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(54) **UNIT FOR STACKING SLATS ON A SUPPORT LADDER FOR THE PRODUCTION OF VENETIAN BLINDS**

(57) The invention concerns a stacking unit of slats on a complete support ladder for the production of Venetian blinds, wherein the complete ladder comprises two uprights (P1, P2), which support a plurality of cross-members (T1, T2) of engagement with the slats arranged at regular distances along the longitudinal extension of the same uprights. The stacking unit comprises: - means (20) for guiding a slat (L) along a longitudinal insertion lane (X) on an insertion plane (m); - means (31, 32) for positioning a complete ladder on a positioning plane (p) incident to said insertion plane (m) at an engagement area (2) with the slats; - means (40) for associating the slat to said ladder at said engagement area (2) acting on said cross-members (T1, T2); and a loader (50), arranged above the insertion plane (m), within which, one at a time, the slats are progressively pushed, juxtaposed to each other, after being associated to the ladder. The positioning means comprise two U-shaped guides (31, 32) which are arranged, spaced transversely apart from each other, on two opposite sides of said longitudinal insertion lane (X) and each of which defines a sliding seat (33) for an upright (P1 or P2) of the ladder along a sliding direction (Y1, Y2) lying on said positioning plane (p). Each sliding seat (33) is open on the longitudinal insertion lane (X) through a slit (34) which extends parallel to said sliding direction (Y1, Y2) to allow in use the passage for said cross-members (T1, T2) from one upright to the other as well as the free sliding of the cross-members through the two U-shaped guides, in said slit (34) each guide (31, 32) having a cross-section bottleneck (35) delimiting said sliding seat (33). Each of these U-shaped guides (31, 32) is divided into two parts (31', 31'') that are reciprocally movable to pass between at least one closed guide po-

sition and at least one open guide position. In the open guide position, the cross-section bottleneck (34) of said sliding seat (33) defines a wider through opening than in the closed guide position.

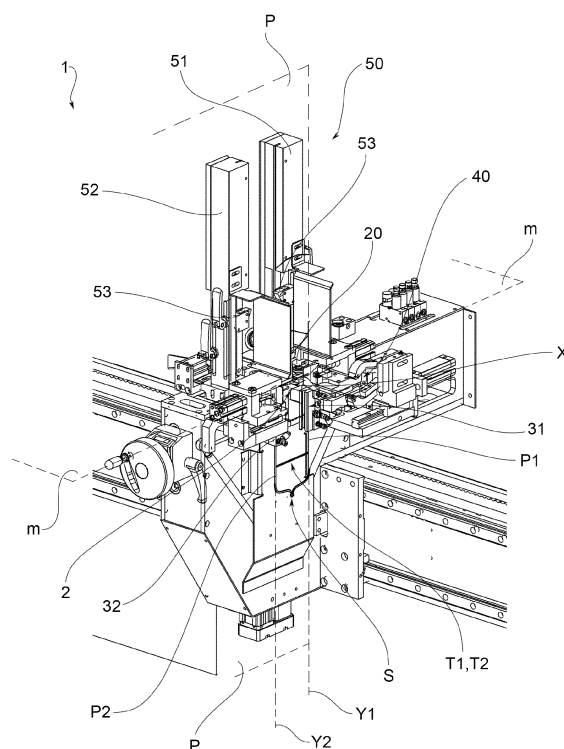


FIG.2

Description

Scope

[0001] The subject-matter of the present invention is a unit for stacking slats on a complete support ladder for the production of Venetian blinds.

State of the art

[0002] As is known, Venetian blinds are composed of a plurality of slats, positioned parallel to each other and held in position by means of support structures made of cord.

[0003] A first type of structure is called a "complete ladder", that is to say composed of two parallel ribs (positioned in the height-wise direction of the blind, hereinafter called ladder "uprights") and by a plurality of cross-members which connect them to each other at regular intervals. A slat is associated to each cross-member, resting thereon (if the cross-member is single) or inserted therein (if the cross-member is multiple).

[0004] A second type of structure is called "separated ladders" or "half-ladder", that is to say, it is composed of two cords separated from each other and each provided with a plurality of cord eyelets distributed at regular distances along the single cord. The support cords are positioned in pairs at opposite sides of the slats, generally aligned transversely. The cords are associated to the slats at the eyelets by means of hooks fixed to the side edges of the same slats.

[0005] The assembly of the Venetian blinds with the support ladders is carried out in automated production lines which comprise specific automated assembly stations in which the individual slats are associated to the complete support ladders or half-ladders and, thus associated, are progressively superimposed one on top of the other to form the Venetian blind.

[0006] The automated assembly stations differ according to whether they are intended to assemble the slats on complete ladders or on half-ladders. However, regardless of the type of support ladder used, the assembly stations have the same general structure.

[0007] More specifically, the assembly station comprises a plurality of slat stacking units, which are aligned with each other along a slat insertion direction and operate simultaneously on the same slat. Each stacking unit is intended to associate a complete ladder or a pair of half-ladders to the slat being processed.

[0008] Operatively, the slats are inserted in sequence one by one along the aforesaid direction of insertion, passing through the individual stacking units and sliding on an insertion plane. In the case of complete ladders, the single stacking unit is suitable to allow the insertion of the slat between the cross-members of the ladder, while in the case of half-ladders, the single stacking unit is suitable to fix the eyelet of each half-ladder to the edge of the slat.

[0009] Once the slat has been associated to the support ladder (complete ladder or half-ladder) in each stacking unit, the individual slat is raised together with the ladder to be carried in a so-called loader arranged above the slat insertion zone so as to allow a new slat to be associated to the support ladder (at the following cross-members or eyelets). In the loader, the slats are superimposed on each other in a compact configuration.

[0010] When assembling Venetian blinds with complete ladders, it is particularly important to position and guide the ladder correctly on a plane transverse to the direction of insertion of the slat. This operation is important because a ladder not correctly positioned on the positioning plane may hinder (if not completely prevent) not only the coupling of the slat with the cross-members, but also the subsequent lifting of the slat itself towards the loader due to friction and tension.

[0011] For these reasons, a stacking unit intended to assemble Venetian blinds with complete ladders is equipped with means for positioning and guiding a complete ladder on a predefined positioning plane. The aforesaid positioning means are arranged near a specific area of the stacking unit where the slats are progressively brought to engage the ladder and the relative cross-members.

[0012] Generally, these positioning means consist of a pair of U-shaped guides, which are arranged (in opposite positions) laterally to the sliding lane of the slats. Inside each guide one of the two uprights of the complete ladder and at least one end portion of the cross-members slide. The two guides are arranged parallel to each other with the respective U-shaped seats open one towards the other in such a way as to leave free the passage of the cross-members from one upright to the other.

[0013] In order to prevent the uprights from sliding out of the respective guides and at the same time not to hinder the free sliding of the cross-members, each guide has a cross-section bottleneck that divides the guide into a sliding seat of the upright and a sliding seat of the cross-members. The bottleneck is sized in such a way as to prevent the upright from sliding out and at the same time allow the passage of the cross-members. This is possible because in a ladder the cross-members are thinner than the uprights.

[0014] Operatively, as already mentioned above, the ladders are slid along the two guides by the movement imparted thereon by each individual slat which, after having engaged the cross-members, is lifted towards the loader, pulling the same ladder therewith.

[0015] Although the movement of the ladder during the assembly of the slats is automated, the initial insertion of the ladders into the guides is still manual.

[0016] Generally, the ladders are associated to the two guides by inserting the upper ends of the two uprights of a ladder into the guides at the respective sliding seats, until the ladder is brought into position. The operation is carried out starting from the lower ends of the guides.

[0017] This insertion method may be adopted with rel-

ative ease if the ladders are not yet associated to the box of the Venetian blind, i.e. the upper ends of the uprights are still free.

[0018] Otherwise, if for production reasons the ladders have to be fed into the stacking unit already assembled to the box of the Venetian blind, i.e. with the upper ends of the uprights already fixed to the box, the operation of inserting them into the guides is complicated considerably. In this case, the insertion must be done by inserting the lower ends of the uprights into the guides from above.

[0019] In some cases, for productive reasons, the ladders must be fed into the stacking unit not only already fixed to the box of the Venetian blind, but also with the lower ends of the uprights connected to each other. In this case, the operation of insertion into the guides becomes even more complicated, since insertion would also require forcing the portions of the uprights that are connected to each other through the bottleneck of the two guides.

[0020] The operations of inserting the ladders into the guides may not be completely easy even with ladders with the upper ends of the uprights free. In some cases, in effect, the ends of the uprights may have burrs due to the hot cutting of the uprights. Such burrs form cross-section bulges, which may complicate the insertion and sliding of the uprights within the guides.

[0021] Finally, in the case wherein the ladders are fed into the stacking unit with the lower ends of the uprights connected to each other, it is not only the insertion into the guides but also the final extraction of the uprights from the guides that complicates matters. The extraction would in effect require forcing the portions of the uprights that are connected to each other through the bottleneck of the two guides.

[0022] There is therefore a need in the field of Venetian blind production to eliminate or at least reduce the drawbacks described above.

[0023] In particular, there is a need to simplify the operations of insertion of the uprights into the positioning guides of the ladders inside the stacking units, without, however, adversely affecting the functionality of the guides.

Presentation of the invention

[0024] Therefore, the object of the present invention is to eliminate in whole or in part the drawbacks of the aforementioned prior art by providing a unit for stacking slats on a complete support ladder for the production of Venetian blinds which allows for the operations of inserting the uprights into the positioning guides of the ladders to be simplified without, however, adversely affecting the functionality of the same guides.

[0025] A further object of the present invention is to provide a slat stacking unit that also simplifies the final extraction of the ladder uprights from the guides.

[0026] A further object of the present invention is to provide a slat stacking unit that is simple and economical

to construct.

[0027] A further object of the present invention is to provide a slat stacking unit that allows for a simple operation.

Brief description of the drawings

[0028] The technical features of the invention, according to the aforesaid objects, are clearly apparent from the contents of the claims provided below and the advantages thereof will become more evident in the following detailed description, made with reference to the accompanying drawings, which represent one or more purely illustrative and non-limiting embodiments thereof, wherein:

- Figure 1 shows a perspective view of an assembly station comprising a plurality of slat stacking units according to the present invention, illustrated with a complete ladder already associated to the positioning guides;
- Figure 2 shows an enlarged detail of the assembly station in the Figure relating to a stacking unit;
- Figure 3 shows a detailed view of a slat stacking unit according to the present invention, illustrated without a ladder;
- Figures 4 and 5 show two perspective views of a component of the stacking unit in Figure 3, relative to a ladder positioning guide, said component being illustrated in two different operating positions, respectively with the guide open and with the guide closed, engaged by a complete ladder;
- Figures 6 and 7 show two orthogonal views from above of the positioning guide illustrated in Figures 4 and 5 respectively;
- Figures 8, 9 and 10 show respectively a perspective view, a front orthogonal view and a orthogonal view from above of the guide in Figure 4, illustrated in open position without a ladder;
- Figures 11, 12 and 13 show respectively a perspective view, a front orthogonal view and a orthogonal view from above of the guide in Figure 5, illustrated in the closed position without a ladder;
- Figures 14 to 20 illustrate in sequence the operative steps of inserting the ladder into a positioning guide in a stacking unit according to the invention and extracting it from the same guide.

Detailed description

[0029] With reference to the attached drawings, a unit for stacking slats on a support ladder for the production of Venetian blinds according to the invention has been indicated collectively at 1.

[0030] The support ladder is a complete ladder S (illustrated in particular in Figures 4 and 5) and comprises two uprights P1, P2, which support a plurality of cross-members T1, T2 of engagement with the slats arranged

at regular distances between them along the longitudinal extension of the same uprights. The cross-members may be single or double (pairs of cross-members, as shown in Figures 4 and 5).

[0031] In particular, the stacking unit 1 according to the invention is intended to be inserted - together with two or more identical units - in a more complex production plant (not shown in Figure 1). The unit 1 may be movably associated to a longitudinal support bar 60 at one end of which a slat production machine may be arranged (not shown).

[0032] Here and in the following description and claims, reference will be made to the stacking unit 1 in the condition of use. It is in this sense that any references to a lower or upper position, or to a front or rear position, are therefore to be understood.

[0033] In accordance with a general embodiment of the invention, the stacking unit 1 comprises

- means 20 for guiding a slat L along a longitudinal insertion lane X on an insertion plane m;
- means 31, 32 for positioning a complete ladder S on a positioning plane p incident to the insertion plane m at an engagement area 2 with the slats;
- means 40 for associating the slat to the ladder S at the aforesaid engagement area 2, acting on the aforesaid cross-members T1, T2; and
- a loader 50, arranged above the insertion plane m, inside of which one at a time the slats are progressively pushed, juxtaposed to each other, after having been associated to the ladder S.

[0034] In particular, as shown in the accompanying Figures, the guide means 20 may consist of two grooved idle wheels where the edges of the slats are slidably inserted. Advantageously, the guide means may assume different configurations, well known to a person skilled in the art. Therefore, these means will not be described here in greater detail.

[0035] Operatively, the aforesaid positioning means 31, 32 are suitable for arranging the ladder S with the two uprights P1, P2, spaced transversely from each other, on the two sides of the aforesaid longitudinal insertion lane X and will be described in detail hereinafter.

[0036] The means 40 for associating the slat to the ladder S at the aforesaid engagement area 2 by acting on the aforesaid engagement elements T1, T2 are known per se to a person skilled in the art. Therefore, such means will not be described in greater detail here.

[0037] Here we limit ourselves to observing that, in the case of complete ladders equipped with double cross-members, the aforesaid means 40 for associating the slat to the ladder comprise devices suitable to divaricate the pair of cross-members T1, T2 to allow the insertion of the slat in the inner space between them. These divaricating devices may be constructed in different ways, as described for example in European patents EP3026208B1, EP2886781B1, EP2677108B1 and

EP2677107B1 in the name of the same applicant, which are fully incorporated herein as a reference.

[0038] The slat loader 50 may be of any type suitable for the purpose. In particular, as illustrated in the accompanying Figures, the loader 50 consists of two bars 51, 52 equipped with spring-loaded teeth 53 to support the slats already inserted in the ladder. The loader 50 is also well known per se to a person skilled in the art and will therefore not be described in greater detail.

[0039] Advantageously, as illustrated in the accompanying Figures, the stacking unit 1 further comprises means 70 for raising the slat L from the insertion plane m to a higher position within the storage loader 50 for the slats already associated to the ladder. In the lifting movement, the slat pulls the ladder S with it on the positioning plane p so as to bring another pair of cross-members T1, T2 or another cross-member in the proximity of the insertion plane m.

[0040] As already mentioned above, the stacking unit 1 comprises means for positioning a complete ladder S on a positioning plane p incident to the insertion plane m at an engagement area 2 with the slats.

[0041] More specifically, as illustrated in particular in Figures 2 and 3, the aforesaid positioning means comprise two guides 31, 32 which are arranged, transversely spaced apart from each other, on two opposite sides of the aforesaid longitudinal insertion lane X.

[0042] Each of these two guides 31, 32 defines a sliding seat 33 for an upright P1 or P2 of the ladder along a sliding direction Y1, Y2 lying on said positioning plane p.

[0043] As illustrated in particular in Figures 3 and 14-20, each sliding seat 33 is open on the longitudinal insertion lane X through a slit 34 which develops - for the whole height of the guide - parallel to the aforesaid sliding direction Y1, Y2 to allow in use the passage of the cross-members T1, T2 from one upright P1 to the other P2, as well as to allow the free sliding of the cross-members through the same guide.

[0044] As illustrated in particular in 6-7, 10 and 13, at the aforesaid slit 34 each guide 31, 32 has a cross-section bottleneck 35 that delimits the sliding seat 33 for the upright P1, P2.

[0045] According to the invention, as illustrated in the accompanying Figures, each of the aforesaid U-shaped guides 31, 32 is divided into two parts 31', 31" reciprocally movable to pass between at least one closed guide position and at least one open guide position, wherein in the open guide position the aforesaid cross-section bottleneck 34 of the sliding seat 33 defines a wider through opening than in the closed guide position.

[0046] In other words, in contrast to the solutions of the prior art which provide for U-shaped guides with fixed opening, the U-shaped guides according to the invention are guides with variable opening.

[0047] Due to the fact that in the open guide position the cross-section bottleneck 34 has a wider through opening than in the closed guide position, the bottleneck 34 no longer hinders the free passage of the upright

through the slit.

[0048] Operatively, this may be used primarily to simplify the step of positioning the ladder on the positioning plane p. In effect, in the open guide position, the individual upright P1, P2 of the ladder may be inserted into the relevant sliding seat 33 of a guide 31 or 32 by passing it through the cross-section bottleneck 35 for the entire extension of the guide along the aforesaid sliding direction Y1, Y2.

[0049] In other words, with the guide in the open position (bottleneck open), the upright may be inserted from the front into the guide 31 or 32, and not necessarily (as is mandatory in the prior art) by inserting the uprights starting from the two longitudinal ends of the guide (i.e. either from the bottom or from the top of the same guide).

[0050] Once the upright has been inserted into the respective sliding seat, the guide 31, 32 may then be returned to the closed guide position (with bottleneck closed) so that it may hold the upright in position therein, preventing it from sliding out of the sliding seat.

[0051] The operative simplification offered by the invention when positioning the ladder is particularly appreciable in the case wherein, for productive reasons, the ladders must be fed into the stacking unit already assembled to the box of the Venetian blind (i.e. with the upper ends of the uprights already fixed to the box), or in the case wherein the lower ends of the uprights are connected to each other (as illustrated in Figures 4 and 5).

[0052] The operative simplification offered by the invention when positioning the ladder, however, may also be appreciated in the case of ladders not associated to the box before assembly and/or with the lower ends of the uprights not connected to each other. In effect, even in these cases, the front insertion of the uprights into the guides is easier and more practical than insertion from below or above.

[0053] Finally, it should be noted that the front insertion allowed by the present invention allows also for the drawbacks linked to bulges present in the uprights due to the hot cutting thereof to be overcome.

[0054] Advantageously, the possibility of adjusting the opening of the U-shaped guides may be used not only to simplify the positioning of the ladders on the positioning plane p, but also to simplify the extraction and/or movement of the ladders themselves from the guides, during and/or after the assembly operations of the Venetian blind.

[0055] In particular, with the guides brought into the open guide position during the final extraction, any bulges of the uprights or lower ends of the uprights connected to each other slide freely through the guides without constituting a hindrance to the extraction and without indirectly inducing tension on the slats associated to the ladder.

[0056] The slat stacking unit according to the invention first of all makes it possible to simplify the operations of inserting the uprights into the ladder positioning guides without, however, adversely affecting the functionality of

the same guides.

[0057] The slat stacking unit according to the invention further allows the final extraction of the ladder uprights from the guides to be simplified. One should also not overlook the possibility offered by the invention for moving the ladders more freely during assembly operations, if this should be required.

[0058] In accordance with a preferred embodiment of the invention, illustrated in the accompanying Figures, the two parts 31', 31", into which each U-shaped guide 31, 32 is divided, each define a branch of the U-shaped cross-section of the guide 31, 32. In particular, the sliding seat 33 is located at the bottom of the U-shaped cross-section.

[0059] Even more preferably, the two parts 31', 31" into which each guide U 31, 32 is divided are movably linked together at their respective portions defining the bottom of the U-shaped cross-section. It is thus the same U-shaped seat that marks the division zone of the guide 31, 32 into the two parts 31', 31". This simplifies the construction of the guide 31, 32 and at the same time avoids interfering with the functionality of the same guide due to the operative connection between the two parts 31', 31".

[0060] Advantageously, each guide 31, 32 comprises kinematic connecting means 36 between the aforesaid two parts 31', 31". Such means are suitable to guide the relative movement of the two parts 31', 31" between the aforesaid open guide position and the aforesaid closed guide position. In this way, the transition between the two positions is controllable and repeatable.

[0061] Preferably, the two parts 31', 31" of each guide are provided with portions 39', 39" of reciprocal abutment that define the aforesaid closed guide position. Preferably said abutment portions 39', 39" are defined near the bottom of the U-shaped cross-section.

[0062] Preferably, the aforesaid kinematic connecting means 36 comprise at least one guide pin 36', 36", which is fixed to a first 31' of the two parts and is slidably associated to the second 31" of the two parts. Operatively, this guide pin 36', 36" defines the relative movement of the two parts 31', 31" between the open guide position and closed guide position as a translational motion parallel to its axis Z.

[0063] In particular, as illustrated in Figures 6 and 7, the axis Z of said at least one guide pin 36', 36" is orthogonal to a centerplane M of the U-shaped cross-section passing through the aforesaid sliding direction Y1, Y2.

[0064] In accordance with the preferred embodiment illustrated in the accompanying Figures, the aforesaid kinematic connecting means 36 may comprise two guide pins 36', 36" parallel to each other.

[0065] According to an alternative embodiment not illustrated in the accompanying Figures, the aforesaid kinematic connecting means may comprise a rotation pin connecting the two parts 31', 31" rotationally to each other around an axis parallel to the aforesaid sliding direction

Y1, Y2. This rotation pin defines the relative movement of the two parts 31', 31" between the open guide position and the closed guide position as a rotational motion around its axis.

[0066] Advantageously, the aforesaid rotation pin is arranged to connect the two parts near the bottom of the U-shaped cross-section of the guide so as not to interfere with the functionality of the same guide.

[0067] Preferably, each guide 31, 32 comprises means 37 for automatically pushing the two parts 31', 31" into which it is divided towards the aforesaid closed guide position.

[0068] Operatively, the presence of an automation when closing the guide ensures the primary functionality of the same guide, i.e. that of guiding the upright by holding it in position.

[0069] Advantageously, the closing automation simplifies the front insertion of the uprights.

[0070] More specifically, the guide may be opened manually by an operator during the insertion of the ladder, overcoming the resistance offered by the automated pushing means towards the closed position. When the operator releases the grip on the guides, they return to the closed position automatically, sparing the operator from performing the closing operation, which is essential for positioning the ladder during assembly of the Venetian blind.

[0071] Advantageously, the automatic pushing means 37 are sized in such a way that the force exerted thereby is sufficient to hold the uprights in place during the operation of the stacking unit and may be manually overcome by an operator opening the guide.

[0072] Preferably, the means for automatically pushing the two parts 31', 31" from the open guide position to the closed guide position are elastic means 37.

[0073] In accordance with the embodiment illustrated in the accompanying Figures, the aforesaid elastic means may be made up of a compression spring arranged coaxially to the guide pin 36', 36", which forces the two parts to follow a translational motion.

[0074] Alternatively, the aforesaid elastic means may be made up of a torsion spring arranged coaxially to the rotation pin which forces the two parts to follow a rotational motion.

[0075] Advantageously, each guide 31, 32 may also comprise means 38 for moving the aforesaid two parts 31', 31" into which it is divided from the closed guide position to the open guide position.

[0076] Preferably, such movement means 38 are remotely controllable and are sized to overcome the force exerted by the aforesaid automatic pushing means 37 towards the closed guide position.

[0077] In accordance with the embodiment illustrated in the accompanying Figures, the aforesaid movement means consist of at least one pneumatic cylinder 38.

[0078] Preferably, this technical solution is adopted in the case wherein the two parts 31', 31" are movably connected to each other to follow a motion of the translational

type. This in effect simplifies the positioning and operation of the pneumatic cylinder 38 in the guide.

[0079] Advantageously, the stacking unit 1 may comprise an electronic control unit (not shown in the accompanying Figures), which is connected to the aforesaid movement means and is programmed to operate them in predefined stages of the Venetian blind assembly process. * * *

[0080] The method of stacking slats on a complete ladder for the production of Venetian blinds according to the invention will now be described.

[0081] The complete ladder comprises two uprights P1, P2, which support a plurality of cross-members T1, T2 for engagement with the slats arranged at regular distances between them along the longitudinal extension of the same uprights.

[0082] According to a general implementation, the method comprises the following operative steps:

- a) providing an assembly station for Venetian blinds comprising at least two slat stacking units 1, each according to the invention and in particular as described above;
- b) arranging on each stacking unit 1 a complete ladder S on the relative positioning plane p, by inserting the relative two uprights P1, P2 inside the sliding seats 33 of the two U-shaped guides 31, 32, so that they are spaced transversely on the two sides of the longitudinal insertion lane X;
- c) inserting a slat along the aforesaid longitudinal insertion lane X, by associating it to the ladder of each stacking unit 1;
- d) lifting the slat associated to the ladder from said insertion plane m until it is brought inside the loaders 3 of the stacking units 1, juxtaposing it in superimposition over any other slats already present in the loaders and causing the ladder to slide along said guides 31, 32.

[0083] Steps c) and d) are repeated a number of times corresponding to the number of slats composing the Venetian blind. The execution of step d) on the last slat causes the extraction of the ladder from the guides. This operation may be preceded or followed by an automatic cutting of the uprights in the case wherein the ladder is not already of the desired length, but rather is fed continuously.

[0084] According to the invention, in step b) of arranging the ladder on the positioning plane p, the insertion of the uprights into the respective sliding seats 33 of the two U-shaped guides 31, 32 is carried out by first bringing the U-shaped guides into the open guide position and then passing the upright through the cross-section bottleneck 35 for the entire extension of the guide along the aforesaid sliding direction Y1, Y2.

[0085] Once the uprights are inserted, the U-shaped guides 31, 32 are returned to the closed guide position so that the uprights P1, P2 are held inside the respective

sliding seats 33 by means of the cross-section bottleneck 35.

[0086] Preferably, the operation of bringing the guides 31, 32 into the open guide position is carried out manually by the operator tasked with positioning the ladder in the guides. The operation of returning the guide to the closed position is preferably automated, due to the presence of means provided for this purpose.

[0087] Advantageously, it may be provided that the operation of bringing the guides 31, 32 into the open guide position will be conducted automatically. This opening automation is appreciable not so much in the step of positioning the ladder in the guides (a step wherein the immediacy of the direct action of the operator is preferable), but rather in some operative steps during the operation of the stacking unit, when a freer movement of the ladder with respect to the guides may reduce tension on the ladder itself and on the slats associated thereto.

[0088] Advantageously, the U-shaped guides 31, 32 are brought into the open guide position before lifting the last slat of a Venetian blind into the loader and are kept in this position until the ladder is fully extracted from said guides 31, 32. In this case, the opening automation is essential in order not to slow down the operation of the machine.

[0089] The invention allows many advantages already partly described to be obtained.

[0090] The slat stacking unit 1 according to the invention makes it possible to simplify the operations of inserting the uprights into the ladder positioning guides without, however, adversely affecting the functionality of the same guides.

[0091] The stacking unit 1 according to the invention further allows the final extraction of the ladder uprights from the guides to be simplified.

[0092] The stacking unit 1 according to the invention further offers greater operative flexibility in the management of the ladders during the assembly of the Venetian blind.

[0093] The slat stacking unit is simple and economical to construct. No changes to the structure of traditional stacking units are in fact required.

[0094] Finally, the stacking unit 1 is substantially simple to operate.

[0095] The invention thus conceived therefore achieves the foregoing objects.

[0096] Obviously, in its practical embodiment, it may also be assumed to take on shapes and configurations other than those illustrated above without departing from the present scope of protection.

[0097] Moreover, all the details may be replaced by technically equivalent elements, and the dimensions, shapes and materials used may be of any kind according to the needs.

Claims

1. A stacking unit of slats on a complete support ladder for the production of Venetian blinds, wherein the complete ladder comprises two uprights (P1, P2), which support a plurality of cross-members (T1, T2) of engagement with the slats arranged at regular reciprocal distances along the longitudinal extension of said uprights, wherein said stacking unit (1) comprises:

- means (20) for guiding a slat (L) along a longitudinal insertion lane (X) on an insertion plane (m);

- means (31, 32) for positioning a complete ladder on a positioning plane (p) incident to said insertion plane (m) at an engagement area (2) with the slats, said positioning means comprising two U-shaped guides (31, 32) that are arranged, spaced transversely apart from each other, on two opposite sides of said longitudinal insertion lane (X) and each of which defines a sliding seat (33) for an upright (P1 or P2) of the ladder along a sliding direction (Y1, Y2) lying on said positioning plane (p), wherein each sliding seat (33) is open on the longitudinal insertion lane (X) by means of a slit (34) which extends parallel to said sliding direction (Y1, Y2) to allow in use the passage of said cross-members (T1, T2) from one upright to another as well as the free sliding of said cross-members through the two U-shaped guides, at said slit (34) each guide (31, 32) having a cross-section bottleneck (35) that delimits said sliding seat (33);

- means (40) for associating the slat to said ladder at said engagement area (2) by acting on said cross-members (T1, T2); and

- a loader (50), arranged above the insertion plane (m), inside which, one at a time, the slats are progressively pushed, juxtaposed to each other, after having been associated to the ladder,

characterized in that each of said U-shaped guides (31, 32) is divided into two parts (31', 31'') reciprocally movable to pass between at least one closed guide position and at least one open guide position, wherein in the open guide position the cross-section bottleneck (34) of said sliding seat (33) defines a wider through opening than in the closed guide position.

2. Stacking unit according to claim 1, wherein the two parts (31', 31'') into which each U-shaped guide (31, 32) is divided each define a branch of the U-shaped cross-section of the guide (31, 32), said sliding seat (33) being made at the bottom of the U-shaped cross-section.

3. Stacking unit according to claim 2, wherein the two parts (31', 31'') into which each U-shaped guide (31, 32) is divided are movably connected to each other at respective portions defining the bottom of the U-shaped cross-section. 5
4. Stacking unit according to one or more of the preceding claims, wherein each of said guides (31, 32) comprises kinematic connecting means (36) between said two parts (31', 31'') suitable to guide the relative movement of said two parts (31', 31'') between said open guide position and said closed guide position. 10
5. Stacking unit according to claim 4, wherein said two parts (31', 31'') are provided with reciprocal abutment portions defining said closed guide position, preferably said abutment portions being defined near the bottom of the U-shaped cross-section. 15
6. Stacking unit according to claim 4 or 5, wherein said kinematic connecting means (36) comprise at least one guide pin (36', 36'') which is fixed to a first (31') of said two parts and is slidably associated to the second (31'') of said two parts and defines the relative movement of said two parts (31', 31'') between said open guide position and said closed guide position as a translational motion parallel to its axis. 20 25
7. Stacking unit according to claim 6, wherein the axis of said at least one guide pin (36', 36'') is orthogonal to a centerplane of said U-shaped cross-section passing through said sliding direction (Y1, Y2). 30
8. Stacking unit according to claim 4 or 5, wherein said kinematic connecting means comprise a rotation pin that rotationally connects the two parts (31', 31'') to each other about an axis parallel to said sliding direction (Y1, Y2) and defines the relative movement of said two parts (31', 31'') between said open guide position and said closed guide position as a rotational motion, wherein preferably said rotation pin is arranged to connect said two parts near the bottom of the U-shaped cross-section. 35 40 45
9. Stacking unit according to one or more of the preceding claims, wherein each of said guides (31, 32) comprises means (37) for automatically pushing said two parts (31', 31'') towards said closed guide position. 50
10. Stacking unit according to claim 9, wherein the means for automatically pushing said two parts (31', 31'') from said open guide position to said closed guide position are elastic means (37). 55
11. Stacking unit according to claim 6 or 7 and claim 10, wherein said elastic means consist of a compression spring arranged coaxially to said guide pin (36', 36'').
12. Stacking unit according to claim 8 or 9 and claim 10, wherein said elastic means consist of a torsion spring arranged coaxially to said rotation pin.
13. Stacking unit according to one or more of the claims from 9 to 12, wherein each of said guides (31, 32) comprises means (38) for moving said two parts (31', 31'') from said closed guide position to said open guide position, wherein preferably said movement means (38) are controllable remotely and are sized to overcome the force exerted by said automatic pushing means (37) towards said closed guide position.
14. Stacking unit according to claim 13, wherein said movement means consist of at least one pneumatic cylinder (38) .
15. Stacking unit according to claim 13 or 14, comprising an electronic control unit which is connected to said movement means and is programmed to operate them in predefined steps of the Venetian blind assembly process.
16. A method of stacking slats on a complete ladder for the production of Venetian blinds, wherein the complete ladder comprises two uprights (P1, P2), which support a plurality of cross-members (T1, T2) for engagement with the slats placed at regular distances along the longitudinal extension of the same uprights, the method comprising the following operative steps:
 - a) providing an assembly station for Venetian blinds comprising at least two slat (L) stacking units (1), each according to one or more of the preceding claims;
 - b) on each stacking unit (1) arranging a complete ladder (S) on the relative positioning plane (p) by inserting the relative two uprights (P1, P2) inside the sliding seats (33) of the two U-shaped guides (31, 32), so that they are spaced transversely on the two sides of said longitudinal insertion lane (X)
 - c) inserting a slat (L) along said longitudinal insertion lane (X) by associating it to the ladder of each stacking unit (1);
 - d) lifting the slat associated to the ladder from said insertion plane (m) until it is brought inside the loaders (3) of the stacking units (1), juxtaposing it in superimposition over any other slats already present in the loaders and causing the sliding of the ladder along said guides (31, 32); **characterized in that** in step b) of arranging the ladder on the positioning plane, the insertion of the uprights in the respective sliding seats (33)

of the two U-shaped guides (31, 32) is carried out by bringing the U-shaped guides into the open guide position in advance and then passing the upright through the cross-section bottleneck (35) for the entire extension of the guide along said sliding direction (Y1, Y2), wherein, after having inserted the uprights (P1, P2) in the respective sliding seats (33), the U-shaped guides (31, 32) are brought back into said closed guide position so as to retain the uprights P1, P2 inside the respective sliding seats (33) by means of the cross-section bottleneck (35).

17. Stacking method according to claim 16, wherein the U-shaped guides (31, 32) are brought into the open guide position before lifting the last slat of a Venetian blind into the loader (3) and are kept in such position until the complete extraction of the ladder from said guides (31, 32) .

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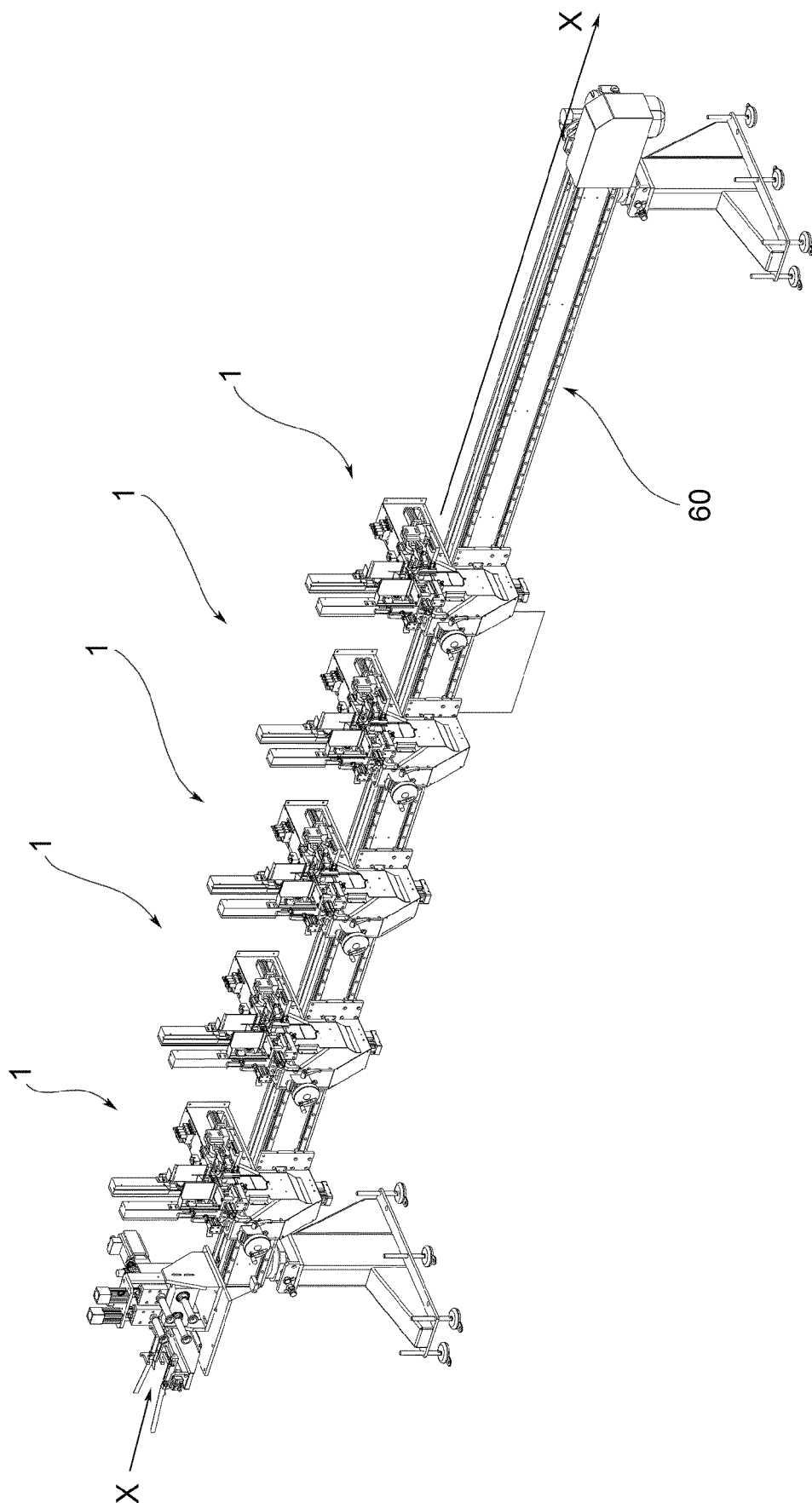
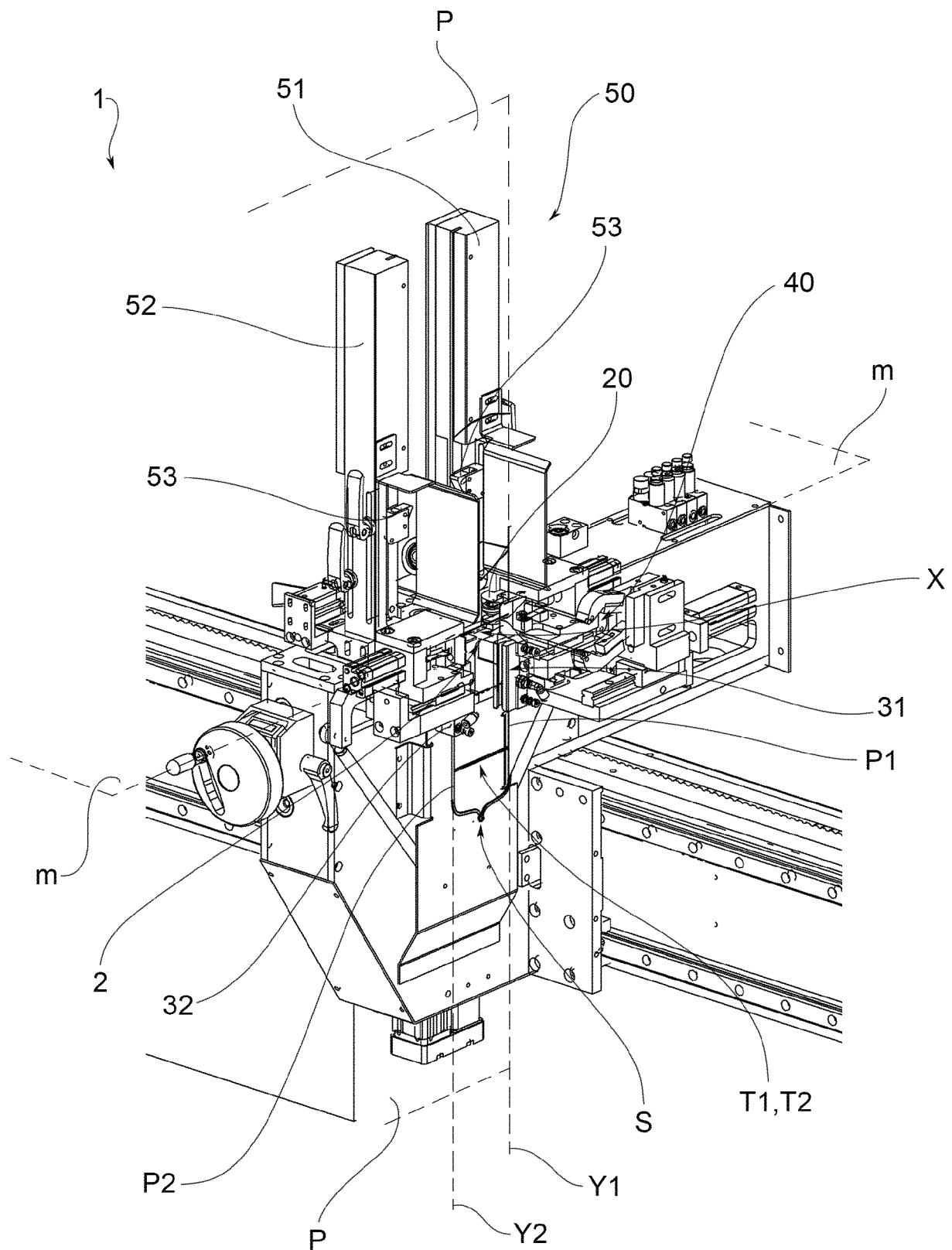


FIG.1



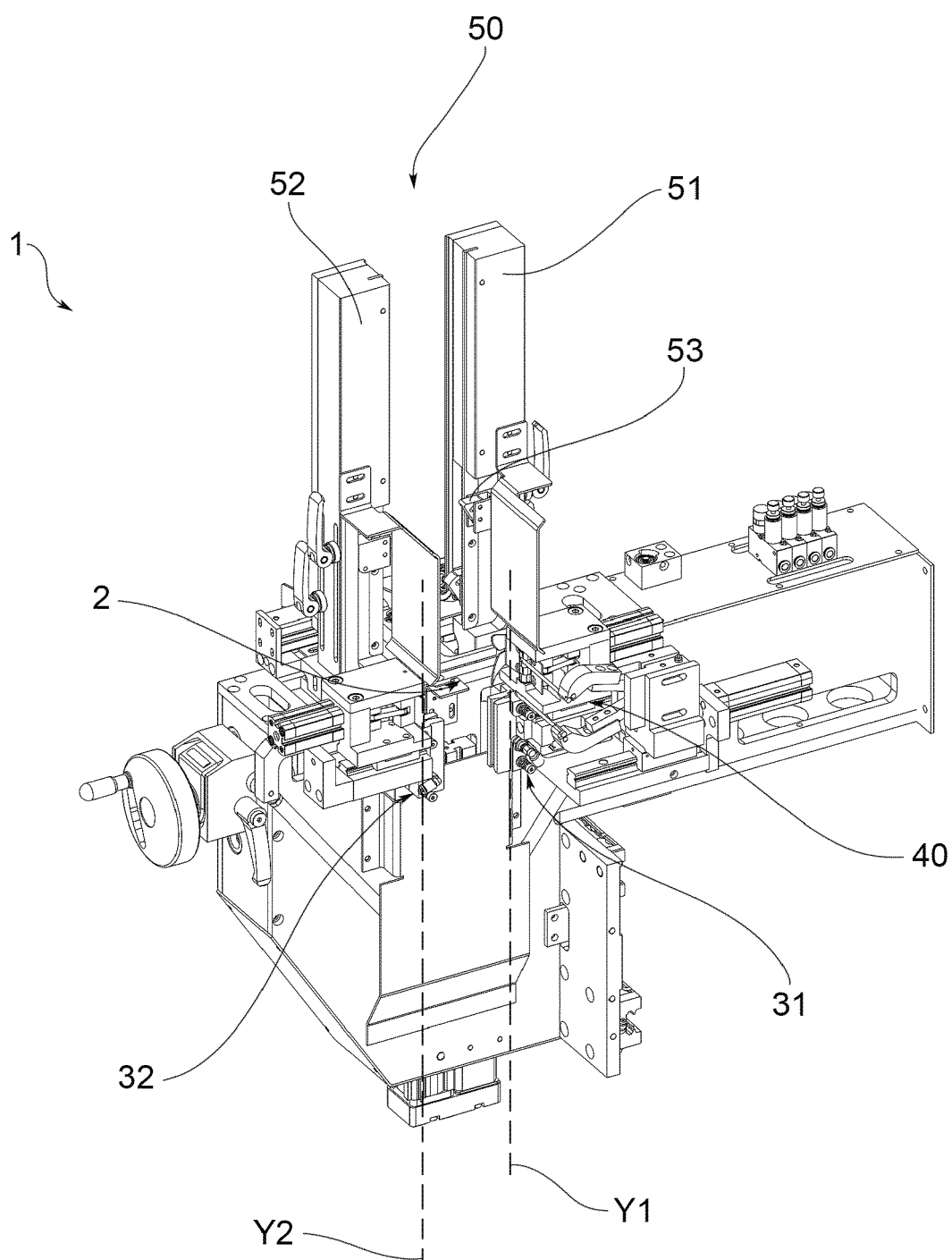


FIG.3

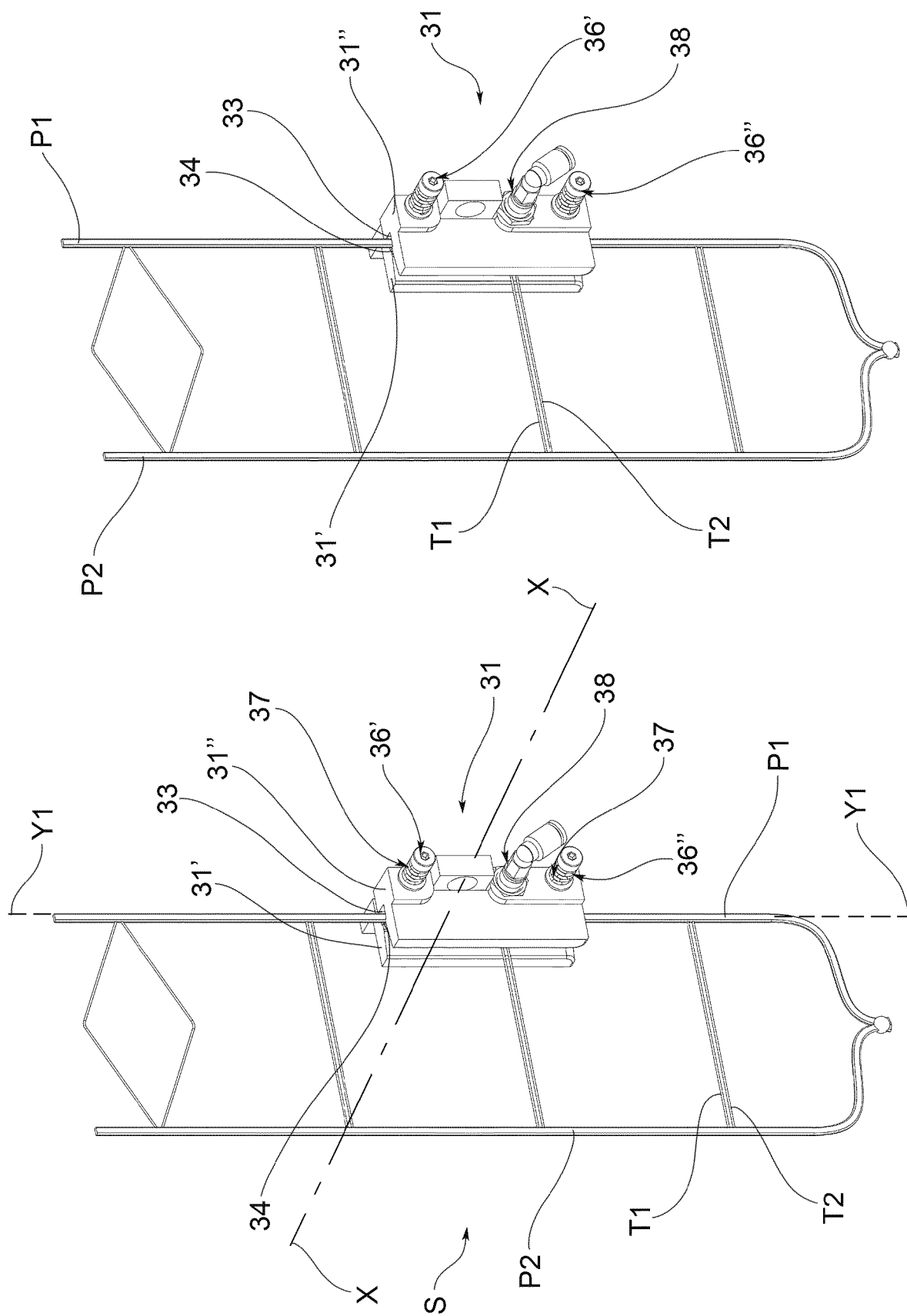


FIG. 5

FIG. 4

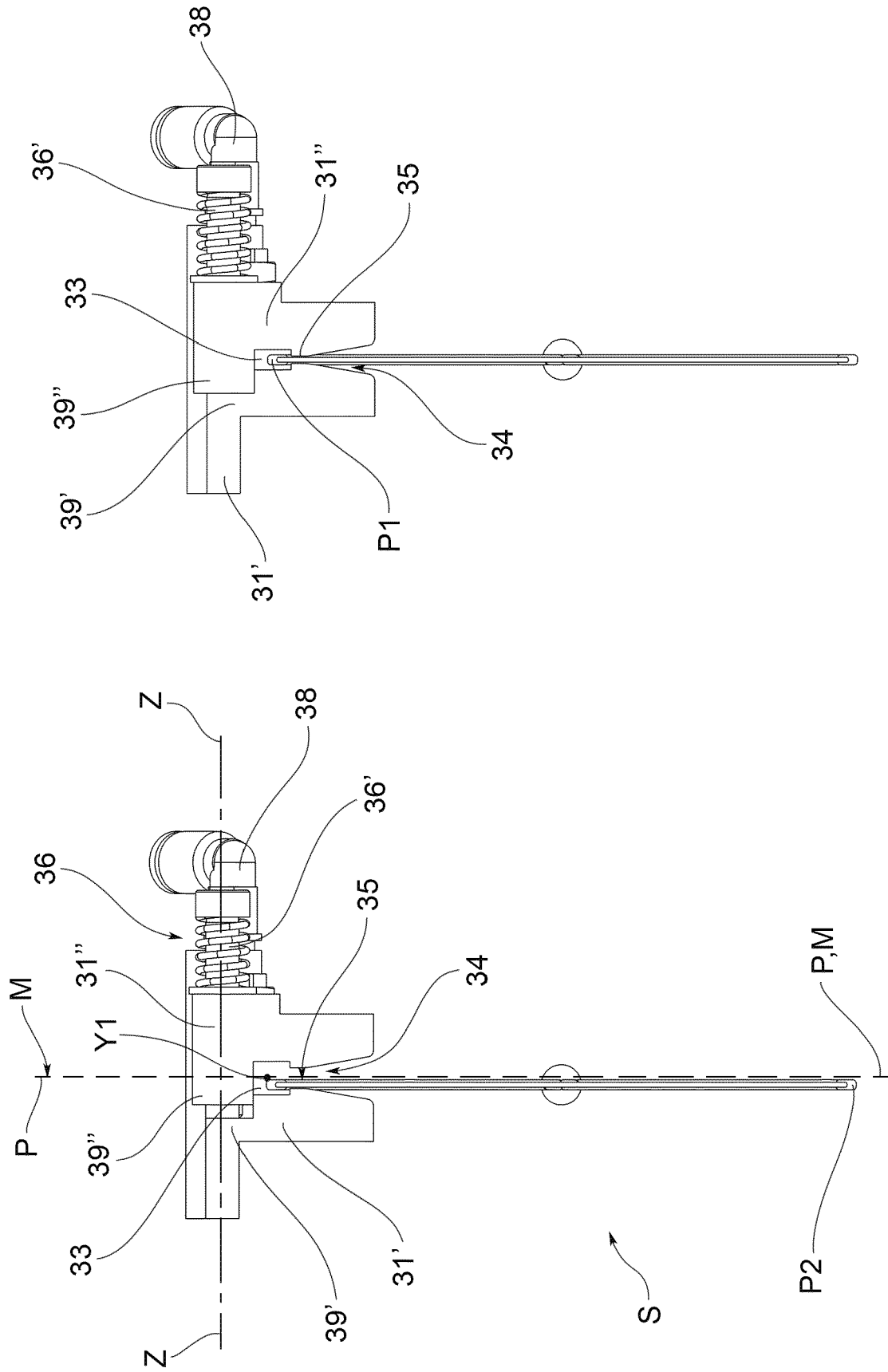
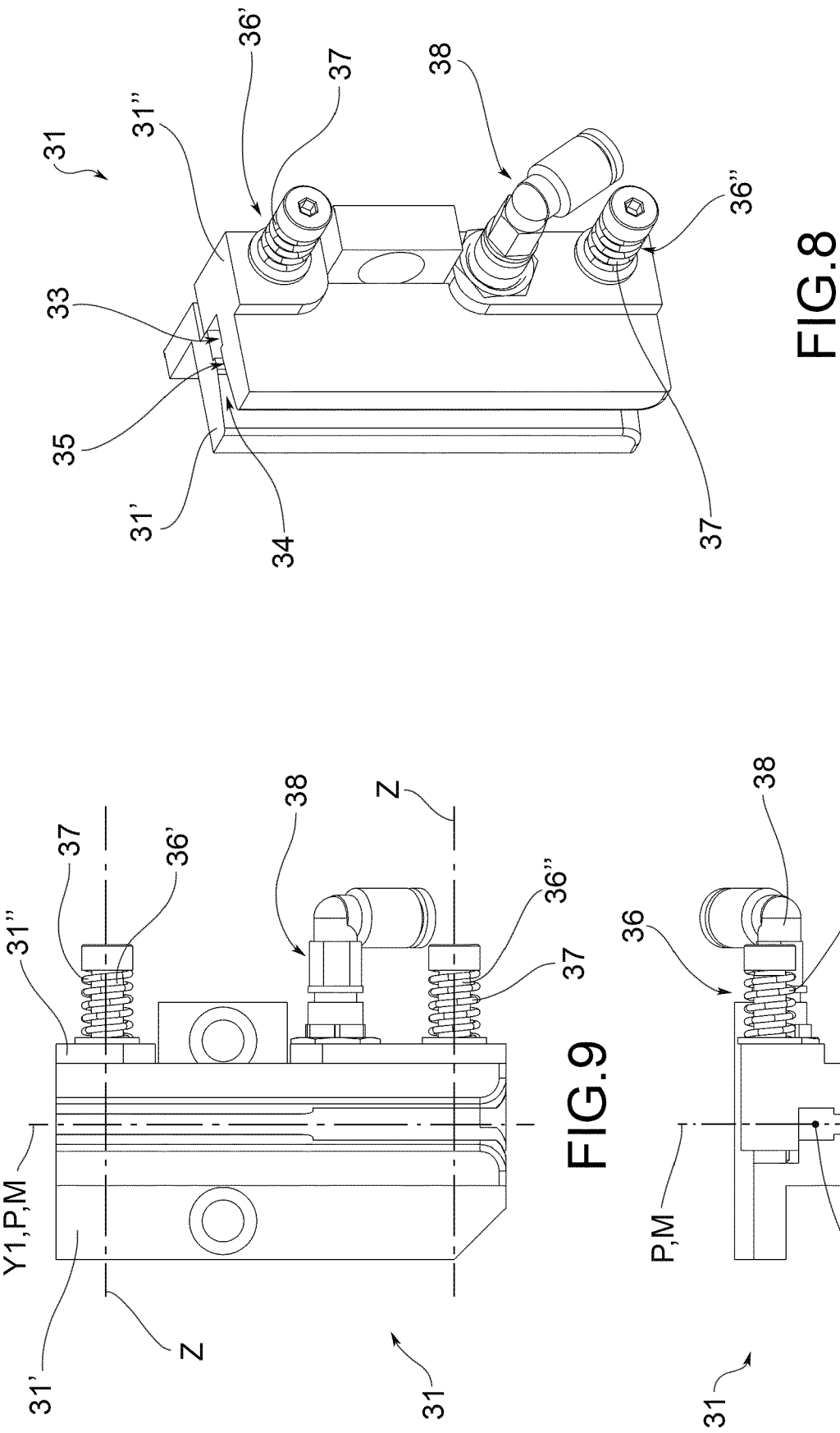


FIG.7

FIG.6



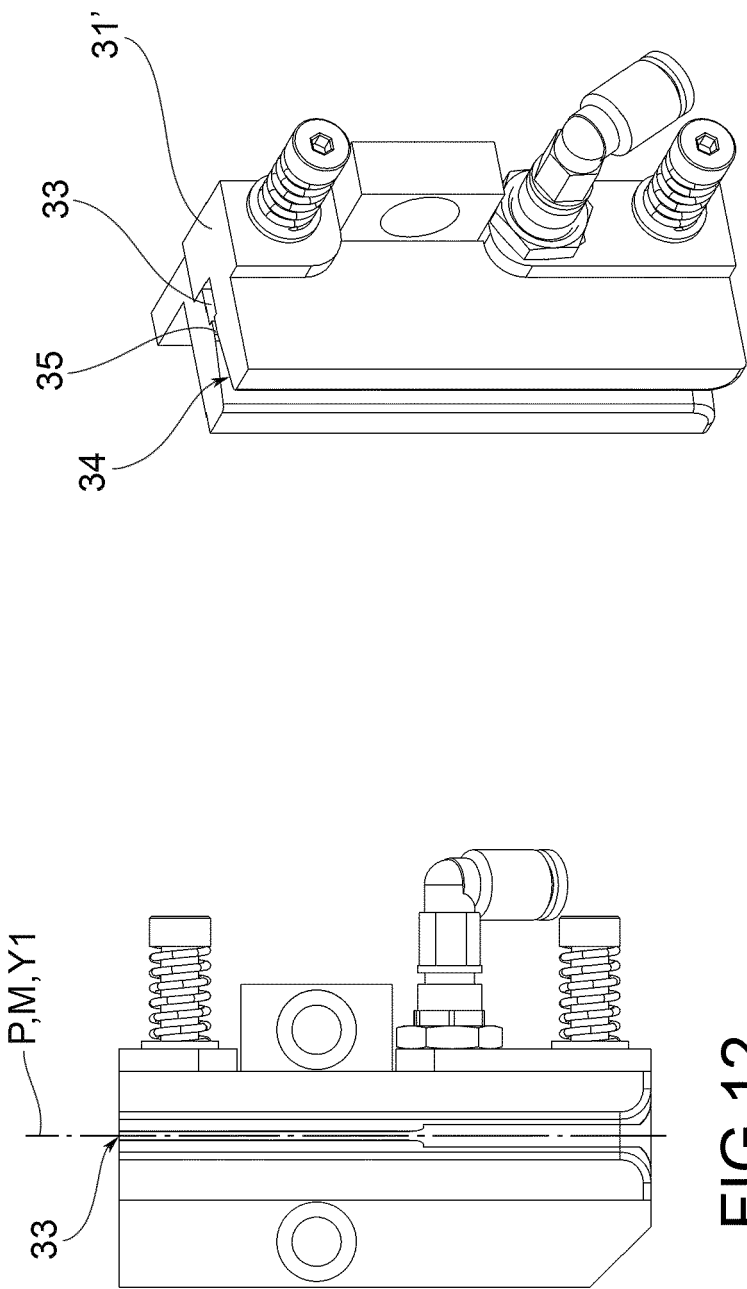


FIG.11

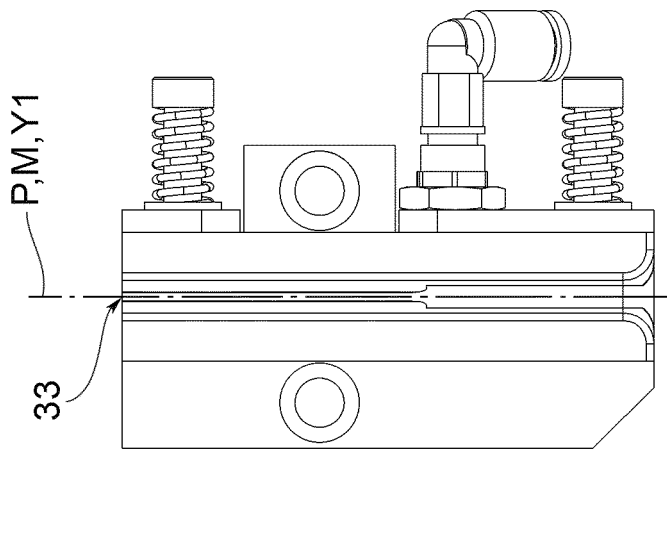


FIG.12

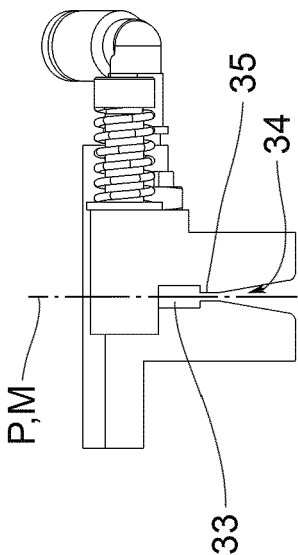
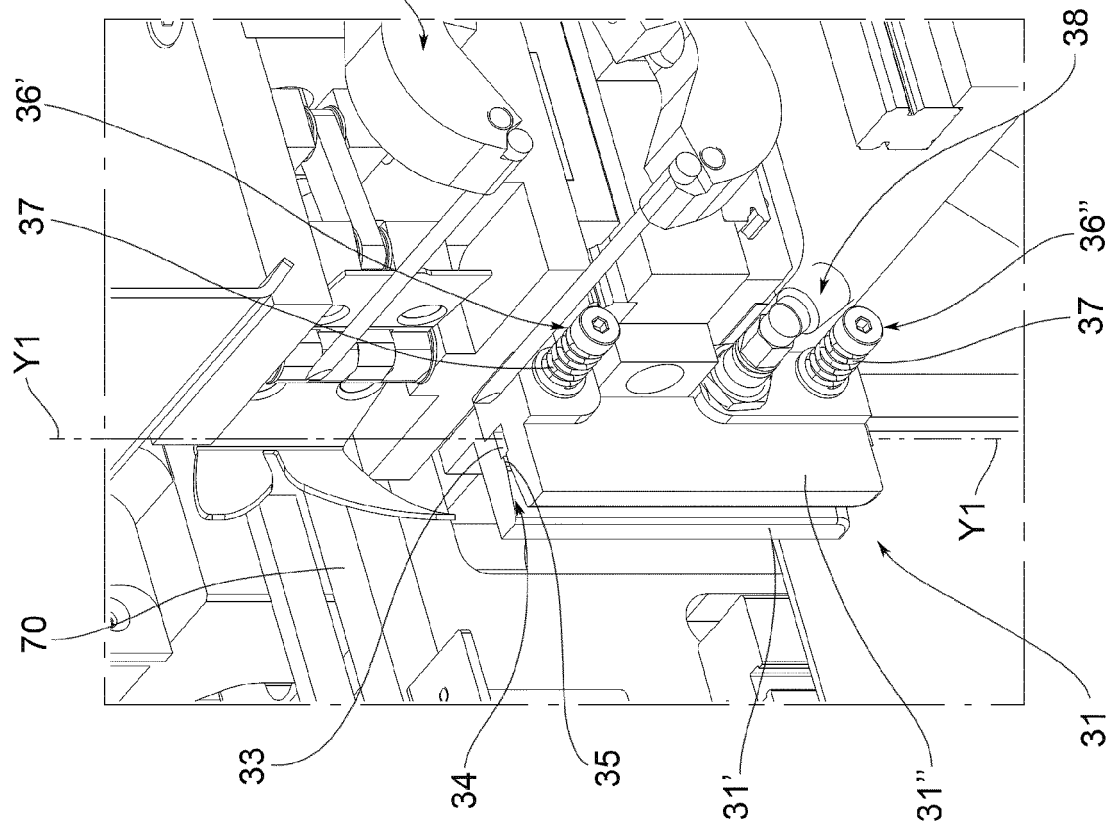
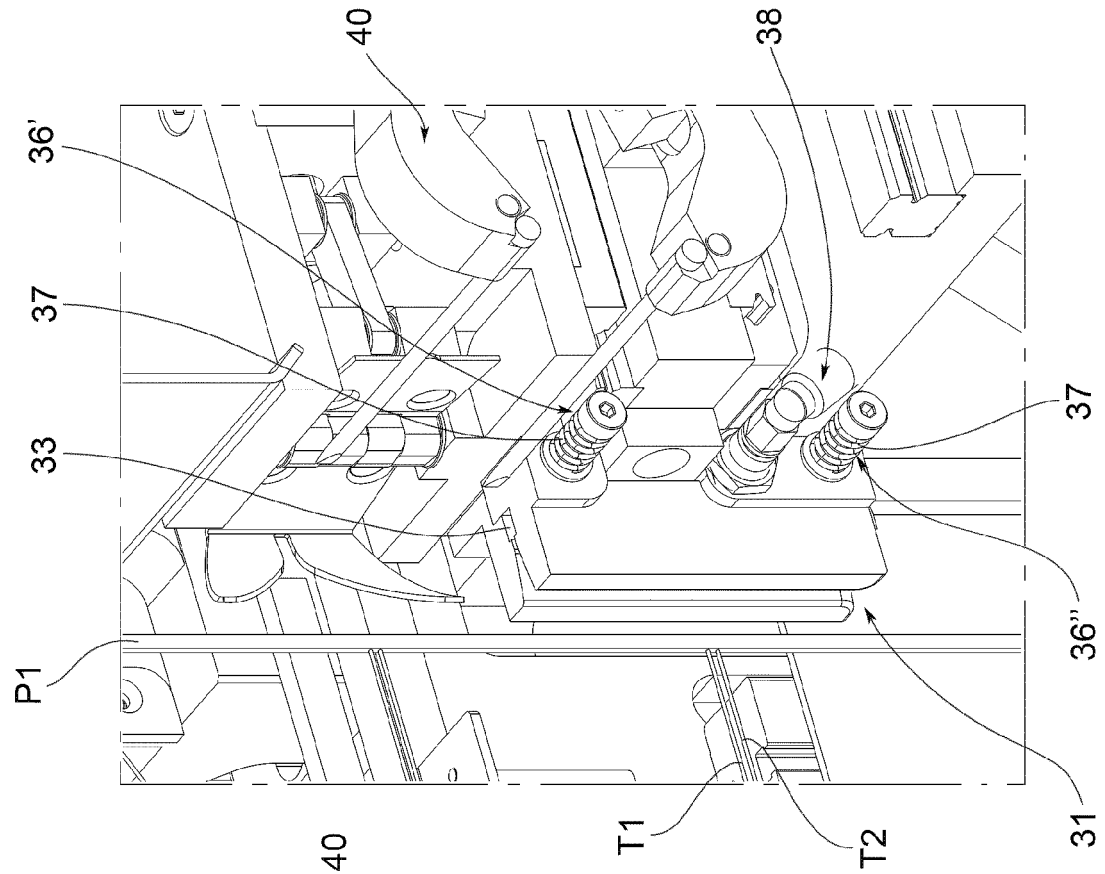


FIG.13



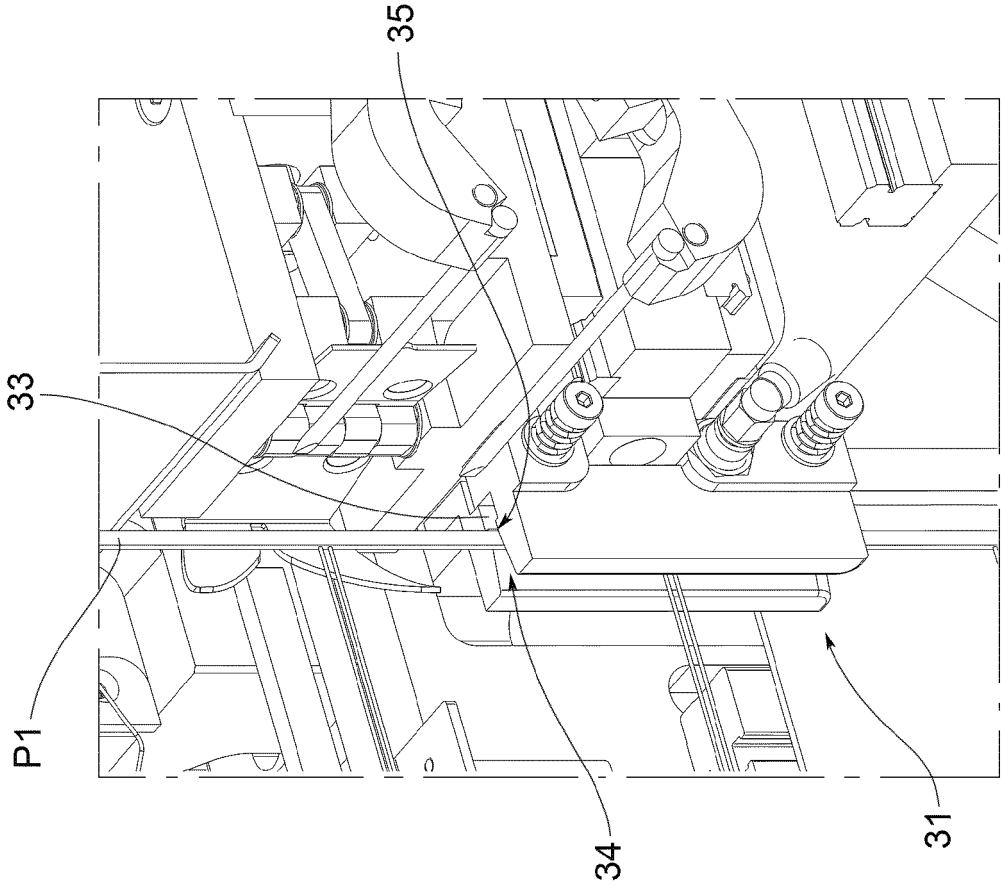


FIG.17

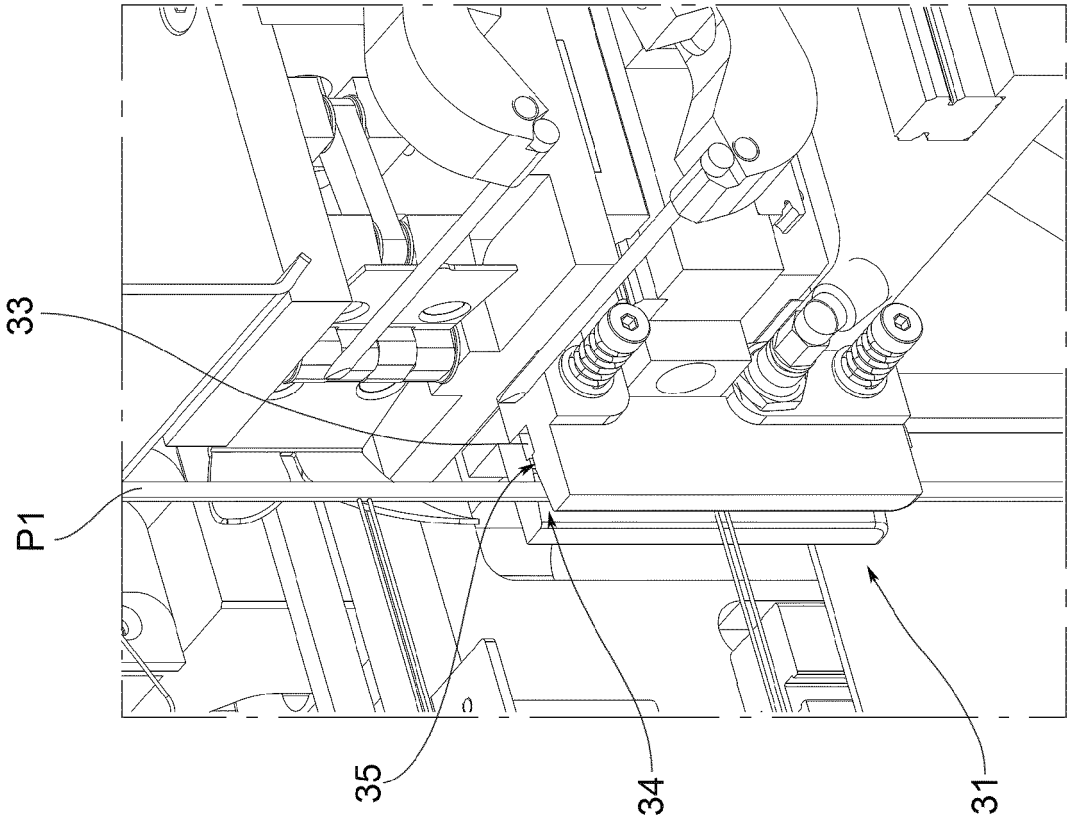
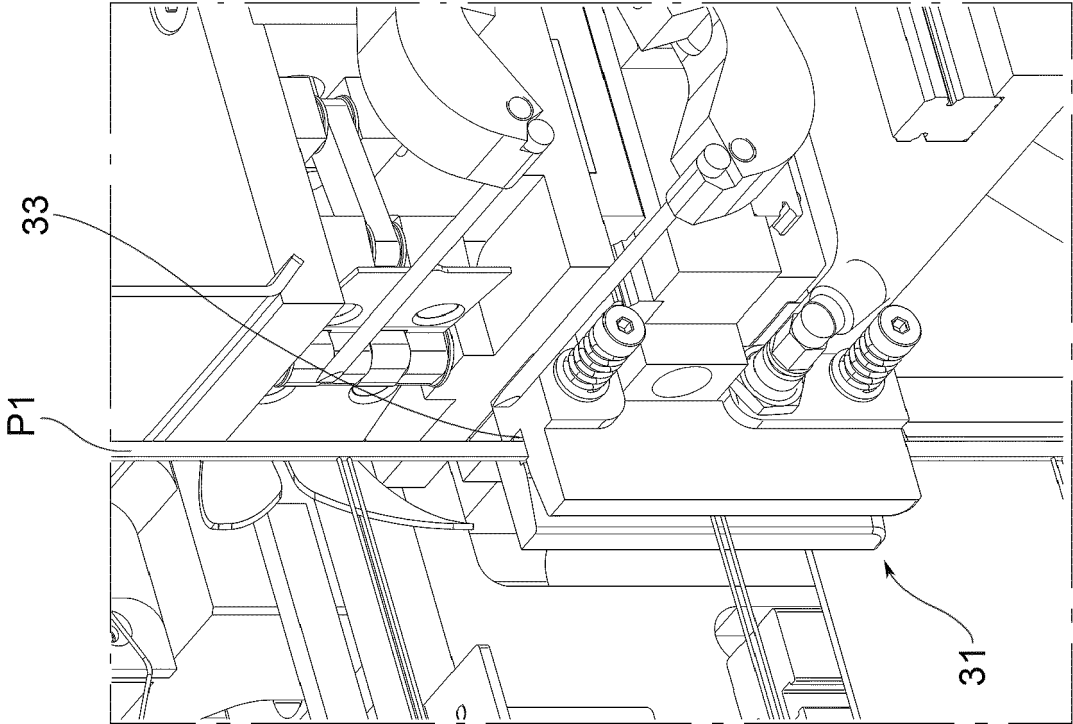
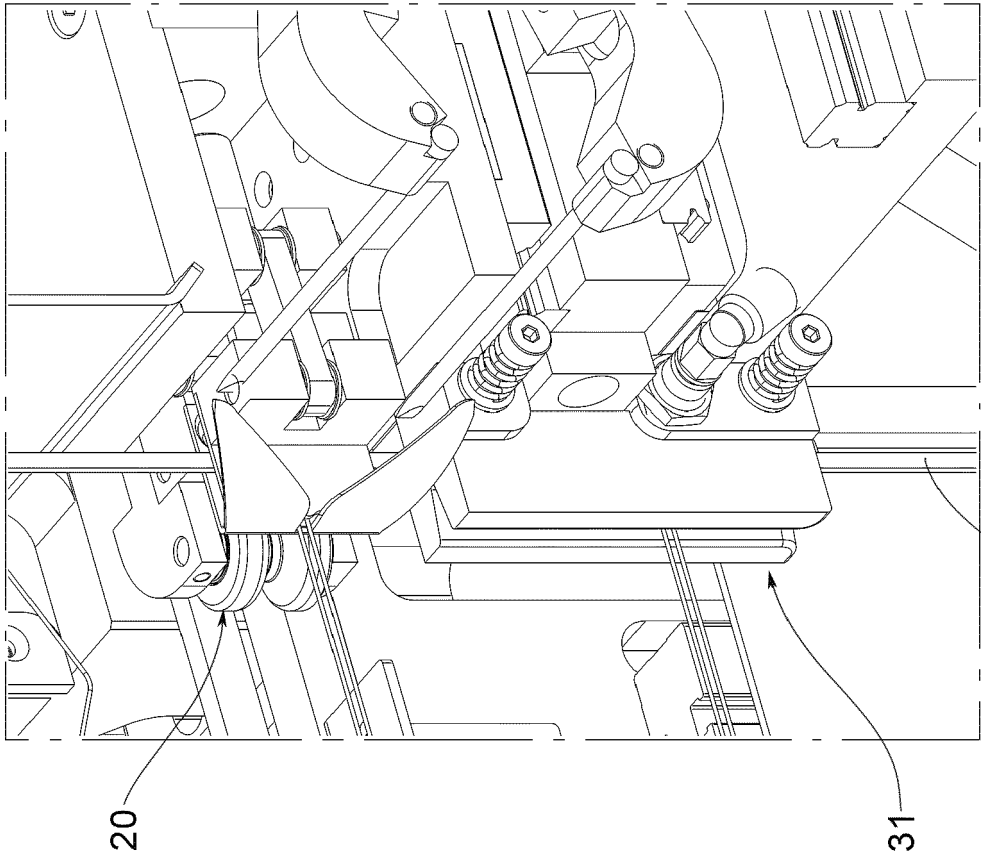


FIG.16



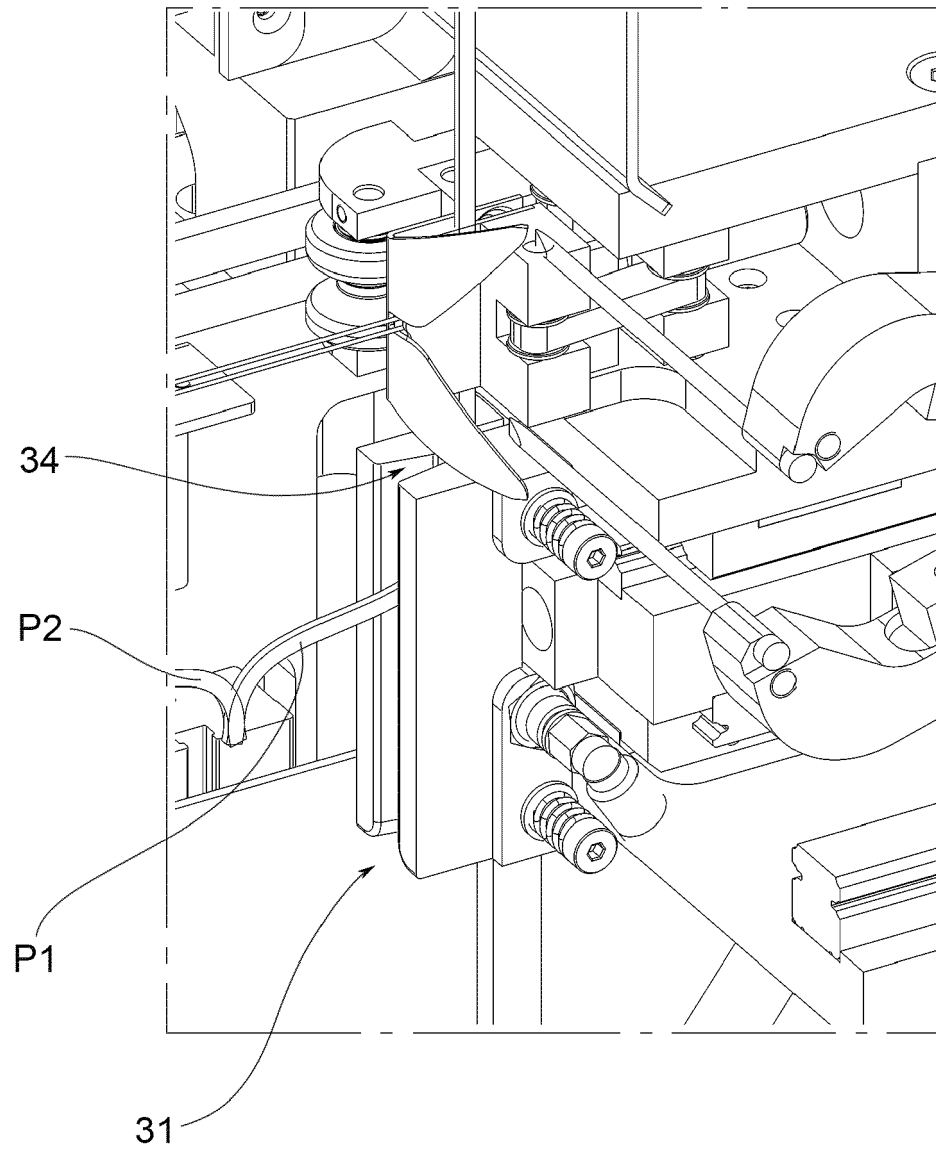


FIG.20



EUROPEAN SEARCH REPORT

Application Number
EP 20 15 7817

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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,D	EP 2 677 108 A1 (DALLAN SPA [IT]) 25 December 2013 (2013-12-25) * paragraphs [0070] - [0071]; figures 6-14 * -----	1,2,4,9, 16,17	INV. E06B9/266
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 April 2020	Examiner Kofoed, Peter
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- EP 2886781 B1 **[0037]**
- EP 2677108 B1 **[0037]**
- EP 2677107 B1 **[0037]**