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(54) Automatic packing machine with several different wrapping tapes of various widths

(57) This invention relates to a machine for automatic packing of products featuring a fixed portal frame in correspondence with the wrapping station used to support and move several wrapping tapes with different

width, whose ends are wound up to form two reels, one fixed in upper position and one mobile in lower position.

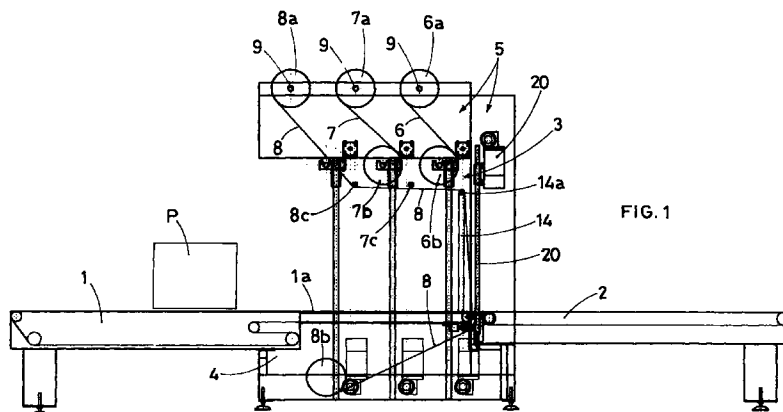


FIG. 1

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Description

[0001] This patent application relates to an automatic packing machine for products that are wrapped up with wrapping tape both in their upper and lower part. There are currently several machines on the market that are able to carry out the above mentioned packing operation automatically. Their operating principle provides for two consecutive aligned conveyor belts, of which one is used to convey the product to be packed towards the wrapping station and the other one to receive the packed product coming out from the wrapping station.

[0002] The wrapping station comprises a support frame for one wrapping tape whose ends are wound up to form two reels that are held above and under the route covered by the product.

[0003] The product runs into the wrapping tape that is located in transversal vertical position with respect to the direction of the product carried by the above mentioned conveyor belts.

[0004] While the product moves on, the two reels are simultaneously unwound so that the lower part of the wrapping tape coats the lower part of the product, and the upper wall of the product is at the same time wrapped up in the upper part of the wrapping tape.

[0005] This type of machines is usually provided with several wrapping tapes with different width that are used alternatively and selectively from time to time according to the width of the product to be packed.

[0006] This means that the each pair of reels must be held by mobile supports in order to be moved and removed to and from the wrapping station.

[0007] The first solution adopted in order to use several wrapping tapes on the same packing machine was to include a support trolley able to support several pairs of reels side by side in transversal position with respect to the direction of the product.

[0008] The reel-holding trolley is able to make horizontally alternated journeys in transversal direction with respect to the movement of the product, in order to position from time to time the wrapping tape with the appropriate width in front of the product, with the two reels resting at the same height, one above and one under the route of the product.

[0009] This first solution, however, involves a considerable increase of the transversal dimension of the operating spaces required by the machine, since the reel-holding trolley must be able to move aside and rest on one side of the transportation line every time the wrapping tape is changed.

[0010] In order to avoid this inconvenience, packing machines have been recently developed in which the reel-holding trolley makes alternated longitudinal journeys to transfer from time to time the pair of reels with the appropriate width to the wrapping station according to the width of the product to be packed.

[0011] In this second type of machines, the reel-holding trolley is designed so as to hold transversally all

pairs of reels, one after the other one according to the direction of the product. This means that the longitudinal journeys astride of the wrapping station, at each change of tape, do not involve transversal volumes on the two sides of the transportation line.

[0012] This reel-holding trolley includes two different supporting elements for each pair of reels. One supporting element is fixed and the other one slides vertically, so as to pass from the first raised resting position located at a certain height over the route of the product, to the second lowered working position, which is located at a certain height under the route of the product.

[0013] Undoubtedly, we have to say that the adoption of a reel-holding trolley that slides longitudinally above the transportation line of the product has allowed to solve the problem related to the excessive transversal volume of the machines provided with a reel-holding trolley that slides in orthogonal direction with respect to the direction of the conveyor belts.

[0014] It must be said, however, that the adoption of a reel-holding trolley that slides either in longitudinal or transversal direction considerably complicates the construction of the machines and notably increases the manufacturing costs compared to the simpler packing machines that are provided with a fixed trolley supporting only one wrapping tape.

[0015] The purpose of this invention is to provide a machine for the automatic packing of products that, although provided with a fixed reel-holding trolley, offers the wide flexibility of use typical of the more expensive machines provided with a sliding trolley, which at the moment are the only machines able to work with several interchangeable wrapping tapes with different width.

[0016] In order to reach this objective, the machine according to the present invention is provided at the wrapping station with a fixed portal frame located between the pair of conveyor belts, able to support various pairs of reels of wrapping tape, one after the other along the direction of the product.

[0017] The upper reel of each wrapping tape is held by a supporting element and is automatically unwound by means of a set of powered rolls, of the known type, while the lower reel of each wrapping tape is inserted on a supporting shaft, whose ends are fixed to two bushes that are inserted and slide in two guiding rods, located on the two sides of the above mentioned frame.

[0018] During their alternated journeys, the said bushes are vertically pulled by a powered chain transmission of the known type, so that, when necessary, the lower reel of each wrapping tape can be transferred from the raised resting position (that is next to the fixed upper reel) to the lowered working position under the first conveyor belt which conveys the product to be packed towards the wrapping station.

[0019] At this regard it must be noted that the first conveyor belt is of telescopic type in order to move back and allow the reel coming down from its raised resting position to reach the lowered working position, which is

located under the first conveyor belt.

[0020] As regards the automatic unwinding of the lower reels of wrapping tape, unlike the known machines provided with a set of powered rolls both for the upper and the lower reel for each wrapping tape, the machine according to this invention is provided with only one actuator for all the wrapping tapes, made up of a pair of adjacent rolls, able to tighten the tape which is currently used to pack the product and located under the space existing between the exit section of the first conveyor belt and the one of the second conveyor belt.

[0021] In particular, one roll is idle and fixed to the telescopic section of the first conveyor belt, while the second roll is powered and driven by means of a transmission chain by the driving shaft of the second conveyor belt, since it is the second tape that allows for detecting the exact quantity of wrapping tape that must be unwound from the lower reel.

[0022] These two rolls do not come into contact automatically when the telescopic section of the first conveyor belt moves to the end of the stroke, in order to cover the underlying housing of the reel of wrapping tape which is currently

[0023] used. As a matter of fact, the idle roll remains at a small distance from the powered roll, against which it is pressed by means of an actuator activated by a sensor that detects the presence of the product moving on the first conveyor belt.

[0024] A further factor for the reduction of the manufacturing cost of the machine according to the present invention is represented by the adoption of only one set of rolls to unwind all the lower reels, instead of a set of rolls for each lower reel, as it happens in the machines currently available on the market. For a clearer explanation, the description of the packing machine according to the present invention continues with reference to the enclosed drawings that only have an explanatory, not restrictive purpose, in which:

- Fig. 1 is a lateral view of the machine, according to a direction perpendicular to the route of the product; the machine is shown in working conditions with one of the wrapping tapes flat across the wrapping station and ready to wrap the product to be packed;
- Fig. 2, which is the same as Fig. 1, shows the machine during the changing of the wrapping tape, when the lower reel of tape to be replaced returns to its raised resting position, while the lower reel of the new tape to be used moves down towards the lowered working position.
- Fig. 3 is a enlarged drawing of a detail of the machine shown in Fig. 1, that refers to the pair of rolls used to unwind the lower reel of the wrapping tape which is being used.
- Fig. 4 is a front view of the reel-holding frame shown as a sketch.

[0025] With reference to figures 1 and 2, the machine according to the present invention comprises a first conveyor belt (1), a second conveyor belt (2), positioned in series with respect to the first one and a wrapping station (3), located between the two conveyor belts (1 and 2).

[0026] The first conveyor belt (1) features a telescopic section (1a) that in forward position comes alongside on the same plane with the next tape (2), while in rear position frees a wide space (4), located under the surface on which the product moves (P).

[0027] A fixed portal frame (5) rests in correspondence with the wrapping station (3) and supports several wrapping tapes, namely three tapes with different width (6, 7, 8), in transversal position above the first conveyor belt (1).

[0028] The said frame (5) holds a pair of reels for each wrapping tape whose ends are wound up to form an upper reel (6a, 7a and 8a) and a lower reel (6b, 7b and 8b).

[0029] The upper reels of each tape are inserted on fixed shafts (9) that extend transversally from one side to the other of the frame (5), while the lower reels are inserted on shafts (10) extending from one side to the other of the frame (5) whose ends are fixed to two bushes (11) that are inserted and slide along a pair of opposed guiding rods (12) located on the two sides of the frame (5). Each pair of bush (11) is dragged along its guiding rod (12) by a chain transmission (13) whose power unit (13a) is located at the base of the rod (12).

[0030] Fig. 1 shows the machine which is the object of the present invention when using the tape (8), whose lower reel (8b) is located in the space (4) under the telescopic section (1a) of the conveyor belt (1).

[0031] Fig. 2 shows the changing of the tape, when tape (8) is to be replaced with tape (7); in this situation, the telescopic section (1a) is in full rear position in order to allow for the rising of the lower reel (8b) of the tape (8) and the descent inside the space (4) of the lower reel (7b) of the tape (7).

[0032] Attention is drawn on the fact that on the front edge of the telescopic section (1a) of the first conveyor belt (1) a pair of opposed rods (14) is applied on the side, supporting a transversal bar (14a) that during the forward movement of the telescopic section (1a) intercepts and pushes into the wrapping station (3) the part of wrapping tape whose lower reel is currently lowered in the working position, inside the space (4).

[0033] It is finally noted that two fixed bars (7c and 8c) extend transversally between the two side walls of the frame (5), located at a slightly higher height than the above mentioned transversal bar (14a) and designed to act as return bars for the wrapping tapes (7 and 8), when one tape is pushed by the bar (14) inside the wrapping station, as shown in Fig. 1. As mentioned above, Fig. 3 is an enlargement of Fig. 1 showing the pair of rolls used to unwind the lower reel of the wrapping tape, namely tape (8) that is currently used to pack

the product (P).

[0034] The said pair is made up of an idle roll (15) and a powered roll (16) that is driven by means of a transmission chain (17) by the pulling cylinder (18) of the second conveyor belt (2).

[0035] The idle roll (15) is fixed to the telescopic section (1a) of the conveyor belt (1) thus following its alternated journeys during the changing of the tape. When the telescopic section (1a) is in its maximum forward position, as shown in Fig. 3, the idle roll (15) does not automatically come into contact with the powered roll (19) against which it is pushed by a piston (19) activated by a sensor of known type (not shown in the figure) that detects the product (P) moving over the conveyor belt (1).

[0036] It is obvious that when the idle roll (15) comes into contact with the powered roll (16), the lower reel that is located inside the space (4) automatically starts unwinding and continues unwinding until the said sensor sends a command signal to the piston (19) calling the idle roll (15) back as far as it is necessary to eliminate the pressure that pushes the wrapping tape against the powered roll (16).

[0037] Finally, it must be mentioned that in Figs. 1 and 2 the wrapping station (3) features a device (20), of known type, used to cut and seal the wrapping tape on the back of the product (P), once the product has left the wrapping station (3).

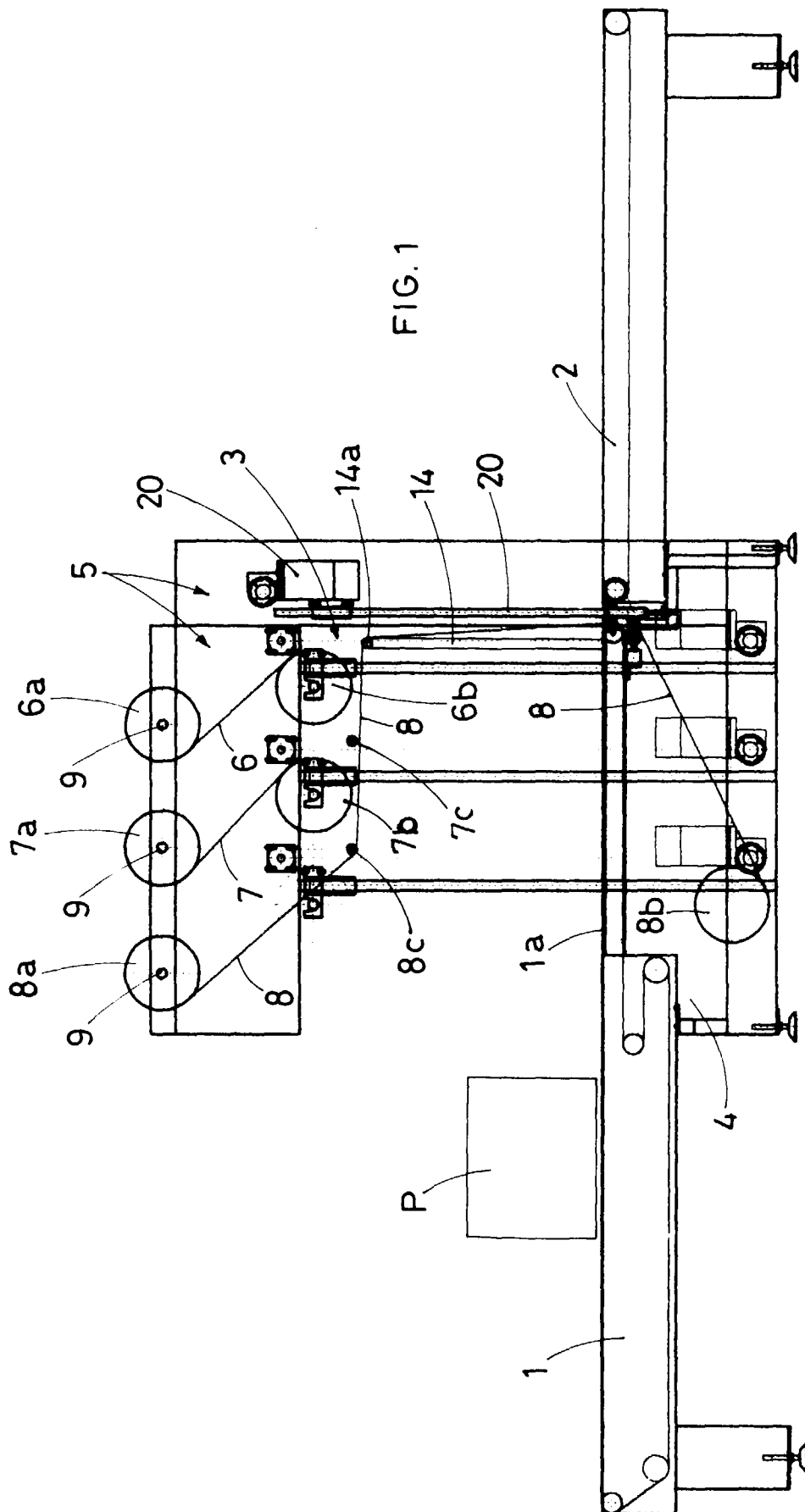
Claims

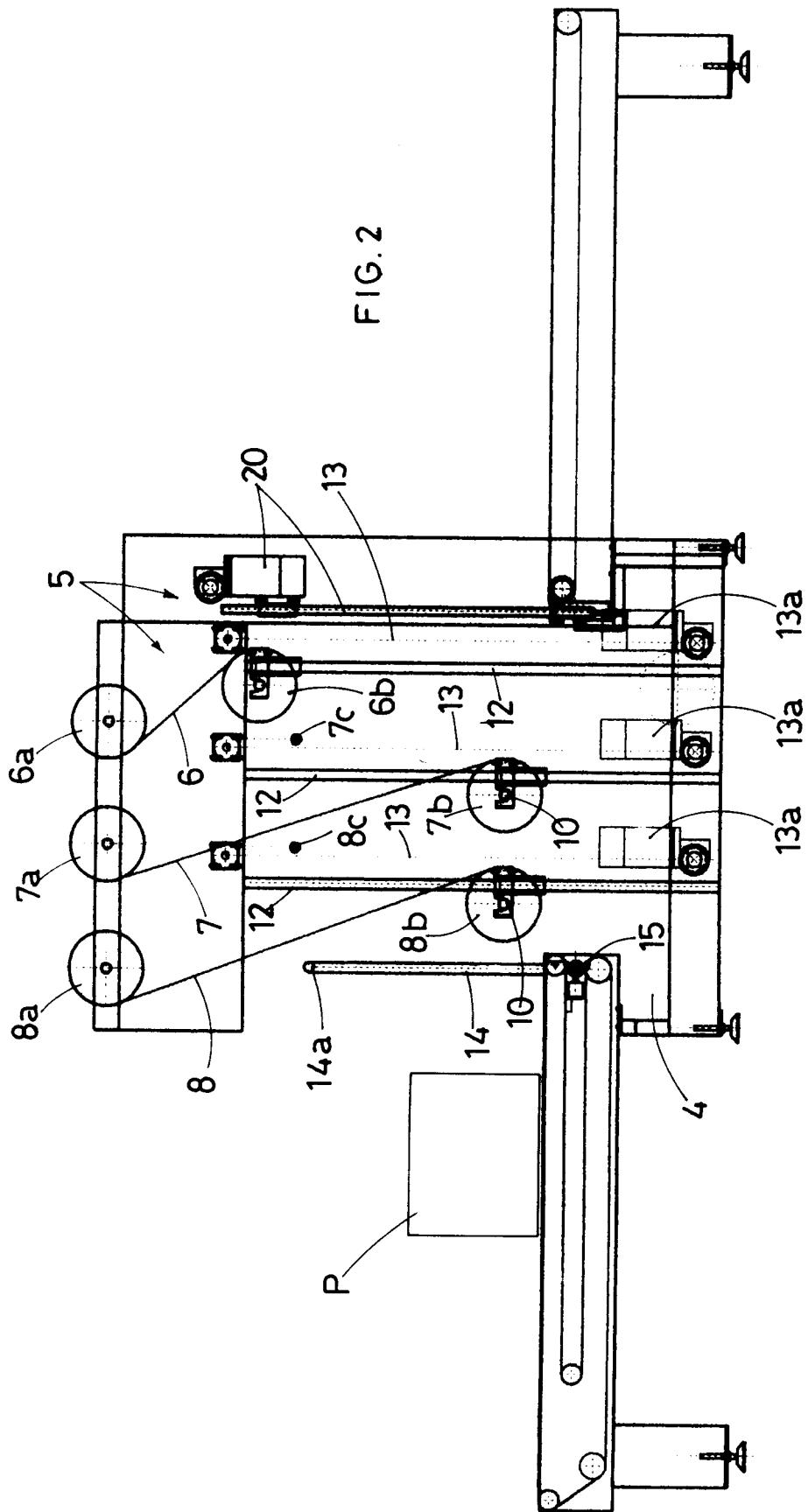
1. Machine for automatic packing of products provided with several wrapping tapes with different width, of the type made up of a wrapping station (3) located between a second exiting conveyor belt (2) and a first entering conveyor belt (1), that features a telescopic section (1a) sliding over a space (4), characterized in that the machine comprises, in correspondence with the wrapping station (3), a fixed portal frame (5), that holds in transversal position over the first conveyor belt (1) several wrapping tapes (6,7 and 8) with different width, whose ends are wound up to form upper reels (6a, 7a and 8a) and lower reels (6b, 7b and 8b), being the upper reels (6a, 7a and 8a) inserted on fixed shafts (9) that transversally extend from one side to the other of the frame (5), and the lower reels (6b, 7b and 8b) inserted on shafts (10) that extend from one side to the other of the frame (5) whose ends are fixed to two bushes (11), respectively inserted and sliding along a pair of opposed guiding rods (12) located on the two sides of the frame (5), being foreseen that:

- Each pair of bushes (11) is dragged along its guiding rod (12) by a chain transmission (13);
- A pair of opposed rods (14) supporting a transversal bar (14a) is applied on the side of the

front edge of the telescopic section (1a) of the first conveyor belt (1);

- An idle roll (15) is applied under the telescopic section (1a) of the conveyor belt (1) and pushed by means of a piston (19), activated by a sensor, against a powered roll (16) that is driven through a transmission chain (17) by the pulling cylinder (18) of the second conveyor belt (2).





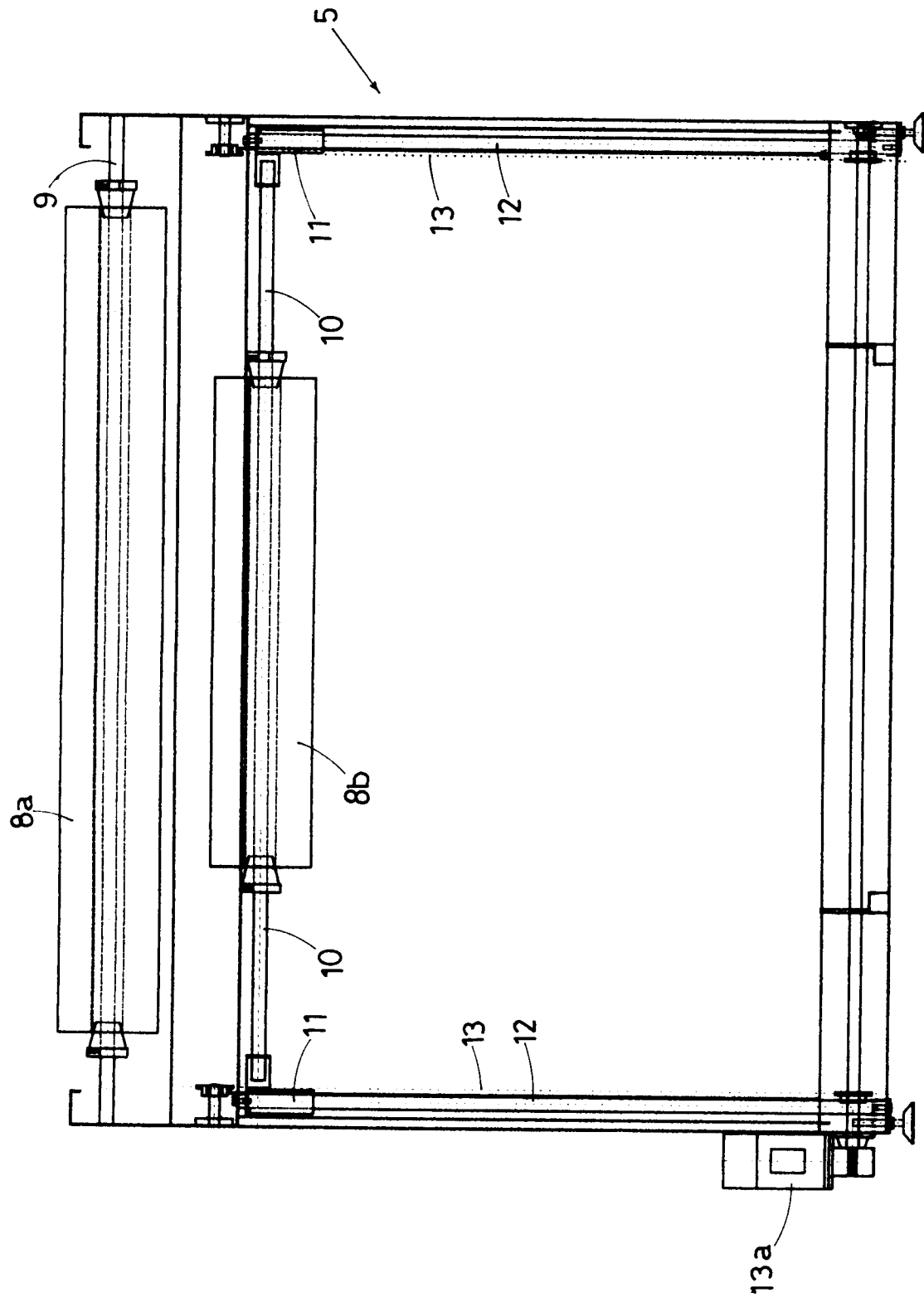


FIG. 3

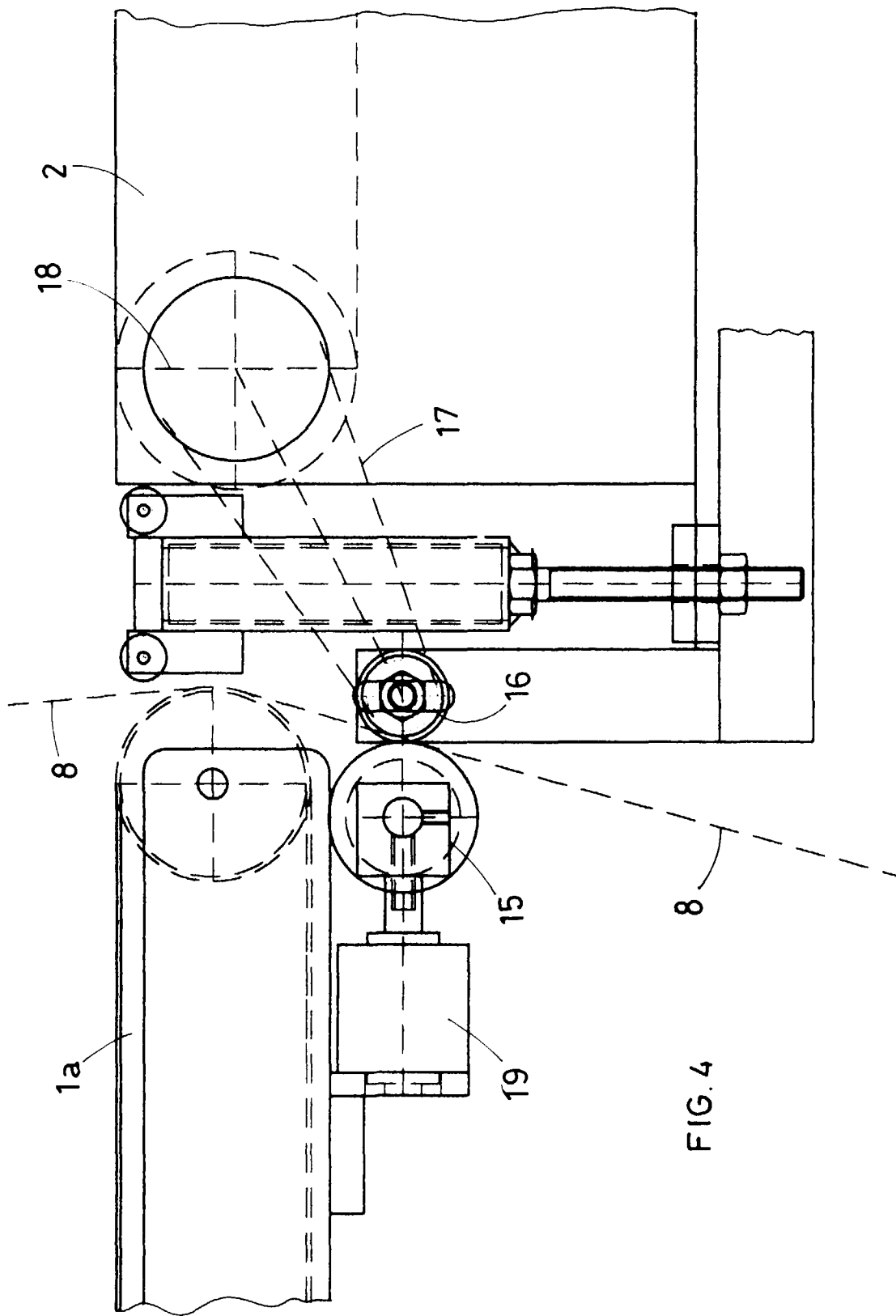


FIG. 4