



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 378 449 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.01.2004 Bulletin 2004/02

(51) Int Cl.7: **B65B 25/20**

(21) Application number: **02425445.0**

(22) Date of filing: **05.07.2002**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Tinarelli, Eugenio**
40037 Sasso Marconi (Bologna) (IT)

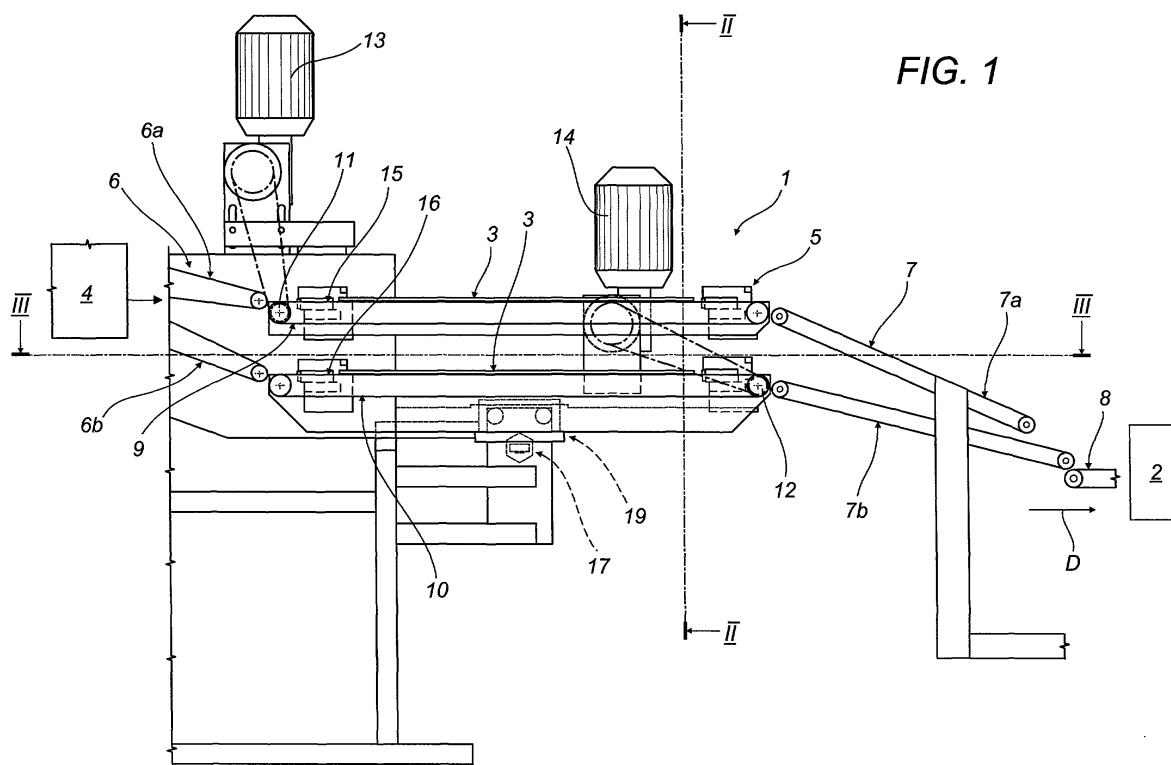
(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via Goito, 18
40126 Bologna (IT)

(71) Applicant: **Tinarelli S.r.l.**
40069 Zola Predosa (Bologna) (IT)

(54) **A unit for automatically feeding a packaging machine for socks or similar hosiery products**

(57) An automatic unit for feeding socks (3) and other hosiery products to a packaging machine (2) comprises: a conveyor assembly (5) located between a manufacturing machine (4) and the packaging machine (2). The conveyor assembly (5) includes a first conveyor and a second conveyor (9, 10) and a unit (7) for forming

pairs of overlaid socks (3) at the outfeed end of the first conveyor and the second conveyor (9, 10) which are moved by an actuator (17) crossways relative to each other between an end position where they are apart to receive the socks (3) and a position where they are closer together to align the socks (3) vertically with each other.



EP 1 378 449 A1

Description

[0001] The present invention relates to a unit for automatically feeding a packaging machine for socks or similar hosiery products.

[0002] In a hosiery manufacturing plant, a machine for making socks is usually connected at the downstream end to an inspection and boarding unit used to fix the shape and size of the socks. The outfeed end of the inspection and boarding unit is in turn linked up to means for conveying the socks to a packaging machine which places the socks in boxes or other packages ready for sale.

[0003] Directly on these conveying means, the socks are adjusted relative to each other so that when they are paired at the outfeed end of the conveying means, the two socks in each pair are laid exactly over each other.

[0004] More specifically, there are transversal adjustment means located on a first stretch of the conveying means. The transversal adjustment means move crossways relative to the conveying means in such a way as to push each sock towards the centre of the conveyor it is travelling on. Then, as the socks proceed along a second stretch of the conveying means, longitudinal adjustment means align them lengthways with each other so that they are exactly paired when they reach the end of the conveyors.

[0005] It has, however, been found that the crossways adjustment performed by the transversal adjustment means may be impaired by the static electricity generated by the friction of the socks rubbing against the surface of the conveyors. Moreover, the properties of the textile materials used to manufacture hosiery products, especially the extremely light materials used to make ladies' stockings, are such that the pushing action of the adjustment means creates unattractive folds and creases which cannot be eliminated before packaging and which are therefore still present in the finished packages placed on sale.

[0006] The present invention therefore has for an object to overcome the above mentioned disadvantage by providing an automatic unit for feeding socks and similar hosiery products that is extremely simple and fast and that significantly reduces friction between the socks and the surface of the conveyors. The present invention accordingly provides an automatic unit for feeding socks and similar hosiery products to a packaging machine, comprising: conveying means located between a manufacturing machine and the packaging machine, where the conveying means include a first conveyor and a second conveyor and means for adjusting the socks lengthways; and means for laying the socks over each other in such a way as to form pairs of overlaid socks at the outfeed end of the conveying means, the feed unit being characterised in that the first conveyor and the second conveyor at least constitute means for vertically aligning the socks. Further, the technical characteristics of the invention, with reference to the above aims, are clearly

described in the claims below and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 is a schematic side view, with some parts cut away for clarity, of a preferred embodiment of the feed unit according to the present invention;
- Figure 2 is a schematic front view, with some parts cut away and others in cross section through the line II-II, of the feed unit shown in Figure 1;
- Figure 3 is a schematic plan view of a part of the feed unit, viewed along the section line III-III of Figure 2;
- Figures 4 and 5 are, respectively, a schematic front view and a schematic plan view along the section line V-V of Figure 4, showing the feed unit of Figure 1 in a second working condition;
- Figures 6 and 7 are two schematic front views of a detail of the feed unit illustrated in Figure 1 in two successive steps of a third working condition;
- Figure 8 is a schematic plan view of a second embodiment of the unit shown in Figure 1.

[0007] With reference to Figure 1, the numeral 1 denotes in its entirety a unit for automatically feeding an automatic machine 2, for example a packaging machine for socks 3 or similar hosiery products.

[0008] The unit 1 is an operating unit forming part of a hosiery manufacturing line. It is connected at the upstream end to a unit 4 for finishing the socks 3, for example an inspection and boarding unit, used to fix the shape and size of the socks 3 and, at the downstream end, to the packaging machine 2 which places the socks 3 in boxes or other packages (not illustrated) ready for sale.

[0009] Both the inspection and boarding unit 4 and the packaging machine 2 are of well known type and therefore illustrated schematically as blocks in Figure 1.

[0010] The feed unit 1 comprises a conveyor assembly 5 located between a stripping and transfer unit 6 which picks the socks 3 up from the unit 4 and an overlaying unit 7 designed to form the pairs of socks 3 to be fed to the machine 2 in a defined direction D on a conveyor belt 8.

[0011] As shown in Figures 1, 2 and 3, the conveyor assembly 5 comprises a first conveyor belt and a second conveyor belt, labelled 9 and 10, respectively, looped around respective end pulleys. One of the two pulleys, labelled 11 and 12, of each of the belts 9 and 10, respectively, is driven by a respective motor 13 and 14 through a customary transmission system.

[0012] The horizontal, parallel upper sections of the conveyors 9 and 10, that is to say, the sections labelled 15 and 16, respectively, are the parts of the conveyors that transport the socks 3 in the direction D and are po-

sitioned at different heights, the section 15 being located at a height above the section 16.

[0013] As shown in Figures 2 and 3, the first conveyor and the second conveyor 9 and 10 move crossways relative to each other from an offset position in which they receive the socks 3 from respective belts 6a and 6b of the stripping and transfer unit 6 to a second position in which the socks 3 are vertically aligned with each other and transferred to respective belts 7a and 7b of the overlaying unit 7. Looking in more detail, the belts 7a and 7b are vertically aligned with each other and at the same time inclined relative to the conveyors 9 and 10, in such a way as to converge towards the infeed end of the conveyor belt 8 that feeds the pairs of overlaid socks 3 to the machine 2.

[0014] As illustrated in more detail in Figures 2 and 3, the first conveyor belt 9, the upper one, is fixed while the lower, second conveyor belt 10 is mobile, driven by actuating means labelled 17 in their entirety, between the above mentioned offset receiving position, drawn with a dashed line in Figures 2 and 3, and the above mentioned position of vertical alignment of the socks 3, drawn with a dashed line in Figure 2 only, where the socks 3 are fed to the overlaying unit 7.

[0015] More specifically, the actuating means 17 are controlled by a control unit 18 and comprise a carriage 19 that supports the conveyor 10 and slides between the two above mentioned positions on horizontal guide rods 20 positioned transversely relative to the upper section 16 of the conveyor 10. The control unit 18 receives input signals from sensors 21 and 22 connected, respectively, to the section 15 of the first conveyor 9 and to the section 16 of the second conveyor 10.

[0016] The sensors 21 and 22 are designed to detect the positions of the socks 3 on the respective conveyor sections 15 and 16 after they have been fed out of the stripping and transfer unit 6 and, more specifically, detect the positions of the longitudinal centre lines 3a of the socks 3 relative to the centre lines 15a and 16a of the conveyor sections 15 and 16, respectively. Downstream of the sensors 21 and 22, the first conveyor and the second conveyor 9 and 10 are equipped with additional sensors 23 and 24 for detecting one end of the socks 3. Through the control unit 18, the sensors 23 and 24 act on the motors 13 and 14 in such a way as to align the socks in each pair lengthways before they are fed into the overlaying unit 7. By accelerating and/or pausing and/or reversing their direction of motion, the motors 13 and 14 can adjust the relative motion of the sections 15 and 16 of the conveyors 9 and 10 until the socks 3 are aligned lengthways. Thus, the two conveyors 9 and 10 not only constitute vertical alignment means but also means for aligning and adjusting the socks 3 lengthways.

[0017] In the example illustrated in Figures 4 and 5, the centre line 3a of the sock 3 which is fed by the belt 6a to the section 16 of the second conveyor 10 does not coincide with the centre line 16a of the conveyor section

16, while the centre line 3a of the other sock 3, which will complete the pair of overlaid socks formed at the outfeed end of the overlaying unit 7 and which is fed by the belt 6b of the section 15, does coincide with the centre line 15a of the section 15. In this case, the sensors 21 and 22 will detect the positions of the longitudinal centre lines 3a of the socks 3 relative to the centre lines 15a and 16a of the sections 15 and 16 and will generate a signal for the control unit 18 to activate the actuator 17.

[0018] The latter, through the carriage 19, will move the second conveyor 10 from the position illustrated by the dashed line in Figure 4 to the position illustrated by the continuous line in Figure 4 where the two centre lines 3a of the socks 3 are vertically aligned.

[0019] In the example illustrated in Figures 6 and 7, neither of the centre lines 3a of the socks 3 fed to the sections 15 and 16 of the conveyors 9 and 10 coincides with the corresponding centre lines 15a and 16a of the conveyor sections 15 and 16. In this case, too, the sensors 21 and 22 will detect the positions of the longitudinal centre lines 3a of the socks 3 relative to the centre lines 15a and 16a of the conveyor sections 15 and 16 and will generate a signal for the control unit 18 to activate the actuator 17 and to enable the latter, through the carriage 19, to move the second conveyor 10 until the two centre lines 3a of the socks 3 are vertically aligned.

[0020] It should be noticed that, in practice, the control unit 18 simply detects the offset of the centre lines 3a of both the socks 3 in each pair and cancels it by appropriately adjusting the conveyor 10 relative to the conveyor 9.

[0021] It should also be noticed that if the belts 6a and 6b can be made to guarantee that the socks 3 are correctly fed to the respective conveyors 15 and 16 according to respective fixed positions, the two conveyors 9 and 10 need not be equipped with the sensors 21 and 22 and the control unit 18 could adjust the conveyor 10 by a fixed amount relative to the conveyor 9.

[0022] In another embodiment of the invention illustrated in Figure 8, where the parts of the socks 3 corresponding to the foot and leg, labelled 25 and 26, are at an angle to each other unlike those of the previous examples which have a straight elongated shape, the belts 6a and 6b or intermediate belts which are not illustrated comprise means for initially adjusting the relative angular position between the foot 25 and the leg 26, as described in European patent No.02425125.8 in the name of the same Applicant, the disclosure of which is incorporated herein by reference. In practice, the initial angular adjustment means 27 comprise means 28 for adjusting the angle of the socks 3.

[0023] It will be understood that the invention can be subject to modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements

Claims

1. An automatic unit for feeding socks and similar hosiery products to a packaging machine, comprising:
a conveyor assembly (5) located between a manu- 5
facturing machine (4) and the packaging machine
(2), where the conveyor assembly (5) includes a
first conveyor and a second conveyor (9, 10) and
means for the lengthways adjustment of the socks; 10
and means (7) for laying the socks (3) over each
other in such a way as to form pairs of overlaid
socks (3) at the outfeed end of the conveyor assem-
bly (5), the feed unit being **characterised in that**
the first conveyor and the second conveyor (9, 10)
at least constitute means for aligning the socks (3) 15
vertically.

2. The unit according to claim 1, **characterised in that**
the vertical alignment means comprise actuating
means (17) connected to at least one of the two con- 20
veyors (9, 10), either first or second, in such a way
as to move the first conveyor and the second con-
veyor (9, 10) crossways relative to each other.

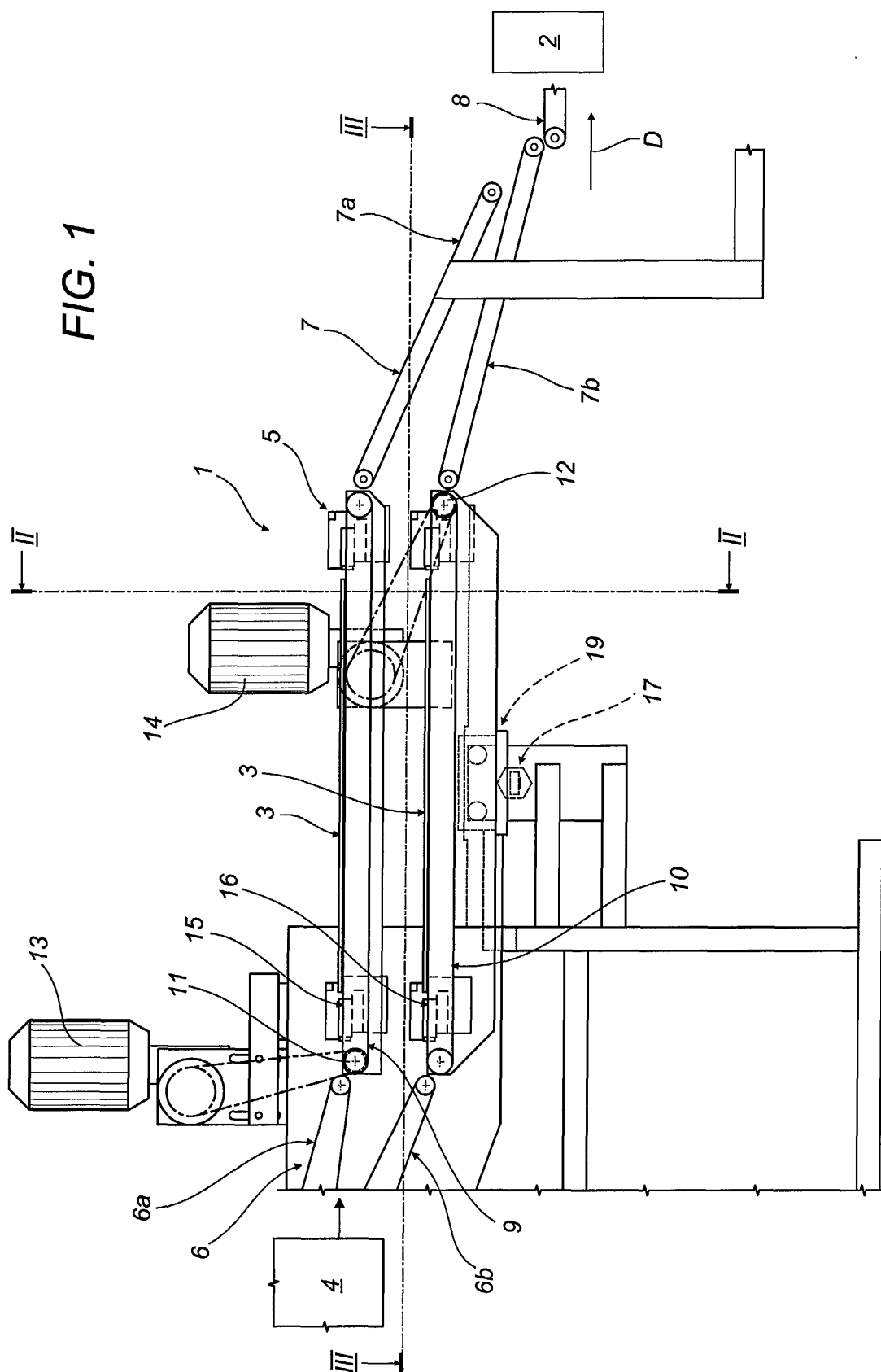
3. The unit according to claim 2, **characterised in that** 25
the vertical alignment means are controlled by
means (21,22) for detecting the position of at least
one of the socks (3) crossways relative to the re-
spective conveyor (9, 10).
30

4. The unit according to claim 3, **characterised in that**
the first conveyor and the second conveyor (9, 10)
move crossways relative to each other between an
end position where they are apart to receive the
socks (3) and a position where they are closer to- 35
gether to align the socks (3) vertically with each other.

5. The unit according to claim 1, **characterised in that**
the first conveyor and the second conveyor (9, 10) 40
also constitute means for lengthways alignment of
the socks (3) acting in combination with the means
for lengthways adjustment.

6. The unit according to any of the claims from 1 to 5, 45
characterised in that, upstream of the vertical
alignment means, the conveyor assembly (5) also
comprises initial adjustment means (27) operating
crossways relative to the respective conveying
means (6a,6b) 50

7. The unit according to claim 4, **characterised in that**
the initial adjustment means (27) comprise means
(28) for adjusting the angle of the socks 3. 55



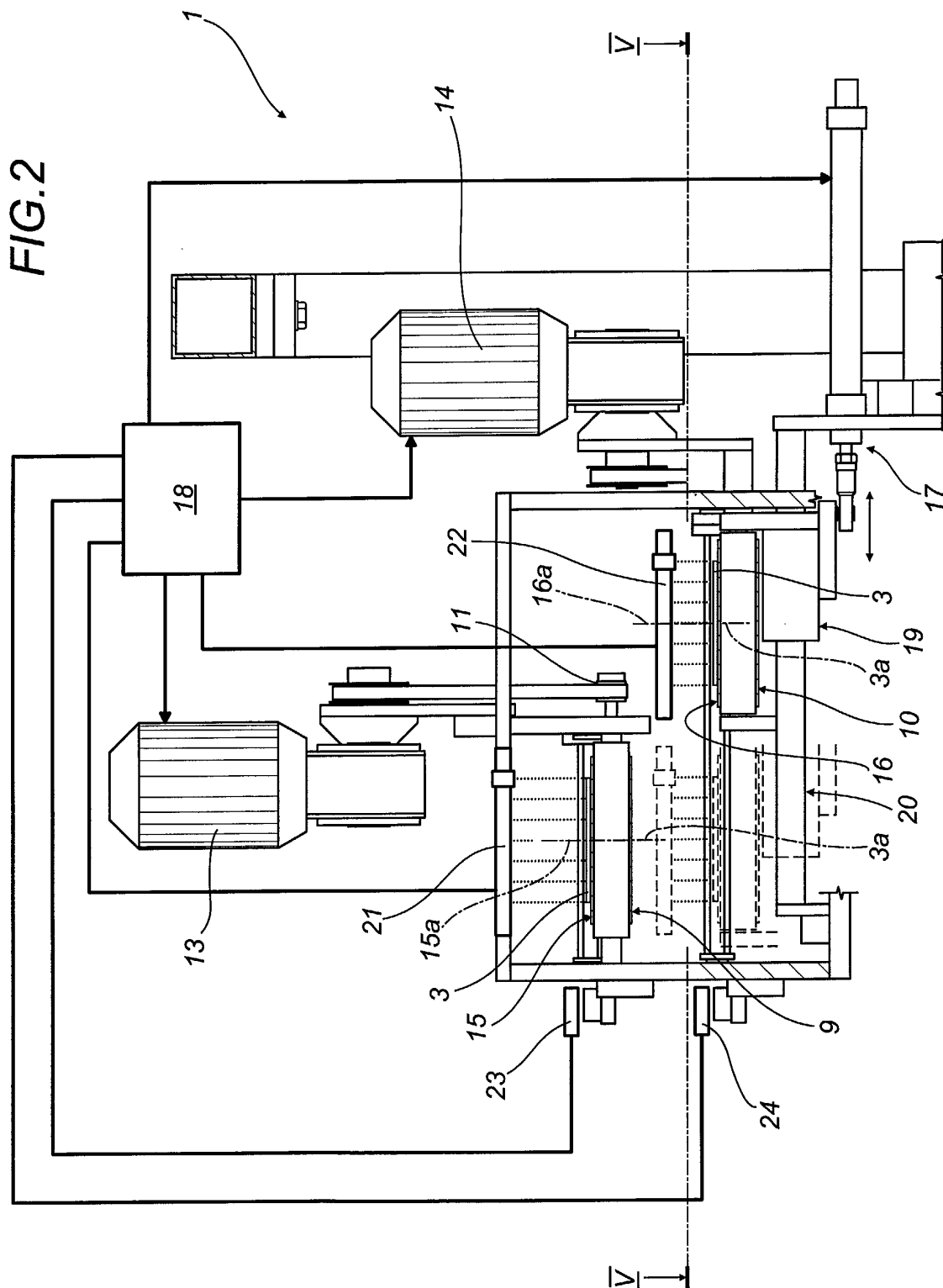
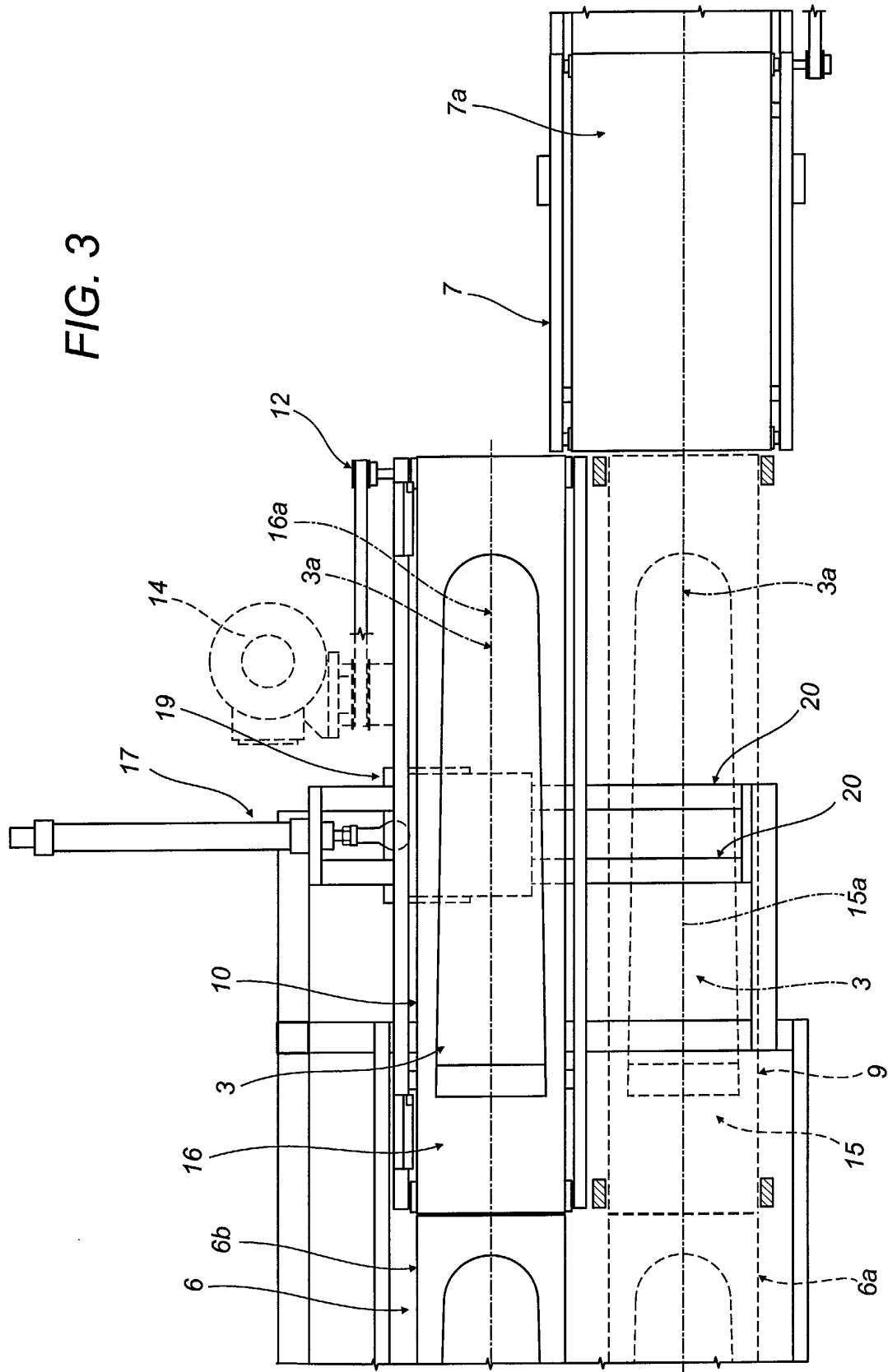


FIG. 3



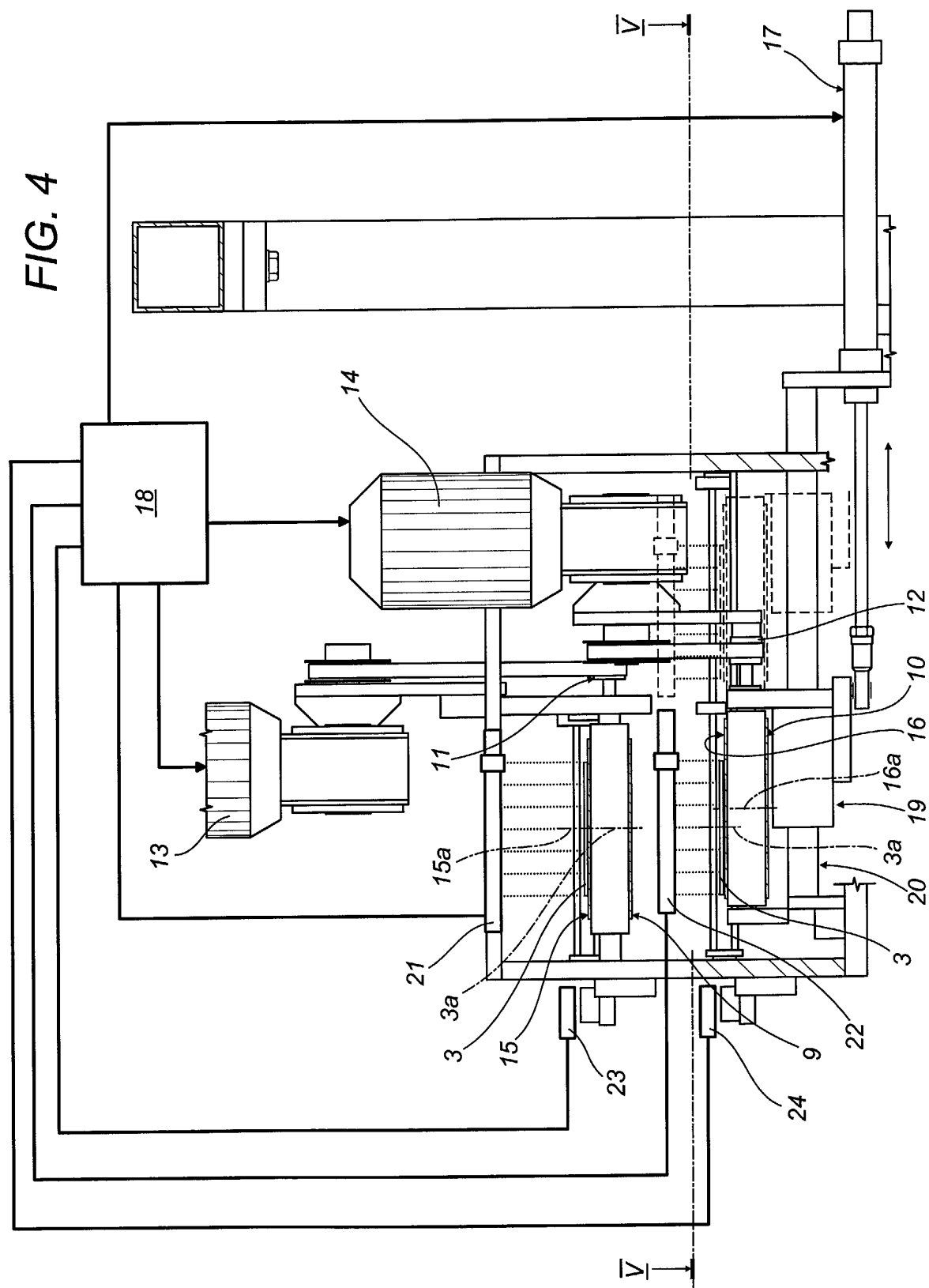


FIG. 5

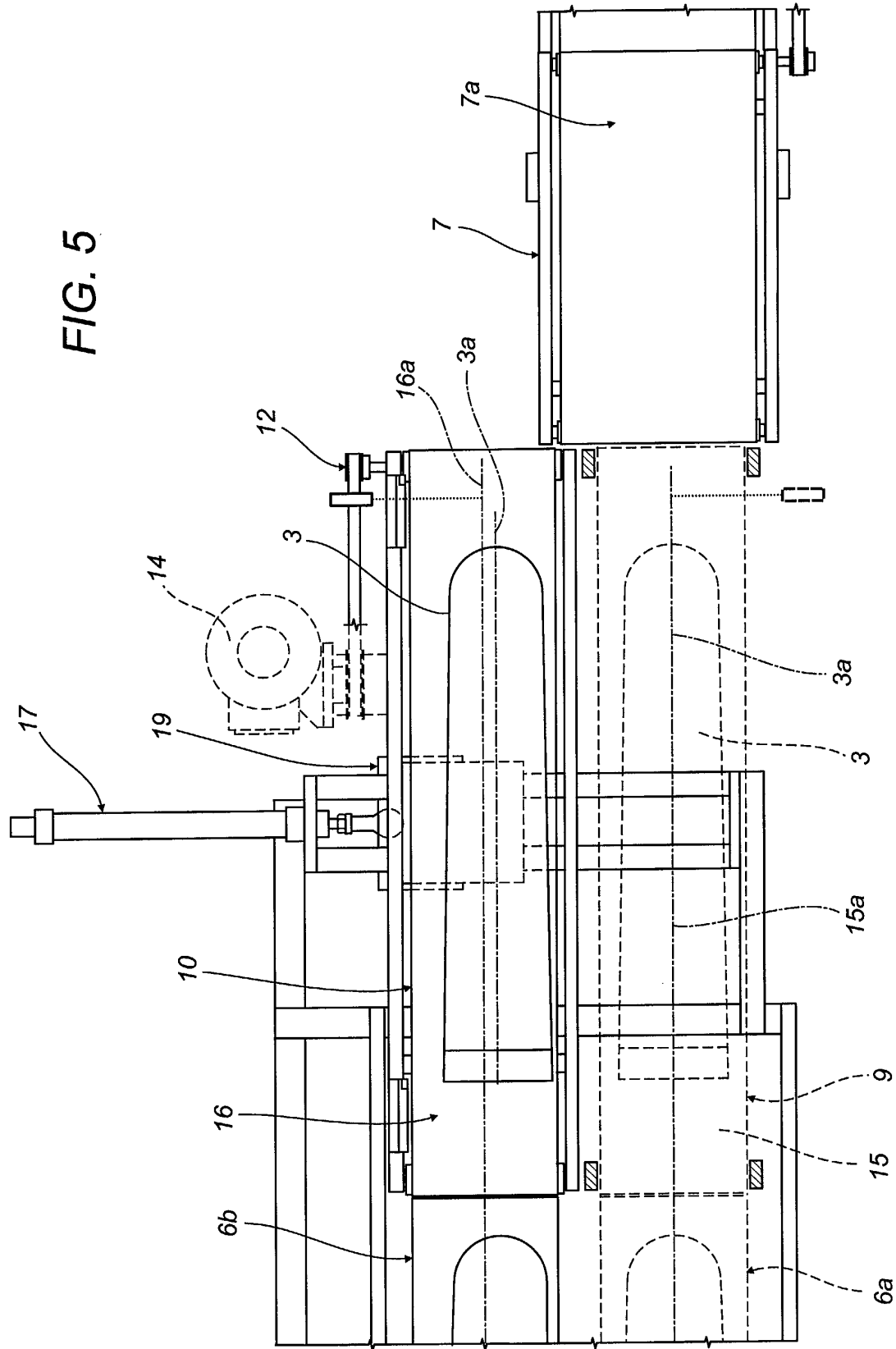


FIG. 6

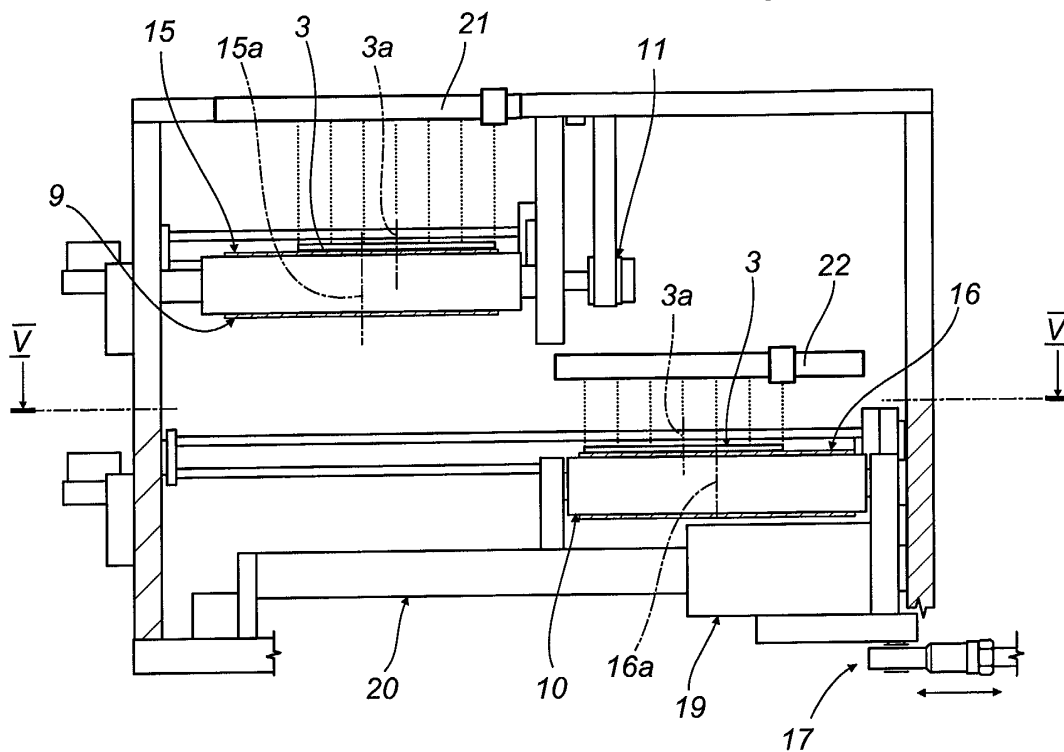


FIG. 7

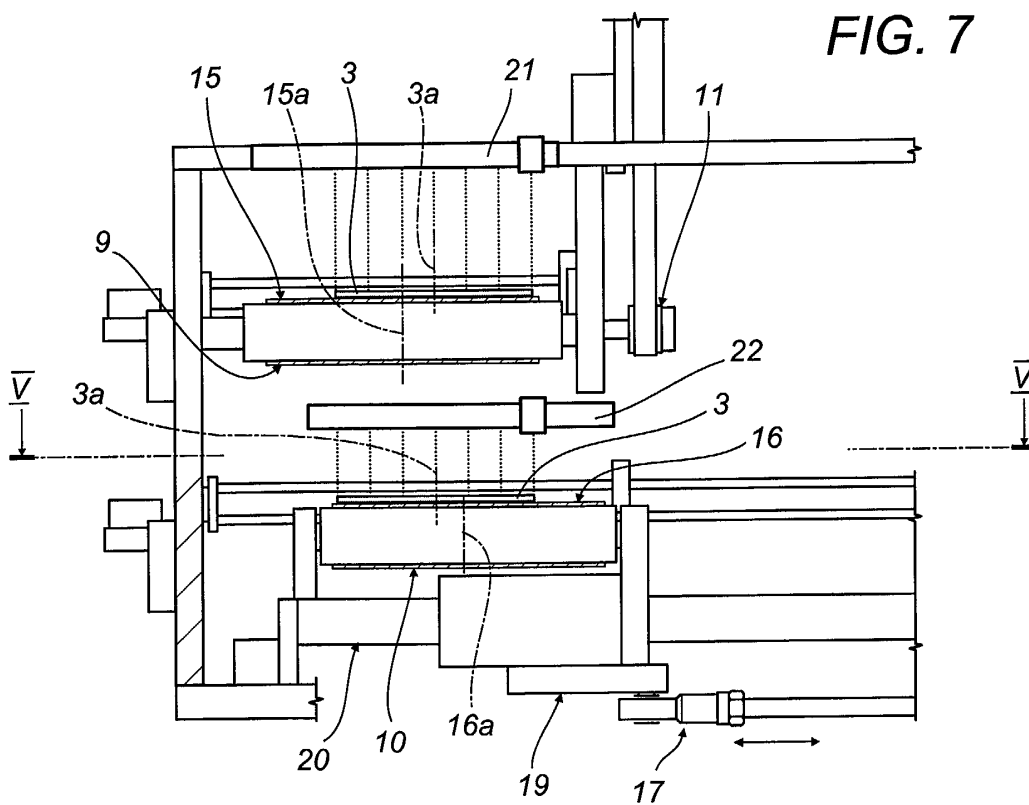
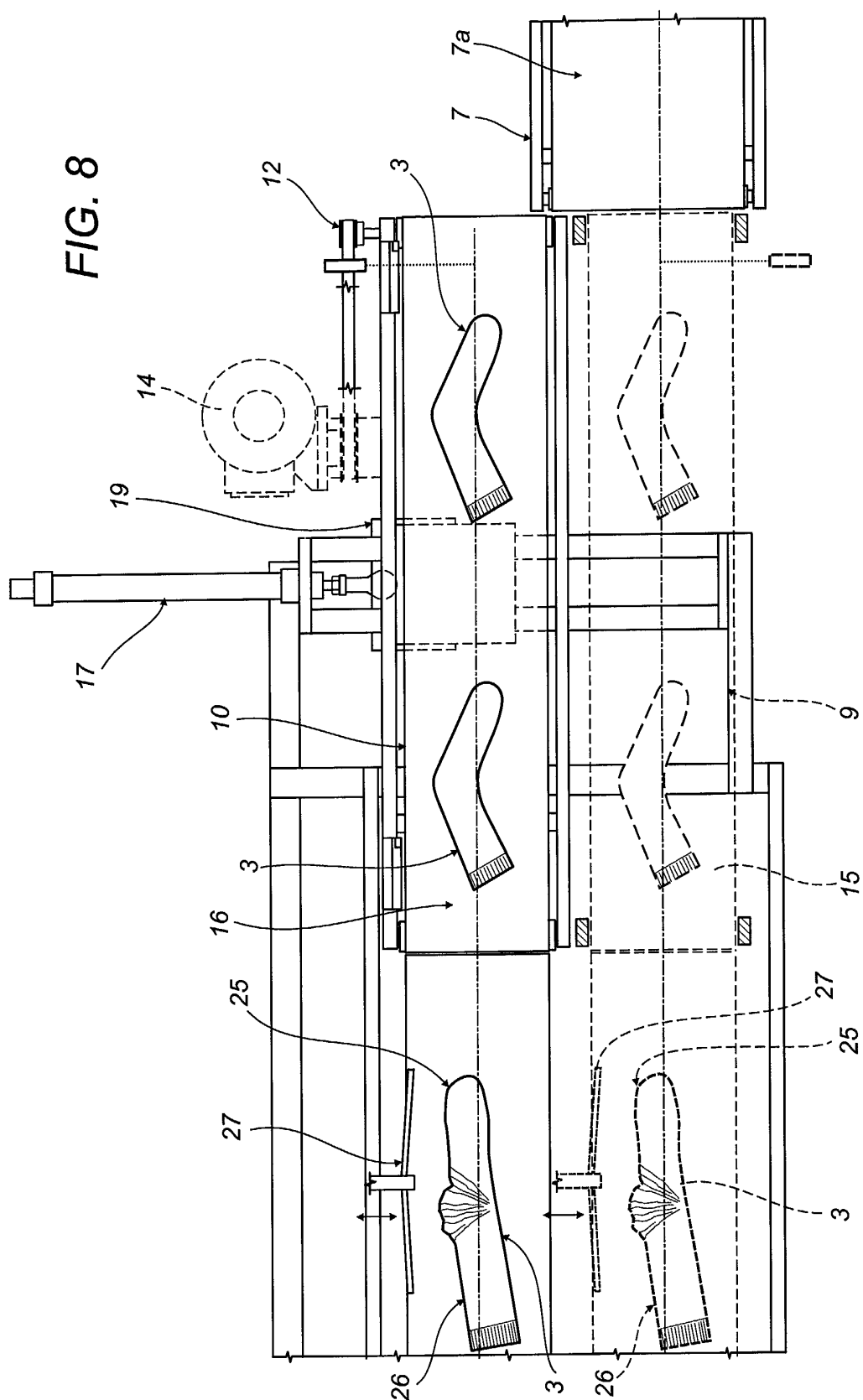


FIG. 8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5445

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.7)
A	EP 0 004 379 A (KREMPEL GMBH & CO AUGUST) 3 October 1979 (1979-10-03) * claims; figures *	1	B65B25/20
A	EP 0 816 555 A (WEPAMAT MASCHINENBAU GMBH) 7 January 1998 (1998-01-07) * column 7, line 3 - column 8, line 30; figures *	1	
A	US 5 788 130 A (COLLINS JR JOSEPH L ET AL) 4 August 1998 (1998-08-04) * column 2, line 62 - column 6, line 44; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B D06H D06C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 January 2003	Examiner Jagusiak, A
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			

EPO FORM 1503 03 82 (P04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 42 5445

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-01-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0004379	A	03-10-1979	DE	2813054 A1	27-09-1979
			EP	0004379 A1	03-10-1979
EP 0816555	A	07-01-1998	DE	19626136 A1	08-01-1998
			CA	2209504 A1	01-01-1998
			CN	1173566 A	18-02-1998
			EP	0816555 A2	07-01-1998
US 5788130	A	04-08-1998	NONE		