

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 978 449 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
15.01.2003 Bulletin 2003/03

(51) Int Cl.7: **B65B 7/22**, B65B 61/20

(21) Application number: **99115026.9**

(22) Date of filing: **02.08.1999**

(54) **Machine for packaging articles into relative boxes**

Maschine zum Verpacken von Artikeln in Schachteln

Machine pour emballer des articles dans des boîtes

(84) Designated Contracting States:
DE ES FR

(30) Priority: **03.08.1998 IT BO980484**

(43) Date of publication of application:
09.02.2000 Bulletin 2000/06

(73) Proprietor: **MARCHESINI GROUP S.p.A.**
I-40065 Pian di Macina Pianoro (Bologna) (IT)

(72) Inventor: **Monti, Giuseppe**
40065 Pianoro (Bologna) (IT)

(74) Representative: **Dall'Olio, Giancarlo**
c/o INVENTION s.a.s.,
Via delle Armi, 1
40137 Bologna (IT)

(56) References cited:
EP-A- 0 576 404 **DE-C- 596 703**
DE-U- 8 604 603 **US-A- 2 662 355**
US-A- 3 032 947

EP 0 978 449 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to packaging articles into boxes.

[0002] Automatic machines, commonly known as articles packaging machines, have heretofore been provided, for packaging various articles into relative boxes.

[0003] In particular, such packaging machines automatically introduce one or more articles, e.g. pharmaceutical products, pharmaceutical blister pack, or other similar products, into a relative box and add a corresponding informative sheet thereto.

[0004] Such packaging machines usually include a conveying line for the boxes to be filled, another conveying line connected to the box for supplying the articles to be placed into the boxes, and a line for feeding informative sheets to be inserted into the boxes along with the articles.

[0005] These conveying lines are moved either in intermittent or continuous way.

[0006] A transfer device is situated along the boxes conveying line for introducing articles and informative sheets into the boxes.

[0007] A drawback of the packaging machines used so far derives from the poor versatility of the means for closing the boxes, which results in complicated adjustment operations when different boxes are used.

[0008] Publication EP-A-0 576 404 discloses a mechanism for folding a closing flap of a carton according to the preamble of appended claim 1, which mechanism includes an adjusting device (18) designed for changing the position of means for closing the cartons (3). The displacement of the closing means is made along a vertical direction in accordance with the height of the cartons (3), and requires a single adjustment action. The closing means comprise a folding member (11) that folds a tab (10) of the flap (2) of each carton, a plate (17) that acts as a guide for inserting the tab (10) into a corresponding opening of the carton, and a pusher member (28) that pushes the tab (10) into the opening.

[0009] This invention was evolved with the general object of proposing a machine for packaging articles into relative boxes, which is versatile, with particular reference to the operative means used to close the boxes, and easily adaptable for use with different types and sizes of boxes.

[0010] A further object of the present invention is to propose a packaging machine, which is reliable and whose structure is very simple.

[0011] The above mentioned objects are obtained in accordance with the contents of the appended claims.

[0012] The characteristic features of the invention will be more fully apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

- Figure 1 is a schematic lateral view of a packaging machine obtained according to the present inven-

tion;

- Figures 2a, 2b and 2c are section views of pliers for withdrawing informative sheets to be joined to the articles, the pliers having been shown in different working steps;
- Figure 3 is a corresponding plan view of the pliers;
- Figures 4a and 4b are schematic top views of means for closing inner tabs of the boxes, also shown in different working steps;
- Figure 5 is perspective view of a boxes closing group;
- Figures 6a and 6b are respective schematic lateral views, seen from opposite sides, of the boxes closing group;
- Figure 7 is a section view of the boxes closing group, taken along a longitudinal plane;
- Figures 8a, 8b, 8c and 8d are schematic views or subsequent steps of closing the outer flap of a box.

[0013] With reference to the above described figures, the reference numeral 1 generally designates a conveying line for boxes 10 to be filled with articles on the proposed packaging machine.

[0014] The conveying line 1 for boxes 10 is operated stepwise by suitable motor means, not shown.

[0015] According to techniques known to those skilled in the art, the conveying line 1 includes a pair of parallel conveying belts 11, 12. For instance, and as shown in Figure 1, the two conveying belts are located one over the other, with horizontal rotation axes.

[0016] The boxes to be filled are conveyed between the two conveying belts and are suitably held by a plurality of protruding lugs 13, regularly equispaced on the belts 11, 12.

[0017] The boxes 10 are introduced between the conveying belts 11, 12 of the conveying line 1 by a device 2, that withdraws flat folded tubular sleeves from a magazine, not shown, and erects them into boxes.

[0018] For instance, a similar device is the one described and claimed by the Patent Application No. BO98A 000486 filed the same day as the Italian Patent application corresponding to the present one, by the same Applicant.

[0019] The articles to be packaged, not shown, are introduced into the boxes 10 by known means, also not shown in that they do not concern the claimed invention.

[0020] Respective informative sheets 3 are withdrawn one by one from a relative magazine 30 by a withdrawing device 31 and fed by a feeding line 32 to a station in which they are introduced, together with the articles, into the boxes 10.

[0021] The feeding line 32 includes a toothed belt 33 equipped with a plurality of spaced out pliers 34 aimed at holding informative sheets 3.

[0022] The belt 33 of the feeding line 32 is guided along a channel 32a integral with the stationary framework of the feeding line 32.

[0023] Basically, each pair of pliers 34 includes, as seen in Figure 2a, a plate 35 and a jaw 36.

[0024] The plate 35 is fastened to the belt 33 of the feeding line 32 by means of a counter-plate 35a, situated below.

[0025] The jaw 36 is hinged to the plate 35 and rotates on a plane transversal to the movement direction of the feeding line 32, against the action of a spring 37 (Figure 3).

[0026] The jaw 36 carries a transversal rod 36a, which is set parallel to the conveying line 32 and which, when the jaw is at rest position, elastically clamps the informative sheet 3 to the plate 35.

[0027] The jaw 36 is operated to open the pliers by a rocker arm 38, which rotates about a pivot 38a, in a plane perpendicular to the feeding line 32. The rocker arm 38 is driven by an actuator 39.

[0028] A transversal tab folding group 4 is located and operates along the conveying line 1, together with a stationary edge 5 situated longitudinally to the same conveying line 1. The task of the tab folding group 4 and stationary edge 5 is that of folding both the transversal tabs 10a, 10b of the boxes 10.

[0029] The transversal tab folding group 4 includes a column 40, operated by a crank mechanism 42 so that it oscillates around a vertical axis.

[0030] The crank mechanism 42 is operated by transmission means 43 driven by a main shaft 62. The shaft 62 sets the operational relation phase of the machine.

[0031] A first folding member 41 protrudes in radial direction from the column 40 (see also Figure 4a).

[0032] A flap closing group 6 is situated downstream of the tab folding group 4, considering the movement direction A of the conveying line 1, and closes the flap 10c of the box 10.

[0033] The flap 10c is situated outside the tabs 10a, 10b and covers them when the box 10 is closed.

[0034] The flap closing group 6, seen in Figure 5, cooperates with a second folding member 7, which partially closes the flap 10c.

[0035] The second folding member 7 includes a bar 70, situated longitudinally to the conveying line 1 and operated to move vertically by an alternative actuator 71, so as to act on the flap 10c of the box 10.

[0036] The flap closing group 6 includes a box-like body 60, situated beside the conveying line 1.

[0037] Inside the box-like body 60, there is a drum 61 supported so that it can rotate about an axis parallel to the conveying line 1 when driven by a suitable motor unit, through known transmission means.

[0038] The motor unit operates the drum via the shaft 62 that enters the body 60.

[0039] The opposite faces of the drum 61 feature a first radial cam 63 and a second radial cam 64, respectively.

[0040] Two rollers, namely a first and a second roller 65, 66, are connected to levers 67, 68, first and second, respectively, and engage the radial cams 63, 64.

[0041] The first lever 67 and the second lever 68 are pivoted to the body 60 on a pivot 69, so that they oscillate in vertical planes crosswise to the conveying line 1 (Figures 6a and 6b).

[0042] A third folding member 72, including substantially a plate, which extends along the conveying line 1, is cantilevered to the first lever 67.

[0043] A crosspiece 73, situated along the conveying line 1, is cantilevered to the second lever 68.

[0044] A pair of teeth 74, acting as pushers for the flap 10c closure, protrude from the crosspiece 73.

[0045] The position of the teeth 74 is adjustable along respective slots 75 made in the crosspiece 73.

[0046] The drum 61 features also, on its cylindrical surface, an axial cam 76, engaged with a third roller 77.

[0047] The third roller 77 is supported by a carriage 78 sliding on a stem 79 longitudinally to the conveying line 1 (Figure 7).

[0048] The carriage 78 forms a rack 80, which engages a pinion 81, carried inside the body 61 and rotating about a vertical axis.

[0049] The pinion 81 is linked to a pulley 82 outside the body 60. A belt 83 is mounted on the pulley 82 and is acted upon by a pair of tightening rollers 84.

[0050] The opposite ends of the belt 83 are fastened to a slide 85, which has the form of a bar and is guided on the body 60, parallel to the conveying line 1.

[0051] The slide 85 carries a trapezoidal bar 86, aligned with the conveying line 1 movement direction.

[0052] The bar 86 moves between a disengaged position, in which it is displaced to protrude sideways from the body 60, and an active position, in which it acts as a stop for the flap 10c being folded.

[0053] Operation of the machine requires the boxes 10 being moved stepwise between the belts 11, 12 of the conveying line 1.

[0054] The articles and informative sheets to be introduced into the boxes are fed in time relation with the movement of the boxes 10 along the conveying line.

[0055] The informative sheets 3 withdrawn from the magazine 30 are transferred to the relative pliers 34 of the feeding line 32.

[0056] This happens while the pliers 34 are kept in open position due to the action of the rocker arm 38, operated by the actuator 39 (Figure 2a).

[0057] When the rocker lever 38 releases the jaw 36, the informative sheet 3 is clamped to the plate 35 by the rod 36a integral with the jaw 36 (Figure 2b).

[0058] Afterwards, the informative sheet 3 is folded in a substantially vertical plane, longitudinally to the feeding line 32, by a stationary abutment 8 (Figure 2c).

[0059] After the articles and corresponding informa-

tive sheets had been introduced into boxes, the lateral tabs 10a, 10b of the boxes 10 are folded by a combined action of the stationary edge 5, which first engages the first tab 10a of the box 10 (Figure 4a), and of the first folding member 41, rotated by the column 40 of the tab folding group 4 (Figure 4b).

[0060] The boxes 10 with the lateral tabs 10a, 10b closed, are then transferred to the station, in which the flap 10c is closed by the flap closing group 6.

[0061] First, the trapezoidal bar 86 is moved to the active position, so as to act as an abutment for closing the flap 10c (Figure 8a).

[0062] Then, the first folding member 7 is operated, so that the bar 70 set parallel to the conveying line 1 pushes the flap 10c of the box 10 and brings it against the trapezoidal bar 86 (Figure 8b).

[0063] The rotation of the drum 61, in time relation therewith, determines, due to the first radial cam 63 and the second radial cam 64, a pre-established oscillation of the first lever 67 and the second lever 68, which carry, respectively, the third folding member 72 and the cross-piece 73 with the teeth 74 protruding therefrom as push means.

[0064] Moving the third folding member 72 folds a wing 10d of the flap 10c against the trapezoidal bar 86 (Figure 8c).

[0065] Then, the trapezoidal bar 86 is moved to the disengaged position.

[0066] Subsequently, the pushing teeth 74 are operated to act on the flap 10c in order to complete the closure of the box (Figure 8d).

[0067] The described machine fulfils the object of packaging articles into relative boxes using a simple and small structure.

[0068] In fact, the machine performs all the operations which are usually performed in different working stations, in a very limited space, which results in considerable reduction of longitudinal dimension.

[0069] Moreover, the proposed packaging machine is very versatile, especially during the boxes closing step, therefore, it can work with boxes of different shapes.

[0070] In particular, the flap closing group 6 can be situated in such a way, as to close the flap 10c downwards, as shown previously, or upwards, according to the position of the flap 10c.

Claims

1. Machine for packaging articles into boxes, the machine including a conveying line (1) for boxes (10), said machine including a flap folding group (6) which in turn includes:

abutment means (86) for a box (10) to be closed;

a folding member (7) moving substantially per-

pendicular to said conveying line (1) and aimed at bringing a flap (10c) for closing the box (10) near said abutment means (86);

a further folding member (72) acting in time relation with folding a wing (10d) of said flap (10c) against said abutment means (86);

pushing means (74) aimed at closing said flap (10c) after the abutment means (86) have been moved to the rest position;

said machine being **characterised in that** said abutment means (86) move longitudinally to said conveying line (1) between an active position, in which said abutment means face a box (10) to be closed, and a rest position.

2. Machine according to claim 1, **characterised in that** said flap closing group (6) includes also a drum (61) rotating about an axis parallel to said conveying line (1) and featuring, on its opposite faces, respectively a first radial cam (63) and a second radial cam (64), which are engaged by relative first lever (67) and second lever (68), said first lever (67) and second lever (68) oscillating on vertical planes cross-wise to the conveying line (1) and carrying respectively said further folding member (72) and said pushing means (74).
3. Machine according to claim 2, **characterised in that** said further folding member (72) is cantilevered to said first lever (67) and includes substantially a plate extending longitudinally to said conveying line (1).
4. Machine according to claim 2, **characterised in that** a crosspiece (73), situated along said conveying line (1), is cantilevered to said second lever (68) and is provided with a pair of teeth (74) protruding from said crosspiece (73) for pushing the flap (10c) of the box (10), so as to close said flap (10c).
5. Machine according to claim 1, **characterised in that** said flap closing group (6) includes a drum (61) featuring, on its cylindrical surface, an axial cam (76), which is engaged by a carriage (78) sliding along an axis (79) longitudinal to said conveying line (1), said carriage (78) being equipped with a rack (80), which engages a pinion (81), integral with a pulley (82) coupled with means (83) for transmission of motion to said abutment means (86).
6. Machine according to claim 5, **characterised in that** said abutment means (86) include a slide (85), which is guided slidably longitudinally to said conveying line (1) and which carries a trapezoidal bar (86) aligned with the conveying line (19) movement

direction.

7. Machine according to claim 1, **characterised in that** said flap closing group (6) includes a drum (61) rotating about an axis parallel to said conveying line (1) and featuring, on its opposite front faces, respectively a first radial cam (63) and a second radial cam (64), which are engaged by relative first lever (67) and second lever (68), said first lever (67) and second lever (68) oscillating on vertical planes crosswise to the conveying line (1) and carrying respectively said further folding member (72) and said pushing means (74) and **in that** said drum (61) features, on its cylindrical surface, an axial cam (76), which is engaged by a carriage (78) sliding along an axis (79) longitudinal to said conveying line (1), said carriage (78) being equipped with a rack (80), which engages a pinion (81), integral with a fourth roller (82) coupled with means (83) for the transmission motion to said abutment means (86).

Revendications

1. Machine pour emballer des articles dans des boîtes, la machine comprenant une ligne de transport (1) destinée aux boîtes (10), ladite machine comprenant un groupe de pliage de volet (6) qui comprend lui-même:

des moyens d'aboutement (86) destinés à une boîte (10) devant être fermée ;
un élément de pliage (7) se déplaçant sensiblement perpendiculairement à ladite ligne de transport (1) et visant à présenter un volet (10c) permettant de fermer la boîte (10) à proximité des dits moyens d'aboutement (86) ;
un autre élément de pliage (72) agissant de manière synchronisée pour plier une aile (10d) du dit volet (10c) contre les dits moyens d'aboutement (86) ;
des moyens de poussée (74) permettant de fermer ledit volet (10c) après que les moyens d'aboutement (86) ont été déplacés vers leur position de repos ;
ladite machine étant **caractérisée en ce que** lesdits moyens d'aboutement (86) se déplacent longitudinalement vers ladite ligne de transport (1) entre une position active dans laquelle les dits moyens d'aboutement sont disposés face à une boîte (10) à fermer, et une position de repos.

2. Machine selon la revendication 1, **caractérisée en ce que** ledit groupe de pliage de volet (6) comprend également un tambour (61) tournant autour d'un axe parallèle à ladite ligne de transport (1) et possédant respectivement sur ses faces opposées une

première came radiale (63) et une deuxième came radiale (64), qui sont engagées par un premier levier (67) et un deuxième levier (68) associés, les dits premier levier (67) et deuxième levier (68) oscillant dans des plans verticaux transversalement à la ligne de transport (1) et portant respectivement ledit autre élément de pliage (72) et lesdits moyens de poussée (74).

3. Machine selon la revendication 2, **caractérisée en ce que** ledit autre élément de pliage (72) est monté en cantilever par rapport au dit premier levier (67) et comprend essentiellement une plaque s'étendant longitudinalement par rapport à ladite ligne de transport (1).

4. Machine selon la revendication 2, **caractérisée en ce qu'**une traverse (73) située le long de ladite ligne de transport (1) est montée en porte-à-faux sur ledit deuxième levier (68) et est munie d'une paire de dents (74) faisant saillie de ladite traverse (73) afin de pousser le volet (10c) de la boîte (10), de façon à fermer ledit volet (10c).

5. Machine selon la revendication 1, **caractérisée en ce que** ledit groupe de pliage de volet (6) comprend un tambour (61) possédant sur sa surface cylindrique une came axiale (76) qui est engagée par un chariot (78) glissant le long d'un axe (79) longitudinal par rapport à ladite ligne de transport (1), ledit chariot (78) étant équipé d'une crémaillère (80) qui engage un pignon (81) solidaire d'une poulie (82) reliée à des moyens (83) permettant de transmettre le déplacement aux dits moyens d'aboutement (86).

6. Machine selon la revendication 5, **caractérisée en ce que** les dits moyens d'aboutement (86) comprennent une glissière (85) qui est guidée de manière à glisser longitudinalement par rapport à ladite ligne de transport (1) et qui transporte une barre trapézoïdale (86) alignée avec la direction du déplacement de la ligne de transport (1).

7. Machine selon la revendication 1, **caractérisée en ce que** ledit groupe de pliage de volet (6) comprend un tambour (61) tournant autour d'un axe parallèle à ladite ligne de transport (1) et comprenant respectivement sur ses faces avant opposées une première came radiale (63) et une deuxième came radiale (64) qui sont engagées par le premier levier (67) et le deuxième levier (68) associés, les dits premier levier (67) et deuxième levier (68) oscillant dans des plans verticaux transversalement à la ligne de transport (1) et transportant respectivement ledit autre élément pliant (72) et les dits moyens de poussée (74) et **en ce que** ledit tambour (61) comprend sur sa surface cylindrique une came axiale (76) qui est engagée par un chariot (78) coulissant

le long d'un axe (79) longitudinal par rapport à ladite ligne de transport (1), ledit chariot (78) étant équipé d'une crémaillère (80) qui engage un pignon (81) solidaire d'un quatrième rouleau (82) relié aux moyens (83) permettant de transmettre le déplacement aux dits moyens d'aboutement (86).

Patentansprüche

1. Maschine zum Verpacken von Gegenständen in Schachteln, welche Maschine eine Förderbahn (1) für Schachteln (10) und eine Laschenfaltgruppe (6) umfasst, welche ihrerseits aufweist:

Anschlagmittel (86) für eine zu verschließende Schachtel (10);
ein Faltglied (7), das sich im wesentlichen senkrecht zu der Förderbahn (1) bewegt und dazu dient, eine Lasche (10c) zum Verschließen der Schachtel (10) in die Nähe der Anschlagmittel (86) zu bringen;
ein weiteres Faltglied (72), das in zeitlicher Beziehung zum Falten eines Flügels (10d) der Lasche (10c) gegen die Anschlagmittel (86) arbeitet;
Schiebemittel (74), die dazu dienen, die Lasche (10c) zu schließen, nachdem die Anschlagmittel (86) in die Ruhestellung bewegt wurden;

wobei die Maschine **dadurch gekennzeichnet ist, dass** sich die Anschlagmittel (86) in Längsrichtung zu der Förderbahn (1) zwischen einer aktiven Stellung, in der die Anschlagmittel einer zu verschließenden Schachtel (10) zugewandt sind, und einer Ruhestellung bewegen.

2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Laschenschließgruppe (6) ferner eine Trommel (61) aufweist, die um eine zur Förderbahn (1) parallele Achse dreht, und die auf ihren gegenüberliegenden Stirnseiten einen ersten radialen Nocken (63) bzw. einen zweiten radialen Nocken (64) aufweist, welche von einem ersten Hebel (67) bzw. einem zweiten Hebel (68) erfasst werden, wobei der erste Hebel (67) und der zweite Hebel (68) in vertikalen Ebenen quer zu der Förderbahn (1) schwingen und das besagte weitere Faltglied (72) bzw. die Schiebemittel (74) tragen.

3. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** das besagte weitere Faltglied (72) an dem ersten Hebel (67) auskragend angebracht ist und im wesentlichen eine Platte umfasst, die in Längsrichtung zu der Förderbahn (1) verläuft.

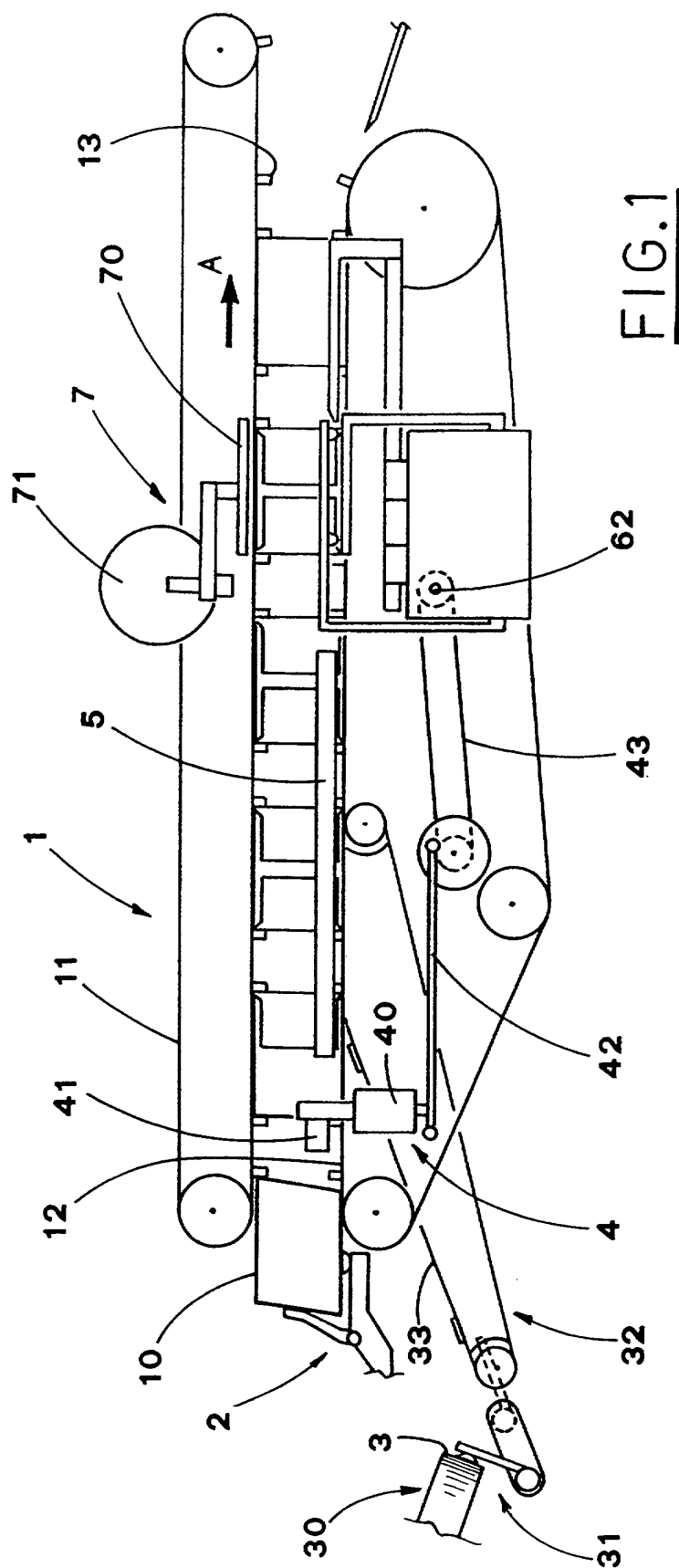
4. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** ein Querstück (73), das längs der

Förderbahn (1) angeordnet ist, an dem zweiten Hebel (68) auskragend angebracht und mit zwei Zähnen (74) versehen ist, die von dem Querstück (73) vorstehen, um die Lasche (10c) der Schachtel (10) zu verschieben und dadurch die Lasche (10c) zu schließen.

5. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Laschenschließgruppe (6) eine Trommel (61) aufweist, die an ihrer zylindrischen Oberfläche mit einem axialen Nocken (76) versehen ist, an dem ein Schlitten (78) angreift, der auf eine Achse (79) in Längsrichtung zu der Förderbahn (1) gleitet, wobei der Schlitten (78) mit einer Zahnstange (30) versehen ist, die mit einem Zahnrad (81) in Eingriff steht, die mit einer Rolle (82) integral ausgebildet ist, welche mit Mitteln (83) zur Bewegungsübertragung auf die Anschlagmittel (86) verbunden ist.

6. Maschine nach Anspruch 5, **dadurch gekennzeichnet, dass** die Anschlagmittel (86) einen Schieber (85) umfassen, der in Längsrichtung zu der Förderbahn (1) gleitend geführt ist und der eine trapezförmige Stange (86) trägt, die zu der Bewegungsrichtung der Förderbahn (1) ausgerichtet ist.

7. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Laschenschließgruppe (6) eine Trommel (86) umfasst, die um eine zu der Förderbahn (1) parallele Achse dreht und an ihren gegenüberliegenden Stirnseiten mit einem ersten radialen Nocken (63) bzw. einem zweiten radialen Nocken (64) versehen ist, an welchen ein erster Hebel (67) und ein zweiter Hebel (68) angreifen, wobei der erste Hebel (67) und der zweite Hebel (68) in vertikalen Ebenen quer zu der Förderbahn (1) schwingen und das besagte weitere Faltglied (72) bzw. die Schiebemittel (74) tragen, und dass die Trommel (61) an ihrer zylindrischen Umfangsfläche mit einem axialen Nocken (76) versehen ist, an dem ein Schlitten (78) angreift, der auf eine Achse (79) in Längsrichtung zu der Förderbahn (1) gleitet, wobei der Schlitten (78) mit einer Zahnstange (80) versehen ist, die mit einem Zahnrad (81) in Eingriff steht, welches mit einer vierten Rolle (82) integral ausgebildet ist, die mit Mitteln (83) zur Bewegungsübertragung auf die Anschlagmittel (86) verbunden ist.



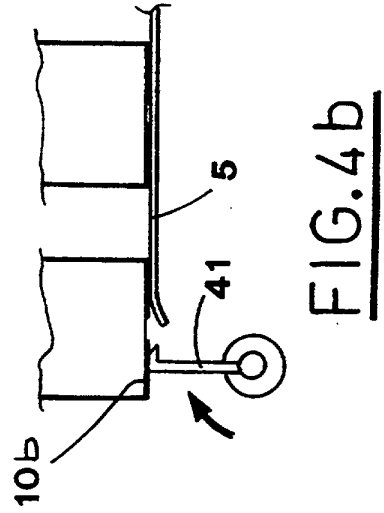
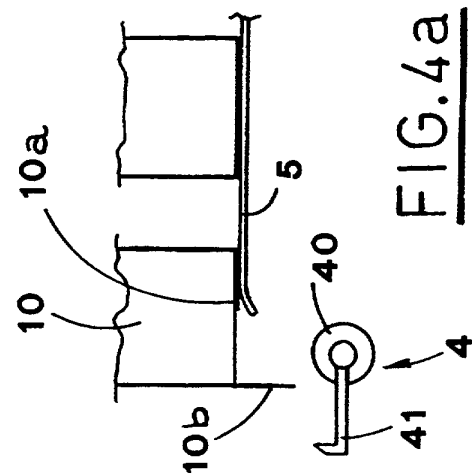
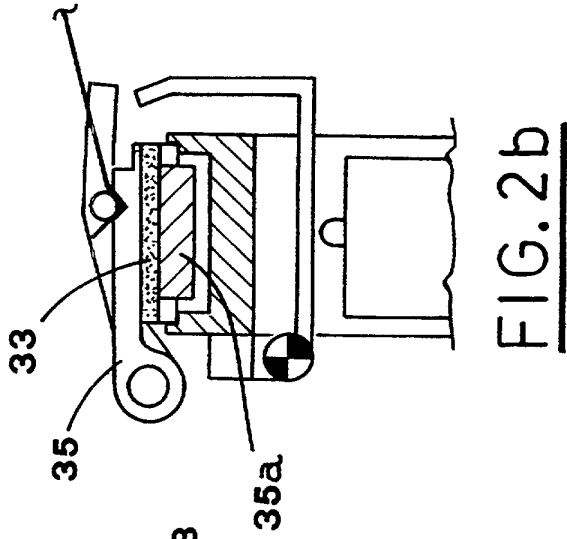
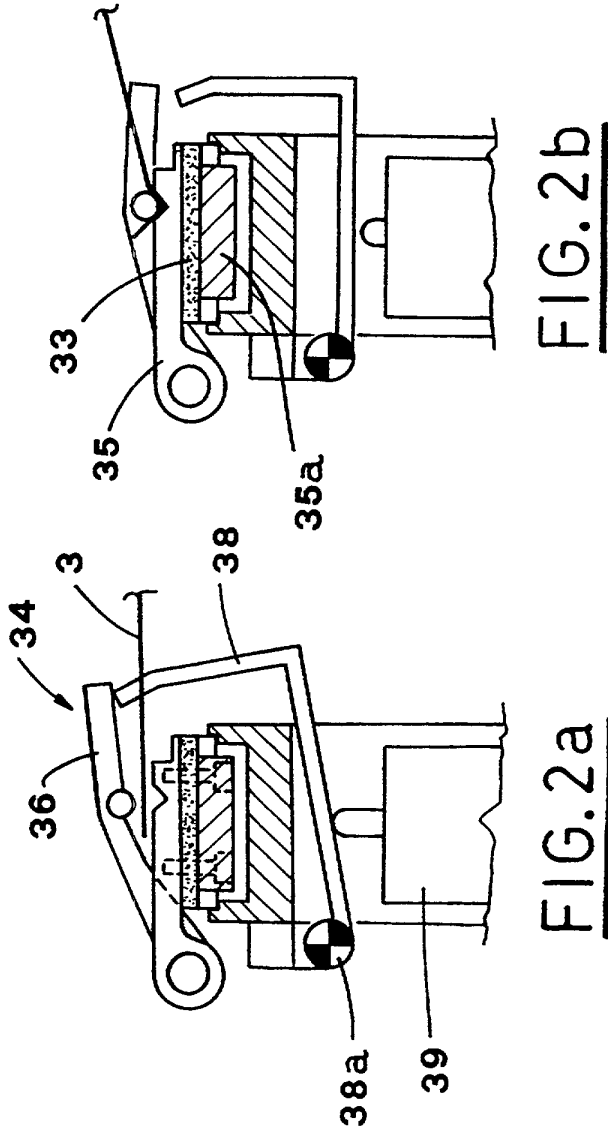
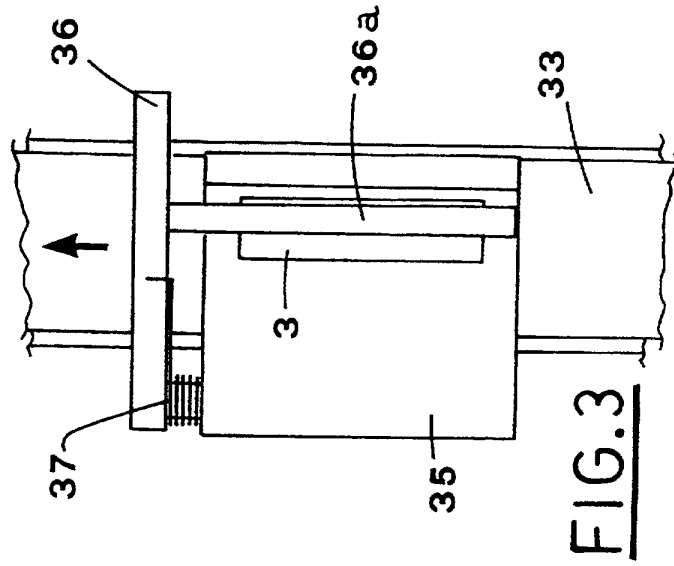
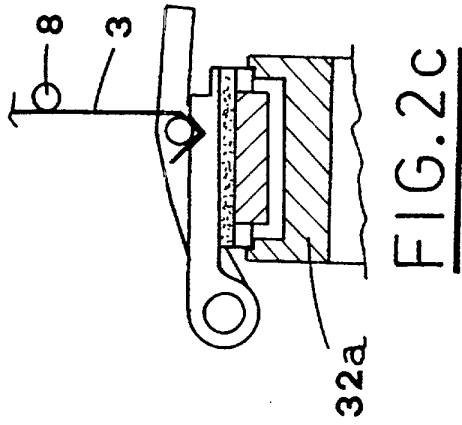


FIG. 5

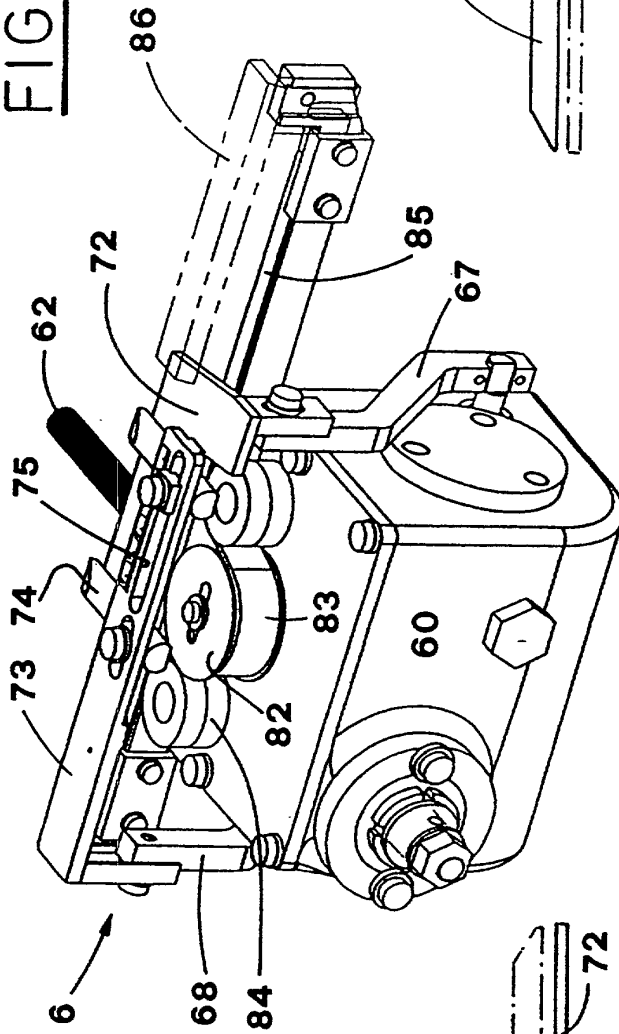


FIG. 6b

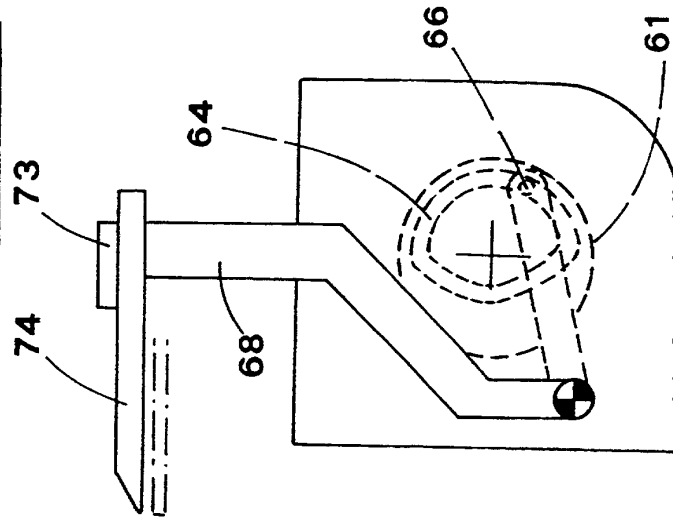


FIG. 7

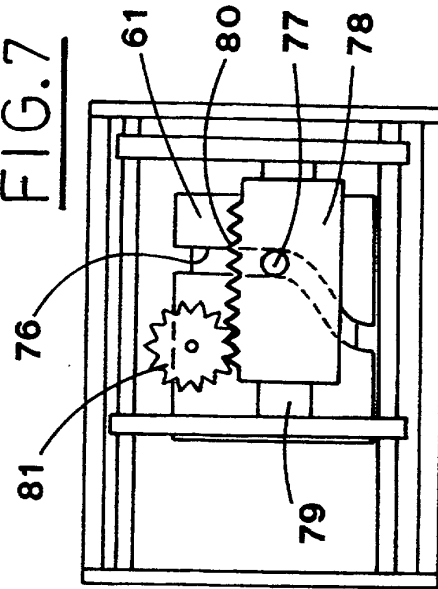


FIG. 6a

