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(54) Packeting plant, in particular for food products, comprising a plurality of mutually independent packeting lines.

(57) A food product (6) packeting plant of the type comprising a plurality of packeting lines (1), each line consisting of the following components arranged in series: first means (2) for conveying products one after another towards an entry station (3) which for each line comprises a guide (4) for bringing together the parallel major edges (5A) of a product packeting film (5), so as to continuously fold the film substantially into the form of a tube, the products being introduced into the tube-folded film by the first conveyor means, a longitudinal welding station (7) comprising meals (7A; 12) for welding the tube-folded film such as to join said edges together and for advancing the film and the products inserted into them, a film transverse welding station (11) for welding and cutting the film transversely between one product and the next, and means (16) for removing the thus packeted products from the transverse welding station. Said components of each line are independent of the components of the other line, the components being electronically controlled.

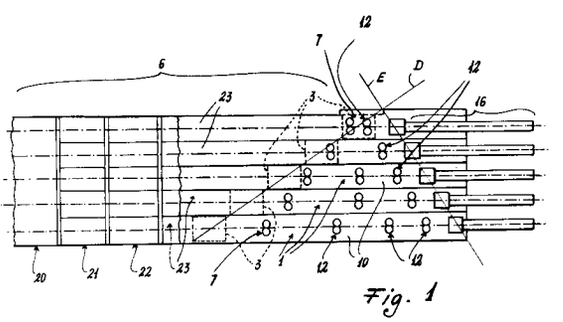

Fig. 1

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This invention relates to a food product packeting plant of the type comprising at least two packeting lines consisting of the following arranged in series: first means for conveying products one after another towards an entry station which for each line comprises a guide for bringing together the parallel major (longitudinal) edges of a packeting film for the products of each line so as to continuously fold the film substantially into the form of a tube, the products being introduced into the tube-folded film by the first conveyor means, a longitudinal welding station comprising means for welding the tube-folded film such as to join said edges together arid for advancing the film and the products inserted into them, a film transverse welding station for welding and cutting the film transversely between one product and the next, and means for removing the thus packeted products from the transverse welding station.

Plants of the aforesaid type are known comprising two parallel packeting lines containing a single transverse welding station common to the two lines. These also comprise common means for feeding the products and film to said station.

The most serious drawback of such plants is related to the fact that if one of the packeting lines has to be halted due to maloperation, for example because a product has remained wedged between the welding members of the transverse welding station, the operation of the other line also has to be halted, with serious consequences in terms of production time and cost. Such interruptions are relatively frequent in that the products have to be conveyed towards the welding station on both lines in phase with the movement of the common transverse welding member.

It should also be noted that products wedged in the welding station are not always easy to remove, in that being common to the two lines the station is relatively bulky and therefore access to the welding members, in particular those of the line more distant from the operator, is very difficult.

An object of the present invention is to provide a plant of the aforesaid type in which the components of the packeting lines and in particular the transverse welding stations are mutually independent, the stoppage of one packeting line therefore having no consequences for the other lines.

A further object is to provide a plant in which the components of all the lines are easily accessible to a single operator.

These and further objects which will be apparent to an expert of the art are attained by a device in accordance with the accompanying claims.

The present invention will be more apparent from the accompanying drawings, which are provided by way of non-limiting example and in which:

Figure 1 is a schematic view of a plant of the invention from above;

Figure 2 is a side schematic view of one of the plant packeting lines;

Figure 2A is a schematic section through a first detail of the plant taken on the line 2A/2A of Figure 2;

Figures 3 and 4 are two schematic perspective views of two different embodiments of the entry conveyor means of the plant of the invention;

Figure 5 is an enlarged perspective view from above of a second detail of the plant.

With reference to said figures, a plant according to the invention comprises a plurality of packeting lines 1 (Figure 1) (five are shown in the example) arranged mutually parallel and adjacent.

Each line comprises a plurality of components represented schematically on the accompanying figures and described hereinafter not in detail in that these components are of usual type and have long been used in single-line packeting plants. Each packeting line 1 comprises first conveyor means 2 (Figure 2) for conveying series-arranged products 6 to be packeted along a slide table 10 comprising a longitudinal slot 10A. At one end of said table 10 there is provided, in proximity to a terminal part A (Figure 2) of the first conveyor means 2, an entry station 3 comprising a guide or conveyor element 4 for bringing together the parallel longitudinal major edges 5A of a film 5 for packeting the products 6 of each line, such that the film is folded substantially in the form of a tube. As explained hereinafter, the film 5 is unwound by a roller positioned above the slide table 10. The products 6 fed by the first conveyor means 2 are brought to the entry station and guided into the tube-folded film. In series with the entry station 3 there is provided below the slide table 10 a longitudinal welding station 7 for the tube-folded film, comprising means 7A, 12 for joining together said edges 5A and for advancing the tube-folded film and the products contained in them.

A transverse welding and cutting station 11 is provided at that end of the table 10 distant from the entry station 3.

At the exit of the transverse welding station 11 there are provided usual second emit conveyor means 16 for removing the packeted products 6A front the welding station.

As shown in Figure 1, the slide tables 10 of the five packeting lines of the example have different lengths such that the line entry stations 3 and transverse welding stations 11 are mutually staggered along convergent straight lines D and E.

With reference to Figure 3, the first conveyor means 2 preferably comprise a first usual common conveyor belt 20, five retractable belts 21 (one for each line of the device), five pairs of variable-speed

bands 22 and five beds 23 with pawls 24 for driving the products 6.

The products 6 to be packeted are conventionally arranged on the belt 20 in parallel rows transverse to the belt, each row comprising twice the number of products (rank) than the number of packeting lines. From the belt 20 the products pass onto the retractable belts 21. These are of usual type and have a terminal portion 21A which can be retracted towards the belt 20. In this manner the products present on the retracted portion 21A and advancing along the belt 21 fall onto an underlying transverse evacuation belt 25 (partly shown). In this manner if one packeting line stops, the other lines can still be fed. Again, by means of the retractable belts any products incorrectly arranged on the belt 20 can be eliminated.

The bands 22A, B of each of the pairs 22 are driven at different speeds so that at the exit C of the bands the products which were initially paired are now mutually offset and in phase with the pawls 24 of the beds 23.

The pawls 24 are connected in conventional manner to two separate chains or similar drive members which at the exit C of the bands are substantially parallel to each other but converge in proximity to that end of the bed 23 closer to the line entry station 3, so that one product at a time is fed to said station.

The drive for the bands 22A, B and for the chains of the pawls 24 of the five lines is preferably common, said elements being connected to a single motor 31 (Figure 2) via suitable known transmission members. The transmission members of each line 1 comprise in particular a usual clutch member 31A (Figure 2) for example of electromechanical type, which enables the transmission members relative to the bands 22 and the chains of the pawls 24 of each line 1 to be connected to or disconnected from the motor 31.

The entry station 3 is provided at an end portion 23A of the bed 23, which centrally comprises the longitudinally moving pawls 24 for advancing the products to be packeted.

At that edge of said end portion 23A facing the slide table 10 the bed comprises a triangular opposition piece 23B enabling the pawls to turn down. The conveyor 4 for the film 5 (shown dashed in Figure 5) is also positioned in correspondence with the end portion 23A of the bed 23 and comprises two pairs of substantially vertical spaced-apart opposing walls 4A, B inclined to the bed, and fins 4C for guiding the film longitudinal edges 5A.

The film arriving from above passes between the opposing walls of each pair 4A, B so as to be folded substantially in the form of an inverted U, the film edges 5A being brought together and conveyed into the slot 10A in the table 10 (see Figure 2A) by means of the guide fins 4C (schematically represented).

The film, folded as an inverted U by the walls of the pairs 4A, B, is hence made to assume a tubular form (as shown in Figure 2A) by the guide fins 4C.

The edges 5A of the tube-folded film engage the rollers 7A of the first welding and/or drive station (see Figure 2A). The products to be packeted are inserted into the tube-folded film by the pawls 24 (see Figure 2A).

In the illustrated example, the welding station 7 comprises two usual welding rollers 7A arranged such that they are in mutual contact at the slot 10A in the table 10 via the film edges 5A to be welded together (see Figure 2A). In this manner the rollers are able both to weld the edges 5A which are passed through the slot 10A and into the contacting region between the two rollers, and to advance (in the direction of the arrow B, Figure 2) the film and the products contained in then, along the table 10 towards the transverse welding station 11. The station also comprises further means 12 for advancing the tubular film and the products contained in them. Said means each comprise pairs of rollers 12 similar to those of the welding station 7. It should be noted that the first rollers 7A could be arranged only to advance the tube-folded film and the products contained in them, and the next pairs of rollers 12 or only one pair thereof being arranged both to weld said opposing edges of the film together and to advance it. It should also be noted that if the slide table 10 is very short the rollers 12 may not be necessary. The drive for the rollers 7 and 12 is advantageously common, comprising a usual electric motor 13 connected to the rollers by usual transmission members 14.

The plastic film 5 is unwound from a reel (not shown) by motorized rollers (not shown) and is guided towards the entry station 3 by idle rollers (Figure 2). The motorized rollers are driven by a conventional motor controlled, as is usual, on the basis of signals originating from usual means for measuring the tension of the film fed to the entry station 3, said means being for example of floating roller type, and on the basis of the speed of the tube-folded film drive rollers 7A and 12 and of the pawls 24.

The transverse welding station 11 comprises two rotary welding members 11A (Figure 2) positioned one above the other such that the tubular film containing the food products can pass between the two members. The welding members 11A are of usual type, each comprising a radial welding bar 11B extending at least along the entire width of the tubular film. At each revolution of the welding members the bars 11B touch each other to transversely weld and rut the tubular film present be-

tween the two bars. The welding members 11A are driven by a usual motor 15 connected to the members by conventional transmission members 15A, for example gearwheels.

It should be noted that the rotary movement of the welding members 11A is mechanically independent of the other components of the device, this movement comprising two distinct stages, namely a first stage synchronous with the advancement of the film, during which this latter is welded and cut to obtain a packet, and a second stage which is non-synchronous such as to bring the welding members again in contact with the film after this has advanced through a predetermined distance corresponding to the length of a packet.

The exit conveyor means 16 of the five packeting lines of the device are usual conveyor belts. Each belt is driven by its own motor 16A (Figure 2) connected to the belt via usual transmission members.

The advancement speeds of the belts 16 are different and related to the different distances between the entry stations 3 and transverse welding stations 11. In this manner, at a terminal portion (not shown) of the conveyor belts 16 the packeted products are arranged on all the belts side by side along rows transverse to the belts in one and the same position equidistant from a member (not shown) towards which the packeted products are fed.

With each conveyor means 16 of each line there is also associated a conventional station (not shown) for quality control of the product packeting and for expulsion of any unacceptable products and/or empty packets.

The aforedescribed components of the five lines are controlled by a control unit preferably of microprocessor type (a type conventional to the expert of the art) which receives as input the signals from a plurality of sensors. In particular, the entry conveyor means 2 comprise a first encoder 30 associated with the motor 31 for driving the bands 22 and chains with which the pawls 24 are associated and a first sensor 32 for sensing the position of the pawls 24 associated with the conveyor means 2 and arranged to drive the products to be packeted towards the entry station 3.

Upstream of this latter there is a second sensor 33 for sensing the presence of a product on one of the pawls 24. A third sensor 34 is positioned at the plastic packeting film before this enters the entry station 3. The sensor 34 is arranged to sense the position of any writing or figures on the film.

A second encoder 35 is associated with the motor 13 which drives the rollers 7A, 12. Upstream of the transverse welding station 11 there is positioned a sensor 36 which senses the position of the products to be packeted relative to the station itself. An encoder 37 is associated with the motor 15 which drives the welding members. Finally, a sensor 38 senses the position of the welding members themselves.

On the basis of the signals from said sensors the control unit controls the movement of the entry conveyor 2 and exit conveyor 16, the movement of the motorized roller for advancing the plastic film 5, the movement of the welding rollers 7A and dragging rollers 12 and the movement of the welding members 11A of the station 11. The main movement is that of the pawls 24, the position of which is determined moment by moment by the encoder 30 and sensor 32. This latter triggers all the functional and control checks, while the encoder determines the control timing. The motor 13 for the rollers 7A, 12 is started if the sensor 33 senses the presence of a product on the pawls to be packaged, its speed being correlated with the required package length on the basis of the signals from the sensor 34. The signals from this latter sensor arid the consequent speed regulation of the motor 13 ensures that the final packet has centered printing.

At each revolution of the welding members 11B the plant control unit also compares the position of these latter with that of the pawls 24, to enable the film to be welded and cut transversely between one product and the next. If the pawl chain halts because of uncoupling of the member 31A or because of the absence of a product in the tubular film, this absence being sensed by the sensor 33, the rollers 7A and 12 stop in a coordinated manner, ready to start again as soon as a new product is sensed or the movement of the pawl chain recommences. This function, which means that empty packets are not produced, leading to considerable saving in wrapping material, is achieved because of the independent movement of each welding member of each line.

It should also be noted that if the sensor 36 senses incorrect positioning of the product within the tubular film the welding members 7B are not rotated, so preventing possible line blockage.

Furthermore, the staggered arrangement of the entry station 3 and transverse welding station 11 along convergent straight lines (D and E, Figure 1) allows full operability and accessibility of all the components of the five lines by a single operator. In addition, each of the five packeting lines operates individually, so that each line can be halted without compromising the operation of the others.

Figure 4 shows a modified embodiment of the described entry conveyor means 2 (those parts common to the preceding embodiment are indicated by the same numbers as used in Figure 3). A device according to the modified embodiment again comprises five packeting lines (not shown in Figure 4), of which however only four can be si-

multaneously fed. In this respect the entry conveyor means 2 comprise upstream of the belt 20 four retractable belts 21 able to convey the products towards four of the five packeting lines by way of four belts 40 rotatable in the plane in which the belts 21 lie, and bands 22. One of the packeting lines of the device therefore remains inactive and ready to use when one of the operating lines has to be halted.

The rotatable belts 40 travel about an idle roller and a motorized roller which are connected conventionally to a frame which in proximity to the retractable part 21A of the belts 21 comprises a pin connected to a drive member for rotating (in the direction of the arrow F, Figure 4) the frame and hence the belt 40 (said rollers, the frame, the pin and the drive member are not shown as they are conventional to the expert of the art).

Finally, it should be noted that the illustrated embodiments are given by way of example and that numerous modifications are possible, all falling within the same inventive concept.

Claims

1. A food product packeting plant of the type comprising at least two packeting lines consisting of the following components arranged in series: first means for conveying products one after another towards an entry station which for each line comprises a guide for bringing together the parallel major longitudinal edges of a packeting film for the products of each line so as to continuously fold the film substantially into the form of a tube, the products being introduced into the tube-folded film by the first conveyor means, a longitudinal welding station comprising means (7A; 12) for welding the tube-folded film such as to join said edges together and for advancing the film and the products inserted into them towards a film transverse welding station for welding and cutting the film transversely between one product and the next, and means for removing the thus packeted products from the transverse welding station, characterised in that each packeting line (1) comprises its own entry station (3), its own station (7; 12) for longitudinally welding and advancing the film and the products contained in it, and its own transverse welding station (11), said components of each line being independent of the corresponding components of the other line, the operation of each line therefore being independent of that of the other line, said components being electronically controlled.

2. A device as claimed in claim 1, characterised in that the transverse welding stations (11) of the packeting lines are positioned in staggered formation.

3. A device as claimed in claim 1, characterised in that the entry stations (3) of the packeting lines are positioned in staggered formation.

4. A device as claimed in claim 1, characterised in that the entry station (3) and transverse welding station (11) of each packeting line are positioned at the opposite ends of a slide table (10), the slide tables of the various lines being of different lengths.

5. A device as claimed in claim 4, characterised in that the entry stations (3) and welding stations (11) are arranged staggered and lie along substantially converging straight lines (D, E).

6. A device as claimed in claim 1, characterised in that each line has its own conveyor means (2) and its own product removal means (16), these being mutually independent.

7. A device as claimed in one of the preceding claims, characterised in that the means (16) for removing products from the transverse welding stations (11) of each line have mutually different speeds.

8. A device as claimed in one of the preceding claims, characterised in that the conveyor means (2) are connected via transmission members to a single motor (31), the transmission members for the conveyor means of each line comprising a clutch member (31A), so as to be able to selectively interrupt the movement of said means of each line.

9. A device as claimed in one of the preceding claims, characterised in that the conveyor means of each line comprise at least one movable part (40) so as to be able to convey the products either towards a first line or towards a second line adjacent to the first.

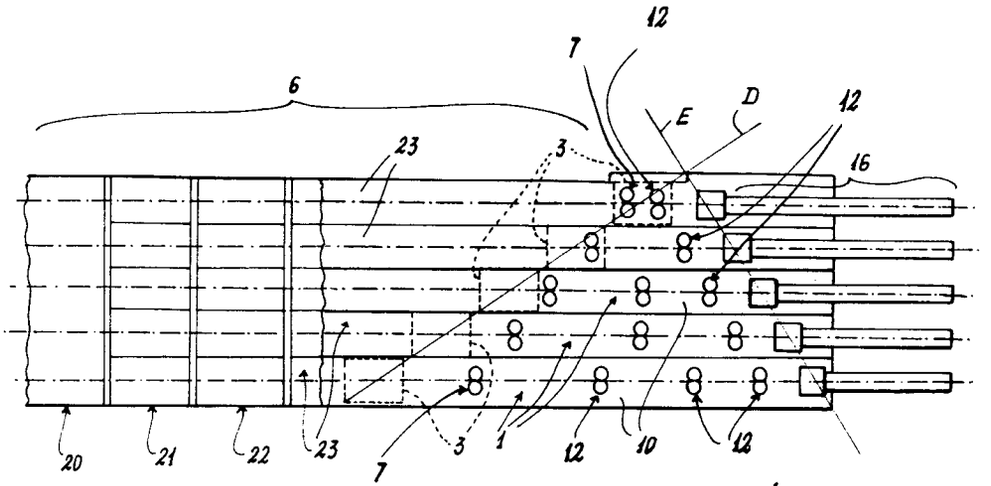

Fig. 1

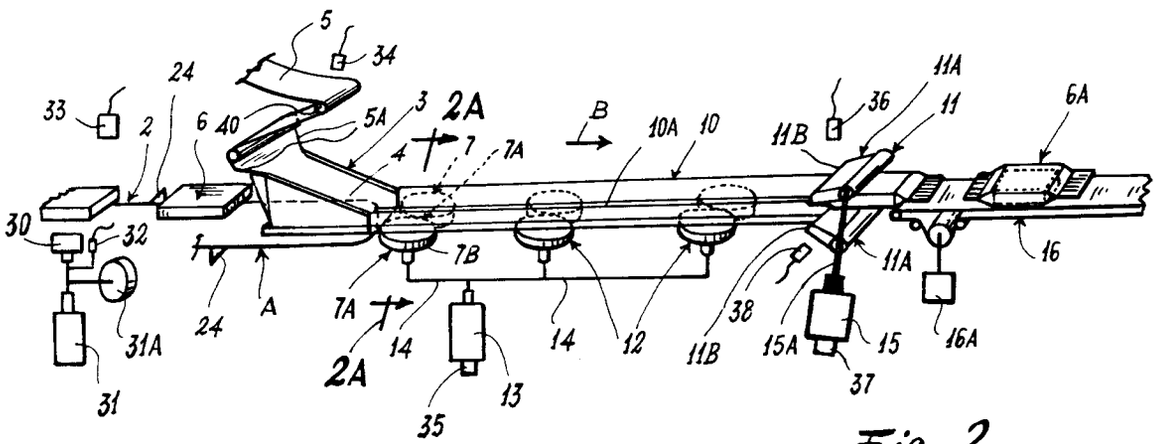

Fig. 2

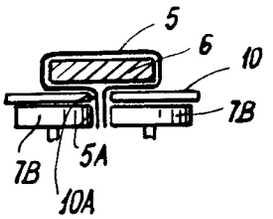

Fig. 2A

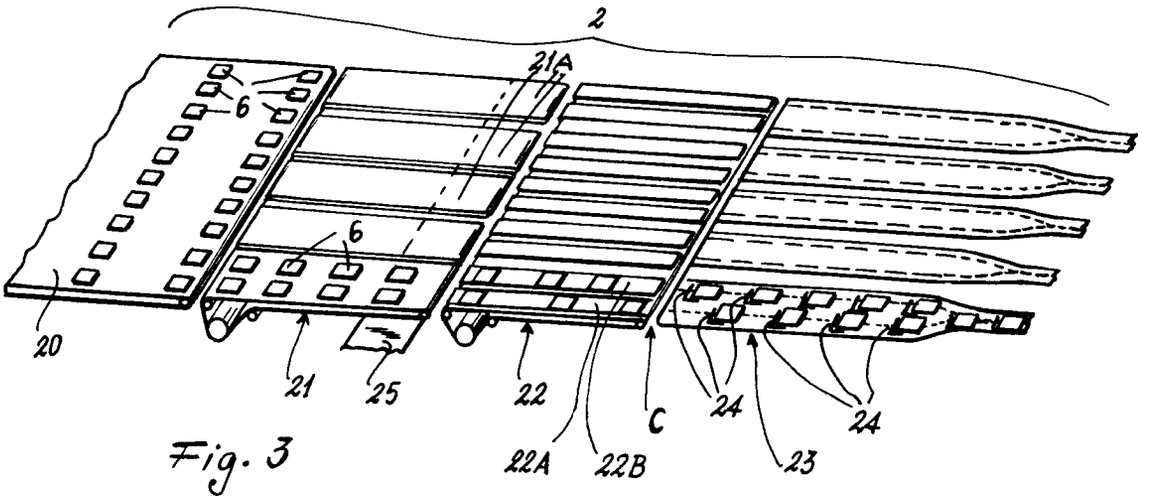

Fig. 3

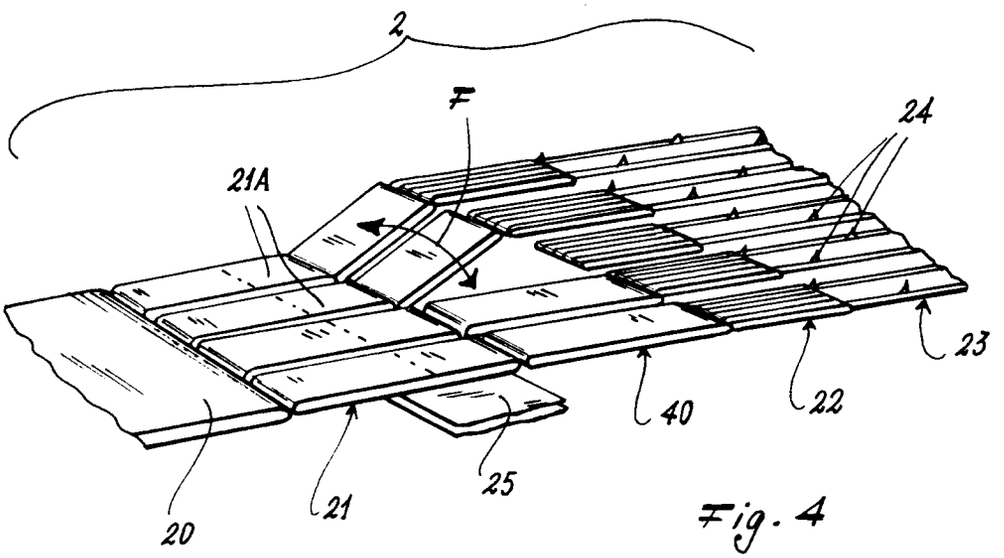

Fig. 4

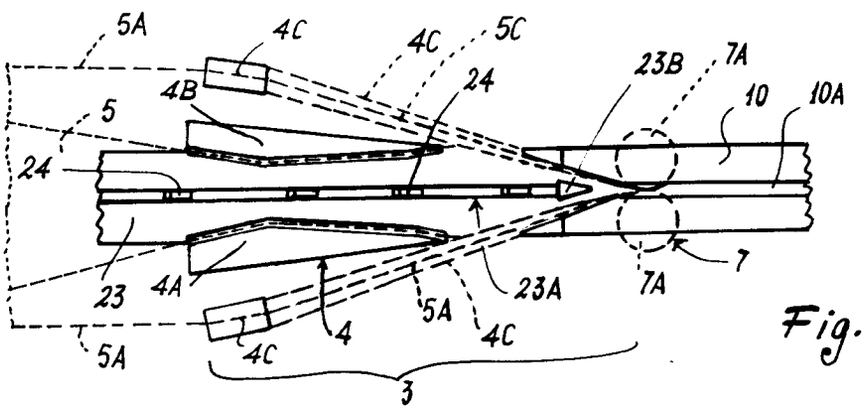

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 6113

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.5)
Y	US-A-4 370 844 (DEGN) * column 4, line 16 - line 42; figure 1 * ---	1	B65B9/06
Y	GB-A-2 015 458 (SIG) * abstract; figure 1 * * page 2, paragraph 2 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 August 1994	Claeys, H

CATEGORY OF CITED DOCUMENTS

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