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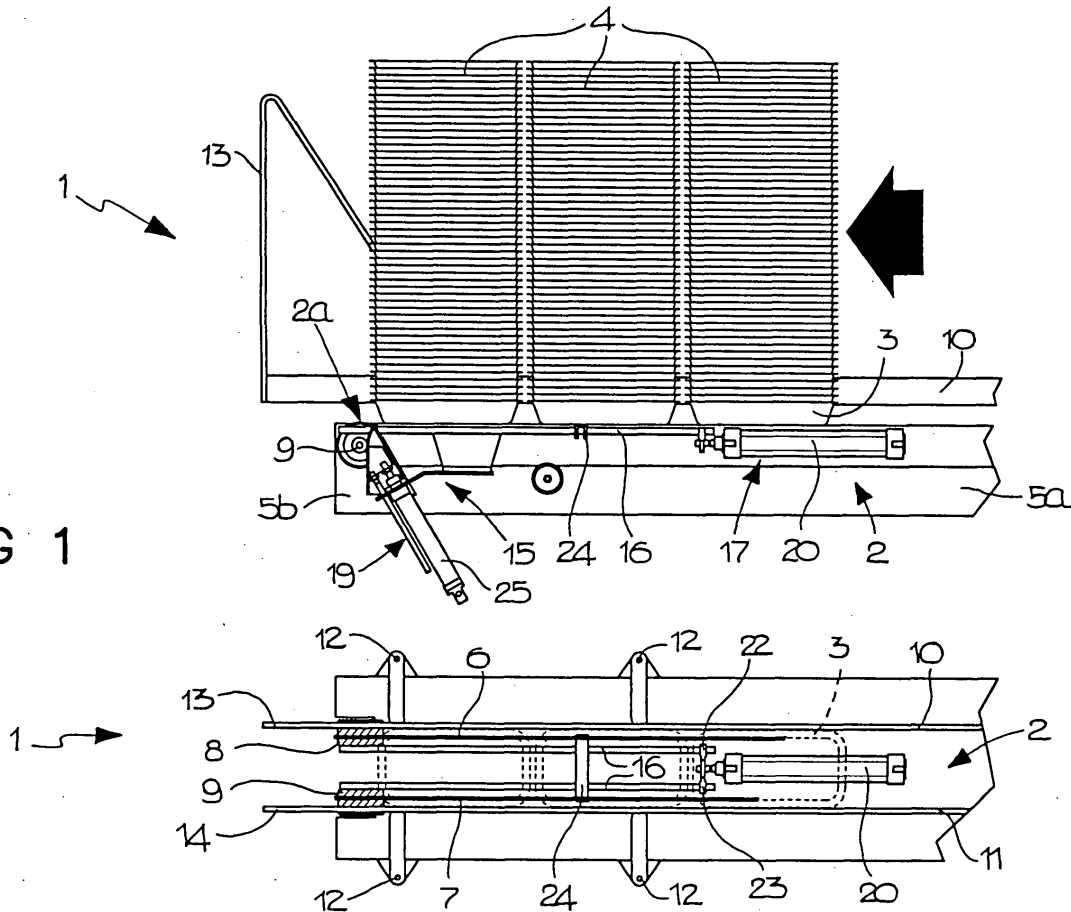
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(54) **Feeder for trays**

(57) A feeder for trays packed in vertical stacks, comprising a conveyance line (2a) with belts (6, 7) that has, at its output, a subsequent station where the stacks

(4) are deposited, and further comprising support, transfer and retention means (15) that are adapted to support the base of each one of the stacks (4) as they leave the conveyance line (2a).

FIG 1



Description

[0001] The present invention relates to a feeder for trays.

[0002] In the particular field of food packaging, it is known to use trays, made of the most different materials, in which foods are placed and then sealed.

[0003] With the diffusion of automation in this field, feeders are widely used which usually convey the trays in a plurality of vertical stacks from one processing station to the next: the feeder often positions each stack of trays, one stack after the other, in a holding area, from which they are then removed to be transferred to further stations.

[0004] In known types of feeders, the stacks are generally conveyed on a horizontal line that is preferably constituted by belts being closed in a loop and wound around pulleys. Such feeders have a drawback related to the positioning of the stacks in the holding station at the output of the line: when a stack arrives at the output and leaves the belts, it tends by gravity to break up or tip, arranging itself incorrectly in the holding station and making it difficult to transfer the trays toward the subsequent processing stations.

[0005] The aim of the present invention is to obviate this drawback by providing a feeder that allows to deposit the stacks of trays correctly and tidily at the output, thus facilitating transfer to the subsequent processing stations.

[0006] Within this aim, an object of the present invention is to provide a feeder that is versatile and flexible, i.e., adapted to transfer effectively, from one station to the next, stacks of trays having different shapes and dimensions.

[0007] Another object of the present invention is to provide a structure that is simple, relatively easy to provide in practice, safe in use, effective in operation, and relatively low in cost.

[0008] This aim and these and other objects are all achieved by the present feeder for trays packed in vertical stacks, comprising a conveyance line with belts that has, at its output, a subsequent station where said stacks are deposited, characterized in that it comprises support, transfer and retention means that are adapted to support the base of each one of said stacks as they leave said conveyance line.

[0009] Further features and advantages will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a tray feeder according to the invention, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a plan view and a side elevation view of the feeder in a first step of operation, in which the stacks of trays advance in succession on the conveyance line;

Figure 2 is a plan view and a side elevation view of

the feeder in a second step of operation, in which the leading stack of trays has partially left the line and is supported by the support and transfer means;

Figure 3 is a plan view and a side elevation view of the feeder in a third step of operation, in which the stack of trays is pushed off the conveyance line;

Figure 4 is a plan view and a side elevation view of the feeder in a fourth step of operation, in which the stack of trays is transferred to the holding station to be subjected subsequently to further processes.

[0010] With reference to the figures, the numeral 1 generally designates a tray feeder according to the invention.

[0011] The feeder comprises a frame 2 that is provided with means for continuously actuating rotationally a conveyance line 2a with belts for trays 3, which are packed into a plurality of vertical stacks 4 and are conveyed between an input 5a and an output 5b; at the output 5b of the conveyance line there is a subsequent station for depositing the stacks, which are then meant to be transferred and subjected to other processes.

[0012] The conveyance line 2a comprises at least two parallel belts 6 and 7, which are closed in a loop and form respective horizontal active upper portions, on which the stacks 4 are made to advance: said belts are wound, at the output 5b, around respective pulleys 8 and 9 that are coaxial one another.

[0013] At the sides of the belts 6 and 7 and parallel thereto, there are vertical shoulders 10 and 11 whose mutual distance can be adjusted for example by way of screw-type adjustment means 12 (in order to allow to convey trays of different sizes), that guide the translational motion of the stacks 4 and extend beyond the output 5b with respective substantially triangular vertical extensions 13, 14 that are adapted to prevent lateral movements of the stack to be arranged in the holding station.

[0014] According to the invention, the feeder comprises support, transfer and retention means 15 that are adapted to support the base of each one of the stacks 4 as it leaves the conveyance line 2a, preventing such stack from breaking up or tipping. The support, transfer and retention means 15 comprise two horizontal bars 16, which are parallel to the belts 6 and 7, are comprised between said belts, and are mirror-symmetrical with respect to the longitudinal axis of symmetry of the feeder; the bars 16 are associated with means 17 for horizontal translational motion and can be actuated so as to advance from a retracted position to an extended position in which they protrude beyond the output 5b of the conveyance line 2a in order to support the base of each one of the stacks 4 as they leave said line. The bars 16 can further be actuated so as to perform a backward translational motion from the extended position to the retracted position during the deposition of the stack 4, so as to allow its descent by gravity.

[0015] The support, transfer and retention means 15 further comprise a pusher 18, which is associated with linear actuation means 19 and can move from a first position, in which it is located below the plane on which the stacks 4 are conveyed, to a second position, in which it is engaged in a rear region on the stack in order to apply thereto a thrust in the advancement direction: in this manner it is possible to obtain the correct exit of each stack 4 from the conveyance line 2a, since the resting of the base is ensured by the bars 16 in their extended position.

[0016] The means 17 for the translational motion of the bars 16 preferably comprise a first double-acting linear pneumatic actuator 20, which is rigidly coupled to the frame 2 of the feeder and acts in a direction that is substantially parallel to the advancement direction of the stacks 4. The stem 21 of the first pneumatic actuator 20 is connected to the centerline of a plate 22 that has, at its opposite ends, holes 23 for fixing the respective end portions of the bars 16. There is also a guide 24, which is rigidly coupled to the frame 2, for the support and sliding of the bars 16 from the retracted position to the extended position.

[0017] The means 19 for the linear actuation of the pusher 18 are constituted, in the specific case, by a second double-acting linear pneumatic actuator 25, in which the head 26 is rigidly coupled to a bracket 27 that is monolithic with the frame 2 and acts in a direction that is substantially inclined with respect to the horizontal advancement direction of the stacks 4: the tip of the stem 28 of the second pneumatic actuator 25 is rigidly connected to the pusher 18.

[0018] The pusher 18 is constituted by a front plate 29 and by a rear plate 30, which are connected one another along their respective upper edges and are rigidly coupled, in a downward region, to an L-shaped element 31 for fixing to the stem 28 of the second pneumatic actuator 25. The front plate 29 has a cambered convex profile that is adapted to apply, in the translational motion of the pusher, a forward thrust that has a component in a substantially horizontal direction to the rear of the stack 4 about to leave the conveyance line 2a. The end of a stiffening rod 32 is further fixed to the L-shaped element 31; said rod is parallel to the stem 28 of the second pneumatic actuator 25 and can slide within an opening 33 formed in the bracket 27 for connection to the frame 2.

[0019] Operation of the tray feeder according to the invention is as follows. Figure 1 illustrates the feeder in a step of operation in which the stacks 4 advance sequentially toward the output 5b, conveyed by the belts 6 and 7. In this step, the bars 16 are in a retracted position between belts 6 and 7, while the pusher 18 is in the first position below the plane of advancement of the stacks 4.

[0020] When a stack 4 approaches the output 5b, the first pneumatic actuator 20 moves the parallel bars 16 from the retracted position to the extended position, so

that they are inserted under the base of the stack 4 when such stack begins to protrude from the conveyance line 2a in order to leave it (Figure 2). At this point, the second pneumatic actuator 25 induces the pusher 18 to perform a translational motion from the first position to the second position (Figure 3): this motion, particularly thanks to the engagement of the front plate 29 of the pusher behind the stack 4, allows to achieve a further advancement of said stack, supported by the bars 16, until it leaves completely the belts 6 and 7 of the feeder. At this point the first pneumatic actuator can produce the reverse translational motion of the bars 16 from the extended position to the retracted position (Figure 4): this translational motion is facilitated by the presence of the pusher 18 in the upper position, said pusher thus constituting an abutment for the stack 4, preventing it from retracting together with the bars 16. The stack 4 can finally descend tidily into the holding station in order to be then subjected to subsequent processing.

[0021] The tray feeder according to the invention allows to transfer effectively and correctly stacks 4 of trays having different shapes and dimensions from one processing station to the next without the occurrence, particularly in the step for deposition of the stacks, of untidy or irregular arrangements that compromise the regular operation of the packaging line.

[0022] It has thus been shown that the invention achieves the intended aim and objects.

[0023] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0024] All the details may further be replaced with other technically equivalent ones.

[0025] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope protection of the appended claims.

[0026] The disclosures in Italian Patent Application No. BO2002A000385 from which this application claims priority are incorporated herein by reference.

[0027] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

50 Claims

1. A feeder for trays packed in vertical stacks, comprising a conveyance line (2a) with belts (6, 7) that has, at its output, a subsequent station where said stacks (4) are deposited, **characterized in that** it comprises support, transfer and retention means (15) that are adapted to support the base of each one of said stacks (4) as they leave said convey-

ance line (2a).

2. The feeder according to claim 1, **characterized in that** said belt-type conveyance line (2a) comprises at least two parallel belts (6, 7), which are closed in a loop and form a horizontal active upper portion for conveying said stacks (4) between two opposite shoulders (10, 11). 5

3. The feeder according to claims 1 and 2, **characterized in that** said support, transfer and retention means (15) comprise two horizontal bars (16) that are parallel to said belts (6, 7), can be actuated by translational motion means (17) so as to advance from a retracted position to an extended position in which they protrude beyond the output (5b) of said conveyance line (2a) in order to support said base of each one of said stacks (4) as it leaves, and can be actuated so as to perform a backward translational motion from said extended position to said retracted position during the step for depositing said stack (4), so as to allow the descent of said stack (4) by gravity. 10
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4. The feeder according to claim 3, **characterized in that** said support, transfer and retention means (15) comprise a pusher (18) that is associated with linear actuation means (19) and can perform a translational motion from a first position, in which it lies below the conveyance plane of said stacks (4), to a second position, in which it is engaged in a rear region on said stack in order to push in the advancement direction, allowing said stack (4) to leave said conveyance line on said bars (16), said pusher (18) constituting an abutment for said stack (4) during the backward translational motion of said bars (16) in order to allow the correct positioning of said stack (4) in said holding station. 25
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5. The feeder according to claim 3, **characterized in that** said translational motion means (17) comprise a first double-acting linear pneumatic actuator (20) that acts along a direction that is substantially parallel to the advancement direction of said stacks (4), its stem (21) being rigidly coupled to the centerline of a plate (22) that has, at its opposite ends, holes (23) for fixing said bars (16). 40
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6. The feeder according to claim 4, **characterized in that** said actuation means (19) comprise a second double-acting linear pneumatic actuator (25) that acts along a direction that is substantially inclined with respect to the advancement direction of said stacks (4) and in which the end portion of the stem (28) is connected to said pusher (18). 50
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7. The feeder according to claims 4 and 6, **characterized in that** said pusher is constituted by a front

plate (29) and by a rear plate (30), which are connected along their respective upper edges and are monolithic, in a downward region, with an L-shaped element (31) for fixing to the stem (28) of said second pneumatic actuator (25), said front plate (29) having a cambered profile that is adapted to apply a thrust that has a component in a substantially horizontal direction to the rear of said stack (4), so as to make said stack (4) leave said conveyance line (2a).

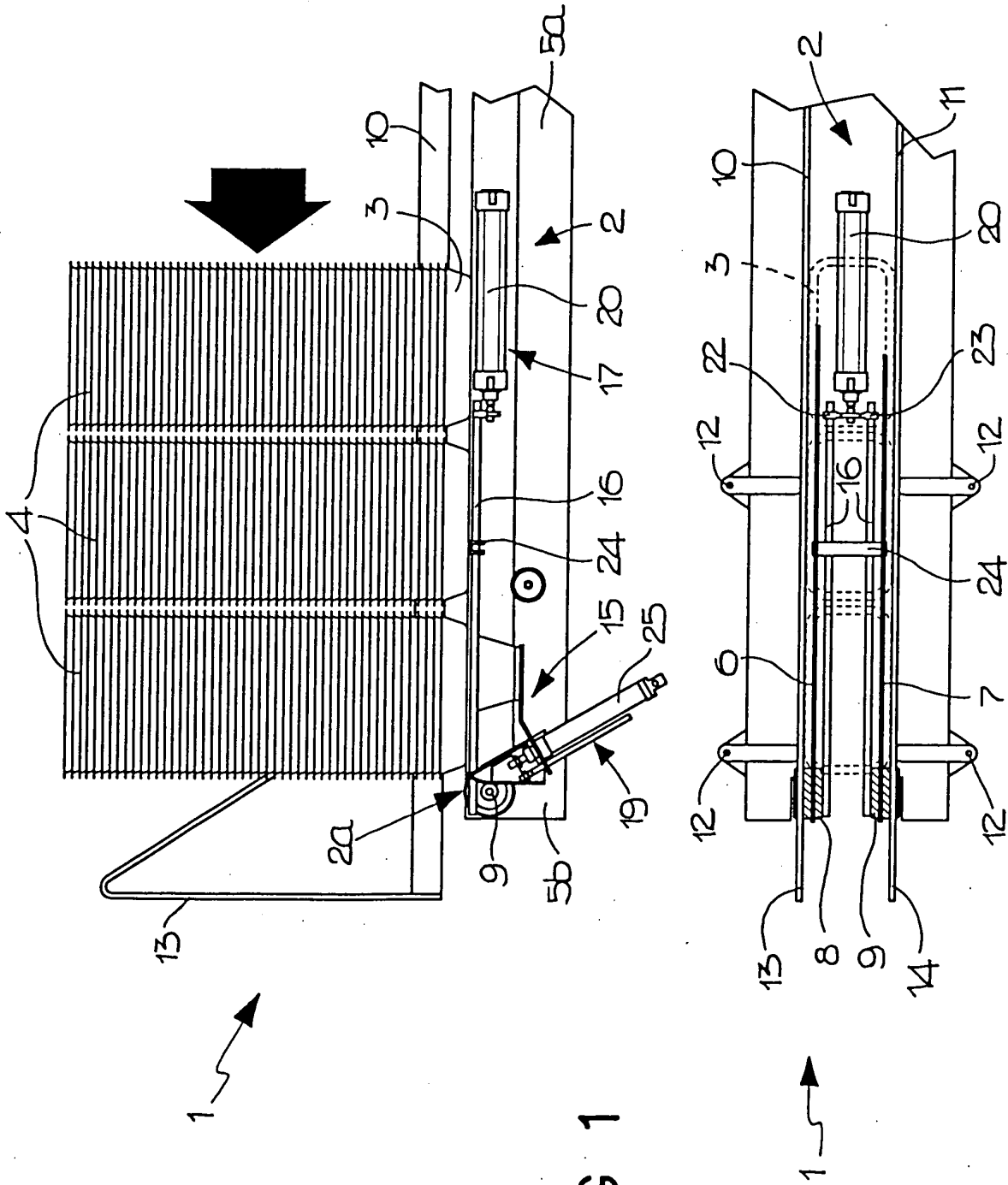


FIG 1

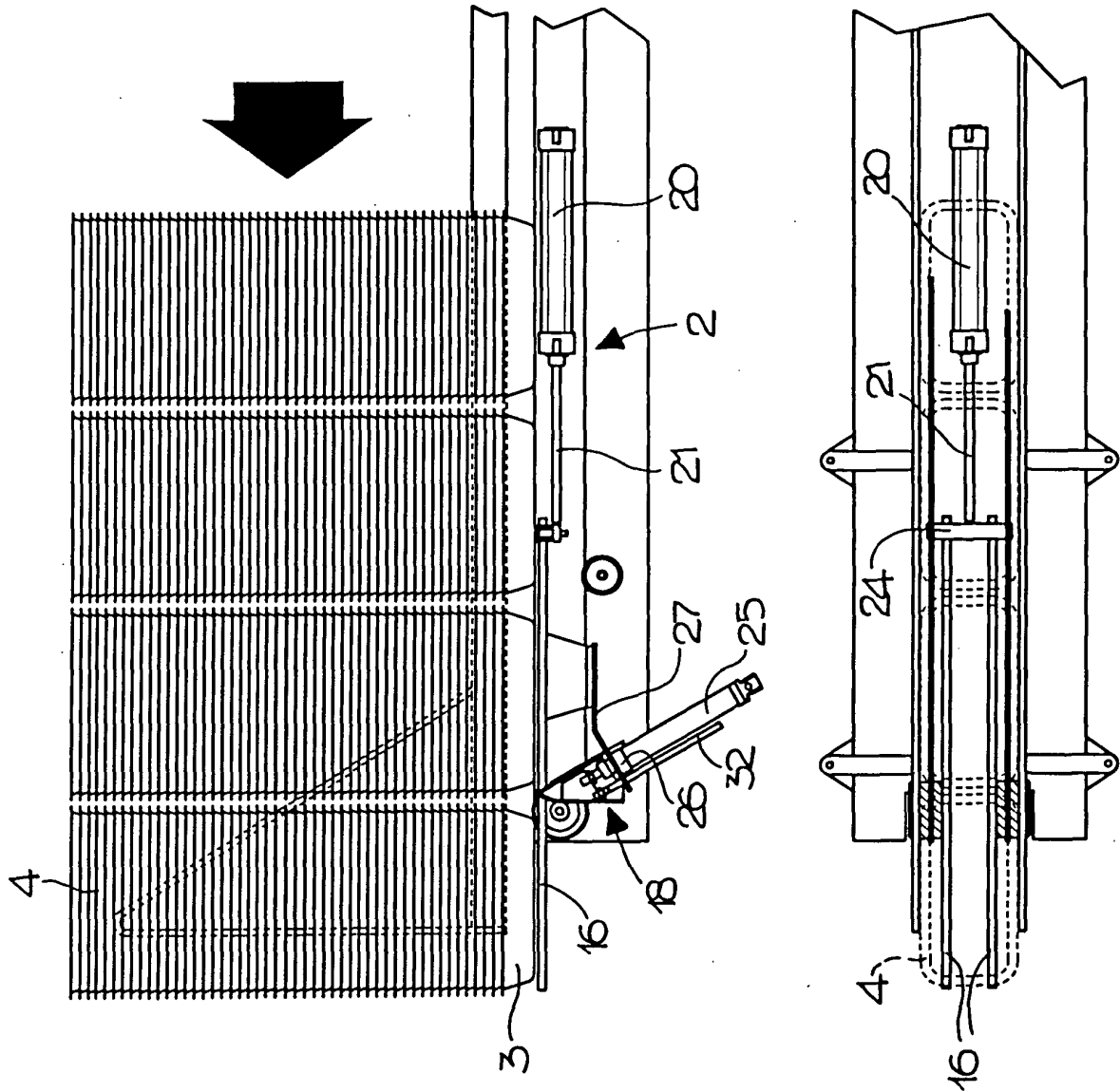


FIG 2

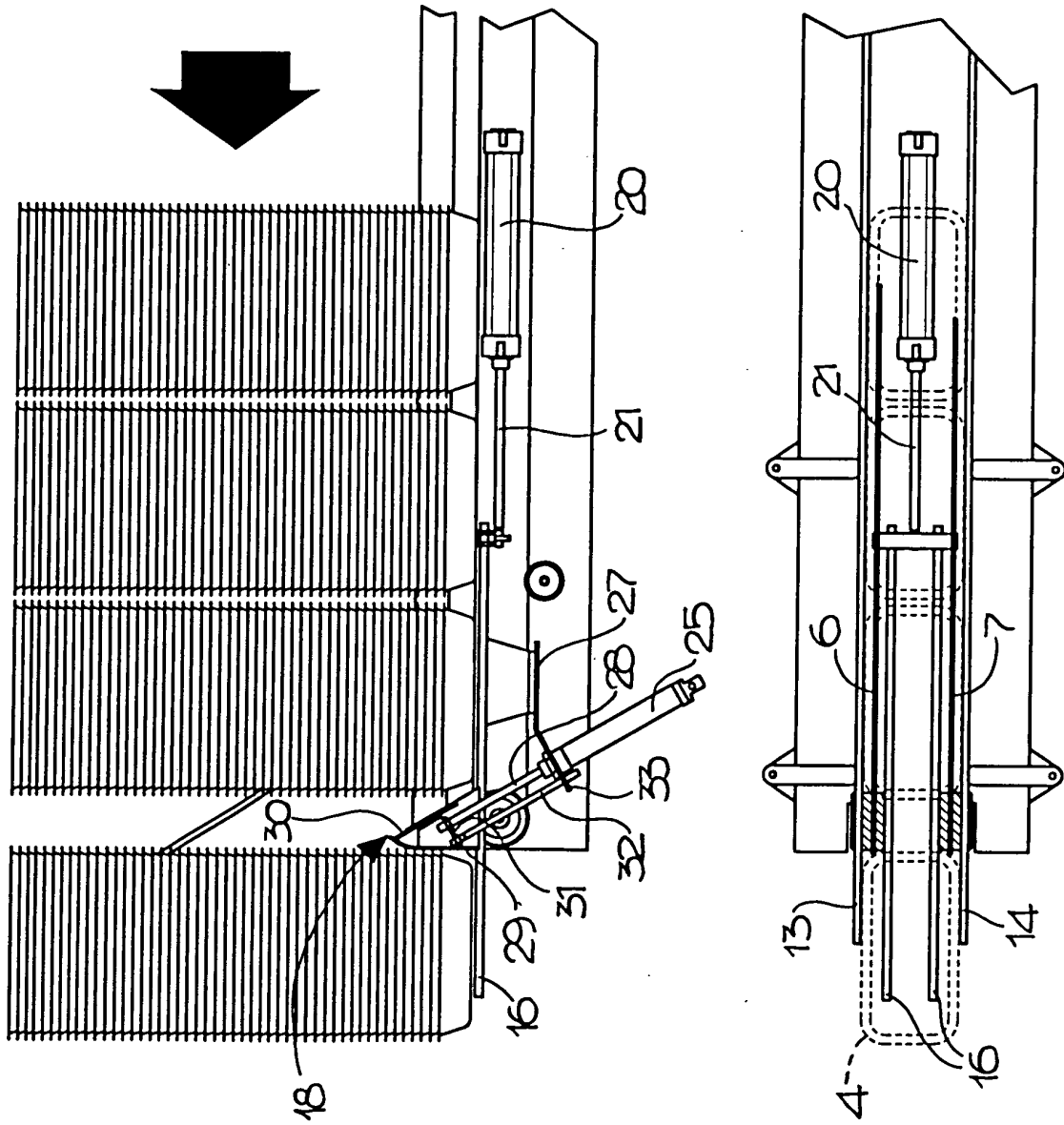


FIG 3

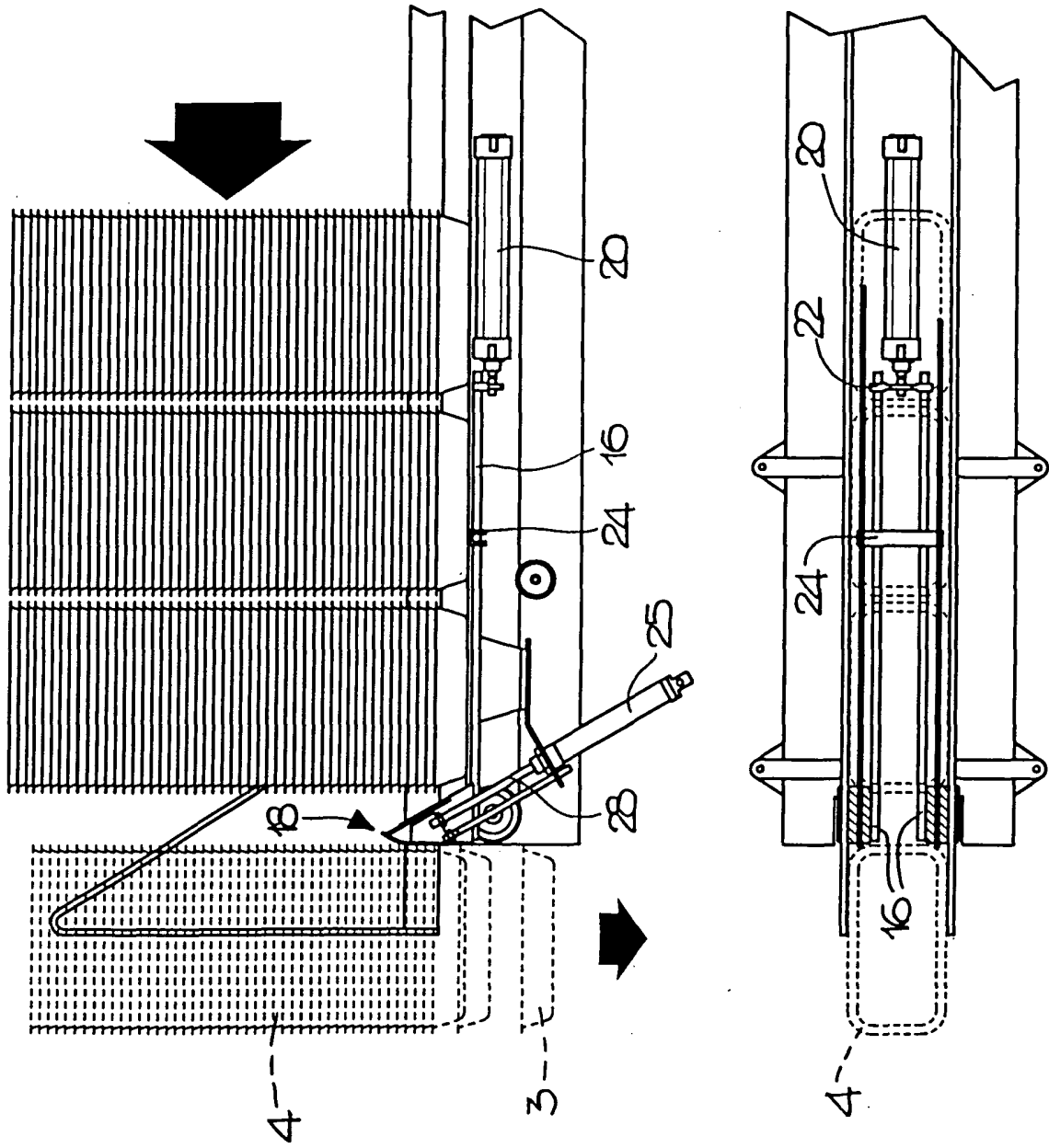


FIG 4



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EUROPEAN SEARCH REPORT

Application Number
EP 03 01 1193

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A	* column 5, line 13 - column 6, line 15; figures *	2,3		
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The present search report has been drawn up for all claims				
Place of search THE HAGUE		Date of completion of the search 15 October 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				

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