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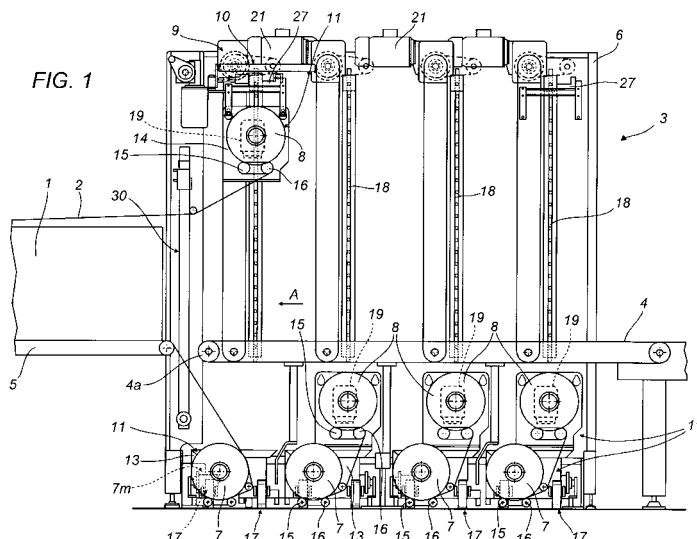
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(54) **Apparatus for packaging products with heat-shrink film**

(57) An apparatus for packaging products (1) comprises: a first conveyor (4) and a second conveyor (5) for transporting products (1) along a feed line (A); the first conveyor (4) is adjustable in length so that it can move towards and away from the second conveyor (5); a portal frame (6) positioned at the first conveyor (4) for mounting a plurality of pairs of rolls (7, 8); actuating means (9) for moving the rolls (7, 8) of a selected pair away from each other in a vertical direction for positioning a section of film (2) transversely to the feed line (A); means (10) for

guiding the selected film (2) and forming a broken-line configuration intercepted by the products (1); each roll (7, 8) is placed inside a respective bin (13, 14); each pair of bins (13, 14) containing a respective pair of rolls (7, 8) and being mobile, thanks to suitable means (17), between a working position in which the rolls (7, 8) are positioned under the first conveyor (4) and an idle position in which the pair of bins (13, 14) has moved in a direction (P) perpendicular to the feed line (A) to a position outside the space defined by the first conveyor (4) and the portal frame 6.



Description

[0001] The present invention relates to an apparatus for packaging single or grouped products with heat-shrink film. In particular, but without restricting the scope of the invention, the products may be parts of furniture units.

[0002] Prior art machines of this type come in two different constructional types: a first solution (see patents IT-1.273.200 and IT-1.273.201) comprises two consecutive infeed and outfeed conveyors, lying in the same plane, which transport the products in a defined feed direction and which are separated by a vertical sealing device.

[0003] A portal frame sliding in a direction parallel to the feed direction mounts at the top of it a plurality of heat-shrink film rolls arranged in pairs of different width. The pair of rolls used for wrapping the products is transported by the sliding portal frame to the wrapping area (that is, close to the film sealing device) and one of the rolls is then made to move below the product feed conveyor (thanks to the possibility of telescopically adjusting the conveyor). Once the film has been positioned vertically in this way, the products moving along the conveyor intercept the film and push it forward in such a way as to unwind it from the rolls and cause it to be drawn around the products as the latter continue moving forward.

[0004] A second solution, described in patent EP-939.031, unlike the first solution described above, comprises a fixed portal frame mounting the pairs of rolls at the top of it, and means for guiding the selected film positioned directly on the infeed conveyor.

[0005] In practice, depending on size, the infeed conveyor retracts as far as the selected pair of rolls. One of the rolls moves down until it is below the level of product feed and the conveyor then moves back to its working position close to the outfeed conveyor. As the conveyor moves forward, the film is tensioned by an overhead crossbeam supported by the end of the conveyor and a tensioning roller lower down associated with the end of the conveyor which together cause the section of film that will be intercepted by the products to be positioned vertically at the outfeed area in the vicinity of the sealing devices.

[0006] The solutions outlined above are not, however, free of disadvantages.

[0007] The first solution has a rather complex and costly structure comprised of a large number of components such as a power-driven frame, parallel rails, etc.

[0008] Further, in both solutions, changing the rolls positioned at the top of the portal frame is a troublesome task.

[0009] The machine has to be shut down even if only one pair of rolls has to be changed. Moreover, the rolls are located quite high up and when new, are very heavy, which means that changing them involves some risk and requires suitable lifting equipment (such as a hoist). The same applies to splicing the film web after the rolls have been changed. This operation, by which the free ends of

the new pair of rolls are joined is also carried out at the top of the portal frame.

[0010] Consequently, the above machine configuration makes changing the film rolls a slow, arduous and even dangerous task. Changing even just a single pair of rolls thus involves considerable machine down time. The present invention therefore has for an aim to overcome the above mentioned drawbacks through an apparatus for packaging products with heat-shrink film having a simple structure which is safe and practical not only during operation but also when changing the film rolls, without reducing productivity and flexibility.

[0011] According to the invention, this aim is achieved by an apparatus for packaging products with film and comprising the following: a first and a second conveyor for transporting products along a feed line; the first conveyor is equipped with an end section that is adjustable in length so that it can move towards and away from the second conveyor; a portal frame positioned at the first conveyor and designed to mount a plurality of pairs of rolls; actuating means for moving a selected pair of rolls away from each other in a vertical direction in such a way as to position a section of film transversely to the feed line; means for guiding the selected film so it forms a broken-line configuration that is intercepted by the products; a part of the portal frame located under the first, infeed conveyor, is equipped with housings for accommodating respective pairs of film rolls; one of the rolls in each pair is fitted with actuating means that move it away from the other roll and raise it towards the top of the portal frame, that is to say, to a position above the first conveyor.

[0012] The technical characteristics of the invention, with reference to the above objects, 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 to better illustrate others, of an apparatus according to the present invention for packaging products with heat-shrink film;
- Figure 2 is a schematic front detail view, with some parts cut away, showing a unit forming part of the apparatus of Figure 1;
- Figure 3 is a schematic top plan view, with some parts cut away in order to better illustrate others, showing a part of the unit of Figure 2;
- Figures 4 to 7 are schematic side views illustrating a succession of steps by which the film is prepared by the apparatus illustrated in the drawings listed above;
- Figure 8 is a schematic top view of a part of the apparatus illustrated in the drawings listed above. With reference to the accompanying drawings, in particular Figures 1 and 8, the apparatus according to the

invention, labelled 3 in its entirety, is used to package single or grouped products 1 with heat-shrink film 2.

[0013] In particular, but without restricting the scope of the invention, the apparatus 3 may be used to package products 1 consisting of parts of furniture units.

[0014] The apparatus 3 essentially comprises:

- a first and a second conveyor 4 and 5, lying in the same plane and designed to transport the products 1 along a feed line (indicated by the arrow A); the first conveyor 4, that is, the product infeed conveyor, is equipped with an end section 4a that is adjustable in length between a retracted position where it away from the end of the second, outfeed conveyor 5 (see Figure 4), and an advanced position where it is close to the second conveyor 5 (see Figure 5);
- a portal frame 6 positioned at the first conveyor 4 (when it is in the advanced position) and designed to mount a plurality of pairs of rolls 7 and 8 differing in width (in the embodiment illustrated by way of example, there are four pairs of rolls placed side by side, one after the other);
- actuating means 9 for moving the rolls 7, 8 of a selected pair away from each other in a vertical direction in such a way as to position a section of film 2 transversely to the feed line A when the first conveyor 4 is in the retracted position;
- means 10 for guiding the selected film 2 so it forms a broken-line configuration that is intercepted by the products 1 moving forward and when the first conveyor 4 is in the advanced position.

[0015] As shown in Figures 1 and from 4 to 7, a part of the portal frame 6 located under the first, infeed conveyor 4 is equipped with housings 11 for accommodating respective pairs of film 2 rolls 7 and 8.

[0016] In this "low" configuration each roll 8 of each pair 7 and 8 is fitted with actuating means 9 which move it away from the other roll 7 so that, when selected, the roll 8 is raised towards the top of the portal frame 6, that is to say, above the first conveyor 4.

[0017] As clearly shown in Figures 1 and 8, each roll 7, 8 fitted is mounted inside a respective bin 13 and 14, constituting the aforementioned housings 11.

[0018] Each bin 13 and 14 is equipped with a respective pair of mounting rollers 15 and 16 for supporting and unwinding the respective roll 7 and 8 itself.

[0019] In addition to this, each pair of bins 13 and 14 containing a respective pair of rolls 7 and 8 is mobile, thanks to suitable means 17, between a working position in which the rolls 7, 8 are positioned under the first conveyor 4 (see continuous line in Figure 8) and an idle position in which the pair of bins 13 and 14 has moved in a direction P perpendicular to the feed line A to a position outside the space defined by the first conveyor 4 and the portal frame 6 (see dashed line in Figure 8).

[0020] At a structural level, the pairs of bins 13 and 14

may comprise wheels 17 on the lower bin 13 for sideways movement, whilst the upper bin 14 rests on the lower bin 13 and is locked to it, for example, by pins housed in respective holes made in the lower bin 13: in this way, when the rolls 7, 8 of that pair are finished, the bins 13 and 14 can simply be pulled out to remove the depleted roll cores and fit the new rolls 7, 8.

[0021] Obviously, the forward and return movement of the bins 13 and 14 may be manual or power-assisted.

[0022] As shown in Figures 1, 2 and 3, each bin 14 containing the upper roll 8 of each pair 7 and 8 can be locked by respective bilateral pairs of carriages 27, to respective vertical guides 18 forming part of the portal frame 6 for moving the upper roll 8 in its bin 14 vertically up and down.

[0023] Further, each bin 14 containing an upper roll 8 is equipped with an independent motor 19 acting on the pair of rollers 15 and 16 for unwinding the film 2 when it is intercepted by the products 1.

[0024] Similarly, each lower roll 7 may be power-driven by a respective motor 7m acting on the pair of rollers 15 and 16 to properly unwind the film 2 when selected.

[0025] For driving each carriage 27 and hence the respective bins 14, the invention contemplates the provision of a kinematic drive system 20 (for example a transmission chain system) equipped with a motor 21 at the top of the portal frame 6, which together form the aforementioned actuating means 9. The aforementioned means 10 for guiding the film 2 (see also Figures 2 and 3), comprise at least one pair of rods 22 and 23 associated with a respective vertical drive carriage 27a, in particular with the carriages positioned at the zone of contact between the mobile end 4a of the first conveyor 4 and the infeed end of the second conveyor 5.

[0026] Each of these rods 22 and 23 is locked to a vertical axis Z and is driven about the axis Z by suitable means 24 (for example a cylinder) between an idle position in which the rods 22 and 23 are positioned parallel with the feed line A (see Figure 2 and the dashed line in Figure 3) and a working position in which the rods 22 and 23 are turned at least by an angle α and positioned transversally to the feed line A in such a way as to intercept the section of selected film 2 when the first conveyor 4 is in the advanced position.

[0027] The carriage 27a equipped with the guide means 10 has means 25 for engaging it with and disengaging it from the respective bin 14 containing the upper roll 8 so that the rods 22 and 23 can be lifted to the working position independently of the movement of the carriage 27: acting in conjunction with the mobile end 4a of the first conveyor 4, this forms a vertical section T of the broken-line configuration of the film 2 at the outfeed area of the portal frame 6.

[0028] For carriage 27 modularity, each of the carriages 27 and 27a in the apparatus 3 is fitted with the aforementioned means 25 for engagement with and disengagement from the respective bin 14.

[0029] By way of example, the means 25 may consist

of a pair of hooks 25a hinged to the support 27a of the carriage 27 and rotationally driven about a horizontal axis 25b (see Figures 2 and 3) by respective means 25c, such as, for example, a cylinder. The hooks 25a may be engaged in respective slots 14a made in the corresponding bin 14 below, so as to permit the vertical movement of the latter.

[0030] The numeral 30 in Figure 1 denotes a customary unit for cutting and sealing the film 2 wrapped around the product 1, positioned between the two conveyors 4 and 5 and downstream of the portal frame 6. This unit secures the film 2 around the wrapped product 1 before the latter enters a shrink tunnel which stabilises the package.

[0031] Figures 4 to 7 show how the film 2 is selected and prepared before the product to be packaged passes through.

[0032] First of all, the first conveyor 4 is retracted (see arrow F, Figure 4) to leave a gap through which the roll 8 can pass as it moves upwards.

[0033] Next, the carriages 27 of the selected roll 8 are actuated in order to raise the latter to its topmost position (see arrow F1, Figure 4).

[0034] At this point, the first conveyor 4 is advanced until it is close to the sealing and cutting unit 30 (see arrow F2, Figure 5). The movement of the first conveyor 4 causes the film 2 to be intercepted and pushed as far as the aforementioned area, the film 2 being unwound in the process, if necessary using the motors on the selected rolls 7 and 8.

[0035] Once this has been done, the rods 22 and 23 are rotated in such a way as to move into contact with the film 2 on both sides of the latter, in the vicinity of the sealing and cutting unit 30 (see Figure 6), whilst the carriage 27a that supports them is disengaged from the bin 14 below it by turning the hooks 25a.

[0036] Lastly the carriage 27a carrying the rods 22 and 23 is raised (see arrow F3, Figure 7), thereby forming the aforementioned vertical section T of film 2 to form a C-shaped broken line with the film 2 so as to allow the product 1 to intercept the film 2 correctly as it passes.

[0037] An apparatus made in this way achieves the preset aims thanks to an optimised and practical portal frame structure that does not unduly encumber the machine as a whole.

[0038] Placing the film rolls under the conveyor has undeniable advantages since, compared to prior art machinery of this kind, it is much easier, safer and quicker to change finished rolls of film without using special equipment.

[0039] Another indubitable advantage of mounting the rolls in a low position is that they can be changed without necessarily shutting down the apparatus: in practice the rolls can be changed in "masked time". Yet another advantage of the configuration of the apparatus according to the invention is that the portal frame structure as a whole is lighter, which means the apparatus is much safer to work with.

[0040] Furthermore, the apparatus according to the invention offers the same production quality and speed as prior art apparatus of the same kind.

[0041] The invention described has evident industrial applications and may 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 apparatus for packaging single or grouped products (1) comprising:

- a first and a second conveyor (4, 5), lying in the same plane for transporting products (1) along a feed line (A); said first conveyor (4) defining a product infeed conveyor and comprising an end section (4a) adjustable in length between a retracted position, away from the second conveyor (5), and an advanced position close to the second conveyor (5);
- a portal frame (6) positioned at the first conveyor (4) for mounting a plurality of pairs of rolls (7, 8) differing in width;
- actuating means (9) for moving the rolls (7, 8) of a selected pair away from each other in a vertical direction for positioning a section of film (2) transversely to the feed line (A) when the first conveyor (4) is in the retracted position;
- means (10) for guiding the selected film (2) in a broken-line configuration intercepted by the products (1) moving forward when the first conveyor (4) is in the advanced position; the apparatus (3) being **characterised in that**:
- each roll (7, 8) is placed inside a respective bin (13, 14), constituting housings (11);
- each pair of bins (13, 14) contains a respective pair of rolls (7, 8) and is mobile, thanks to suitable means (17), between a working position in which the rolls (7, 8) are positioned under the first conveyor (4) and an idle position in which the pair of bins (13, 14) has moved in a direction (P) perpendicular to the feed line (A) to a position outside the space defined by the first conveyor (4) and the portal frame 6.

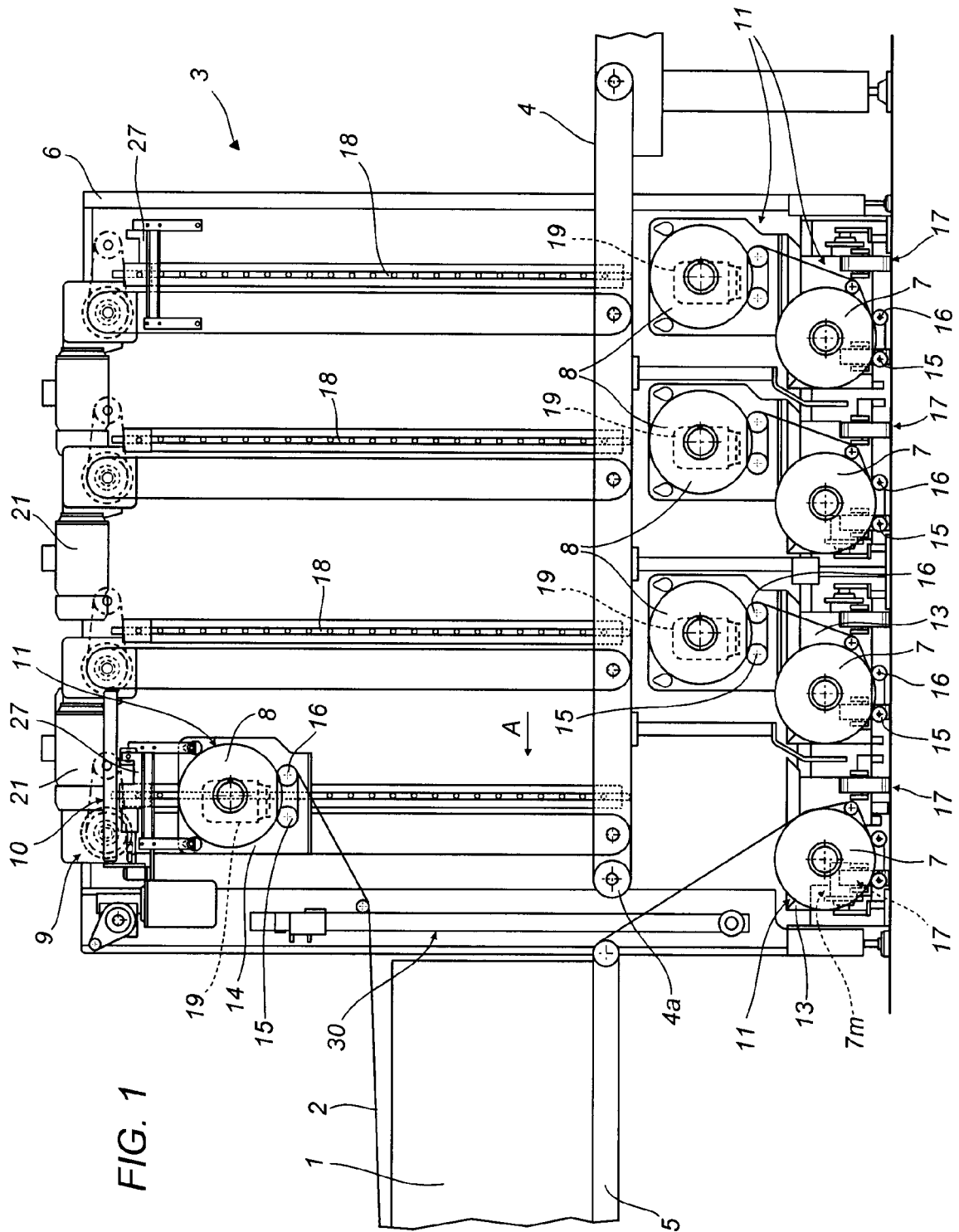
2. The apparatus according to claim 1, **characterised in that** one of the rolls (8) in each pair (7, 8) is fitted with the actuating means (9) which move it away from the other roll (7) so that when a pair of rolls (7, 8) is selected, the roll (8) **in that** pair is raised towards the top of the portal frame (6), that is to say, above the first conveyor (4).

3. The apparatus according to claim 1 or 2, **character-**

ised in that each bin (14) containing the upper roll (8) of each pair of rolls (7, 8) can be locked by respective bilateral pairs of carriages (27), constituting a part of the actuating means (9), to respective vertical guides (18) forming part of the portal frame (6) for moving the upper roll (8) in its bin (14) vertically up and down. 5

4. The apparatus according to claims 2 and 3, **characterised in that** each bin (14) containing an upper roll (8) is equipped with a motor (19) for unwinding the film (2). 10
5. The apparatus according to claim 3, **characterised in that** the actuating carriages (27) are connected to a kinematic system (20) equipped with a motor (21) at the top of the portal frame (6) and constituting another part of the actuating means (9). 15
6. The apparatus according to the foregoing claims from 1 to 5, **characterised in that** the means (10) for guiding the film (2) comprise at least one pair of rods (22, 23) associated with a respective vertical actuating carriage (27a) positioned at the zone of contact between the mobile end (4a) of the first conveyor (4) and the infeed end of the second conveyor (5); each of the rods (22, 23) being locked to a vertical axis (Z) and driven about the latter by suitable means (24) between an idle position in which the rods (22, 23) are positioned parallel with the feed line (A) and a working position in which the rods (22, 23) are turned at least by an angle (α) and positioned transversally to the feed line (A) in such a way as to intercept the section of selected film (2) when the first conveyor (4) is in the advanced position. 20
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7. The apparatus according to claim 6, **characterised in that** at least the carriage (27a) equipped with the guide means (10) has means (25) for engaging it with and disengaging it from a respective bin (14) containing an upper roll (8) so that the rods (22, 23) can be lifted to the working position independently of the movement of the bin (14) and so as to form, in conjunction with the mobile end (4a) of the first conveyor (4), a vertical section (T) of a broken-line configuration of the film (2) at the outfeed area of a portal frame (6). 40
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8. The apparatus according to claim 7, **characterised in that** each of the carriages (27, 27a) in the apparatus (3) is fitted with the means (25) for engagement with and disengagement from the respective bin (14). 50

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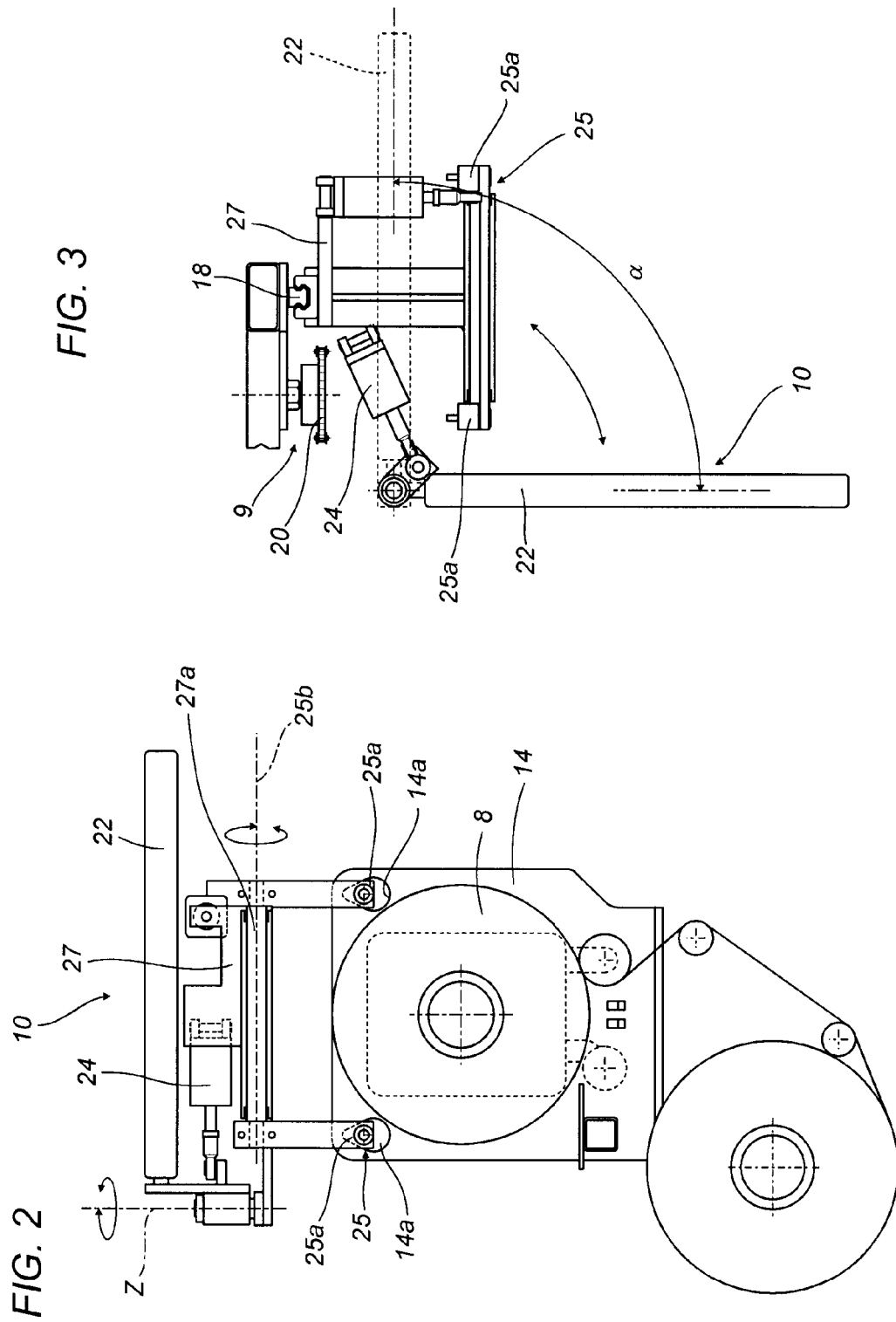


FIG. 4

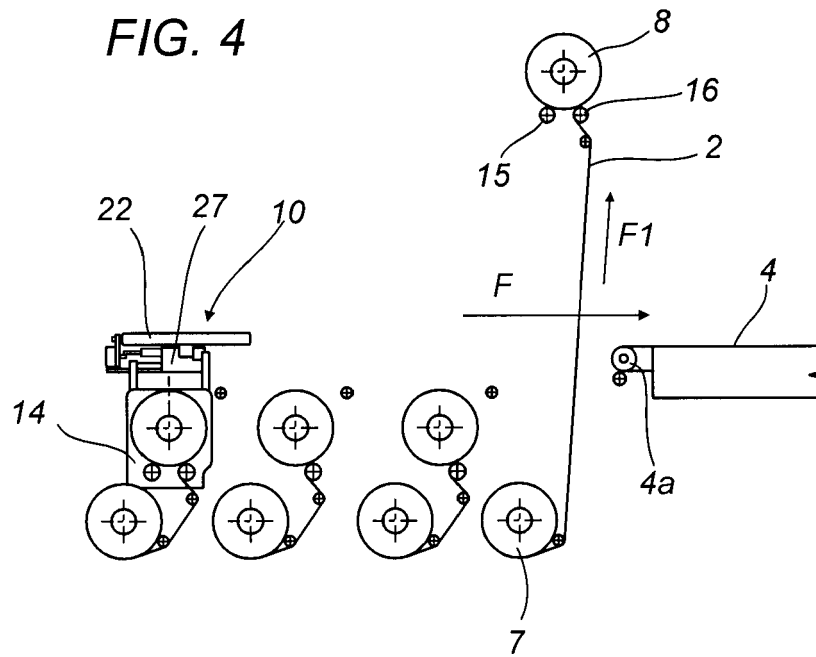


FIG. 5

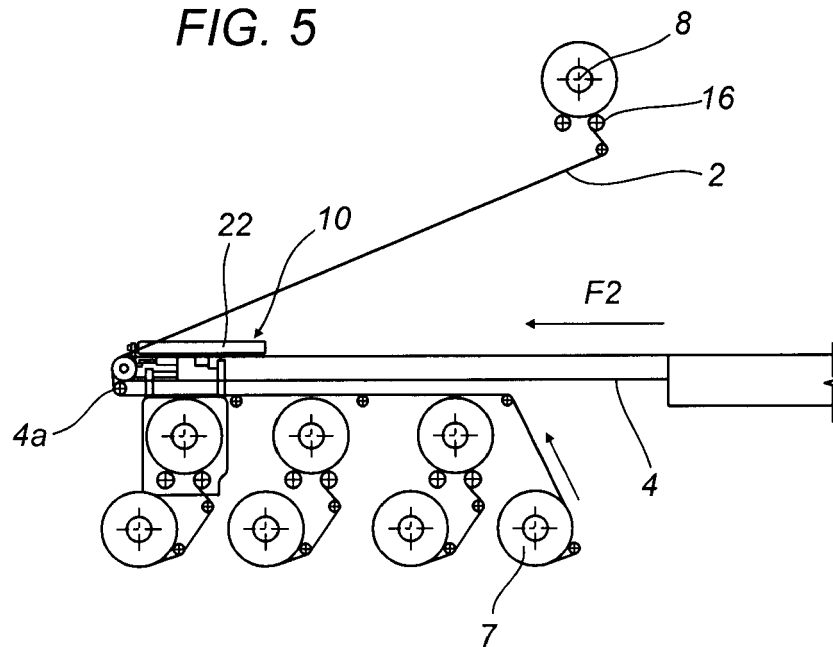


FIG. 6

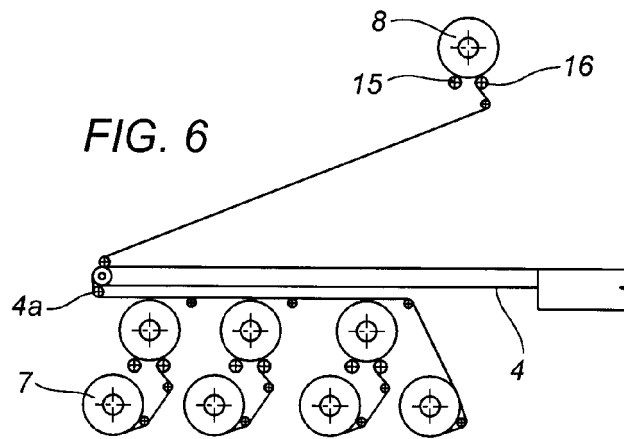


FIG. 7

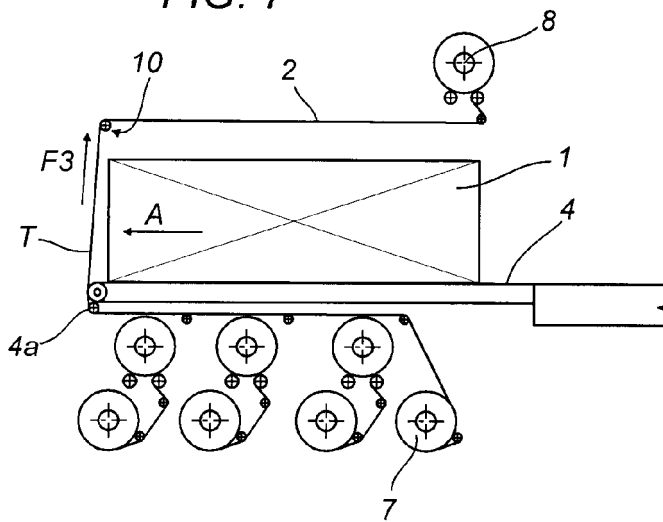
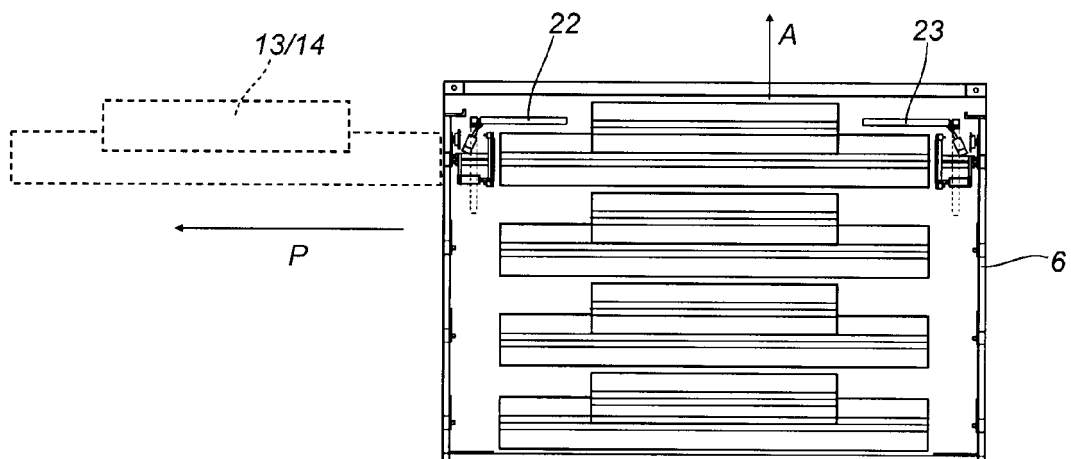


FIG. 8





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 3739

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		13 June 2006	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			

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

EP 06 11 3739

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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13-06-2006

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