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(54) **A guide device of a panel in an edge-banding machine**

(57) The present invention relates to a guide device (4) of a panel (P) in an edge-banding machine, comprising a supporting bar (5) provided with a plurality of pressing rollers (7) pivoted thereon, said bar being mounted slidingly along a substantially vertical direction (Z) on at least one support (8) integral with the base (2) of the machine, said support (8) and said supporting bar (5) being provided with cam means adapted to control translation thereof along said substantially vertical direction (Z).

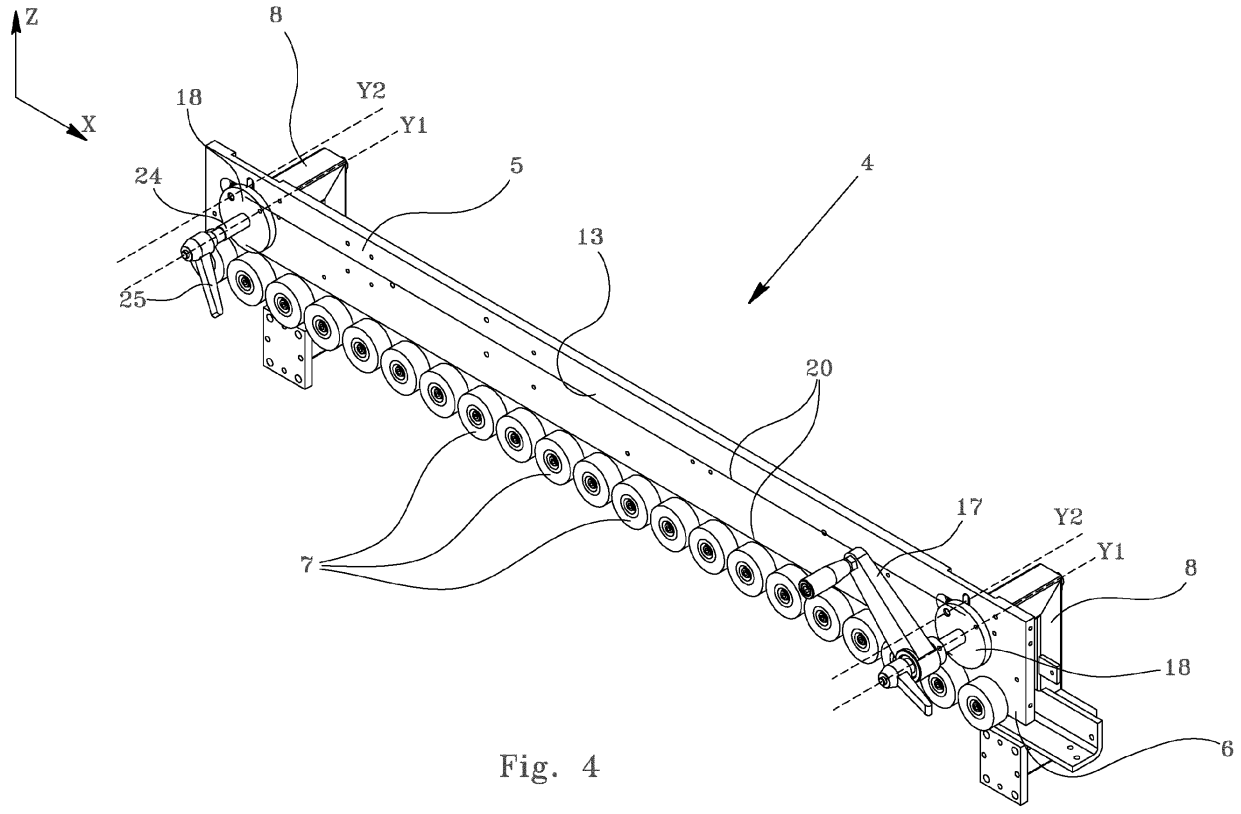

Fig. 4

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Description

[0001] The present invention relates to a guide device of a panel in an edge-banding machine and more in particular a device adapted to enable correct feed and driving of a panel in machines of this type.

[0002] The invention relates to the panel machining field and more in particular to edge-banding machines.

[0003] Edge-banding machines are machines configured to apply a sheet-like element, and more specifically a strip, of a given material along the lateral edge of a panel.

[0004] In general, this machining operation is carried out on panels made of wood, chipboard or panels made of other composite materials.

[0005] The edging elements applied are instead generally made of plastic material (PVC, ABS, etc.), aluminium, wood, wood fibre or the like.

[0006] The present invention relates in particular to edge-banding machines for square panels, i.e. wherein the edge to which the edging element is to be applied is substantially rectilinear.

[0007] These machines generally comprise a base provided with a driving belt adapted to move the panel through a plurality of consecutive stations, each having the purpose of carrying out a step of the edging (spreading glue on the edge of the panel, feeding the edging material, adhesion thereof to the edge of the panel, cutting the ends and the sides of the edge to size, any necessary smoothing and polishing operations, etc.).

[0008] Said belt is generally placed under the panel, which is maintained in contact therewith by a specific guide device, placed over it and which ensures sufficient pressure at all times, so that the panel can be driven correctly.

[0009] More in detail, in addition to enabling the feed of the panel, said guide device must exert sufficient pressure to prevent the forces exerted by the tools cause sliding, translation or rotation thereof with respect to the belt, in order to ensure maximum precision and finish of the machining operation.

[0010] Said guide device generally comprises a longitudinal bar arranged parallel to the driving belt and provided with a plurality of pressing rollers which, during feed of the panel, gradually contact the upper surface, exerting the necessary pressure thereon.

[0011] To be able to adjust said pressure, but also to be able to adapt the guide device for panels of different thicknesses, this is provided with a system for adjusting the distance of the rollers from the belt.

[0012] Figs. 1 a and 1 b illustrate a guide device provided with a system for adjusting the distance of the rollers according to the prior art.

[0013] With reference to said figures, the adjustment system comprises a pair of square thread screws 102, placed at the ends of the longitudinal bar 101, and pivoted by means of bearings (not visible) on supports 103 integral with the base of the machine (not illustrated in the figure).

[0014] On said longitudinal bar 101 there are fastened a pair of blocks 104, provided with threaded bushings or nuts (not visible) each engaged with said screws 102.

[0015] Through rotation of the screws 102 with respect to the threaded bushings it is possible to vary the height of the longitudinal bar 101 and therefore to position the rollers 107 at the required distance from the driving belt (not illustrated in the figure).

[0016] Rotation of the screws 102 is controlled by a crank 105 or the like, or in some cases through an electric motor. Motion is transmitted from the crank (or from the motor) to the screws 102 through bevel gears 106 or the like.

[0017] The guide system of the panel, as described and illustrated, is however subject to improvement; in fact, although said system to adjust the distance is functional, it is too costly with a view to progressively reducing the production costs of this type of machinery.

[0018] In particular, said high cost of the device is attributable both to the use of a large number of components and to their unit cost (above all in relation to the screws, the threaded bushings, the gears, and the various bearings and supporting bushings).

[0019] In this context, the object of the present invention is to propose a guide device of a panel in an edge-banding machine, which overcomes the problems of prior art.

[0020] In detail, an object of the invention is to propose a guide device of a panel in an edge-banding machine, which enables rapid and precise adjustment of the position of the pressing rollers but which is at the same time simple and inexpensive.

[0021] In even more detail, an object of the invention is to propose a guide device of a panel in an edge-banding machine, which comprises a smaller number of components with respect to prior art devices.

[0022] A further object of the present invention is to propose a guide device of a panel in an edge-banding machine, which enables the use of simpler and less expensive components with respect to those used in prior art devices.

[0023] The aforesaid objects are in substance achieved by a guide device of a panel in an edge-banding machine, in conformity with one or more of the appended claims.

[0024] In particular, these objects are achieved by a guide device of a panel in an edge-banding machine, comprising a supporting bar provided with a plurality of pressing rollers pivoted thereon, said bar being mounted slidingly along a substantially vertical direction on at least one support integral with the base of the machine, said support and said supporting bar being provided with cam means adapted to control translation thereof along said substantially vertical direction.

[0025] In more detail, said cam means comprise at least a first pin, pivoted on said support, sliding in a first substantially vertical slot obtained on the supporting bar,

at least a second pin sliding in a second slot arranged crosswise to the first slot and also obtained on said supporting bar, said first pin and said second pin being able to rotate integrally around a first axis coincident with the axis of said first pin, there being provided means adapted to rotate said first pin about said first axis.

[0026] By rotating the first pin, said second pin thus performs a rotation about the axis of the first pin and, being engaged with the second slot, during movement thereof drives the supporting bar along the substantially vertical direction.

[0027] The movement system thus configured is particularly simple and inexpensive, using a limited number of low cost components.

[0028] Other characteristics and advantages will become more readily apparent in the exemplary, and therefore non-limiting, description of a preferred but not exclusive embodiment of the invention, as illustrated in the appended figures, wherein:

- Fig. 2 is a perspective view of an edge-banding machine provided with a guide device of a panel according to the invention;
- Fig. 3 is a front view of the edge-banding machine of Fig. 2;
- Fig. 4 is a perspective view of the guide device of a panel according to the invention;
- Fig. 5 is a perspective view of a detail of the guide device of Fig. 4;
- Fig. 6 is a front view of a detail of the guide device of Fig. 4;
- Fig. 7 is a sectional view of the guide device of Fig. 4.

[0029] With reference to Figs. 2 and 3, the edge-banding machine, indicated as a whole with 1, comprises a base 2 on which there are installed a plurality of stations (not visible in the figure as covered by a casing C) provided with tools and accessories adapted to perform the various steps required for application of an edging element on a panel P.

[0030] In detail, said operations take place in succession during translation of said panel, along an axis X, from an inlet area I of the machine toward an outlet area O.

[0031] Movement of the panel is entrusted to a driving belt 3 in contact with the lower surface thereof.

[0032] As already mentioned, to ensure the correct friction force between the belt and the panel, the machine is provided with a guide device, indicated as a whole with 4, adapted to press said panel and maintain it in contact with the belt below.

[0033] According to the invention said guide device comprises a supporting bar 5 aligned with said belt 3 and placed above it.

[0034] In the embodiment illustrated said supporting bar 5 is composed of a plate, preferably made of metal, having a length similar to that of the belt 3 and arranged vertically.

[0035] In proximity of the lower edge 6 said bar is provided with a plurality of pressing rollers 7 pivoted thereon, and arranged so that at least a portion of their perimeter projects from said lower edge to be able to contact the panel P below.

[0036] To be able to adjust the distance of said pressing rollers from the belt 3, to ensure the correct pressure is exerted on the panel P according to its thickness, said bar 5 is mounted slidingly along a substantially vertical direction Z on at least one support 8 which can be connected integrally with the base 2 of the machine (Fig. 4).

[0037] Preferably, to ensure greater stability, said supporting bar 5 is mounted on a pair of supports 8 placed at the two lateral ends thereof.

[0038] In more detail, each support is provided with a slide 9 housed in a race 10 obtained on a rear face 11 of the bar which acts as a guide for translation of this bar along a substantially vertical direction Z (Fig. 5).

[0039] In even more detail, said slide 9 is composed of a plate with at least two rectilinear and parallel lateral edges 9a adapted to slide in contact with the same number of lateral edges 10a of the race 10.

[0040] A characteristic of the invention is that of providing the supporting bar 5 and the supports 8 with cam means adapted to control translation of said bar along the substantially vertical direction Z.

[0041] In more detail, with reference to Figs. 5, 6 and 7, said cam means comprise at least a first pin 12 pivoted on said support 8 and arranged with the axis Y1 thereof substantially perpendicular to the front face 13 of the supporting bar.

[0042] In practice, the pin 12 is able to rotate about its axis Y1 and is constrained to the translation in a plane X-Z.

[0043] According to the invention, said first pin 12 is housed slidingly in a first through slot 14, obtained on the supporting bar 5; preferably said slot is arranged parallel to the lateral edges 9a of the slide 9 and even more preferably it is arranged vertically.

[0044] Said cam means also comprise a second pin 15, also arranged with its axis Y2 substantially perpendicular to the front face 13 of the supporting bar.

[0045] Said second pin 15 is in turn housed in a second through slot 16, obtained on the supporting bar 5 and arranged crosswise to the first slot 14.

[0046] According to a preferred embodiment, said second slot 16 is arranged perpendicular to said first slot 14 and even more preferably is it arranged horizontally.

[0047] According to the invention said first pin 12 and said second pin 15 are connected in such as manner as to be able to rotate integrally around the axis Y1 of the first pin.

[0048] In this way the second pin 15 performs a rotation about the axis Y1 describing a circumference with radius E equal to the distance between the two axes Y1 and Y2 in a plane X-Z.

[0049] This ensures that during its movement in the plane X-Z the second pin 15, engaged with the second

slot 16, can drive the supporting bar 5 along the only direction of movement possible, i.e. along the axis Z.

[0050] By rotating the first pin 12 it is therefore possible to control lifting or lowering of the supporting bar 5 and thus adjust the distance of the pressing rollers 7 from the driving belt 3.

[0051] The length L1 of the first slot 14 determines the maximum movement that the supporting bar can carry out along the vertical axis Z.

[0052] The distance E between the axes Y1 and Y2 of the two pins instead determines the ratio between the angle of rotation of the first pin and the linear distance travelled by the supporting bar along the axis Z.

[0053] The greater this distance is, the greater the movement of the bar with the same angle of rotation of the first pin 12 will be.

[0054] This distance can be varied at will, depending on the need to obtain a device with a movement that is more rapid, or more precise and sensitive.

[0055] In the embodiment illustrated, for reasons linked to optimization of the machining operation, the first and the second slot penetrate one another; this has no implication in the operation of the device as the two slots can also be separated.

[0056] Preferably the second pin 15 is provided with a bearing 21 to reduce the friction between it and the edges 22 of the second slot 16, thus reducing the effort required for movement of the supporting bar 5.

[0057] In fact, according to a preferred embodiment, to control lifting or lowering of the supporting bar 5 there is provided a lever 17, which can be operated manually, fastened integrally with said first pin 12 to rotate it.

[0058] Advantageously, the device is provided with a graduated index (not illustrated) that measures the movement of the supporting bar along the direction Z; in more detail, said index, when reset, returns the values of thickness of panel that can be machined to a given height of the bar.

[0059] The index thus configured is set in such a manner as to enable a certain degree of interference between the pressing rollers and the surface of the panel, to ensure the correct pressure thereon at all times, preventing manual errors by the operator.

[0060] Alternatively, according to the invention it is possible to use electric, pneumatic or similar motors, also connected directly or indirectly to said first pin 12.

[0061] The connection between the first pin 12 and the second pin 15 is obtained through a non-deformable rigid element in such a manner that the distance E remains unchanged and that this can transmit the necessary torque for movement of the supporting bar 5.

[0062] In the embodiment illustrated the first and the second pin are fastened on a plate 18.

[0063] To enable simultaneous and synchronous rotation of the two first pins 12 of each support, connection means 19 are provided between them, and more in particular between the two plates 18.

[0064] In this way, movement means (the lever 17 or other motor means) can be present only on one of the two supports 8 or, if provided on both the supports, they can be operated singularly to enable in any case balanced translation of the supporting bar.

[0065] According to a preferred embodiment, said plates 18 are composed of two pinions and said connection means comprise a chain wound around it adapted to transmit the rotational motion from the manually activated pinion to the driven pinion.

[0066] Alternatively, said connection means 19 comprise a pair of tie rods 20 fastened at the ends on homologous points of a diameter of each plate 18.

[0067] In this way, by rotating one of the two plates 18, through the lever 17 (or the motor means), one of the two tie rods, the one subject to traction, also enables the opposite plate to be driven, rotating it by the same angle. By rotating the plate 18 in the opposite direction, rotation of the opposite plate will take place through the other tie rod now subjected to traction.

[0068] In yet another alternative, it is possible to use only one rigid connection element, such as a rod or the like, capable both of driving and of pushing the opposite plate.

[0069] Preferably, to maintain the supporting bar 5 in place after having adjusted the distance from the belt 3, the guide device is provided with a blocking system 23 that acts on the plates 18 preventing rotation of the first pin 12.

[0070] In detail, said blocking system comprises a bushing 24, inserted on a portion of the first pin 12 projecting from the plate 18, and a lever 25 which can be screwed onto a threaded end portion of said first pin.

[0071] Screwing said lever presses the bushing against the plate 18, which in turn is pressed on the front surface 13 of the supporting bar.

[0072] The friction between the plate 18 and the bar 5 is sufficient to prevent the force exerted by the pressing rollers on the panel from causing it to lift, nullifying the initial adjustment.

[0073] With the present invention it is possible to produce a simple guide device of a panel that enables rapid and precise adjustment of the distance of the pressing rollers from the conveyor belt.

[0074] The device thus described provides for the use of a limited number of components, which are relatively inexpensive, reliable and which do not require particular maintenance.

[0075] Several changes and variations can be made to the present invention as described and illustrated, all falling within the scope of the inventive concept; moreover, all details can be replaced with technically equivalent elements.

Claims

1. A guide device (4) of a panel (P) in an edge-banding machine, comprising a supporting bar (5) provided

with a plurality of pressing rollers (7) pivoted thereon, said bar being mounted slidingly along a substantially vertical direction (Z) on at least one support (8) integral with the base (2) of the machine, said support (8) and said supporting bar (5) being provided with cam means adapted to control translation thereof along said substantially vertical direction (Z).

2. The guide device according to claim 1, **characterized in that** said cam means comprise at least a first pin (12), pivoted on said support (8), sliding in a first substantially vertical slot (14) obtained on the supporting bar (5), at least a second pin (15) sliding in a second slot (16) arranged crosswise to the first slot and also obtained on said supporting bar, said first pin (12) and said second pin (15) being able to rotate integrally around a first axis (Y1) coincident with the axis of said first pin (12), there being provided means adapted to rotate said first pin about said first axis (Y1).

3. The guide device according to claim 2, **characterized in that** said second pin (12) is provided with a bearing (21) placed in said second slot (16).

4. The guide device according to claim 2 or 3, **characterized in that** said support is provided with a slide (9) sliding in a race (10) obtained on the supporting bar (5), said slide acting as a guide for translation of said bar along said substantially vertical direction (Z).

5. The guide device according to any one of the preceding claims, **characterized in that** it is provided with at least a pair of supports (8) placed at the lateral ends of said supporting bar, each of said supports being provided with cam means adapted to control translation of the bar along said substantially vertical direction.

6. The guide device according to any one of claims 2 to 5, **characterized in that** the first pin (12) and the second pin (15) are fastened on a rigid and non-deformable plate (18), in such a manner that the distance (E) between their axes remains unchanged.

7. The guide device according to claims 5 and 6, **characterized in that** it is provided with connection means (19) between the plates (18) at each support (8), said means allowing synchronous rotation of said plates (18).

8. The guide device according to claim 7, **characterized in that** said connection means comprise a pair of tie rods (20) fastened at their ends on homologous points of a diameter of each plate (18).

9. The guide device according to any one of claims 2 to 8, **characterized in that** it is provided with a blocking system (23) which prevents rotation of the first pin (12).

10. The guide device according to claims 7 and 9, **characterized in that** said blocking system comprises a bushing (24), inserted on a portion of the first pin (12) projecting from the plate (18), and a lever (25) which can be screwed onto a threaded end portion of said first pin (12), said lever pressing said bushing against the plate (18) during screwing thereof.

PRIOR ART

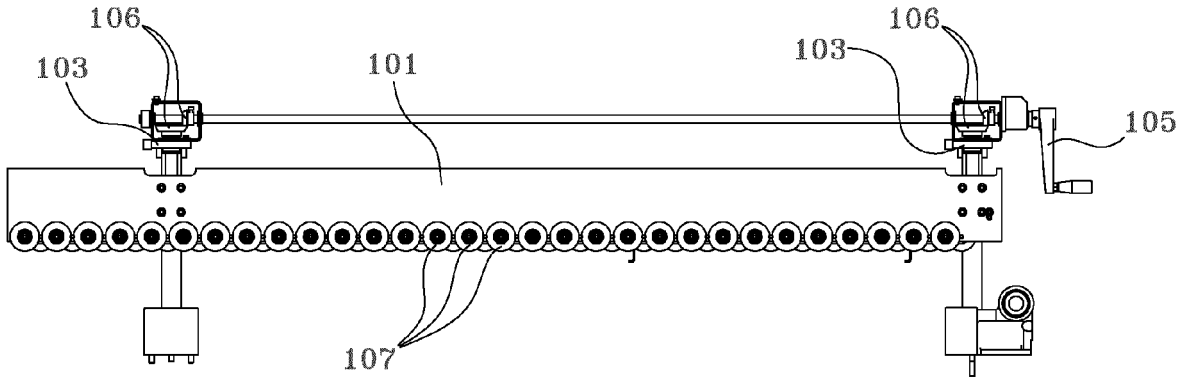
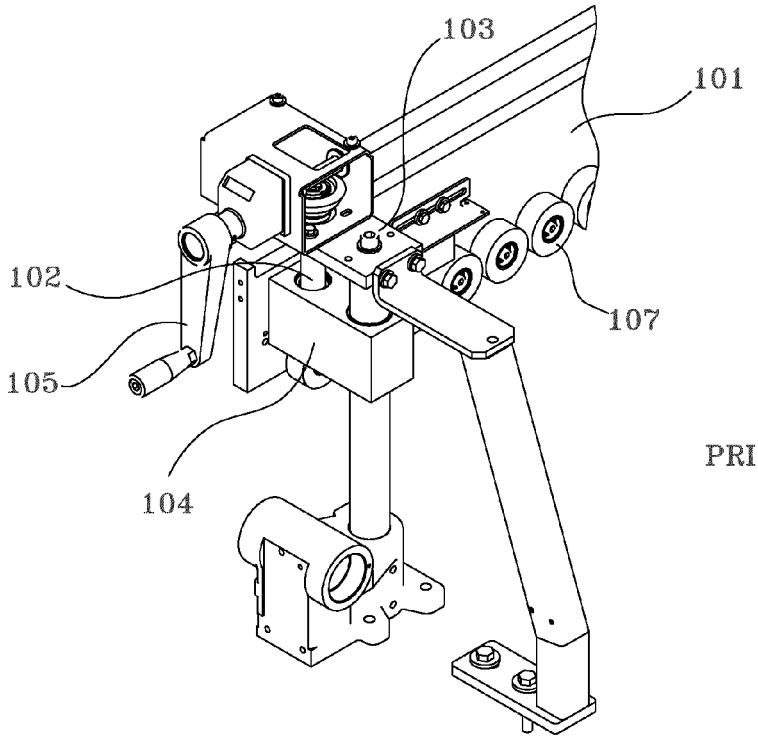


Fig. 1a



PRIOR ART

Fig. 1b

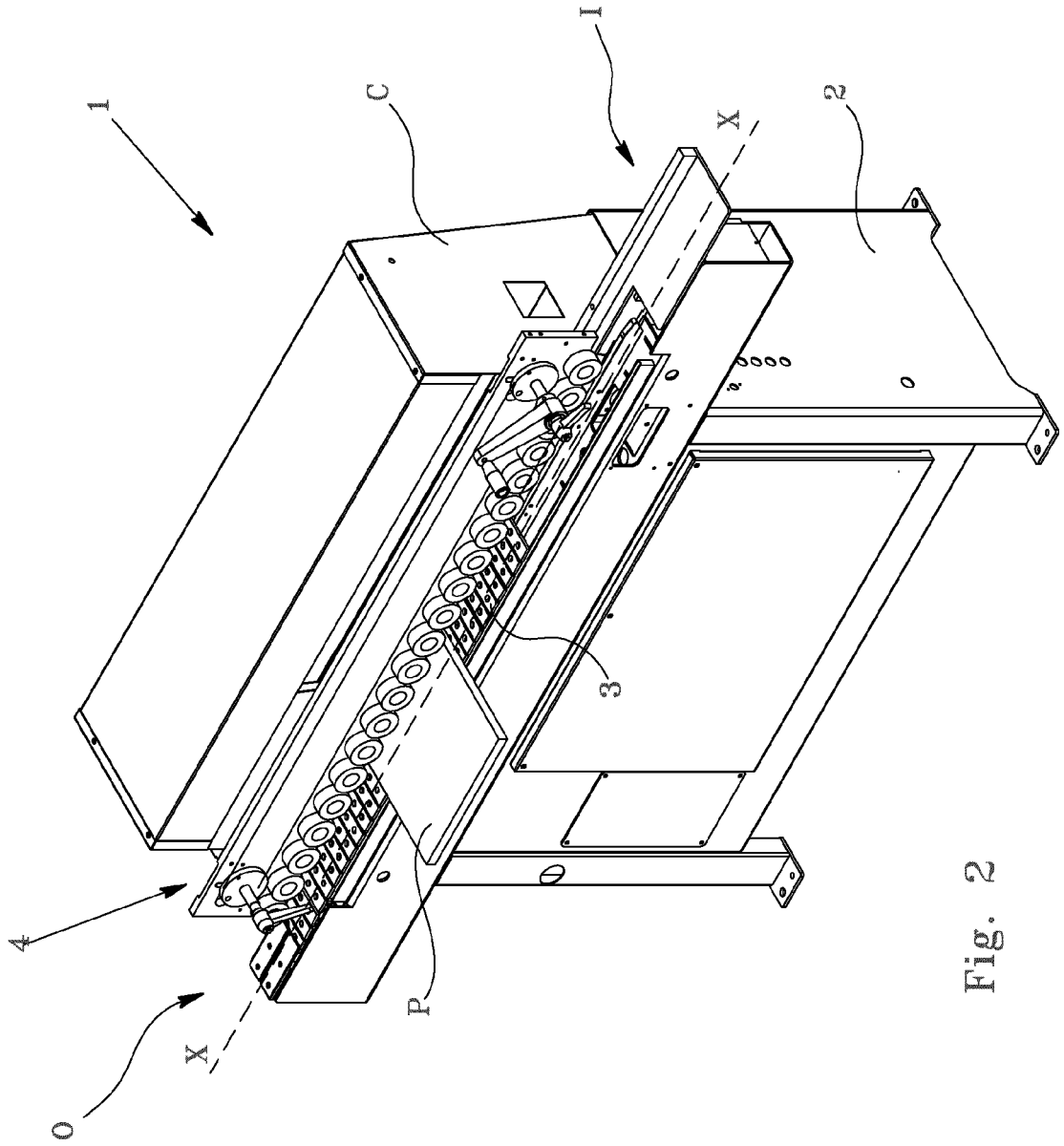


Fig. 2

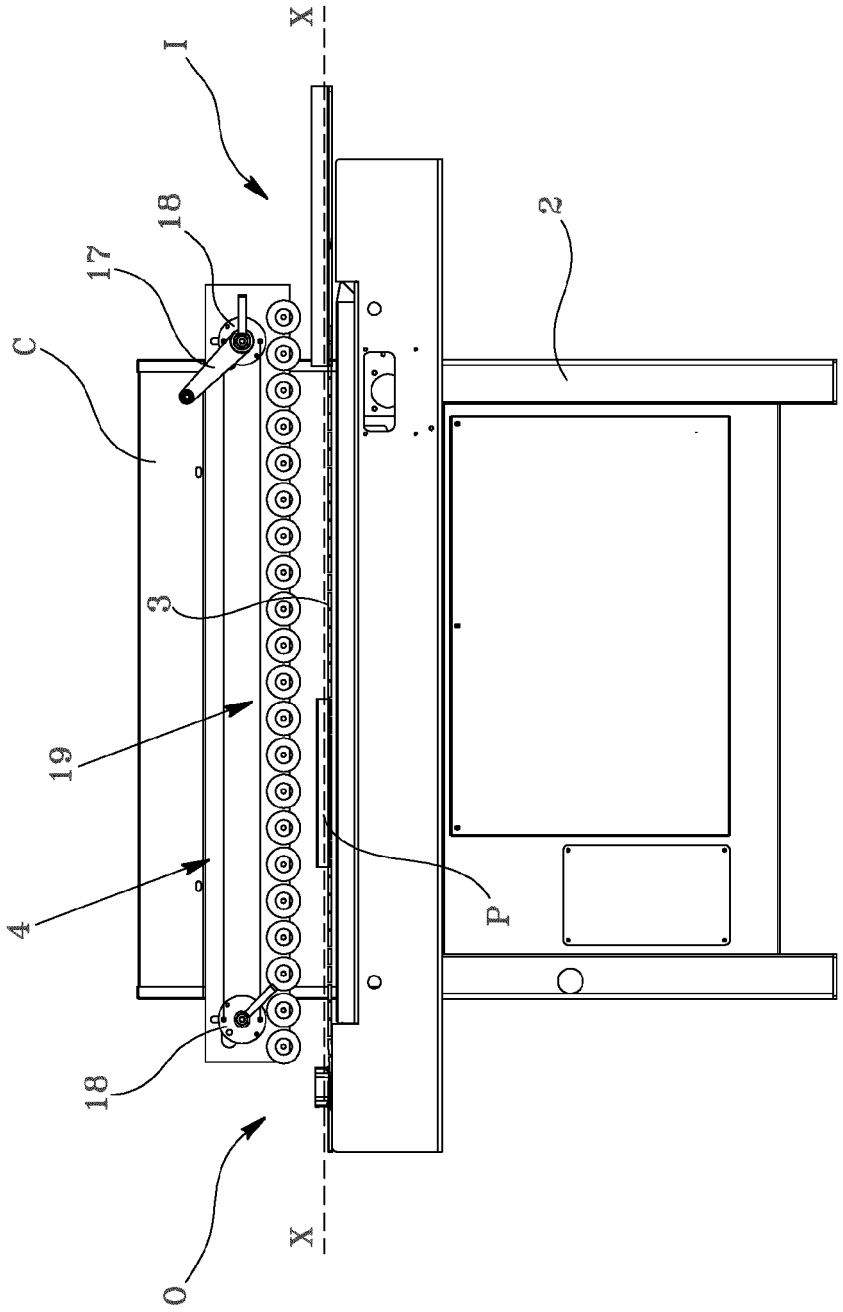


Fig. 3

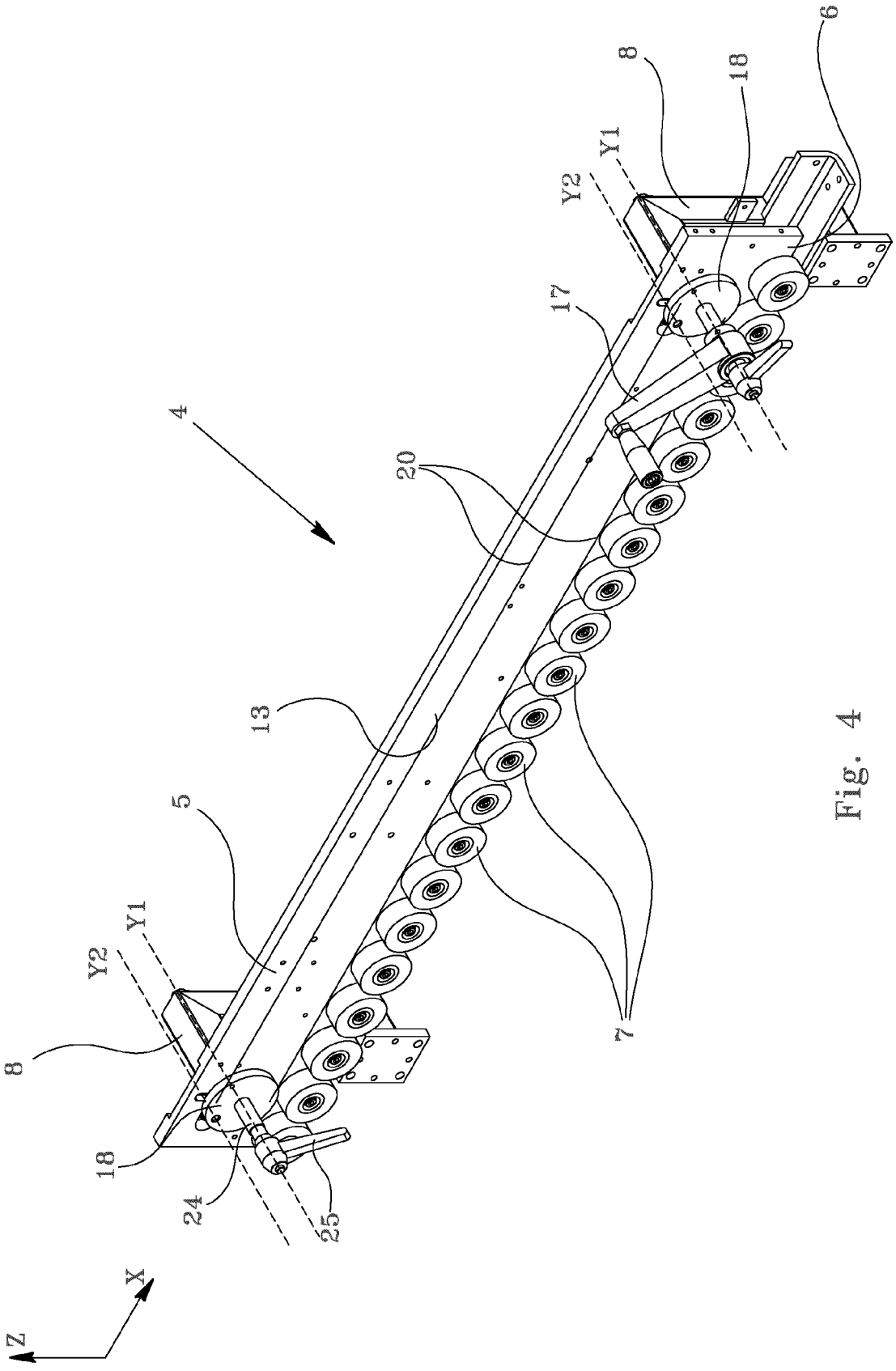


Fig. 4

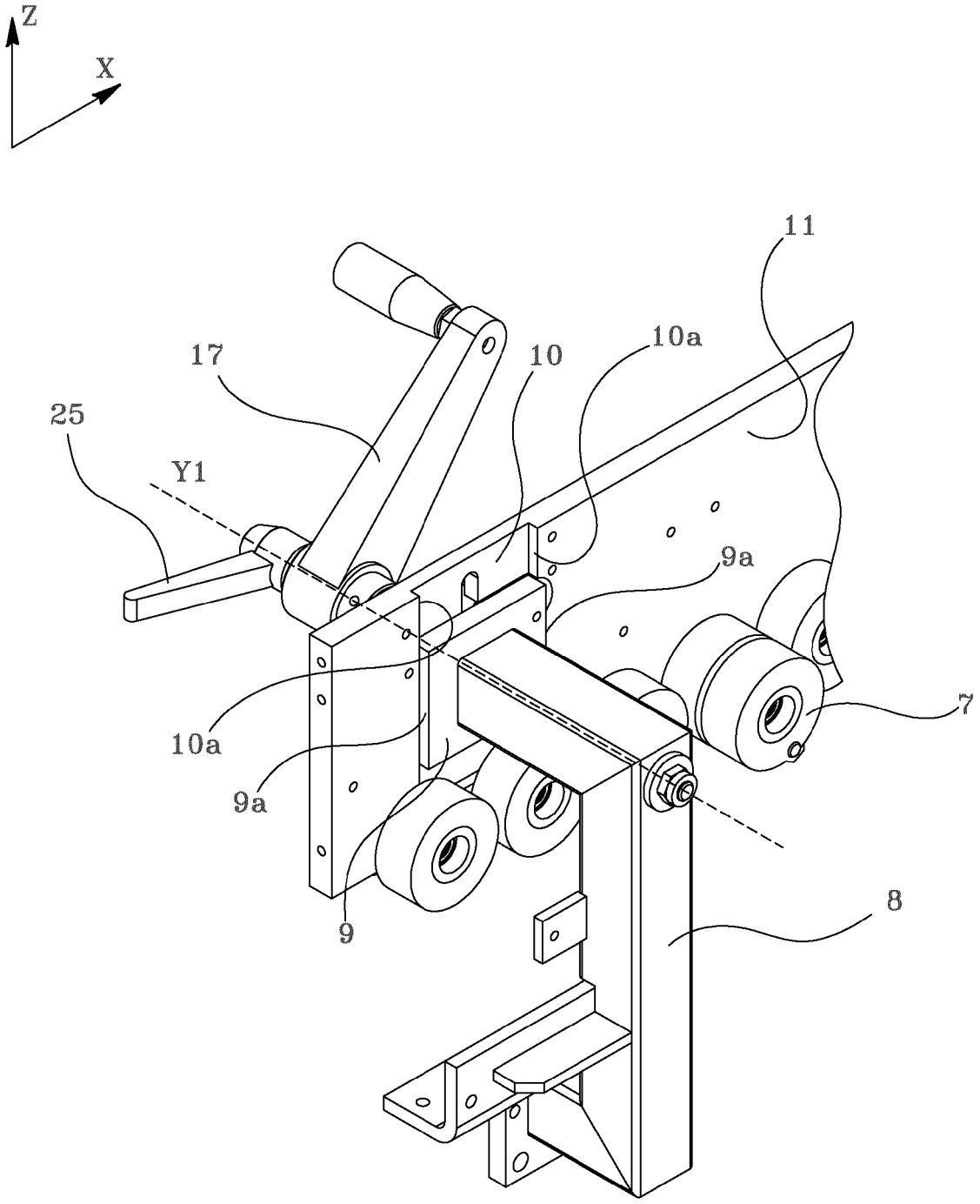


Fig. 5

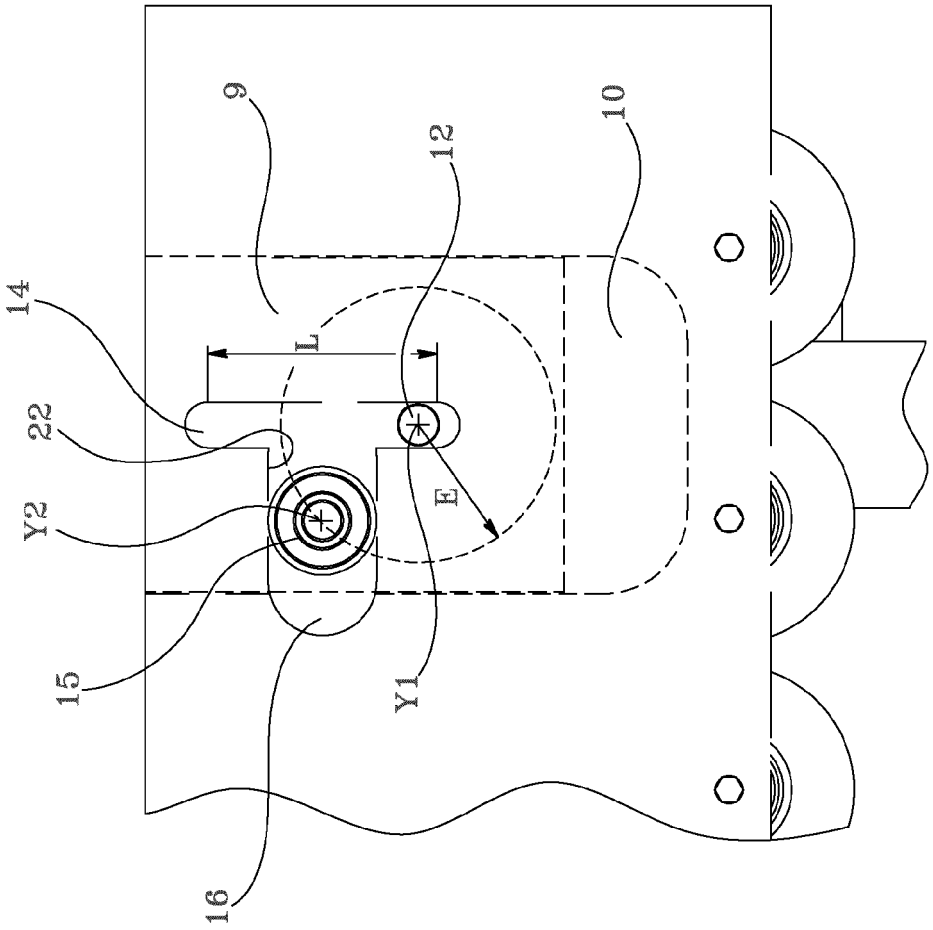


Fig. 6

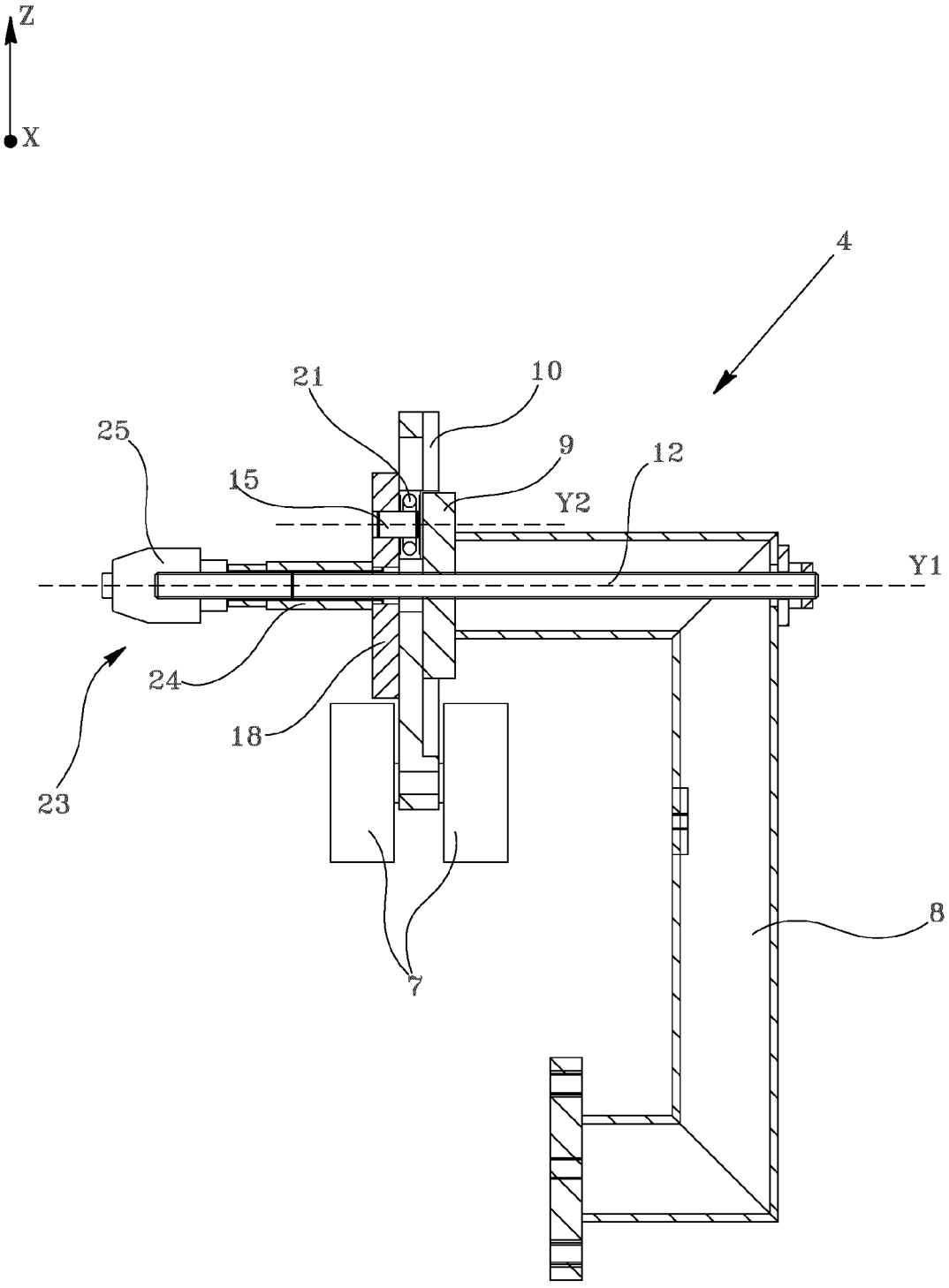


Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 2079

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TECHNICAL FIELDS SEARCHED (IPC)

B27D
B65G
B27F
B27M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 February 2013	Jaeger, Hein

CATEGORY OF CITED DOCUMENTS

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