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(54) **GLUEING PLOTTER FOR PAPER INDUSTRY**

(57) A glueing plotter for paper industry comprising a support plane (1) and at least one longitudinal rail (2), movable transversally with respect to said support plane (1), along which a glueing gun (21) is slidingly coupled with (21); wherein said at least one rail (2) is mounted as a cantilever on a movable carriage (23) slidable parallel to either transversal edge of said support plane (1).

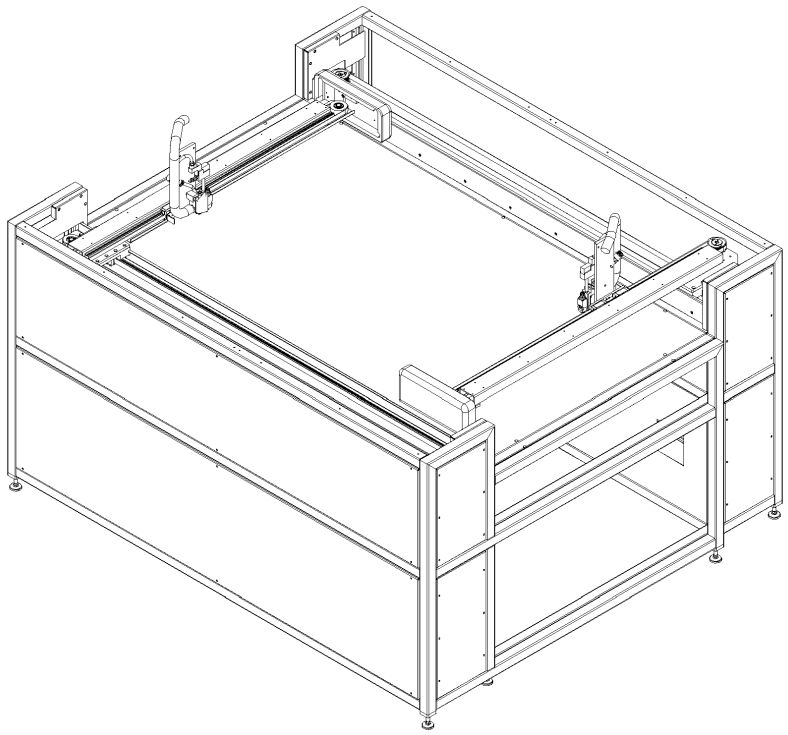

FIG. 7

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Description

Technical field

[0001] The present patent application belongs to the sector of the machines used in the paper industry for producing packing boxes, display stands, shop window placards, and the like. In particular, the scope of the invention is a device specifically designed for processing die-cut products, and more specifically this machine is used to spread glue on the flaps of paper or carboard, die-cast sheets, which will subsequently be used to manufacture products like those mentioned above.

Present status of the art

[0002] Devices are known for glueing die-cut flat products, the so-called glueing plotters, which are used to automatically spread glue on the flaps of sheets made from paper, cardboard, or other similar materials, which will subsequently be folded to form boxes or similar objects. Usually the cardboard sheets on which glue is laid down have previously been die-cut, so as to impart an appropriate shape thereto; in addition, lines are often engraved on the sheets which pre-constitute laminar hinges to be used to make it easier a correct folding of flaps during the assembling step. Usually in glueing plotters a die-cut sheet is laid horizontally on a rectangular support plane and a glueing gun moves above the die-cut sheet, whose dispenser nozzle faces downwards; the glueing gun is slidingly in turn horizontally moves above the support plane, in a transversal direction, i.e. orthogonally to its own main axis.

[0003] In this way, combining the transversal movement of the movable rail with respect to the support plane with the longitudinal movement of the glueing gun with respect to the movable rail makes it possible to reach any points in the support plane with glue.

[0004] Furthermore, by way of a Cartesian coordinate system, the position of the glue dispenser nozzle can be easily identified by a monitoring and control unit; the latter controls the operation of the complete machine and is capable of controlling both the translation of the movable rail and the movement of the glueing gun thereupon, and is also capable of opening and closing the dispenser nozzle and measuring out the glue going out, as a function of the position of the glueing gun and of other parameters.

[0005] In all known plotters, both ends of the longitudinal movable rail are integrally connected to their respective movable carriages, each of which is slidingly coupled with a respective fixed transversal rail. The two fixed transversal rails are located at the upper transversal edge and at the lower transversal edge respectively of the support plane. The most common plotters use two or three motors to move the glueing gun, depending on their kinematic mechanisms and their principles of operation.

[0006] Usually a first motor is always dedicated to making the glueing gun slide along the movable longitudinal rail, by using handling solutions of a known type, for instance by using a transmission based on the use of a belt installed between two pulleys located at the two ends of the rail respectively, one of which is a driving pulley and is operated by the first motor. Since the glueing gun is integrally connected to one point of the belt, the movement of the latter results in the glueing gun sliding along the rail.

[0007] The movable carriages connected to the two ends of the movable rail can be made slide along their respective fixed transversal rails according to different modes. In two-motor plotters, either carriage is motor driven and transmits motion to the second carriage via a propeller shaft, so that the two carriages always move simultaneously.

[0008] In another solution, each movable carriage is fixed to a respective belt, installed between two horizontal-axle pulleys, one of which is driving and the other is idle; to make sure that the movement of the two carriages takes place simultaneously, the two driving pulleys are rigidly connected to each other via a propeller shaft and the motor transmits motion to the latter rigid system by way of driving means of a known type.

[0009] In three-motor plotters, both movable carriages are motor driven or are connected to mechanically independent handling systems; in the latter case, the movement of the movable carriages is made simultaneous by the control system which controls its translation via encoders and drives of the master/slave type.

[0010] In both cases, in the plotters of the known type the movement of the movable rail entails a simultaneous translation of the two movable carriages, with the complications resulting therefrom, irrespective of whether mechanical-type solutions or electronic controls are preferred.

[0011] These problems are very much felt, not only because of the high construction costs entailed by them, but also because of their operation being delicate and of the high overall idlenesses of the movable longitudinal rail handling system, which make it difficult to promptly invert their sense of translation. In this type of machines, having prompt accelerations and brakings is very important to provide a high productivity, while warranting a constantly and homogeneously measured out supply of glue.

[0012] A further drawback of the known solutions concerns the poor advantages that would be obtained by using two glueing guns in one and the same plotter, because be should slide on one and the same movable rail and consequently transversally translate in unison.

Objects and summary of the invention

[0013] An object of the present invention is thus to implement a glueing plotter that is cost effective as compared to the known devices and simultaneously makes it possible to achieve a greater productivity, by reducing the idlenesses of the kinematic mechanisms and of the drives.

[0014] A further object of the present invention is to implement a particularly high performing glueing plotter featuring high glueing quality and high reliability.

[0015] A further object of the device according to the present patent application is to provide a plotter capable of using two glueing guns simultaneously, one independently of the other.

[0016] A last but not least object of the present invention is to provide a glueing plotter having reduced overall dimensions. The plotter according to the present patent application achieves the objects listed hereabove and others which will be apparent after reading the following text, thanks to a surprising arrangement whereby the movable rail is mounted as a cantilever, i.e. by anchoring one end only of the latter to a respective movable carriage.

[0017] This innovative solution substantially reduces the system idlenesses and also lowers the production costs thanks to the lower number of component parts that are necessary, be they mechanical or electrical or electronic.

[0018] In a particularly effective embodiment of the present invention, the movable longitudinal rail includes a closed section, of a substantially box-like type, so as to join stiffness to lightness.

[0019] In a very advantageous embodiment, the movable carriage to which an end of the longitudinal rail is integrally connected features a transversal cross section shaped like a square, i.e. like a letter "L", preferably rotated in such a way that the angle is located in the upper part of the section. In addition, the arrangement whereby the movable rail is mounted as a cantilever makes it possible a further embodiment of the invention, which has been found to be extremely profitable in that it allows a simultaneous operation of two glueing guns in a fully independent manner from each other. As a matter of fact, in the scope of the same invention concept, the plotter according to the present patent application can be formed of two longitudinal movable rails, a first movable rail being connected as a cantilever to a movable carriage slidingly coupled with an upper transversal rail located at the upper edge of the support plane, and the second movable rail connected as a cantilever to a lower movable carriage which slides along a lower transversal rail located at the lower edge of the support plane. In this high-performing configuration, both longitudinal rails move independently of each other and a respective glueing gun is slidingly coupled with each of them.

[0020] In this configuration, the duration of the glueing cycle is substantially halved, while keeping the overall dimensions unchanged and incrementing the cost of the machine to a very limited extent.

Brief description of the drawings

[0021]

Figure 1 shows a perspective view of a plotter according to the present patent application, showing the support plane (1) on the right-hand side of which a movable longitudinal rail (2) is located; on the latter, there is a glueing gun assembly (21). At the free end of the movable rail (2) there is located an anti-impact protection (26), whereas at the other end there are a movable carriage (23) and a driving pulley (24) which in turn drives a longitudinal belt (25), this way making the glueing gun (21) slide along the movable rail (2). At the upper edge of the support plane (1) there is located a transversal belt (11), installed between an idle pulley (12) and a driving pulley, which is responsible for the transversal translation of the movable carriage (23) along the upper rail (13).

Figure 2 is a top view of the plotter, from which a number of elements have been omitted to show, besides the components visible in figure 1, an idle pulley (27) which, together with the driving pulley (24), supports the longitudinal belt (25). The figure also shows a driving pulley (14) which drives the transversal belt (11) and causes a translation of the movable carriage (23), whose upper and side sliding blocks slide along an upper guide (132) and a side guide (131) respectively.

Figure 3 is a front view of the plotter, wherein the cutting plane of the cross section shown in figure 4 is identified.

Figure 4 is a cross section view showing a side sliding block (231) sliding along the side guide (131) and an upper sliding block (232) sliding along the upper guide (132). A gearmotor (27) is also visible, which drives the driving pulley (24).

Figure 5 is a side view with a partial cross section wherein the gearmotor (15) used to drive the driving pulley (14) is specifically visible.

Figure 6 is a top view of the plotter in a two-movable-rail configuration.

Figure 7 is a perspective view of the configuration shown in figure 6.

Detailed description of an embodiment of the invention

[0022] In a basic embodiment, the paper glueing plotter according to the present patent application comprises a support plane (1) receiving the planar elements on which glue shall be laid down, usually consisting of paper or cardboard die-cut sheets and a longitudinal rail (2), movable on a horizontal plane, with which a glueing gun is slidingly coupled, the nozzle facing the sheets underneath, on which glue shall be laid down. The longitudinal rail (2) has one free end and the other one integrally connected to a movable carriage (23) slidable along a fixed rail parallel to the transversal edges of the support plane (1).

[0023] According to an advantageous embodiment, the cross section of said movable carriage (23), cut according to a plane orthogonal to the sliding direction of

said carriage (23), is shaped like a square, with a vertical element and a horizontal element from which sliding blocks project and slidingly engage respective fixed guide, according to a type of a coupling that makes it possible for the sliding blocks to slide only, whereas they cannot disconnect from the guide. The cross section of the movable carriage (23) being shaped like a square is advantageous to increase the arm of the couple of forces that balances the joint bending moment generated by the rail (2) mounted as a cantilever.

[0024] In addition, in order to increase the stiffness of the rail (2) without increasing its weight, in an interesting construction choice use is made of a box-like tubular element, featuring a cross section and a thickness specifically calculated to get a very strong, yet light structure.

[0025] In an interesting embodiment of the invention, use is made of two movable rails (2) on one and the same plotter, on each of which a respective glueing gun (21) slides, an ability that is banned to traditional plotters, in which there is one movable rail only, both ends of which are constrained to translation means.

[0026] In both embodiments, there is provided the possibility of equipping the free end of the rail (2) with impact detector means (26), which can be taken advantage of to stop the translation of the rail whenever it gets in contact with the staff.

[0027] In the embodiment here shown the translation of the glueing gun (21) and of the movable carriage (23) is obtained by way of belts supported by pulleys, at least one of which is driven into rotation by a corresponding electric motor; other equivalent solutions are possible.

Claims

1. A glueing plotter for paper industry comprising one or more elements defining a support plane (1) for die-cut sheets to be glued and at least one longitudinal rail (2), movable transversally with respect to said support plane (1), along which a glueing gun (21) is slidingly coupled with, **characterized in that** said at least one rail (2) is mounted as a cantilever on a respective movable carriage (23) slidable in parallel to one of the transversal edges of said support plane (1).

2. A glueing plotter according to the previous claim 1 **characterized in that** the cross section of said movable carriage (23), according to a plane orthogonal to the sliding direction of said carriage (23), is shaped like a square.

3. A glueing plotter according to the previous claim 2 **characterized in that** said square comprises a horizontal element and a vertical element.

4. A glueing plotter according to the previous claim 3 **characterized in that** said movable carriage comprises two sliding blocks projecting from said horizontal and vertical elements of the said square, respectively.

5. A glueing plotter according to the previous claim 2 **characterized in that** said square comprises an upper horizontal element and a lower vertical element.

6. A glueing plotter according to the previous claim 5 **characterized in that** said movable carriage (23) comprises an upper sliding block (232) and a side sliding block (231).

7. A glueing plotter according to the previous claim 6 **characterized in that** said upper sliding block (232) and said side sliding block (231) project below from said upper horizontal element and sideways from said lower vertical element respectively.

8. A glueing plotter according to the previous claim 4 **characterized in that** said sliding blocks slidingly engage two respective horizontal fixed guides, parallel to the transversal edge of said support plane (1).

9. A glueing plotter according to the previous claim 8 **characterized in that** the coupling between said sliding blocks and said guides allows a sliding movement only, whereas it does not allow their disconnection.

10. A glueing plotter according to the previous claim 6 **characterized in that** said upper sliding block (232) and said side sliding block (231) are slidingly coupled with a respective upper fixed guide (132) and a side fixed guide (131), both parallel to the transversal edge of the support plane (1).

11. A glueing plotter according to any of the previous claims **characterized in that** the cross section of said at least one rail (2) is rectangular.

12. A glueing plotter according to any of the previous claims **characterized in that** said rail (2) has the shape of a box-like element.

13. A glueing plotter according to any of the previous claims **characterized in that** the free end of said rail (2) comprises impact detector means (26).

14. A glueing plotter according to any of the previous claims **characterized in that** it comprises two movable longitudinal rails (2), each of which is mounted as a cantilever on a respective movable carriage (23), which slides along either transversal edge of said support plane (1) respectively.

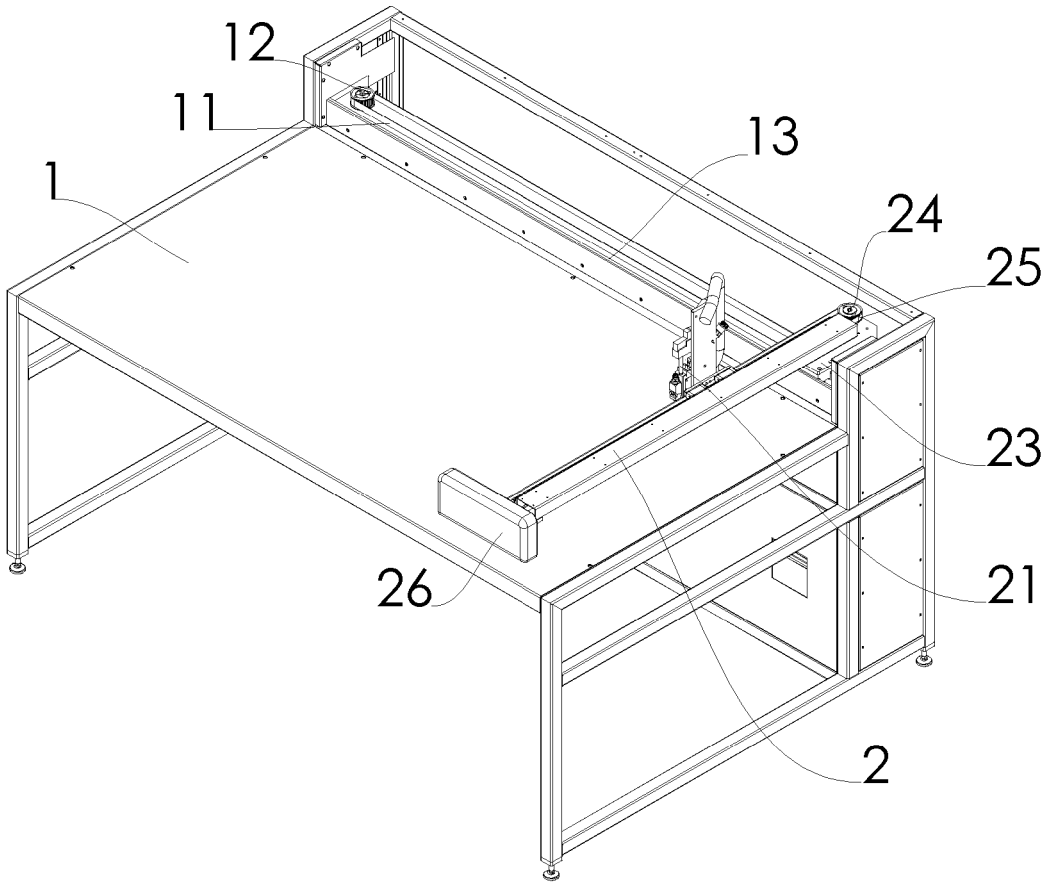

FIG. 1

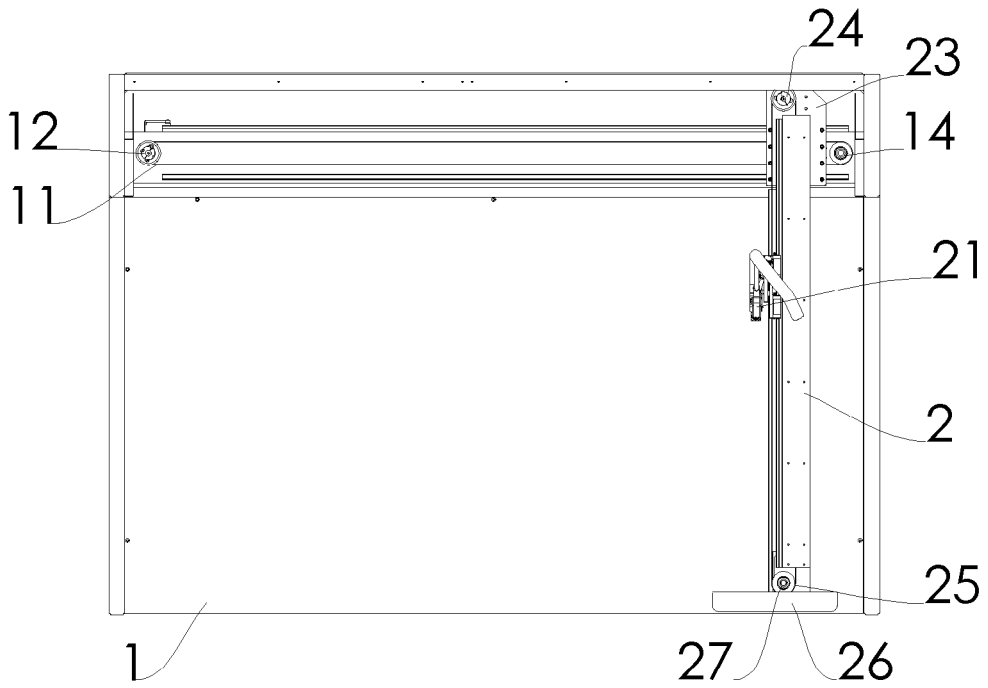

FIG. 2

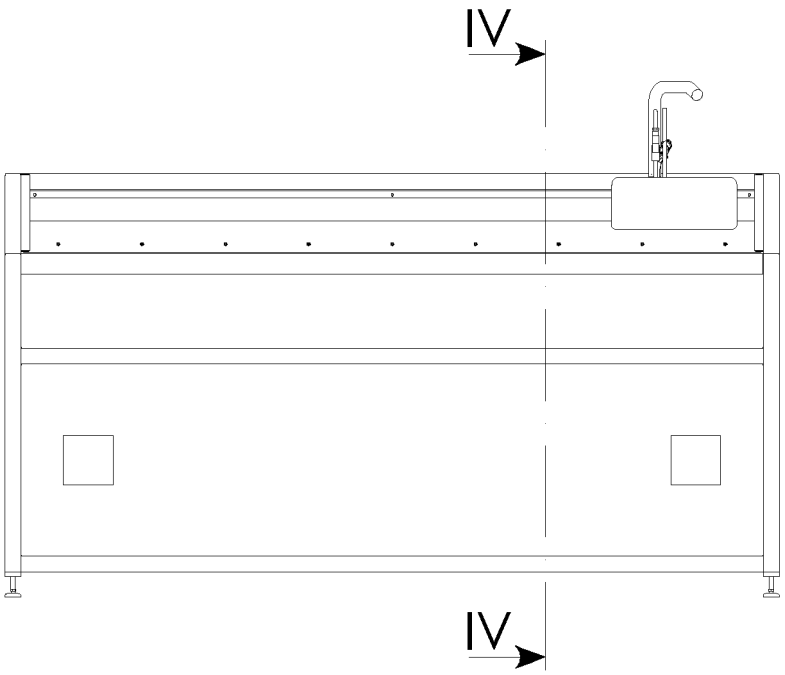

FIG. 3

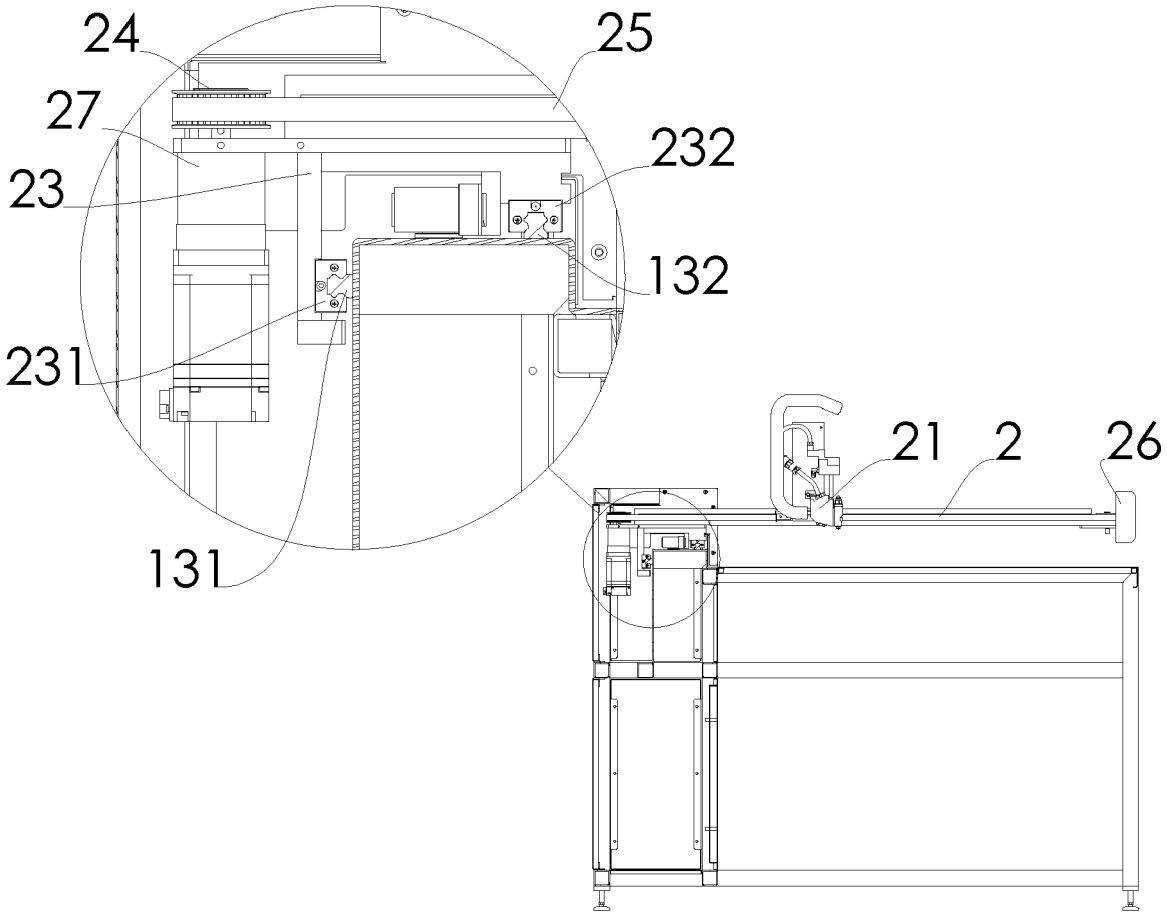

FIG. 4

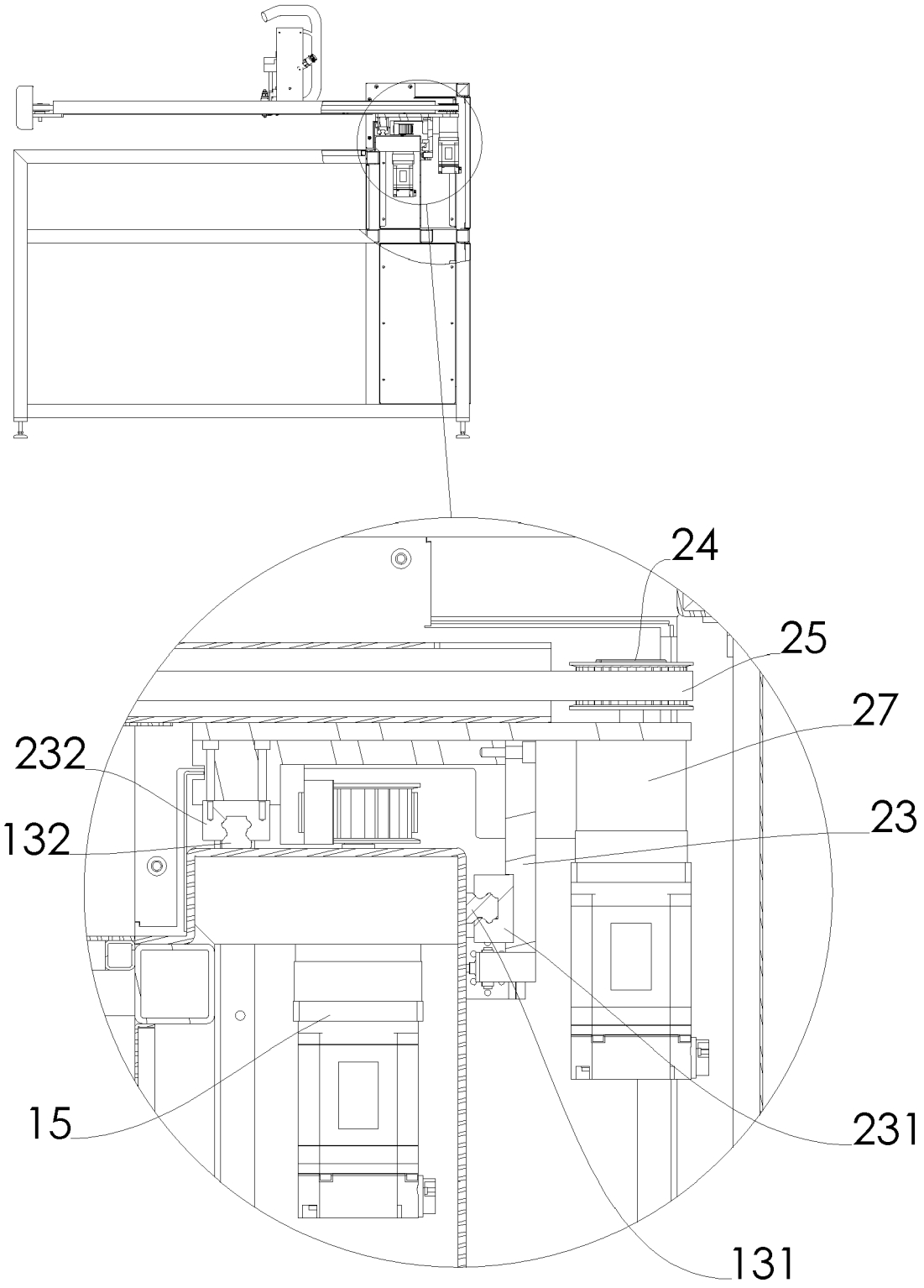

FIG. 5

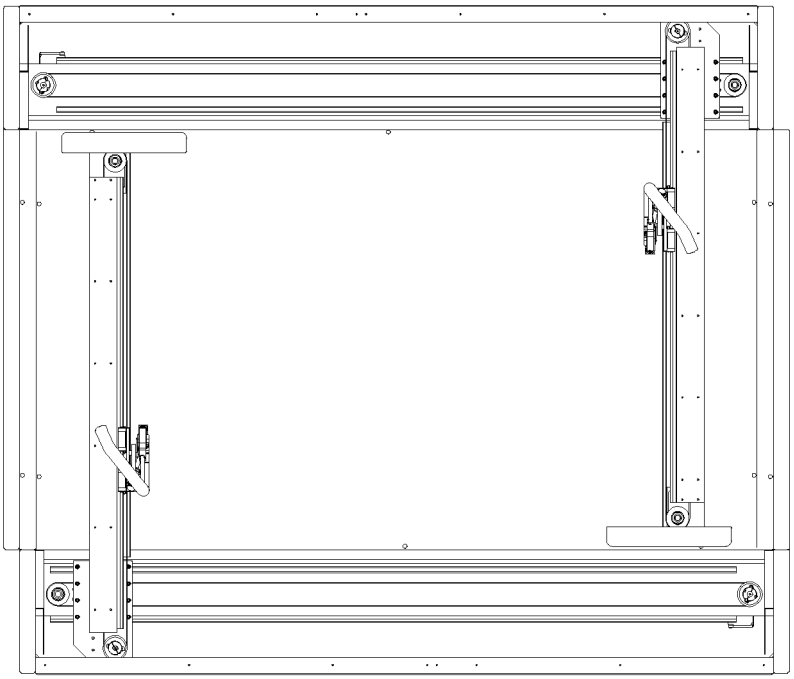

FIG. 6

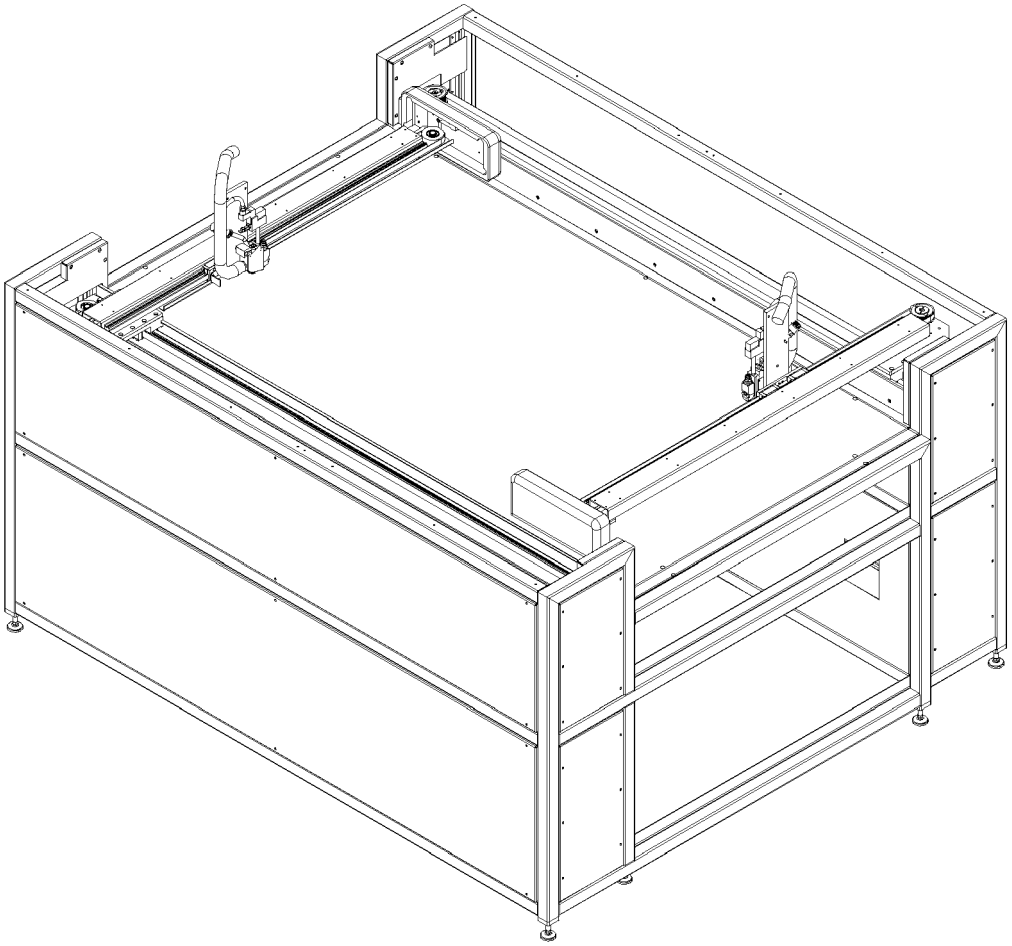

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 1904

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2007/199648 A1 (HULVERSCHEIDT DETLEF JR [DE]) 30 August 2007 (2007-08-30) * figure 1 * -----	1-14	INV. B05C5/02 B31B50/62
A	JP 2001 270111 A (SEIKO EPSON CORP) 2 October 2001 (2001-10-02) * figure 1 * -----	1-14	

TECHNICAL FIELDS SEARCHED (IPC)

B05C
B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 September 2017	Lawder, M

CATEGORY OF CITED DOCUMENTS

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