(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 293 434 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.03.2003 Bulletin 2003/12

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

(21) Application number: **02425125.8**

(22) Date of filing: **05.03.2002**

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

(30) Priority: **17.09.2001 IT BO20010561**

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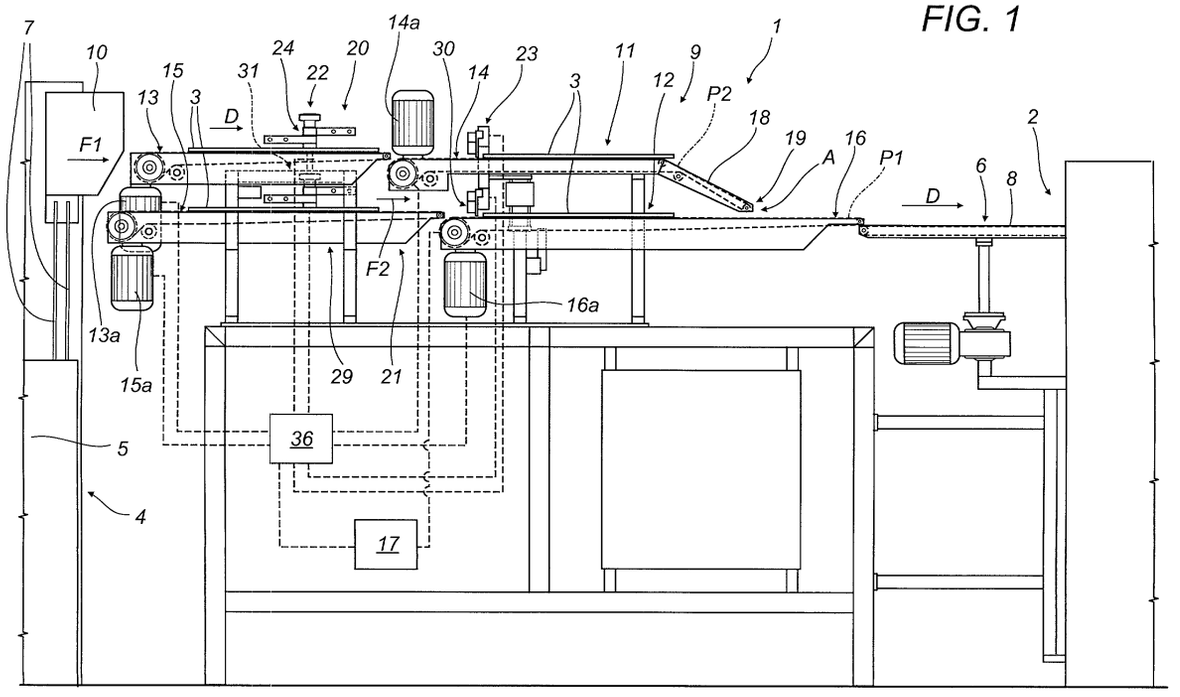
(54) A method and unit for automatically feeding a packaging machine for socks or similar hosiery products

(57) In a method and a unit for automatically feeding a packaging machine (2) for socks (3) or similar hosiery products, the socks (3) are stripped in pairs off respective pairs of forms (7) in a processing unit (4) and are transferred to a respective pair of belt conveying devices (11, 12) which feed the socks (3) along respective paths (P2, P1) that converge on each other and, before laying the socks (3) over each other at the point of convergence (A) of the feed paths (P2, P1), act in conjunction with respective devices (22, 23, 29, 30) for adjusting the position of the socks (3) relative to each other in such a way as to align the socks neatly as they are laid over each other.

FIG. 1



EP 1 293 434 A1

Description

[0001] The present invention relates to a method and 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 a unit which feeds the socks to a packaging machine which places the socks in boxes or other packages ready for sale.

[0003] To give an example, a customary inspection and boarding unit normally comprises a carousel that rotates in steps about a usually vertical axis and peripherally mounts a plurality of pairs of forms parallel to the axis of rotation. The pairs of forms, each of which is used for a repective pair of socks, are stopped in succession at a first loading station where, usually, an operator manually pulls a sock over each form. The forms then move one after another through a second shrinkage station, a third steam setting station, where each sock is set to the shape of the form, a fourth drying station and a fifth unloading station located at the infeed end of the aforementioned feed unit.

[0004] At the unloading station of a customary installation, there is a feed unit equipped with a roller system. The roller system is designed to strip the socks from both forms in each pair simultaneously and to lay them flat over each other on a conveyor belt connected to the above mentioned packaging machine.

[0005] In a system of this type, during the steps of stripping the socks from the forms and subsequently laying them over each other and placing them on the conveyor belt, it is difficult to keep the two socks of each pair neatly aligned with each other, with the result that the packaged end product may look quite unattractive. This disadvantage is even more evident in those cases where the forms are L-shaped like leg and foot, which makes the operation of stripping the socks from the forms more difficult.

[0006] The aim of the present invention is to provide a method for automatically feeding a packaging machine for socks or similar hosiery products that overcomes the above mentioned disadvantage.

[0007] In accordance with this aim, the present invention provides a method for automatically feeding socks or similar hosiery products to a packaging machine as the socks feed out of a sock processing unit, the method comprising a step of laying the socks over each other and a step of placing the socks on conveyor means connected to the infeed section of the packaging machine; the method being characterised in that it comprises a step of adjusting the position of the socks relative to each other.

[0008] The present invention also relates to a unit for automatically feeding a packaging machine for socks or similar hosiery products.

[0009] Accordingly, the present invention provides a unit for automatically feeding a packaging machine for socks or similar hosiery products; the unit comprising conveyor means connected to an infeed section of the packaging machine and being designed to receive the socks placed on the conveyor means as they feed out of a sock processing unit, and aligning means for laying the socks transferred from the processing unit over each other; the feeding unit being characterised in that it comprises means for adjusting the position of the socks relative to each other.

[0010] The invention will now be described with reference to the accompanying drawings which illustrate a preferred embodiment of it and in which:

- Figure 1 is a schematic side view, with some parts cut away for clarity, of a first preferred embodiment of the feed unit according to the present invention;
- Figures 2 and 3 are two different perspective views of the unit shown in Figure 1;
- Figure 4 is a schematic front view of a part of the feed unit, viewed in the direction indicated by the arrow F1 in Figure 1;
- Figure 5 is a schematic front view of another part of the feed unit, viewed in the direction indicated by the arrow F2 in Figure 1;
- Figures 6 and 7 are two schematic perspective views of a detail of the feed unit illustrated in Figure 1, in two different operating positions;
- Figure 8 is a schematic side view, with some parts cut away for clarity, of a second preferred embodiment of the feed unit according to the present invention;
- Figure 9 is a schematic plan view of the feed unit shown in Figure 8;
- Figure 10 is a schematic front view, with some parts cut away, of the feed unit shown in Figure 8; 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.

[0011] 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 processing and/or finishing the socks 3, for example an inspection and boarding unit 4, 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.

[0012] 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.

[0013] In particular, Figure 1 shows an outfeed carousel 5 of the unit 4 and an infeed conveyor 6 of the machine 2. The carousel 5 rotates in steps about a vertical axis and peripherally mounts a plurality of pairs of forms

7 placed side by side and parallel to the axis of rotation. The conveyor 6, on the other hand, is a belt conveyor system comprising a conveyor section 8 that forms a horizontal conveying plane and that is designed to feed the socks 3 towards the working parts of the machine 2 in a defined direction D.

[0014] The feed unit 1 comprises a conveyor assembly 9 followed in the direction D by the infeed conveyor 6 of the machine 2, and a stripping and transfer unit 10 which picks the socks 3 in pairs from the respective pairs of forms 7 and places the socks 3 on the conveyor assembly 9. The stripping and transfer unit 10 is of well known type and therefore illustrated schematically as a block in Figure 1.

[0015] As shown in Figures 1, 4 and 5, the conveyor assembly 9 comprises a first conveying device 11 and a second conveying device 12, each designed to convey one of the socks 3 forming a pair of socks 3 transferred by the unit 10.

[0016] The first conveying device 11 comprises a first conveyor section 13 (Figures 1 and 4) and a second conveyor section 14 (Figures 1 and 5), positioned one after the other in substantially the same plane. Looking in more detail, the conveyor sections 13 and 14 form a horizontal conveying plane at a height above the conveying plane formed by the aforementioned conveyor section 8.

[0017] The second conveying device 12 comprises a first conveyor section 15 (Figures 1 and 4) and a second conveyor section 16 (Figures 1 and 5), positioned one after the other in substantially the same plane. Looking in more detail, the conveyor sections 15 and 16 form a horizontal conveying plane at a height below the conveying plane formed by the conveyor sections 13 and 14 and lying in substantially the same plane as the conveying plane formed by the conveyor section 8.

[0018] As illustrated in Figure 4, the conveyor sections 13 and 15 are parallel to each other at different heights in a fixed position and offset from each other in such a way as to partially overlap.

[0019] The conveyor sections 14 and 16 are parallel to each other at different heights and are driven transversely relative to each other to and from a position in which they are vertically aligned with each other. Looking in more detail, with reference to Figure 5, the conveyor section 16 is supported by a carriage 37 that runs on guide rails 38 under the action of an actuator 17 which drives the conveyor section 16 itself, transversely and horizontally, under the conveyor section 14.

[0020] In particular, the conveyor section 16 can move from a first position (drawn with a continuous line on the right in Figure 5) in which it receives the socks 3 from the conveyor section 15 preceding it in the aforementioned direction D, and in which the conveyor section 16 is vertically offset, in the direction D, relative to the infeed conveyor 6 of the packaging machine 2, whilst it is aligned, again in the direction D, with the conveyor section 15, and a second position (illustrated in Figure 1 and drawn with a dashed line on the left in Figure 5) in which it receives and lays the socks 3 over each other, and in which the conveyor section 16 is vertically aligned with the conveyor section 14 and aligned, in the direction D, with the conveyor section 14 itself and with the conveyor 6.

[0021] Looking in more detail, the conveyor section 16 is longer than the conveyor section 14 and connects with the conveyor section 8 of the conveyor 6 so as to transfer the socks 3 to the conveyor 6 itself.

[0022] In addition to the conveyor sections 13 and 14, the first conveying device 11 comprises a third conveyor section 18 positioned in succession after the conveyor section 14 and obliquely relative to the conveyor section 14. More specifically, the conveyor section 18 is inclined downwardly in the direction D and converges with an intermediate portion of the conveyor section 16 below when the latter is in the aforementioned second working position for receiving and laying the socks 3 over each other.

[0023] The conveyor sections 13, 15 and 16 consist of respective conveyor belts independently driven in steps by separate motors 13a, 15a and 16a and are looped around respective pulleys whose axes are horizontal and parallel to each other. The conveyor sections 14 and 18, on the other hand, consist of a single conveyor belt also independently driven in steps by a motor 14a and looped around pulleys whose axes are horizontal and parallel to each other. In an embodiment which is not illustrated, the conveyor sections 14 and 18, like the conveyor sections 13, 15 and 16, consist of two separate conveyor belts.

[0024] The conveyor sections 16 and 18 constitute aligning means 19 since they form respective conveying paths P1 and P2 which converge at a zone A where the socks 3, transported by the conveyor sections 16 and 18 themselves, are laid over each other as they move forward. The zone A is created when the conveyor section 16 is moved by the actuator 17 from its first position to its second position.

[0025] In order to ensure that the socks 3 are exactly aligned when they are laid over each other at the convergence zone A, the conveying devices 11 and 12 cooperate, upstream of the zone A in the direction D, with respective means 20 and 21 for adjusting the position of the socks 3 relative to each other. The adjustment means 20 associated to the conveying device 11 comprise a first adjustment device 22 associated to the conveyor section 13 (Figures 1, 2, 4, 6 and 7) and a second adjustment device 23 (Figures 1, 2 and 5) associated to the conveyor section 14.

[0026] As shown in more detail in Figures 2, 4, 6 and 7, the device 22 comprises an articulated pusher 24 that moves in a direction T transversal to the direction D of the conveyor section 13 and has two push plates 25 and 26, jointed to each other in a Vee configuration and designed to intercept and push the socks 3 in such a way as to adjust the position of the socks 3 transversely with

respect to the conveyor section 13. The Vee shaped configuration of the plates 25 and 26 makes it possible to adjust the angular position of the parts of the socks 3 corresponding to the foot and leg. As shown in Figures 6 and 7, the pusher 24 is moved in the direction T by respective actuating means, illustrated in Figure 4 and labelled 24a, between a rest position away from the centre of the conveyor section 13, shown in Figures 4 and 6, where the two plates 25 and 26 do not interfere the socks 3 that arrive from the aforementioned unit 10 and move along the first part of the conveyor section 13 with the foot and leg portions not exactly orientated, and an adjustment position close to the centre of the conveyor section 13, shown in Figure 7, where the two plates 25 and 26 interfere with the socks 3 in such a way as to correctly orientate the foot and leg portions.

[0027] As shown in Figures 6 and 7, one of the two plates of the pusher 24 namely, the plate 26, is connected to the articulated pusher 24 by an arm 26a that is free to turn about a vertical axis X. Looking in more detail, the plate 26 is joined to the pusher 24 by an actuator 41 which allows the plate 26 to move angularly between a position in which it is substantially parallel to the direction D, shown in Figure 6, and an angled position towards the centre of the conveyor section 13, shown in Figure 7, where it orientates the foot portion of the sock 3 relative to the leg portion.

[0028] As shown in more detail in Figures 3 and 5, the second adjustment device 23 comprises a rocker arm 27, that rotates about a horizontal axis transversal to the direction D and mounts at its free end a push plate 28 designed to intercept the socks 3 in such a way as to adjust the position of the socks 3 lengthways, that is to say, in the direction D, relative to the conveyor section 14. The plate 28 acts in conjunction with a position sensor 39 connected to the control unit 36.

[0029] Similarly, the adjustment means 21 associated to the conveying device 12 comprise a first adjustment device 29 associated to the conveyor section 15 and a second adjustment device 30 associated to the conveyor section 16, when it is in its second position under and in vertical alignment with the conveyor section 14.

[0030] As shown in more detail in Figures 2, 4, 6 and 7, the device 29 comprises an articulated pusher 31 that moves in a direction T' transversal to the direction D of the conveyor section 15 and parallel to the direction T and has two push plates 32 and 33, jointed to each other in a Vee configuration and designed to intercept and push the socks 3 in such a way as to adjust the position of the socks 3 with respect to the conveyor section 15 in the same way as the plates 25 and 26 of the pusher 24 adjust it relative to the conveyor section 13. Thus, as in the previous case relating to the pusher 24 and the conveyor section 13, the Vee shaped configuration of the plates 32 and 33 makes it possible to adjust the angular position of the parts of the socks 3 corresponding to the foot and leg.

[0031] As shown in Figures 6 and 7 and as in the case of the plates 25 and 26, one of the plates of the pusher 31, namely, the plate 33, has the same type of articulation as the plate 26.

[0032] As shown in more detail in Figures 3 and 5, the device 30 comprises a rocker arm 34, that rotates about a horizontal axis transversal to the direction D and mounts at its free end a push plate 35 designed to intercept the socks 3 in such a way as to adjust the position of the socks 3 lengthways, that is to say, in the direction D, relative to the conveyor section 16. Like the plate 28, the plate 35 acts in conjunction with a position sensor 40 also connected to the control unit 36.

[0033] During use, each time the carousel 5 stops, a pair of forms 7 stops in front of the stripping and transfer unit 10 and the unit transfers the socks 3 from the forms 7, in a known manner which is not illustrated, and places the socks 3 on the conveyor assembly 9. More specifically, of the two socks 3 transferred, one is placed on the conveyor section 13 of the device 11 and the other on the conveyor section 15 of the device 12.

[0034] When the conveyor sections 13 and 15 stop, the adjustment devices 22 and 29 connected to them are driven by the control unit 36 in such a way as to transversely adjust the position of the socks 3 relative to the conveyor sections 13 and 15, respectively. During this adjustment step, performed by the pushers 24 and 31, the socks 3 are also adjusted angularly thanks to the Vee shaped configuration of the plates 25, 26, 32 and 33, in the manner described above.

[0035] Next, the conveyor sections 13 and 15 feed the respective socks 3 towards the corresponding conveyor sections 14 and 16, the section 16 being in the position illustrated by the continuous line in Figure 5, that is to say, on the right of the section 14 and offset relative to the latter.

[0036] While they are on the conveyor sections 14 and 16, the socks 3 are stoped after coming into contact with and passing the plates 28 and 35. At this point, the control unit 36, on signals from the proximity sensors 39 and 40, inverts the direction of motion of the conveyor sections 14 and 16 so as to bring the socks 3 into contact with the respective plates 28 and 35. On contact, detected by the sensors 39 and 40 connected to the rocker arms 27 and 34, the conveyor sections 14 and 16 start moving in the direction D again. More specifically, before restarting in the direction D, the conveyor section 16, under the action of the actuator 17, which is triggered by the control unit 36 when the latter receives the signals from the sensors 39 and 40, moves from the position illustrated by the continuous line in Figure 5 to the position, illustrated by the dashed line in Figure 5, where it is vertically aligned with the conveyor section 14, so that it is aligned in the direction D not only with the conveyor section 14 but also with the conveyor 6.

[0037] Once their longitudinal positions relative to each other have been adjusted in the manner described above, the socks 3 are fed towards the zone A where the paths P1 and P2 converge and where the socks 3

are laid over each other as they move along the paths P1 and P2.

[0038] After being laid over each other, the socks 3 continue moving in the direction D towards the conveyor section 8 from the portion of the conveyor section 16 that is located downstream of the zone A.

[0039] From the above description, it is clear that the positions of the socks 3 relative to each other are adjusted indirectly by adjusting the position of each sock 3 relative to the respective conveying device 11, 12. It is also clear that the exact reciprocal alignment of the socks 3 when they are laid over each other at the zone A is accomplished thanks to the coordinated and combined action of the adjustment means 20 and 21 with the respective conveying devices 11 and 12, made possible by the control unit 36 and by the independent drive of the conveyor sections 13, 14, 15 and 16, through the separate motors 13a, 14a, 15a and 16a.

[0040] In another embodiment of the unit 1 which is not illustrated, the actuator 17 might be connected to the conveyor section 15 which would move in the same way as the conveyor section 16, while the conveyor section 16 would be fixed in a position corresponding to the position of reciprocal vertical alignment with the conveyor section 14.

[0041] With reference to Figures 8, 9 and 10, which illustrate a variant of the embodiment described with reference to Figures 1 to 7, the conveyor section 15 is positioned at a height above the conveyor section 8 and the conveyor section 16 is inclined downwardly in the direction D in such a way as to connect the conveyor sections 15 and 8. Further, the conveyor section 16 is transversely fixed, that is to say, there is no actuator 17.

[0042] The conveyor sections 13 and 14 of the first conveying device 11 of Figure 1 are substituted by a single conveyor section 42, which is equal in length to the conveyor section 15 below it and which is aligned lengthways above the conveyor section 15 itself. In other words, with reference to the direction D, the upstream ends of the conveyor sections 15 and 42 are vertically aligned, as are the downstream ends of the conveyor sections 15 and 42. The upstream ends of the conveyor sections 16 and 18 are also vertically aligned, whilst the downstream end of the conveyor section 18 is positioned above an intermediate zone of the conveyor section 16 below it.

[0043] As shown in Figures 9 and 10, the conveyor sections 42, 18 and 16 are equal in width, whilst the conveyor section 15 is wider, in this case, twice as wide: the conveyor section 15 has a first transversal edge that is vertically aligned below a first corresponding transversal edge of the conveyor section 42, and a second transversal edge that extends outwards with respect to the orthogonal projection of the conveyor section 42.

[0044] The adjustment means 20 and 21 are associated to the conveyor sections 42 and 15, respectively. Looking in more detail, the conveyor section 42 is connected to both the first adjustment device 22 and the second adjustment device 23, whilst the conveyor section 15 is connected to both the first adjustment device 29 and the second adjustment device 30. The first adjustment devices 22 and 29 are exactly the same as those described above, whilst the second adjustment devices 23 and 30, which for convenience, have the same reference numbers as those described above, are of the optical type and, in particular, each of the rocker arms 27 and 34 is substituted by a pair of retroreflective photocells designed to detect the toe and welt of each sock 3.

[0045] The stripping and transfer unit 10 comprises two outfeed belt conveyors 43 and 44, both downwardly inclined in the direction D. Of these conveyors, the conveyor 43 is aligned lengthways with the conveyor section 42 and is equal to it in width, whilst the conveyor 44, which is inclined to a greater extent than the conveyor 43, runs alongside the latter so that the socks 3 are placed on a longitudinal strip of the conveyor section 15 which extends past the edge of the conveyor section 42 above it.

[0046] During use, the socks 3 stripped from the forms are placed by the conveyors 43 and 44 on the conveyor sections 42 and 15, respectively. The adjustment devices 22 and 29 are driven by the control unit 36 in such a way as to adjust the positions of the socks 3 transversely and angularly relative to the conveyor sections 42 and 15, in such a way that the socks 3 are aligned with each other transversely to the direction D.

[0047] The motion of the conveyor sections 42 and 15 is controlled by the control unit 36, acting in conjunction with the optical adjustment devices 22 and 30 in such a way as to align the socks 3 with each other lengthways in the direction D.

[0048] Once their positions relative to the conveyor sections 42 and 15, and hence, indirectly, their positions relative to each other, have been adjusted in the manner described above, the socks 3 are fed towards the zone A where the paths P1 and P2 converge and where the socks 3 are laid over each other as they move along the paths P1 and P2.

[0049] After being laid over each other, the socks 3 continue moving in the direction D towards the conveyor section 8 from the portion of the conveyor section 16 that is located downstream of the zone A.

[0050] It should be emphasised that the present invention, of which only some embodiments have been described, may be further modified and adapted in several ways without thereby departing from the spirit of the inventive concept.

Claims

1. A method for automatically feeding socks or similar hosiery products to a packaging machine as the socks (3) feed out of a sock (3) processing unit (4), the method comprising a step of laying the socks

(3) over each other and a step of placing the socks (3) on conveyor means (9) connected to the infeed section (6) of the packaging machine (2); the method being **characterised in that** it comprises a step of adjusting the position of the socks (3) relative to each other.

2. The method according to claim 1, **characterised in that** the adjustment step precedes the overlaying step.

3. The method according to claim 1, **characterised in that** the step of placing the socks (3) on the conveyor means (9) precedes the adjustment step.

4. The method according to claim 3, **characterised in that** the adjustment step is performed with the socks (3) positioned on the conveyor means (9).

5. The method according to claim 4, **characterised in that** the step of placing the socks (3) on the conveyor means (9) comprises a further step of positioning each of the two socks (3) in each pair of socks (3) respectively on a first and on a second conveying device (11, 12) of the conveyor means (9); the adjustment step being performed individually on each of the two socks (3) while the socks (3) are positioned on the first and second conveying devices (11, 12).

6. The method according to claim 5, **characterised in that** the first and second conveying devices (11, 12) feed each of the socks (3) along respective feed paths (P2, P1) that converge on each other at a zone (A) where the socks (3) are laid over each other as they move forward.

7. A unit for automatically feeding a packaging machine for socks or similar hosiery products; the unit (1) comprising conveyor means (9) connected to an infeed section (6) of the packaging machine (2) and being designed to receive the socks (3) placed on the conveyor means (9) as they feed out of a sock (3) processing unit (4), and aligning means (19) for laying the socks (3) transferred from the processing unit (4) over each other; the feeding unit (1) being **characterised in that** it comprises means (20, 21) for adjusting the position of the socks (3) relative to each other.

8. The unit according to claim 7, **characterised in that** the adjustment means (20, 21) are positioned upstream of the aligning means (19) in the feed direction (D) of the socks (3) from the processing unit (4) to the packaging machine (2).

9. The unit according to claim 8, **characterised in that** the adjustment means (20, 21) act in conjunction with the conveyor means (9) to adjust the position of the socks (3) relative to each other while the socks (3) themselves are positioned on the conveyor means (9).

10. The unit according to claim 9, **characterised in that** the conveyor means (9) comprise a first and a second conveying device (11, 12) each designed to convey one of the socks (3) forming a pair of socks (3) placed on the first and second conveying devices (11, 12) by the stripping and transfer means (10); the adjustment means (20, 21) acting in conjunction with the first and second conveying devices (11, 12) to adjust the position of the socks (3) relative to each other while the socks (3) themselves are positioned on the first and second conveying devices (11, 12).

11. The unit according to claim 9, **characterised in that** the adjustment means (20, 21) comprise articulated pushers (24, 31) that move between a position where they do not interfere with the socks (3) and a position where they adjust the orientation of the socks (3); the adjustment means (20, 21) comprising, for each conveying device (11, 12) two push plates (25, 26; 32, 33) designed to come into contact with the leg and foot parts of the socks (3), respectively.

12. The unit according to claim 11, **characterised in that** at least one plate (26; 33) of the two plates (25,26;32,33) of each pusher (24, 31) can move between two operating positions.

13. The unit according to claim 10, **characterised in that** each of the first and second conveying devices (11, 12) comprises at least one first conveyor section (13, 15) and at least one second conveyor section (14, 16) positioned one after the other in substantially the same plane.

14. The unit according to claim 11, **characterised in that** the first conveyor sections (13, 15) are parallel at different heights in a fixed position; whilst the second conveyor sections (14, 16) are parallel at different heights and are driven transversely relative to each other to and from a position in which they are vertically aligned with each other.

15. The unit according to claim 12, **characterised in that** the first conveying device (11) comprises a third conveyor section (18) positioned in succession after the conveyor section (14) and obliquely relative to the section (14) itself.

16. The unit according to claim 13, **characterised in that** the third conveyor section (18) of the first conveying device (11) and the second conveyor section (16) of the second conveying device (12) constitute

the aligning means (19) forming respective conveying paths (P2, P1) which converge at a zone (A) where the socks (3) are laid over each other as they move forward.

17. The unit according to claim 10, **characterised in that** the first and second conveying devices (11, 12) constitute the aligning means (19) which form respective conveying paths (P2, P1) that converge at a zone (A) where the socks (3) are laid over each other as they move forward.

18. The unit according to claim 10, **characterised in that** each of the first and second conveying devices (11, 12) comprises at least one first conveyor section (42, 15) and at least one second conveyor section (18, 16) positioned one after the other.

19. The unit according to claim 18, **characterised in that** the first conveyor sections (42, 15) are parallel to each other at different heights; whilst the second conveyor sections (18, 16) are obliquely convergent.

20. The unit according to claim 19, **characterised in that** the second conveyor sections (18, 16) constitute the aligning means (19) which form respective conveying paths (P2, P1) that converge at a zone (A) where the socks (3) are laid over each other as they move forward.

FIG. 1

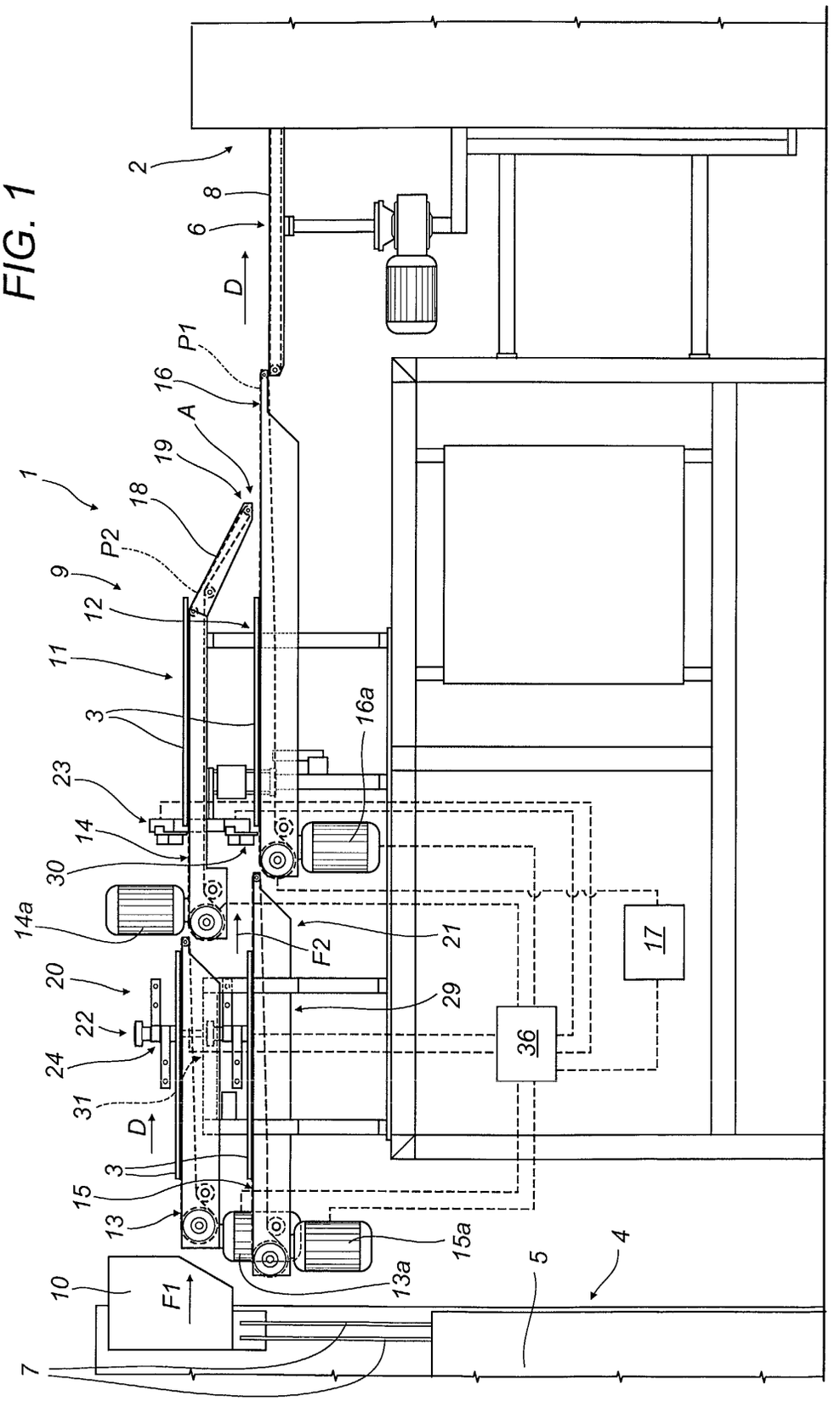

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FIG. 2

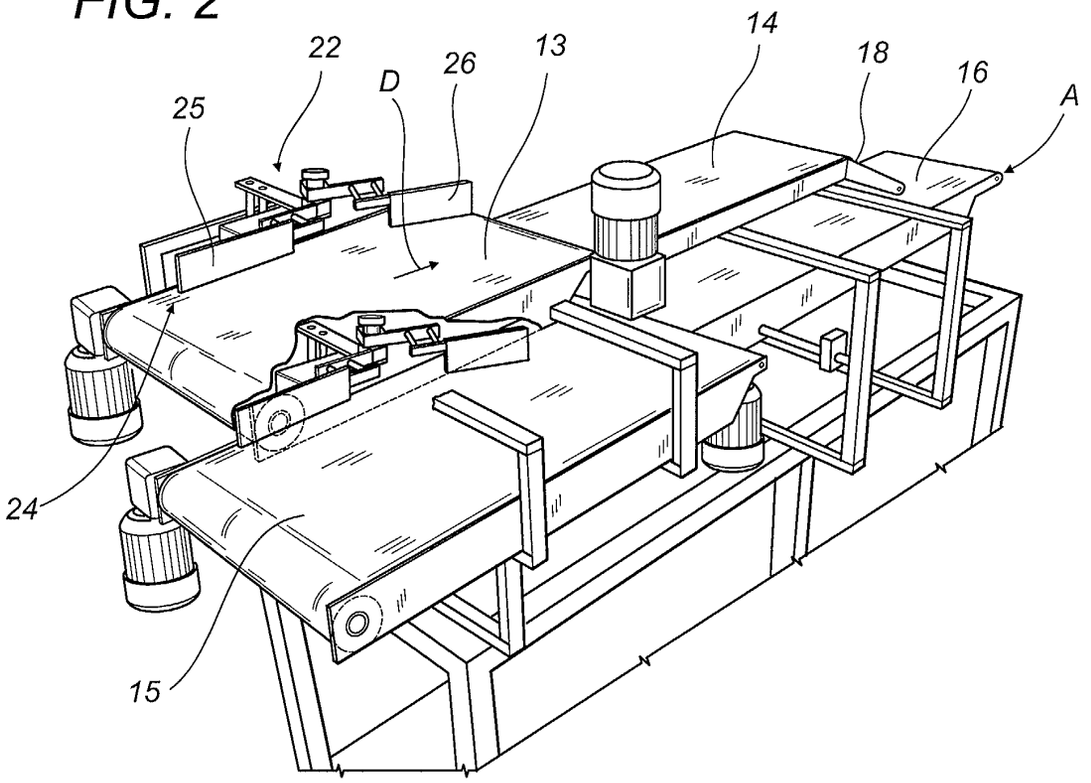

FIG. 3

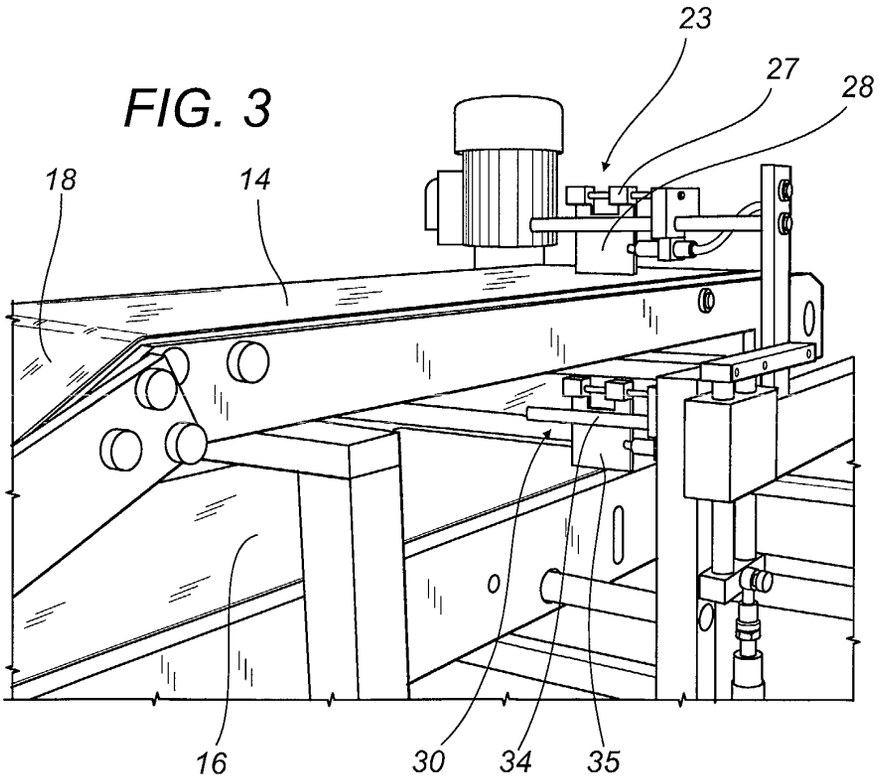

FIG. 4

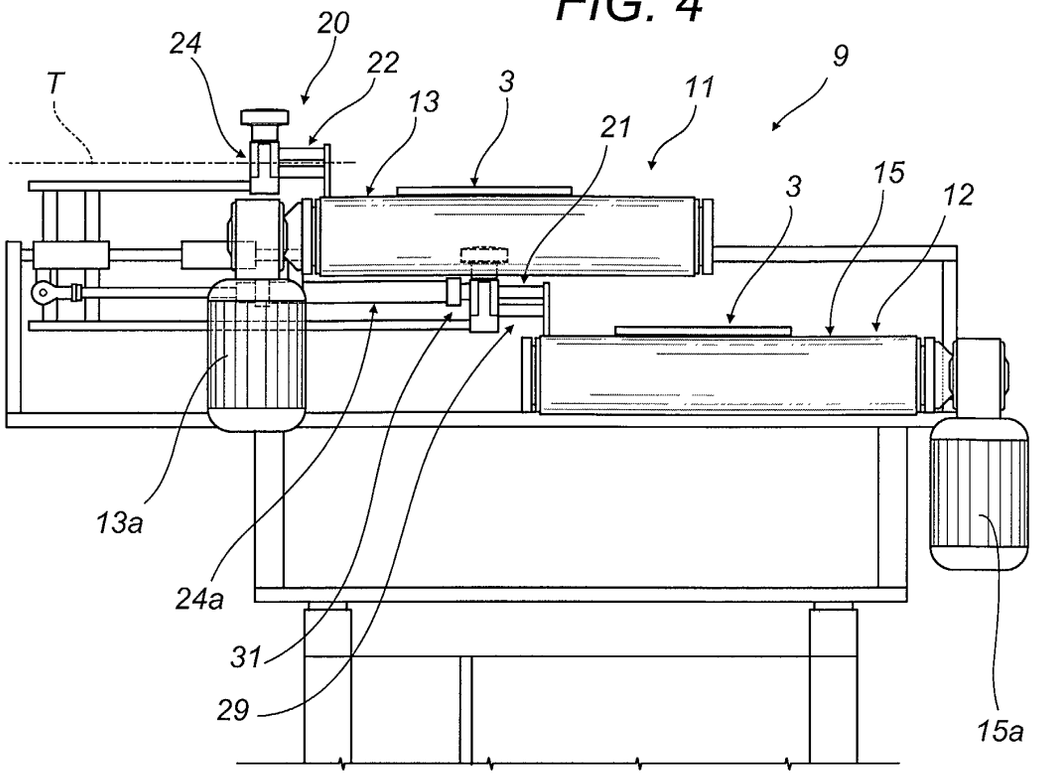
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FIG. 5

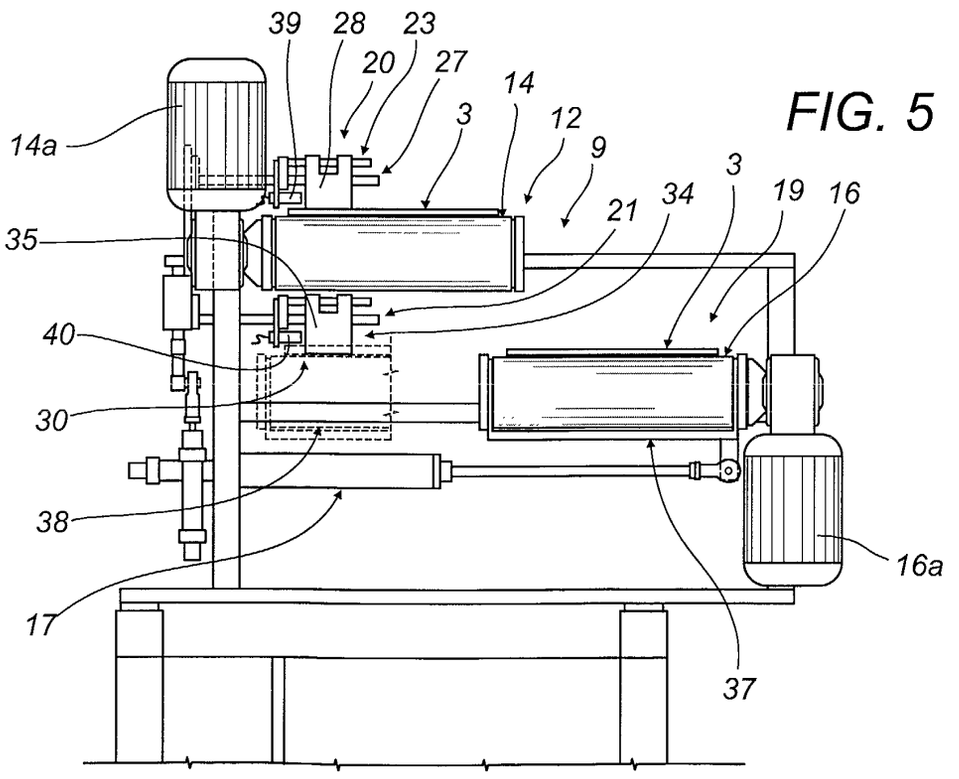
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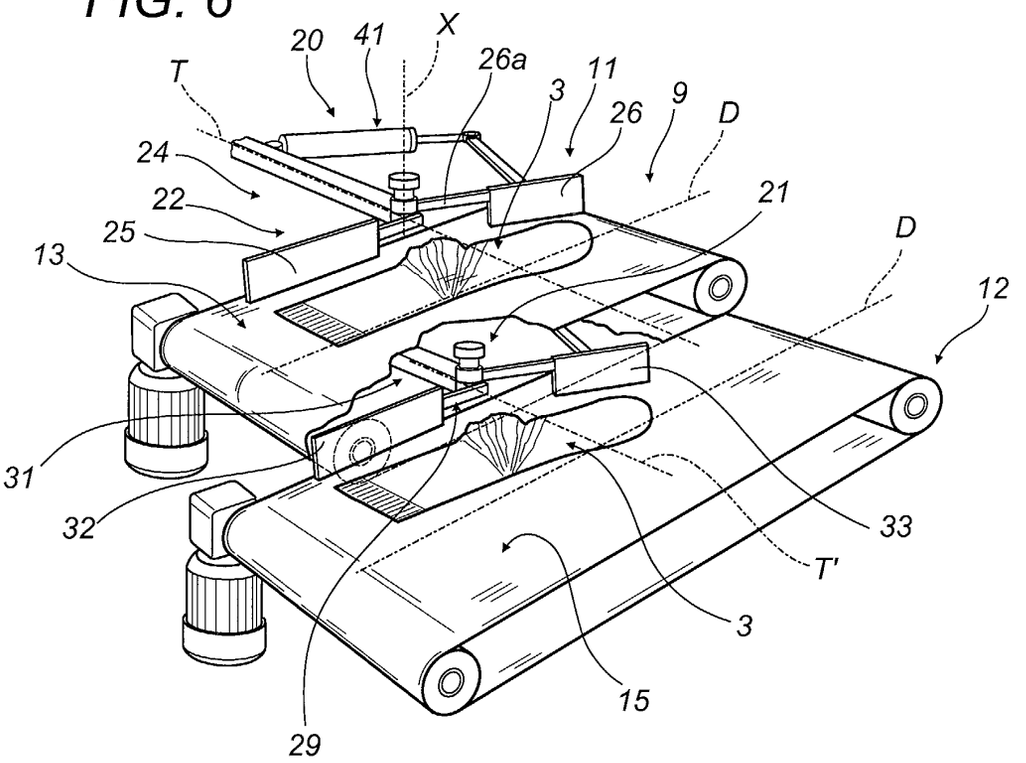
FIG. 6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31
32
33
T'
3
15
29

FIG. 7

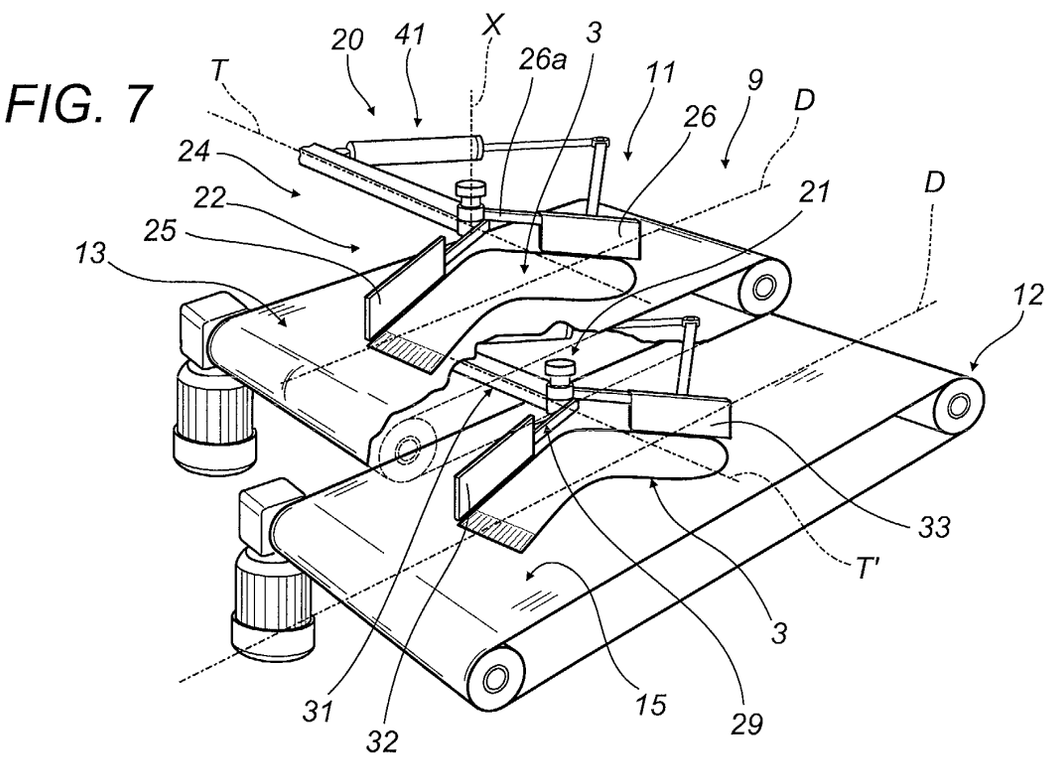

20
41
X
3
T
26a
11
9
D
26
24
22
21
D
25
13
12
33
T'
3
31
32
15
29

FIG.8

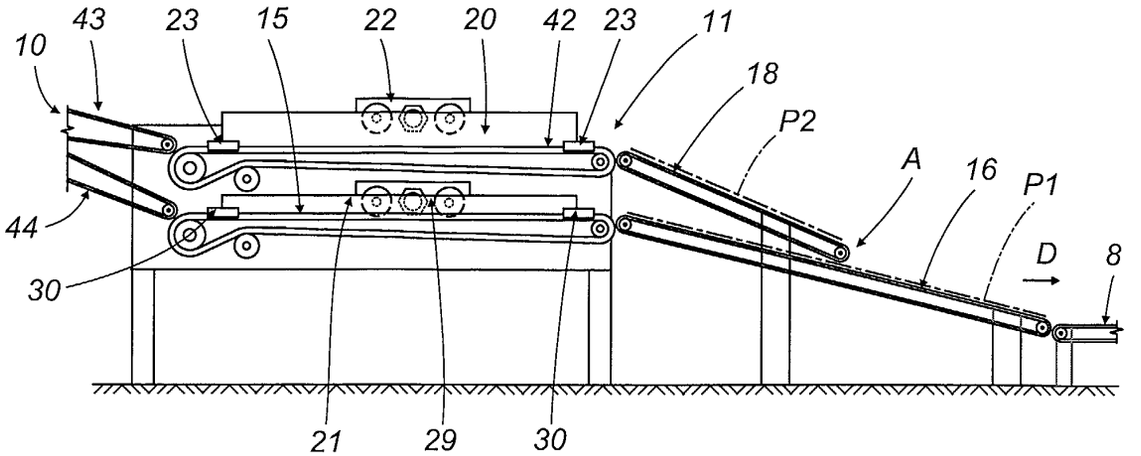


FIG.9

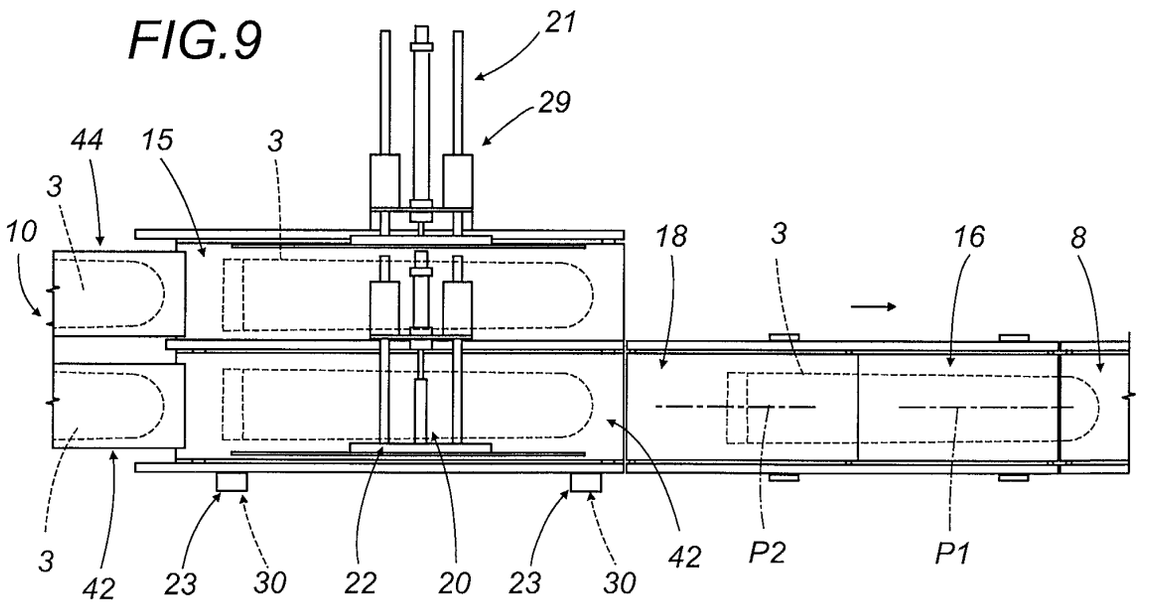
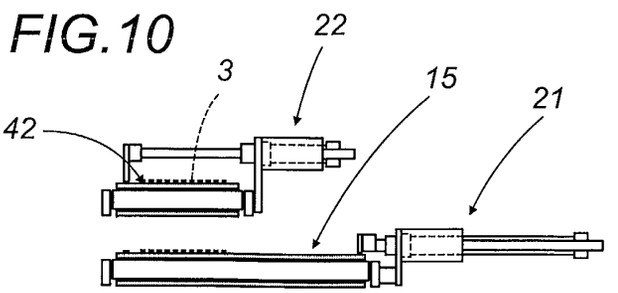


FIG.10



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EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5125

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			B65B D06H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 December 2002	Jagusiak, A

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