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(54) **STATION FOR ASSEMBLING VENETIAN BLINDS**

(57) The invention relates to an assembling station of Venetian blinds with support half-ladders, comprising a plurality of stacking units 10 of the slats on support half-ladders. Said units are aligned with each other along an insertion axis X of the slats and are slidably associated with a shared support structure 2 which extends parallel to said axis X. The assembling station comprises a sliding guide 20 for the slat which crosses the assembling station along the insertion axis and defines a support for the slat in the empty spaces V comprised between one stacking unit and the other. The sliding guide is held suspended between two opposite ends 1', 1" of the assembling station. The sliding guide is arranged at a height such as to ensure the entrance of the slat in the stacking units without however interfering with the action of the positioning means 13 provided in the units 10. The stacking units 10 are slidingly associated to the sliding guide 20 parallel to the insertion axis X.

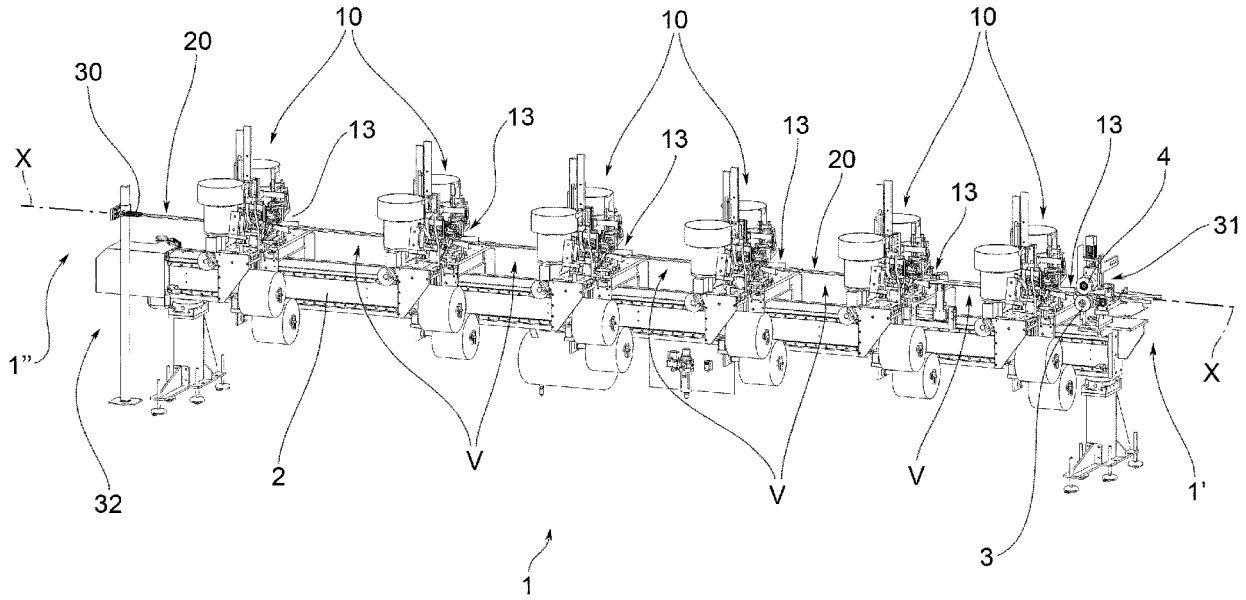

FIG.4

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Description

Field of application

[0001] The object of the present invention is an assembling station of Venetian blinds with support half-ladders.

Prior art

[0002] As is known, Venetian blinds consist of a plurality of slats, arranged parallel to each other and held in position by means of cord support structures, which are essentially of two types.

[0003] A first type of structure is called a "complete ladder", that is, consisting of two parallel ribs (arranged in the direction of the height of the blind) and by a plurality of crosspieces connecting them at regular distances. Each crosspiece is associated to a slat, in support (if the crosspiece is single) or in insertion (if the crosspiece is multiple).

[0004] A second type of structure is called "separate ladders" or "half-ladder", that is, it consists 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 on opposite sides of the slats, generally transversely aligned. The cords are associated to the slats at the eyelets by means of hooks fixed to the side edges of the slats themselves. The slats L, which may have any cross-section, for example in the shape of C, Z or S, must have folded edges T (as shown in Figure 1) so as to constitute a reinforced area capable of rigidly supporting a hook.

[0005] The hooks G can be of many types, but all characterized in that the eyelet is blocked on the hook and not directly on the slat.

[0006] A very common type of hook is shown in Figure 2 and consists of a U-shaped element, which defines the anchoring portion of the hook to the slat, and an open ring R, which extends from the U-shaped element in an opposite position with respect to the two free ends of the U and at which the eyelet is inserted. The open ring is then closed after the eyelet is inserted.

[0007] The assembling of Venetian blinds with support half-ladders is carried out in automated production lines that comprise specific automated assembling stations, in which the individual slats are associated to the support half-ladders and, thus associated, progressively superimposed on one another to form the Venetian blind.

[0008] Assembling stations are known which, in addition to inserting the eyelet and closing the ring, also provide for the prior attachment of the hooks to the slats, as illustrated in the European patent EP 2653646 B1 in the name of the same applicant.

[0009] There are also assembling stations that only carry out the eyelet insertion and the ring closure. In this case, the attachment of the hooks to the slats is carried out upstream in a dedicated station, separate from the assembling station.

[0010] In general, as illustrated in Figure 3, an assembling station A comprises a plurality of stacking units B distributed along a main axis X, along which the slats are progressively arranged. Each stacking unit A supports a pair of opposing half-ladders in height and is adapted to associate said pair of half-ladders to the single slats which are progressively inserted in the assembling station, by inserting the eyelets and closing the rings, and possibly also by attaching two hooks at a time on the two opposite sides of the single slat.

[0011] Operatively, once inserted along said main axis X of the assembling station A, the single slat is simultaneously engaged by all the stacking units B. After being associated to the different pairs of half-ladders, the single slat will be raised upwards, so as to allow the insertion of a new slat and continue to make the Venetian blind.

[0012] As shown in Figure 3, the individual stacking units B are slidably associated with a longitudinal support bar C which develops parallel to the aforesaid main axis X. In this way, when the features of the blinds to be produced vary, it is possible to reposition the stacking units B along said bar C adapting its position according to the length of the slats (i.e. the length of the blind to be produced) and/or to the pitch required between a pair of half-ladders and the other.

[0013] A critical assembling step is the insertion of the slats in the assembling station. Because of its weight, the single lamella slat tends to bend between one unit and the other, with the risk that the tip end of the slat itself, lowering with respect to the insertion plane, jams along the insertion path. In order to facilitate the correct insertion of the slat, each stacking unit is provided with a guiding slide D at its inlet. However, in the case of particularly long slats, it may happen that the bending of the slat is particularly accentuated and that the guiding slide is not sufficient enough to accompany the slat correctly.

[0014] To overcome this problem, as shown in Figure 3, assembling stations are provided with intermediate supports E for the slat, arranged between one stacking unit and the other. Each support defines a support and sliding plane for the slat, preventing it from bending excessively into the space between one unit and the other.

[0015] These intermediate supports E are slidably associated with the same longitudinal support bar C to which the stacking units B are associated, so that their position can be adapted to the position of the stacking units.

[0016] However, these intermediate supports E, although fully performing their function, have some limits.

[0017] A first limit is related to the fact that the intermediate supports are arranged on the same axis of movement of the stacking units and can therefore hinder their freedom of positioning. The stacking units are generally moved in an automated manner by means of a rack, so as to ensure a synchronized and precise positioning thereof; differently, the intermediate supports can only be moved manually, as their precise positioning along

the support bar is not necessary. Therefore, during the repositioning of the stacking units, it may be necessary to remove them beforehand. This complicates the operation of the assembling station, extending dead times.

[0018] A second limit is linked to the size of the aforementioned intermediate supports, which in some cases may be excessive. In particular, in the production of blinds with half-ladders arranged at a particularly reduced pitch, it may be necessary to remove the intermediate supports to free up space available to the stacking units.

[0019] Therefore, in Venetian blind assembling stations with support semi-ladders, there is a need to avoid jamming of the slats during insertion, but overcoming the operating limits related to the use of intermediate supports.

Disclosure of the invention

[0020] Therefore, the object of the present invention is to eliminate in whole or in part the drawbacks of the prior art cited above by providing an assembling station of Venetian blinds with support half-ladders, which allows preventing jamming of the slats during the insertion step without affecting the operation of the assembling station.

[0021] A further object of the present invention is to provide an assembling station of Venetian blinds with support half-ladders which is easier to manage than similar known assembling stations.

[0022] A further object of the present invention is to provide an assembling station of Venetian blinds with support half-ladders which is simple and cost-effective to be realized.

Brief description of the drawings

[0023] The technical features of the invention, according to the aforesaid aims, can clearly be seen in the content of the claims below, and its advantages will become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which illustrate one or more purely exemplary and non-limiting embodiments thereof, in which:

- Figure 1 shows a perspective view of an example of a slat with folded edges;
- Figure 2 shows a perspective view of an example of a hook with an open ring;
- Figure 3 shows an overall perspective view of an assembling station of Venetian blinds with conventional support half-ladders;
- Figure 4 shows an overall perspective view of an assembling station of Venetian blinds with support half-ladders according to an embodiment of the present invention;
- Figure 5 shows a top perspective view of a detail of the assembling station in Figure 4, relative to the inlet portion of the station, illustrated with some parts removed to better highlight others;
- Figure 6 shows a top perspective view of a further enlarged detail of Figure 5;
- Figure 7 shows a top perspective view of a detail of the assembling station in Figure 4, relative to the inlet portion of the station, illustrated with some parts removed to better highlight others and with a portion of slat inserted in the station;
- Figure 8 shows a top perspective view of a further enlarged detail of Figure 7, with further parts removed to better highlight others;
- Figure 9 shows a side orthogonal view of the inlet portion of the assembling station shown in Figure 7; and
- Figure 10 shows an enlarged view of a detail of Figure 4, relative to the outlet portion of the assembling station.

Detailed description

[0024] With reference to the accompanying drawings, reference numeral 1 designates as a whole an assembling station of Venetian blinds with support half-ladder according to the invention.

[0025] Herein and in the following description and claims, reference will be made to the assembling station 1 in use condition. Therefore, any references to a lower or upper position or to a horizontal or vertical orientation should be interpreted in such condition.

[0026] According to a general embodiment of the invention, the assembling station 1 of Venetian blinds with support half-ladder comprises a plurality of stacking units 10 of slats on support half-ladders.

[0027] Such stacking units 10 are aligned with each other along an insertion axis X of the slats in the assembling station 1 and are slidably associated with a shared support structure 2 which extends parallel to said insertion axis X.

[0028] In particular, as shown in the accompanying Figures, the aforesaid shared support structure 2 consists of a bar which extends parallel to the insertion axis X.

[0029] Preferably, the assembling station 1 comprises motorised means for moving one or more of said stacking units 10 along said shared support structure 2 parallel to the insertion axis X. In this way, when the features of the blinds to be produced vary, it is possible to reposition the stacking units 10 along such a support structure 2 adapting its position according to the length of the slats (i.e. the length of the blind to be produced) and/or to the pitch required between a pair of half-ladders and the other.

[0030] Advantageously, at the inlet the assembling station 1 can be provided with means for moving the single slat along the insertion axis X. In particular, as illustrated in the accompanying Figures, said moving means of the single slat consist of a pair of opposing towing rollers 3 and 4.

[0031] The assembling station 1 according to the invention may be adapted to carry out, in addition to insertion of the eyelets of the half-ladders in the open rings of

the hooks and the subsequent closing of the rings, also the prior attachment of the hooks to the slats. In this case, functionally the aforementioned operations for attaching hooks, inserting eyelet and closing ring are carried out in each of the aforementioned stacking units 10. Preferably, in this case each of the stacking units 10 is made according to the European patent EP 2653646 B1 in the name of the same applicant, which is herein incorporated as a reference.

[0032] Alternatively, the assembling station 1 according to the invention may be adapted to perform only the insertion of the eyelets and the subsequent closure of the rings themselves. In this case, functionally the aforementioned operations for eyelet insertion and ring closing are carried out in each of the aforementioned stacking units 10.

[0033] Independently of the operating functionality of the aforesaid stacking units 10, each of said units 10 comprises:

- a working seat 11 for a portion of a slat L, at which a pair of half-ladders is associated with the portion of slat L; and
- means 13 for positioning the slat in said working seat 11.

[0034] In particular, as illustrated in particular in figures 5 and 6, the positioning means 13 may consist of a guiding slide 13a (placed at the inlet of the stacking unit 10) and, alternatively or in combination, of a guiding chamfer 13b (obtained directly at the inlet of the working site 11).

[0035] Operationally, the aforesaid working site 11 also acts as a sliding seat of the slat L in an insertion step of the slat along the aforesaid insertion axis X inside the assembling station 1.

[0036] The assembling station 1 according to the invention can be placed in line with a slat manufacturing machine, or it can be placed out of line to avoid slowing down the faster slat manufacturing process.

[0037] In general, the features and functions of the stacking units 10 usable in an assembling station of Venetian blinds with support half-ladders are known to a man skilled in the art and will therefore not be described herein in greater detail.

[0038] According to the invention, the assembling station 1 comprises a sliding guide 20 for the slat L. This sliding guide passes through the assembling station 1 along the aforesaid insertion axis X and defines a support for the slat L in the empty spaces V between one stacking unit 10 and the other.

[0039] Moreover, according to the invention, the aforesaid sliding guide 20 is held suspended between two opposite ends 1', 1" of the assembling station 1 parallel to the insertion axis X.

[0040] Functionally, said sliding guide 20 is arranged at a height such as to ensure the entrance of the slat in the stacking units 10 without however interfering with the action of the positioning means 13 of the slat L provided in the stacking units 10.

[0041] In other words, operationally, according to the invention, the sliding guide 20 has the function of accompanying the slat in input to each stacking unit, introducing the slat itself in the positioning means 13 and preventing the tip end of the slat itself, by lowering under its own weight, from jamming along the insertion path. The function of correctly positioning the slat L in the working site 11 of each stacking unit 10, instead, is left to the positioning means 13.

[0042] The stacking unit 10 of the assembling station is slidably associated with the aforementioned sliding guide 20 parallel to the insertion axis X. In this way, the aforementioned sliding guide 20 does not in any way affect the freedom of adjustment of the position of the stacking units 10 along the aforesaid insertion axis X.

[0043] Operationally, the sliding guide 20 can therefore support the single slat L in the empty spaces V between one stacking unit and the other (avoiding jamming of the slats during the insertion step) and, due to the fact that it is held suspended between the two opposite ends 1', 1" of the assembling station 1 and the fact that the stacking units 10 of the assembling station are slidably associated with the aforementioned sliding guide 20 parallel to the insertion axis X, the sliding guide 20 does not affect on the operation of the assembling station, i.e. the stacking units 10.

[0044] In fact, thanks to the invention, the repositioning of the stacking units can be carried out without the presence of the sliding guide constituting any constraint or limit. Unlike the prior art solutions, it is therefore not necessary to remove the sliding guide. This simplifies the operation of the assembling station, reducing dead times.

[0045] Moreover, the sliding guide 20, being suspended through the assembling station and therefore without intermediate support elements, leaves all the space of the shared support structure free along the insertion axis X for the movement of the stacking units 10. Therefore, in no case, even in the production of blinds with half-ladders arranged at a particularly reduced pitch, it is necessary to remove the sliding guide to free up space available to the stacking units.

[0046] Thanks to the invention, the assembling station 1 is therefore easier to manage than similar assembling stations of a known type.

[0047] Preferably, said sliding guide 20 consists of at least one cable which extends parallel to said insertion axis X through the assembling station 1. The realization of the sliding guide with one or more cables allows combining simplicity, lightness and low production cost.

[0048] According to the preferred embodiment illustrated in the accompanying Figures, the aforesaid sliding guide 10 consists of a pair of cables 21, 22 which extend parallel to the insertion axis X through the assembling station 1. The presence of two cables, instead of one, allows realizing a more stable support for the slat L during insertion, reducing the risk that the slat L rotates around the insertion axis X.

[0049] Preferably, the two cables 21, 22 of the aforesaid pair of cables are mutually spaced transversally with respect to the insertion axis X. The distance between the two cables is less than the width of the slat L.

[0050] Advantageously, as will be shown below, the transverse distance between the two cables 21 and 22 can be adjusted according to the size and shape of the slats which from time to time are processed in the assembling station 1. Advantageously, the aforesaid at least one cable or each cable of the aforesaid pair of cables 21, 22 is made of metal, preferably steel. The realization of the aforesaid cables with steel allows combining resistance to simplicity, lightness and cost-effectiveness of production.

[0051] Advantageously, as illustrated in particular in Figure 6, each stacking unit 10 comprises a crossing opening 12 for the aforesaid at least one cable or for each cable of the pair of cables 21, 22. Such a crossing opening 12 extends axially parallel to the insertion axis X.

[0052] Preferably, said crossing opening 12 consists of a groove axially open on at least one side. This configuration is advantageous since it allows an easier assembling of the cables in the stacking units 10. In particular, this configuration facilitates the replacement of the cables 21, 22 and possibly the replacement of the parts of the single stacking unit 10 affected by the crossing of the cables 21, 22.

[0053] Advantageously, as shown in Figures 4, 8 and 10, the aforesaid at least one cable or each cable 21, 22 of the pair of cables is attached at the two opposite ends 21', 21" and 22', 22" thereof to two opposite anchoring structures 31, 32. Each anchoring structure 31, 32 is arranged at one of the two opposite longitudinal ends 1', 1" of the assembling station 1.

[0054] The single anchoring structures may be mechanically supported by the shared support structure 2 of the assembling station, as shown in Figure 8, or it may be independent of such a shared support structure 2, as shown in Figure 10.

[0055] Preferably, the position of said two anchoring structures 31, 32 can be adjustable in the height direction with respect to the insertion axis X to adjust the positioning of said cable with respect to the stacking units 10 and to the relative positioning means 13.

[0056] Advantageously, the position of these two anchoring structures 31, 32 can be adjustable in a transversal direction with respect to the insertion axis X to adjust the positioning of said cable according to the size and/or shape of the slats which from time to time are processed in the assembling station 1.

[0057] Preferably, as shown in the accompanying figures, the assembling station 1 comprises means 30 for tightening the aforesaid at least one cable or the pair of cables 21, 22 along a direction parallel to the insertion axis X. In this way, adequate support for the slats is ensured, preventing the cables from loosening over time due to the weight and the sliding action of the slats on the cables themselves.

[0058] In particular, the tightening means 30 may consist of elastic means, axially aligned with the single cable 21, 22.

[0059] Preferably, as shown in the accompanying Figures, the tightening means 30 are arranged at one of the aforesaid two opposite anchoring structures 31, 32.

[0060] The invention allows several advantages to be achieved, some of them already described.

[0061] The assembling station of Venetian blinds with support half-ladders allows preventing the jamming of the slats during the insertion step without affecting the operation of the assembling station.

[0062] The assembling station 1 according to the invention is also simpler to manage than similar assembling stations of a known type.

[0063] Finally, the assembling station 1 according to the invention, in particular when the sliding guide consists of one or more cables, is simple and cost-effective to be realized.

[0064] The invention thus conceived thus achieves the intended purposes.

[0065] Of course, it may take, in its practical embodiment, also shapes and configurations other than the above without departing from the present scope of protection.

[0066] Furthermore, all details may be replaced with technically equivalent elements and dimensions, shapes and materials used may be any according to the needs.

Claims

1. Station for assembling Venetian blinds with support half-ladders, comprising a plurality of stacking units (10) of the slats on support half-ladders, wherein said stacking units (10) are aligned with each other along an insertion axis (X) of the slats and are slidingly associated to a shared support structure (2) which extends parallel to said insertion axis (X),
each stacking unit (10) comprising:

- a working seat (11) for a portion of a slat (L), at which seat a pair of half-ladders is associated to said portion of slat (L), said working seat also acting as a sliding seat of the slat (L) in an insertion step of the slat along said insertion axis (X) inside the assembling station (1); and
- means (13) for positioning the slat in said working seat (11),

characterized in that it comprises a sliding guide (20) for the slat (L) which crosses the assembling station (1) along said insertion axis (X) and defines a support for the slat (L) in the empty spaces (V) between one stacking unit (10) and the other, wherein said sliding guide (20) is held suspended between two opposite ends (1' 1") of said assembling station (1) parallel to said insertion axis (X) and wherein said

sliding guide (20) is positioned at a height such as to ensure the entrance of the slat in the stacking unit (10) without interfering however with the action of said positioning means (13) of the slat (L).
and **in that** said stacking units (10) are slidingly associated to said sliding guide (20) parallel to said insertion axis (X).

2. Assembling station according to claim 1, wherein said sliding guide (20) consists of at least one cable which extends parallel to said insertion axis (X) through said assembling station (1).

3. Assembling station according to claim 2, wherein said sliding guide (10) consists of a pair of cables (21, 22) which extend parallel to said insertion axis (X) through said assembling station (1).

4. Assembling station according to claim 3, wherein the two cables (21, 22) of said pair of cables are spaced with each other transversally with respect to said insertion axis (X).

5. Assembling station according to claim 2, 3 or 4, comprising means (30) for tightening said at least one cable or said pair of cables (21, 22) in a direction parallel to said insertion axis (X).

6. Assembling station according to one or more of the claims from 2 to 5, wherein said at least one cable or each cable of said pair of cables (21, 22) is made of metal, preferably steel.

7. Assembling station according to one or more of the preceding claims, wherein each stacking unit (10) comprises an opening (12) for the crossing of said at least one cable or for each cable of said pair of cables (21, 22), wherein said crossing opening (12) extends axially parallel to said insertion axis (X).

8. Assembling station according to claim 7, wherein said crossing opening (12) consists of a groove axially open on at least one side.

9. Assembling station according to one or more of the claims from 2 to 8, wherein said at least one cable or each cable (21, 22) of said pair of cables is attached at its two opposite ends (21, 21; 22', 22") to two opposite anchoring structures (31, 32), each of which is placed at one of the two opposite longitudinal ends (1', 1") of the assembling station (1), preferably the position of said two anchoring structures (31, 32) is adjustable in height with respect to the insertion axis (X) to adjust the positioning of said cable.

10. Assembling station according to claim 9, wherein the position of said two anchoring structures (31, 32) is adjustable in a direction transverse to the insertion axis (X) to adjust the positioning of said cable.

11. Assembling station according to claim 5 and 9, wherein said tightening means (30) are placed at one of said two opposite anchoring structures (31, 32).

12. Assembling station according to one or more of the preceding claims, wherein the shared support structure (2) to which said stacking units (10) are slidingly associated, consists of a bar, which extends parallel to said insertion axis (X).

13. Assembling station according to one or more of the preceding claims, comprising motorised means for moving one or more of said stacking units (10) along said shared support structure (2) parallel to said insertion axis (X) .

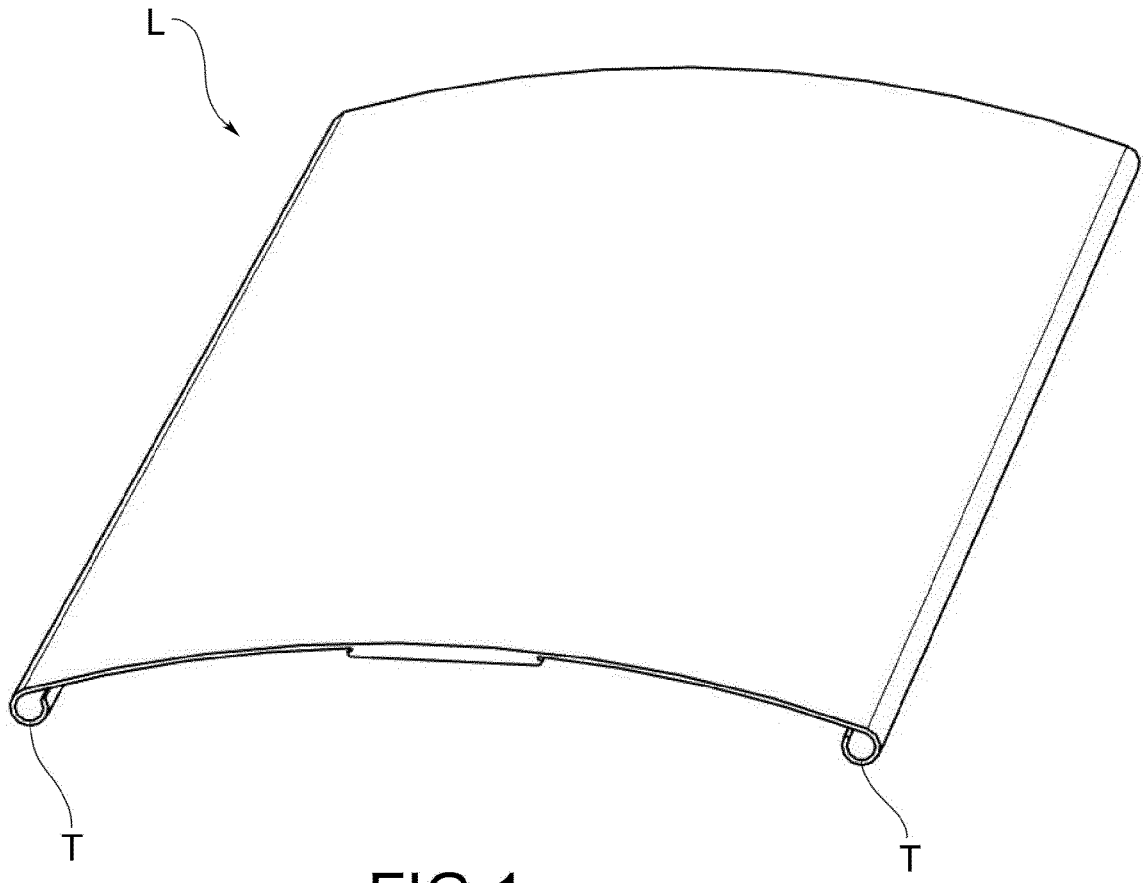

FIG.1

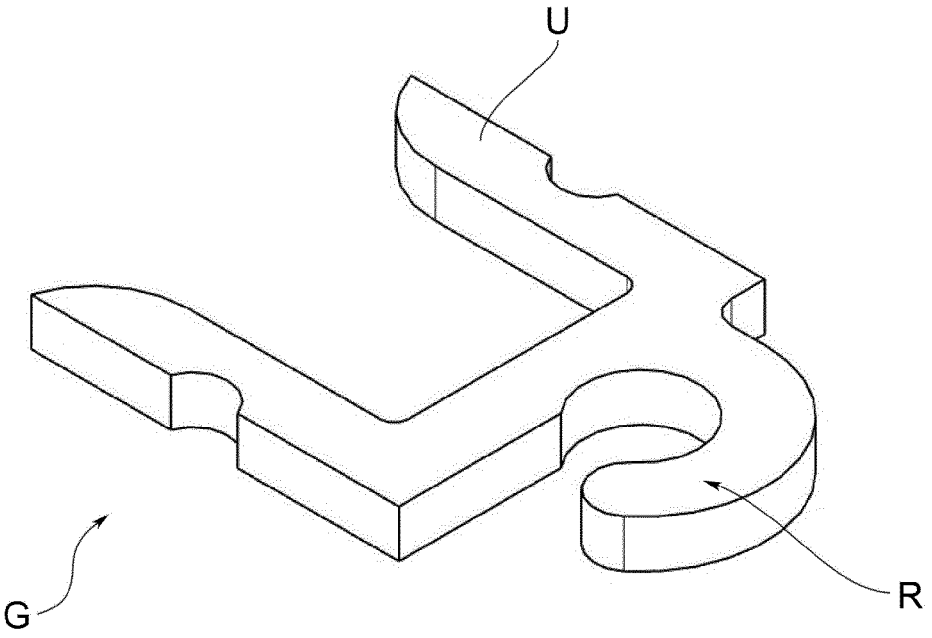

FIG.2

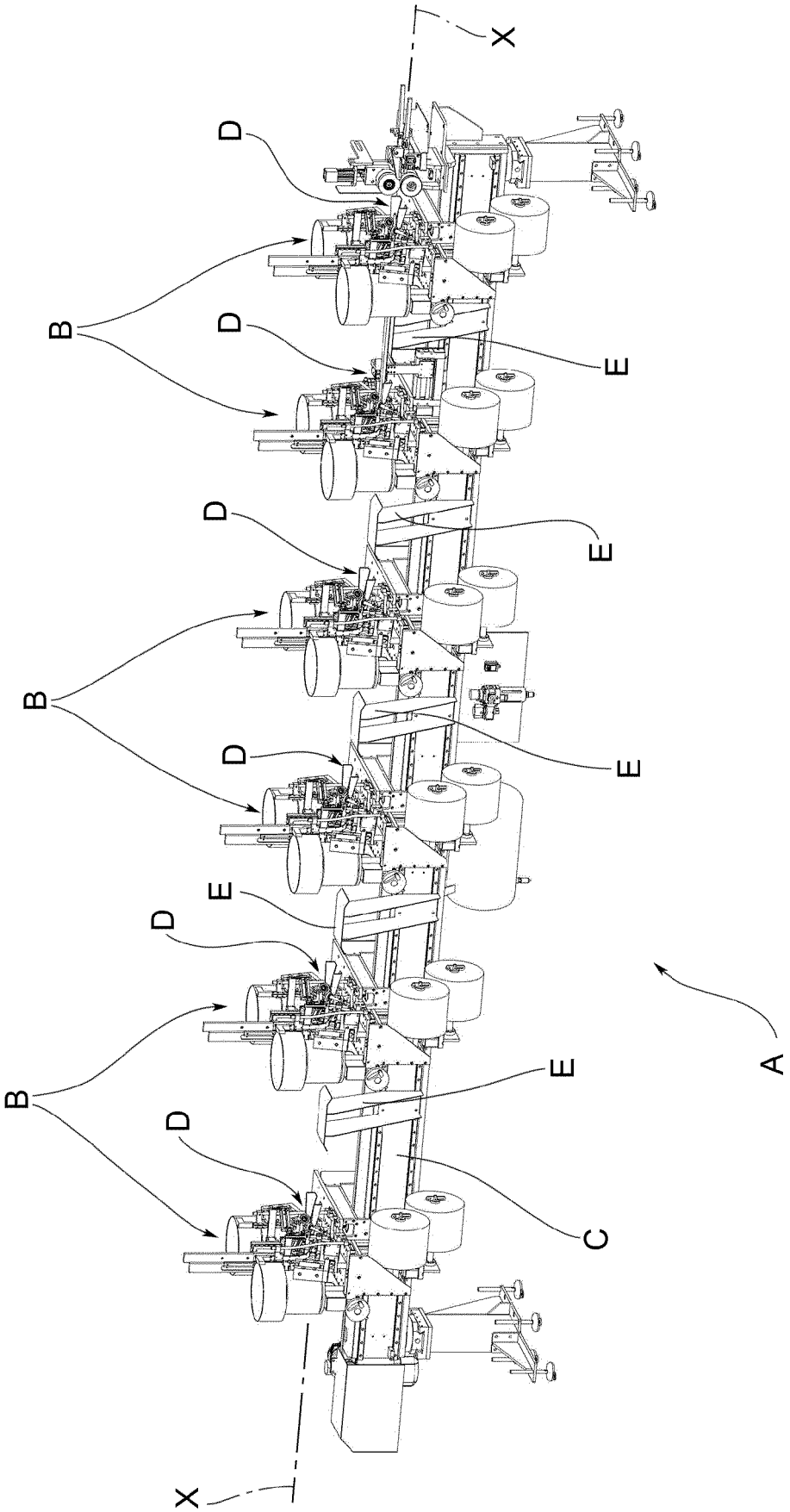

FIG.3

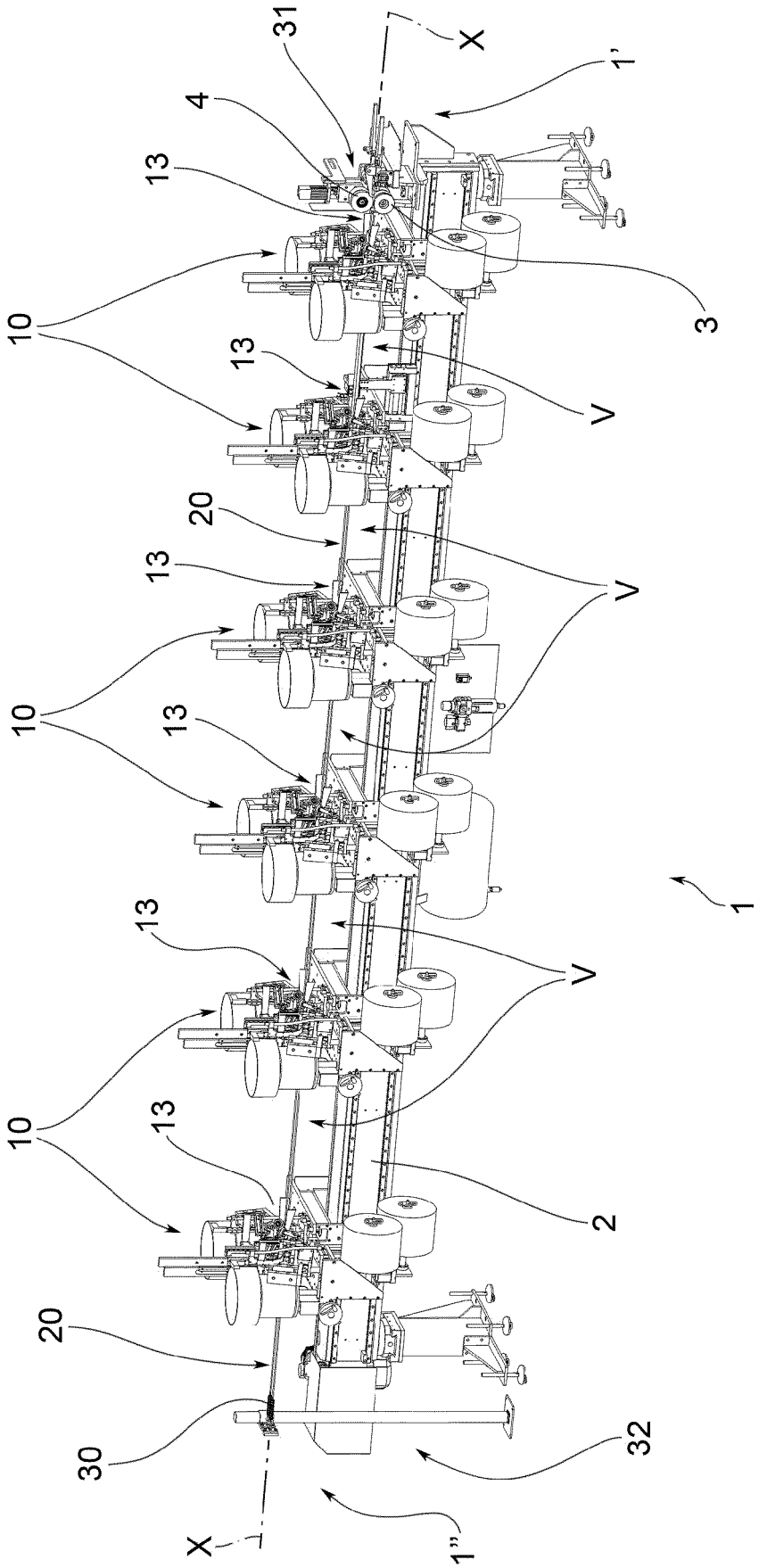

FIG.4

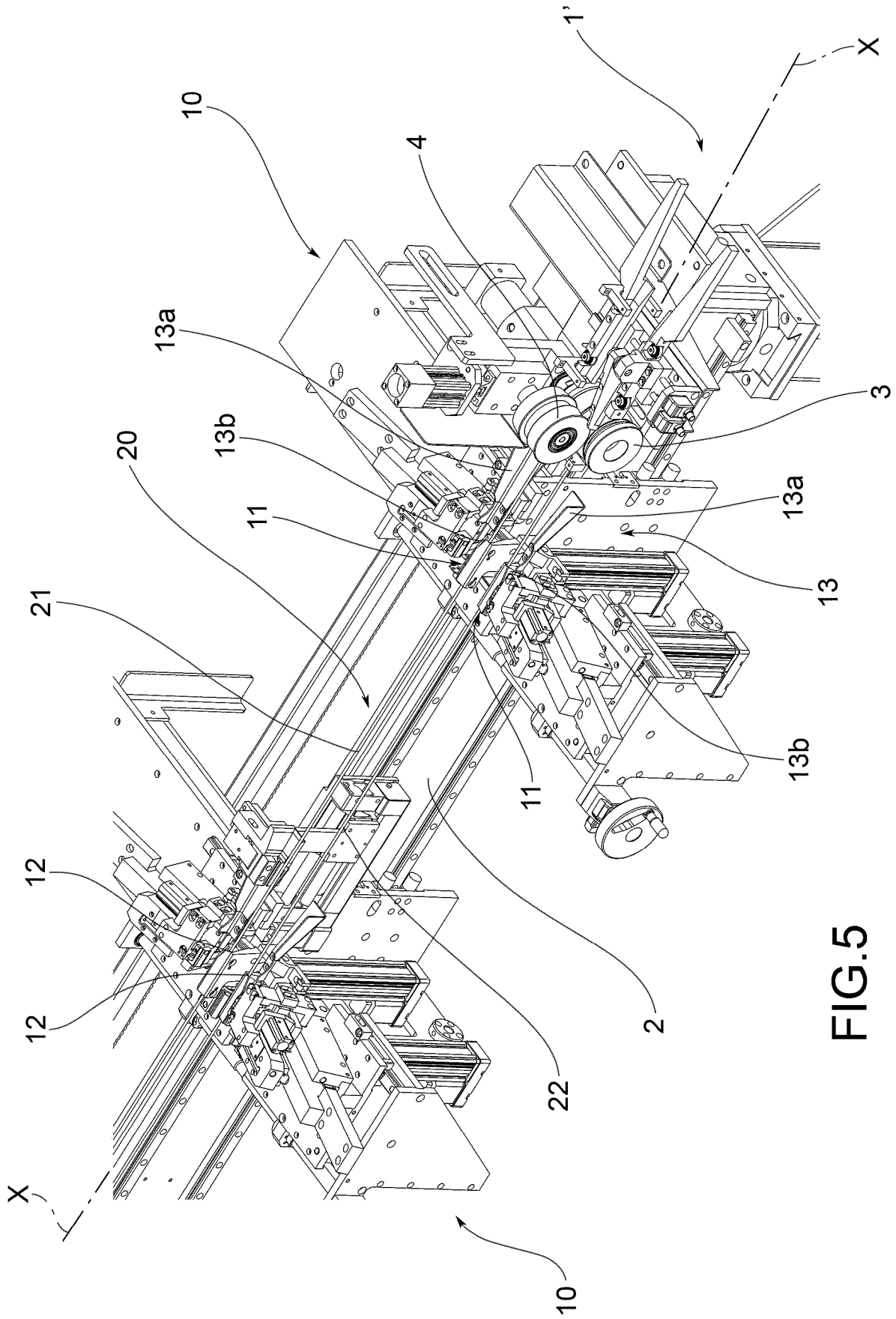

FIG.5

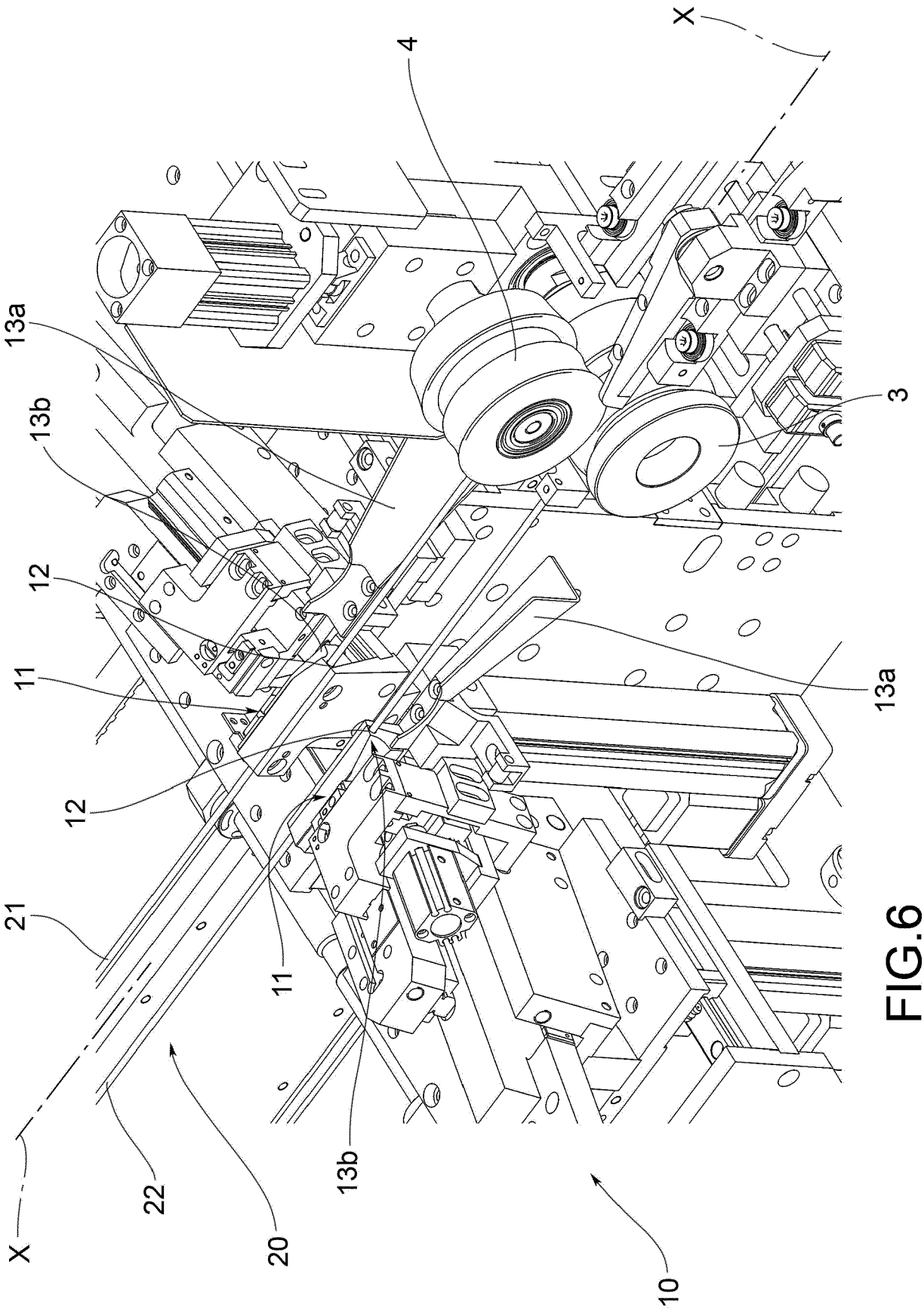

FIG.6

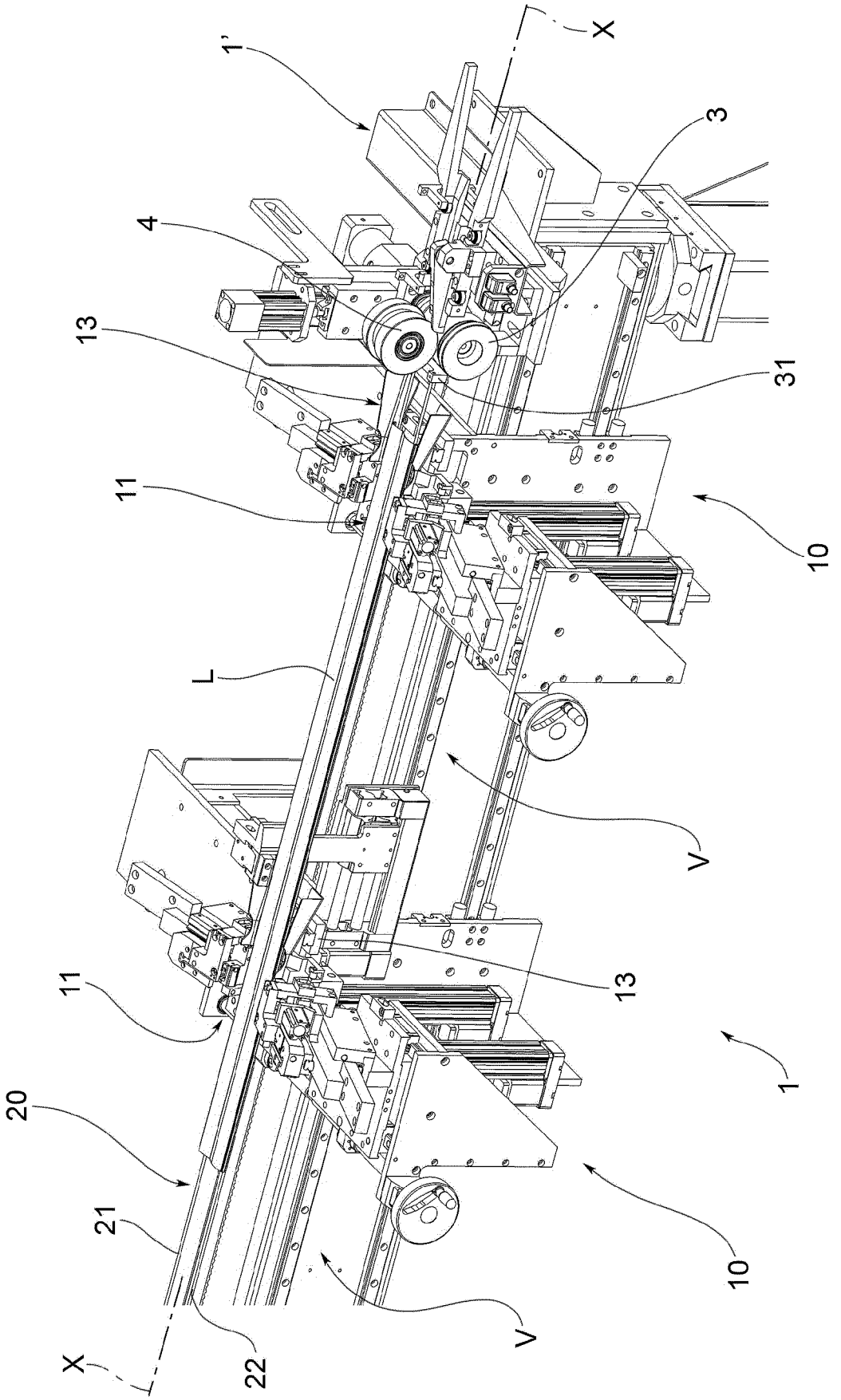

FIG.7

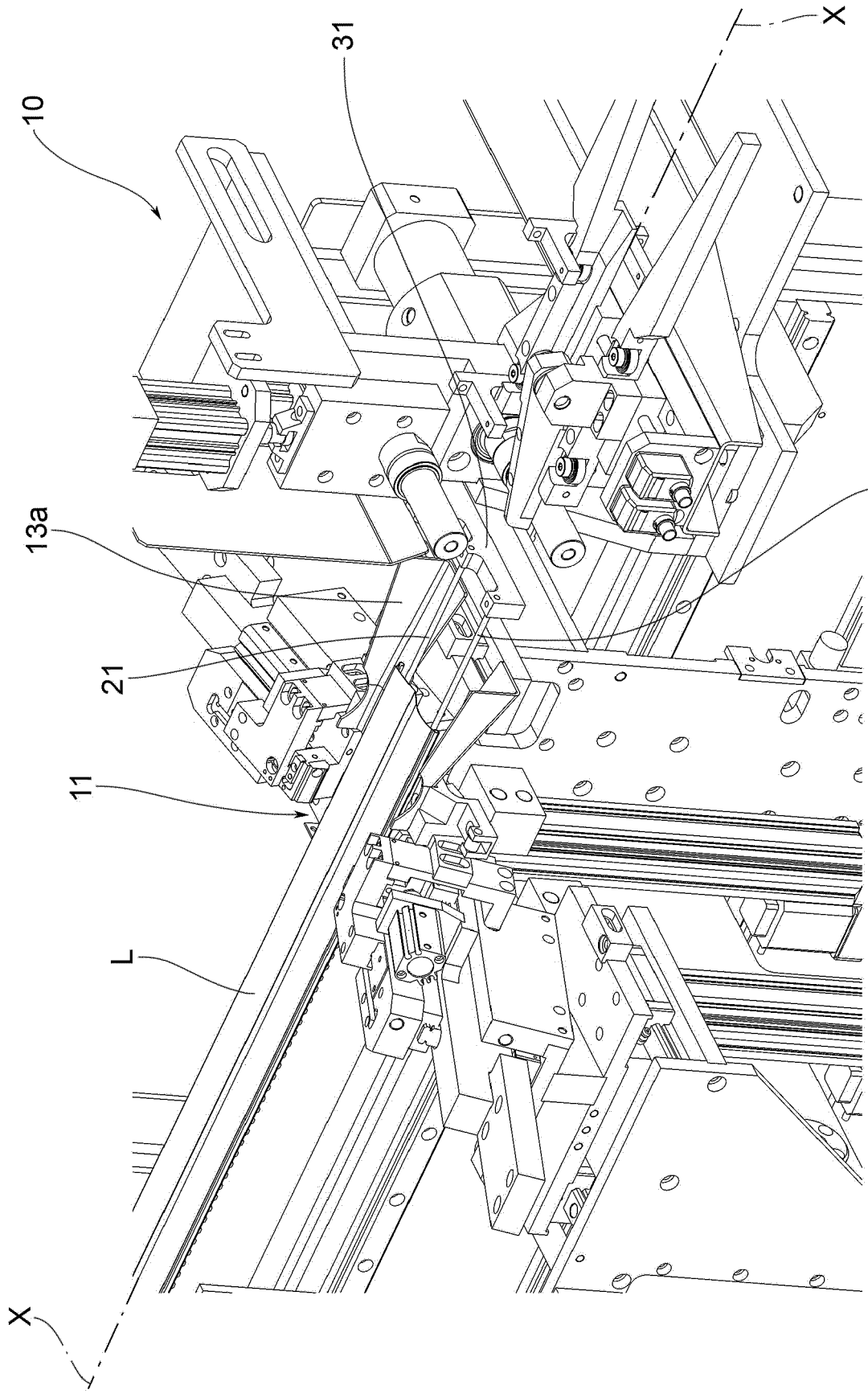

FIG.8

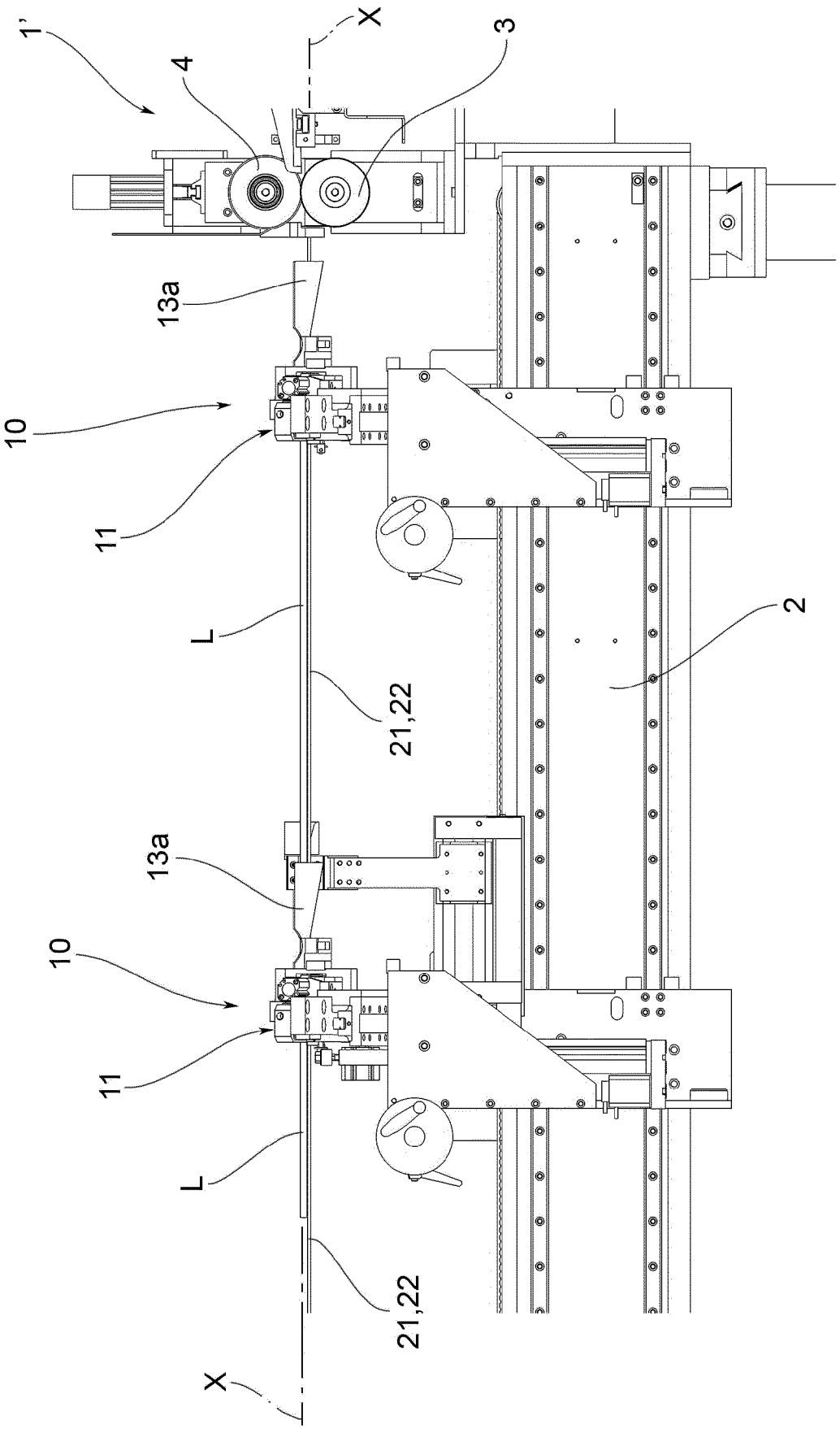

FIG.9

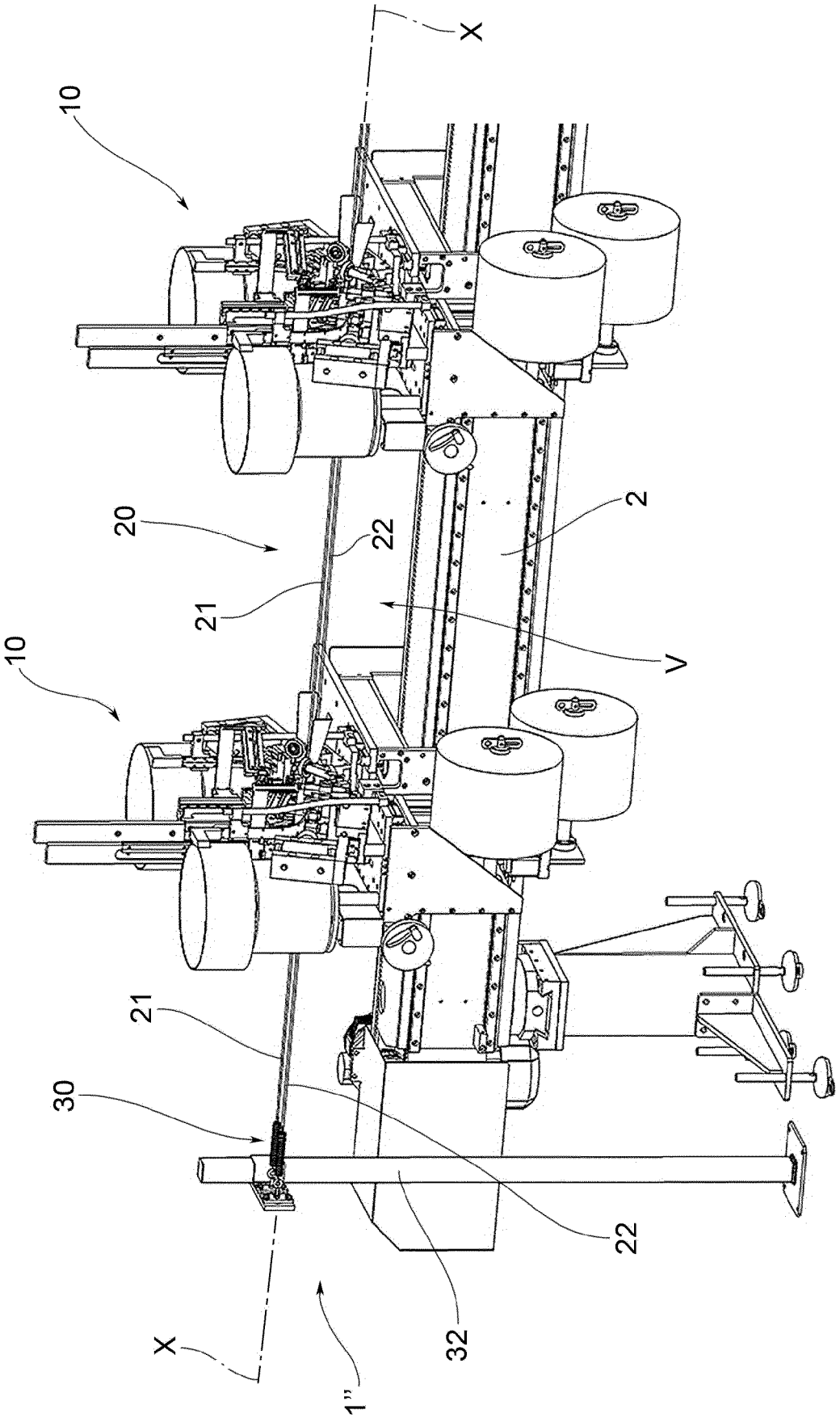

FIG.10

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 2932

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 2 653 646 A2 (DALLAN SPA [IT]) 23 October 2013 (2013-10-23) * abstract; figures 1-18 *	1-13	INV. E06B9/266
A	US 5 349 730 A (ANDERSON RICHARD N [US] ET AL) 27 September 1994 (1994-09-27) * column 9, line 19 - column 10, line 4; figures 1,11,19; compound 164 *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 June 2018	Koulo, Anicet

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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