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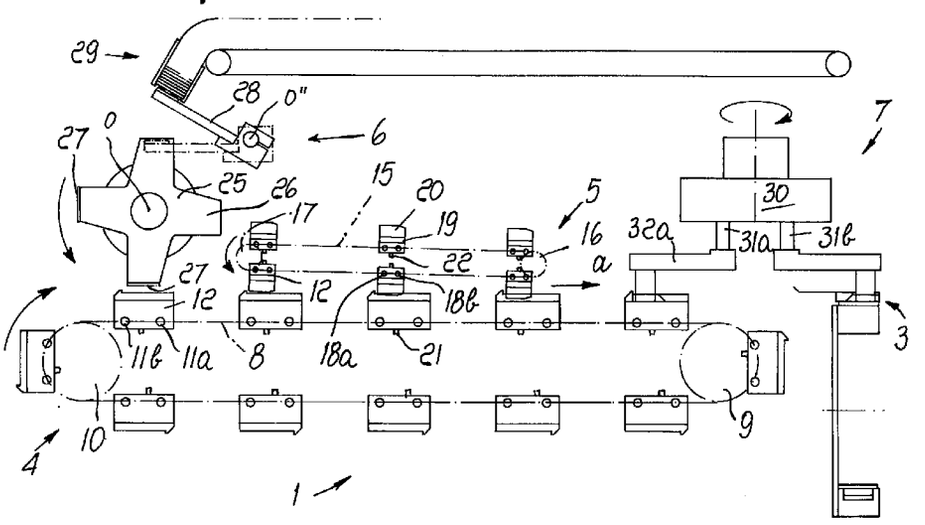
(54) Folding unit for a corrugated separator

(57) A quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like, comprising: a line (4) for the stepwise advancement of the cutouts, which has a plurality of pairs (11a,11b) of cross-members along which a plurality of trucks (12) are mounted so that they are slideable transversely, plates being rigidly coupled to the trucks and being arranged longitudinally to the line so as to support and fold the upper crests of the spacers of the cutout, the plates being provided with a rear pusher tooth for the advancement of the cutout; a cutout folding line (5), which lies above the advancement line (4) and has a plurality of cross-members (18a,18b) that advance stepwise and along which a plurality of trucks (19) are mounted so that they are slideable transversely, respective longitudinal seats (20) being rigidly coupled to the trucks, the plates (16) being insertable in the seats; fixed cam profiles for the translatory motion of the trucks along the cross-members; means (6) for depositing the cutouts at the inlet of the advancement line; and means (7) for removing the folded cutouts.

Fig.1



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Description

The present invention relates to a quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like.

For packaging products such as ampoules, bottles, or the like, boxes are conventionally used on the bottom whereof a cutout is arranged and possibly glued; said cutout is made of a material such as cardboard and is corrugated or rather folded in a fret-like pattern so as to form a plurality of mutually parallel and slightly spaced seats, wherein the ampoules or the like can be inserted by slight forcing: such cutouts, which for a while had been replaced with thin contoured shells molded from a sheet of a material such as plastics, are coming back in use because they provide a package that is entirely made of cardboard and is considered more adapted for a less polluting waste disposal.

Conventional units for folding said cutout entail some drawbacks concerning their bulk, which is usually considerable, and their operating speed, which is rather low, and also entail a plurality of rather troublesome operations if a change of format is required.

The technical aim of the present invention is to obviate the mentioned drawbacks of conventional devices, that is to say, to provide a quick folding unit for a fret-folded separator cutout having a limited bulk, a high operating speed, and allowing quick format changing.

Within the scope of this technical aim, an object of the present invention is to achieve said aim with a structure that is simple, relatively easy to execute in practice, safe in use, reliable in operation, and has a relatively low cost.

This aim and this object are both achieved by the present quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like, characterized in that it comprises: a line for the stepwise advancement of the cutouts, which has a plurality of pairs of cross-members along which a plurality of trucks are mounted so that they are slideable transversely, plates being rigidly coupled to said trucks and being arranged longitudinally to the line so as to support and fold the upper crests of the spacers of the cutout, said plates being provided with a rear pusher tooth for the advancement of the cutout; a cutout folding line, which lies above said advancement line and has a plurality of cross-members advancing stepwise and along which a plurality of trucks are mounted so that they are slideable transversely, respective longitudinal seats being rigidly coupled to said trucks, said plates being insertable in said seats, the active lower portion of said line descending slightly to carry said seats from a raised configuration, in which no interference occurs with the cutout, to a lowered configuration for the complete folding of the cutout on said longitudinal plates of the advancement line; fixed cam profiles for the translatory motion of said trucks along said cross-members, which are adapted to move said trucks in the active portions of said lines from a condition in which the trucks are spaced from one another to a closer condition, and vice versa in the return portions; means for depositing the cutouts at the inlet of the advancement line; and means for removing the folded cutouts.

Further particularities will become apparent and evident from the detailed description of a preferred but not exclusive embodiment of a quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic side view of a quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like;
figure 2 is an enlarged-scale side view of a detail of the unit of figure 1;
figure 3 is a schematic front view of the configuration assumed by the cutout and of some operating elements of the unit according to the invention, in the positions designated by A, B, and C in figure 2;
figure 4 is an enlarged-scale side view of a detail of the means for removing the folded cutouts.

With particular reference to the above figures, the reference numeral 1 generally designates a quick folding unit for a fret-folded separator cutout 2 for boxes 3 for containing ampoules or the like according to the invention.

The unit 1 comprises a line 4 for the stepwise advancement of the cutouts, a cutout folding line 5, means 6 for depositing the cutouts at the inlet of the advancement line, and means 7 for removing the folded cutouts.

The line 4 comprises two parallel conveyor chains 8 that are closed in a loop, are wound around respective driving and guiding sprockets 9 and 10, are associated with a step motor drive, not shown in the figures, have substantially horizontal upper active portions, and are interconnected by a plurality of pairs 11a and 11b of cross-members having a cylindrical cross-section and distributed along the chains with a constant pitch: the arrow a indicates the direction of advancement of the cutouts 2.

Advantageously, the cutout 2 has a straight edge I and an edge that is affected by a succession of profiles II which are shaped like an isosceles trapezoid and are spaced by narrow dividing spaces III: the cutout is affected by folding lines, shown in figure 3A, and is meant to be folded in the sequence A, B, C of figure 3 to form, together with the regions affected by the trapezoidal profiles, a row of trays for arranging ampoules or the like so that they are spaced by the upper spacers III: it is noted that the inclined trapezoidal profiles leave space for the manual removal of the narrower ends of the ampoules and that the dimensions of the trays are such that the sides slightly clamp the ampoules to couple them to the cutout and thus lock them in the box.

A plurality of trucks 12 are mounted along the pairs of cross-members 11a and 11b so that they are slideable transversely by means of appropriate bearings and bushes; plates 13 are rigidly coupled to said trucks at the upper faces of the active portion; said plates have a profile, are longitudinal to the line, are meant to support and fold the upper crests of the spacers III of the cutout, and are provided with a rear pusher tooth 14 for the advancement of the cutout.

The cutout folding line 5, which lies above the line 4, is constituted by two parallel chains 15 that are closed in a loop, are wound around respective driving and guiding sprockets 16 and 17, are advantageously associated with the step motor drive of the line 4, and are interconnected by a plurality of pairs of cylindrical cross-members 18a and 18b distributed along the chains with a constant pitch.

A plurality of trucks 19 are slidingly mounted along the pairs of cross-members and have respective longitudinal seats 20 rigidly coupled thereto; the plates 16 are insertable in said seats, and the lower active portion of the line 5 descends slightly to carry the seats 20 from a raised configuration, in which they do not interfere with the cutout, to a lowered configuration for the complete folding of the cutout on the plates 16; in practice, the supporting frame of the line 5 is provided so that the level of its output end is adjustable, in order to adapt to the various formats of the cutouts.

Conveniently, the number of the trucks 12 and 19 is equal to the number of the upper crests of the spacers of the cutout and is also equal to the number of trays for the ampoules, increased by one: it is in fact convenient to provide spacers III also on the two outermost sides of the cutout.

The trucks 12 and 19 are centrally provided, on the opposite side with respect to the plates and the seats, with respective tabs 21 and 22 adapted to engage in profiles of channel-shaped translatory motion cams 23 and 24 that are fixed between the active portion and the return portion of the respective lines: the profiles 23 and 24 for the translatory motion of the trucks along the respective pairs of cross-members are adapted to move the trucks in the active portions of the respective lines from a condition in which the trucks are spaced from one another to a condition in which they are closer to each other, and vice versa in the return portions (see the sequence of figures A, B, and C).

The means 6 for depositing the cutouts are constituted by a star 25 formed by arms 26 with suckers 27 that is mounted so as to be rotatable stepwise with a transverse horizontal axis O' above the inlet of the advancement line: the arms, with the stepwise rotation of the star 25, move from an upper position, in which an arm 28, which is mounted and actuated so as to be oscillatable about O", deposits onto the suckers of an arm 26 a flattened cutout taken from an overlying magazine 29 of cutouts, to a lower position for unloading the cutout onto a row of plates 13 of the advancement line.

The means 7 for removing the folded cutouts are constituted by a carousel 30 rotatably mounted at the output of the line 4 and having two opposite vertical pistons 31a and 31b rigidly coupled thereto; said pistons support two respective horizontal arms 32a and 32b so that they are movable vertically, and respective heads 33 with suckers 34 for gripping the folded cutout are mounted on the arms 32 in a downward region; the carousel 7 is actuated so that it is rotatable stepwise, and the head is actuated so that it is movable vertically to lower onto the trucks of the advancement line and then rise again to pick up the cutout and then, after the rotation of the carousel, to descend and deposit the cutout in the corresponding box 3 arranged on means for the stepwise advancement of the open box, which are not shown in the figure.

The head 33 is provided, in a downward region, with a row of suckers 34 that are adapted to grip the lower flat regions of the folded cutout and are spaced from one another to allow the insertion of the vertical spacer ribs of the cutout; the suckers 34 are connected to a suction pipe 36 through ducts 35.

Two L-shaped arms 37a and 37b are mounted at the two sides of the head 33, oscillate about respective pivots 37c, and are associated with the head 33 by elastic means constituted for example by a helical traction spring 38 and adapted to draw the lower ends of the arms back towards the axis of the head; respective free rollers 40 are mounted at the lower ends of the arms 37; when the head 33, with the suckers 34 applying suction, rises from the trucks 12, picking up the folded cutout, the arms 37a and 37b are drawn back by the springs 38 towards the centerline of the head and fold inwardly the vertical end flaps of the cutout, thus facilitating their insertion in the box; during the subsequent descent of the head 33 into the box, the free rollers 40 roll on the lateral flaps of the box, supported by underlying brackets, causing the upward return motion of the arms 37 during the insertion of the folded cutout in the box.

It is noted that the figures do not illustrate the supporting structures, the drive systems and the pneumatic connections, since they can be performed with different components that are easily commercially available.

If the number or width of the trays of the cutout vary, it is sufficient to adapt the number of trucks for each row and the convergence of the cams 24.

It has thus been shown that the invention achieves the intended aim and object.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically ones.

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

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.

Claims

1. A quick folding unit for a fret-folded separator cutout for boxes for containing ampoules or the like, characterized in that it comprises: a line for the stepwise advancement of the cutouts, which has a plurality of pairs of cross-members along which a plurality of trucks are mounted so that they are slideable transversely, plates being rigidly coupled to said trucks and being arranged longitudinally to the line so as to support and fold the upper crests of the spacers of the cutout, said plates being provided with a rear pusher tooth for the advancement of the cutout; a cutout folding line, which lies above said advancement line and has a plurality of cross-members that advance stepwise and along which a plurality of trucks are mounted so that they are slideable transversely, respective longitudinal seats being rigidly coupled to said trucks, said plates being insertable in said seats, the active lower portion of said line descending slightly to carry said seats from a raised configuration, in which no interference occurs with the cutout, to a lowered configuration for the complete folding of the cutout on said longitudinal plates of the advancement line; fixed cam profiles for the translatory motion of said trucks along said cross-members, which are adapted to move said trucks in the active portions of said lines from a condition in which the trucks are spaced from one another to a closer condition, and vice versa in the return portions; means for depositing the cutouts at the inlet of the advancement line; and means for removing the folded cutouts.

2. A unit according to claim 1, characterized in that said advancement line comprises two parallel conveyor chains that are closed in a loop, wind around respective driving and guiding sprockets, are associated with a step motor drive, the upper active portions being substantially horizontal, said chains being interconnected by said plurality of pairs of cross-members distributed on the chains with a constant pitch.

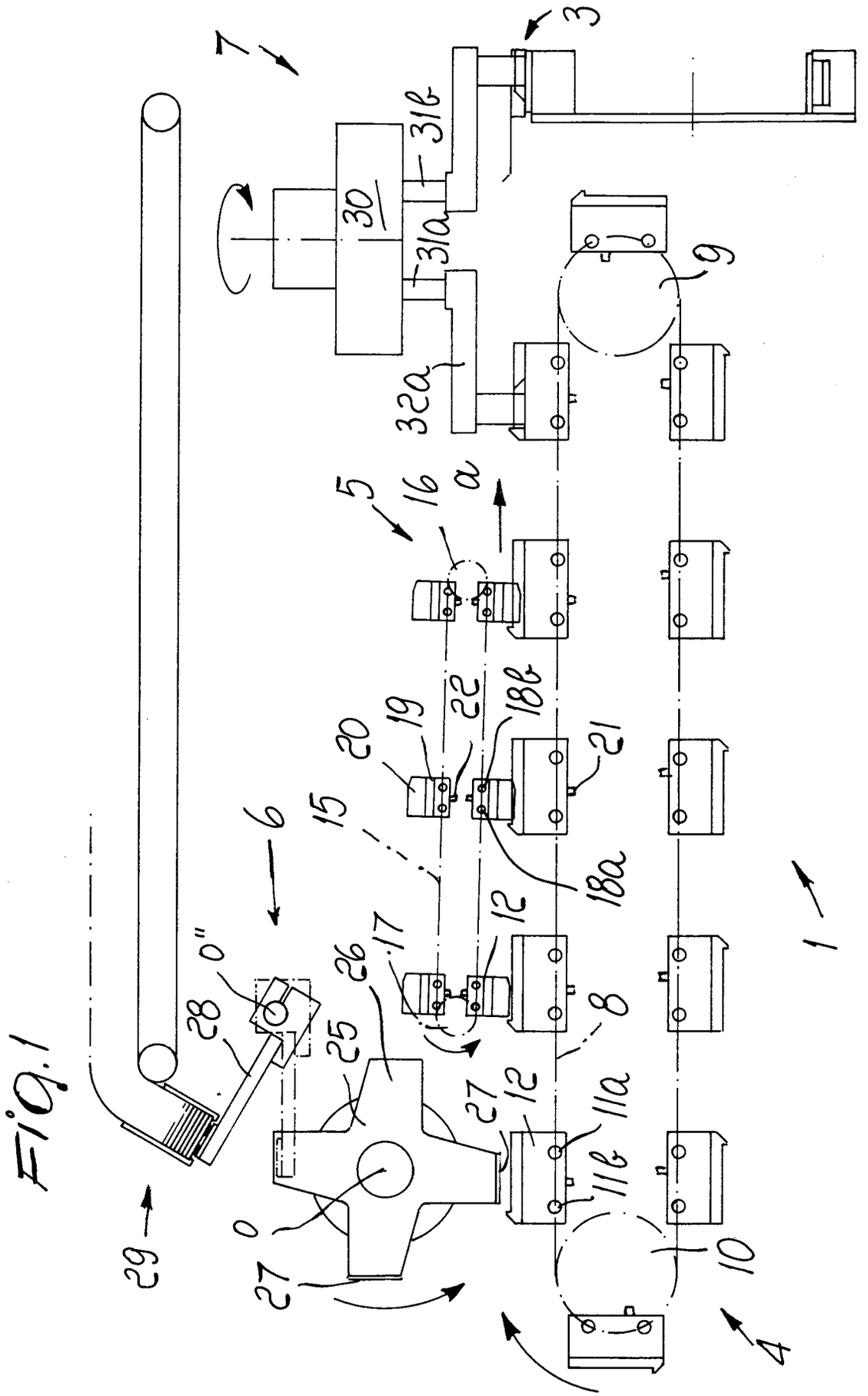
3. A unit according to claims 1 and 2, characterized in that said cutout folding line is constituted by two parallel chains that are closed in a loop, wind around respective driving and guiding sprockets, are associated with said step motor drive, and are interconnected by said plurality of pairs of cross-members that are distributed on the chains with a constant pitch.

4. A unit according to claim 1, characterized in that the number of said trucks is equal to the number of the upper crests of the spacers of the cutout.

5. A unit according to claim 1, characterized in that said trucks are centrally provided with respective tabs adapted to engage in said cam profiles, said profiles being fixed between the active portion and the return portion of the respective lines.

6. A unit according to claim 1, characterized in that said means for depositing the cutouts are constituted by a star formed by arms provided with suckers that is mounted so as to be rotatable stepwise with a transverse horizontal axis above the inlet of the advancement line, said arms being adapted to move from an upper position, in which an oscillating arm deposits onto the suckers of an arm a cutout taken from an overlying cutout magazine, to a lower position for unloading the cutout onto a row of said plates of the advancement line.

7. A unit according to claim 1, characterized in that said means for removing the folded cutouts are constituted by a carousel rotatably mounted at the outlet of said advancement line and having at least one vertically movable sucker-fitted head for gripping the folded cutout, said head being actuated so as to be movable vertically to lower onto the trucks of the advancement line and then rise again to remove the cutout and then, after the rotation of the carousel, descend and deposit the cutout in the corresponding box arranged on means for the stepwise advancement of the open box.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3
31b
30
31a
32a
9
5
16
a
20
19
22
18b
21
15
6
18a
12
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17
8
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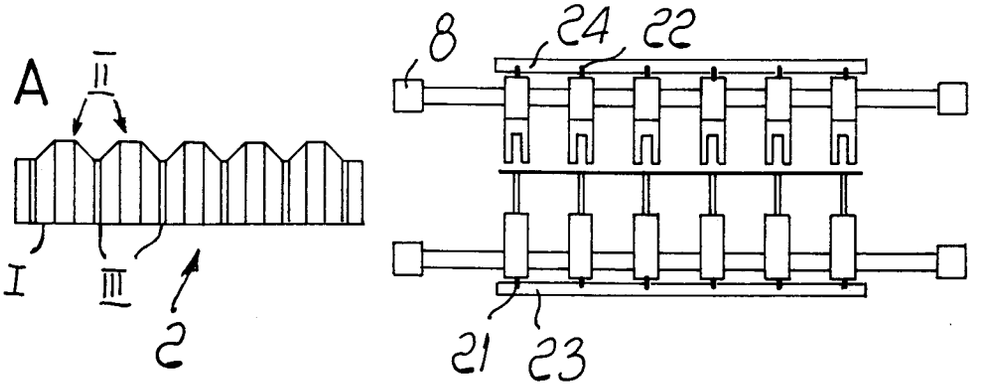
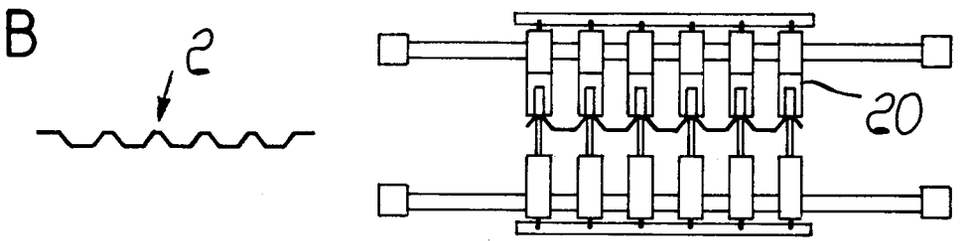
4

Fig.1





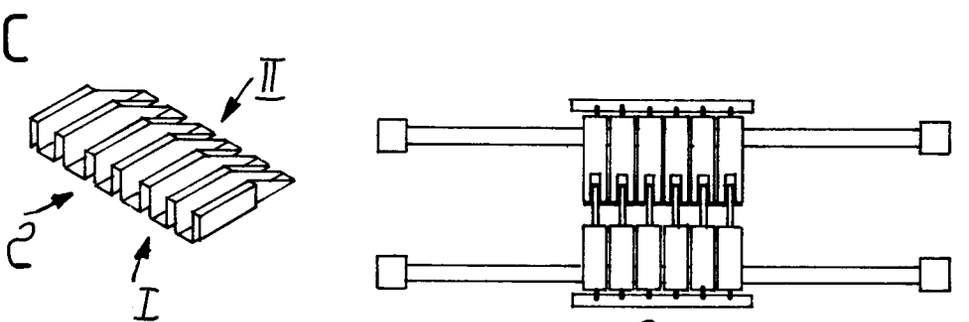


FIG. 3

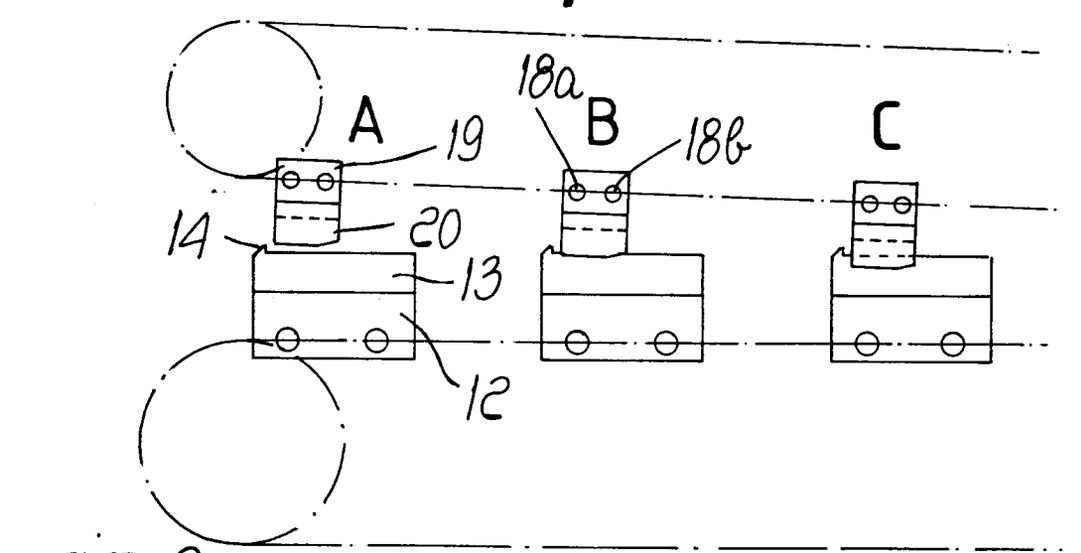


FIG. 2

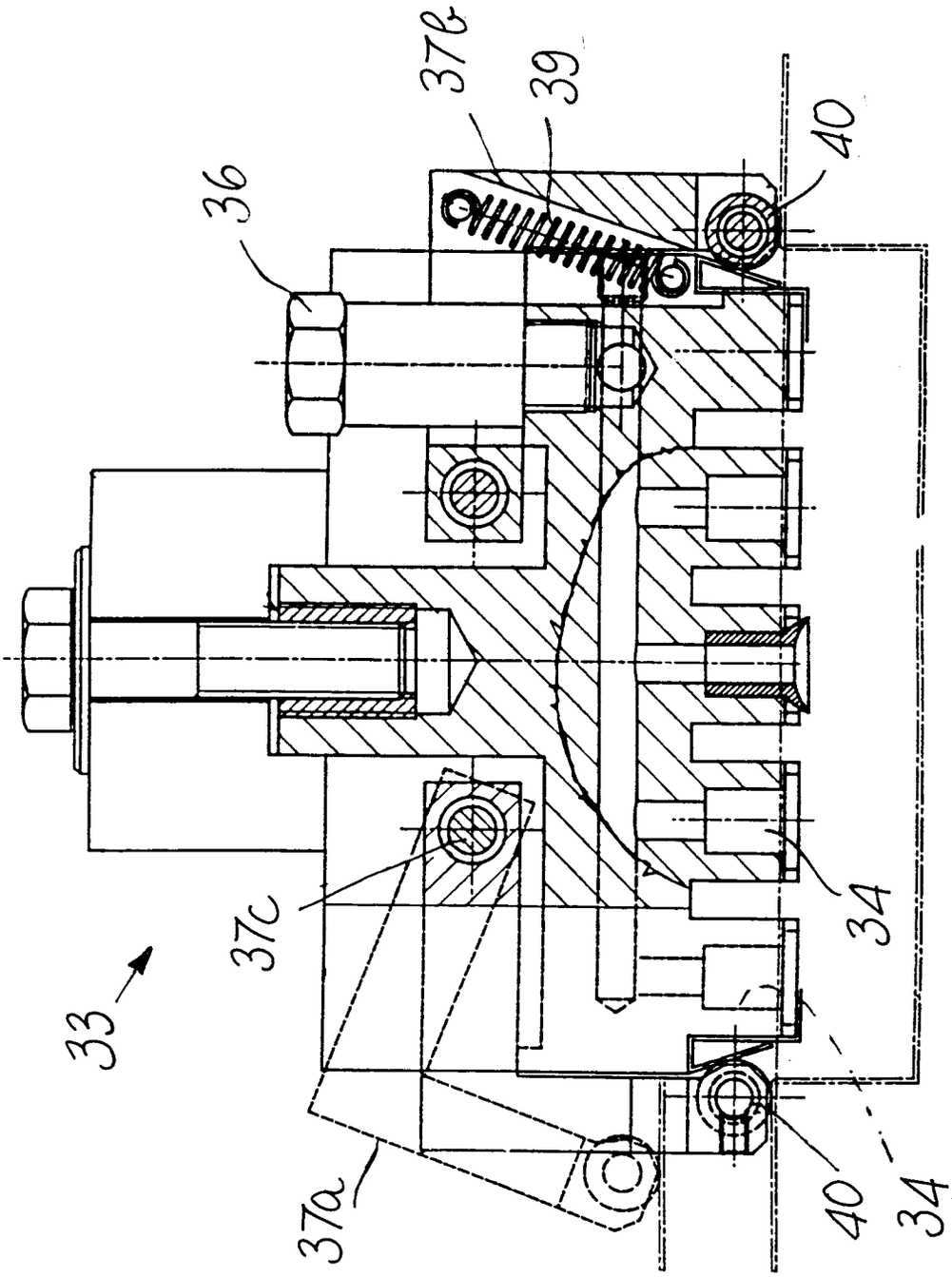


Fig. 4