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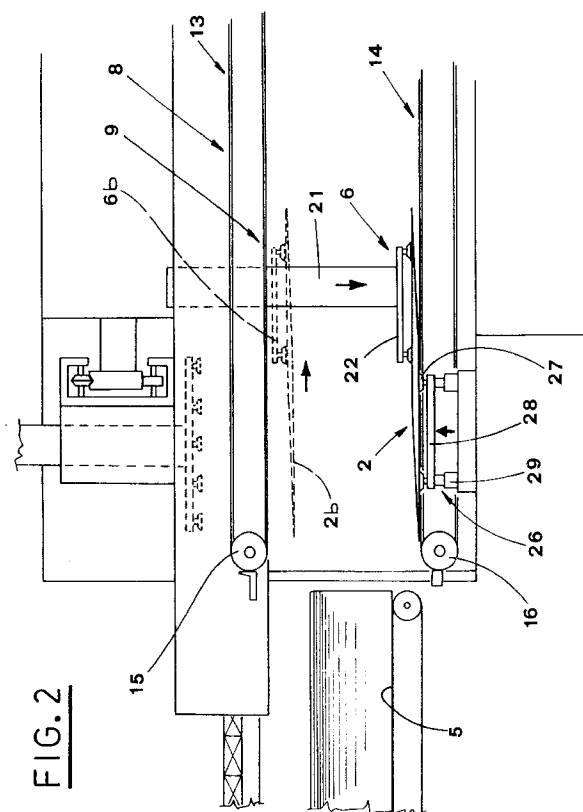
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(54) Device for collecting and erecting tubular blanks, in cartoning machines and the like

(57) A device for collecting and erecting tubular blanks (2) includes first collecting means (6) for removing each time a single tubular flat-folded blank (2) from the top of a stack (2a) of blanks (2), in the region of a collecting station (4). A robotic equipment (19) controls movement of the first collecting member (6) along two perpendicular axes, on a longitudinal vertical plane, in

order to transfer the blank (2) removed from the stack (2a) to a conveying line (8), in the region of a station (9), in which the blank (2) is erected. Second collecting means (26) are situated in the lower part of the erecting station (9) and keep a lower part of the blank (2), during a step in which the first collecting member (6) pulls upwards the opposite wall in order to form a container.

**FIG. 2**

Description

The present invention relates to packaging articles in carton containers which are obtained from tubular blanks.

These blanks feature suitable creasing lines that define lateral walls and flaps which form bottom and top of the containers.

Consequently, every blank is made of a sheet closed in a tubular form and folded in the regions of the creasing lines so as to define two overlapped parts; along an intermediate line, each of these overlapped parts features another creasing line parallel to the other ones.

There are machines for setting up or forming the said tubular blanks into corresponding containers with at least one end being left open for introduction of groups of articles therein.

According to the teachings of one of the known solutions, the blanks are removed one by one from the bottom of a stack situated in a magazine, and transferred to a setup station equipped with fixed suction cups that attach themselves to one wall of the blank; the opposite wall is held by movable suction cups, carried by a rotary cantilevered frame that causes the blank erection.

Simultaneously with the erecting operation, suitable folder members fold the opposite flaps of the container bottom through an arc of 90°.

This solution brings about constructive complications, since the said rotary cantilevered frame includes a combination of arms and levers articulated to one another in order to allow the best erection of the blanks and easy change-over operation in relation to different sizes of the blanks.

A considerable drawback of the above mentioned solution results from the fact that each working step takes place in a different station that is located far from other stations, and this leads to big dimensions and limited working speed of the apparatus.

Another known solution, disclosed in the US-A-4.414.789, uses suction elements as first collecting means, aimed at grasping the lowermost blank of the stack.

The blank is then set up by the above mentioned first collecting means cooperating in a first time with second collecting means, later with a strike arm and finally with third collecting means.

In order to be erected, the blank is transferred from a collecting station to an erection station, in which two lateral walls of the blank are simultaneously held perpendicular to each other by the first and third collecting means, thus causing stabilisation of the blank shape.

An object of that solution is to carry out all the steps i.e. blank erection, folding of the flaps defining the container bottom, introduction of regular groups of articles and finally, folding of the flaps defining the container top, in a single container forming station.

In still a further solution, disclosed in the IT-B-

1.221.531, the lowermost blank of the stack is collected by first collecting means equipped with suction cups carried by a rotary cantilevered frame.

Second collecting means, cooperating with these first ones, are carried by a second rotary cantilevered frame and erect the blank.

The said first and second collecting means hold two lateral walls of the container, that are maintained perpendicular to each other.

However, the above mentioned solutions are considerably complex from constructive and functional points of view.

A particular problem derives also from the fact, that at present the said blanks are preferably made of recycled cardboard which is not so elastic and therefore needs particular attention during the erecting step.

The object of the present invention is to propose a device that withdraws and erect tubular blanks to form containers in a very simple way, with a structure of limited dimensions and working with high speed.

The above mentioned object is obtained in accordance with the contents of the claims.

The characteristic features of the present invention are pointed out in the following description with reference to the enclosed drawings, in which:

- Fig. 1 shows a schematic lateral view of the device for collecting and erecting tubular blanks, mounted on a cartoning or the like machine;
- Figs. 2 and 3 show the same lateral view of the subject device, in subsequent working steps;
- Fig. 4 shows a cross section of the device taken along the plane IV-IV of Fig. 3;
- Fig. 5 shows a plan view of the device, during the working step of Fig. 3;
- Fig. 6 shows the above mentioned lateral view of the device during another working step.

With reference to the above mentioned figures, a cartoning machine 3, or the like, is equipped with the device for collecting and erecting tubular blanks 2, indicated with reference number 1.

The tubular blanks 2 to be withdrawn and erected are fed in stacks to a collecting station 4 by conveying means 5, operated intermittently when each stack is near to finish; each stack of blanks is indicated with 2a.

The device 1 features a first collecting member 6 equipped with suction elements 7, like suction cups, that collect single tubular blanks 2 from the top of the stack 2a and transfer the withdrawn blanks to a conveying line 8, in the region of an erecting station 9.

The conveying line 8 is in longitudinal alignment with conveying means 5 that feed the tubular blanks 2, and is parallel to a line 10 that feeds the articles 11 to be introduced into the containers obtained from the blanks 2.

The articles 11 are carried to a station 2 (Fig. 4), in which groups of these articles 11 are formed and intro-

duced inside the containers. The station 12 is situated beside the station 9, in which the blanks 2 are erected.

The conveying line 8 includes two pairs of parallel belts 13 and 14, upper and lower, situated on vertical planes, one on side of the other. On their extremities, the belts 13,14 turn around respective pulleys 15,16.

Crosspieces 17,18 extend perpendicularly from the belts 13,14, and the pairs of upper belts 13 and lower belts 14 are operated simultaneously and intermittently, so that the corresponding lower run 13a and upper run 14a move in the same direction H (Fig. 1).

The collecting member 6 is controlled by a robotic equipment 19 that drives its movement along two perpendicular axes, on a vertical plane transversal to the conveying line 8.

The robotic equipment 19 features a vertical stem 21, the lower part of which carries a plate 22 supporting the suction cups 7; in fact the suction cups 7 are arranged, turned downwards, in the regions of the corners of the plate 22, that has e.g. a square shape.

The stem 21 is slidably inserted into a ring-like slide block 23 that features a groove set in engagement with a guide 24, of a known type, extending along a bar 25 (see Figs. 4 and 5), which is situated longitudinally over the said conveying line 8.

The device 1 features also, located in the region of the erecting station 9, a second collecting member 26 including suction cups 27, situated astride the lower belts 14 of the conveying line 8.

The suction cups 27 are supported by a plate 28 that is driven to move along a vertical axis by actuating means 29; in fact the suction cups 27 are arranged, turned downwards, in the regions of the corners of the plate 28, this latter having e.g. square shape (Fig. 2).

Operation of the device will be now described beginning from the step, in which a tubular blank 2 is removed from the stack 2a that is situated in the collecting station 4, while resting against the conveying means 5 (Fig. 1).

During this collecting step the collecting member 6 is situated over stack of blanks.

In order to withdraw the blank, the collecting member 6 is lowered so as to bring the suction cups 7 to contact the uppermost blank 2 of the stack 2a, in the position indicated with the sketched line 6a in Fig. 1.

Subsequent raising of the collecting member 6 causes correspondent raising of the said blank. The lowering and raising of the collecting member 6 are determined by the vertical sliding of the stem 21 of the robotic equipment 19: during these movements the pairs of belts 13, 14 are motionless.

Subsequent movement of the slide block 23 of the robotic equipment 19 along the guide 24 brings the collecting member 6 to the erecting station 9, as shown with the broken line 6b in Fig. 2, where the blank withdrawn by the same collecting member is indicated with 2b.

The collecting member 6 is lowered again so as to carry the withdrawn blank 2 to contact the second col-

lecting member 26, the suction cups 27 of which, in this step, are moved by the actuating means 29 over the surface defined by the upper run of the belts 14 (Fig. 2).

It is to be noted that the second collecting member 26 holds the blank 2 to be erected by attachment to a lower part that is designed to form a wall of the container that is opposite to the one defined by the upper part, which the first collecting member 6 grasps.

Therefore, raising and simultaneous translation of the collecting member 6, as indicated with the sketched line 6c in Fig. 3, cause progressive erection and shaping of the blank, as indicated with the correspondent broken line 2c.

When this step of raising and translation of the collecting member 6 is completed, the blank assumes the parallelepiped shape of the container 20.

The bottom and top flaps of this container 20 are opened and the container is ready to be filled with groups of articles 11 formed in the station 12 (see also Figs. 4 and 5).

It is to be noted that during the introduction of the articles 11, the members 6 and 26 keep on holding the opposite walls, upper and lower, of the container 20.

In fact, during erection and shaping of the container 20, the blank is kept by the said collecting members 6,26 that allow to avoid folding of the container also when the same blank is made of recycled cardboard and the like.

It is also to be noted that the distance between the belts 13 and 14 of the conveying belt 8 is suitably than the height of the container 20 so as not to interfere with the erecting of the same container.

After having completed filling of the container 20 with the articles 11 (Fig. 6), the collecting members 6 and 26 release the opposite walls of the container 20.

The container 20 filled with the articles 11 is moved forward by the belts 13,14 of the conveying line 8, moved simultaneously in opposite directions.

The crosspieces 17,18 of the belts 13,14 engage the container 20. The movement of the container in direction H, schematically indicated with the broken line 20a in Fig. 6, determines engagement of folder elements 30, situated downstream of the erection station 9 according to the movement direction of the conveying line 8.

These folder elements 30 close the opposing flaps of the bottom and the top of the container 20.

The proposed device withdraws, in a very simple way, blanks from a stack fed to the cartoning machine and erects the same blanks in order to obtain containers therefrom.

In fact, these operations are carried out by collecting members operated by mechanisms working with a combination of straight movements, avoiding the use of rotating arms and the like.

Furthermore, this allows to facilitate the adjustment of the device in relation to different sizes of the same blanks.

It is to be pointed out that since the blank is with-

drawn from the top of the stack 2a, it is not subjected to any mechanical stress; moreover, the said blank is opened and kept opened until it is completely filled by the suction cups 7,27 acting on the horizontal walls of the correspondent container 20.

In the embodiment illustrated in the enclosed figures, the robotic equipment 19 moves the collecting member 6 along two perpendicular axes, more precisely, on a vertical plane parallel with respect to the conveying means 5 and to the conveying line 8; this is possible due to the fact that the said conveying means 5 and the conveying line 8 are in longitudinal alignment.

Obviously, this is an advantageous simplification and not a limitation, because nothing prevents from providing the robotic equipment 19 with another longitudinal axis perpendicular to both previously mentioned axes.

Claims

1. Device for collecting and erecting tubular blanks (2), in particular in cartoning machines (3), each of the said blanks (2) being made of a sheet closed in tubular form and featuring creasing lines defining lateral walls, flaps of the bottom and of the top of a correspondent container (20), characterised in that it includes first collecting member (6) aimed at collecting single tubular flat folded blanks (2) from the top of a stack (2a) of these blanks (2) in the region of a collecting station (4);

a robotic equipment (19) aimed at controlling movement of the said first collecting member (6) along two perpendicular axes, on a longitudinal vertical plane, for transferring the blank (2) withdrawn from the said stack (2a) to a conveying line (8), in the region of an erecting station (9) for the same blanks (2); second collecting member (26), situated in the lower part of the said erecting station (9) and aimed at holding a lower wall of the said blank (2) during the step in which the opposite wall is raised by the said first collecting member (6), in order to form a container (20) subsequently filled in the same erecting station with groups of articles (11).

2. Device, according to claim 1, characterised in that the said second collecting member (26) feature suction means (27) driven to move vertically by actuating means (29) between a lowered disengagement position and a blank collecting position, raised over the plane defined by the conveying means (14) of the said conveying line (8).
3. Device, according to claim 1, characterised in that the said first collecting member (6) feature suction

means (7) supported in their lower part by a stem (21) of the said robotic equipment (19), sliding vertically on a slide block (23), that moves on a guide (24) extending longitudinally over the said conveying line (8), for the alternative translation of the same collecting member (6) between the said collecting station (4) and the said erecting station (9).

4. Device, according to claim 1, characterised in that the said step, in which the wall of the said blank (2) opposite to the wall held by the said second collecting member (26), is raised so as to form the said container (20), is obtained by a combined movement of vertical sliding and longitudinal translation of the said first collecting member (6).
5. Device, according to claim 1, characterised in that the said conveying line 8 includes at least two pairs of parallel belts (13,14), upper and lower, moved intermittently in synchrony in opposite directions, with the belts (14) relative to the lower pair situated bilaterally with respect to the said erecting station (9), with the above mentioned belts (13,14) having fixed thereto respective crosspieces (17,18) extending perpendicularly thereto, on respective lying surfaces, the said crosspieces being aimed to engaging, in the said erecting station (9), the said container (29) already filled with the said relative groups of articles (11) in order to transfer it toward the folder elements (30), connected with the said pairs of belts (13,14), and closing the opposing flaps of the same container bottom and top.
6. Device, according to claim 5, characterised in that the distance between the lower run 13a of the upper pair of belts (13) and the upper run (14a) of the lower pair of belts (14) is bigger than the height of the above mentioned container (20).

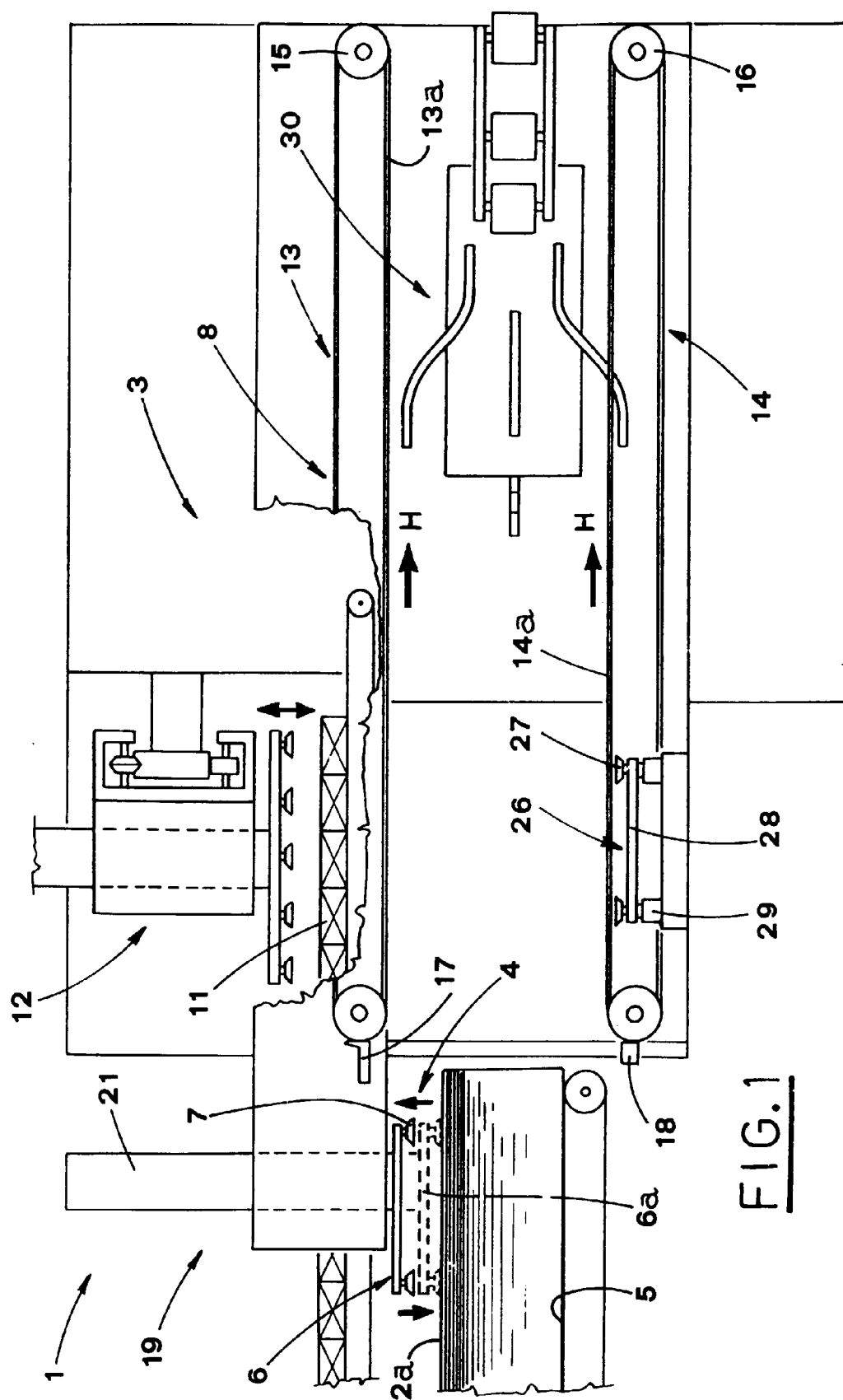
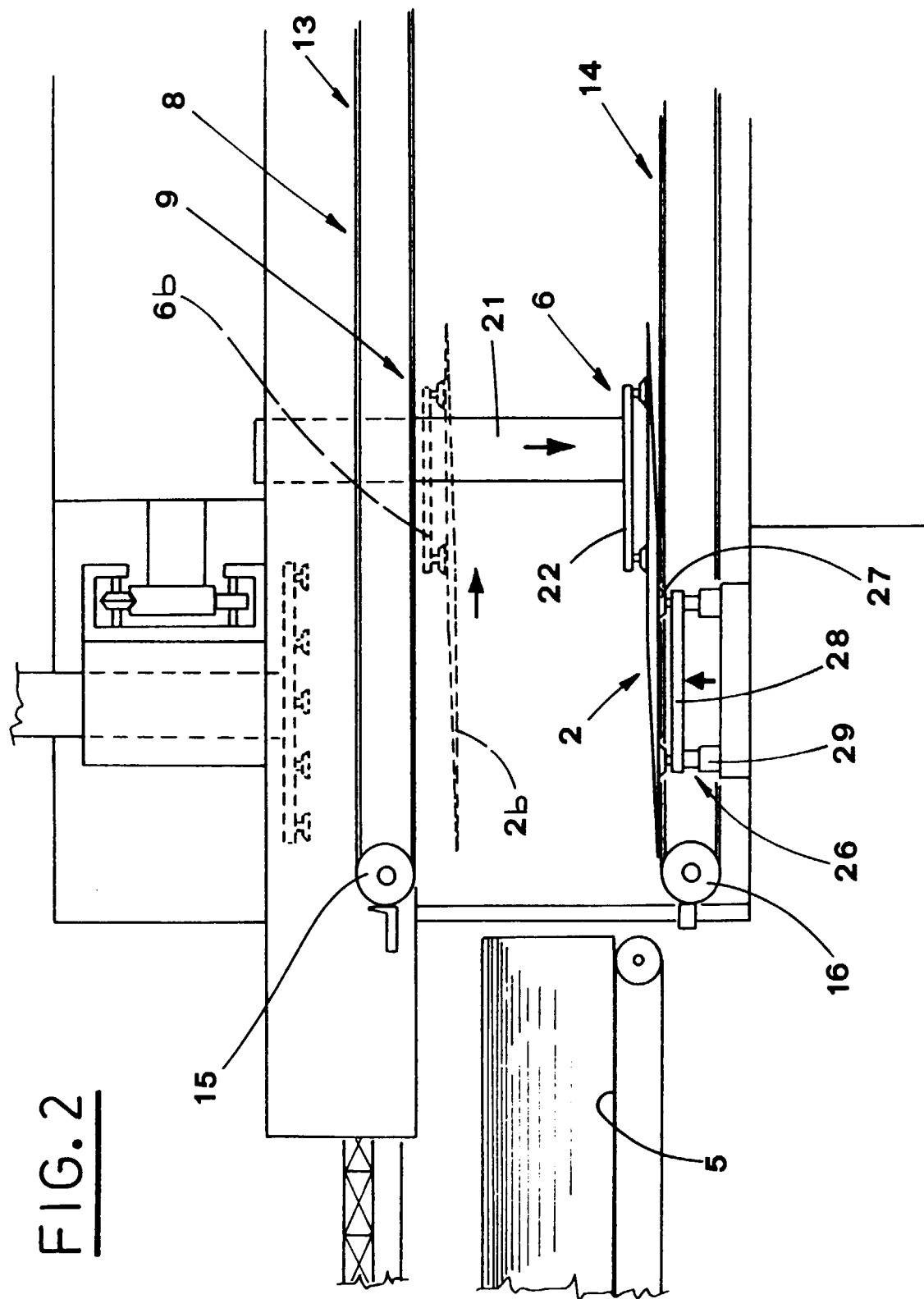
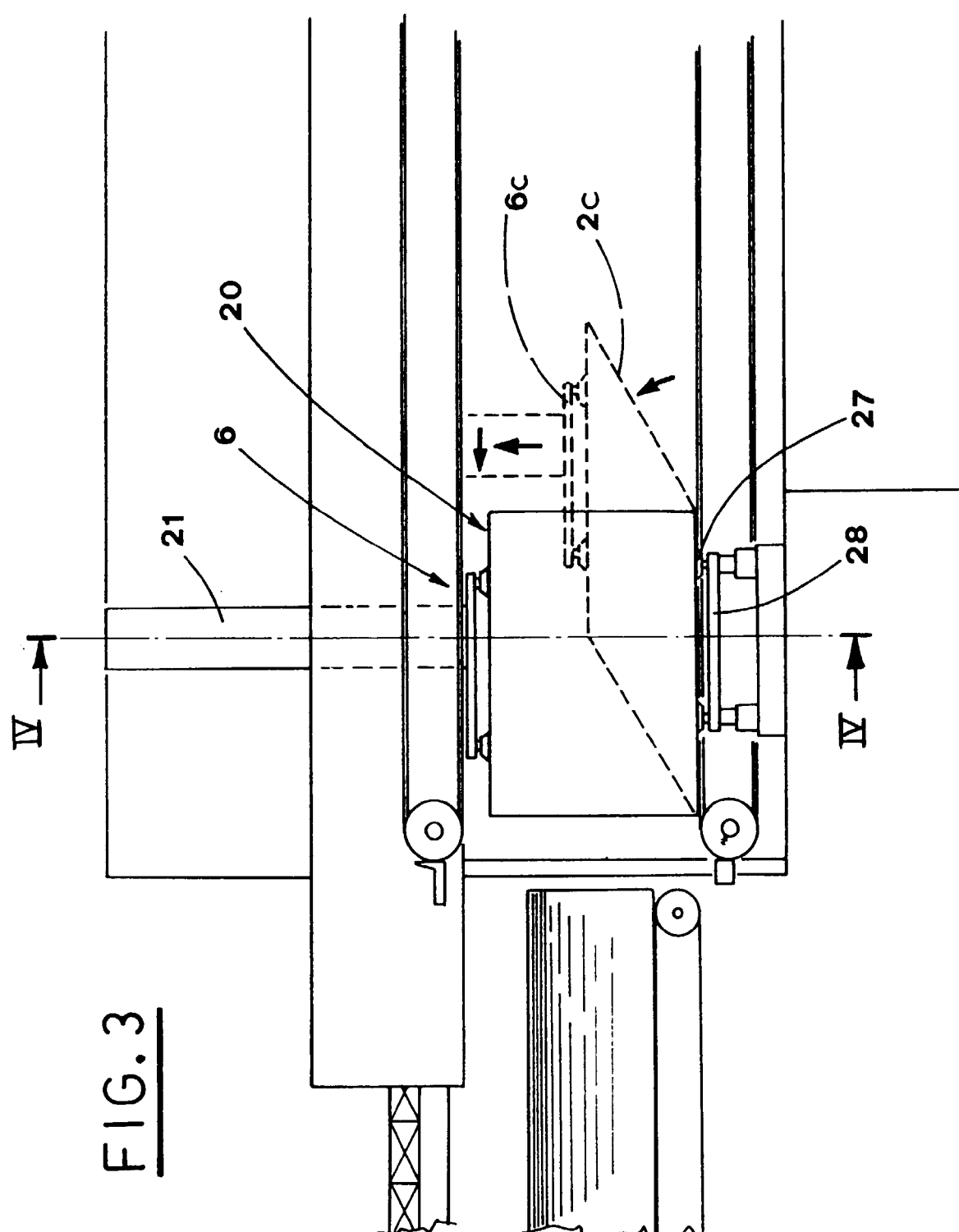
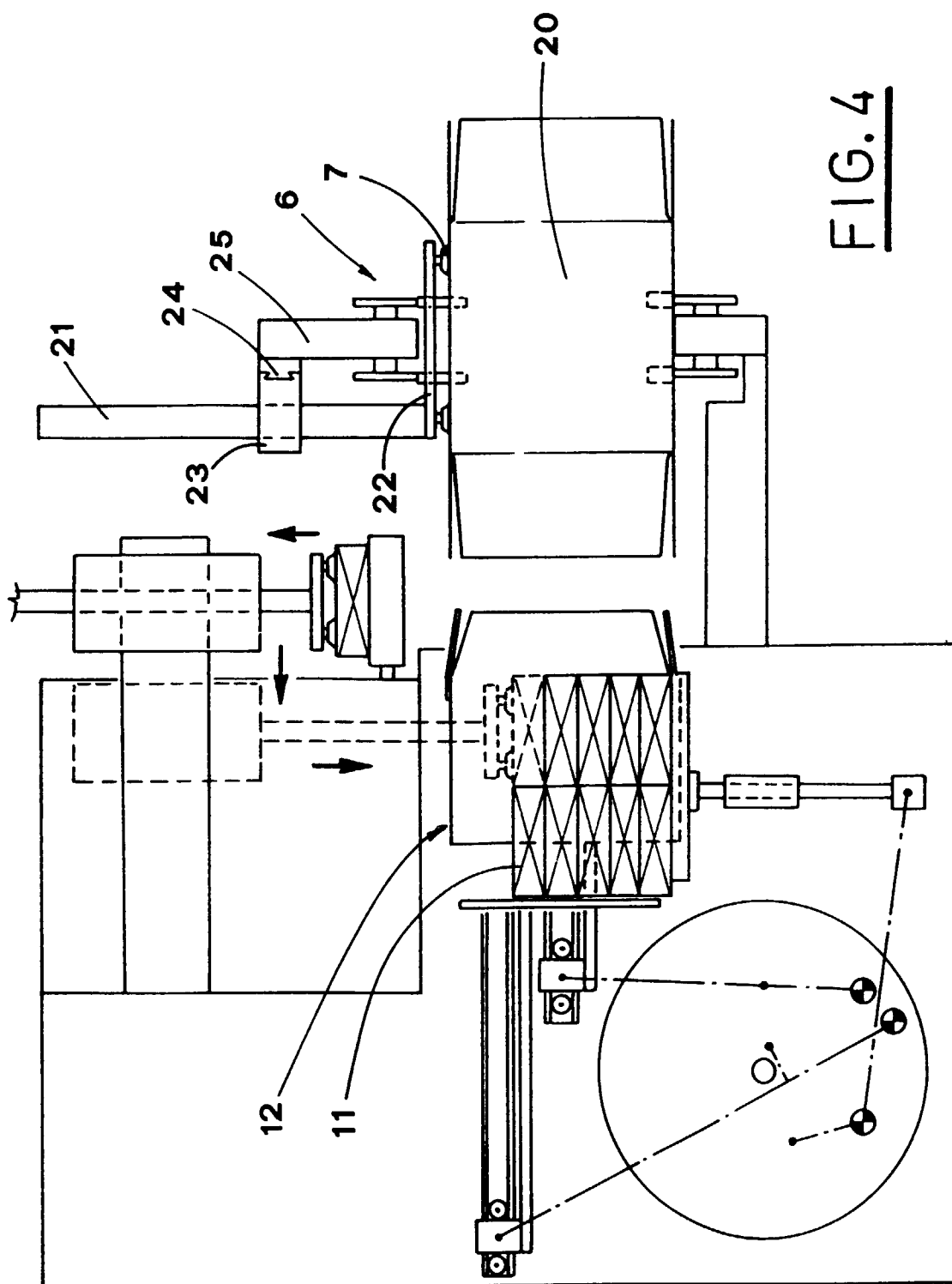


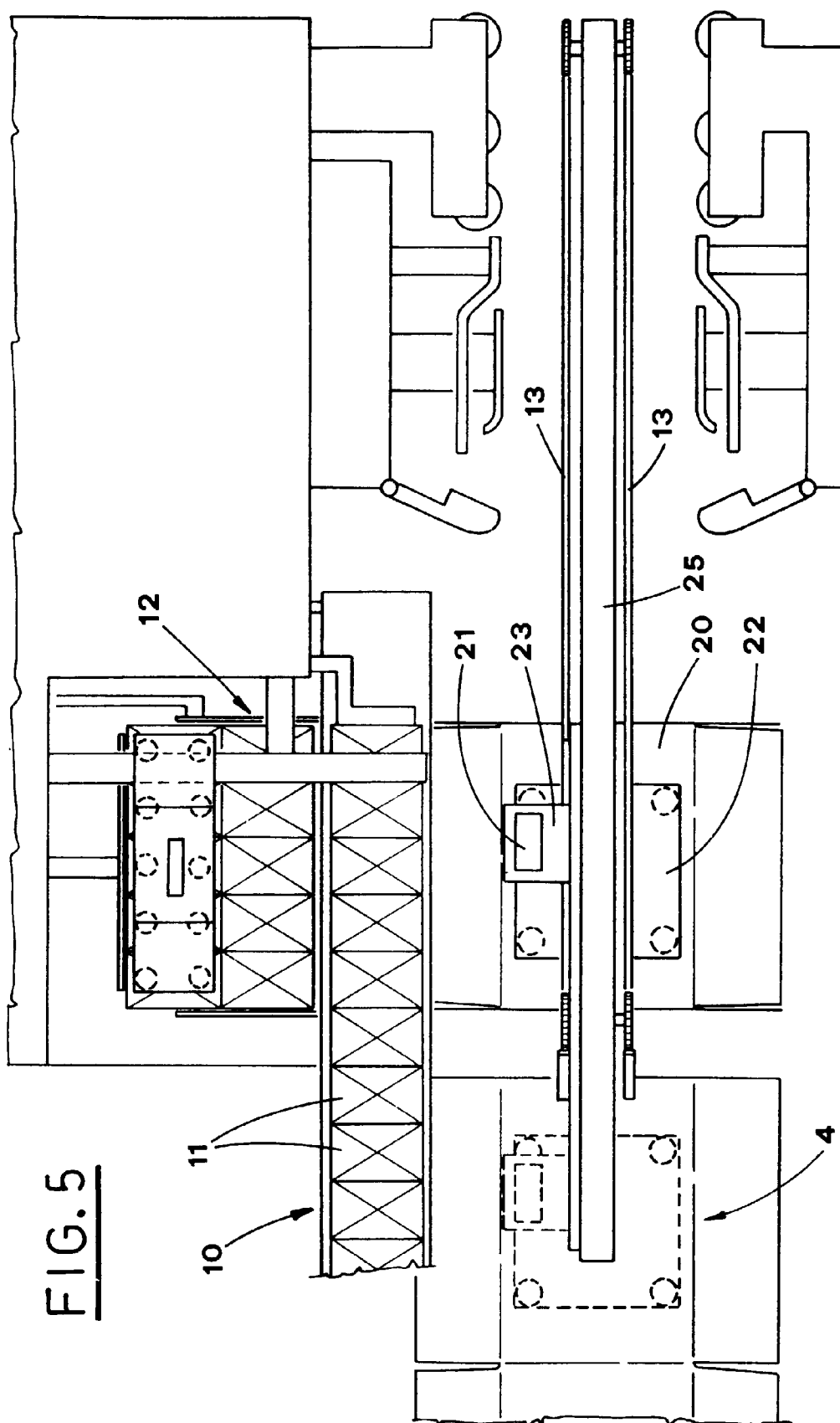
FIG. 1

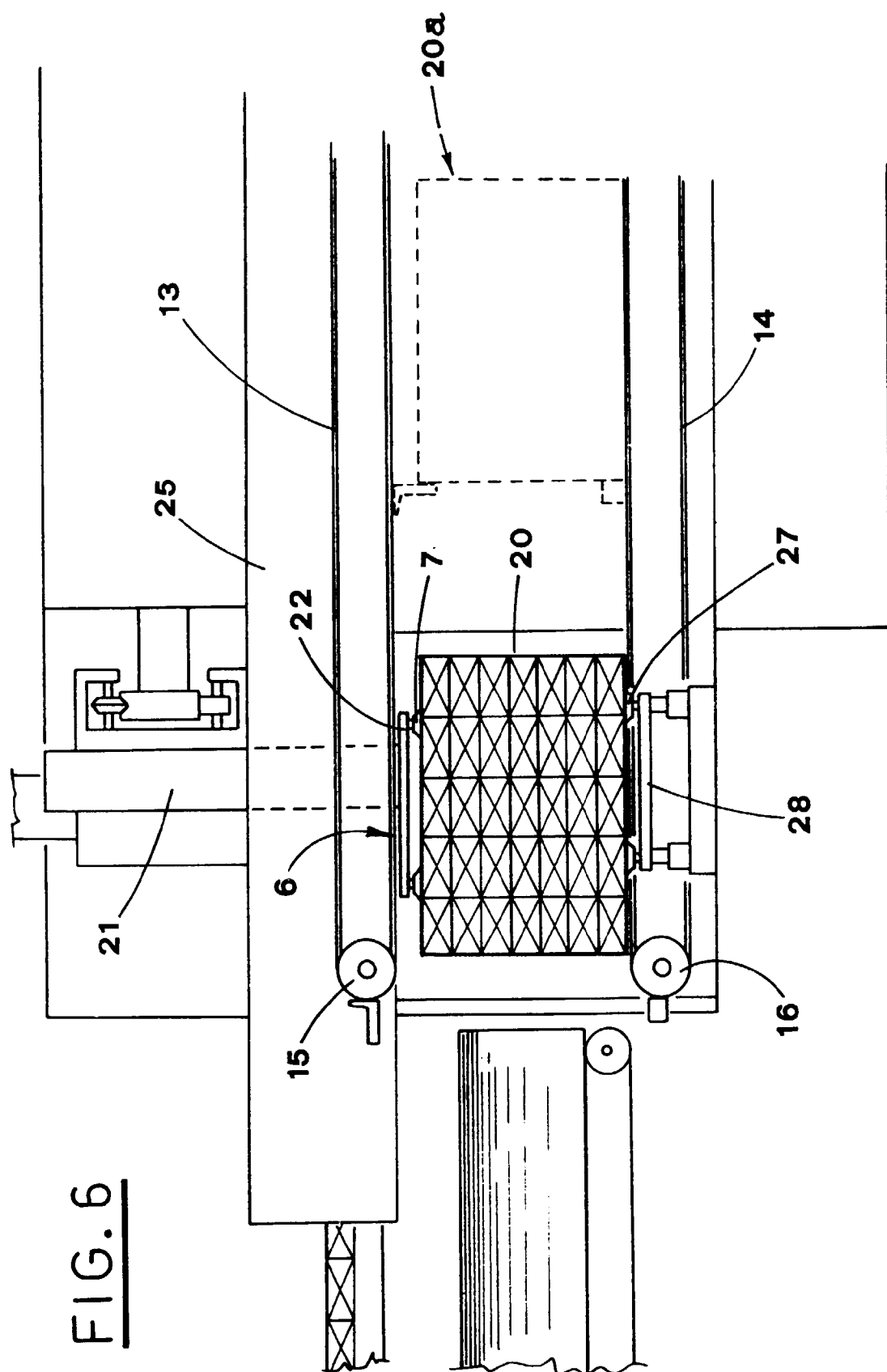
FIG. 2













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EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0115

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.6)
A	DE-A-22 50 667 (PACKO) * the whole document *	1,2	B65B43/30
A	FR-A-2 532 912 (THERMOPAC) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B B31B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		15 July 1996	Claeys, H
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