



(22) Date de dépôt/Filing Date: 1998/01/13

(41) Mise à la disp. pub./Open to Public Insp.: 1998/08/07

(45) Date de délivrance/Issue Date: 2001/11/27

(30) Priorité/Priority: 1997/02/07 (0269/97) CH

(51) Cl.Int.⁶/Int.Cl.⁶ B31B 5/02, B31B 5/62, B31B 5/52

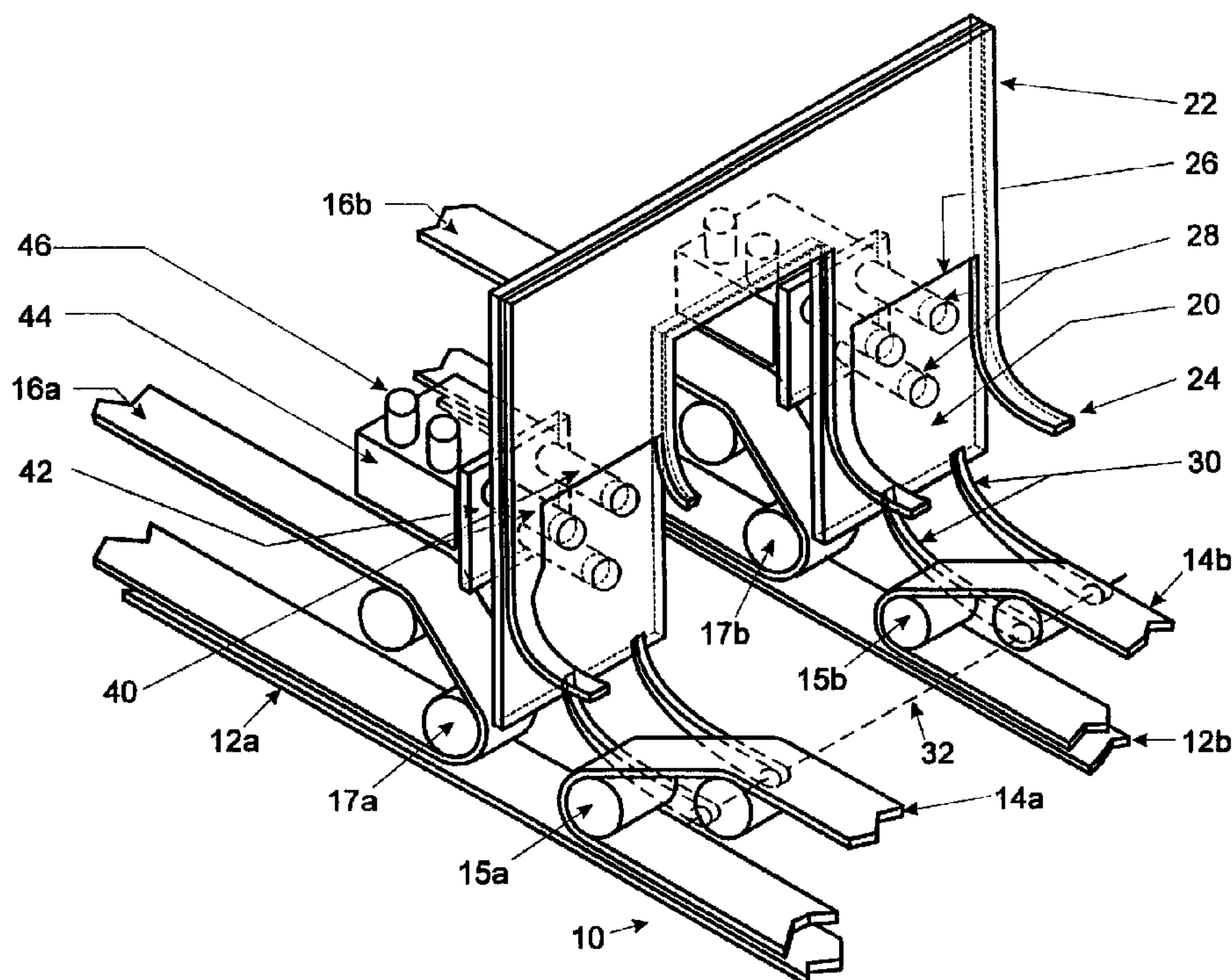
(72) Inventeurs/Inventors:
WENGER, Jean-Louis, CH;
COULLERY, Gérard, CH

(73) Propriétaire/Owner:
BOBST S.A., CH

(74) Agent: SMART & BIGGAR

(54) Titre : DISPOSITIF PERMETTANT DE FAIRE TOURNER LE PANNEAU AVANT D'UNE PIECE DE TRAVAIL EN
FORME DE PLAQUE DANS UNE PLIEUSE COLLEUSE

(54) Title: DEVICE FOR TURNING THE FRONT PANEL OF A PLATE-LIKE WORKPIECE WITHIN A FOLDER-GLUER



(57) Abrégé/Abstract:

The device for turning the front panel of a plate-like workpiece within a folder-gluer comprises a substantially vertical retaining plate (20) located transversally slightly above the travelling plane of the plate-like workpieces, as well as a series of independent lifting fingers (30) located transversally below the travelling plane and slightly before the retaining plate (20), this series of independent lifting fingers (30) being actuated by at least one cylinder from a horizontal rest position to a slanted position at the arrival of the front panel in order to direct it to the retaining plate (20) behind the retaining sliding rails (22,24). This device also comprises at least one pusher (40), substantially orthogonal to the retaining plate (20), actuated by an actuator (44) in order to separate a flap of the plate-like workpiece when the front panel passes against the retaining plate (20).



JBF211

ABSTRACT

The device for turning the front panel of a plate-like workpiece within a folder-gluer comprises a substantially vertical retaining plate (20) located transversally slightly above the travelling plane of the plate-like workpieces, as well as a series of independent lifting fingers (30) located transversally below the travelling plane and slightly before the retaining plate (20), this series of independent lifting fingers (30) being actuated by at least one cylinder from a horizontal rest position to a slanted position at the arrival of the front panel in order to direct it to the retaining plate (20) behind the retaining sliding rails (22,24). This device also comprises at least one pusher (40), substantially orthogonal to the retaining plate (20), actuated by an actuator (44) in order to separate a flap of the plate-like workpiece when the front panel passes against the retaining plate (20).

(Figure 1).

DEVICE FOR TURNING THE FRONT PANEL OF A PLATE-LIKE WORKPIECE WITHIN A FOLDER-GLUER

The present invention relates to a device for turning the front panel of a plate-like workpiece within a folder-gluer, that is to say a machine processing plate-like workpieces, such as cardboard or paper blanks, into "flat folded" and piled up boxes, these boxes can rapidly be converted in three dimensions afterwards. The blank size, as well as the creasing lines positioning the subsequently foldings, define the front and rear panels, the lateral panels, the bottom and cover elements of the box and, if required, the inner partitions. Some panels may also be provided with glue flaps.

The invention more particularly relates to a device for turning a rather big front panel of a blank, i.e. a folding of this panel from front to the rear, such as considered with regard to the travelling direction of this blank within the folder-gluer. Such a turning action of the front panel proves to be necessary, for example, when manufacturing record sleeves.

The turning of a small front flap effects in known manner owing to a device which is rather simple, comprising one or more hooks hanging in elastic manner on to a crossbar, the lower end of these hooks being located in the travelling plane of the blanks.

The document FR 2 306 075 describes an example of a known device for turning a bigger front panel. This device comprises, on the one hand, a folding crossbar located slightly above the travelling plane of the blanks, and whose horizontal V-shaped cross section is directed opposite to the travelling direction of the blanks. This device comprises, on the other hand, a series of lifting fingers located upstream under the travelling plane parallel to the crossbar, and actuated by a cylinder from an initial horizontal position to an instantaneous slanted position directed towards the top of the crossbar at the arrival of a blank. This operation may also be achieved by an air jet. As soon as the leading edge of the front panel is engaged above the crossbar, the fingers are brought back in to the horizontal position.

The creasing line delimitating the rear edge of the front panel, which can thus remain flat on the lower conveyor, this line yields in a folding when arriving at level with this crossbar. The front panel then rapidly tilts by the stopping action of the crossbar onto the following intermediate panel, and these two panels pass together under the crossbar, then in a calender finishing the folding operation.

Folder-glueers are also known wherein the turning device includes an upper vertical division plate associated with a lower upstream series of lifting fingers. In order to avoid resiling of the front part of the front panel when ascending, at the risk of causing a prematured folding, the upstream delivery side of this plate is provided with several vertical sliding rails held in front of this side with a spacing slightly greater than the thickness of the blank. These sliding rails have the form of vertical bars whose lower ends are bent upstreamly in order to facilitate the engagement of the leading edge of the front panel guided by the lifting fingers which are instantaneous slanted. Moreover, the outlet of the upper upstream conveyor is positioned at a certain distance with regard to the plate in such a manner that the front panel, initially arriving in the horizontal position, can bend in order to raise in to the vertical position against the plate without breaking, but in such a way that the rear creasing line immediately yields in a folding at its arrival. This folding pass under the plate in order to be seized afterwards by the downstream conveyor, the front panel being then pulled downwards and pushed against the following intermediate panel.

Working satisfactorily, the folder-glueers provided with these devices of prior art, however, reach their limits when the front panel or panels to be turned include, in addition, one or more flaps initially retained by matter bridges or nicks distributed along the C-shaped, U-shaped or else peripheral blank, these flaps having to be set free before completion of the turning operation.

Such front panels with flaps are particularly used in the case of blanks for special boxes for transporting beer-bottles, the front panels and

68200-171

3

their flaps being destined to convert into inner partitions kept in position by glue flaps.

Now, such a breaking operation of weak holding points, in the form of small matter bridges, is related to the waste stripping operation usually occurring rather in a platen where the blank is momentarily stopped during lowering and raising of an adequate tool of the same kind as a punching member. However, such a machine downtime is hardly compatible with the continuous folding operations executed at high speed in these folder-gluers, particularly at the level of the turning operation which is one of the first operations.

The aim of the present invention is a device for turning the front panel of a plate-like workpiece which is fitted to open one or more flaps in a front panel that is being turned, and this in a manner that is compatible with the high speed of the machine and, as much as possible, without requiring heavy complicated and hence onerous equipments.

The invention provides a device for turning a front panel of a plate-like workpiece within a folder-gluer, and for separating a flap from said front panel, comprising: a horizontal conveyor for moving said workpiece in a horizontal travelling plane; a substantially vertical retaining plate located transversely slightly above said travelling plane; a series of lifting fingers located transversely below the travelling plane and substantially upstream of said retaining plate; curved sliding rails positioned on the upstream side of said retaining plate and laterally offset with respect to said lifting fingers; said lifting fingers being actuated by at least one cylinder to move between a retracted position below said horizontal travelling plane and an operative extended slanted position above said travelling plane to direct the front panel of the workpiece towards the retaining plate behind

68200-171

3a

said retaining sliding rails to be guided thereby against said retaining plate; and at least one pusher oriented substantially orthogonal to the retaining plate to be operated by an actuator in order to separate the flap of the front panel when the
5 latter passes against the retaining plate.

The longitudinal travelling direction of the blanks being taken as reference, the terms "upstream" and "downstream" define an object respectively directed to the start of travelling, generally the feeding station; and to the arrival,
10 in this case the delivery and piling station. In a similar

manner, the term "transversal" means a line which is perpendicular to the travelling direction and belonging to the plane of the blank, as well as the term "vertical" refers to a line which is orthogonal to this plane of the blank.

In the last described device of prior art, the front panel of the blank remains against the plate in a vertical position say "maximum" during a certain time, until the creasing line at the level of the lower conveyor converts into a folding engaging then under the plate. This folding formation time corresponds to a forward motion of about 5 cm of the creasing line at the level of the plate, a forward motion during which the panel pushed against the plate keeps an almost constant height. This folding formation time is just enough for a pusher to be moved forward and backward by a rapid actuator available on sale.

Advantageously, the device includes several pushers fitted on a common small plate actuated by the actuator. More particularly, this small plate may include a plurality of threaded holes allowing to arrange the pushers according the form and the dimensions of the flap or flaps.

Alternatively, the device comprises, for each flap, a single pusher, whose action surface corresponds to the one of the flap. In that case, such a pusher is related to a kind of punching member.

Usefully, the action surface of the pusher or pushers facing a flap is slanted, the least protuberant part corresponding to the folding area of the flap.

According to a first embodiment, the pusher or pushers are located in crossing apertures of the plate and are actuated upstreamly. Usefully then, the plate may have a plurality of apertures corresponding to the plurality of threaded holes of the small plate allowing to arrange the pushers in accordance to the size of the flaps.

Usefully then, the sliding rails of the retaining plate form an upper and lateral framing for each flap. Such a framing allows to better hold the panel against the retaining plate when opening the flaps by the pushers.

According to a second embodiment, the retaining plate has a lower edge which is rounded in correspondence for each flap, and the pusher or pushers are actuated downstreamly.

Advantageously, the actuators may be pneumatic or electromagnetic, double-acting, or single-acting acting in opposition to a spring.

The invention will be better understood by the study of an embodiment taken by way of non-limitative example and illustrated by the attached drawings, in which:

- Fig. 1 is a perspective view of the turning device, and
- Figs. 2a, 2b and 2c illustrate three stages in succession of the turning action of a blank front panel by the device of Fig. 1.

Fig. 1 illustrates a device for turning blank front panels based on a vertical retaining plate 20, arranged transversally slightly above a conveyor of blanks 10 and associated with lifting fingers 30 arranged slightly before the plate 20 under the conveyor 10.

In this example, the lower part of the conveyor 10 consists of two parallel endless belts 12a and 12b, the outer return and drive pulleys of which are not represented. Correspondingly, this conveyor 10 comprises a first pair of upper endless belts 14a and 14b located above the plate 20 and whose downstream return pulleys 15a, 15b are located rather near the plate at a spacing of 5 to 25 cm. This conveyor 10 comprises also a second pair of downstream endless belts 16a, 16b, whose upstream return pulleys 17a, 17b are located longitudinally at the level of the plate 20. These upper belts 14a, 14b, 16a, 16b push the blanks against the lower conveyor 12a, 12b in order to ensure a drive and an forward motion of these blanks, without neither lateral nor slantwise skidding or shifting. If desired, the lower belts 12a, 12b might be replaced by a series of transversal parallel rolls and the upper belts 14a, 14b and 16a, 16b might be replaced by a longitudinal series of rollers located in correspondence with the rolls.

In this example, the retaining plate 20 has a substantially rectangular transversal form with a notch in the lower median part, this notch being rectangular vertical. This plate with its notch thus allows to turn two lateral front panels of a blank by leaving enough place for another operation, such as lateral folding, of a median front panel. The transversal length of this plate 20 substantially corresponds to the width of the blank. The lower edge of this plate 20 is located above the lower conveyor belts 12a, 12b.

More particularly according to the invention, a retaining and framing slide plate 22 is fixed facing the upstream side of the retaining plate 20 with a spacing slightly larger than the thickness of the blank to be processed. This slide plate 22 has, like the retaining plate 20, a central notch leaving free passage for the median front panel receiving another processing. On the other hand, according to the invention, each lateral panel of this slide plate 22 has a framing window 26 whose vertical and transversal dimensions correspond to the dimensions of the flaps to be opened within the front panels to be processed. Moreover, the lower ends of the window framings have the form of sliding lids 24 arc-shaped upstreamly ensuring a guiding of the panels as will be shown afterwards. These retaining plates 20 and slide plates 22 can be made out of steel plates or of a material allowing to ensure an adequate rigidity.

The turning device furthermore comprises a series of lifting fingers 30 whose upstream ends are independently mounted on a pneumatic cylinder, and whose downstream ends are arc-shaped upwardly while being located slightly behind the retaining plate 20 substantially at half length of the sliding lids 24. By rotating the common axle 32, these lifting fingers 30 can be brought from a first horizontal rest position under the conveyor 10 to a second slanted active position in which the arc-shaped downstream ends emerge upwardly with regard to the travelling plane of the blanks.

More particularly according to the invention, each lateral panel of the retaining plate 20 includes crossing apertures 28 in each of which a pusher 40 can slide orthogonally to the retaining plate 20. On the other side of the plate, downstream, the rear ends of each pusher group 40 are fixed to common small plates 42 being part of actuator rods 44 destined to impart a rapid downstream/upstream movement to the pusher 40. The length of the pushers may be identical so that all of them make level with the upstream surface of the plate 22. Better, the length of the pushers which are near the lower folding line of the flap 2 may be shorter than the one of the upper pushers, so as to have a general slanted action surface which is more compatible with the geometry of the open flap.

These actuators 44 may be double-acting forward/backward pneumatic or electromagnetic cylinders, or simple-acting actuators, for example acting forward but in opposition to springs bringing them back in rest position. These pneumatic actuators 44 are connected to an air source by connectors 46.

Such as described, the turning device according to the invention operates in the following manner.

Fig. 2a illustrates a blank 1 having two lateral front panels 2, each panel comprising a flap 5 to be opened.

This Fig. 2a illustrates the arrival of this blank 1 in the device, a phase during which the lifting fingers 30 are in a high position in order to direct the front edges of the panels 2 under the sliding lids 24, hence between the slide plate 22 and the retaining plate 20. During this phase, the creasing line 8 delimitating the rear edge of the panels 2 is still kept in the upstream conveyor. The front panels 2 then rise against the plate 20 by passing arc-shaped without folding between the conveyor and the plate.

Fig. 2b illustrates the phase in which the creasing line 8, having left the upstream conveyor, converts in a folding 8'. Shortly before, the lifting fingers 30 have returned to their horizontal rest position subjacent to the conveyors in such a way that this folding line 8' remains in contact with

the lower endless belts 12a, 12b.

As may be gathered on the right part of this Fig., the flap 5 of the panel 2 is in the window 26 of the slide plate 22 again. Therefore, and as better visible on the left part of this Fig. 2b, the actuator 44 moves the small plate 42 forward to the plate 20, so that the ends of the pushers 40 protrude from the upstream surface of this plate in order to open the flap 5 by breaking the retaining matter bridges. The retract of these pushers follows immediately afterwards.

Fig. 2c illustrates the ejecting phase in which the folding 8' is taken by the downstream conveyors 16a, 16b thus forcing a lowering of the panels 2 with their open flaps 5. Particularly, the arc-shaped motion of the cylinder occurring at the level of the return pulleys 17a momentarily confirms the opening of the flaps before their closing when turning up the panels 2 against the following part of the blank.

As may have been gathered at the reading of the foregoing, the turning device according to the invention contrives to execute an opening operation of flaps by breaking weak points "on-the-fly" simultaneously with a turning operation of blank front panels. As a matter of fact, said device only requires an improvement of the sliding rails in the form of a retaining and framing plate provided with lower arc-shaped lids and the addition, at a place which has been judiciously chosen, of pushers actuated by rapid actuators. Preferably, this device is controlled by a microprocessor control that release the pushers either at a predetermined "machine-degree", or at the reception of a sensor signal verifying the arrival of the front panel of the blank.

Safety margins of operating are defined when locating the pushers 40 with regard to the upper edge of the windows 26 in accordance with the rapidity of action of the actuators 44. Particularly, the super-quick-acting actuators allow to arrange relatively long pushers near the edge so as to have a clean break of the flaps.

The invention having been illustrated with flaps whose folding line being arranged in the lower part, but, a few precautions provided, flaps with a lateral, right, left or upper folding line have also to be considered.

Alternatively, it is also possible that the actuator 44 and the small plate 42 are located above the plate 20, therefore the pushers move forward downstreamly in to windows arranged, in correspondence with the flaps, in the retaining plate 20. Preferably then, a creasing line is provided along the lower edge of such a window in order that the flap can be moved within the panel at the time of its ejection and turning. Other improvements can be provided by the man skilled in the art within the scope of the claims.

68200-171

10

CLAIMS:

1. A device for turning a front panel (2) of a plate-like workpiece (1) within a folder-gluer, and for separating a flap from said front panel, comprising:

5 a horizontal conveyor for moving said workpiece in a horizontal travelling plane;

a substantially vertical retaining plate (20) located transversely slightly above said travelling plane;

10 a series of lifting fingers (30) located transversely below the travelling plane and substantially upstream of said retaining plate (20);

curved sliding rails (22, 24) positioned on the upstream side of said retaining plate (20) and laterally offset with respect to said lifting fingers (30);

15 said lifting fingers being actuated by at least one cylinder to move between a retracted position below said horizontal travelling plane and an operative extended slanted position above said travelling plane to direct the front panel of the workpiece towards the retaining plate (20) behind said
20 retaining sliding rails (22, 24) to be guided thereby against said retaining plate; and

at least one pusher (40) oriented substantially orthogonal to the retaining plate to be operated by an actuator (44) in order to separate the flap (5) of the front panel when
25 the latter passes against the retaining plate (20).

2. A device according to claim 1, comprising several pushers (40) mounted on a common actuator plate (42) operated by the actuator (44).

68200-171

11

3. A device according to claim 1 or claim 2, wherein the front panel has a plurality of flaps, wherein for each flap (5) there is a single pusher (40) having an action surface that corresponds to the one of the flap (5).

5 4. A device according to claim 3, wherein the or each action surface of each pusher (40), facing a flap (5), is slanted away from said actuator towards the upper end of the pusher (40).

5. A device according to any one of claims 1 to 4,
10 wherein the or each pusher is located in crossing apertures (28) of the retaining plate (20) and is actuated to move in an upstream direction.

6. A device according to claim 1, wherein the sliding rails (22, 24) form an upper and lateral framing window (26)
15 for each flap (5).

7. A device according to claim 1, wherein the retaining plate (20) has a lower edge rounded in correspondence for each flap (5), and wherein the pushers (40) are actuated in a downstream direction.

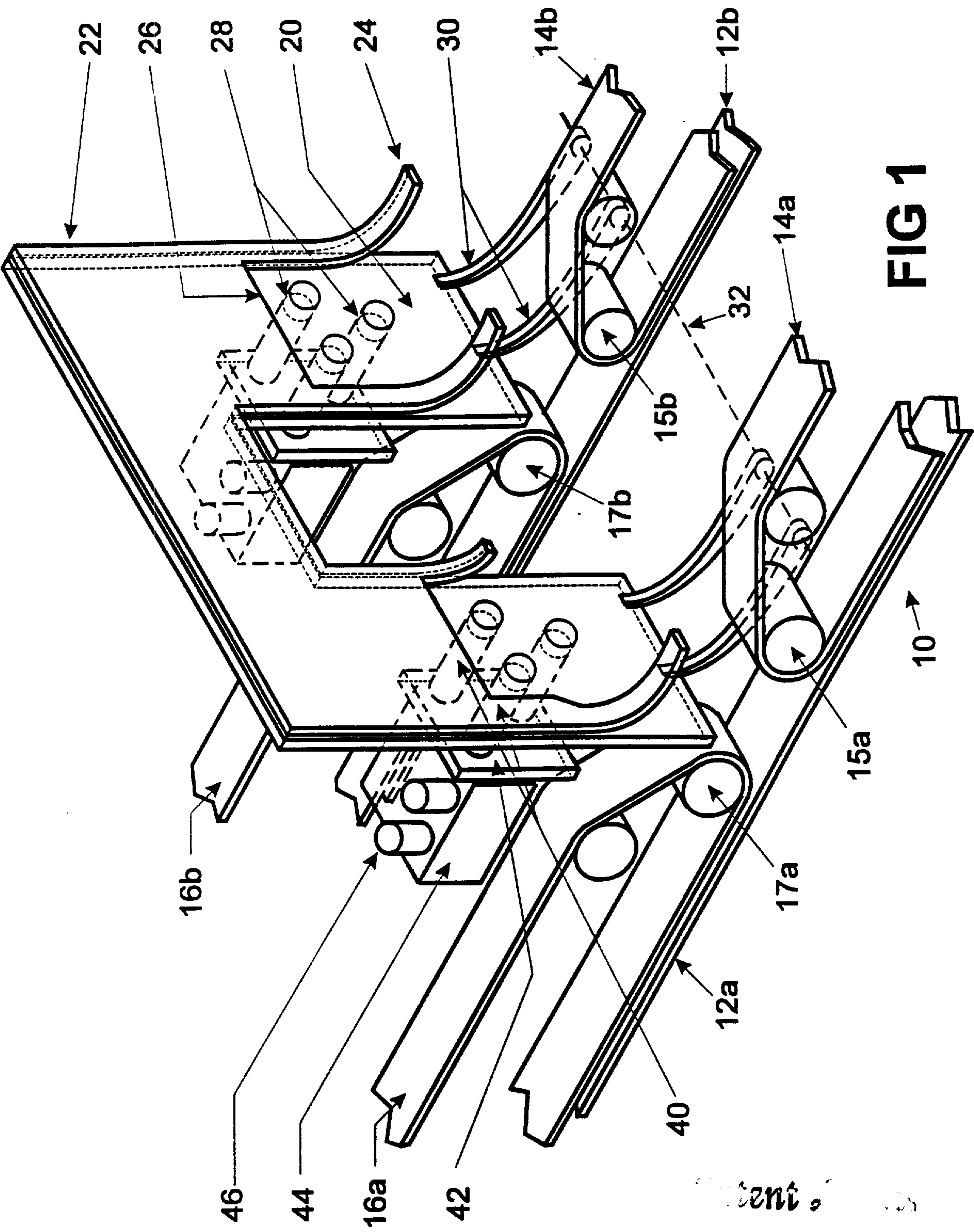
20 8. A device according to any one of claims 1 to 7, wherein the or each actuator (44) is pneumatic or electromagnetic either double-acting forward/backward, or single-acting forward, backward motion being effected by a return spring.

25

SMART & BIGGAR

OTTAWA, CANADA

PATENT AGENTS



Patent & ...

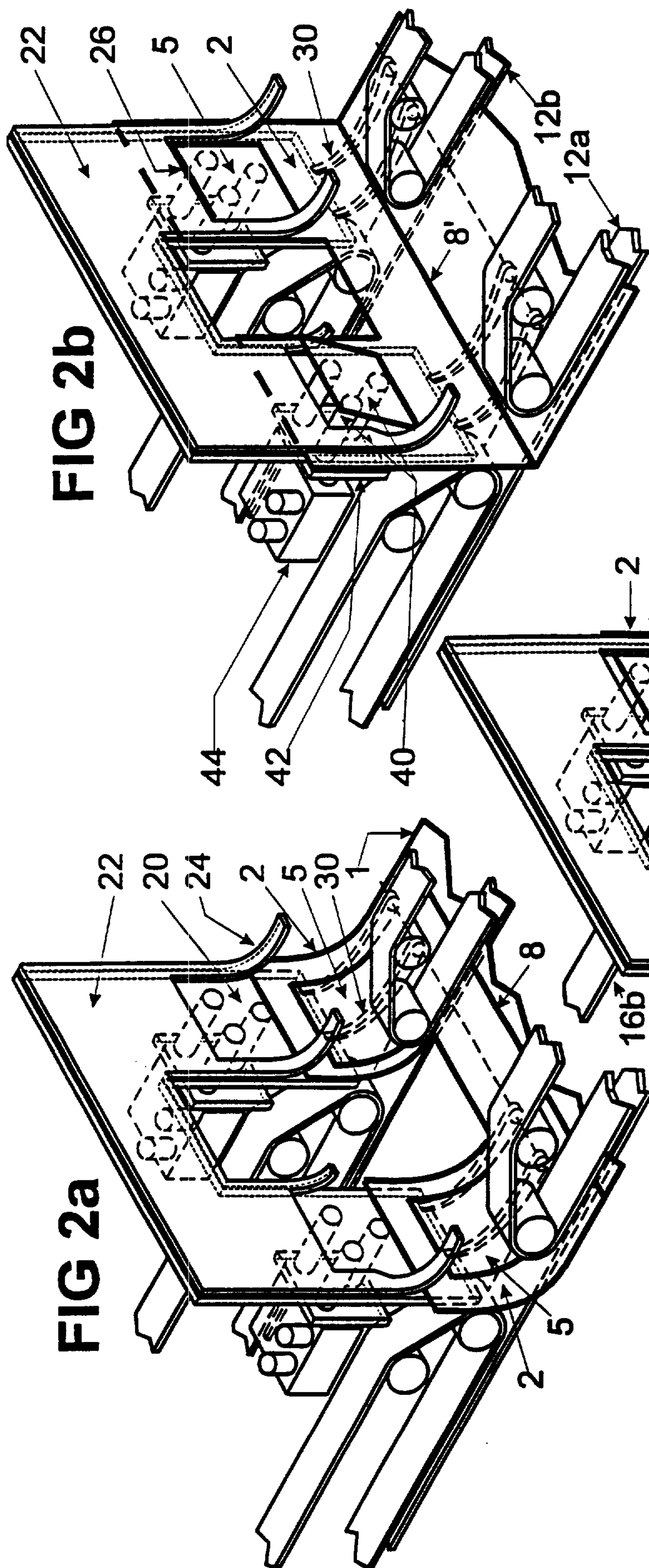


FIG 2b

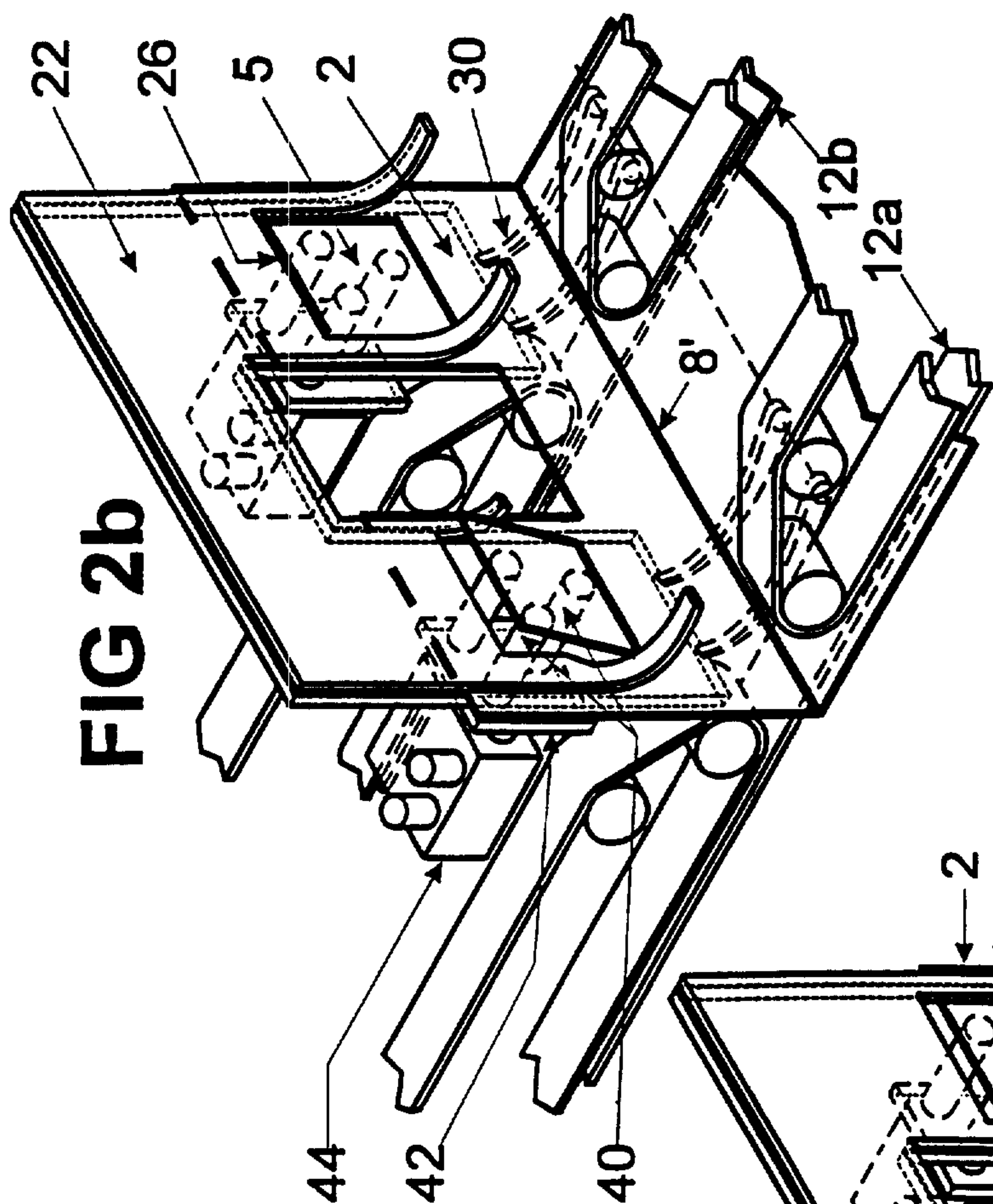
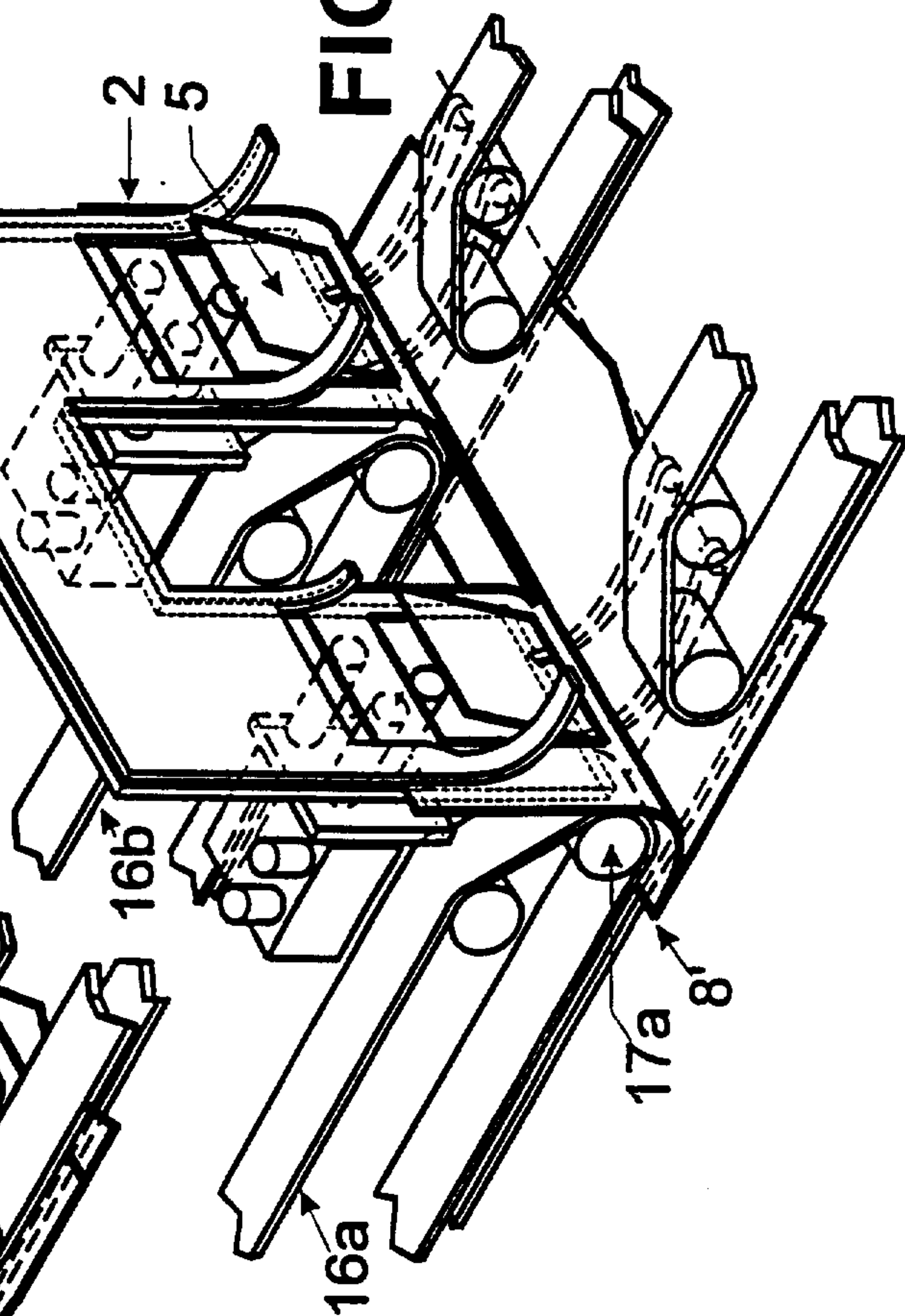


FIG 2c



Int. & Light

