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(54) **Device for feeding an adge in an edge banding machine**

(57) The present invention relates to a device for feeding an edge (B) in an edge banding machine comprising a support (3) on which there is mounted a first roller (4) positioned at a first face (B1) of said edge (B), said roller being mounted on a shaft (6) free to rotate on a first axis (Z1) with respect to said support (3), a free wheel (8) fitted on one end (6a) of said shaft (6), a gear (9) fitted on said free wheel (8) and a rack (10) meshed with said gear (9), said rack being connected to actuator means (11) adapted to move a cutting device (2) of said edge (B).

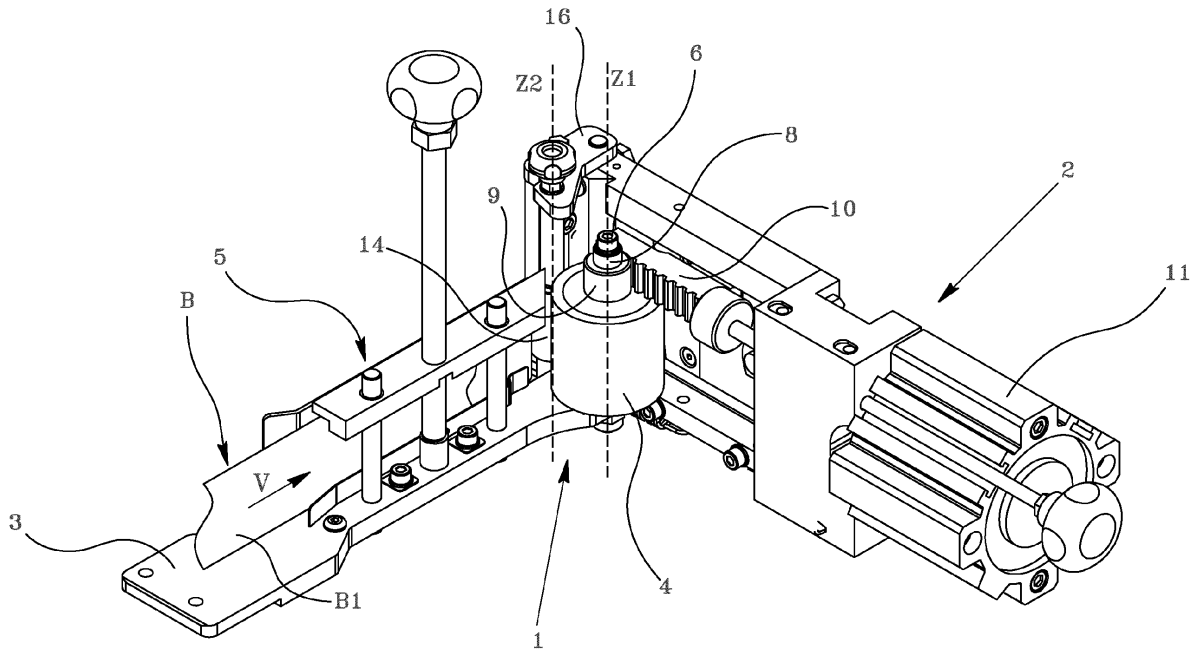

Fig. 3

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Description

[0001] The present invention relates to a device for feeding an edge in an edge banding machine. More in detail, the invention relates to a device for feeding a strip of a given material to be applied along the cut perimeter of a panel.

[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 (or cut perimeter) of a panel, for both aesthetic and functional reasons.

[0004] In general, but not exclusively, this operation is carried out on "faced" composite panels, having a wood core (made of chipboard or other materials) and outer surfaces covered with plies of materials differing from those of the core (such as melamine, prestigious wood veneer, plastic materials, etc...).

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

[0006] These machines generally comprise a base provided with a feed belt adapted to move a panel through a plurality of consecutive stations, each having the purpose of carrying out on and or more steps 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 of the edge - front and rear - to size, trimming the excess edge on the faced surfaces, any smoothing and polishing operations necessary, etc.).

[0007] In detail, the present invention relates to the device adapted to feed the edge-banding material during advance of the panel so as to enable contact and adhesion between them.

[0008] Figs. 1a to 1f illustrate a station of an edge-banding machine during the step of applying an edge B to a lateral face F of a panel.

[0009] In detail, the figures illustrate a feeding device 100 that conveys a panel P toward a station in which an adhesive is spread on a lateral face of the panel, the edge is applied to said face and the edge is cut to size.

[0010] With reference to Fig. 1a there is illustrated the panel P that advances with the lateral face F in contact with a first roller 101 adapted to spread thereon a given quantity of adhesive required for gluing of the edge B.

[0011] In Fig. 1b the panel P advances and couples with the edge B, suitably oriented so as to interfere with the trajectory of the panel and come into contact therewith and with one or more pressure rollers 102. The edge B, supplied in a roll or the like, is gradually unrolled with a speed equal to the advancing speed of the panel.

[0012] In Fig. 1c the lateral face F of the panel remains in contact with said pressure rollers 102, which during advance of the panel press the edge B against said face to enable perfect adhesion.

[0013] In Fig. 1d the edge B has been applied along the whole of the length of the lateral face F.

[0014] In Fig. 1e a cutting device 104, provided with a blade 105 translating perpendicular to the unwinding direction of the edge B, cuts said edge to size to enable the panel to continue toward subsequent stations.

[0015] In Fig. 1f, a feeding device 106 returns the cut end of the edge B to the initial position (as shown in Figs. 1a and 1b), i.e. along the trajectory of the subsequent panel and at the first pressure roller 102.

[0016] Said feeding device according to the prior art comprises a first roller 107 mechanically connected to other moving members, such as a conveyor device 100, to be made to rotate continuously.

[0017] Said roller 107 is substantially positioned adjacent to a lateral face B1 of the edge B.

[0018] The device also comprises a second counter pressure roller 108 connected to an actuator 109 that moves it from an operating position in which it presses the edge B against the first roller 107 to a neutral position in which it is detached from the opposite lateral face B2.

[0019] During application of the edge, the feeding device 106 remains inactive, i.e. the second counter pressure roller 108 is maintained at a distance from the first roller 107.

[0020] When application of the edge has terminated and the cutting device 104 has cut the portion to the predetermined length, the actuator 109 pushes the second counter pressure roller 108 against the first continuously rotating roller 107.

[0021] The edge B interposed between these two rollers is then fed by friction and moved with a speed equal to the peripheral speed of said rollers. The time for which the two rollers are maintained in contact and, therefore, advancing of the end of the edge B toward the trajectory of the panel, is calculated as a function of this speed.

[0022] However, this feeding device according to the prior art has some problems.

[0023] In fact, with this system the length of the segment by which the end of the edge B is made to advance is controlled only as a function of the contact time between the two opposed rollers 107 and 108.

[0024] The actuator 109 is generally a pneumatic actuator, by means of which precise control of the contact time is difficult, causing imprecision in cutting of the edge to size.

[0025] In particular, if the edge is made to advance by a segment that is too short, there is the risk that it will be unable to come into contact with the front part of the panel to be fed together with it.

[0026] On the contrary, if it is made to advance by a segment that is too long, the excess portion projecting from the panel could cause problems during the subsequent finishing operations.

[0027] The system thus configured also requires a dedicated actuator control system (actuator, sensors, PLC) with an increase in the costs of the machine.

[0028] Figs. 2a to 2f represent another feeding device according to the prior art during the steps to apply the

edge to the panel

[0029] Said device comprises an actuator 201 positioned parallel to the edge B in the area in which it is cut by a cutting device 202 similar to the one described previously.

[0030] On the rod of said actuator there is mounted a gripper 203, which surrounds the lateral faces B1 and B2 of the edge B.

[0031] In detail, said gripper 203 is configured so as to allow the edge B to run freely therein when it is unwound from its roll during application to the lateral face of the panel P.

[0032] When application of the edge has terminated and the cutting device 202 has cut the portion to the predetermined length, the actuator 201 extends (or in other cases retracts) the rod which, by means of the gripper 203, feeds the cut end of the edge B to the point in which it is positioned along the trajectory of the subsequent panel (Fig. 2f) at the first pressure roller.

[0033] Also this device thus configured has problems and limitations.

[0034] In fact, the actuator 201 is a component dedicated only to this edge feeding operation and, just as the actuator 109, requires an independent control system with consequent increase in the costs and constructional complexity of the machine.

[0035] In this context, the object of the present invention is to propose a device for feeding an edge in an edge-banding machine, which overcomes the problems of prior art.

[0036] In particular, the object of the invention is to propose a device for feeding an edge in an edge-banding machine, which enables the constructional complexity and the cost of prior art machines to be reduced.

[0037] In detail, an object of the invention is to propose a device for feeding an edge in an edge-banding machine, characterized by a smaller number of components, which are simple to produce.

[0038] A further object of the present invention is that of providing a device for feeding an edge in an edge-banding machine, which enables the control system, the drive and some mechanical components to be shared with other devices present on the machine.

[0039] The aforesaid objects are in substance achieved by a device for feeding an edge in an edge banding machine comprising a support on which there is mounted a first roller positioned at a first face of said edge, said roller being mounted on a shaft free to rotate on a first axis with respect to said support, a free wheel fitted on one end of said shaft, a gear fitted on said free wheel and a rack meshed with said gear, said rack being connected to actuator means adapted to move a cutting device of said edge.

[0040] In practice, according to the invention there is provided a single drive and a single actuator that operates the cutting device and the feeding device.

[0041] This enables the number of components of the machine to be reduced and control of the device to be simplified. The cutting device and the feeding device are in fact connected mechanically and consequently already synchronized to each perform its own operation at the right moment.

[0042] Further characteristics and advantages will be more apparent from the indicative, and therefore non-limiting, description of an example of a preferred but not exclusive embodiment of the invention, as shown in the accompanying figures wherein:

- Fig. 3 is a perspective view of the feeding device according to the invention;
- Fig. 4 is a top view of the feeding device of Fig. 3;
- Fig. 5 is a schematized sectional view of a detail of the feeding device of Fig. 3;
- Figs. 6a to 6d are the same number of schematic top views showing the device during some operating steps.

[0043] With reference to Figs. 3 and 4 there is shown a portion of an edge-banding machine, and in particular of a feeding device, indicated as a whole with 1, and of a cutting device, indicated as a whole with 2.

[0044] Said feeding device comprises a support 3 mounted integral on the edge-banding machine provided with guide means 5 of known type adapted to guide an edge B, unwound along a direction V from a roll or the like (not shown in the figure), toward a panel P.

[0045] On said support 3 there is hinged a first roller 4 positioned at a first face B1 of the edge B to be applied to a lateral face F of the panel P. In practice, said roller 4 is arranged with the lateral surface 4a substantially in contact with said face B1 of the edge B.

[0046] More in detail, said roller 4 is mounted integral on a shaft 6, in turn hinged at least at one end on the support 3 and is free to rotate with respect thereto on a first axis Z1. According to a preferred embodiment, said shaft 6 is hinged on the support 3 at the lower end 6b by means of a bearing 7 or the like (Fig. 5).

[0047] At the opposite end 6a of said shaft there is fitted a free wheel, indicated as a whole with 8. In detail, the inner ring 8a is coupled integral with said end 6a of the shaft while the outer ring 8b can rotate freely with respect to the inner ring in a first direction of rotation S1, while it rotates integral therewith in a second direction of rotation S2 (Fig. 4).

[0048] On the outer ring 8b there is fitted a gear or a toothed wheel 9 rotating integral therewith.

[0049] In practice, said free wheel 8 is interposed between the gear 9 and the roller 4, the shaft 6 being integral with said roller.

[0050] Said gear 9 is in turn meshed with a rack 10 that enables rotation thereof following a rectilinear movement along an axis X.

[0051] More in particular, when the rack 10 translates along the axis X in a direction X2 it operates the gear 9 which, rotating in the direction of rotation S1, rotates integral with the outer ring 8b of the free wheel but freely

with respect to the inner ring 8a, i.e. with respect to the shaft 6 and to the roller 4.

[0052] Instead, when the rack translates in an opposite direction X1 the gear 9 rotates in the direction of rotation S2, also rotating the inner ring 8a of the free wheel 8, thus the shaft 6 and consequently also the first roller 4.

[0053] As it is in contact with the surface B1 of the edge B, the roller 4 feeds said edge, making it advance by a distance equal to the outer radius of the roller multiplied by the angle of rotation travelled.

[0054] In this way, when the rack is in the retracted position, the free wheel 8 enables, i.e. does not obstruct, feed of the edge.

[0055] A characteristic of the invention is that of providing said rack connected integral with the cutting device 2 and more in detail with its actuator 11 adjacent to the feeding device 1.

[0056] In detail, said cutting device 2 is positioned subsequent to the feeding device with respect to the unwinding direction V of the edge B.

[0057] Said cutting device 2 comprises said actuator 11 on whose rod 12 there is mounted a blade 13 to cut the edge B (once application to a panel P has terminated).

[0058] Operation of the feeding device is illustrated with reference to Figs. 6a to 6d.

[0059] In Fig. 6a there is illustrated an edge-banding machine in which the edge B is applied along almost the whole of the length of the lateral face F of a panel P.

[0060] In Fig. 6b the actuator 11 of the cutting device 2 is operated to translate the blade 13 along the direction X2 so as to intercept the face B1 of the edge B, cutting it to size.

[0061] During this step, the rack 10 rotates the gear 9 in the direction of rotation S1, freely with respect to the shaft 6 and to the roller 4, which are rotating in the direction S2.

[0062] In Fig. 6c, after the step to cut the edge B has terminated, the actuator 11 is operated in the opposite direction X1 to return the blade 13 to the initial position.

[0063] During the return movement, the rack 10 rotates the gear 9, which now rotating in the direction of rotation S2, also rotates the inner ring 8a of the free wheel and therefore the shaft 6 and the roller 4.

[0064] As described previously, the edge B, which is in contact with the surface of the roller 4, is fed along the unwinding direction V.

[0065] In Fig. 6d, the blade 1 is completely retracted and the edge B is fed to the operating position in which the cut end thereof interferes with the trajectory of the panel P where, closed between the panel and a first pressure roller, it will be fed upon arrival of the same panel.

[0066] In this way, feeding and repositioning of the edge B takes place automatically, following operation of the cutting device 2, each time application to a panel has terminated.

[0067] This enables a single actuator 11 to be used to simultaneously operate both the cutting device and the feeding device

[0068] In practice, due to the present invention it is possible to produce an integrated edge feeding and cutting device, which enables both the number of components to be reduced and control of the two devices to be simplified, with a consequent reduction in the production cost of the machine.

[0069] To promote friction between the face B1 of the edge B and the surface of the roller 4, this latter is preferably coated with a layer of rubber material or the like.

[0070] To ensure improved feeding of the edge B by the roller 4, the device is preferably provided with a second counter pressure roller 14, positioned at the face B2 of the edge B and aligned with the first roller 4.

[0071] Said second roller 14 is mounted idle on the support 3 and acts as a support to enable the first roller 4 to exert on the surface B1 a given pressure to create the friction required for feeding of the edge B.

[0072] For this purpose, said second counter pressure roller is mounted with its axis Z2 movable with respect to the axis Z1 and is subject to the action of elastic means 15 adapted to maintain the edge B pressed between the first roller 4 and the second roller 14.

[0073] According to a preferred embodiment, said second roller is mounted on a pair of arms 16 in turn hinged to the support 3.

[0074] A spring 15, or the like, is connected at one end to one of said arms and at the opposite end to the support 3, or to another component integral therewith, such as the actuator 11, and is preloaded so as to maintain the rollers 4 and 14 in contact with the edge B with a given force.

[0075] Preferably, according to the invention, the feeding device is also provided with a system to adjust the end of stroke position of the rod 12 of the actuator 11 which enables adjustment of the length of advance of the edge B and therefore correct positioning of the edge on the trajectory of the panel.

[0076] The device is also provided with a system to adjust the speed of the rod 12 of the actuator 11 in its travel along the axis X, which enables advance of the edge B to be synchronized with advance of the panel P, so as to obtain optimum adhesion of the edge B to the panel P in the first gluing segment (a few millimetres).

[0077] Due to the present invention it is thus possible to produce a device for feeding an edge that enables the number of components of the edge-banding machine and consequently the constructional complexity to be reduced.

[0078] In particular, using a single actuator for the feeding system and for the cutting system, it is possible also to reduce the various sensors required for its control and to simplify the PLC or similar control system.

[0079] Moreover, the mechanical connection between rack 10 and gear 9 always ensures a given and precise edge feeding, less subject to faults or malfunctioning.

[0080] Several changes and variations can be made to the present invention as described and illustrated, all falling within the scope of the inventive concept; moreo-

ver, all details can be replaced with technically equivalent elements.

Claims

1. Device for feeding an edge (B) in an edge banding machine comprising a support (3) on which there is mounted a first roller (4) positioned at a first face (B1) of said edge (B), said roller being mounted on a shaft (6) free to rotate on a first axis (Z1) with respect to said support (3), a free wheel (8) fitted on one end (6a) of said shaft (6), a gear (9) fitted on said free wheel (8) and a rack (10) meshed with said gear (9), said rack being connected to actuator means (11) adapted to move a cutting device (2) of said edge (B).

2. Device for feeding an edge, according to claim 1, **characterized in that** said free wheel (8) comprises an inner ring (8a) integral with the shaft (6) and an outer ring (8b) integral with the gear (9).

3. Device for feeding an edge, according to claim 1 or 2, **characterized in that** it is provided with a second roller (14) positioned at a second face (B2) of the edge (B) and aligned with said first roller (4).

4. Device for feeding an edge, according to claim 3, **characterized in that** said second roller is mounted on the support (3) with its axis (Z2) movable with respect to the first axis (Z1), there being provided elastic means (15) adapted to maintain said second roller (14) pressed against the surface (B2) of the edge (B).

5. Device for feeding an edge, according to claim 3, **characterized in that** said second roller (14) is mounted on at least one arm (16) hinged on the support (3).

6. Device for feeding an edge according to claim 5, **characterized in that** said elastic means comprise a spring (15) connected at one end to said arm and at the opposite end to said support (3).

7. Device for feeding an edge, according to any one of the preceding claims, **characterized in that** the surface of at least said first roller (4) is coated with a rubber material or the like.

8. Device for feeding an edge, according to any one of the preceding claims, **characterized in that** it is provided with a system to adjust the end of travel position of said actuator means (11) which enables adjustment of the feed length of the edge (B).

9. Device for feeding an edge, according to any one of the preceding claims, **characterized in that** it is provided with a system to adjust the speed of said actuator means (11) which enables synchronization of the feed of the edge (B) with the feed of the panel (P).

10. Integrated device for feeding and cutting an edge in an edge banding machine comprising at least one actuator (11) on which there is mounted a blade (13) and a feeding device according to one or claims 1 to 8.

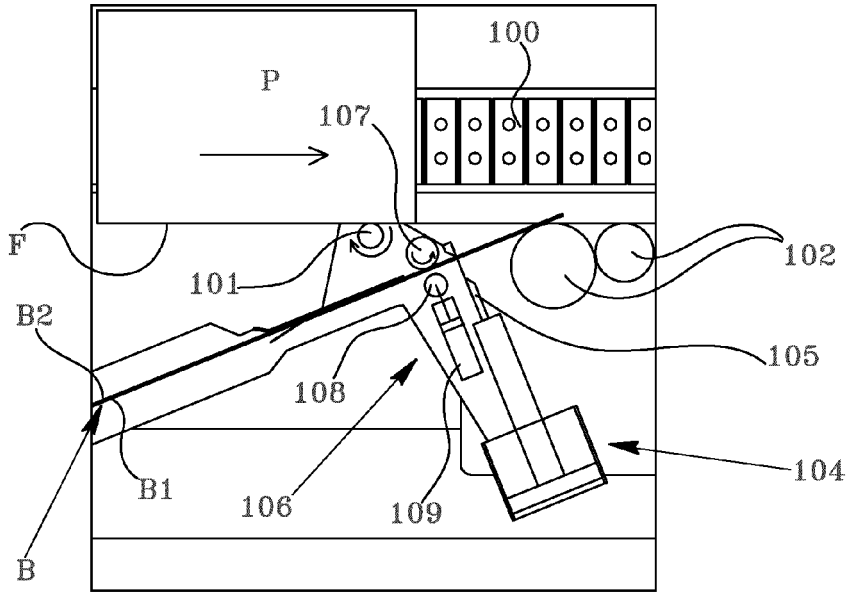

Fig. 1a

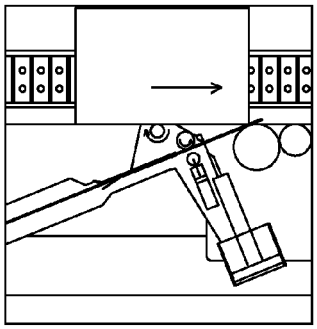

Fig. 1b

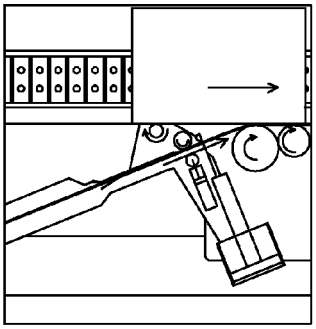

Fig. 1c

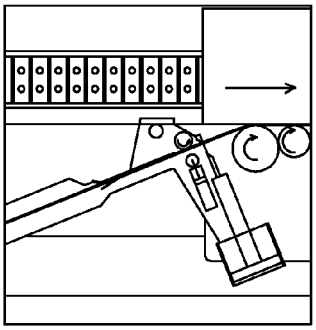

Fig. 1d

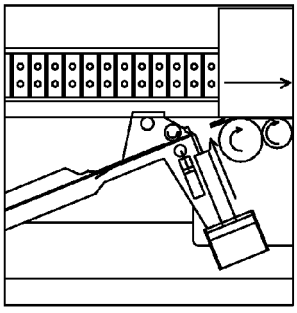

Fig. 1e

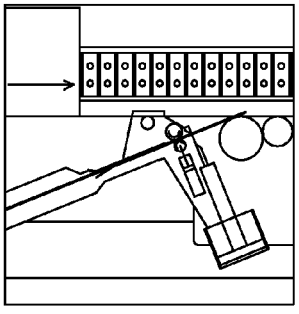

Fig. 1f

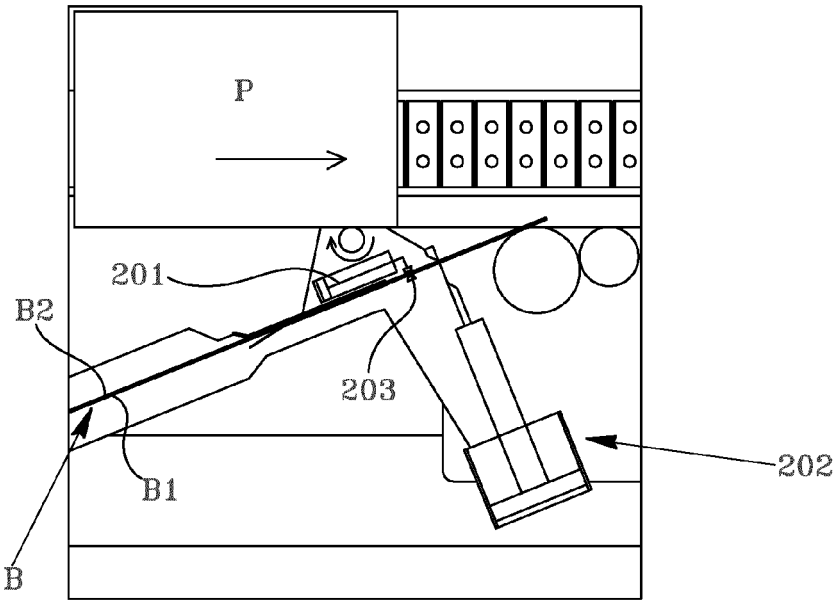

Fig. 2a

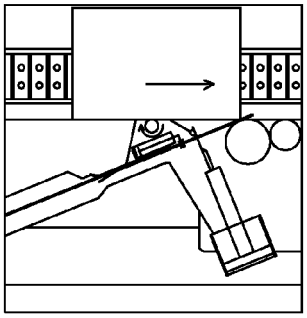

Fig. 2b

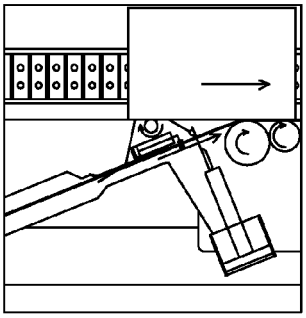

Fig. 2c

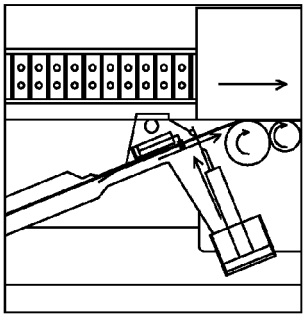

Fig. 2d

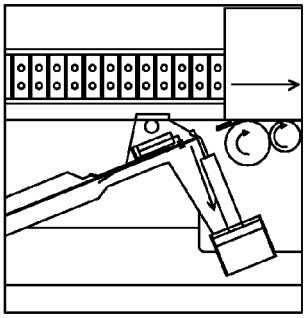

Fig. 2e

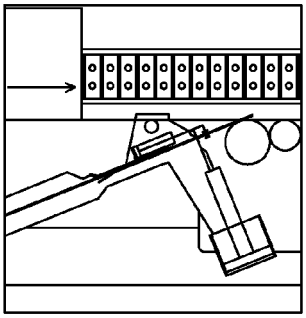

Fig. 2f

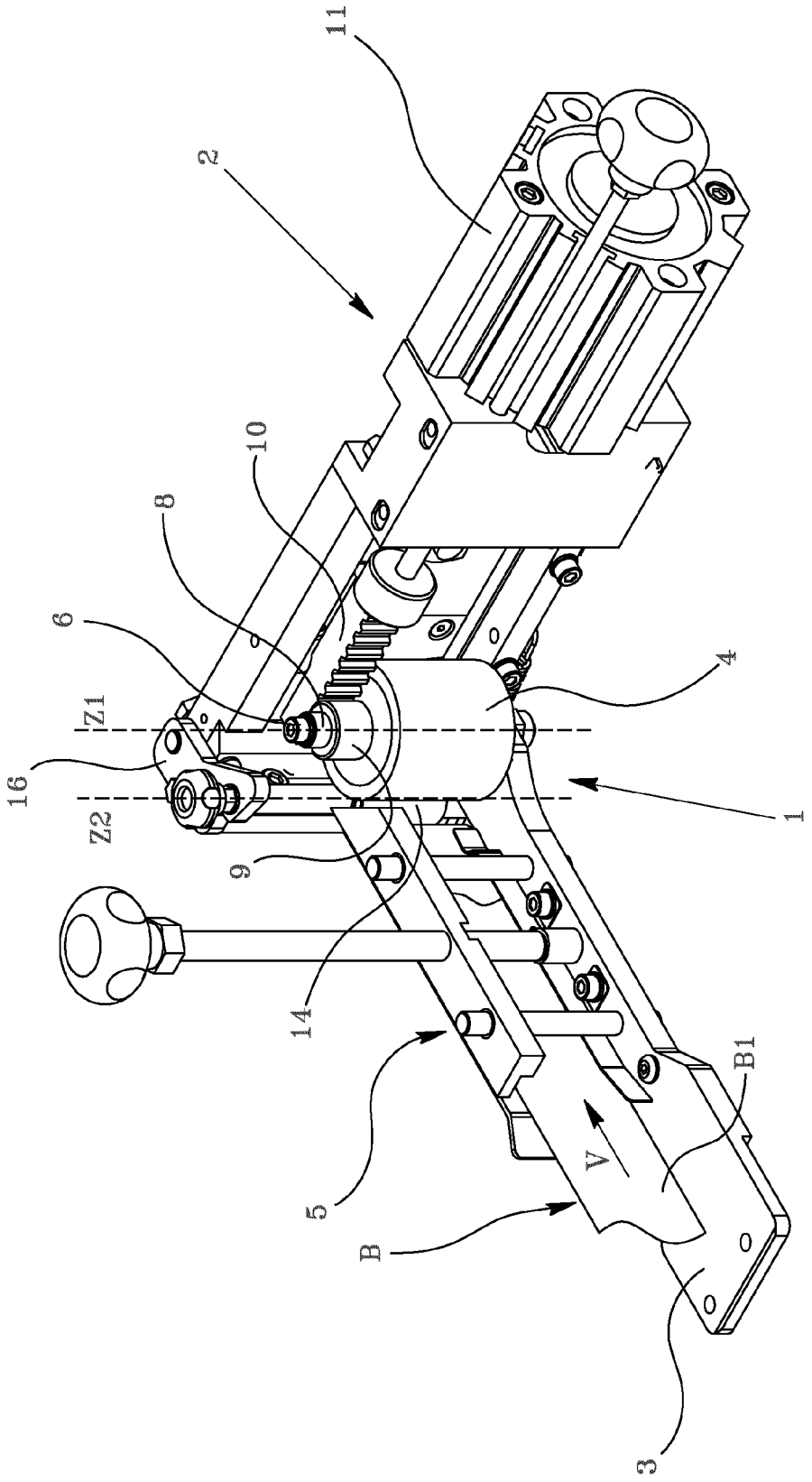

Fig. 3

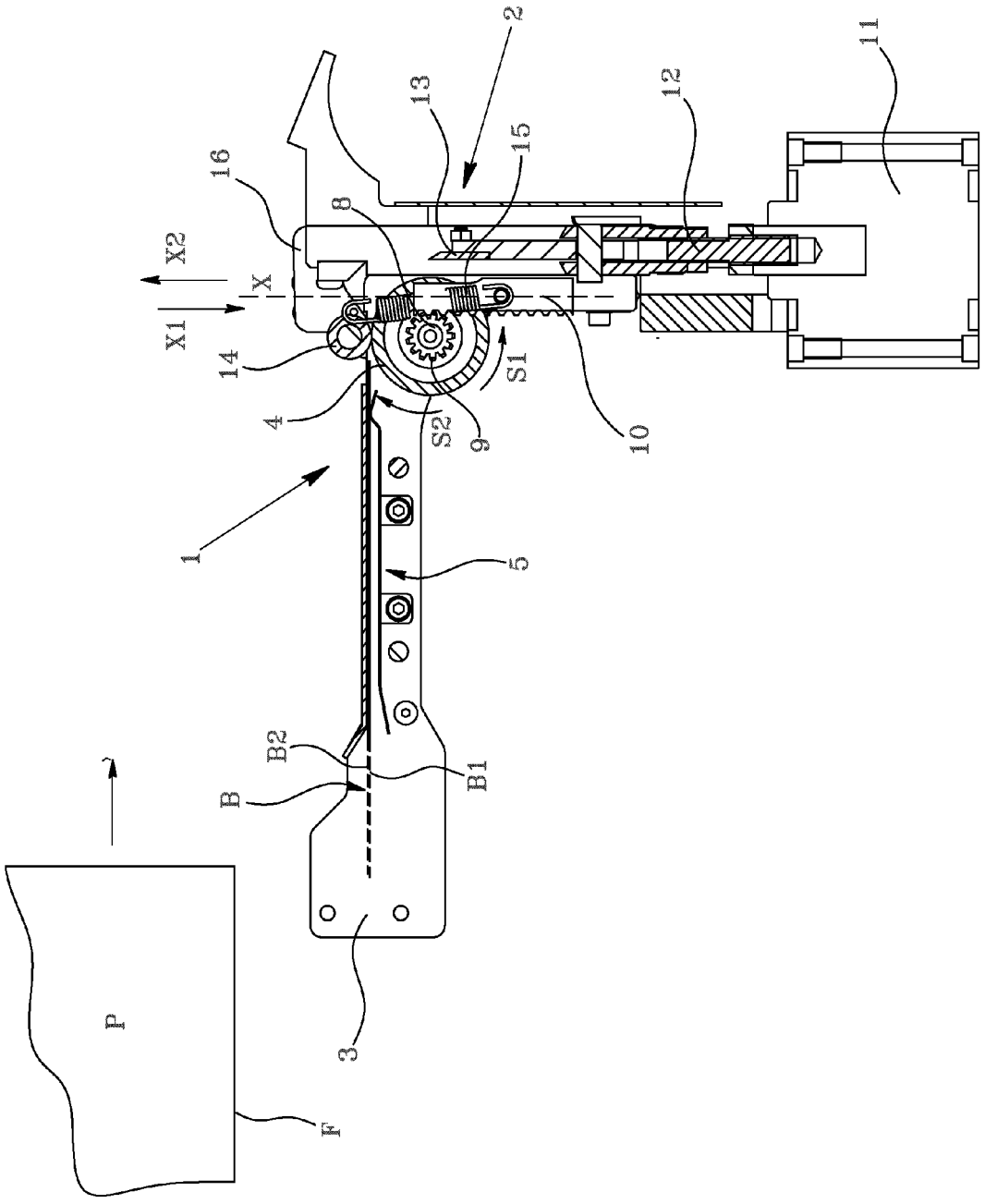

Fig. 4

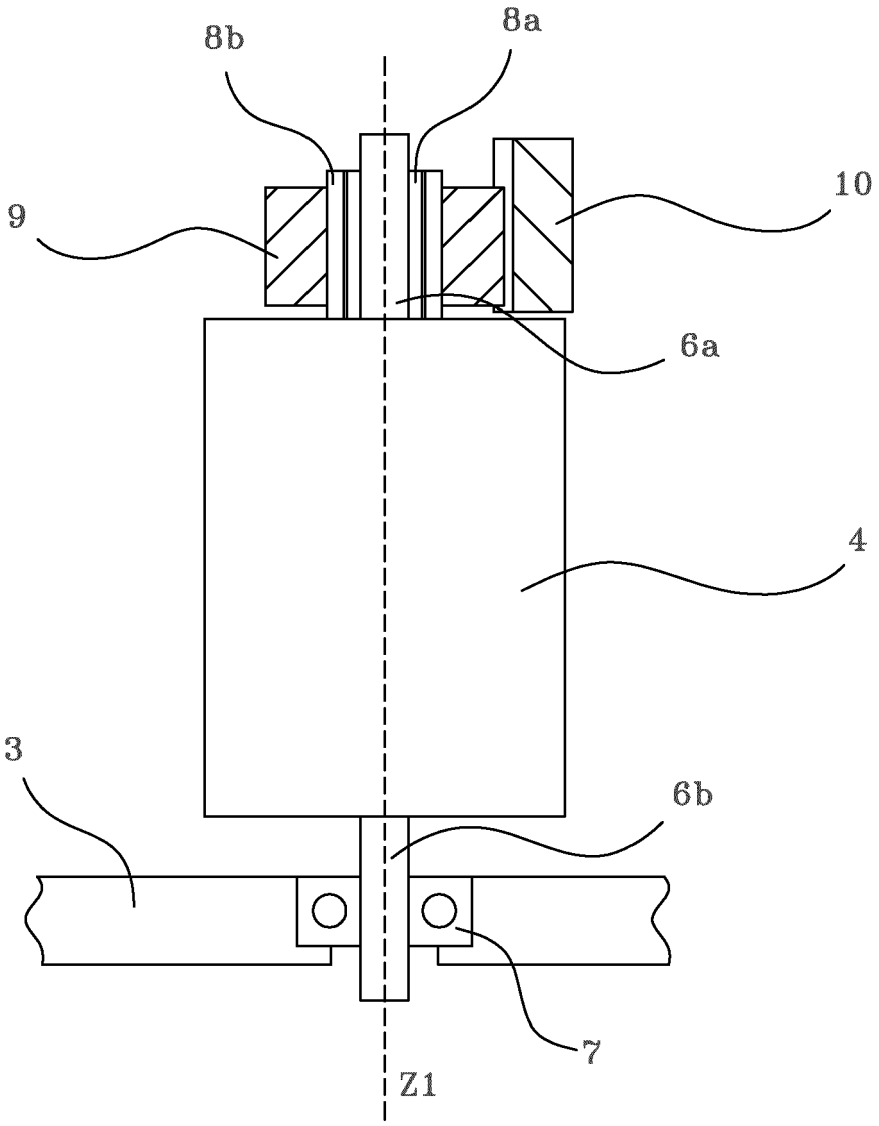

Fig. 5

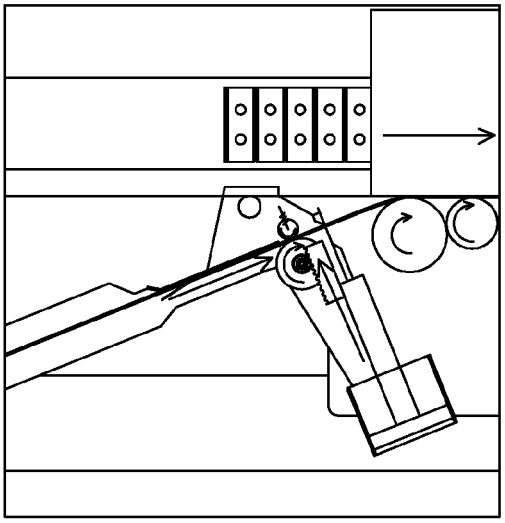

Fig. 6a

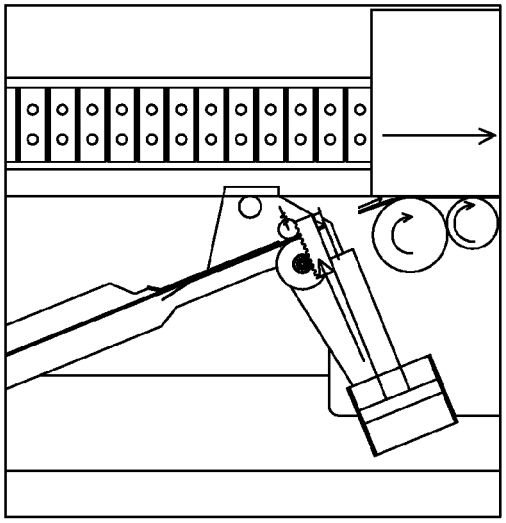

Fig. 6b

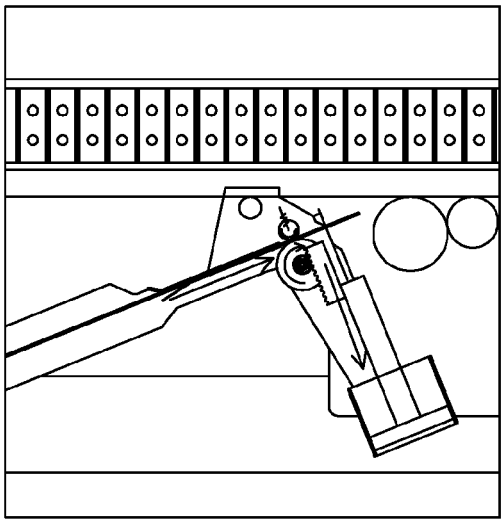

Fig. 6c

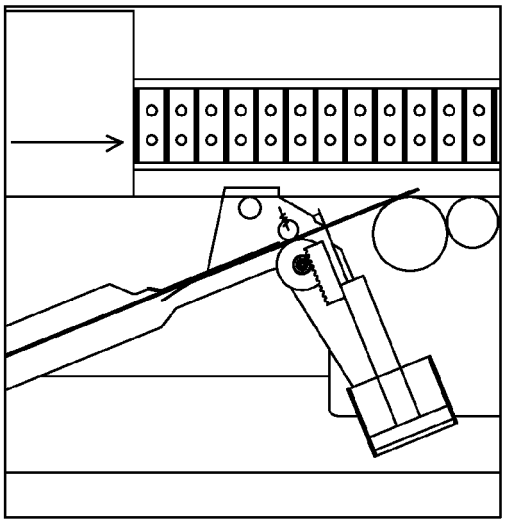

Fig. 6d

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European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 13 16 4037

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	WO 2008/003439 A1 (REHAU AG & CO [DE]; SCHREIER PETER [DE]) 10 January 2008 (2008-01-10) * abstract * * page 2, line 14 - page 2, line 17 * * page 8, line 21 - page 8, line 24 * * figures *	1-10	INV. B27D5/00
A	DE 73 21 921 U (IMA-KLESSMAN KG) 27 September 1973 (1973-09-27) * figure 1 *	3-5	
A	EP 1 445 082 A2 (SCHULTE-GOEBEL CHRISTOF [DE]) 11 August 2004 (2004-08-11) * figure 1 *	3	
			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	18 June 2013	Hamel, Pascal

CATEGORY OF CITED DOCUMENTS

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