in Figure 3, carried by the upper jaw 34.

[0035] Each one of the jaws 33 and 34 is formed, in the embodiment of the invention described herein by way of non-limiting example, by an L-shaped bracket.

[0036] The vertical guide 37 is carried by a plate 40 between two limit stops 41 and 42.

[0037] By activation of the actuator 39, the two jaws 33 and 34 move toward one another and clamp the edge of the panel 14 that rests on rollers 44 of the platform 11; such platform with rollers is of a type known per se.

[0038] The longitudinally elongated element 32 for lateral pushing of the panel 14 in a transverse direction is constituted by a tubular body that carries at its ends corresponding motors 45 with a pinion for a corresponding rack 46 which is fixed to the platform 11.

[0039] Therefore, once the panel 14 to be machined arrives on the platform 11, of the type with motorized rollers, the longitudinally elongated element 32 approaches with the gripping devices 30 open; the open lower jaw 33 is arranged below the resting surface formed by the motorized rollers 44.

[0040] After encountering the edge of the panel 14, the gripping devices 30 close, gripping the panel 14 firmly.

[0041] By activation of the motors 45, for example electric motors, the longitudinally elongated element 32, and the panel 14 carried by it, are made to move toward the working region above the guide 12 for the working units 13, 15 and 16.

[0042] The extent of the part of the panel 14 to be cut, i.e., the dimensions of the waste 19, are determined by means of the advancement of the longitudinally elongated element 32.

[0043] The gripping devices 30 are nearer to one another on one side of the platform 11 with motorized rollers for being able to grip small panels.

[0044] The gripping means also comprise a series of sucker devices 67 for retaining the panel 14 proximately to the working region, as shown clearly in Figures 4, 5 and 6.

[0045] Each sucker device 67 is supported by the platform 11, below the resting surface formed by the rollers, at a gripping device 30 and on the side opposite the platform 11.

[0046] A sucker device 67, of a type known per se and shown in partial cross-section in Figure 4, comprises a piston 68, which carries a sucker 69 and is arranged so that it can move vertically in a corresponding chamber formed on a supporting body 70, which is fixed to the platform 11.

[0047] The sucker 69, as in the figure, is normally below the panel 14, in order not to hinder its translational movements toward the working region.

[0048] When the panel 14 has been positioned, air is injected below the piston 68 by means of a first tube 71 in order to push the former upward so that the sucker 69 makes contact with the lower face of the panel 14; the pressure of the sucker 69 against the panel 14 causes the lowering of a ball 72 (which is to be understood as being supported by a spring which is not illustrated for the sake of simplicity) and the formation of the vacuum, by means of a suction tube 73 that allows the grip of the sucker 69. There are two contrast springs 74 adapted to return the piston 68 downward when the panel 14 is released.

[0049] The sucker devices 67 make it possible to retain in the best possible way the part of the panel 14 that has to be machined, giving it stability and thus contributing to the optimization of its machining.

[0050] The clamp-like devices 30 and the sucker devices 67 make it possible to machine the panel 14 in a stationary position; this particularity of the machining center 10 according to the invention is particularly important because the machining obtained with the movement of the working units 13, 15 and 16 instead of the panel 14 allows a considerable saving of volumes and of useful spaces with respect to the background art.

[0051] The means 18 for the automated unloading of the waste 19 are constituted by a waste supporting frame 48 with waste supporting cross-members 49 provided with conveyance belts 50.

[0052] The conveyance belts 50 are moved by an associated motor drive 51, so as to form a sort of conveyor belt that moves the waste 19 away from the cutting region toward a tilting side table 52 for removing the waste from the waste supporting frame 48.

[0053] The waste supporting frame 48 is pivoted to a footing 54 and is associated therewith with means for rotating away from the platform 11 in order to allow the passage of the working units 13, 15 and 16.

[0054] The rotation means for the waste supporting frame 48 are constituted by actuators 55 which are pivoted to a corresponding flange which is fixed to the footing 54.

[0055] The tilting side table 52 is moved by other actuators 56, each pivoted to a bracket 57 which is fixed to the frame 48.

[0056] The table 52 can thus be lifted for allowing a comfortable grip of the portion of waste 19.

[0057] The working units 13, 15 and 16 are to be understood as being of a type known per se.

[0058] In particular, Figure 7 is a view of the cutting and grinding unit 13, which comprises the parting (i.e., cutting) blades 60 and the grinding unit 61.

[0059] Figure 7 also shows the edge banding and trimming unit 15, with plates 62 for supporting the edge banding tapes, not shown for the sake of simplicity, and a set of wheels 63 for pressing the tape against the edge of the panel 14, such wheels being followed by a lower trimming unit 64.

[0060] Finally, Figure 7 also shows the upper trimming

unit 16, with a tool supporting crosspiece 65 and a suction channel 66 for the generated dust and debris.

[0061] The suction channel 66, like the suction channels 66a and 66b of the other two working units, are interconnected slidably with the suction tube 76 that is arranged in parallel to the guide 12.

[0062] Such working units can be replaced obviously by other similar and equivalent units.

[0063] Such working units, indicated and described here by way of example as being three in number, can also be more than three, with similar and equivalent functions or even different and additional ones.

[0064] The machining center 10 according to the invention thus makes it possible to provide, by way of an automated management, for example by way of an electronic management unit, represented schematically by a cabinet 70, a series of operations that are currently performed in a manual or semiautomatic manner.

[0065] The cabinet 70 exemplifies and represents schematically a numeric-control unit, or a personal computer, which can be programmed according to the needs and requirements.

[0066] In practice it has been found that the invention achieves the intended aim and objects.

[0067] In particular, by means of the invention a machining center for machining panels made of wood and the like has been provided which is compact and has a greatly reduced volume with respect to sets of machines and lines of machines of the known type, thanks to the working units, which are grouped on three sliders that are independent but all able to slide on the same rail, proximately to the platform that carries the panel to be machined.

[0068] Moreover, the machining center according to the invention performs machining automatically with the part stationary, i.e., the panel to be machined is held motionless and the working units are the ones that move, with a considerable saving of working clearances that would have been necessary if the larger panel had been moved instead of the more compact working units.

[0069] Moreover, with the invention a machining center has been perfected which allows savings in terms of labor, because the panel to be machined does not need to be moved from one machining island to another, as in the background art.

[0070] Moreover, the automation allowed by the electronic management unit also makes it possible to save labor, because once the panel has been loaded on the machining center, the machining is indeed performed automatically without any intermediate intervention by any operator, barring malfunctions, since the gripping and movement means and the working units all have automated motion.

[0071] Further, the invention has perfected a machining center that can indeed be automated thanks to the motor drives of each working unit and of the platform, which can be coordinated easily in their movements and in the machining to be performed by way of such elec-

tronic management unit, for example of the numeric-control type or a personal computer of a known type which has been programmed specifically.

[0072] Moreover, the invention has perfected a machining center that is safe for the operators, since their intervention is limited to failures and malfunctions.

[0073] Moreover, the present invention has provided a machining center which is structurally simple and easy to use and can be manufactured at low cost with known plants and technologies.

[0074] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0075] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0076] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A machining center (10) for machining panels made of wood and the like, **characterized in that** it comprises a panel supporting platform (11) with which a sliding guide (12) is associated on which three working units are arranged so that they can move:

- a unit (13) for cutting and grinding a panel (14) arranged on said platform (11),
- a unit (15) for edge banding and lower trimming,
- and an upper trimming unit (16),

said platform (11) having means (17) for the automatic gripping and moving of said panel (14) being machined, and means (18) for the automated unloading of the waste (19) produced by the cutting of the panel (14) being machined.

2. The machining center according to claim 1, **characterized in that** said guide (12) is formed by a longitudinally elongated tubular body provided with two rails, a first lateral rail (20) and a second upper rail (21), on said rails (20, 21) there being arranged slidably the supporting sliders (22, 23, 24) respectively of said cutting and grinding unit (13), of said edge banding and lower trimming unit (15), and of said upper trimming unit (16), each slider being provided, in a lower region, with corresponding sliding blocks (25) for sliding on said rails (20, 21).

3. The machining center according to the preceding claims, **characterized in that** each slider (22, 23, 24) is provided with means for independent movement which can be automated on said guide (12).

4. The machining center according to the preceding claims, **characterized in that** said movement means are constituted by a motor drive (26), which is mounted on the respective slider (22, 23, 24) and is adapted to actuate a pinion (27), which in turn engages a rack (28) that is jointly connected to the guide (12).

5. The machining center according to the preceding claims, **characterized in that** said means (17) for automatic gripping and movement of a panel (14) being machined are constituted by the motorized rollers of the platform (11), of the type with motorized rollers, and by a series of clamp-like gripping devices (30) adapted to grip, in a perimetric region thereof, the panel (14) being machined, on the side opposite the portion to be cut and the edge (31) to be machined, said clamp-like gripping devices (30) being carried, so that they are spaced, by a longitudinally elongated element (32) for pushing the panel (14) laterally in a transverse direction with respect to the direction of translation of said working units (13, 15, 16) on said guide (12).

6. The machining center according to the preceding claims, **characterized in that** each clamp-like gripping device (30) is constituted by two jaws (33, 34), each jaw being arranged so that it can slide vertically, by means of a respective sliding block (35, 36) which is associated with a vertical guide (37) that is fixed to said longitudinally elongated lateral pushing element (32), said jaws (33, 34) being moved vertically by an associated actuator (39).

7. The machining center according to claims 5 and 6, **characterized in that** said gripping means also comprise a series of sucker devices (67), for retaining the panel (14) proximately to the working region.

8. The machining center according to the preceding claims, **characterized in that** said clamp-like gripping means (30) and said sucker devices (67) are adapted to make it possible to machine the panel (14) while the part is stationary, since the working units (13, 15, 16) are designed to move proximately to the panel (14), which is locked in the predefined arrangement for its machining.

9. The machining center according to the preceding claims, **characterized in that** said longitudinally elongated element (32) for the lateral pushing of the panel (14) in a transverse direction is constituted by a tubular body which supports, at its ends, corre-

sponding motors (45) with a pinion for a corresponding rack (46) fixed to the platform (11).

10. The machining center according to the preceding claims, **characterized in that** said means (18) for the automated unloading of the waste (19) are constituted by a waste supporting frame (48) with waste supporting cross-members (49) provided with conveyance belts (50) moved by an associated motor drive (51), so as to move the waste (19) away toward a tilting side table (52) for removing the waste from the waste supporting frame (48). 5 10
11. The machining center according to the preceding claims, **characterized in that** said waste supporting frame (48) is pivoted to a footing (54) and is associated therewith with means for rotation away from said platform (11) in order to allow the passage of the working units (13, 15, 16). 15 20
12. The machining center according to the preceding claims, **characterized in that** it comprises a management unit (70) of the electronic type, for example a numeric-control unit, or a personal computer, which can be programmed and is designed to control the automatic execution of sequences of operations for moving and machining said panel (14) that are currently performed manually or semiautomatically. 25 30
13. The machining center according to the preceding claims, **characterized in that** said platform (11) with said means (18) for the automated unloading of the waste (19) and said guide (12) that supports said working units (13, 15, 16) are mutually arranged so as to provide the machining center (10) with high compactness and producing reduced space occupations. 35 40 45 50 55

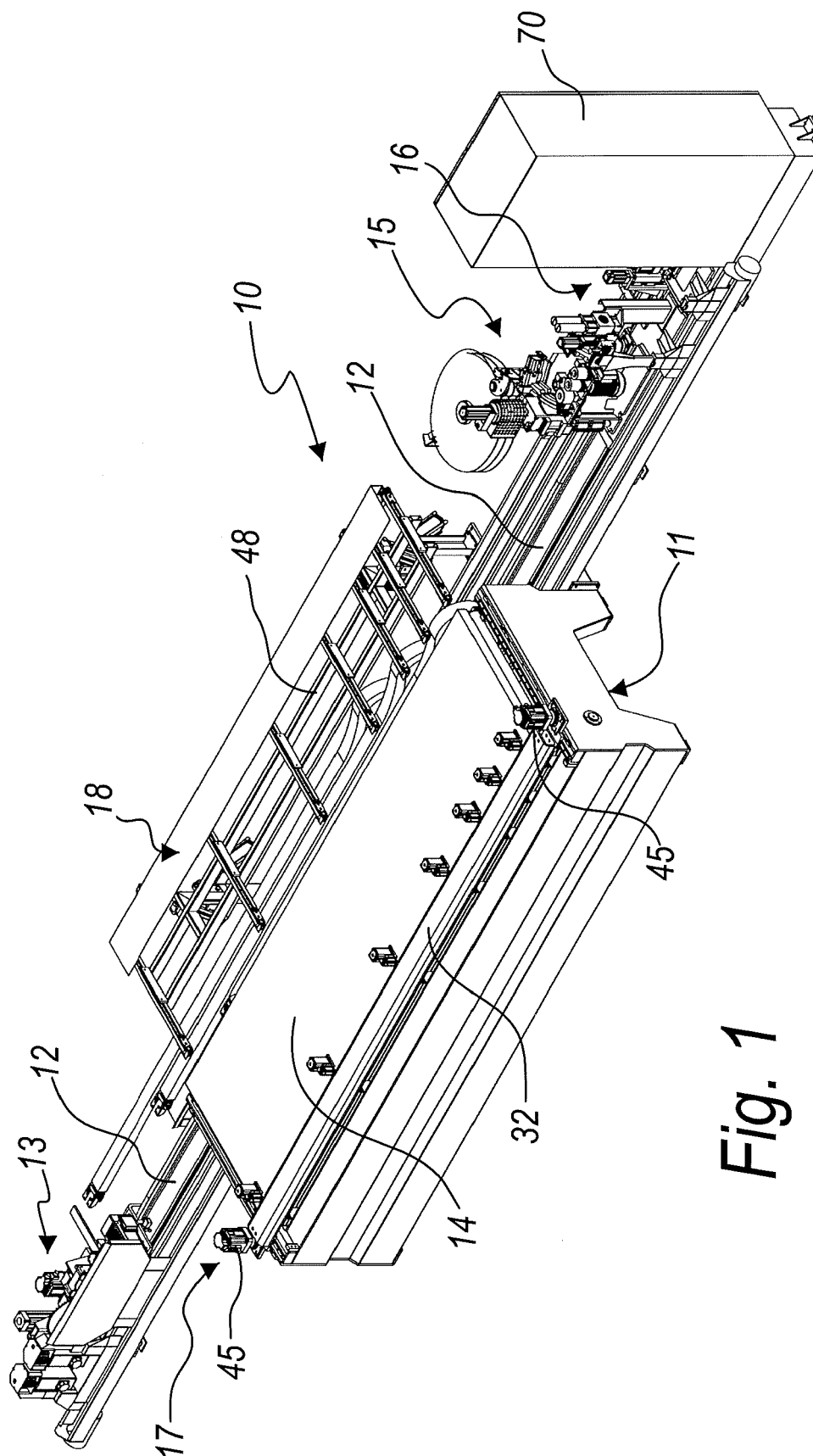
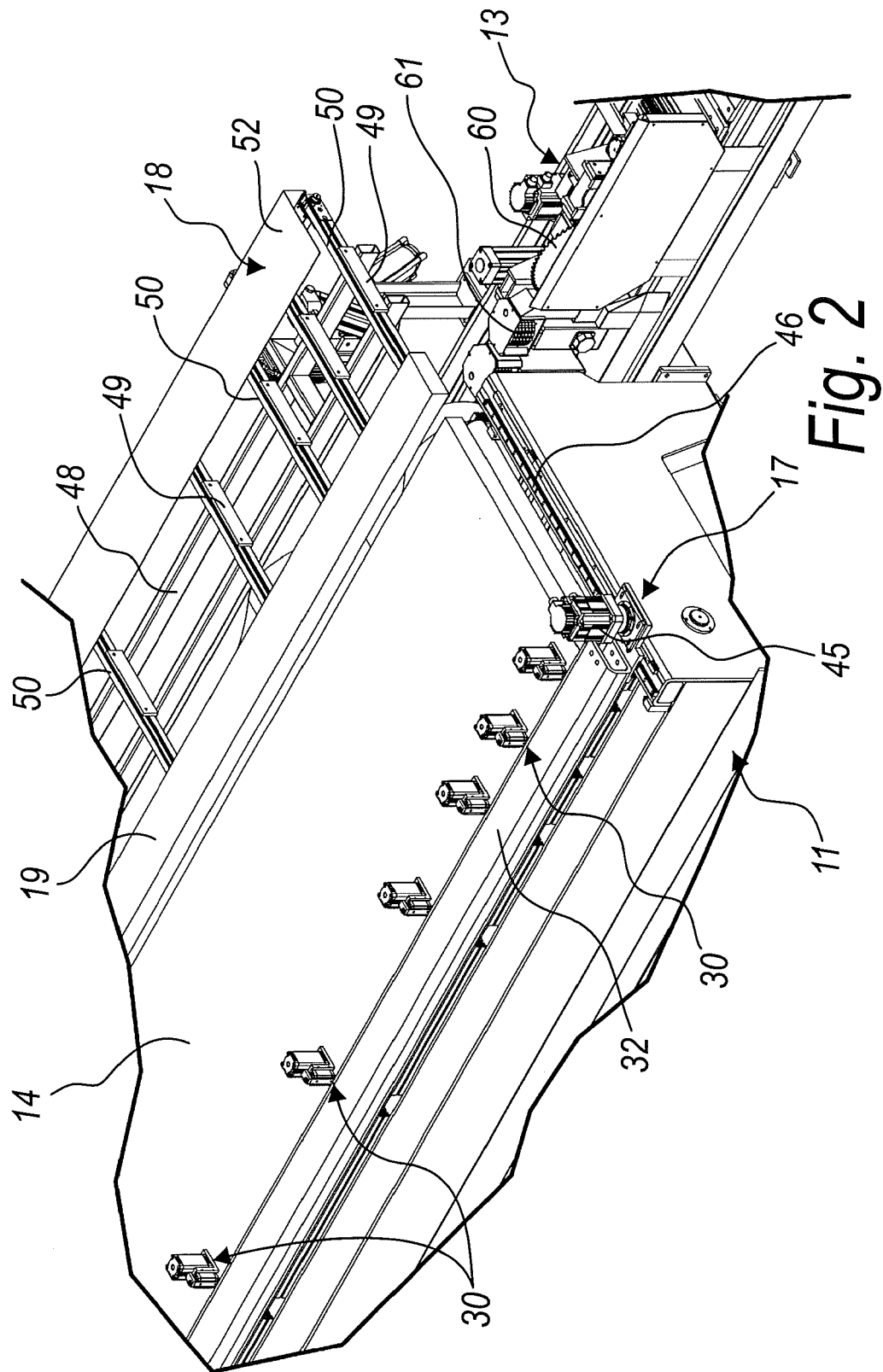
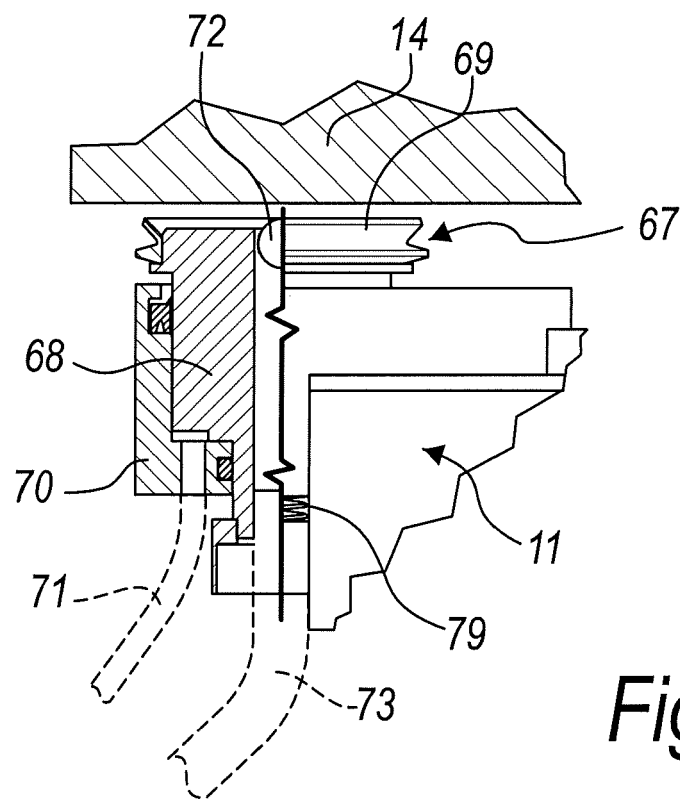
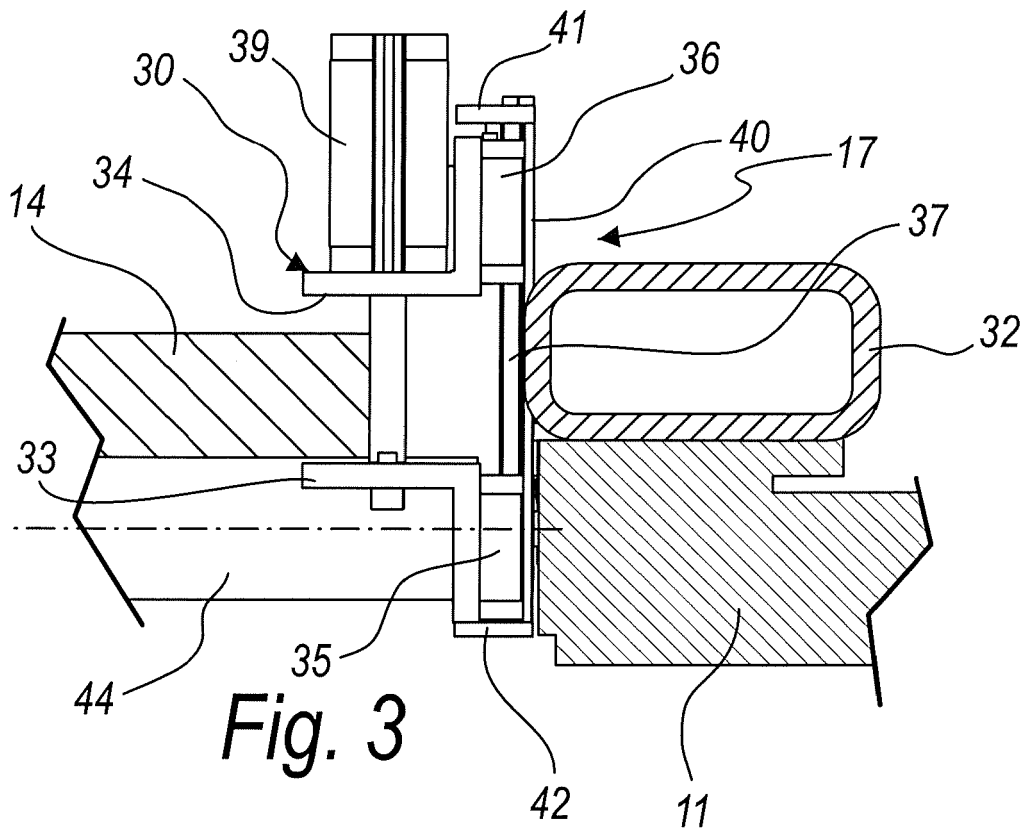


Fig. 1





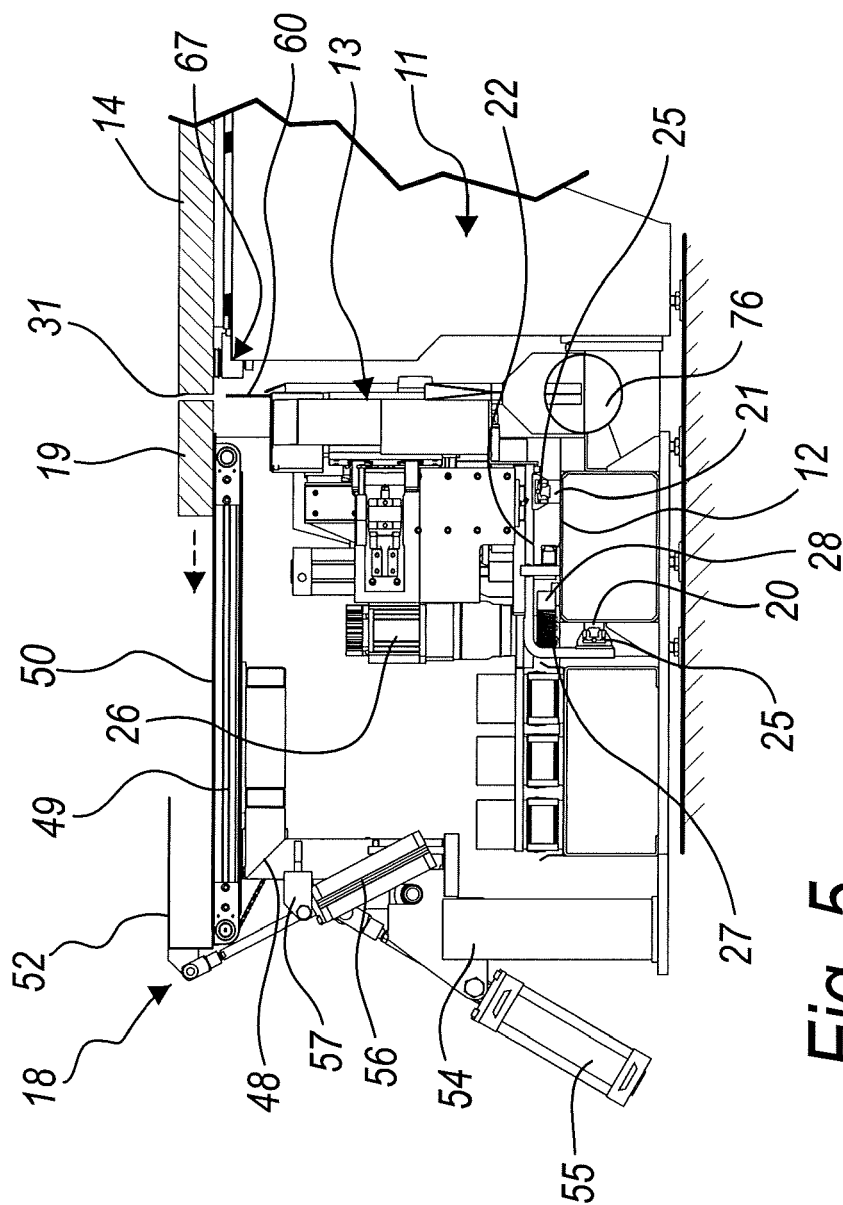


Fig. 5

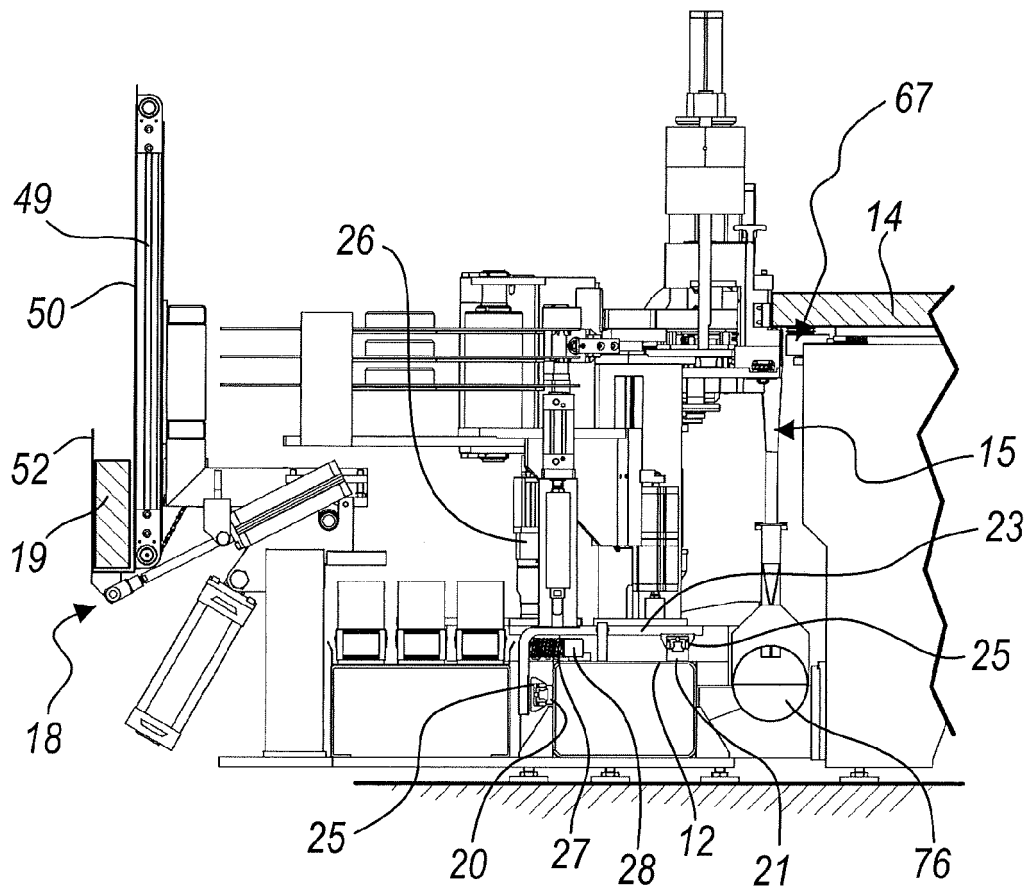


Fig. 6

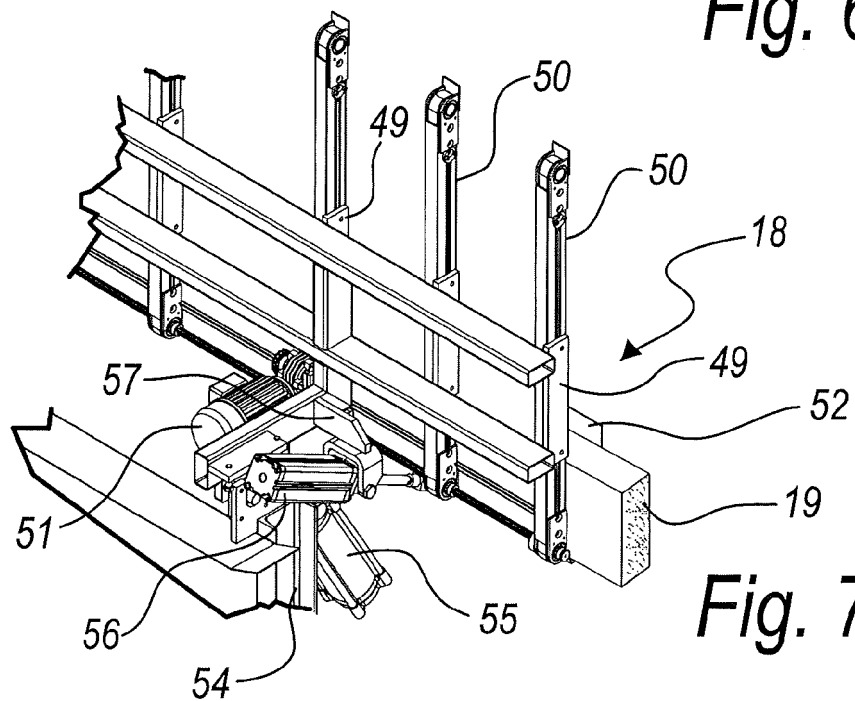


Fig. 7

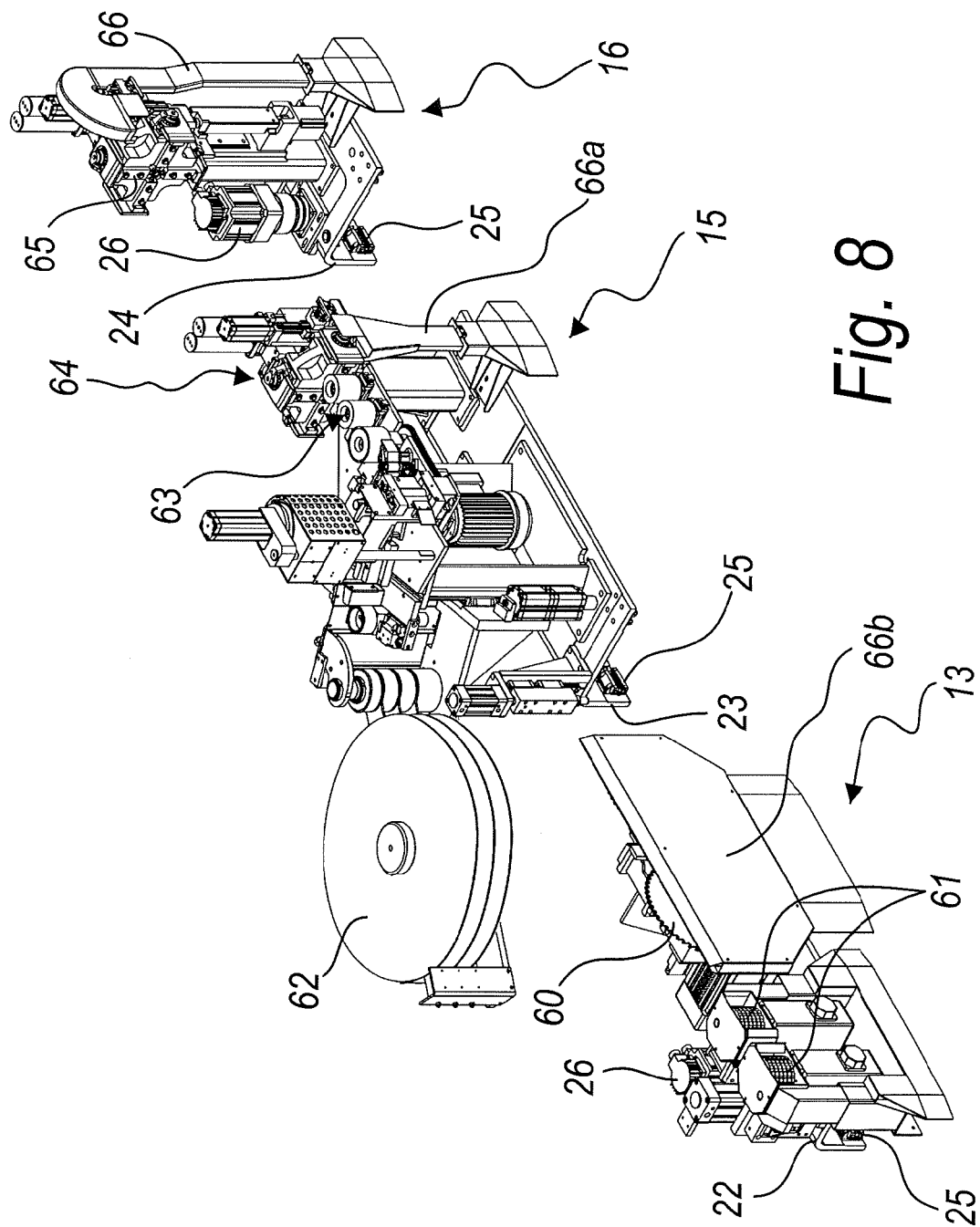


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 November 2010	Examiner Hamel, Pascal
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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