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(54) **UNIT FOR STACKING VENETIAN BLIND SLATS ON SUPPORT STRUCTURE AND METHOD OF POSITIONING A SUPPORT STRUCTURE IN A UNIT FOR STACKING SLATS**

VORRICHTUNG ZUM STAPELN VON JALOUSIELAMELLEN AUF EINER TRAGSTRUKTUR UND VERFAHREN ZUR POSITIONIERUNG EINER TRAGSTRUKTUR IN EINER EINHEIT ZUM STAPELN VON LAMELLEN

UNITÉ POUR L'EMPILAGE DE LAMES DE STORES SUR UNE STRUCTURE DE SUPPORT ET PROCÉDÉ DE POSITIONNEMENT D'UNE STRUCTURE DE SUPPORT DANS UNE UNITÉ D'EMPILEMENT DE LAMELLES

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Description

Field of application

[0001] This invention relates to a unit for stacking slats on a support structure for the production of Venetian blinds and a method of positioning a support structure in a unit for stacking slats of a Venetian blind.

State of the art

[0002] As is known, Venetian blinds are constituted by a plurality of slats, arranged parallel to each other and maintained in position by string support structures. These structures are essentially of two types: "complete ladder" (more simply "ladder") or "separate ladders" (more simply "semi-ladder").

[0003] A support structure of the "ladder" type is constituted by two parallel ribs (arranged in the direction of the height of the blinds) and a plurality of crosspieces that connect them to each other at regular distances. A slat is associated to each crosspiece, supported (if the crosspiece is single) or inserted (if the crosspiece is double or multiple). Therefore, the two ribs serve as uprights for the slats.

[0004] A support structure of the "semi-ladder" type is constituted by two cords separated from each other and each provided with a plurality of string eyelets, distributed at regular distances along the single cord. The support cords are positioned in pairs on opposite sides of the slats, generally transversely aligned. The cords are associated to the slats at the eyelets, in particular using clips or hooks fastened on the side edges of the slats themselves. Therefore, the two cords serve as uprights for the slats.

[0005] Both types of support structure are similar in that they both have uprights, to which are associated the means of attachment of the slats, constituted by the crosspieces (single or double) in the case of the ladder or by eyelets in the case of the semi-ladder. In both cases, the support structure must be positioned with respect to the slat in such a way that the each of the uprights are located on one of the two sides of the slat itself.

[0006] A Venetian blind is realised by associating a plurality of slats to two or more support structures spaced longitudinally from each other. Generally, this operation is automated using production systems that comprise two or more stacking units along a slat sliding line. In particular, each stacking unit is suitable to position a support structure on a plane transverse to the slat sliding line, with the two uprights arranged laterally to the slats. As the slats are associated to the support structure, they are progressively stacked one on another in a storage area for the slats already worked. With this movement, they jerkily drag with them the entire support structure associated with them.

[0007] A stacking unit for producing a Venetian blind using a "ladder" as support structure for the slats is described, for example, in EP2677108A1, WO2014/009818A1, EP2677107A1 in the name of the same Applicant, and in EP2253794A2 and EP2314822A1.

[0008] A stacking unit for producing a Venetian blind using a "semi-ladder" as support structure for the slats is described, for example, in EP2653646A2 in the name of the same Applicant.

[0009] From an operational point of view, it is crucial to be able to correctly position the support structure with respect to the working plane of the slats. In particular, it is essential that, after each lifting jerk of the support structure, the crosspieces (in the case of ladders) or eyelets (in the case of semi-ladders) about to be associated with the slat are positioned exactly on the working plane of the slat itself. In the case of ladders, this means facilitating the insertion of the slat in the crosspieces, while in the case of semi-ladders, it means allowing the application means of the hooks or clips to not operate in vain, but to effectively engage the eyelets with precision.

[0010] The positioning of the crosspieces or eyelets is linked to the movement imposed on the entire support structure by the progressive displacement of the slats from the working plane to the storage area for the slats already worked.

[0011] However, this method of moving the support structure is not always able to ensure a correct positioning of the crosspieces or eyelets with respect to the working plane of the slats. In fact, despite the crosspieces and eyelets being arranged along the uprights with a regular pitch, in many cases, the dimensional tolerance in the distribution of eyelets and crosspieces is such as to significantly affect the final positioning of these elements. Moreover, a support structure (whether ladder or semi-ladder) is not rigid and is therefore subject to movements, tensions or slackening that, in fact, affect the actual position of the eyelets and crosspieces. Furthermore, two uprights of the same support structure may be subject to different tensions in the same stacking unit. This is inevitably reflected in the position of the crosspieces and eyelets with respect to each other and the working plane.

[0012] At present, due to the dimensional tolerances of the support structures and the different tensions that the stacking units may apply to the uprights, it is not possible to precisely and constantly control the positioning of the eyelets and crosspieces. This adversely affects the quality of the Venetian blinds.

Presentation of the invention

[0013] Therefore, the purpose of this invention is to wholly or partly eliminate the drawbacks of the prior art cited above, by providing a slat stacking unit on a support structure for the production of Venetian blinds that allows the controlled positioning of this supports structure with respect to a slat working plane in such a way that the final position of the eyelets or crosspieces about to be associated with a slat is not affected, or not significantly,

by the dimensional tolerances of the support structure and/or by any tensions applied to the structure itself.

[0014] A further purpose of this invention is to make available a slat stacking unit that can operate without distinction with support structures of the ladder and semi-ladder type.

[0015] A further purpose of this invention is to make available a slat stacking unit that is simple to manage.

[0016] A further purpose of this invention is to make available a slat stacking unit that is simple and economical to produce.

[0017] A further purpose of this invention is to make available a method of positioning a support structure in a unit for stacking slats of a Venetian blind that allows the controlled positioning of the support structure in such a way that the final position of the eyelets or crosspieces about to be associated with a slat is not affected, or not significantly, by the dimensional tolerances of the support structure and/or by any tensions applied to the structure itself.

Brief description of the drawings

[0018] The technical characteristics of the invention, according to the above-mentioned purposes, can be clearly understood from the claims listed below and its advantages will become more apparent from the detailed description that follows, made with reference to the accompanying drawings, which show one or more purely exemplary and non-limiting embodiments wherein:

- Figures 1 and 2 show respectively a perspective view and a front orthographic view of a stacking unit according to a preferred embodiment of this invention, illustrated with a several slats already associated to a support structure and with several components eliminated to better highlight the others;
- Figure 3 shows an orthogonal front view of a part of the stacking unit of Figure 1 according to the direction III indicated therein, without slats;
- Figures 4 to 10 are views of the stacking unit of Figure 3 that show in sequence - for a support structure of the semi-ladder type - the various steps of positioning the support structure with respect to a slat working plane as slats are progressively added in the stacking unit;
- Figure 11 shows a front view of the stacking unit of Figure 3, shown with a plurality of already worked slats placed in a storage area, an already worked slat placed in a temporary storage area and the slat working area empty; and
- Figure 12 shows a partially lateral perspective view of the stacking unit illustrated in Figure 11.

Detailed description

[0019] With reference to the accompanying drawings, the reference number 1 indicates, in its entirety, a slat stacking unit on a support structure for the production of Venetian blinds according to the invention.

[0020] In particular, the stacking unit 1 is intended to be inserted - together with one or more identical units - in a more complex production system (not shown in the figures). More in detail, the unit 1 may be movably associated with a longitudinal support bar (not shown) at one end of which is arranged a slat production machine (not shown).

[0021] Here and in the following description and claims, reference will be made to the stacking unit 1 in condition of use. References to a lower or higher position must be understood in this sense.

[0022] In general, the support structure S with which the stacking unit 1 works is provided with two uprights P1,P2 and a plurality of connection elements T1,T2 to the slats, attached to the uprights and distributed along the longitudinal extension of the latter.

[0023] The support structure S can be of the ladder type, in which the two uprights are connected to each other by crosspieces (single, double or multiple) that constitute the connection elements to the slats. The support structure S can be of the semi-ladder type (as shown, for example, in the accompanying figures), in which the two uprights are separated from each other, each provided with a plurality of eyelets that constitute the connection elements to the slats. The slat stacking unit according to the invention is thus suitable to operate without distinction with support structures of the ladder or semi-ladder type.

[0024] According to a general embodiment of the invention, the stacking unit 1 comprises at least one guide element (not shown) for a slat L, which defines a working plane m on which the slat L slides supported along a longitudinal axis of movement X. Preferably, this guide element is constituted by a laminar element rigidly secured to a support structure of the stacking unit 1.

[0025] In correspondence of the working plane m, the slat is associated to connection elements T1,T2 of a support structure S positioned on a positioning plane p incident to the working plane m, with the two uprights positioned on two opposite sides of the longitudinal axis X. For this purpose, the stacking unit is provided with devices for associating the slats L to the connection elements of the support structure S. These devices may be of any type provided they are suitable for the purpose. They are not described here since they do not constitute the core of this invention and are, in any case, known to a person skilled in the art. By way of example, in the case of a support structure of the semi-ladder type, the association devices of the slats to the eyelets of the uprights can be those described in European patent application No. EP EP2653646A2 filed in the name of the same Applicant and incorporated herein by reference. In the case of a support structure of the ladder type, association devices of the slats to the crosspieces of the uprights may comprise, for example, divaricating means of the crosspieces, well known to a person skilled in the art.

[0026] Preferably, the stacking unit 1 comprises

means 20 for positioning the support structure S on such a positioning plane p incident to the working plane m, in such a way that the two uprights are arranged on two opposite sides with respect to the longitudinal axis X.

[0027] Operationally, as will be taken up in the following description, during working the support structure S is made to slide on the positioning plane p along a sliding direction Q incident to the working plane m.

[0028] According to the preferred embodiment illustrated in the accompanying figures, the positioning means 20 comprise in particular two guides 21,22, spaced from each other to receive each one of the two uprights P1, P2 of the support structure S. In the free space between the two guides, the connection elements T1, T2 of the structure S are progressively arranged as the support structure slides along the sliding direction Q, in such a way as to be accessible for the operations of association to the slats.

[0029] In particular, as shown for example in Figures 2 and 3, each guide 21,22 has a limited longitudinal extension along the sliding direction Q and terminates in the vicinity of the working plane with an upper end 21', 22'.

[0030] According to an essential aspect of this invention, the stacking unit comprises means 30,40 for moving the two uprights P1,P2 of the support structure S independently of one another making them slide parallel to the above-mentioned sliding direction Q incident to the working plane m. Operationally, these moving means 30,40 are controlled, preferably by an electronic control unit (not illustrated in the accompanying figures), so as to progressively position the connection elements T1, T2 of each upright exactly in correspondence of the working plane m.

[0031] The expression "exactly in correspondence to the working plane" should be interpreted as meaning that the connection elements are in the required position so that they can be properly associated with the slat. This position depends on the characteristics of devices intended to carry out such operations. The adaptation is within the reach of a technician in the field, by merely deciding the position in which the connection element is to be stopped depending on the operational needs of the devices actually used.

[0032] Differently from the prior art, the independent and controlled movement of the two uprights of the support structure is able to ensure a correct positioning of the crosspieces or eyelets (i.e., the connection elements) with respect to the working plane of the slats. In fact, this positioning method is not affected by dimensional tolerances in the distribution of eyelets and crosspieces, as it allows a very accurate local positioning. The positioning method according to the invention is not even significantly affected by the "non-rigidity" of the support structure and by any movements, tensions or slackness to which they may be subjected. In addition, the independent positioning of the two uprights allows remedying any differentiated tensions between the two uprights.

[0033] There is practically no risk that the independent positioning of the two uprights may interfere with the operation of the stacking unit, determining offsets on the sliding movement of the uprights and therefore of the support structure, and thus jams. On the contrary, the independent positioning is a guarantee with respect to such events. For example, the independent positioning allows continuously, and in a controlled manner, correcting any errors in the initial loading of the support structure, in particular in the case of semi-ladders, in which the two uprights are physically separated.

[0034] In any case, the independent positioning operates on support structures in which the connection elements (eyelets and crosspieces) are realised with a substantially regular pitch. Therefore, the intervention of the moving means is essentially corrective and does not oppose to the normal operation of the stacking unit. In any case, the elasticity of the uprights is able to absorb any unevenness between one side and the other with a compensation effect, even during working when one or more slats are already associated to the structure.

[0035] The invention therefore allows precisely and constantly controlling the positioning of the eyelets and crosspieces, significantly increasing the quality of the final product. This happens in the case of both ladder structures and semi-ladder structures.

[0036] Preferably, the moving means 30,40 comprise at least two distinct releasable gripping elements 31, 41, constituted for example, by controllable grippers able to clamp the uprights.

[0037] These gripping elements 31,41 are moveable parallel to the above-mentioned sliding direction Q, independently from one another, on opposite sides with respect to the longitudinal axis of movement X. The two gripping elements 31,41 preferably operate in correspondence with the positioning plane p of the support structure so that each gripping element 31,41 can engage an upright P1,P2 of the support structure.

[0038] Preferably, each gripping element 31, 41 is functionally associated to least one sensor 32,42 suitable to detect the position of the connection elements T1,T2 of the respective upright P1,P2 in relation to the working plane m. Operationally, the movement of each gripping element 31,41 is controlled by the respective sensor 32,42 through, for example, the above-mentioned control unit, which receives input signals from the sensors and is programmed to control and actuate the gripping elements.

[0039] Advantageously, as shown in particular in Figure 12, the above-mentioned at least one sensor 32,42, preferably optical, is arranged below the working plane m at a predefined distance. Functionally, the movement of the gripping element 31,41 is controlled in such a way that, after the detection of the passage of a connection element by the respective sensor 32,42, the gripping element 31,41 is stopped after having covered a further section equal to the predetermined distance.

[0040] Operatively, as illustrated in the sequence of Figures 3 to 8, each gripping element 31,41 moves par-

allel to the above-mentioned sliding direction Q between a gripping start position (Figs. 3, 4 and 8) and a gripping end position (Fig. 5) in a cyclical manner, alternating going and return movements. In the going movement from the start gripping position to the end gripping position (see Figs. 4-5) the gripping element grips the respective upright so as to drag it with itself, while in the opposite return movement (Figs. 5-8) the gripping element does not grip the upright, leaving it stopped.

[0041] According to a preferred embodiment shown in the accompanying figures, each gripping element 31,41 is slidingly associated with a guide bar 33,43 that extends parallel to the sliding direction Q.

[0042] Preferably, in the return movement, each gripping element 31,41 is moved away from the respective upright P1,P2 to avoid accidentally touching the connection elements and/or the edge of the slats (see Figs. 6-7). Advantageously, for this purpose, the gripping element 31,41 may be slidably associated to the guide bar 33,43 by means of a carriage 34,44. The gripping element is movably associated with the carriage so as to move transversely with respect to the carriage itself and thus to the guide bar and be able to thus move away from the upright during the return movement.

[0043] Advantageously, the stacking unit 1 comprises, for each upright P1,P2, blocking means of the movement of the uprights themselves. Operationally, these blocking means (not illustrated in the accompanying figures) are deactivated during the going movement of the gripping element, while they are activated at least during the return movement to prevent the upright - in the absence of the action exerted by the gripping element - to move from the position in which it was carried. In particular, the blocking means can be constituted by pawls arranged on the guides 21,22 and actuated by pneumatic or hydraulic pistons, whose intensity of intervention is controllable. As a function of the intensity of actuation of the pistons, the pawls can brake the sliding of the upright or block it completely.

[0044] In particular, each of the guides 21,22 - which are part of the positioning means 20 - is formed so as to wrap the portion of upright that is inserted in it, letting it project to the outside substantially only the related connection elements T1,T2. Advantageously, as illustrated in Figures 3 to 8, each gripping element 31,41 grips the respective upright in a section not covered by the guide 21,22 beyond the upper end 21', 22' and thus above the working plane m. In this way, there is no risk that the movement of the gripping elements being obstructed or limited by the steric encumbrance of the guides.

[0045] Advantageously, the stacking unit 1 comprises a loader 10 in which the slats are deposited with a movement along the above-mentioned sliding direction Q, after being associated to the support structure S.

[0046] Preferably, the movement of the slats into the loader 10 is performed by lifting means 50, specifically dedicated to that function.

[0047] In particular, the loader 10 defines a storage compartment 10a,10b for slats placed above the working plane m. The lifting means 50 are suitable to lift the slats from the working plane m to the storage compartment 10a,10b. Advantageously, the lifting means 50 are controlled by the already mentioned electronic control unit.

[0048] In particular, the moving means 30,40 of the uprights impose a movement to the uprights P1, P2 concordant with that of the slats L, i.e., substantially parallel to the sliding direction Q.

[0049] According to a preferred embodiment illustrated in the accompanying figures, the loader 10 is formed by two first vertical support bars 11,12, arranged on two opposite sides with respect to the longitudinal axis of movement X. Operationally, as shown for example in Figure 11, the slats L are inserted between the two bars 11,12 and supported in position by at least one pair of retractable brackets 13,14 formed by two brackets placed at the same level, of which a first bracket fixed to one bar and a second bracket fixed to the other bar. Each pair defines a storage area. The brackets, suitable to define a stable support area for the slats, are of the retractable type if subjected to a push from below, so as to eliminate their encumbrance. These retractable brackets are equipped with an automatic system for return to the active position, for example based on elastic means. In particular, the position of each bracket 13,14 is adjustable in height along the respective bar 11,12 by means of an adjustment hand wheel 36,46.

[0050] Preferably, the storage area is divided into a temporary storage area 10a and a final storage area 10b formed on different levels. The temporary storage area 10a is formed at an intermediate level between the working plane m and the final storage area 10b.

[0051] Operationally, the temporary storage 10a temporarily stores each slat L as soon as it is associated to the support structure S before being moved to the final storage area 10b, where it is placed alongside any other slats that may be present and already associated to the support structure S.

[0052] Thus the temporary storage area 10a receives the slat just associated to the support structure. As is clear from the sequence of Figures 8-10, a slat is held in the temporary storage area until a new slat is associated to the support structure. At this point, the slat in the temporary storage area 10a is moved to the final storage area 10b, where all the worked slats are progressively stacked. When the temporary storage area is freed, it is possible to place a new slat in it. Preferably, the two movements take place simultaneously in a synchronised manner.

[0053] In the loader, the slats are overlapped on one another in a compact configuration. In this step, it is important that the portions of the uprights between one pair of crosspieces and another one be arranged externally of the slats, assuming a folded S shape (see Figure 12). A technician of the field knows that, in some cases, due to incorrect positions assumed by the uprights during previous processing steps, it may happen that the uprights

end up moving towards the inside of the support structure, thus positioning themselves between one slat and another one. This incorrect positioning of the uprights, in addition to not allowing a correct overlapping between the slats in the loader, may impart a shape memory to the uprights themselves, such that during use they will tend to resume this incorrect position, at the expense of functionality and of aesthetics of the Venetian blind.

[0054] It has been found that dividing the step of stacking the slats into two steps, that is, into a first step of placing the slat in the temporary storage area and then a second step from the temporary storage to the final storage area, reduces the occurrence, in the final product, of uprights caught between two slats when they are brought together.

[0055] Operationally, the stationing of the slat in the temporary storage area allows to physically separating the step of working slat, during which the slat is associated to a portion of the support structure, and step of storing the worked slat, in which the slat is placed next to the previously worked slat and the uprights assume the typical S-shape. Once worked, the slat is not then immediately placed next to the previous slat, but is left stationed in the temporary storage area. After working, the uprights could have tensions related to the operations of associating the slats. In particular, during the association of the slat, a part of each upright is inserted inside the respective guide, while the remainder is disposed outside of the guide. This can lead to a difference of tension in the section of upright between one slat and another and thus induce tensions such as to cause an incorrect movement of the uprights themselves in the folding step. Otherwise, thanks to the upward lifting and subsequent stationing in the temporary storage area, before the beginning of folding, the entire upright is arranged outside the guide and any accumulated residual tensions can be released. The upright - no longer held in the guide and therefore less subject to external constraints - is now more free to follow the normal S-shaped bend.

[0056] Preferably, as illustrated in the accompanying figures, the temporary storage area 10a is formed at a higher level than the upper end 21' or 22' of each guide 21,22 of the positioning means 20 of the support structure S.

[0057] According to the preferred embodiment illustrated in the accompanying figures, each storage area 10a, 10b is defined by a pair of brackets, associated with the two first bars 11,12 and retractable inside the respective bar, if subjected to a push from below. Preferably, the position of each bracket 13,14 is adjustable in height along the respective bar 11,12 by means of an adjustment hand wheel 36,46.

[0058] In particular, the first two vertical bars 11,12 are positioned on a plane parallel to and distinct from the positioning plane p of the support structure S.

[0059] Advantageously, the lifting means 50 of the slats comprise first and second lifting elements 51 and 52, movable parallel to said sliding direction Q respectively on two opposite sides of said longitudinal axis of movement X.

[0060] More in detail, the first and second lifting means 51 and 52 are operationally independent from each other and are supported by two second guide bars 33 and 43. These latter, in particular, are arranged on a plane parallel to, and distinct from, the positioning plane p of the support structure S on two opposite sides with respect to the longitudinal axis of movement X.

[0061] Preferably, both the first lifting means 51 and the second lifting means 52 each comprise:

- an initial lifting device 51',52' suitable to lift a slat from the working plane m up to the temporary storage area 10a; and
- a final lifting device 51",52" suitable to lift a slat from the temporary storage area 10a to the final storage area 10b.

[0062] As illustrated in the accompanying figures, the stacking unit 1 is provided, on each of two opposite sides with respect to the longitudinal axis X, with a pair of elevators, formed by an initial lifting device 51' or 52' and a final lifting device 51" or 52".

[0063] In particular, the initial lifting device 51' or 52' and the final lifting device 51" or 52" are slidingly associated to the same second guide bar 33 or 43, which extends parallel to the sliding direction Q.

[0064] More in detail, each initial lifting device 51',52' is composed of a non-retractable bracket while each final lifting device 51",52" is composed of a bracket retractable inside the relative bar when subjected to a push from below.

[0065] Preferably, the initial lifting device 51' and 52' and the final lifting device 51" and 52" are kinematically integral with each other so as to ensure a mutually synchronised movement. In this way, as is clear from the sequence of Figures 9 and 10, the movement of a slat L from the working plane m to the temporary storage area 10a can take place simultaneously with the movement of a worked slat L (worked in the cycle immediately preceding) from the temporary storage area 10a to the final storage area 10b, with a reduction of dead time.

[0066] As already mentioned previously, the lifting of the slats is entrusted to the lifting means 50, specifically dedicated to this function, and is operationally separate from the movement of the uprights P1, P2. According to the underlying logic of this invention, the movement of the uprights is, in fact, entrusted to the moving means 30 and 40.

[0067] Advantageously, to prevent operational interference between the two types of means, the lifting means 50 of the slats L have a movement coordinated with the moving means 30 and 40 of the uprights P1,P2, in the sense that the former are activated to follow the movement of the latter. Preferably, from an operational point of view, the movement of the slats depends on the movement of the uprights.

[0068] Operationally, the controlled movement of the uprights, coordinated with that of the slats, also has beneficial effects on the correct arrangement of the uprights with respect to the slats. In fact, thanks to the intervention of the moving means, which preferably act on the portions of the uprights above the slats being worked, in the step of stacking in the loader, the uprights are "accompanied" at least for a first section in the lifting path and kept in position parallel to the sliding direction Q. This is advantageous because this reduces the risk that, in the initial stacking step (which in the case illustrated in the accompanying figures coincides with the transition from the working plane m to the temporary storage area 10a) the uprights - subjected to tensions not always uniform - move from the sliding direction Q towards the space comprised between two slats, with the risk of being then arranged between one slat and another at the end of stacking.

[0069] According to the preferred embodiment illustrated in the accompanying figures, each releasable gripping element 31,41 is kinematically integral with the initial lifting device 51' or 52' and with the final lifting device 51" or 52" operating on the same side of the stacking unit 1 with respect to the longitudinal axis X.

[0070] More in detail, this operational solution is realised by slidably associating the gripping element 31,41 to the same guide bar 33,43 of the two lifting devices and moving all three elements (gripping element and the two lifting devices) with the same carriage 34 or 44 sliding along the guide bar. In particular, with this configuration, a single actuator can be used for the movement of both the gripping element and the two lifting devices. In particular, as illustrated in the accompanying figures, the common carriage 33,43 is moved by a single actuator, consisting of a pneumatic piston 35,45.

[0071] Advantageously, the guide bar 33,43 in common between the gripping element and the two lifting devices can also be used as a vertical support bar of the loader on the same side with respect to the longitudinal axis X, to the advantage of the compactness of the stacking unit 1.

[0072] Preferably, to ensure that the slats are correctly positioned in the loader 10 passing the brackets 13,14 that define the two storage areas, the height position of the retractable brackets 13,14 of the loader is adjusted in such a way that the distance between the working plane m and the level of the intermediate storage area 10a and the distance between the two storage areas 10a and 10b, are less than the pitch between the connection elements T1, T2 of the support structure in use, taking due account of the dimensional tolerances of the pitch. In this way, given that the uprights and therefore also the slats are lifted in height for a section equal on average to the pitch, it is certain that the slats are able to pass the brackets of the loader and are positioned correctly.

[0073] Similarly the distance between the initial lifting device 51' or 52' and the final lifting device 51" or 52" is defined in such a way as to ensure the correct positioning of the slats in the two storage areas 10a and 10b.

[0074] The operating steps of the stacker 1 in relation to the positioning of a semi-ladder support structure (Figures 4 to 10) according to the embodiment illustrated in the accompanying figures are now briefly described.

[0075] In Figure 4, the stacking unit 1 is in the initial condition: the semi-ladder has been positioned and a first slat was placed on the working plane m and here associated to the eyelets T1, T2. The gripping elements 31,41 have already gripped the uprights P1, P2 in a position external to the guides 21,22. The uprights are moved upwards by means of the gripping elements 31,41 and, at the same time, the lifting means 50 are also actuated, which act directly on the slat to bring it up to the temporary storage area 10a. The movement of the gripping elements 31,41 and therefore also of the lifting means 50 is stopped when the eyelets immediately following have arrived in correspondence of the working plane. The adjustment on two sides is independent one from the other and is performed by detecting the position of the eyelets with optical sensors arranged below the working plane m at a predefined distance from it (Figure 5). At this point, once the eyelet of each upright to be about to be associated to the slat has been positioned correctly, both gripping elements 31,41 are brought back to the starting point, following the reverse path, but distanced from the respective uprights (Figures 6 -8). In this step, the blocking means of the uprights are actuated to prevent them from losing their position in the absence of the gripping elements. The cycle now resumes as already described, with the only difference that, in this case, the temporary storage area 10a contains a slat (Figure 9) and the latter is transferred to the final storage area (Figure 10) following the activation of the gripping elements and of the lifting means. Figure 11 illustrates the situation after a series of cycles, when several slats have accumulated in the final storage area 10b.

[0076] The method for positioning a support structure S in a slat stacking unit for Venetian blinds according to the invention will be now described.

[0077] This method is applicable, in general, to a support structure S provided with two uprights P1, P2 and a plurality of connection elements T1,T2 to the slats, attached to the uprights and distributed along the longitudinal extension of the latter. The structure can thus be, without distinction, of either the ladder or semi-ladder type.

[0078] According to a general embodiment, the method comprises the following operational steps:

- a) arranging a stacking unit 1 of slats L according to the invention and, in particular, as previously described;
- b) moving the two uprights P1, P2 of the support structure S independently of one another making them slide parallel to a sliding direction Q incident to the working plane m;
- c) detecting the position of the connection element

T1, T2 that is approaching the working plane m;

- d) controlling the movement imposed on each upright P1, P2 by the moving means 30,40 based on the position detected in step c) so as to stop said movement when the connection element T1,T2 of the respective upright P1,P2 is positioned exactly at the working plane m.

[0079] In particular, step c) of detecting the position of the connection element T1,T2 that is approaching the working plane is performed by the sensors 32,42 already described.

[0080] In particular, step d) of controlling the movement imposed on each upright P1, P2 by the moving means 30,40 can be performed with the aid of an electronic control unit that receives input signals from the sensors and is programmed to control and actuate the already described means 30,40 responsible for moving the uprights.

[0081] The advantages of this method have already been described in relation to the stacking unit and, for simplicity of exposition, will not be explained again.

[0082] The invention allows obtaining many advantages in part already described.

[0083] The stacking unit 1 and the method of positioning according to the invention allow the controlled positioning of a support structure for slats with respect to a plane for working the slates in such a way that the final position of the eyelets or crosspieces about to be associated with a slat is not affected, or not significantly, by the dimensional tolerances of the support structure and/or by any tensions applied to the structure itself.

[0084] The stacking unit 1 according to the invention can operate without distinction on support structures of both the ladder type and semi-ladder type, since it requires that the support structure be engaged in correspondence to the uprights, i.e., in correspondence to the components present in both types of structures.

[0085] The stacking unit 1 is manageable via a normal PLC that is equipped with a normal electronic control unit, already used in traditional units. The unit 1 is therefore simple to manage. In fact, operationally, it only requires the management of a plurality of actuators as a function of the signals deriving from two sensors suitable to detect the position of two distinct connection elements with respect to a predefined fixed reference, with operating cycles on the whole simple.

[0086] The stacking unit 1 is also simple and economical to produce since, with respect to traditional units, it requires only the addition of simple and economical mechanical components to be built and/or found on the market.

[0087] Therefore, the invention thus conceived achieves the predefined purposes.

[0088] Obviously, it may even assume, in its practical embodiment, forms and configurations different from that illustrated above without, for this reason, departing from the present scope of protection.

[0089] Moreover, all the details may be replaced by technically equivalent elements and the dimensions, forms and materials used may be any according to the needs.

Claims

1. Unit for stacking slats on a support structure for the production of Venetian blinds, such structure (S) being provided with two uprights (P1, P2) and a plurality of connection elements (T1, T2) to the slats, attached to the uprights and distributed along the longitudinal extension of the latter, the unit comprising:

   - at least one guide element for a slat (L), defining a working plane (m) on which the slat (L) slides supported along a longitudinal axis of movement (X), at said plane (m) the slat being associated with connection elements (T1, T2) of a support structure (S) positioned on a positioning plane (p) incident to the working plane (m), with the two uprights positioned on two opposite sides of the longitudinal axis (X);

   characterised in that it comprises means (30, 40) of moving the two uprights of the support structure (S) independently of one another making them slide parallel to a sliding direction (Q) incident to the working plane (m), said moving means (30, 40) being controllable so as to progressively position the connection elements (T1, T2) of each upright exactly at the working plane (m).

2. Stacking unit according to claim 1, wherein the moving means (30, 40) comprise at least two distinct releasable gripping elements (31, 41) movable parallel to said sliding direction (Q), independently of each other, on opposite sides of said longitudinal axis of movement (X), at said positioning plane (p) so that each gripping element (31, 41) can engage an upright (P1, P2) of the support structure.

3. Stacking unit according to claim 2, wherein each gripping element (31, 41) is functionally associated to at least one sensor (32, 42) suitable to detect the position of the connection elements (T1, T2) of the respective upright (P1, P2) in relation to the working plane (m), the movement of the gripping element (31, 41) being controlled by said at least one sensor (32, 42).

4. Stacking unit according to claim 3, wherein said at least one sensor (32, 42), preferably optical, is placed below the working plane (m) at a predefined distance, the gripping element (31, 41) being controlled in such a way that after the sensor detects the passage of a connection element the movement of the gripping element (31, 41) stops, after having

covered a further section equal to said predefined distance.

5. Stacking unit according to one or more of the claims 2 to 4, wherein each gripping element (31, 41) moves cyclically parallel to said sliding direction (Q) between a gripping start position and a gripping end position, in the going movement from said gripping start position towards the gripping end position, the gripping element (31, 41) engaging the respective upright (P1, P2), while in the opposite return movement the gripping element (31, 41) does not engage the upright.

6. Stacking unit according to claim 5, wherein each gripping element (31, 41) is slidingly associated with a guide bar (33, 43) which extends parallel to the sliding direction (Q).

7. Stacking unit according to claim 5 or 6, wherein in the return movement each gripping element (31, 41) is distanced from the respective upright (P1, P2).

8. Stacking unit according to claim 6 or 7, wherein the gripping element (31, 41) is slidingly associated with the guide bar (33, 43) by means of a carriage (34, 44), said gripping element being movably associated to the carriage in order to be able to translate transversely with respect to the carriage and thus the guide bar (33, 43) and thus be able to move away from the upright during the return movement.

9. Stacking unit according to one or more of the claims from 5 to 8, comprising for each upright (P1, P2) blocking means of the movement of said uprights, said blocking means being disabled during the return movement of the gripping element.

10. Stacking unit according to one or more of the previous claims, comprising means (20) for positioning the support structure (S) on said positioning plane (p) incident to the working plane (m), with the two uprights on two opposite sides of the longitudinal axis (X), said positioning means (20) comprising two guides (21, 22), distanced from each other to each receive one of the two uprights (P1, P2) of the support structure (S), connection elements (T1, T2) of the structure (S) being progressively arranged in the free space between the two guides gradually as the support structure slides in the sliding direction (Q).

11. Stacking unit according to claim 10, wherein each guide (21, 22) has a limited longitudinal extension in the sliding direction (Q) and ends next to the working plane with an upper end (21', 22'), preferably each gripping element (31, 41) engaging in the respective upright in a portion not covered by the guide (21, 22) beyond the upper end (21', 22') above the working plane (m).

12. Stacking unit according to one or more of the previous claims, comprising a loader (10) in which the slats (L) are deposited, once associated to the support structure (S) with a movement in said sliding direction (Q), the moving means (30, 40) imparting to the uprights (P1, P2) a movement concordant with that of the slats (L).

13. Stacking unit according to claim 12, wherein the loader (10) defines a storage compartment (10a, 10b) for slats positioned over the working plane (m), the stacking unit (1) comprising means (50) for lifting the slats from the working plane (m) up to the storage compartment (10a).

14. Stacking unit according to claim 13, wherein the storage compartment (10) is made of two first vertical support bars (11, 12), positioned on two opposite sides of the longitudinal axis of movement (X), the slats (L) being inserted between said two bars (11, 12) and supported by at least a pair of retractable brackets (13, 14) which are connected to said two bars and define a storage compartment.

15. Stacking unit according to claim 13 or 14, wherein the slat storage compartment is divided into a temporary storage compartment (10a) and a final storage compartment (10b) made on different levels, the temporary storage compartment (10a) being made at an intermediate level between the working plane (m) and the final storage compartment (10b), preferably the two storage compartments (10a, 10b) being each defined by a pair of brackets which are associated to the first two bars (11, 12) and are retractable within the respective bar when subjected to a push from below.

16. Stacking unit according to claim 14 or 15, wherein the two vertical bars (11, 12) are positioned on a plane parallel to and distinct from the positioning plane (p) of the support structure (S).

17. Stacking unit according to one or more of the claims from 13 to 16, wherein the lifting means (50) comprise first and second lifting elements (51, 52), movable parallel to said sliding direction (Q) respectively on two opposite sides of said longitudinal axis of movement (X).

18. Stacking unit according to claim 17, wherein the first and second lifting means (51, 52) are operatively independent of each other and are supported by two second guide bars (33, 43) which are arranged on a plane parallel and distinct from the positioning plane (p) of the support structure (S) on two opposite sides of the longitudinal axis of movement (X).

19. Stacking unit according to claim 15 or 16 and claim 17 or 18, wherein both the first, and the second lifting means (51, 52) comprise an initial lifting device (51', 52') suitable to lift a slat from the working plane (m) up to the temporary storage compartment (10a), and a final lifting device (51", 52") suitable to lift a slat from the temporary storage compartment (10a) to the storage compartment (10b).

20. Stacking unit according to claim 19, wherein the initial lifting device (51', 52') and the final lifting device (51", 52") are slidingly associated to the same second guide bar (33, 43) which extends parallel to the sliding direction (Q),

21. Stacking unit according to claim 20, wherein the initial lifting device (51', 52') is composed of a non-retractable bracket while the final lifting device (51", 52") is composed of a bracket retractable inside the relative bar when subjected to a push from below.

22. Stacking unit according to one or more of the claims from 19 to 21, wherein the initial lifting device (51', 52') and the final lifting device (51", 52") are kinematically integral with each other so as to ensure a mutually synchronised movement.

23. Stacking unit according to one or more of the claims from 13 to 22, wherein the lifting means (50) of the slats (L) have a movement coordinated with the moving means (30, 40) of the uprights (P1, P2).

24. Stacking units according to claim 23, wherein each releasable gripping element (31, 41) is kinematically integral with the initial lifting device (51', 52') and the final lifting device (51", 52") operating on the same side, preferably the gripping element (31, 41) being slidingly associated to the same second guide bar (33, 43) as the two lifting devices.

25. Method of positioning a support structure (S) in a unit for stacking slats of a Venetian blind, such structure (S) being provided with two uprights (P1, P2) and a plurality of connection elements (T1, T2) to the slats attached to the uprights and distributed along the longitudinal extension of the latter, the method comprising the following operating steps:

a) arranging a stacking unit (1) of slats (L) according to one or more of the previous claims;
b) moving the two uprights (P1, P2) of the support structure (S) independently of one another making them slide parallel to a sliding direction (Q) incident to the working plane (m);
c) detecting the position of the connection element (T1, T2) approaching to the working plane (m);
d) controlling the movement imposed on each upright (P1, P2) by the moving means (30, 40) based on the position detected in step c) so as to stop said movement when the connection element (T1, T2) of the respective upright (P1, P2) is positioned exactly at the working plane (m).

Patentansprüche

1. Einheit zum Stapeln von Lamellen auf einer Stütz- bzw. Trägerstruktur für die Herstellung von Jalousien, wobei diese Struktur (S) mit zwei Pfosten bzw. Ständern (P1, P2) und einer Mehrzahl von Verbindungselementen (T1, T2) zu den Lamellen versehen ist, die an den Ständern angebracht und entlang der Längserstreckung der letzteren verteilt sind, wobei die Einheit umfasst:

- zumindest ein Führungselement für eine Lamelle (L), das eine Arbeitsebene (m) definiert, auf der die Lamelle (L) gestützt bzw. getragen entlang einer Längsbewegungsachse (X) gleitet, wobei an der Ebene (m) die Lamelle mit Verbindungselementen (T1, T2) einer Stütz- bzw. Trägerstruktur (S) assoziiert bzw. verbunden ist, die auf einer Positionierungsebene (p) auftreffend auf die Arbeitsebene (m) positioniert ist, wobei die beiden Ständer auf zwei entgegengesetzten Seiten der Längsachse (X) positioniert sind;

dadurch gekennzeichnet, dass sie Mittel (30, 40) zum voneinander unabhängigen Bewegen der beiden Ständer der Trägerstruktur (S) umfasst, was diese parallel zu einer Gleitrichtung (Q) auftreffend auf die Arbeitsebene (m) gleiten lässt, wobei die Bewegungsmittel (30, 40) dahingehend steuer- bzw. regelbar sind, die Verbindungselemente (T1, T2) jedes Ständers progressiv exakt an der Arbeitsebene (m) zu positionieren.

2. Stapeleinheit nach Anspruch 1, wobei die Bewegungsmittel (30, 40) zumindest zwei einzelne bzw. verschiedene lösbare Greifelemente (31, 41) umfassen, die unabhängig voneinander parallel zu der Gleitrichtung (Q) auf entgegengesetzten Seiten der Längsbewegungsachse (X) bewegbar bzw. beweglich sind, und zwar an der Positionierungsebene (p),so dass jedes Greifelement (31, 41) in einen Ständer (P1, P2) der Trägerstruktur eingreifen kann.

3. Stapeleinheit nach Anspruch 2, wobei jedes Greifelement (31, 41) funktional mit zumindest einem Sensor (32, 42) assoziiert bzw. verbunden ist, der geeignet ist, die Position der Verbindungselemente (T1, T2) des jeweiligen Ständers (P1, P2) in Relation zu der Arbeitsebene (m) zu detektieren, wobei die Bewegung des Greifelements (31, 41) von dem zu-

mindest einen Sensor (32, 42) gesteuert bzw. geregelt wird.

4. Stapeleinheit nach Anspruch 3, wobei der zumindest eine Sensor (32, 42), vorzugsweise optisch, unterhalb der Arbeitsebene (m) in einer vorbestimmten Entfernung platziert ist, wobei das Greifelement (31, 41) derart gesteuert bzw. geregelt wird, dass nachdem der Sensor den Durchgang eines Verbindungselements detektiert, die Bewegung des Greifelements (31, 41) stoppt, nach-dem es eine weitere Sektion gleich der vorbestimmten Entfernung abgedeckt hat.

5. Stapeleinheit nach einem oder mehreren der Ansprüche 2 bis 4, wobei sich jedes Greifelement (31, 41) zyklisch parallel zu der Gleitrichtung (Q) zwischen einer Greifstartposition und einer Greifendposition bewegt, wobei bei der gehenden bzw. weggehenden Bewegung von der Greifstartposition zu der Greifendposition das Greifelement (31, 41) in den jeweiligen Ständer (P1, P2) eingreift, während das Greifelement (31, 41) bei der entgegengesetzten Rückkehrbewegung nicht in den Ständer eingreift.

6. Stapeleinheit nach Anspruch 5, wobei jedes Greifelement (31, 41) gleitfähig mit einer Führungsstange (33, 43) assoziiert bzw. verbunden ist, die sich parallel zu der Gleitrichtung (Q) erstreckt.

7. Stapeleinheit nach Anspruch 5 oder 6, wobei bei der Rückkehrbewegung jedes Greifelement (31, 41) von dem jeweiligen Ständer (P1, P2) entfernt ist bzw. sich entfernt.

8. Stapeleinheit nach Anspruch 6 oder 7, wobei das Greifelement (31, 41) gleitfähig mit der Führungsstange (33, 43) mittels eines Schlitten (34, 44) verbunden ist, wobei das Greifelement bewegbar mit dem Schlitten assoziiert bzw. verbunden ist, um in der Lage zu sein, sich quer bezüglich des Schlittens und somit der Führungsstange (33, 43) zu bewegen, und somit in der Lage zu sein, sich von dem Ständer während der Rückkehrbewegung weg zu bewegen.

9. Stapeleinheit nach einem oder mehreren der Ansprüche 5 bis 8, umfassend, für jeden Ständer (P1, P2), Blockiermittel der Bewegung der Ständer, wobei die Blockiermittel während der Rückkehrbewegung des Greifelements deaktiviert sind.

10. Stapeleinheit nach einem oder mehreren der vorhergehenden Ansprüche, umfassend Mittel (20) zum Positionieren der Trägerstruktur (S) auf der Positionierungsebene (p) auftreffend auf die Arbeitsebene (m), wobei die beiden Ständer auf zwei entgegengesetzten Seiten der Längsachse (X) sind, wobei das Positionierungsmittel (20) zwei Führungen (21, 22) umfasst, die voneinander entfernt sind, um einen der beiden Ständer (P1, P2) der Trägerstruktur (S) aufzunehmen, wobei Verbindungselemente (T1, T2) der Struktur (S) progressiv in dem freien Raum zwischen den beiden Führungen angeordnet sind, und zwar graduell wenn bzw. in dem Maße wie die Trägerstruktur in der Gleitrichtung (Q) gleitet.

11. Stapeleinheit nach Anspruch 10, wobei jede Führung (21, 22) eine begrenzte Längserstreckung in der Gleitrichtung (Q) aufweist und neben der Arbeitsebene mit einem oberen Ende (21', 22') endet, wobei vorzugsweise jedes Greifelement (31, 41) in den jeweiligen Ständer in einem Abschnitt eingreift, der nicht von der Führung (21, 22) abgedeckt ist, und zwar jenseits des oberen Endes (21', 22') über der Arbeitsebene (m).

12. Stapeleinheit nach einem oder mehreren der vorhergehenden Ansprüche, umfassend einen Lader (10), in dem die Lamellen (L) angeordnet werden, sobald er mit der Trägerstruktur (S) mit einer Bewegung in der Gleitrichtung (Q) assoziiert bzw. verbunden ist, wobei die Bewegungsmittel (30, 40) den Ständern (P1, P2) eine Bewegung in Übereinstimmung mit derjenigen der Lamellen (L) verleihen.

13. Stapeleinheit nach Anspruch 12, wobei der Lader (10) eine Aufbewahrungskammer (10a, 10b) für Lamellen definiert, der bzw. die über der Arbeitsebene (m) positioniert ist bzw. sind, wobei die Stapeleinheit (1) Mittel (50) zum Anheben der Lamellen aus der Arbeitsebene (m) zu der Aufbewahrungskammer (10a) umfasst.

14. Stapeleinheit nach Anspruch 13, wobei die Aufbewahrungskammer (10) aus zwei ersten vertikalen Stütz- bzw. Trägerstangen (11, 12) besteht, die auf zwei gegenüberliegenden bzw. entgegengesetzten Seiten der Längsbewegungsachse (X) positioniert sind, wobei die Lamellen (L) zwischen den zwei Stangen (11, 12) eingesetzt sind und von zumindest einem Paar zurückziehbarer Halterungen (13, 14) gestützt bzw. getragen sind, die mit den beiden Stangen verbunden sind und eine Aufbewahrungskammer definieren.

15. Stapeleinheit nach Anspruch 13 oder 14, wobei die Lamellenaufbewahrungskammer in eine temporäre Aufbewahrungskammer (10a) und eine endgültige Aufbewahrungskammer (10b) unterteilt ist, die auf verschiedenen Ebenen gemacht sind, wobei die temporäre Aufbewahrungskammer (10a) auf einer Zwischenebene zwischen der Arbeitsebene (m) und der endgültigen Aufbewahrungskammer (10b) gemacht ist, wobei vorzugsweise die beiden Aufbewahrungskammern (10a, 10b) jeweils durch ein Paar Halterungen definiert sind, die mit den ersten

beiden Stangen (11, 12) assoziiert bzw. verbunden sind und innerhalb der jeweiligen Stange zurückziehbar sind, wenn sie eine Drückkraft von unten erfahren.

16. Stapeleinheit nach Anspruch 14 oder 15, wobei die beiden vertikalen Stangen (11, 12) auf einer Ebene parallel zu und entfernt von der Positionierungsebene (p) der Trägerstruktur (S) positioniert sind.

17. Stapeleinheit nach einem oder mehreren der Ansprüche 13 bis 16, wobei die Anhebemittel (50) erste und zweite Anhebemittel (51, 52) umfassen, die parallel zu der Gleitrichtung (Q) jeweils auf zwei gegenüberliegenden bzw. entgegengesetzten Seiten der Längsbewegungsachse (X) beweglich sind.

18. Stapeleinheit nach Anspruch 17, wobei die ersten und zweiten Anhebemittel (51, 52) operativ voneinander unabhängig sind und von zwei zweiten Führungsstangen (33, 43) gestützt bzw. getragen sind, die auf einer Ebene parallel zu und entfernt von der Positionierungsebene (p) der Trägerstruktur (S) auf zwei gegenüberliegenden bzw. entgegengesetzten Seiten der Längsbewegungsachse (X) angeordnet sind.

19. Stapeleinheit nach Anspruch 15 oder 16 und Anspruch 17 oder 18, wobei sowohl die ersten als auch die zweiten Anhebemittel (51, 52) eine Anfangshebevorrichtung (51', 52'), die geeignet ist, eine Lamelle aus der Arbeitsebene (m) zu der temporären Aufbewahrungskammer (10a) zu heben, und eine Endhebevorrichtung (51", 52") umfassen, die geeignet ist, eine Lamelle aus der temporären Aufbewahrungskammer (10a) zu der Aufbewahrungskammer (10b) zu heben.

20. Stapeleinheit nach Anspruch 19, wobei die Anfangshebevorrichtung (51', 52') und die Endhebevorrichtung (51", 52") gleitfähig mit derselben zweiten Führungsstange (33, 43) assoziiert bzw. verbunden sind, die sich parallel zu der Gleitrichtung (Q) erstreckt.

21. Stapeleinheit nach Anspruch 20, wobei die Anfangshebevorrichtung (51', 52') aus einer nicht zurückziehbaren Halterung besteht, während die Endhebevorrichtung (51", 52") aus einer Halterung besteht, die innerhalb der relativen Stange zurückziehbar ist, wenn sie eine Druckkraft von unten erfährt.

22. Stapeleinheit nach einem oder mehreren der Ansprüche 19 bis 21, wobei die Anfangshebevorrichtung (51', 52') und die Endhebevorrichtung (51 ", 52") kinematisch miteinander integral sind, um eine gegenseitig synchronisierte Bewegung sicherzustellen.

23. Stapeleinheit nach einem oder mehreren der Ansprüche 13 bis 22, wobei die Anhebemittel (50) der Lamellen (L) eine Bewegung aufweisen, die mit den Bewegungsmitteln (30, 40) der Ständer (P1, P2) koordiniert ist.

24. Stapeleinheit nach Anspruch 23, wobei jedes lösbare Greifelement (31, 41) kinematisch mit der Anfangshebevorrichtung (51', 52') und der Endhebevorrichtung (51", 52") integral ist, die auf der gleichen Seite arbeiten bzw. arbeiten, wobei vorzugsweise das Greifelement (31, 41) gleitfähig mit derselben zweiten Führungsstange (33, 43) assoziiert bzw. verbunden ist wie die beiden Anhebevorrichtungen.

25. Verfahren zum Positionieren einer Stütz- bzw. Trägerstruktur (S) in einer Einheit zum Stapeln von Lamellen einer Jalousie, wobei solch eine Struktur (S) mit zwei Pfosten bzw. Ständern (P1, P2) und einer Mehrzahl von Verbindungselementen (T1, T2) zu den Lamellen versehen ist, die an den Ständern angebracht und entlang der Längserstreckung der letzteren verteilt sind, wobei das Verfahren die folgenden Betriebsschritte umfasst:

a) Anordnen einer Stapeleinheit (1) für Lamellen (L) nach einem oder mehreren der vorhergehenden Ansprüche;
b) Bewegen der beiden Ständer (P1, P2) der Trägerstruktur (S) unabhängig voneinander, wodurch diese parallel zu einer Gleitrichtung (Q) auftreffend auf die Arbeitsebene (m) gleiten;
c) Detektieren der Position des Verbindungselements (T1, T2), das sich der Arbeitsebene (m) nähert;
d) Steuern bzw. Regeln der Bewegung, die jedem Ständer (P1, P2) durch die Bewegungsmittel (30, 40) verliehen wird, basierend auf der in Schritt c) detektierten Position, um die Bewegung zu stoppen, wenn das Verbindungselement (T1, T2) des jeweiligen Ständers (P1, P2) exakt an der Arbeitsebene (m) positioniert ist.

Revendications

1. Unité pour l'empilage de lames sur une structure support pour la production de stores vénitiens, une telle structure (S) étant dotée de deux montants (P1, P2) et d'une pluralité d'éléments de liaison (T1, T2) aux lames, attachés aux montants et distribuées le long de l'extension longitudinale de ces derniers, l'unité comprenant :

- au moins un élément de guidage pour une lame (L), définissant un plan de travail (m) sur lequel la lame (L) coulisse supportée le long d'un axe longitudinal de mouvement (X), au niveau dudit

plan (m) la lame étant associée à des éléments de liaison (T1, T2) d'une structure support (S) positionnée sur un plan de positionnement (p) incident au plan de travail (m), avec les deux montants positionnés sur deux côtés opposés de l'axe longitudinal (X) ;

caractérisée en ce qu'elle comprend des moyens (30, 40) de déplacement des deux montants de la structure support (S) indépendamment l'un de l'autre en les faisant coulisser parallèlement à une direction de coulissement (Q) incidente au plan de travail (m), lesdits moyens de déplacement (30, 40) pouvant être commandés de façon à positionner progressivement les éléments de liaison (T1, T2) de chaque montant exactement sur le plan de travail (m).

2. Unité d'empilage selon la revendication 1, dans laquelle les moyens de déplacement (30, 40) comprennent au moins deux éléments de préhension libérables distincts (31, 41) déplaçables parallèlement à ladite direction de coulissement (Q), indépendamment l'un de l'autre, sur des côtés opposés dudit axe longitudinal de mouvement (X), au niveau dudit plan de positionnement (p) de façon à ce que chaque élément de préhension (31, 41) puisse venir en prise avec un montant (P1, P2) de la structure support.

3. Unité d'empilage selon la revendication 2, dans laquelle chaque élément de préhension (31, 41) est fonctionnellement associé à au moins un capteur (32, 42) adapté pour détecter la position des éléments de liaison (T1, T2) du montant respectif (P1, P2) par rapport au plan de travail (m), le déplacement de l'élément de préhension (31, 41) étant commandé par ledit au moins un capteur (32, 42).

4. Unité d'empilage selon la revendication 3, dans laquelle ledit au moins un capteur (32, 42), de préférence optique, est placé sous le plan de travail (m) à une distance prédéfinie, l'élément de préhension (31, 41) étant commandé de telle manière que après que le capteur détecte le passage d'un élément de liaison, le déplacement de l'élément de préhension (31, 41) s'arrête, après avoir couvert une autre section égale à ladite distance prédéfinie.

5. Unité d'empilage selon une ou plusieurs des revendications 2 à 4, dans laquelle chaque élément de préhension (31, 41) se déplace cycliquement parallèlement à ladite direction de coulissement (Q) entre une position de départ de préhension et une position de fin de préhension, dans le déplacement en cours de ladite position de départ de préhension vers la position de fin de préhension, l'élément de préhension (31, 41) entrant en prise avec le montant respectif (P1, P2), alors que dans le déplacement de retour opposé l'élément de préhension (31, 41) n'entre pas en prise avec le montant.

6. Unité d'empilage selon la revendication 5, dans laquelle chaque élément de préhension (31, 41) est associé de manière coulissante à une barre de guidage (33, 43) qui s'étend parallèlement à la direction de coulissement (Q).

7. Unité d'empilage selon la revendication 5 ou 6, dans laquelle dans le déplacement de retour chaque élément de préhension (31, 41) est distant du montant respectif (P1, P2).

8. Unité d'empilage selon la revendication 6 ou 7, dans laquelle l'élément de préhension (31, 41) est associé de manière coulissante à la barre de guidage (33, 43) au moyen d'un chariot (34, 44), ledit élément de préhension étant associé de manière déplaçable au chariot afin de pouvoir se déplacer transversalement par rapport au chariot et ainsi la barre de guidage (33, 43) et ainsi être capable de s'éloigner du montant pendant le déplacement de retour.

9. Unité d'empilage selon une ou plusieurs des revendications 5 à 8, comprenant pour chaque montant (P1, P2) des moyens de blocage du déplacement desdits montants, lesdits moyens de blocage étant désactivés pendant le déplacement de retour de l'élément de préhension.

10. Unité d'empilage selon une ou plusieurs des revendications précédentes, comprenant des moyens (20) pour positionner la structure support (S) sur ledit plan de positionnement (p) incident au plan de travail (m), avec les deux montants sur deux côtés opposés de l'axe longitudinal (X), lesdits moyens de positionnement (20) comprenant deux guides (21, 22), distants l'un de l'autre pour recevoir chacun un des deux montants (P1, P2) de la structure support (S), des éléments de liaison (T1, T2) de la structure (S) étant progressivement agencés dans l'espace libre entre les deux guides progressivement à mesure que la structure support coulisse dans la direction de coulissement (Q).

11. Unité d'empilage selon la revendication 10, dans laquelle chaque guide (21, 22) a une extension longitudinale limitée dans la direction de coulissement (Q) et se termine à côté du plan de travail avec une extrémité supérieure (21', 22'), de préférence chaque élément de préhension (31, 41) entrant en prise avec le montant respectif dans une portion non couverte par le guide (21, 22) au-delà de l'extrémité supérieure (21', 22') au-dessus du plan de travail (m).

12. Unité d'empilage selon une ou plusieurs des revendications précédentes, comprenant un chargeur (10)

dans lequel les lames (L) sont déposées, une fois associé à la structure support (S) avec un déplacement dans ladite direction de coulissement (Q), les moyens de déplacement (30, 40) imprimant aux montants (P1, P2) un déplacement concordant avec celui des lames (L).

13. Unité d'empilage selon la revendication 12, dans laquelle le chargeur (10) définit un compartiment de stockage (10a, 10b) pour des lames positionnées sur le plan de travail (m), l'unité d'empilage (1) comprenant des moyens (50) pour lever des lames du plan de travail (m) jusqu'au compartiment de stockage (10a).

14. Unité d'empilage selon la revendication 13, dans laquelle le compartiment de stockage (10) est formé de deux premières barres support verticales (11, 12), positionnées sur deux côtés opposés de l'axe longitudinal de mouvement (X), les lames (L) étant insérées entre lesdites deux barres (11, 12) et supportées par au moins une paire de supports rétractables (13, 14) qui sont reliés auxdites deux barres et définissent un compartiment de stockage.

15. Unité d'empilage selon la revendication 13 ou 14, dans laquelle le compartiment de stockage de lames est divisé en un compartiment de stockage temporaire (10a) et un compartiment de stockage final (10b) réalisés sur différents niveaux, le compartiment de stockage temporaire (10a) étant réalisé à un niveau intermédiaire entre le plan de travail (m) et le compartiment de stockage final (10b), de préférence les deux compartiments de stockage (10a, 10b) étant chacun définis par une paire de supports qui sont associés aux premières deux barres (11, 12) et sont rétractables à l'intérieur de la barre respective lorsqu'ils sont soumis à une poussée depuis le bas.

16. Unité d'empilage selon la revendication 14 ou 15, dans laquelle les deux barres verticales (11, 12) sont positionnées sur un plan parallèle à et distinct du plan de positionnement (p) de la structure support (S).

17. Unité d'empilage selon une ou plusieurs des revendications 13 à 16, dans laquelle les moyens de levage (50) comprennent des premier et deuxième éléments de levage (51, 52), déplaçables parallèlement à ladite direction de coulissement (Q) respectivement sur deux côtés opposés dudit axe longitudinal de mouvement (X).

18. Unité d'empilage selon la revendication 17, dans laquelle les premier et deuxième moyens de levage (51, 52) sont fonctionnellement indépendants l'un de l'autre et sont supportés par deux deuxièmes barres de guidage (33, 43) qui sont agencées sur un plan parallèle et distinct du plan de positionnement (p) de la structure support (S) sur deux côtés opposés de l'axe longitudinal de mouvement (X).

19. Unité d'empilage selon la revendication 15 ou 16 et la revendication 17 ou 18, dans laquelle le premier et le deuxième moyen de levage (51, 52) comprennent tous deux un dispositif de levage initial (51', 52') adapté pour lever une lame depuis le plan de travail (m) jusqu'au compartiment de stockage temporaire (10a), et un dispositif de levage final (51", 52") adapté pour lever une lame du compartiment de stockage temporaire (10a) au compartiment de stockage (10b).

20. Unité d'empilage selon la revendication 19, dans laquelle le dispositif de levage initial (51', 52') et le dispositif de levage final (51", 52") sont associés de manière coulissante à la même deuxième barre de guidage (33, 43) qui s'étend parallèlement à la direction de coulissement (Q).

21. Unité d'empilage selon la revendication 20, dans laquelle le dispositif de levage initial (51', 52') se compose d'un support non rétractable alors que le dispositif de levage final (51", 52") se compose d'un support rétractable à l'intérieur de la barre relative lorsqu'il est soumis à une poussée depuis le bas.

22. Unité d'empilage selon une ou plusieurs des revendications 19 à 21, dans laquelle le dispositif de levage initial (51', 52') et le dispositif de levage final (51", 52") sont cinématiquement solidaires l'un avec l'autre de façon à assurer un déplacement mutuellement synchronisé.

23. Unité d'empilage selon une ou plusieurs des revendications 13 à 22, dans laquelle les moyens de levage (50) des lames (L) ont un déplacement coordonné avec les moyens de déplacement (30, 40) des montants (P1, P2).

24. Unités d'empilage selon la revendication 23, dans lesquelles chaque élément de préhension libérable (31, 41) est cinématiquement solidaire avec le dispositif de levage initial (51', 52') et le dispositif de levage final (51", 52") fonctionnant du même côté, de préférence l'élément de préhension (31, 41) étant associé de manière coulissante à la même deuxième barre de guidage (33, 43) que les deux dispositifs de levage.

25. Procédé de positionnement d'une structure de support (S) dans une unité pour empiler des lames d'un store vénitien, une telle structure (S) étant dotée de deux montants (P1, P2) et d'une pluralité d'éléments de liaison (T1, T2) aux lames attachées aux mon-

tants et distribuées le long de l'extension longitudinale de ces derniers, le procédé comprenant les étapes de fonctionnement suivantes :

a) agencement d'une unité d'empilage (1) de lames (L) selon une ou plusieurs des revendications précédentes ;
b) déplacement des deux montants (P1, P2) de la structure support (S) indépendamment l'un de l'autre en les faisant coulisser parallèlement à une direction de coulissement (Q) incidente au plan de travail (m) ;
c) détection de la position de l'élément de liaison (T1, T2) s'approchant du plan de travail (m);
d) commande du déplacement imposé sur chaque montant (P1, P2) par les moyens de déplacement (30, 40) sur la base de la position détectée dans l'étape c) de façon à arrêter ledit déplacement lorsque l'élément de liaison (T1, T2) du montant respectif (P1, P2) est positionné exactement au niveau du plan de travail (m).

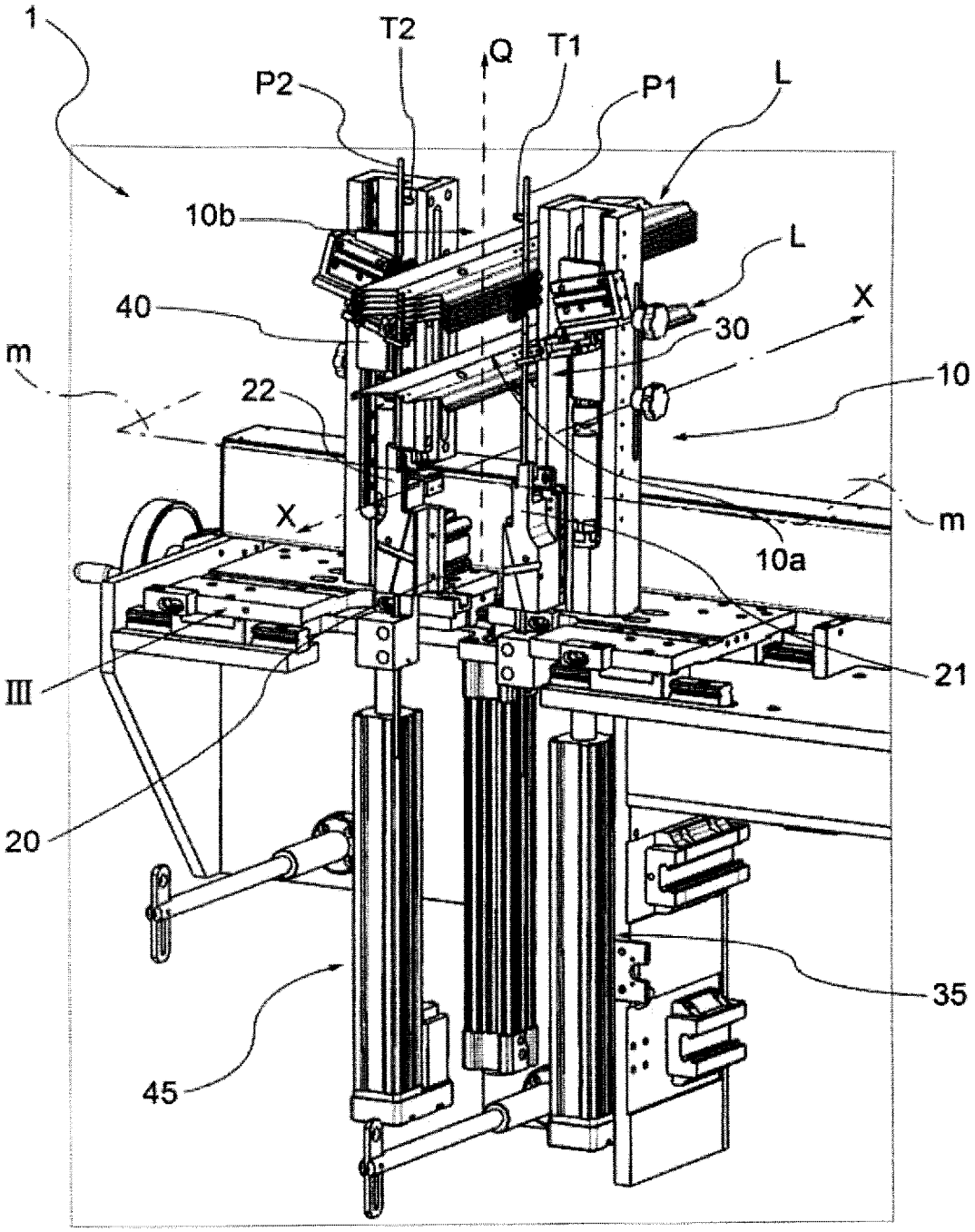


Fig.1

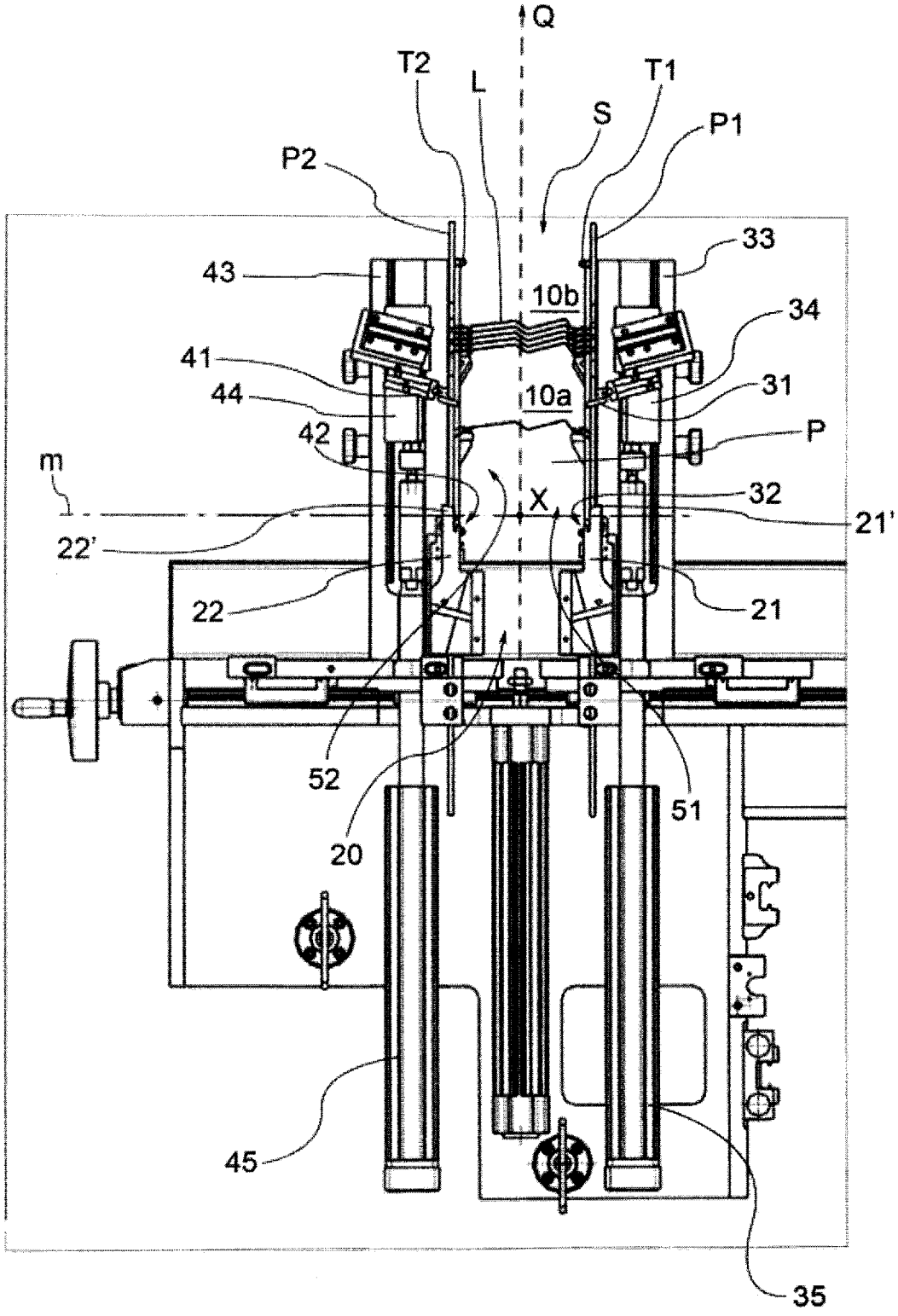

Q
T2
L
T1
S
P1
P2
33
43
10b
34
41
31
44
10a
42
P
m
X
32
21'
22'
22
21
52
51
20
45
35

Fig.2

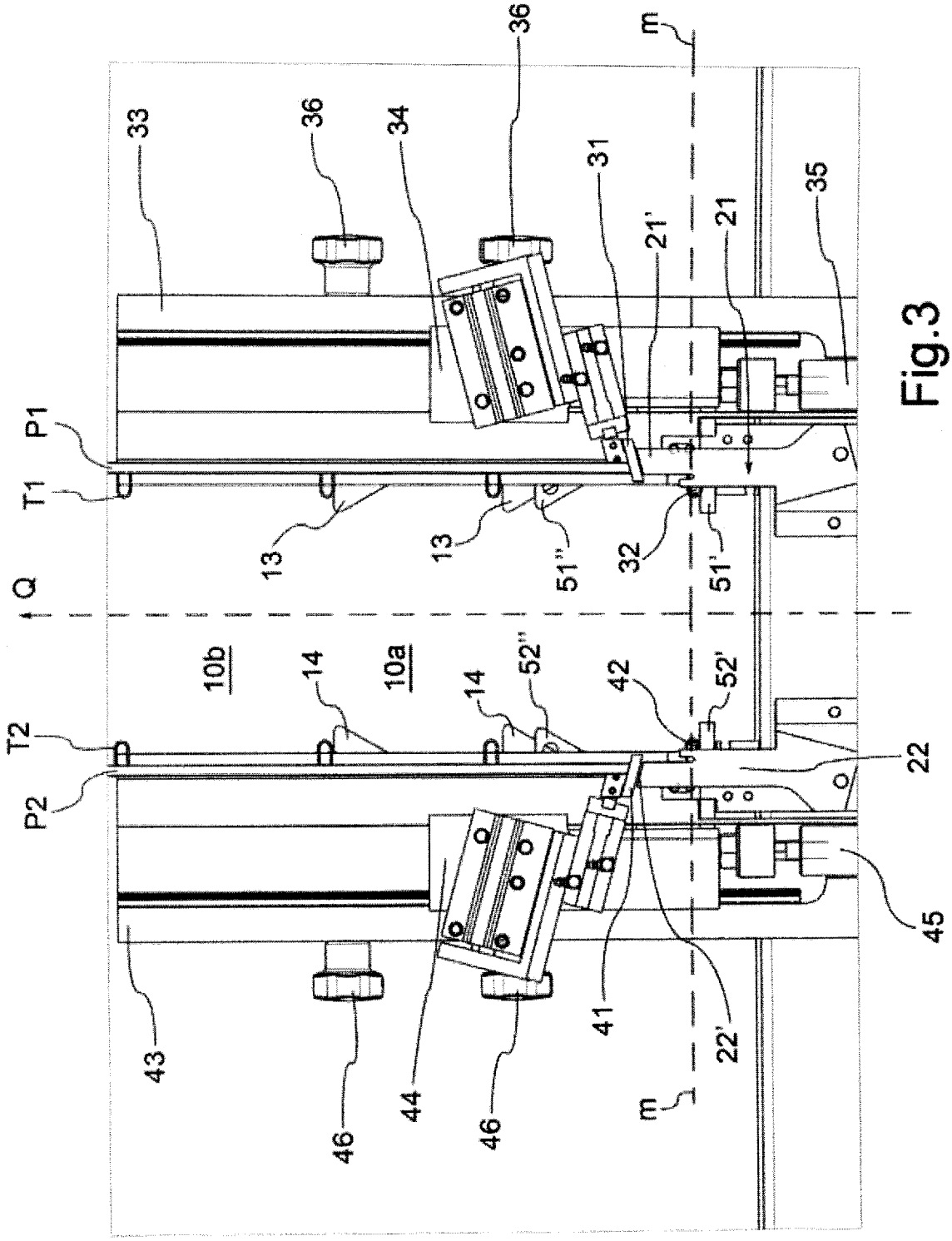

36
m
33
36
34
31
21'
21
35
P1
T1
13
13
51''
32
51'
Q
10b
14
10a
14
52''
42
52'
T2
P2
22
45
43
46
44
46
41
22'
m

Fig.3

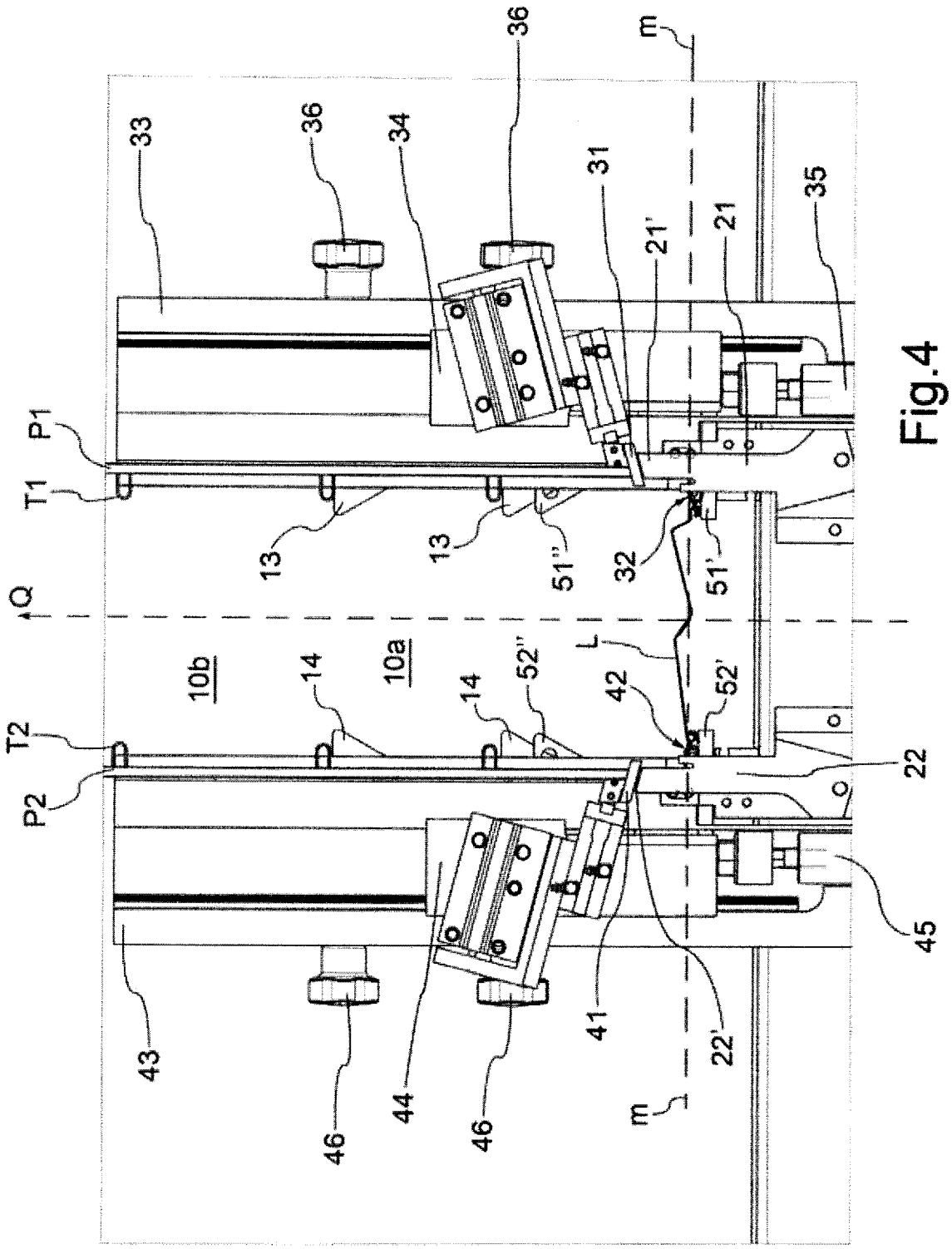
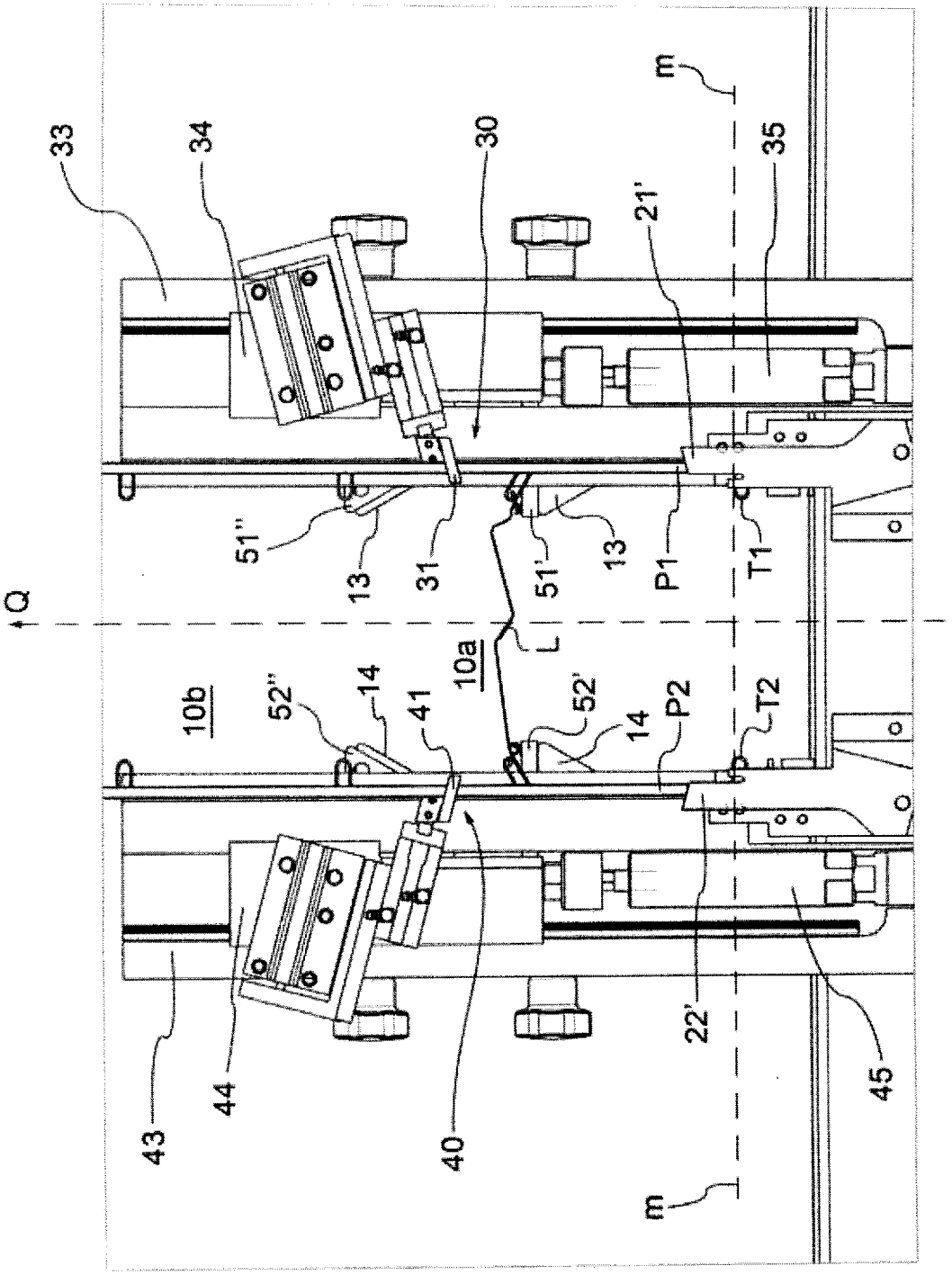

36
m
33
36
34
31
21'
21
35
P1
T1
13
13
51''
32
51'
Q
10b
14
10a
14
52''
L
42
52'
T2
P2
22
45
43
46
44
46
41
22'
m

Fig.4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30
m
35
21'
51''
13
31
51'
13
P1
T1
Q
L
10b
52''
14
41
10a
52'
14
P2
T2
43
44
40
22'
45
m

Fig.5

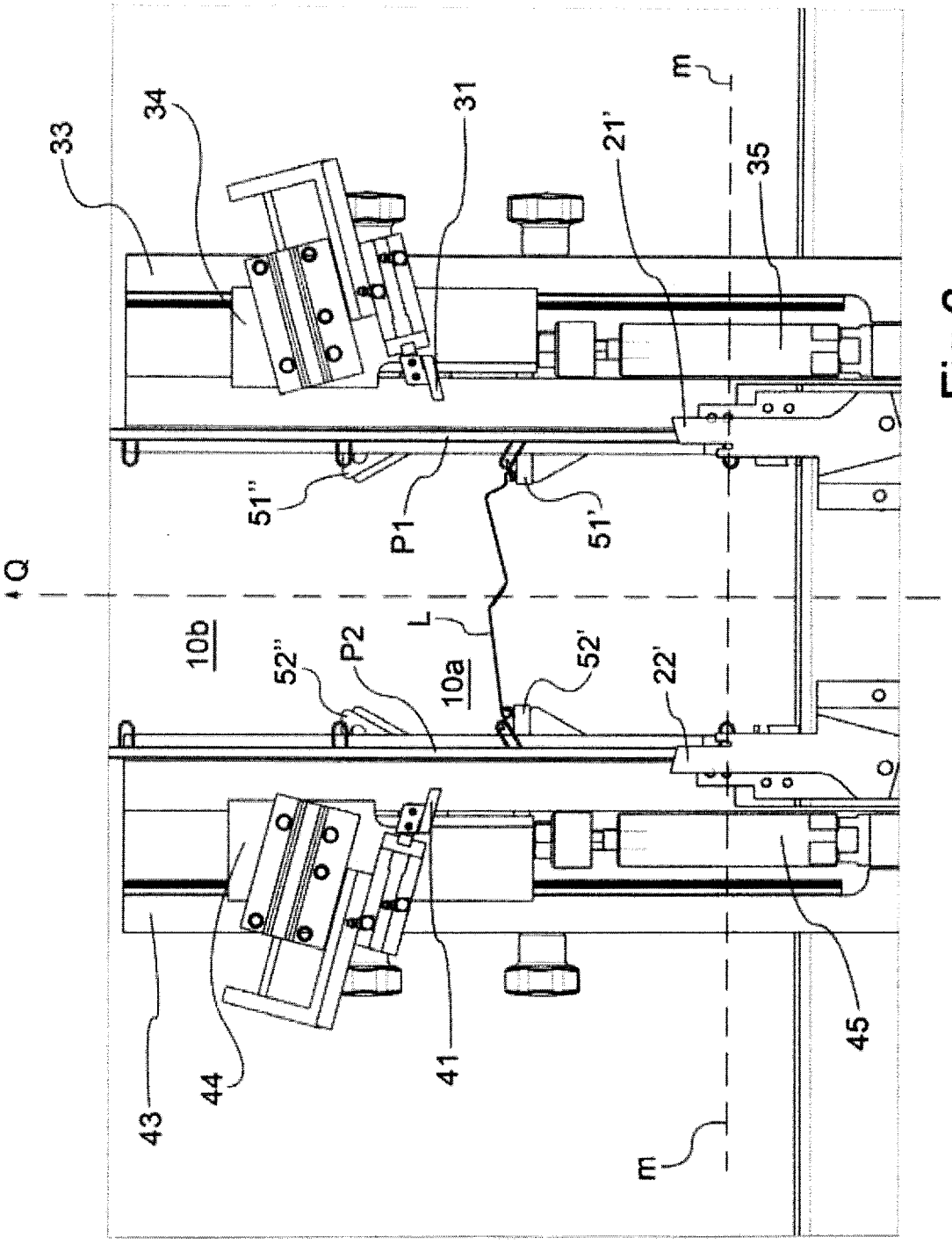

Fig.6

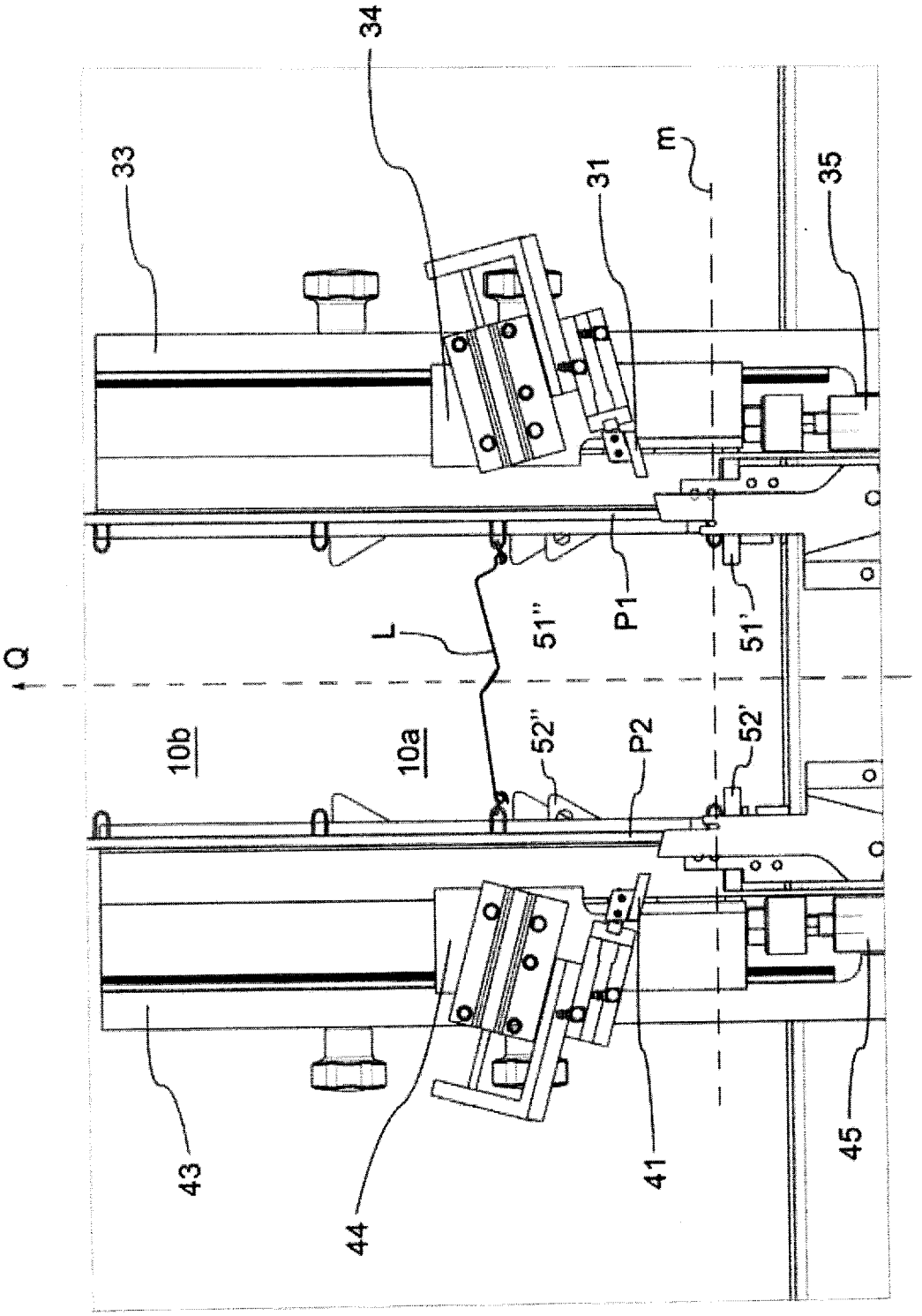

Fig.7

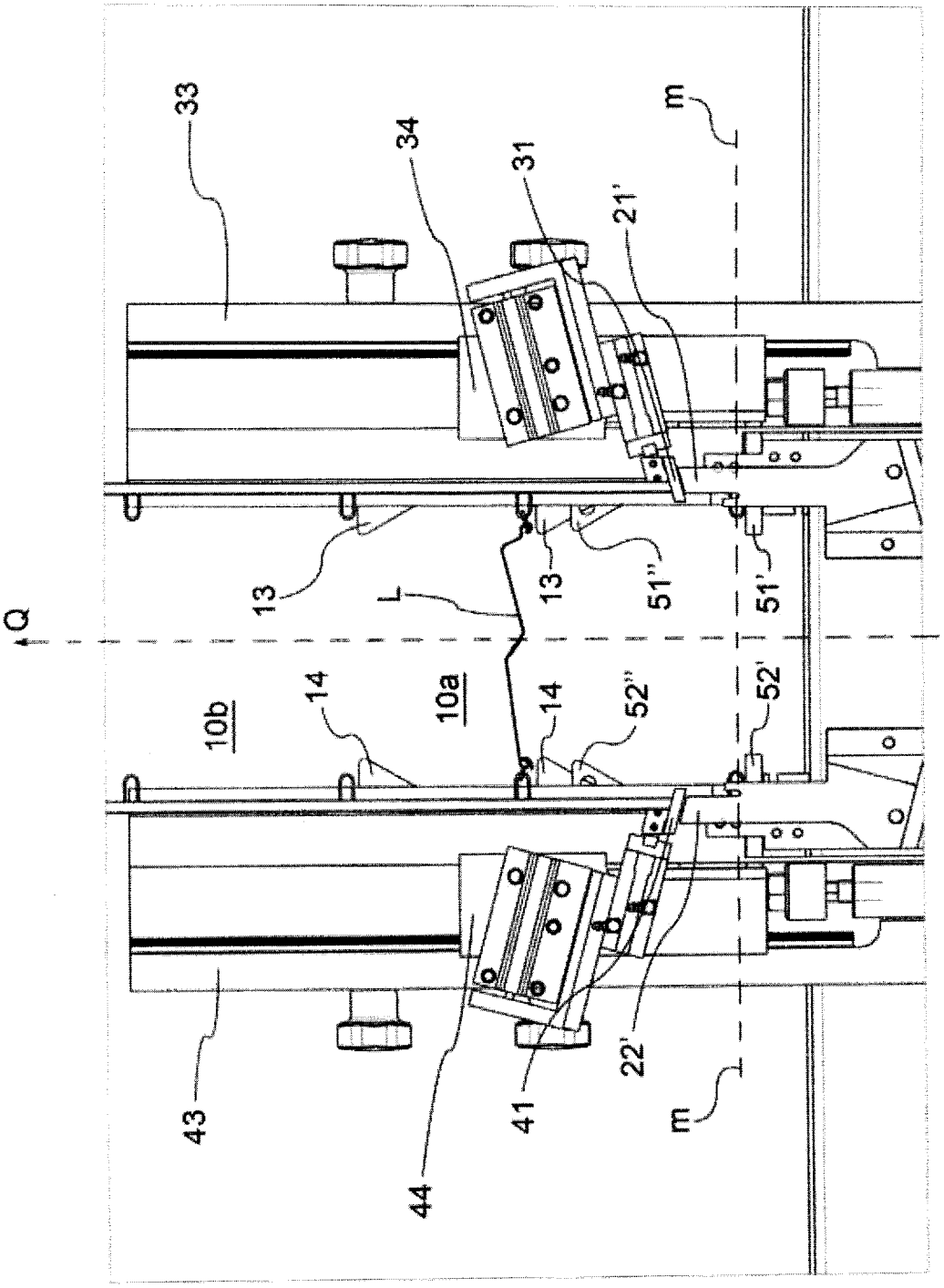

Fig.8

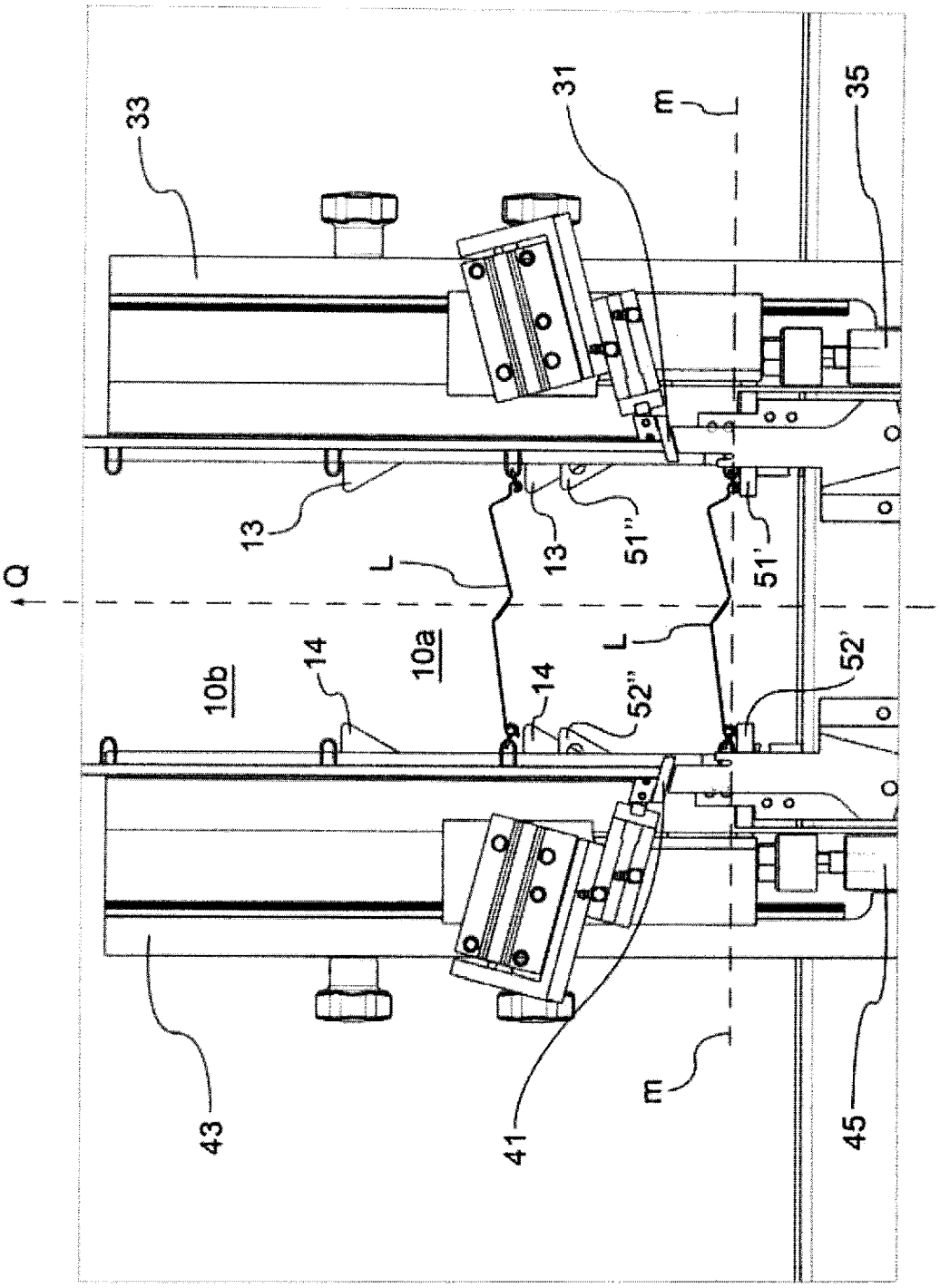

Fig.9

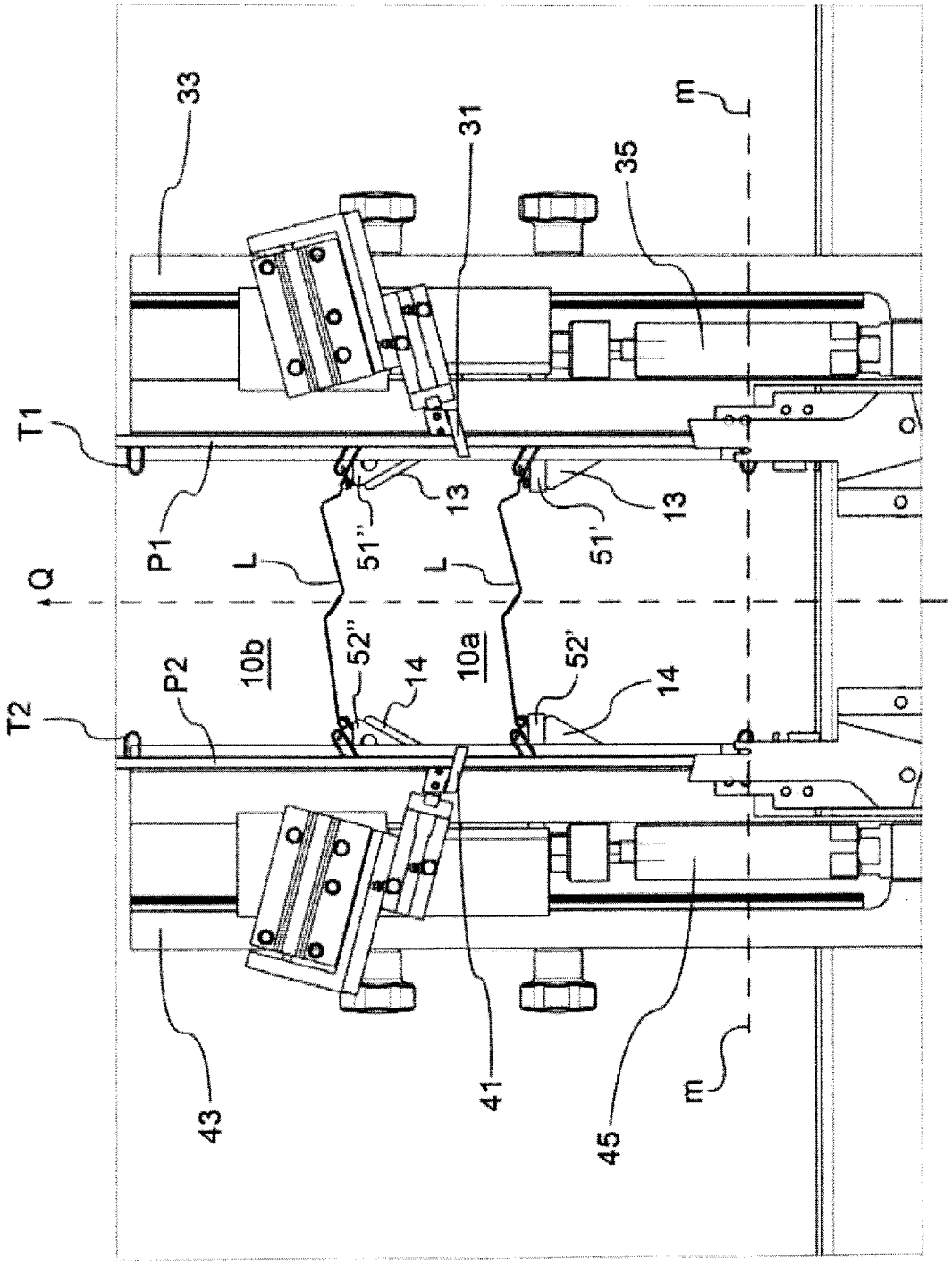

Fig.10

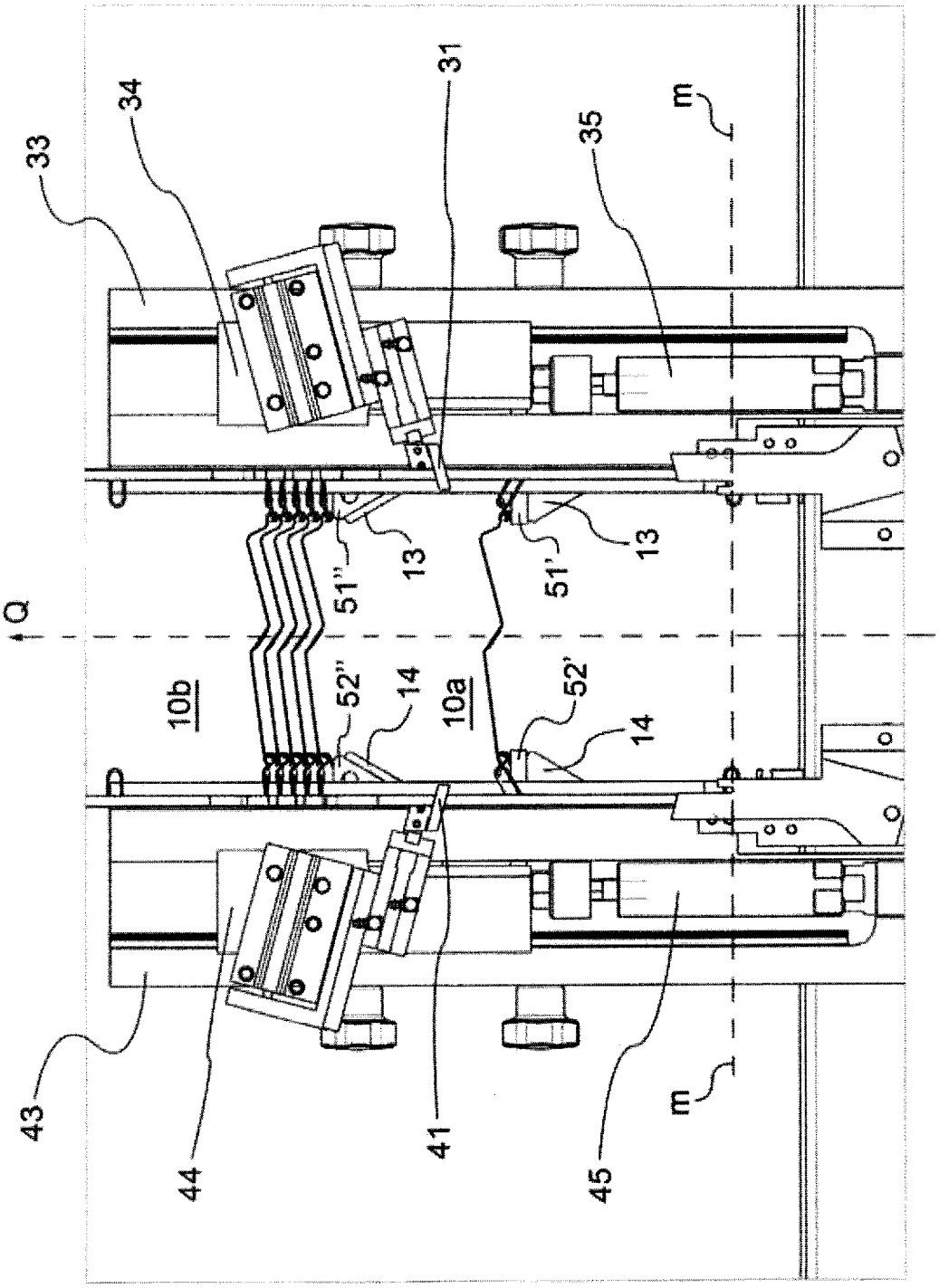

Fig.11

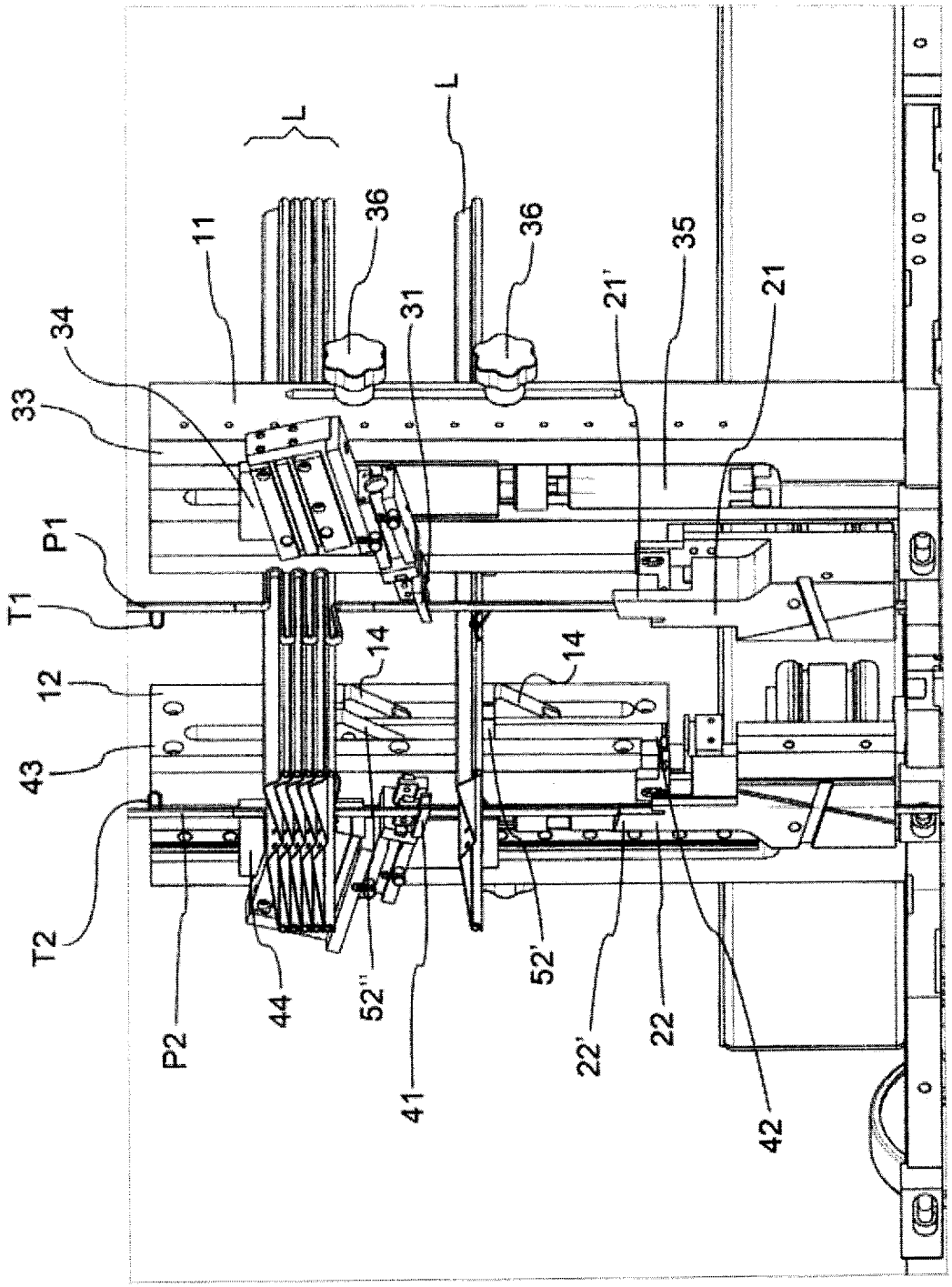
L
L
11
36
36
31
21'
35
21
34
33
P1
T1
12
43
T2
14
14
P2
44
52''
41
52'
22'
22
42

Fig.12

REFERENCES CITED IN THE DESCRIPTION

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