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(54) Device for positioning socks, particularly short socks, in labeling machines

(57) A sock positioning device, particularly for short socks, in labeling machines of the type comprising a conveyor belt (2) which can move along an advancement direction and with at least one station (4) for applying a label (5) at the tops (6) of a pair of mutually superimposed socks (7) arranged so that their tops (6) are proximate to a lateral edge (8) of the conveyor belt (2); the pair of socks (7) is deposited on the conveyor belt (2) so that the feet (9) are folded onto the legs (10), orientated transversely to the advancement direction, and so that the end portion (9a) of the feet on the toe side is folded again onto the remaining part (9b) of the feet (9) in order to keep the label application region clear. The positioning device (1;1a) comprises overturning means (12a, 12b) which can be arranged downstream of the application station (4), along the advancement direction of the conveyor belt (2), and are suitable to act on the folded end portion (9a) of the feet (9) in order to fully extend the feet (9) onto the legs (10) of the socks (7).

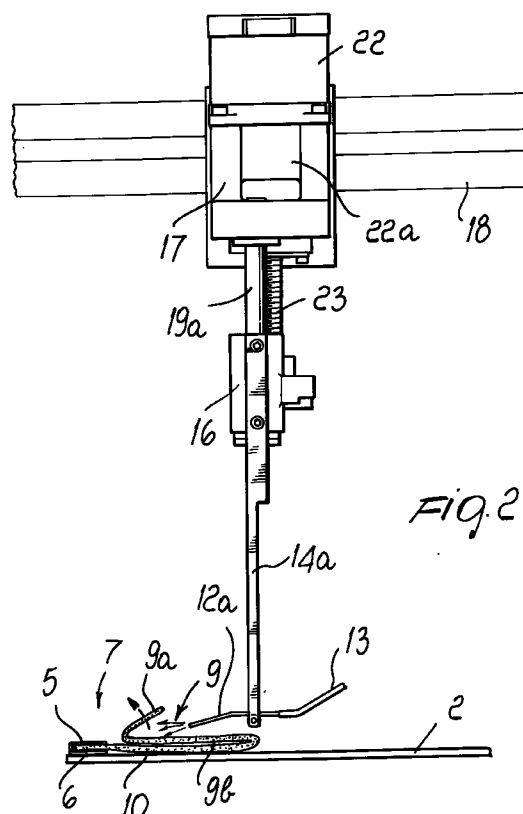


Fig. 2

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Description

The present invention relates to a device for positioning socks, particularly short socks, in labeling machines.

European Patent application no. 95119751.6 of December 14, 1995, discloses an automatic machine for labeling both long or knee-length socks and short socks.

Said machine is substantially composed of a conveyor belt which is arranged substantially horizontally and whereon the socks to be labeled are placed, arranging mutually superimposed pairs of socks so that their tops are arranged proximate to a lateral edge of the conveyor belt, which is actuated with a translatory motion along an advancement direction.

More particularly, the socks to be labeled are positioned so that their tops, i.e., the end regions of their legs, which are meant to receive the label, protrude by a certain extent laterally from the conveyor belt; the tops are supported by suitable supporting means, arranged laterally to the conveyor belt, up to a station for applying the label so that it straddles the two superimposed tops of the pair of socks.

Long socks are deposited at the beginning of the conveyor belt so that their feet are folded onto a portion of the legs, orientated at right angles to the advancement direction of the conveyor belt, while short socks are simply deposited onto the conveyor belt with their legs orientated in the same manner but without folding the feet so that they overlap the legs, since such folding would cause the toes to overlap the region of the top that is meant to receive the label.

Downstream of the label application station, above the conveyor belt, there is provided a pincer-like element which cyclically engages a labeled pair of socks and moves it towards the opposite lateral edge of the conveyor belt in order to correctly position the pair of socks upstream of a printing station, wherein additional indications, such as for example the trade mark, the size or other information, are applied to a foot of the pair of socks.

In order to correctly label and then print short-type socks, in view of the fact that, as mentioned, the socks are simply deposited on the conveyor belt without folding the feet so as to overlap the legs and therefore have feet which are not orientated at right angles to the advancement direction of the conveyor belt, the machine has a positioning device which engages the pair of socks after applying the label and partially rotates the pair of socks so as to orientate the foot of the socks in a direction substantially perpendicular to the advancement direction of the conveyor belt, i.e., in a correct position for undergoing the subsequent printing operation.

The above machine has proved to be susceptible of further improvements, particularly as regards the device for positioning short-type socks, which is located down-

stream of the label-applying station.

The aim of the present invention is to provide a sock positioning device, particularly for short socks, in labeling machines of the type described in the above-mentioned patent application, which is highly reliable in operation.

Within the scope of this aim, an object of the present invention is to provide a sock positioning device which, applied to a machine of the above described type, allows, even in the case of short socks, to print on the foot of the socks which is overlapped on the legs without causing any problem as regards the application of the label to the tops of the socks.

Another object of the present invention is to provide a positioning device which can be installed very easily on a labeling machine of the type described in the above-mentioned patent application.

Another object of the present invention is to provide a positioning device which can be manufactured at a low cost.

This aim, these objects and others which will become apparent hereinafter are achieved by a sock positioning device, particularly for short socks, in labeling machines of the type comprising a conveyor belt which can move along an advancement direction and with at least one station for applying a label at the tops of a pair of mutually superimposed socks arranged so that their tops are proximate to a lateral edge of the conveyor belt; said pair of socks being deposited on the conveyor belt so that the feet are folded onto the legs, orientated transversely to said advancement direction, and so that the end portion of the feet on the toe side is folded again onto the remaining part of the feet in order to keep the label application region clear; characterized in that it comprises overturning means which can be arranged downstream of said application station, along said advancement direction, and are adapted to act on said folded end portion of the feet in order to fully extend the feet onto the legs of the socks.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of two preferred but not exclusive embodiments of the device according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic top plan view of an automatic sock labeling machine with a first embodiment of the positioning device according to the present invention installed thereon;
figure 2 is a lateral elevation view of the positioning device in its first embodiment;
figure 3 is a front elevation view of the positioning device in its first embodiment;
figure 4 is a schematic top plan view of an automatic sock labeling machine, with a second embodiment of the positioning device applied thereto;
figure 5 is a lateral elevation view of the positioning

device in its second embodiment;

figure 6 is a partially sectional rear elevation view of part of the overturning means of the positioning device in its second embodiment.

With reference to the above figures, the sock positioning device according to the present invention, generally designated by the reference numerals 1 and 1a in its two embodiments, is meant to be installed preferably on labeling machines of the type described in European Patent application no. 95119751.6, i.e., of the type comprising a conveyor belt 2 which can move along an advancement direction, indicated by the arrow 3, and along which there is provided a station 4 for applying a label 5 at the tops 6 of a pair of socks 7, which are mutually superimposed and positioned so that their tops 6 are proximate to a lateral edge 8 of the conveyor belt 2.

More particularly, the pair of socks 7 is arranged on the conveyor belt 2 so that the feet 9 are folded onto the legs 10. The legs 10 are orientated transversely to the advancement direction 3 and the end portion 9a of the feet on the toe side is folded again onto the remaining part 9b of the feet 9 in order to keep clear the region for applying the label 5.

A printing station 11, for applying additional indications to the foot of the socks, is arranged along the conveyor belt 2 downstream of the station 4 for applying the label 5 with respect to the advancement direction 3 of the conveyor belt 2.

The positioning device 1, 1a is interposed between the station 4 for applying the label 5 and the printing station 11.

The positioning device 1, 1a comprises overturning means which are adapted to act on the folded end portion 9a of the feet 9 of the socks in order to fully extend the feet 9 onto the legs 10 of the socks, so as to prepare the socks for the subsequent printing operation.

More particularly, as shown in particular in figures 1 to 3, the overturning means comprise means for dispensing at least one jet of compressed air which is directed towards the top 6 of the pair of socks 7 and is adapted to strike the region where the end portion 9a of the feet overlaps the remaining part 9b of the feet of the socks.

The means for dispensing at least one jet of compressed air comprise a pair of nozzles 12a and 12b which are connected to ducts 13 for feeding compressed air and are mutually spaced parallel to the advancement direction 3.

The nozzles 12a and 12b have dispensing directions which are orientated transversely to the advancement direction 3 and converge towards the lateral edge 8 of the conveyor belt 2, proximate to which the tops 6 of the socks 7 are arranged.

The positioning device, in its first embodiment, also comprises means for moving the nozzles 12a and 12b in a direction which is substantially perpendicular to the plane of arrangement of the face of the conveyor belt 2

on which the socks 7 are deposited.

The nozzles 12a and 12b, which can be simply constituted by gauged hoses, are connected at the lower ends of two arms 14a and 14b of a bifurcated support, generally designated by the reference numeral 15, which faces, by means of the lower ends of the two arms 14a and 14b, the face of the conveyor belt 2 that supports the socks 7.

The two arms 14a and 14b are joined in an upward region by a cross-member 16 which is supported, so that it can slide in a direction which is substantially perpendicular to the face of the conveyor belt 2 that supports the socks 7, by a block 17 which is fixed to a bar 18, which is arranged transversely to the advancement direction 3 and is fixed to the supporting structure of the machine, above the conveyor belt 2.

More particularly, the block 17 has two guiding shafts 19a and 19b which are orientated at right angles to the face of the conveyor belt 2 that supports the socks 7, or vertically if the conveyor belt 2 is arranged horizontally, and slidingly engage seats 20a and 20b formed in the cross-member 16 of the bifurcated support 15.

At the ends of the guiding shafts 19a and 19b that are directed towards the conveyor belt 2 there are provided suitable shoulders 21a and 21b which limit the possibility of the cross-member 16 to slide, along the guiding shafts 19a and 19b, towards the conveyor belt 2.

The means for moving the bifurcated support 15 in the direction at right angles to the face of the conveyor belt 2 that supports the socks 7 are conveniently constituted by a linear actuator, which is fitted on the block 17 and acts on the cross-member 16 of the bifurcated support 15 in order to produce the sliding of the bifurcated support 15 along the guiding shafts 19a and 19b.

The linear actuator is preferably constituted, as shown, by a step motor 22 which is mounted on the block 17 and is connected, by means of its output shaft 22a, to a threaded shaft 23 which is coupled to a female thread 24 formed in the cross-member 16, parallel to the seats 20a and 20b.

Operation of the positioning device in the first embodiment described above is as follows.

Each pair of socks 7 to be labeled and printed is deposited on the conveyor belt 2 so that the top 6 is arranged proximate to the lateral edge 8 of the conveyor belt 2, as described in European Patent application no. 95119751.6, and the feet 9 of the socks are folded above the legs 10, which are orientated at right angles to the advancement direction 3.

Since the socks are short, the folding of the feet 9 onto the legs 10 causes the toe 9a of the feet to overlap the region of the legs 10 proximate to the tops 6, i.e., the region meant to receive the label 5 in the station 4. Accordingly, the end portion 9a of the feet 9 on the toe side is folded again onto the remaining part 9b of the feet 9, so as to keep clear said region for the application of the label 5.

After the labeling machine has applied the label 5 at the station 4, as a consequence of the advancement of the conveyor belt 2, the pair of socks 7 thus labeled passes with its end portion 9a in front of the nozzles 12a and 12b.

Shortly before the arrival of the socks, the step motor 22 is activated so as to lower the nozzles 12a and 12b towards the conveyor belt 2 until they are in a position which is suitable to strike, with the compressed-air jets, the folded end portion 9a in order to overturn said end portion 9a onto the legs 10 of the pair of socks 7, thus fully extending the feet 9 onto the legs 10 of the socks.

At this point, the socks 7 are positioned correctly for printing in the subsequent station 11.

It should be noted that downstream of the positioning device 1, along the advancement of the conveyor belt 2 in the direction 3, it is possible to provide, as described in European Patent application no. 95119751.6, means for gripping and moving the socks 7 transversely to the advancement direction 3 towards the lateral edge 25 of the conveyor belt 2 which is opposite to the lateral edge 8, in order to correctly position the socks 7 with respect to the printing station 11.

In the second embodiment, illustrated in figures 4 to 6, of the positioning device according to the present invention, the overturning means comprise an abutment which can be inserted, on the opposite side with respect to the tops 6, between the folded end portion 9a (toe) of the feet 9 and the underlying remaining part 9b of the feet 9, and comprise means for gripping and moving the pair of socks 7 with respect to the conveyor belt 2 transversely to the advancement direction 3, towards the lateral edge 25 of the conveyor belt 2 which is opposite to the lateral edge 8 whereat the tops 6 of the socks 7 are positioned during the loading of the labeling machine.

More particularly, the above-mentioned abutment is formed by a bar 30 which is supported above the conveyor belt 2 and is parallel to the advancement direction 3.

The bar 30 is fixed, at its longitudinal ends, to two posts 31a and 31b which are arranged at right angles to the bar 30 and are joined, above the bar 30, by a transverse shaft 32.

The transverse shaft 32 is supported by a slider 33 so that it can oscillate about its own axis 32a, which is substantially parallel to the advancement direction 3.

The slider 33 is supported, so that it can slide substantially at right angles to the face of the conveyor belt 2 that supports the socks 7, by a block 34 which can be fixed to a bar 35, which is in turn fixed to the supporting structure of the labeling machine above the conveyor belt 2.

More particularly, the block 34 is provided with two shafts 36a and 36b which are orientated at right angles to the face of the conveyor belt 2 that supports the socks 7 and slidably pass through a pair of seats 37a and 37b formed in the slider 33.

The device according to the present invention, in its second embodiment, comprises first movement means for causing the oscillation of the bar 30 about the axis 32a of the shaft 32, i.e., about an axis which is substantially parallel to the advancement direction 3, and second movement means for shifting the bar 30 towards or away from the face of the conveyor belt 2 that supports the socks 7.

The first movement means are conveniently constituted by a pneumatic cylinder 38, which is fitted on the slider 33 and faces, with the stem of its piston, one of the two posts 31a and 31b; in the illustrated case, it faces the post 31b.

The actuation of the pneumatic cylinder 38 causes the oscillation of the posts 31a and 31b, of the bar 30 and of the shaft 32 about the axis 32a in contrast with the action of elastic return means which are constituted, for example, by a helical spring 40 which is interposed between an abutment 41 which is rigidly coupled to the post 31b and an abutment 42 which is rigidly coupled to the slider 33.

The second means for moving the bar 30 are conveniently constituted by a linear actuator which acts on the slider 33 to move it along the guiding shafts 36a and 36b.

The linear actuator is preferably constituted by a step motor 43 which is mounted on the block 34 and is connected, by means of its output shaft 43a, to a threaded shaft 44 which is parallel to the guiding shafts 36a and 36b and engages a female thread 45 formed in the slider 33.

At the lower end of the guiding shafts 36a and 36b there are provided shoulders 46a and 46b which limit the sliding of the slider 33 towards the conveyor belt 2.

The device according to the present invention, in its second embodiment, comprises means for gripping and moving the pair of socks substantially at right angles to the advancement direction 3 with respect to the conveyor belt 2, in order to move the pair of socks 7 towards the lateral edge 25 of the conveyor belt 2 which is opposite with respect to the lateral edge 8.

The gripping and moving means can be constituted, for example, by pincers 50 which are supported so that they can slide along a bar 51 which is fixed to the supporting structure of the labeling machine, above the conveyor belt 2 and below the bar 35. The pincers 50, with their translatory motion at right angles to the advancement direction 3, can be moved until they are located at the bar 30. The opening and closing movement of the pincers 50 is actuated by a pneumatic cylinder 52.

In practice, the pincers 50 can be constituted by the sock gripping and moving means already described and illustrated in European Patent application No. 95119751.6.

Operation of the positioning device in its second embodiment is as follows.

The socks 7 are arranged on the conveyor belt 2 in

a manner similar to the one already described with reference to the operation of the device in its first embodiment.

Downstream of the station 4 for applying the label 5, the socks 7 pass, with the end portion 9a of their feet 9 folded onto the remaining part 9b of their feet 9, proximate to the bar 30 which, by means of the actuation of the step motor 43, has been moved to a level which is slightly higher than the level of the upper face of the remaining part 9b of the feet 9. The pneumatic cylinder 10 38 has been actuated beforehand so as to swing the bar 30 away from the lateral edge 8 of the conveyor belt 2.

In practice, the bar 30 is parallel to the line for folding the end portion 9a with respect to the remaining part 15 9b of the feet and faces the inlet of the region where the end portion 9a overlaps the remaining part 9b of the feet.

At this point, the pneumatic cylinder 38 is deactivated, i.e., actuated in the opposite direction, so that the elastic reaction of the spring 40 causes the oscillation of the bar 30 about the axis 32a of the shaft 32 and the consequent insertion of the bar 30 between the end portion 9a and the remaining part 9b of the feet 9 of the socks. 20

While the bar 30 is thus inserted between the end portion 9a and the remaining part 9b of the feet of the pair of socks 7, the pincers 50 are actuated in order to grip the pair of socks 7 on the opposite side with respect to the tops 6 and to move them transversely to the advancement direction 3, towards the lateral edge 25 25 of the conveyor belt 2.

As a consequence of this fact, the end portion 9a is overturned onto the legs 10 of the socks and the pair of socks 7 is thus correctly orientated so that the feet 9 overlap the legs and is ready to undergo the subsequent printing action in the station 11. 30 35

In practice, it has been observed that the device according to the present invention fully achieves the intended aim, since it allows highly reliable operation of labeling machines of the type described in European 40 Patent application no. 95119751.6 in the labeling and printing of short-type socks as well.

The device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may also be replaced with other technically equivalent elements. 45

In practice, the materials used, as well as the dimensions, may be any according to requirements and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs. 50 55

Claims

1. A sock positioning device, particularly for short socks, in labeling machines of the type comprising a conveyor belt which can move along an advancement direction and with at least one station for applying a label at the tops of a pair of mutually superimposed socks arranged so that their tops are proximate to a lateral edge of the conveyor belt; said pair of socks being deposited on the conveyor belt so that the feet are folded onto the legs, orientated transversely to said advancement direction, and so that the end portion of the feet on the toe side is folded again onto the remaining part of the feet in order to keep the label application region clear; characterized in that it comprises overturning means which can be arranged downstream of said application station, along said advancement direction, and are adapted to act on said folded end portion of the feet in order to fully extend the feet onto the legs of the socks.
2. A device according to claim 1, characterized in that said overturning means comprise means for dispensing at least one jet of compressed air which is directed towards the top of the socks and is suitable to strike the region where said end portion overlaps the remaining part of the feet.
3. A device according to claim 2, characterized in that said means for dispensing at least one jet of compressed air comprise two nozzles which are connected to ducts for feeding compressed air and are mutually spaced parallel to said advancement direction, said nozzles having dispensing directions which are orientated transversely to said advancement direction and converge towards the lateral edge of the conveyor belt that carries the tops of the socks.
4. A device according to claim 3, characterized in that it comprises means for moving said nozzles along a direction which is substantially perpendicular to the plane of arrangement of the face of the conveyor belt that carries the socks.
5. A device according to one or more of the preceding claims, characterized in that said nozzles are fitted at the lower ends of two arms of a bifurcated support which face said conveyor belt in an upward region, said bifurcated support being connected, so that it can slide substantially at right angles to the plane of arrangement of the face of the conveyor belt that carries the socks, to a block which can be associated with the supporting structure of the labeling machine, above the conveyor belt.
6. A device according to one or more of the preceding

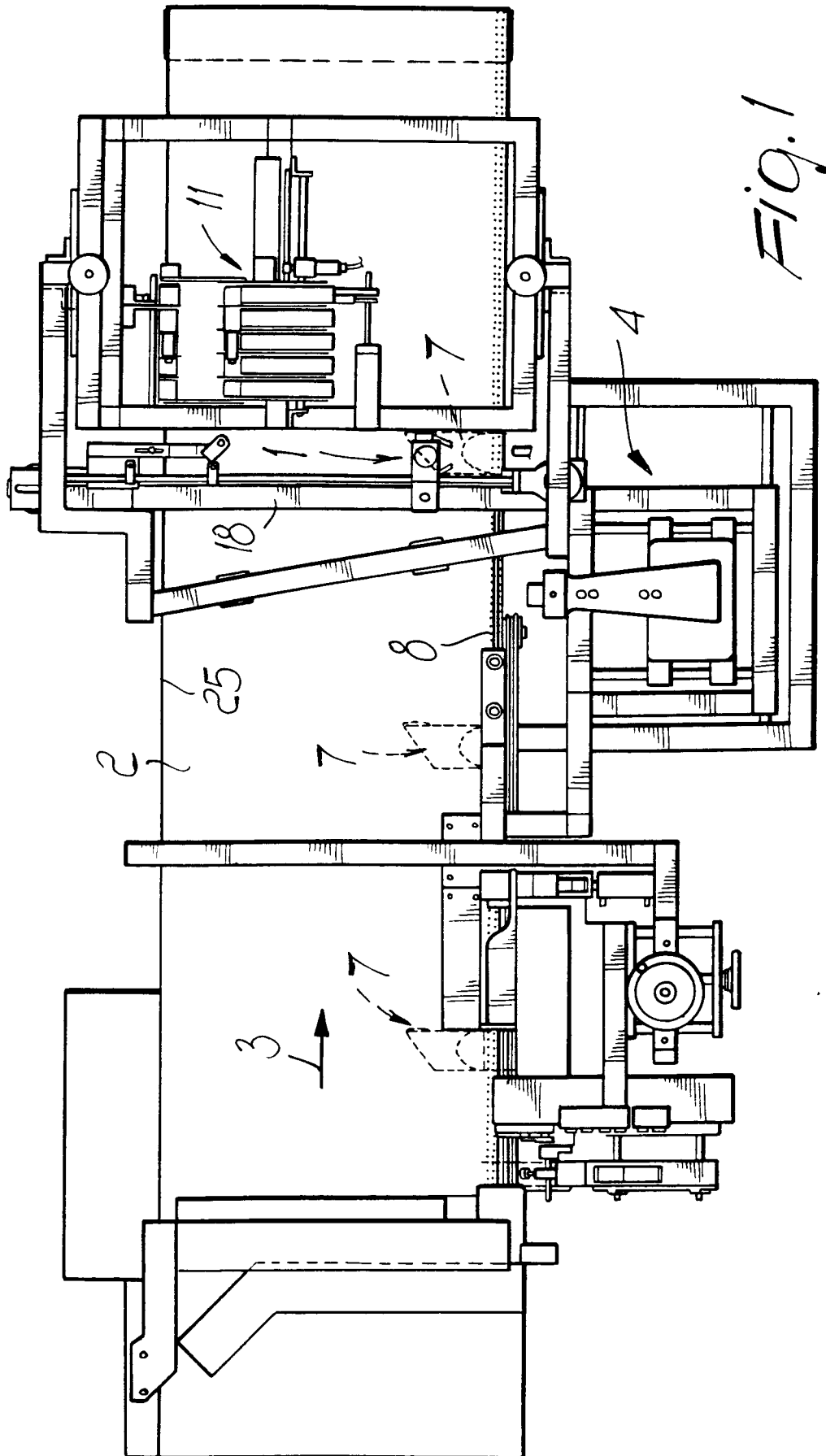
claims, characterized in that said block has two guiding shafts which are orientated at right angles to said face of the conveyor belt and slidingly pass through the connecting portion of the two arms of said bifurcated support, said means for moving said nozzles comprising a linear actuator which is mounted on said block and acts on said bifurcated support to slide it along said pair of guiding shafts.

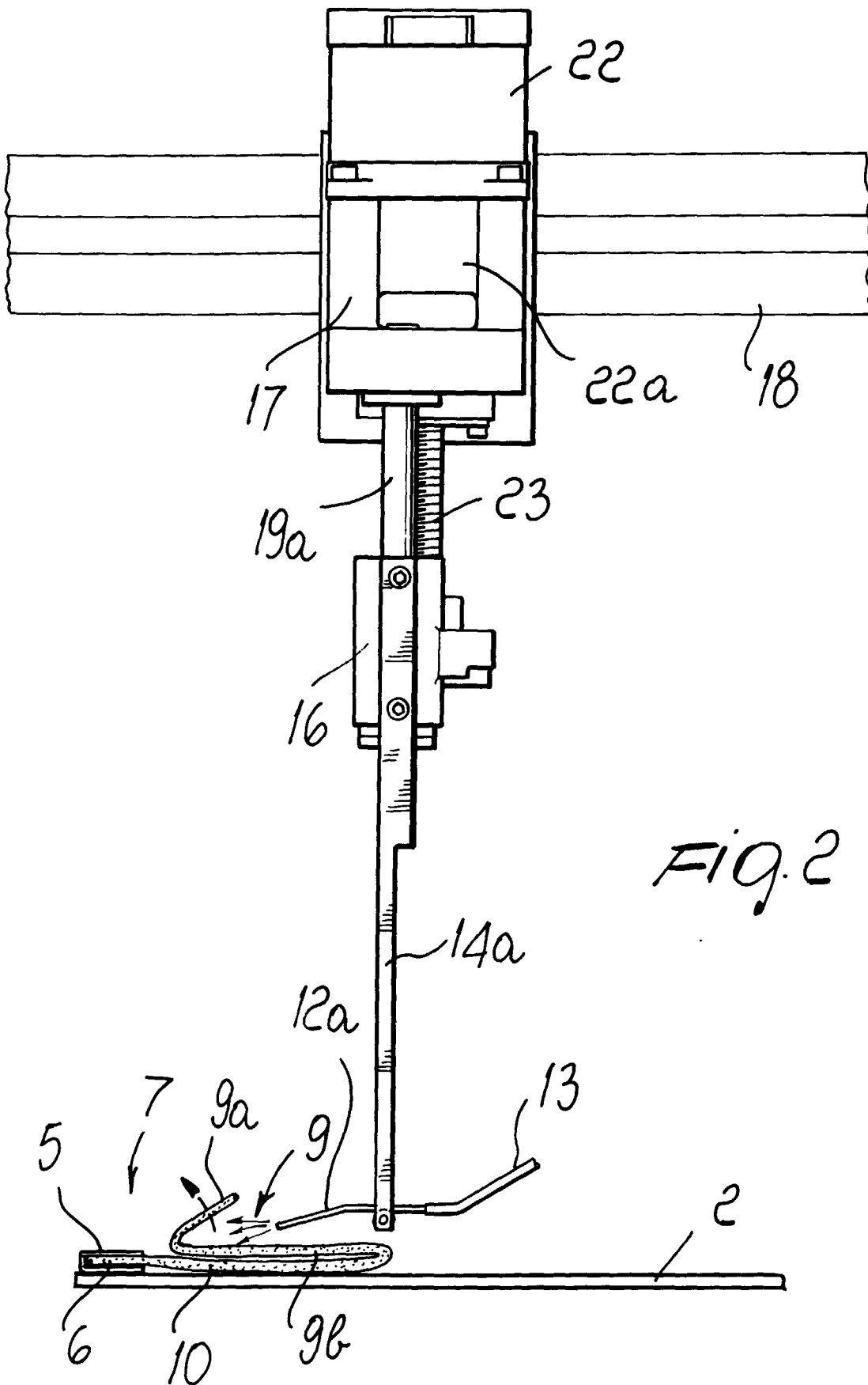
7. A device according to claim 6, characterized in that said linear actuator comprises a step motor which is mounted on said block and is connected, by means of its output shaft, to a threaded shaft which is parallel to said guiding shafts and is coupled to a female thread formed in said bifurcated support.
8. A device according to claim 1, characterized in that said overturning means comprise an abutment which can be inserted, on the opposite side with respect to the tops, between said folded end portion of the feet and the remaining underlying part of the feet, and means for gripping and moving the pair of socks, with respect to the conveyor belt, transversely to said advancement direction, towards the lateral edge of the conveyor belt which is opposite with respect to the lateral edge for the positioning of the tops of the socks.
9. A device according to claim 8, characterized in that said abutment is formed by a bar which is supported above said conveyor belt and is parallel to said advancement direction, first means being provided to move said bar so that it oscillates about an axis which is substantially parallel to said advancement direction for its insertion between said folded end portion of the feet and the remaining part of the feet.
10. A device according to claim 9, characterized in that it comprises second means for moving said bar towards or away from the face of the conveyor belt that carries the socks.
11. A device according to claim 9, characterized in that said bar is connected, by means of its longitudinal ends, to two posts which are arranged substantially at right angles to said bar and are joined by a transverse shaft which is supported, so that it can oscillate about its own axis, which is arranged substantially parallel to said advancement direction, by a slider which is slidingly supported, along a direction which is substantially perpendicular to the face of the conveyor belt that carries the socks, by a block which can be associated with the supporting structure of the labeling machine above the conveyor belt.

12. A device according to one or more of the preceding

claims, characterized in that said block has two guiding shafts which are orientated at right angles to said face of the conveyor belt and slidingly pass through two seats formed in said slider, said second movement means comprising a linear actuator which is mounted on said block and acts on said slider for its translatory motion along said guiding shafts.

13. A device according to one or more of the preceding claims, characterized in that said linear actuator of the second movement means comprises a step motor which is mounted on said block and is connected, by means of its output shaft, to a threaded shaft which is parallel to said guiding shafts and is coupled to a female thread formed in said slider.
14. A device according to one or more of the preceding claims, characterized in that said first movement means comprise a pneumatic cylinder which is mounted on said slider and acts on at least one of said two posts for the oscillation of said posts about the axis of said transverse shaft with respect to said slider in contrast with elastic return means.
15. A device according to claim 8, characterized in that said gripping and movement means comprise pincers which are supported above said conveyor belt and can move on command substantially at right angles to said advancement direction.





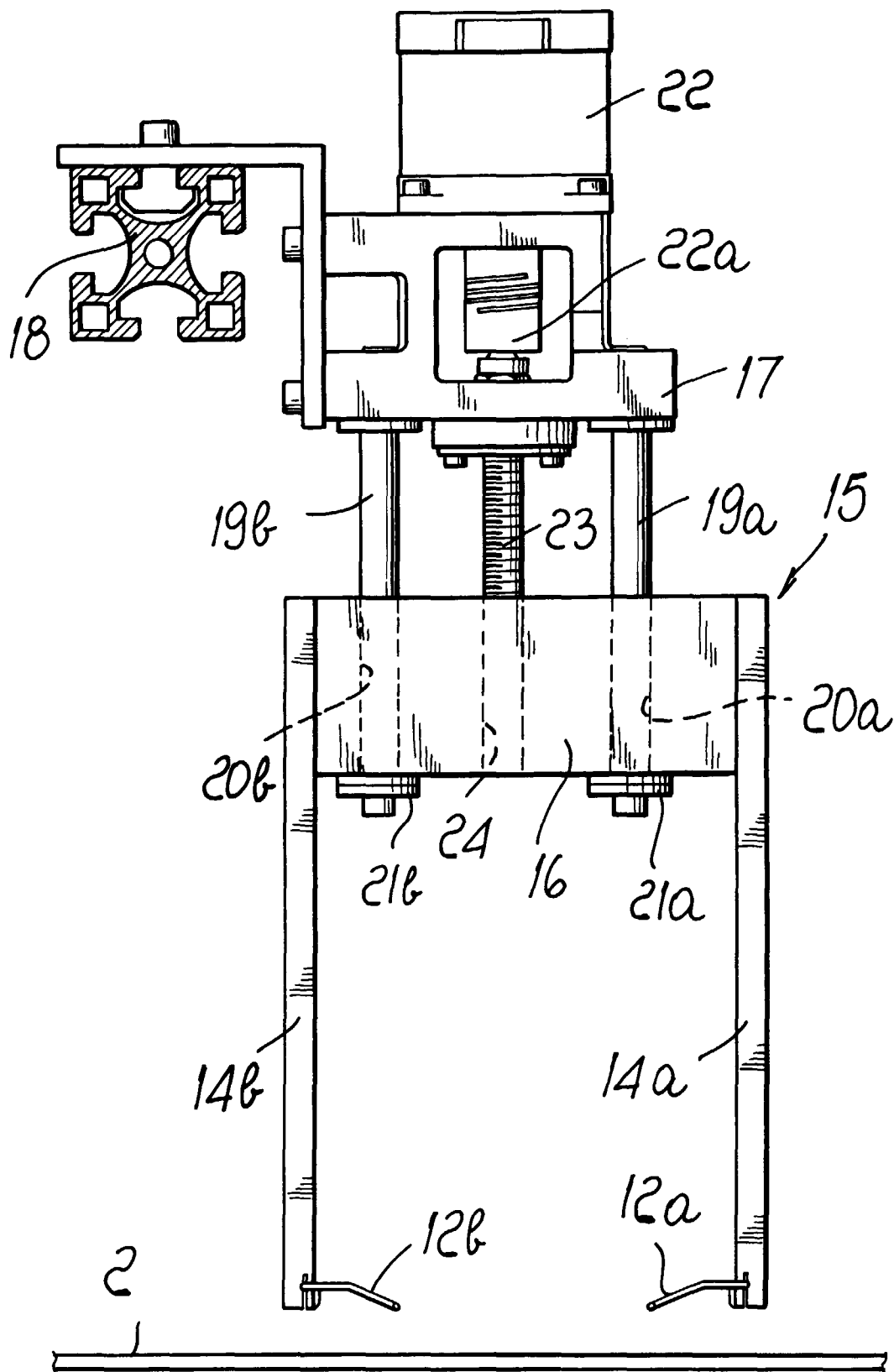
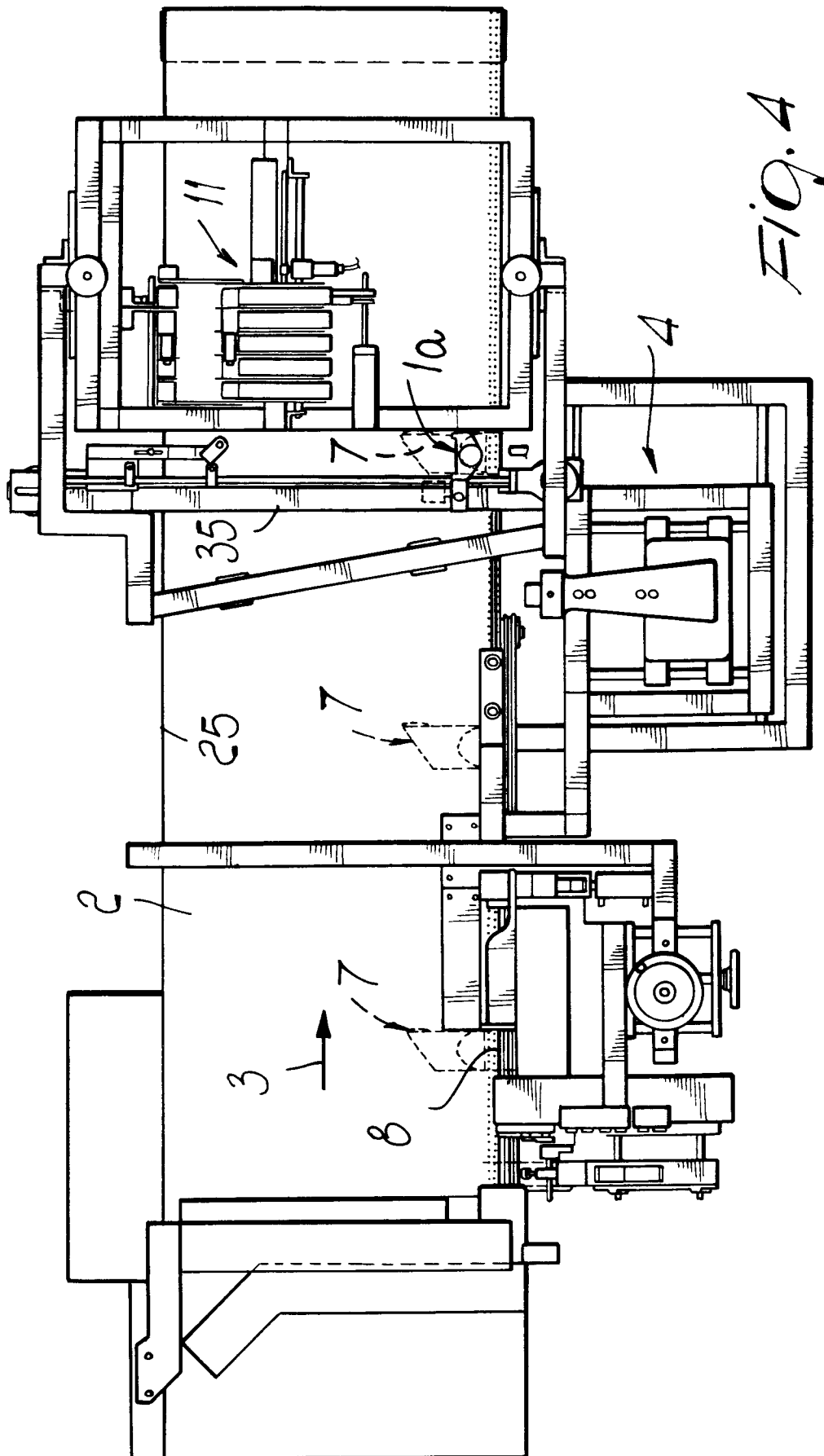
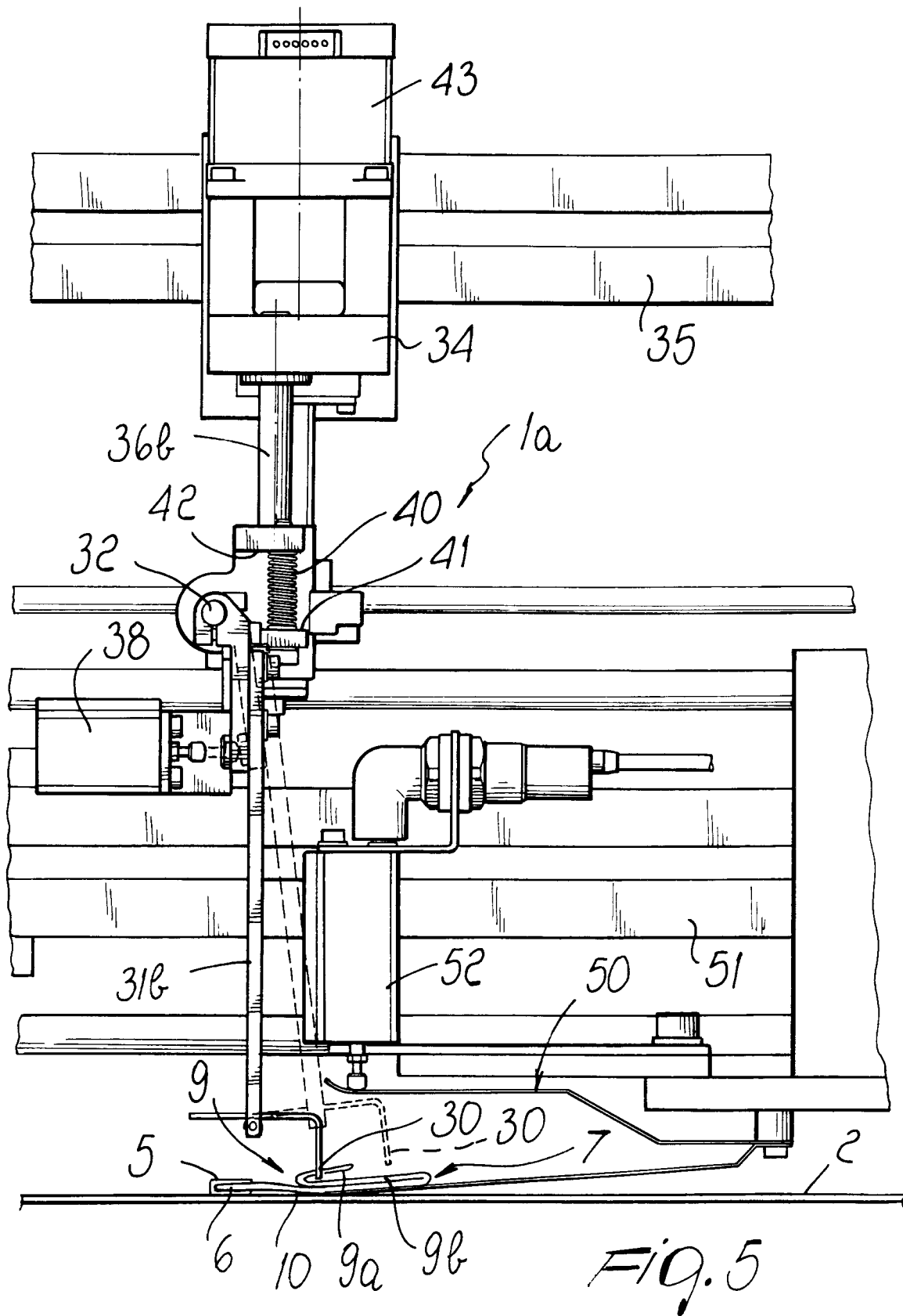


Fig. 3





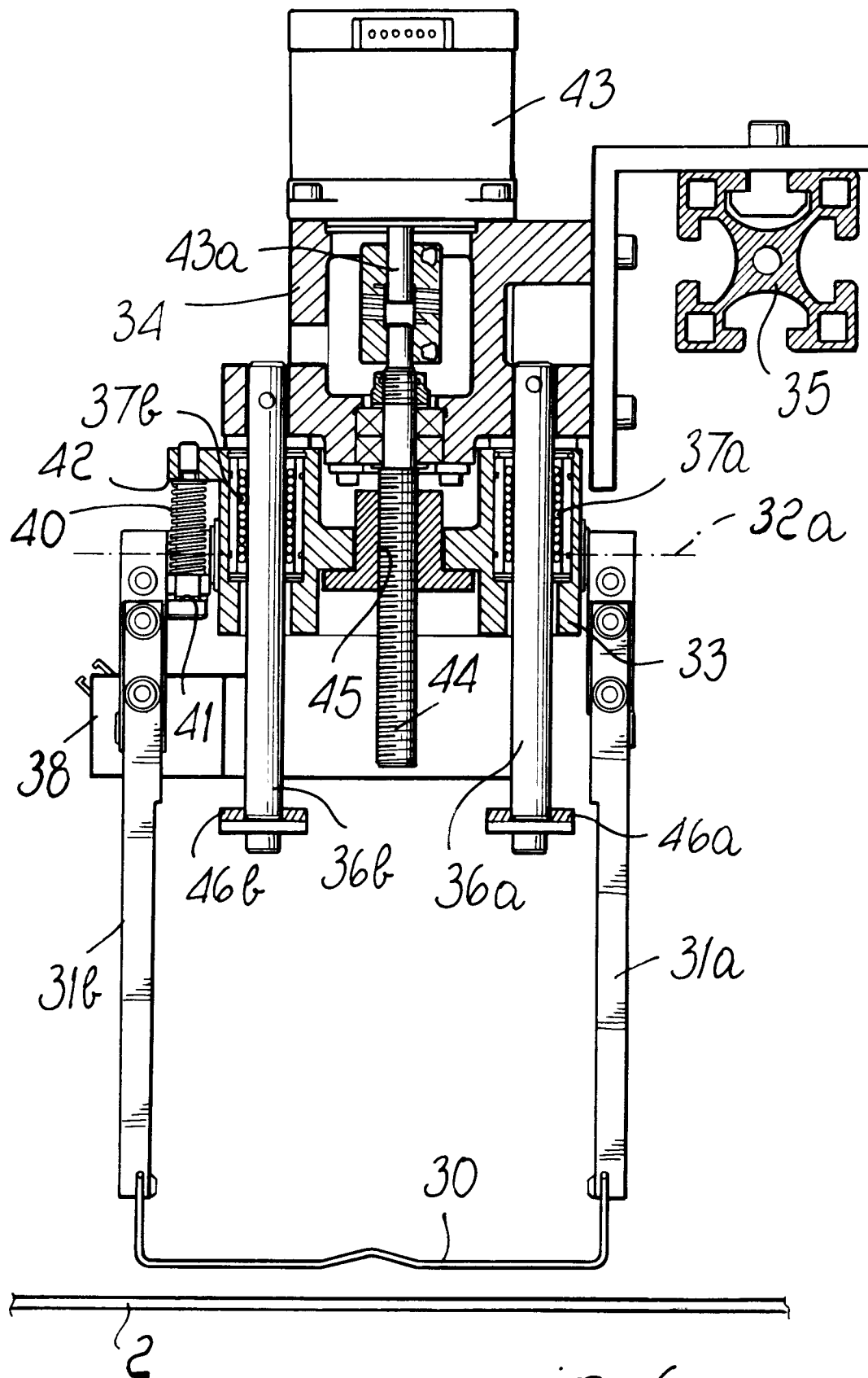


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 97 11 8917

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 051 057 B (TAKATORI MACHINERY WORKS) * column 36, line 22 - column 37, line 39 * * figures 15,16A-16D * ---	1,2	B65C5/00
D,A	EP 0 718 200 A (CONTI COMPLETT SPA) * column 3, line 8 - line 25 * * figure 1 * ---	1	
A	US 4 922 685 A (M. HODGES) * column 4, line 10-21 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65C B65B D05B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		4 February 1998	Smolders, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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