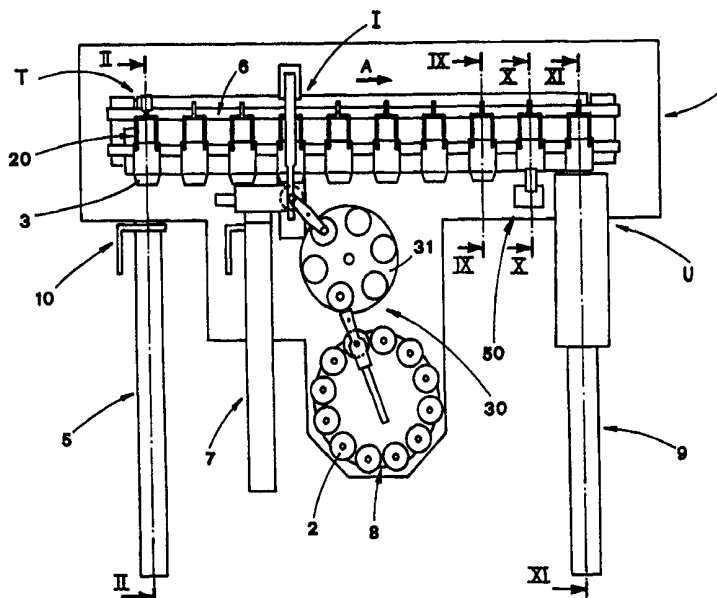




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(54) Title: A MACHINE FOR PACKAGING COMPACT DISCS AND THE LIKE INTO ENVELOPES



(57) Abstract

In a machine (1) for packaging compact discs (2) into relative envelopes (3) picking up means (10) withdraw single envelopes (3) from a magazine (5) and transfer these envelopes in a predetermined position to a conveying line (6). Clamping means (20) keep the envelopes (3) on the conveying line (6) during its forward movement. Handling means (30) join single compact discs (2) with respective cover sheets (4) withdrawn from a magazine (7). The handling means (30) introduce the compact discs together with cover sheets (4) into relative envelopes (3) dwelling on the conveying line (6).

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**A MACHINE FOR PACKAGING COMPACT DISCS AND THE LIKE INTO
ENVELOPES**

BACKGROUND OF THE INVENTION

5 The present invention relates to packaging of compact discs and the like into relative envelopes.

DESCRIPTION OF THE PRIOR ART

Compact discs can be packaged not only in the traditional
10 cases formed by two shells made of a plastic material, but also inserted into envelopes of different shape made from sheet material like paper or cardboard.

According to the simplest configuration, these envelopes are obtained from a sheet of cardboard folded along a
15 median line, so as to form two surfaces facing each other, that are joined along two sides adjacent to the fold side by gluing of respective flaps.

Thus the side of the envelopes opposite to the fold side is open.

20 In other cases, the envelopes are provided with a closing strips, extending from one surface along the open side, and can be folded over the other surface to close the envelope opening.

These closing strips may have different shapes and
25 dimensions; in particular, they may extend on an area equal to the envelopes surfaces.

Usually, one of the envelope surfaces has an aperture, generally circular, covered with a sheet of a transparent material, so that a corresponding face of the compact disc
30 contained in the envelope can be seen from outside.

The compact discs are usually accompanied by respective cover sheets, sometimes book-like made, containing information about the disc contents and the like.

Packaging of the compact discs inside the envelopes of
5 different shape is difficult because of little versatility of the packaging lines.

Actually, if the shape, i.e. the type of the envelope is to be changed, when the machine permits such operation, it is necessary to carry out complicated adjustments before
10 the production can be resumed, adjustments which need time and specialized operators.

SUMMARY OF THE INVENTION

The object of the present invention is to propose a
15 versatile machine for packaging compact discs into relative envelopes, with the possibility of using envelopes of different shapes without any need of part substitution or size change over.

Another object of the present invention is to propose a
20 machine, which requires only rapid adjustment of the envelopes magazine walls, when the envelope shape is to be changed.

A further object of the present invention is to propose a machine, with which compact discs can be packed together
25 with a cover sheet situated under or over the compact disc, into the envelopes.

The above mentioned objects are obtained, in accordance with the invention, by a machine for packaging compact discs and the like into related envelopes, with each
30 envelope defining a bottom edge and two front edges by which the inside of the envelope is made accessible, said

machine being characterized in that it includes:

a withdrawing unit for withdrawing single envelopes from a magazine and for transferring the withdrawn envelopes to an envelope conveying lines, with the front edges located
5 in alignment with a reference axis defined along said conveying line;

clamping means for keeping said envelopes on said conveying line during forward motion thereof;

handling means for releasing single compact discs, said
10 handling means being adapted to join up said compact discs and respective sheets taken out from a sheet magazine and insert said compact discs along with associated sheets into related envelopes kept dwelling on said conveying line.

15

BRIEF DESCRIPTION OF THE DRAWINGS

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

- 20 - Figure 1 shows a plan view of the whole machine for packaging compact discs, that incorporates the present invention;
- Figures 2a, 2b, 2c, 2d, 2e and 2f show cross sectional views of envelopes picking up means of this machine, in
25 different working steps, taken along line II-II of Figure 1;
- Figure 3 shows a plan view of clamping means aimed at keeping a single envelope during movement along the conveying line;
- 30 - Figures 4 and 5 show plan view of the envelope clamping

means working on envelopes of different shape;

- Figures 6a and 6b show plan views of compact discs handling means in different working steps;

- Figures 7a, 7b and 7c show cross sectional views of compact discs handling means in different working steps,
5 taken along line VII-VII of Figure 6a;

- Figure 8 shows a cross sectional view of the compact discs handling means, taken along the line VIII-VIII of Figure 7c;

10 - Figure 9 shows a cross sectional view of envelopes closing means, taken along the line IX-IX of Figure 1;

- Figures 10a, 10b and 10c show cross sectional views of other envelopes closing means in different working steps, taken along line X-X of Figure 1;

15 - Figures 11a, 11b and 11c show cross sectional views of means which move away the compact discs packaged into relative envelopes in different working steps, taken along line XI-XI of Figure 1.

20 **BEST MODES OF CARRYING OUT THE INVENTION**

With reference to the above mentioned figures, reference numeral 1 indicates the machine for packaging compact discs 2 into relative envelopes 3.

Cover sheets 4 are associated to the compact discs 2
25 introduced into the envelopes 3.

The machine 1 includes a unit 10 for withdrawing single envelopes 3 from a magazine 5, in which these envelopes are arranged in line, facing each other and suitably inclined (Figure 2a).

30 Then, the withdrawing unit 10 transfers the withdrawn

envelopes 3 to a conveying line 6, which extends horizontally crosswise to the longitudinal axis of the magazine 5.

The bottom of the magazine 5 is defined by a conveying
5 belt 5a which moves stepwise the row of envelopes 3, in suitable time relation with the envelope withdrawing action of the unit 10.

The withdrawing unit 10 includes an arm 11 situated beside the magazine 5 and oscillating on a pin 12, in a vertical
10 plane parallel to the magazine 5.

At its free end, the arm 11 carries a cross-bar 13 equipped with gripping suction cups 14, which act on the first envelope fed by the magazine 5.

This arm 11 cooperates with a carriage 15, reciprocating
15 on guides 16, which are disposed longitudinal to the magazine 5 and over the conveying line 6.

The carriage 15 is operated by an actuator, not shown, controlled by an electronic control unit, also not shown.

Preferably, for the reasons explained later, the working
20 stroke in direction L (Figures 2c, 2d, 2e) extends for a first part having a determined length and for another part covered in steps.

The carriage 15 carries further withdrawing suction cups means 17, which receive the envelopes 3 withdrawn from the
25 magazine 5 and transfers them to the conveying line 6.

The conveying line 6 is formed by a pair of conveying belts 6a, 6b, arranged coplanar with a running surface 18, and located into suitable openings made in this running surface 18.

30 A sensor 19, situated over the running surface 18, checks the positioning of the envelopes 3 on the conveying line 6

(Figure 2d).

The conveying line 6 carries clamping means 20, which keep the envelopes 3 on this conveying line 6 during its movement.

5 These clamping means 20 are basically formed by a fork-like presser 21, pivoted by a pin 22 to a connector 23 fastened to the belt 6a of the conveying line 6.

On their fore extremities, the prongs of this presser 21 carry respective rollers 24 which engage the upper surface
10 of a relative envelope 3, thus keeping it clamped onto the belt 6b.

A lever mechanism 25, hinged on a pin 26 and controlled by an actuator 27, acts on the rear part of the presser 21, in the region of a station T, where the envelopes 3 are
15 transferred to the conveying line 6.

This lever mechanism 25 operates a rotation of this presser 21 to open.

It is to be noted that the presser 21 fulfills its task independently from the shape of the envelope 3, as it is
20 seen in Figures 3, 4 and 5, which show respectively an envelope with a closing strip 3a equal to the envelopes surfaces, an envelope with two closing strips 3b, 3c of limited width, extending along opposite sides, and an envelope without any closing strip.

25 In all these cases, the front edges 233 of the envelope 3, i.e. the edges which are raised in order to introduce the compact disc 2 together with the cover sheet 4 therebetween, must be positioned in alignment with a reference axis R (o zero axis) of the machine.

30 Moreover, the envelopes 3 may have a circular aperture 3d, made in accordance with a known way and closed with a

sheet of a transparent material.

A station I, where the compact discs 2 are introduced into the above mentioned envelopes 3 fed along the conveying line 6, is situated downstream of the station T, where the envelopes 3 are transferred in the moving direction A of this conveying line 6.

Handling means 30 for giving out single compact discs 2 are situated in the region of the introduction station I and are aimed at joining respective cover sheets 4 withdrawn from a magazine 7 to these compact discs 2.

The handling means 30 include a carousel carrier 31, rotating on a vertical axis 32 and featuring, equally spaced out along its edge, a plurality of seats 31a housing respective compact discs 2 (Figure 6a).

The carousel carrier 31 is fed by a drum magazine 8, which stores compact discs 2 piled within suitable seats.

The carousel carrier 31 cooperates with a transferring element 33 rotating on a vertical axis 34, and equipped with suction cups 35 arranged diametrically opposite, which pick up single compact discs 2 from the carousel carrier 31 and transfer these compact discs 2 to a running surface 36.

This running surface 36 is defined by a pair of parallel guides 36a, 36b, set crosswise to the conveying line 6.

The guides 36a, 36b have a double series of nozzles 37 which are to be connected alternatively with suction means, so as to make the compact discs slightly adhere to the running surface 36, and to the compression means, so as to create a light jet of air at the nozzles 37 outlet to support the compact discs.

The rotating transferring element 33 is driven into

vertical motion

by not shown actuators, between a lowered position, in which the compact discs 2 to be transferred are picked up and released, and raised position, in which the compact
5 discs 2 are transferred, the raised position being indicated with the broken line 33a in Figure 7a.

The cover sheets 4 to be joined to the compact discs 2 are fed to the running surface 36 by a transversal surface 38, defined by a series of parallel plates.

10 The transversal surface 38 is fed by the magazine 7, in the region of which a pusher 39 operates.

The compact disc 2 together with the cover sheet 4 is introduced into the relative envelope 3, which is kept dwelling on the conveying line 6, by pliers operated
15 crosswise to the conveying line 6 in the region of the running surface 36 (Figure 7a).

An opening mechanism 41 for opening the envelope 3 dwelling on the conveying line 6 operates in the region of the introduction station I.

20 This opening mechanism 41 includes a rocker lever 42, which is operated on a vertical plane crosswise to the conveying line 6 and which is equipped with suction cup gripping means 43 acting on the upper surface of the envelope 3, near the opening side.

25 Other stationary gripping means 44, cooperating with the suction cups 43, act on the lower surface of the envelope 3 in the region of the running surface 18.

Finally, the machine includes also a closing unit 50 for closing the envelopes 3.

30 The closing unit 50 includes a stationary folder element 51, which folds the closing strip 3a, 3b of the envelope

3, so that it assumes orthogonal position with respect to the running surface 18 of the conveying line 6 (see Figures 9 and 10c).

Folding pliers 52, situated downstream of the stationary
5 folder element 51, completes the closing of the envelope 3, only in case of envelopes provided with a closing strip 3b of limited dimensions (Figure 10a).

The folding pliers 52 include a pair of jaws 53a, 53b, which clamp the closing strip 3b to the envelope.

10 The first jaw 53a is stationary, whereas the second jaw 53b is supported by an oscillating arm 55 via spring means 54.

An outlet station U for the packaged compact discs is situated downstream of the closing unit 50.

15 A presser roller 56, situated in the outlet station U, is carried rotatably by an arm 57, which oscillates on a vertical plane crosswise to the conveying line 6.

The presser roller 56 is driven into rotation by driving means 58 connected to the arm 57 (Figure 11a).

20 The presser roller 56 cooperates with a contrast roller 59, idle on the running surface 18 of the conveying line 6.

The rollers 56, 59, rotating in opposite directions, transfer the packaged compact discs to a moving away line
25 9, which extends crosswise to the conveying line 6.

Another pair of rollers 60, rotating in opposite directions, situated at the entrance of the moving away line 9, engage the packages going out of the outlet station U.

30 The operation of the described machine will be explained

in the following , beginning from the step, in which the envelopes 3 are withdrawn from the magazine 5 by the withdrawing unit 10.

The oscillating arm 11 of the withdrawing unit 10 moves
5 between a lowered position, in which the suction cups 14 pick up the first envelope 3 of the pile contained in the magazine 5 (Figure 2a) and a raised position, in which this envelope 3 is released from the pile (Figure 2b).

In the raised position, the envelope 3, withdrawn by the
10 suction cups 14, is released by these suction cups 14 and, at the same time engaged by other suction cups 17 carried by the carriage 15 (Figure 2c).

In this way, the envelope 3 is transferred by the movement of the carriage 15 on the guides 16.

15 During this transferring, the sensor 19 detects the bottom edge 133 of the envelope 3 (see Figure 2d); at this point the carriage 15, controlled by the electronic control unit, which has registered therein the significant parameters of the envelope, i.e. the distance between the
20 bottom edge 133 and the front edges 233, performs a stroke C of such amplitude that these front edges 233 are positioned in the region of the reference axis R.

In order to reduce the working time, a part of this stroke is covered at a constant speed, while the final part is
25 covered in steps.

Consequently, the sensor 19 causes the carriage 15 make a stroke of a predetermined amplitude, beginning from the position defined by this sensor 19 (Figure 2e).

Thus the envelope 3 is released in a predetermined
30 position, in the transfer station T, defined by the side of the envelope 3 opposite to the opening, therefore

independently from the possible presence of the closing strip or its extension.

The envelope 3 transferred by the withdrawing unit 10 to the above mentioned predetermined position is locked by the presser 21, that, once its has been released by the lever mechanism 25, goes down to clamp the envelope 3 against the belt 6b of the conveying line 6 (Figure 2f).

The presser 21 is hinged to the belt 6a of the conveying line 6, so that during the movement of the conveying line, i.e. conveying belts 6a, 6b, the envelope 3 is kept in the predetermined position by the presser 21, which moves together with this conveying line 6.

When in the introduction station I, the rear part of the envelope 3 is kept by presser 21, while its fore part is opened by the suction means 43 carried by the rocker lever 42 of the opening mechanism 41, so as to allow the compact disc 2 together with the relative cover sheet 4 to be introduced into the envelope 3.

The compact discs 2, fed to the carousel carrier 31 by the magazine 8, are withdrawn by the rotating transferring element 33, which rotates intermittently on its vertical axis 34, and subsequently transferred to the guides 36a, 36b defining the running surface 36 (Figure 6a).

The cover sheets 4 are fed to this running surface 36 in suitable time relation with the withdrawal and transfer of the compact discs 2, so that a relative cover sheet 4 is joined with each compact disc 2 (Figure 6b).

Usually, in this step, the compact disc 2 is situated over the cover sheet 4, so that, after being introduced into the envelope 3, this compact disc 2 can be seen through the circular aperture 3d of the envelope 3 situated in the introduction station I.

That is why the cover sheet 4 is positioned on the guides 36a, 36b of the running surface 36 before the compact disc 2 is transferred thereto (Figure 7a).

A light suction is applied to the nozzles 37 of the guides 36a, 36b, so that the cover sheet 4 adheres to these guides.

The pliers 40 are operated in direction B, so as to take the compact disc 2 together with the cover sheet 4, situated below, and introduce this compact disc 2 together with the cover sheet 4 into the open envelope 3 (Figure 7b).

If required, it is possible to position the cover sheet 4 over the compact disc 2, which in this case is transferred to the running surface 36 before the cover sheet is placed thereon.

In this case, the nozzles 37 eject a light jet of air, which creates an air cushion supporting the compact disc.

The rotating transferring element 33 is moved from the raised transferring position 33a to the lowered position 33b, in which the compact discs 2 are released onto the guides 36a, 36b (Figure 8).

The pusher 39 is operated to move from the withdrawn position 39a to an advanced position, thus transferring the cover sheet 4 onto the compact disc 2.

After the compact disc 2 together with the cover sheet 4 have been introduced into the envelope 3, this envelope is transferred to the closing unit 50 by the conveying line 6.

If the envelope 3 is equipped with a short closing strip 3b, the stationary folder element 51 folds first this closing strip 3b to the position orthogonal to the running

surface 18 of the conveying line 6 (Figure 9).

Then, the folding pliers 52, situated beside the conveying line 6, are operated, with the jaws 53a, 53b initially opened (Figure 10a).

- 5 The closing strip 3b is folded over the lower surface of the envelope 3 by the advance movement of the folding pliers 52 and closing of the jaws 53a, 53b (Figure 10b).

Afterwards, the envelope 3 is brought to the outlet station U, below the presser roller 56 (Figure 11a).

- 10 This presser roller 56 is lowered onto the envelope 3 and operated against the roller 59, so as to transfer the envelope 3, passing between the counter-rotating rollers 60, to the moving away line 9 (Figure 11b).

- 15 If the dimensions of the closing strip 3a of the envelope 3 are the same as of the envelope surface, this closing strip 3a is folded to the orthogonal position by the stationary folder element 51 (Figure 10c).

- 20 Then the presser roller 56 moves the envelope 3 with the strip 3a folded orthogonal between the counter-rotating rollers 60, which close the strip 3a (Figure 11c).

As it appears from the present description, the proposed machine is very versatile and can be used for packaging compact discs in envelopes of different shapes, currently in use.

- 25 In order to change the size, it is enough to adjust the distance between the sides of the magazine 5, if obviously, the width of the new envelopes is different than the width of the previous ones, and store the new distance between the bottom edge 133 and the front edges 233 in the memory of the electronic control unit.
- 30

Consequently, it is not necessary to substitute groups or

parts of machine for a new envelope size, which is extremely advantageous because reduces the machine handling costs.

The proposed machine uses envelopes of different shapes and sizes, i.e. with closing strips 3a of different sizes, 5 or without these closing strips.

Moreover, the machine includes simple means and guarantees a high working speed.

The machine is also extremely versatile, as any type of 10 envelope can be used for packaging compact discs 2 accompanied by cover sheets 4, which can be placed over or under the compact discs.

Consequently, the proposed machine is universal, i.e. it can be used for any kind of envelopes and for the group 15 compact disc - cover sheet in any configuration, and its structure allows to avoid substitution of its groups or parts when the size change is required.

It is understood that what above has been described as a mere, non limitative example, therefore possible 20 constructive variants remain within the protective scope of the present invention as claimed below.

CLAIMS

1. A machine for packaging compact discs (2) and the like into related envelopes (3), with each envelope defining a
5 bottom edge (133) and two front edges (233) by which the inside of the envelope is made accessible, said machine being characterized in that it includes:

a withdrawing unit (10) for withdrawing single envelopes (3) from a magazine (5) and for transferring the withdrawn
10 envelopes (3) to an envelope conveying lines (6), with the front edges (233) located in alignment with a reference axis (R) defined along said conveying line;

clamping means (20) for keeping said envelopes (3) on said conveying line (6) during forward motion thereof;

15 handling means (30) for releasing single compact discs (2), said handling means being adapted to join up said compact discs (2) and respective sheets (4) taken out from a sheet magazine (7) and insert said compact discs (2) along with associated sheets (4) into related envelopes
20 (3) kept dwelling on said conveying line (6).

2. A machine as in claim 1, wherein said clamping means (20) for keeping said envelopes (3) on said conveying line (6) include a fork-like presser means (21) pivoted by a
25 pin (22) to connecting means (23) fastened to a belt (6a) of said conveying line (6), said presser means (21) being adapted to engage an upper surface of a related envelope (3) being advanced along said conveying line (6).

30 3. A machine as in claim 2, wherein said presser means (21) has a fork-like shape and features two prongs with

fore ends carrying respective rollers (24) aimed at clamping said envelope (3) to conveying means (6b) of said conveying line (6).

5 4. A machine as in claim 2, wherein a lever mechanism (25) acts on a rear part of said presser means (21), in the region of a station (T) where said envelopes (3) are transferred to said conveying line (6), said lever mechanism being hinged on a pin (26) and controlled by
10 actuator means (27) so as to operate a rotation of said presser means (21) to open.

5. A machine as in claim 1, wherein said withdrawing unit (10) for withdrawing and transferring said envelopes (3)
15 includes:

an arm (11) oscillating in a vertical plane crosswise to the conveying line (6), said arm being equipped with gripping means (14) which act on a single envelope released by the magazine (5); and

20 a carriage (15) reciprocating crosswise to said conveying line (6) and equipped with further gripping means (17) aimed at receiving said envelopes (3) released from said magazine (5).

25 6. A machine as in claim 1, wherein said withdrawing unit (10) for transferring said envelopes (3) to said conveying line (6) includes sensor means (19) connected to an electronic control unit and located over a running surface (18) of said conveying line (6), said sensor means being
30 aimed at detecting the bottom edge of an envelope (3) while being transferred from said magazine (5) to said

conveying line (6).

7. A machine as in claim 1, wherein said handling means (30) for releasing single compact discs (2) include a
5 rotating transferring element (33) rotating on a vertical axis (34) and equipped with gripping means (35) for picking up single compact discs (2) from a carousel carrier (31) and for transferring said compacts discs to a running surface (36), that is set crosswise to said
10 conveying line (6) and onto which said sheets (4) are supplied to be associated to said compact discs (2).

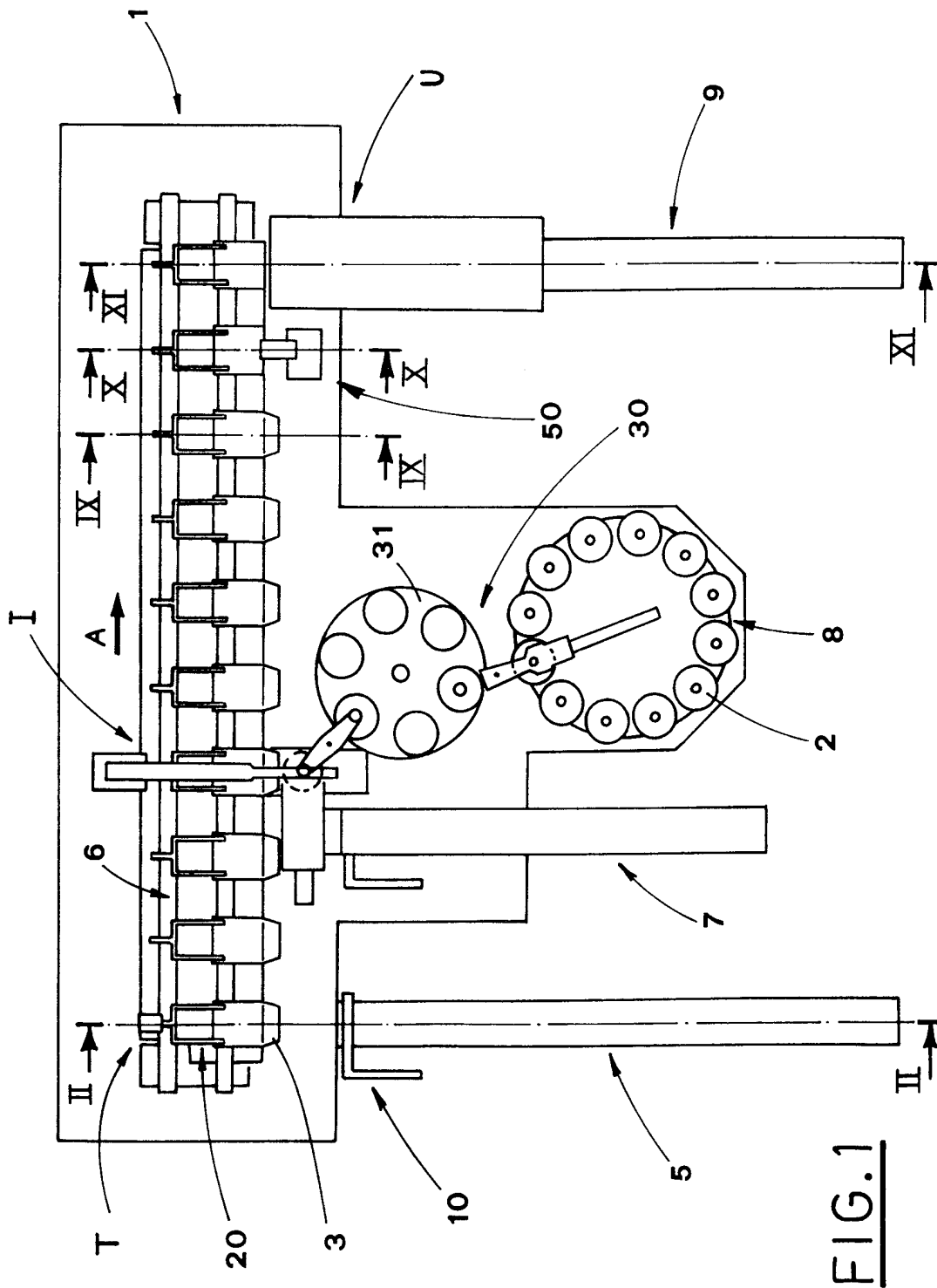
8. A machine as in claim 7, wherein said running surface (36) is defined by guiding means (36a, 36b) disposed
15 crosswise to said conveying line (6) and featuring a series of nozzles (37) which are alternatively connected to suction means, to create a light adherence force directed towards said running surface (36), and with pressure means so as to create a light air jet coming out
20 from said nozzles (37).

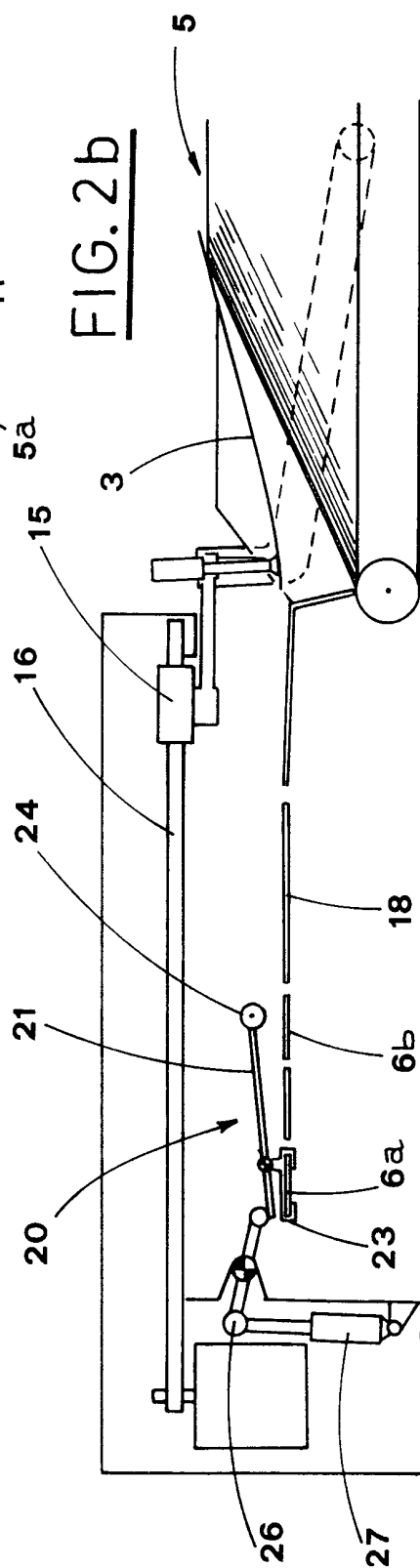
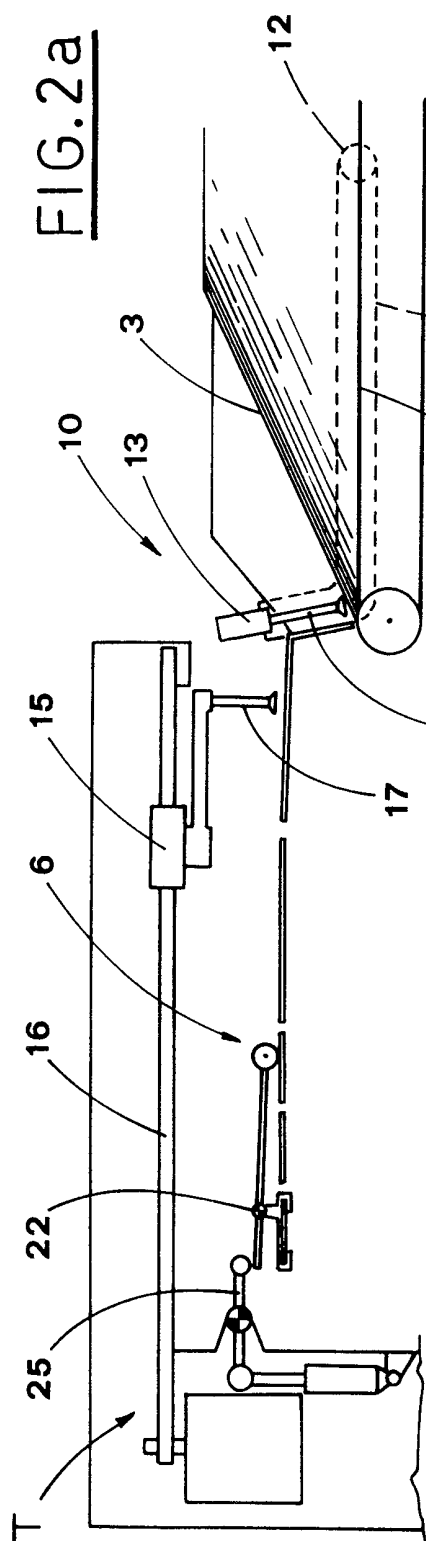
9. A machine as in claim 1, wherein there is a closing unit (50) for closing said envelopes (3), said closing unit (50) including stationary folder means (51) for
25 folding a closing strip (3a,3b) of the envelopes (3) up to a position orthogonal with respect to the plane of the conveying line (6).

10. A machine as in claim 9, wherein said closing unit (50) includes, downstream of said stationary folder means (51), a pliers folder member (52) for completing the

envelope closing operation, said pliers folder member (52) being mobile along a direction crosswise to said conveying line (6) and including a pair of jaws (53a, 53b), which resiliently clamp the closing strip (3b) to the envelope

5 (3).





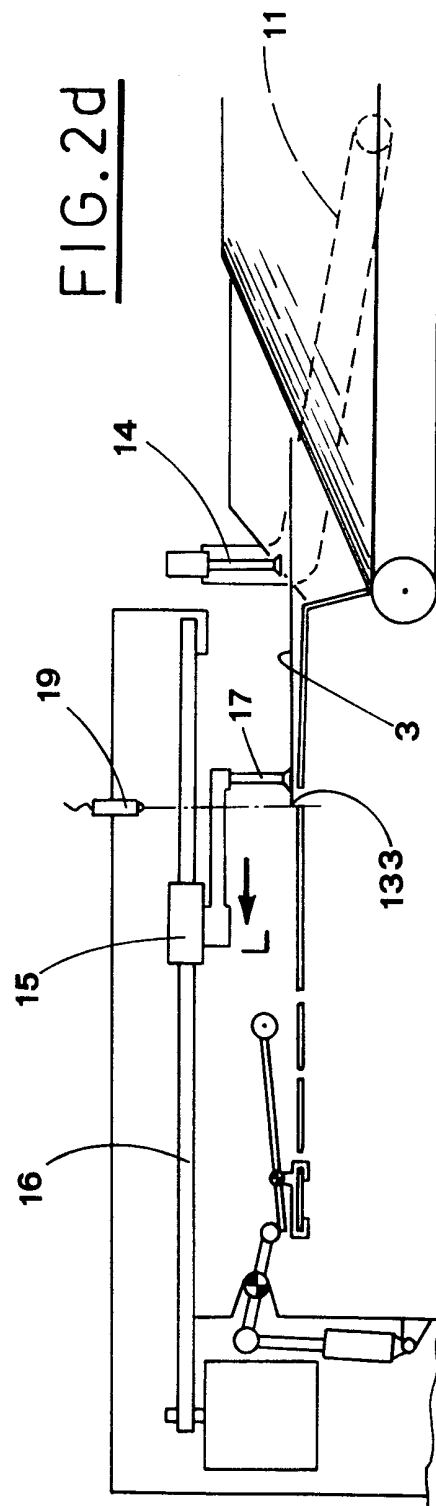
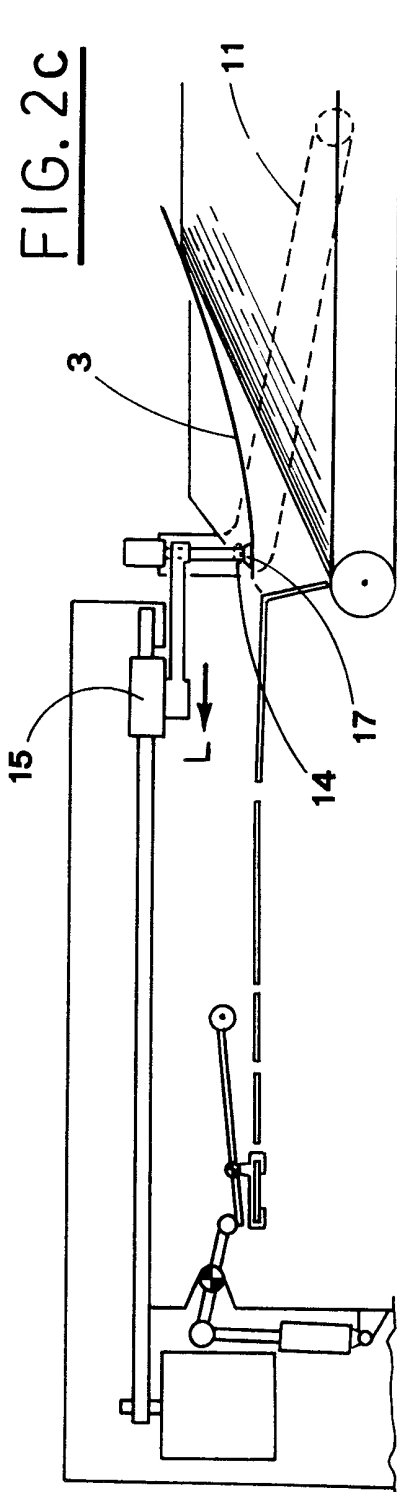


FIG. 2e

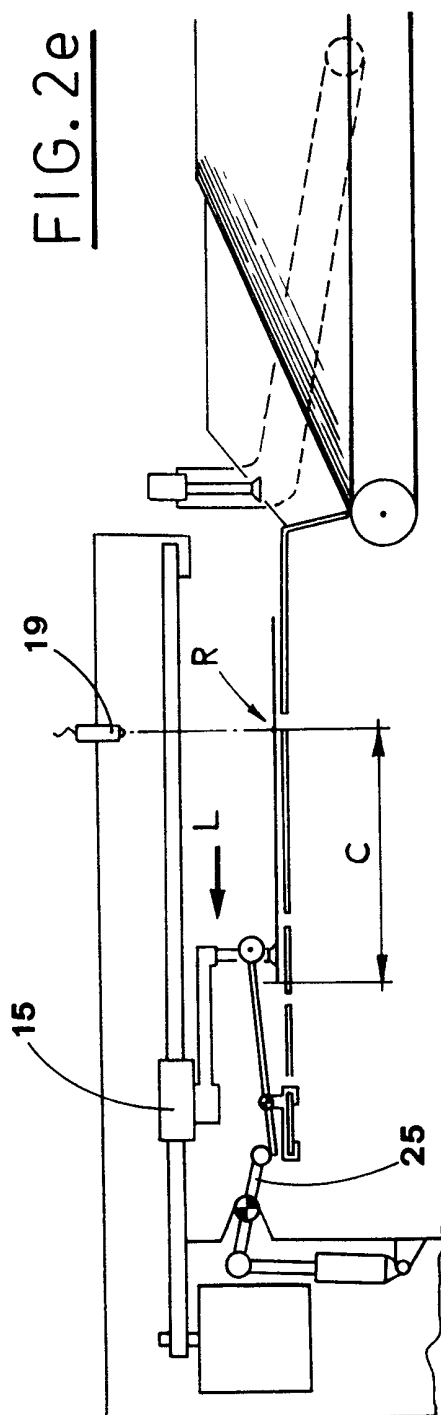
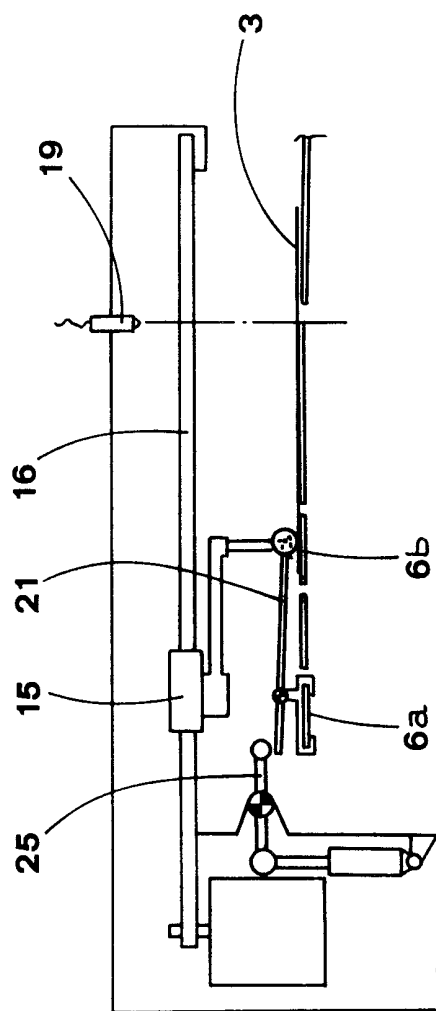
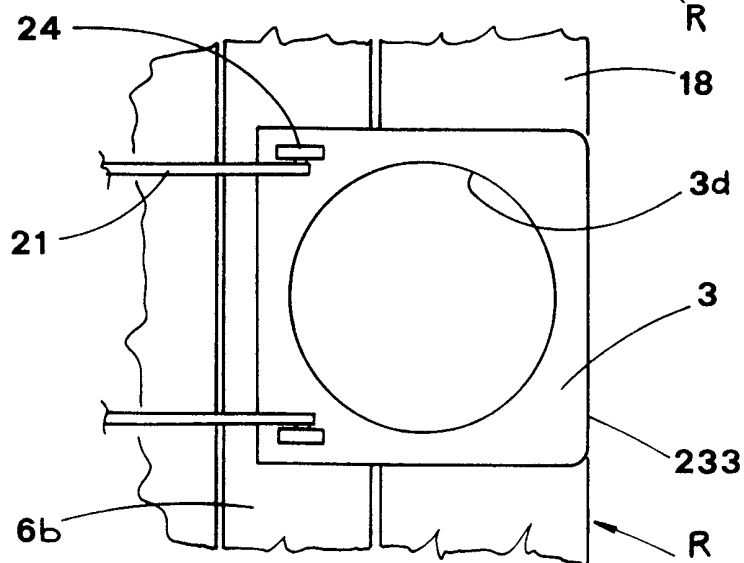
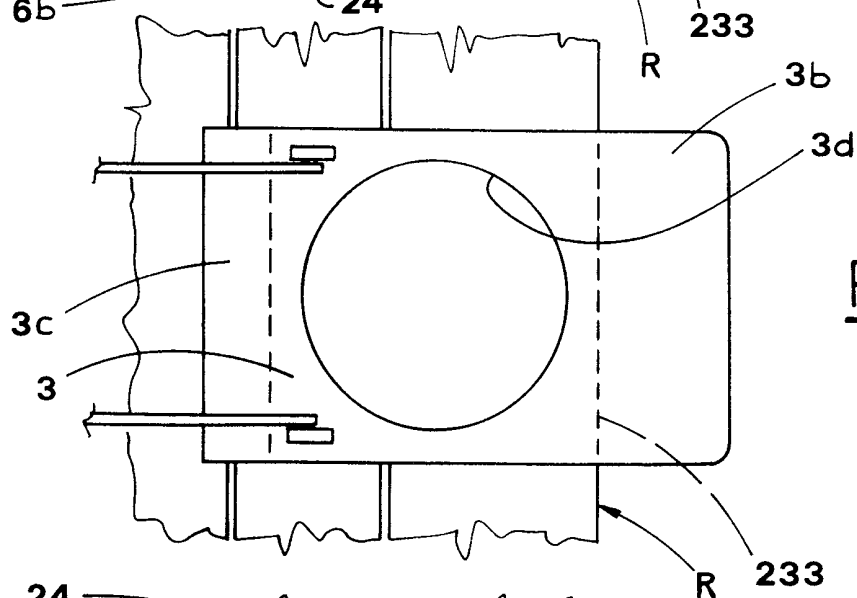
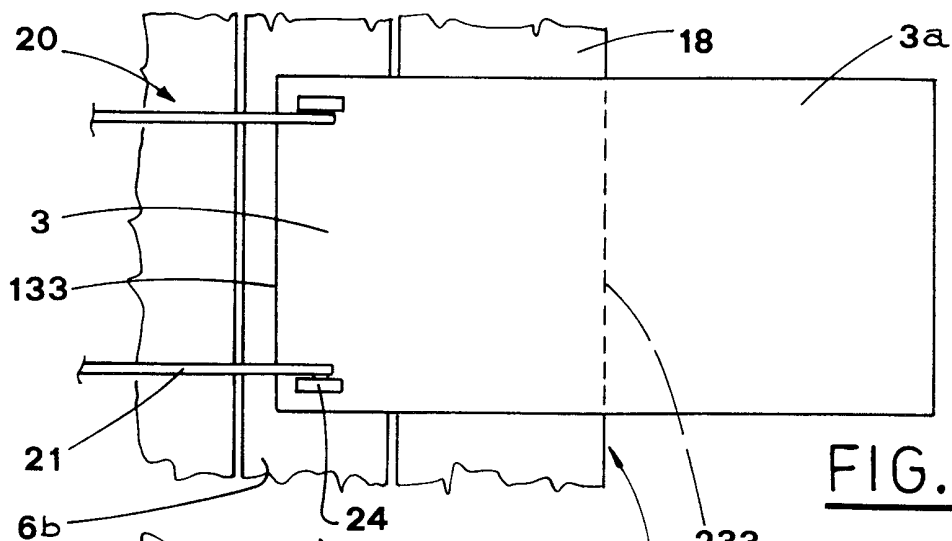
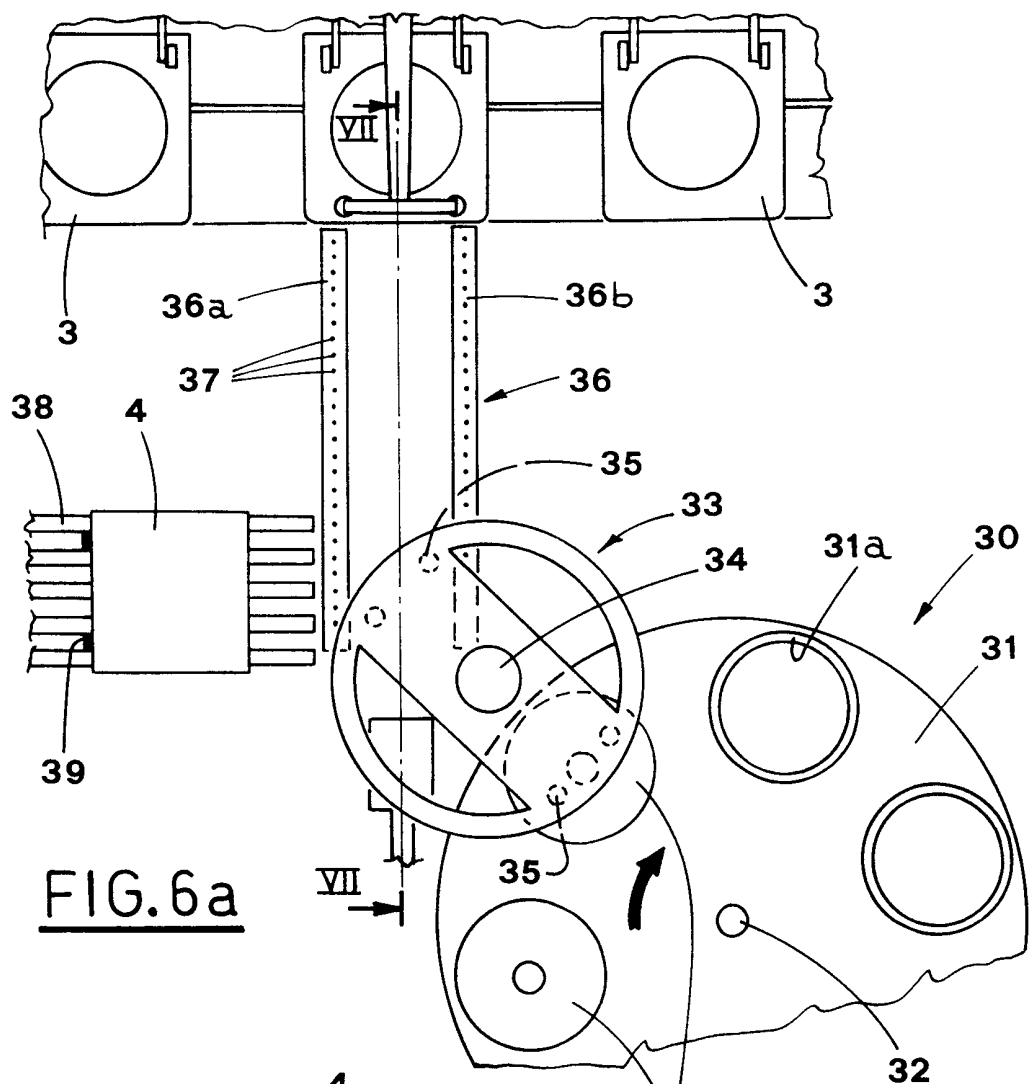
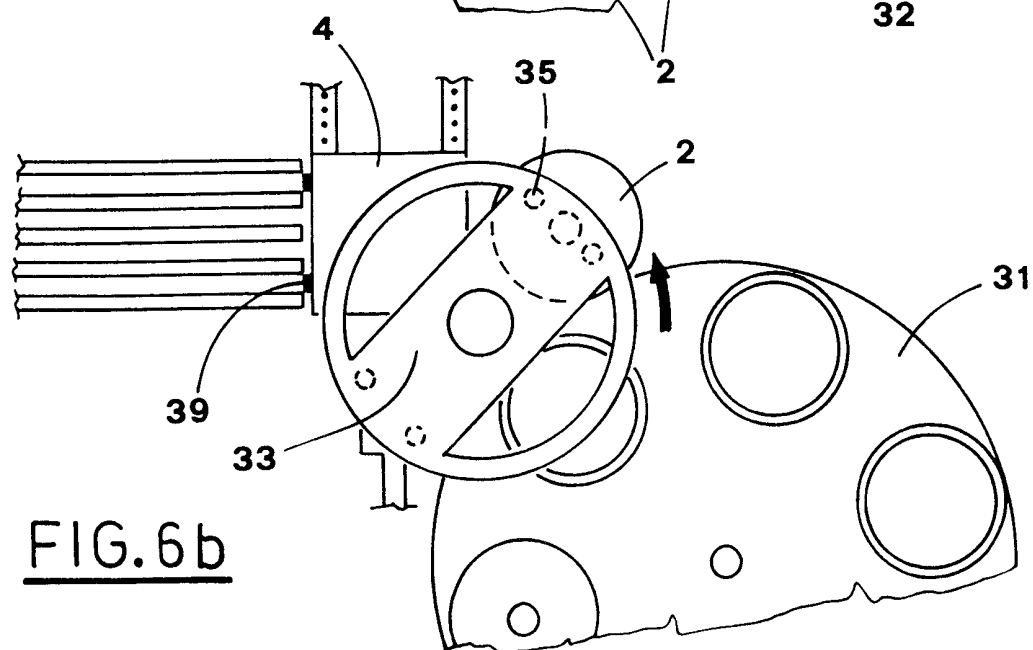


FIG. 2f

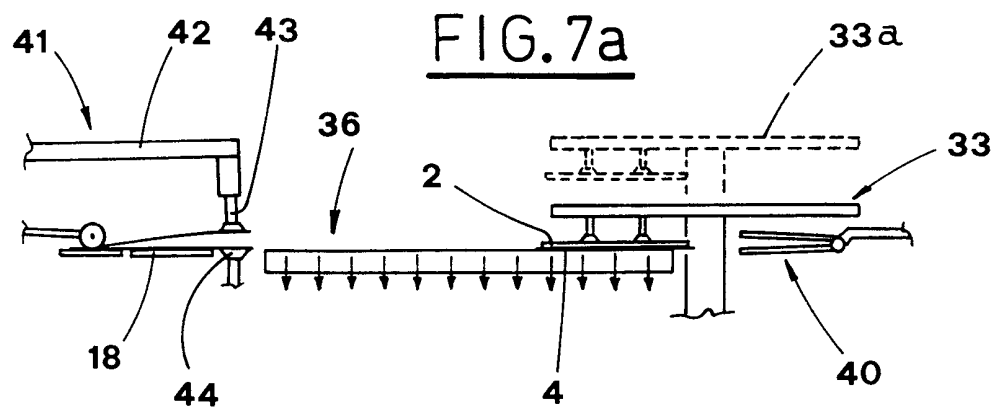


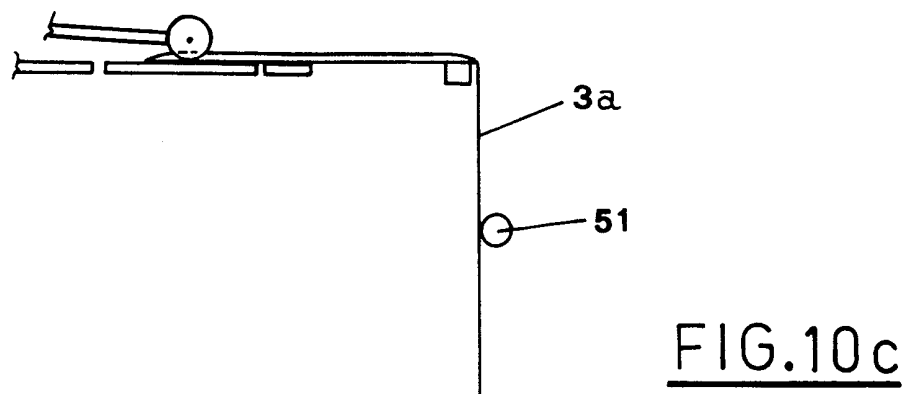
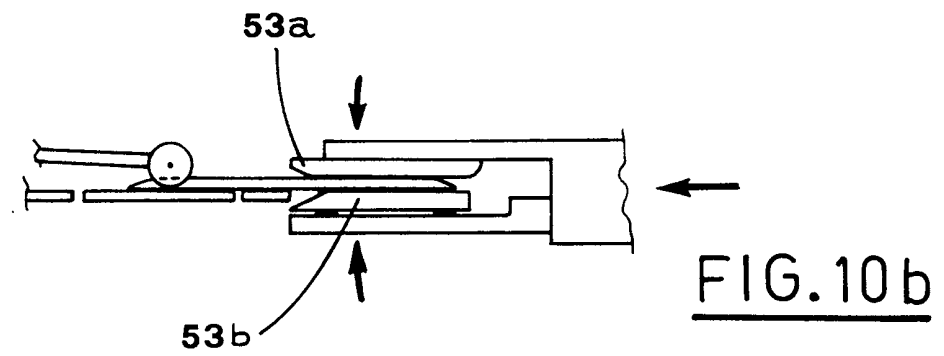
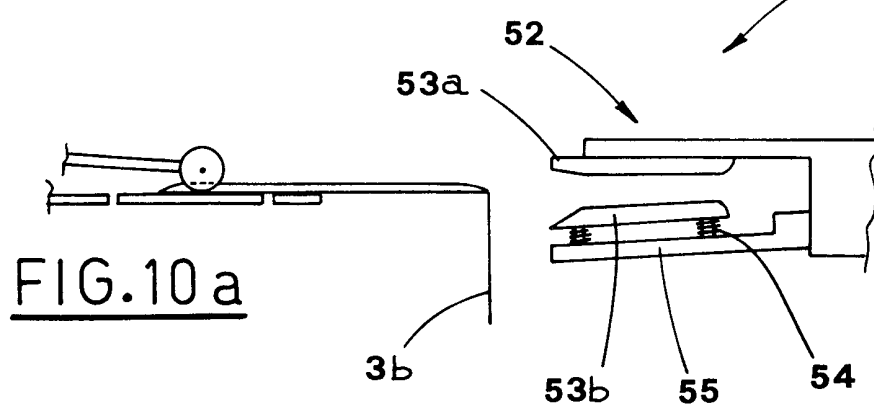
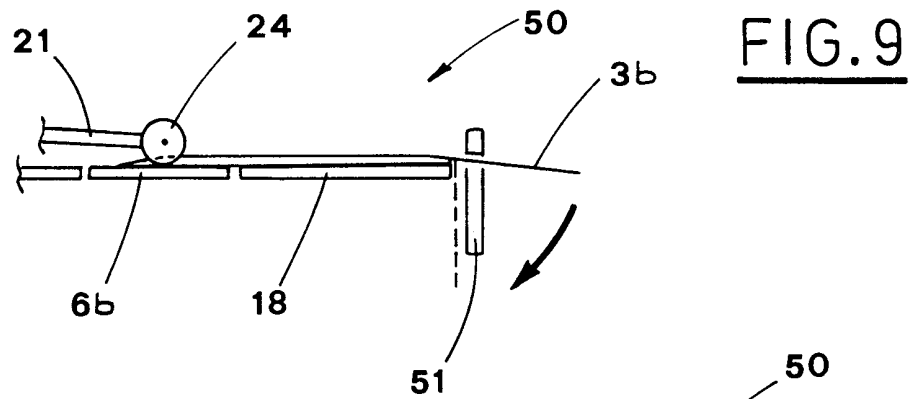
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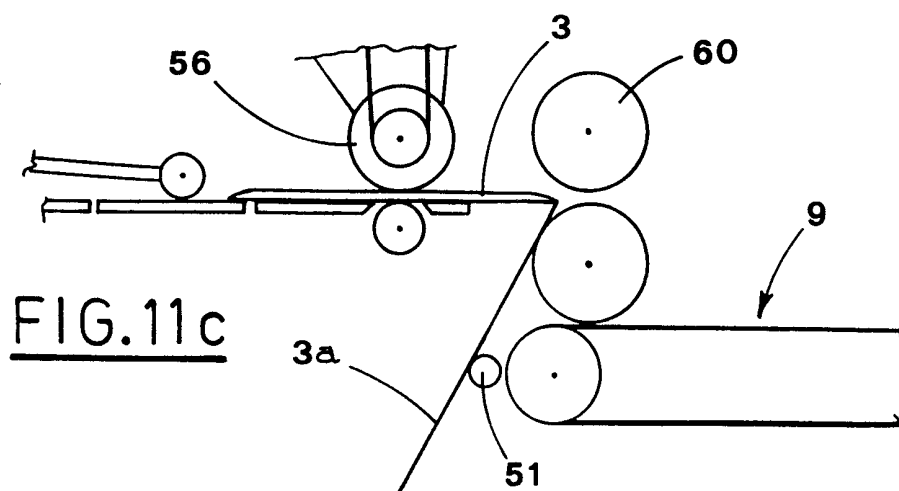
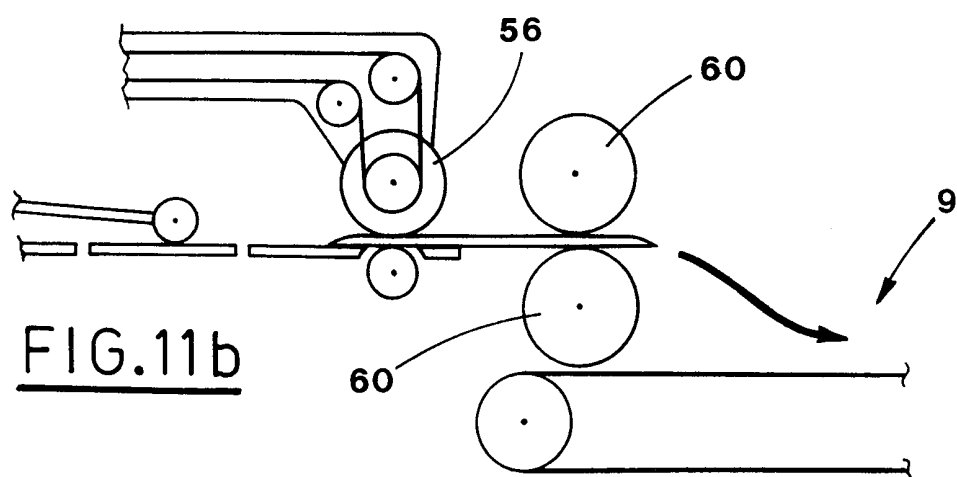
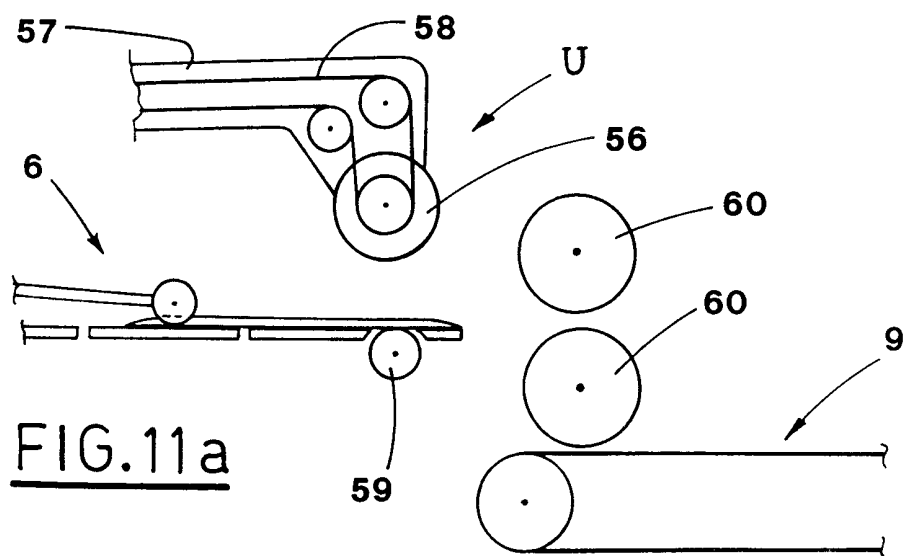


FIG. 6aFIG. 6b

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INTERNATIONAL SEARCH REPORT

In ational Application No

PCT/IB 99/00363

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65B25/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 561 962 A (EVERHARD) 8 October 1996 see abstract -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

29 June 1999

Date of mailing of the international search report

08/07/1999

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In International Application No

PCT/IB 99/00363

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5561962 A	08-10-1996	NONE	