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(54) Machine and method for folding closing flaps of a package

Vorrichtung und Verfahren zum Einfalten der Verschlussklappen einer Verpackung

Machine et procédé pour replier les rabats de fermeture d' un emballage.

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Description

[0001] The present invention relates to machines and apparatuses fit for packaging articles or products in boxes or packages, and particularly it refers to a machine and method for folding closing flaps of a package, such as a carton box or similar, and to perform its complete closing.

[0002] Apparatuses and machines are known for the automatic folding of closing flaps or edges of a carton box, that is deposited on a carrier or a conveyor belt in overturned position to contain the object or the objects to be packaged. In such position, the closing flaps, longitudinal and transversal with respect to the direction of advancement of the box, extend substantially perpendicular toward the outside, beginning from the lower end of the respective side walls.

[0003] These apparatuses generally include a couple of conveyor belts positioned end against end and fit to swing independently to the top. More precisely, due to said partial rotation, the faced end of the two conveyor belts can lower or rise, one respect the other. In this way, the transversal edges of the package, supported by such conveyor belts, through subsequent movements of advancement and withdrawal of the same package can be refolded toward the inside during closing.

[0004] The longitudinal edges are refolded by suitable articulated means proceeding during operation after releasing the base portions on which each longitudinal edge is refolded.

[0005] A disadvantage of such apparatuses and machines is that they need accurate moving and control means in order to precisely regulate height or rotation of the conveyor belts and to allow the retrograde motion of the package.

[0006] Other disadvantage, connected to such operation, consists in the high time required for folding up the closing flaps causing a reduced machine productivity.

[0007] Further disadvantage consists in that said machines are equipped with articulated and complexes moving and support means, therefore of expensive realization and assemblage.

[0008] A purpose of the present invention is to propose a machine and a method for folding closing flaps of carton packages, allowing to get an elevated productive ability without package withdrawals.

[0009] Other purpose is to propose a machine equipped with simple and effective moving means, a reliable and economic machine to be realized and assembled.

[0010] The cited purposes are obtained according to the content of the claims.

[0011] The characteristics of the invention are underlined in the following, with reference to attaches drawings, in which:

Figures from 1A to 1G illustrate frontal schematic

views of the machine for folding flaps of a package in subsequent operational phases, each view comprising besides an axonometric view of the package in the corresponding phase;

Figure 2 illustrates a schematic plant view of the machine of figure 1A;

Figures from 3A to 3C illustrate axonometric and partial schematic views of the machine of figure 1A in further subsequent operational folding phases, each of which in association with an axonometric view of the partially refolded package;

Figures 4A and 4B illustrate a schematic enlarged frontal view of extensible portions of first and second conveyor means in two end conditions respectively of maximum and minimum extension;

Figure 5 illustrates a partial enlarged axonometric schematic view of the machine of figure 3A in association with a package;

Figures 6 and 7 illustrate schematic enlarged views respectively frontal and plant of the machine of figure 5.

[0012] With reference to figures from 1A to 7, reference 1 indicates the machine for folding flaps of a package 100 object of the present invention, comprising substantially extensible conveyor means, first 2 and second 3, aligned there between and third 4 and fourth 5 conveyor means downwardly the second extensible conveyor means 3, said conveyor means 2, 3, 4, 5 being fit for moving and supporting the package 100.

[0013] The conveyor means first 2 and second 3 are provided of extensible portions, respectively first 12 and second 13, mutually faced; each portion 12, 13 is mobile among two extreme conditions, respectively of maximum extension A and of minimum extension B, so that to reciprocally approach and fold the transversal flaps 101, 102, with respect to the longitudinal motion direction of said package 100.

[0014] The extensible conveyor means 2, 3 include carrier means first 23 and second 33, constituted by a conveyor belt or a plurality of conveyor belts or belts placed side by side, destined to support and translate the package 100.

[0015] The first carrier means 23 are enveloped around a series of pulleys, first motorized 24, and free second 25, third 21 and fourth 22. The third 21 and fourth 22 pulleys are fixed to first carriage means 20, realizing the first extensible portion 12 of the first extensible conveyor means 2. The carriage means 20 are, in fact, sliding and operated, from actuating means known and not illustrated, between two extension conditions, maximum A and minimum B of the respective extensible portion 12. The particular disposition of the free pulleys second

25, third 21 and fourth 22 allows, after fixing the extension length of the carrier means 23, to extend or shorten the extensible portion 12 to form a support surface more or less long.

[0016] In a totally similar way, the second carrier means 33 are wound around a series of pulleys motorized fifth 34 and free sixth 35, seventh 31 and eighth 32, the free pulleys seventh 31 and eighth 32 have fixed to second carriage means 30, which constitute the second extensible portion 13 and are operated by actuating means, known and not illustrated.

[0017] The third 4 and fourth 5 conveyor means are positioned downstream the second conveyor means 3 and are mutually parallels and staggered in the longitudinal motion direction of the package 100. They have a width lower than the second conveyor means 3, preferably equal to around the half width of these latter, so freeing the base portion of the package 100 on which the corresponding longitudinal edge 103, 104 must be refolded during closing.

[0018] Such operation is made also possible thanks to the containing means first 6 and second 16, at sides respectively of third 4 and fourth 5 conveyor means, laterally supporting the package 100.

[0019] Said containing means 6, 16 are self-centering and include, in correspondence of each side of the corresponding conveyor means 4, 5, motorized belt guides or smooth sliding block having free wheels, known and not illustrated, for facilitating and checking the translation of the package 100.

[0020] Third containing means 26 can be provided for laterally supporting the packages 100 in correspondence of the first 2 and second 3 conveyor means.

[0021] The conveyor means third 4 and fourth 5 have a length greater than the longitudinal dimension of the package 100 to allow folding means, first 17 and second 18, such as known, for instance, rotating brackets or movable or fixed shaped arms, as illustrated in the enclosed figures, to refold the longitudinal flaps 103, 104 of the package 100, during its passage above the conveyor means respectively third 4 and fourth 5.

[0022] Downstream of the fourth conveyor means 5 can be provided transfer means 8 which output the package 100 from the machine 1 with edges 101, 102, 103, 104 refolded closed. Typically such transfer means 8 are of a taping machine that seals the package 100, applying a band of adhesive tape at least on the longitudinal flaps 103, 104.

[0023] The machine includes sensor means, known and not illustrated, fit to determine at least the position and the speed of the carrier means 23, 33 and the position of the extensible portions 12, 13 and the containing means 6, 16.

[0024] Computational and control electronic means are provided, connected to sensor means and fit to check the phase relationship between the conveyor means 2, 3, 4, 5, the containing means 6, 16 for the automatic operation of the machine.

[0025] The method for folding flaps of a package 100 using the machine above described includes the following phases:

- 5 - to translate the package 100 on first extensible conveyor means 2, in condition of minimum extension B of the first extensible portion 12, operating the respective carrier means 23;
- 10 - to move a second extensible portion 13 of the second conveyor means 3 in direction of the first conveyor means 2, from the condition of minimum extension B to the condition of maximum extension A near the first conveyor means 2, to match a front transversal flap 101 of the package 100, protruding over the first conveyor means 2, partially folded up downwardly, because of its own weight and of the natural withdrawal of the folding carried out on the carton;
- 15 - to maintain in movement the carrier means first 23 and second 33 of the respective conveyor means 2, 3 with continuous and constant advancement, to allow the translation of the package 100 and the simultaneous closing refolding of the front transversal flap 101 inside the package 100, up its supporting by means of the second conveyor means 3;
- 20 - to stop the second carrier means 33 and to move the second extensible portion 13 from the condition of maximum extension A till the rear transversal flap 102 protrudes and folds downwardly, in the space between the two extensible portions 12, 13;
- 25 - to move the first extensible portion 12 of the first conveyor means 2 in direction of the second conveyor means 3 beginning from the minimum extension condition B up to match the rear transversal flap 102, near the second conveyor means 3;
- 30 - to move the extensible portions 12, 13 with continuous and constant advancement in the same direction, till the conditions respectively of maximum extension A and minimum extension B, and simultaneously to move the carrier means 23, 33 in opposite direction, to refold inwardly the rear transversal flap 102;
- 35 - in correspondence of the minimum extension condition B of the second extensible portion 13, to reverse the motion direction of the carrier means 23, 33, in order to transfer the package 100 to the second conveyor means 3 and subsequently to the third conveyor means 4.
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[0026] The method further provides:

- 50 - to move the third conveyor means 4, supporting the package 100 in association with the first containing means 6, to refold inwardly a first longitudinal flap 103 by first folding means 17;
- 55 - to move the fourth conveyor means 5, supporting the package 100 in association with the second containing means 16, to refold inwardly a second longitudinal flap 104 by second folding means 18.

[0027] Particularly, with reference to the last two phases, the longitudinal flaps 103, 104, due to the partial support of the package 100 furnished by the conveyor means 4, 5, are free and can be refolded inside the box by the folding means 17, 18 suitably shaped, during the translation of the same package.

[0028] The method provides, during the movement of the third conveyor means 4, to move the first containing means 6, so centering and sideways supporting the package 100. Likewise the second containing means 16 are moved, to center and sideways support said package 100 when it is arrived onto the fourth conveyor means 5.

[0029] When the package 100 is completely supported by the fourth conveyor means 5 and by the second containing means 16, the first containing means 6 can be repositioned for adapting to the width of a new package 100 coming from the second conveyor means 3, allowing an increase of the machine speed.

[0030] It is important to underline that the folding method above described allows to easily and quickly refold the flaps of a package with an unidirectional motion, without withdrawals and therefore with a time optimization.

[0031] An advantage of the present invention is to furnish a machine and a method for folding edges of carton packages obtaining an elevated productivity, with a moving without withdrawals of the package.

[0032] Other advantage is to furnish a machine equipped with means of simple and effective moving, therefore reliable and also of economic realization and assemblage.

Claims

1. Machine for folding bottom flaps of a package (100) **characterized in that** it comprises at least first (2) and second (3) extensible conveyor means, longitudinally aligned and provided with respective extensible first (12) and second (13), portions, mutually faced; said conveyor means (2, 3) supporting and moving said package (100) and each extensible portion (12,13) being operable between two extreme conditions, respectively of maximum extension (A) and of minimum extension (B), to refold transversal flaps (101, 102) inwardly of the package (100).
2. Machine according to claim 1 **characterized in that** it comprises conveyor means, third (4) and fourth (5), displaced downstream of the second conveyor means (3) and mutually parallel and staggered in the direction of longitudinal motion of the package (100).
3. Machine according to claim 2 **characterized in that** the conveyor means, third (4) and fourth (5), have a width smaller than the second conveyor means (3).
4. Machine according to claim 2 **characterized in that** it that the conveyor means, third (4) and fourth (5),

have a greater length than the longitudinal dimension of the package (100).

5. Machine according to claim 2 **characterized in that** it comprises movable containing means, at least first (6) and second (16), positioned to the sides of the conveyor means respectively third (4) and fourth (5), and destined to center and sideways support the package (100) during its translation.
6. Machine according to claim 5 **characterized in that** the containing means (6) are self-centering and comprise, in correspondence of each side of the conveyor means (4, 5), motorized belt guides or smooth sliding block or free wheels, to facilitate the translation of the package (100).
7. Machine according to claim 1 **characterized in that** it each extensible portion, first (12) and second (13), comprises respective carriage means first (20) and second (30), provided at least of free pulleys, respectively third (21), fourth (22) and seventh (31) and eighth (32); said carriage means (20, 30) being motorized for moving between the two extreme conditions (A, B).
8. Machine according to claim 7 **characterized in that** the extensible conveyor means, first (2) and second (3), respectively comprise carrier means, first (23) and second (33), and respectively first motorized pulley (24), second free pulley (25) and fifth motorized pulley (34), sixth free pulley (35); said carrier means (23, 33) enveloping to the respective motorized pulleys (24, 34) and free pulleys (21, 22, 25; 31, 32, 35).
9. Machine according to claim 1 **characterized in that** it comprises folding means, first (17) and second (18), fit to refold longitudinal flaps first (103) and second (104) of the package (100), in correspondence of the conveyor means respectively third (4) and fourth (5).
10. Machine according to the preceding claims **characterized in that** it comprises computational and checking electronic fit for checking the phase relationship at least among the conveyor means (2, 3, 4, 5), the containing means (6, 16) and the folding means.
11. Method for folding bottom flaps of a package (100) using the machine according to any one of the preceding claims **characterized in that** it comprises the following phases:
 - to translate the package (100) on the first extensible conveyor means (2), in the condition of minimum extension (B) of the first extensible portion (12), operating the respective carrier

means (23);

- to move the second extensible portion (13) of the second conveyor means (3) in direction of the first conveyor means (2), from the condition of minimum extension (B) to the condition of maximum extension (A), to match a front transversal flap (101) of the package (100), protruding over the first conveyor means (2), partially folded up downwardly;

- to maintain in movement the first (23) and second (33) carrier means of the first (2) and second (3) conveyor means, to allow the translation of the package (100) and the simultaneous closing refolding of the front transversal flap (101) inside the package (100), up its supporting by means of the second conveyor means (3);

- to stop the second carrier means (33) and to move the second extensible portion (13) from the condition of maximum extension (A) till the rear transversal flap (102) protrudes and folds downwardly;

- to move the first extensible portion (12) of the first conveyor means (2) in direction of the second conveyor means (3) beginning from the minimum extension condition (B) up to match the rear transversal flap (102), near the second conveyor means (3);

- to move the extensible portions (12, 13) with continuous and constant advancement in the same direction, till the conditions respectively of maximum extension (A) and minimum extension (B), and simultaneously to move the carrier means (23, 33) in opposite direction, to refold inwardly the rear transversal flap (102);

- in correspondence of the minimum extension condition (B) of the second extensible portion (13), to reverse the motion direction of the carrier means (23, 33), in order to transfer the package (100) to the second conveyor means (3) and subsequently to the third conveyor means (4).

12. Method according to claim 11 characterized in that it includes:

- to move the third conveyor means (4), supporting the package (100) in association with the first containing means (6), to refold inwardly a first longitudinal flap (103) by first folding means (17);

- to move the fourth conveyor means (5), supporting the package (100) in association with the second containing means (16), to refold inwardly a second longitudinal flap (104) by second folding means (18).

13. Method according to claim 12 characterized in that it provides, during the moving of the conveyor means, third (4) and fourth (5), to move the respec-

tive containing means first (6) and second (16), to center and to sideways support said package (100).

5 Patentansprüche

1. Maschine zum Falten von Bodenklappen einer Verpackung (100), **dadurch gekennzeichnet, dass** sie mindestens erste und zweite verlängerbare Fördereinrichtungen (2, 3) aufweist, die in Längsrichtung zueinander ausgerichtet und mit entsprechenden ersten und zweiten verlängerbaren Abschnitten (12, 13) versehen sind, welche gegeneinander weisen, wobei die Fördereinrichtungen (2, 3) die Verpackung (100) lagern und bewegen und jeder verlängerbare Abschnitt (12, 13) zwischen zwei Extremzuständen, nämlich einer maximalen Verlängerung (A) und einer minimalen Verlängerung (B), verwendbar ist, um sich in Querrichtung erstreckende Klappen (101, 102) in Bezug auf die Verpackung (100) nach innen umzufalten.

2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** sie dritte und vierte Fördereinrichtungen (4, 5) aufweist, die in abstromseitiger Richtung von den zweiten Fördereinrichtungen (3) verschoben und parallel zueinander sowie in Richtung der Längsbewegung der Verpackung (100) versetzt angeordnet sind.

3. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** die dritten und vierten Fördereinrichtungen (3, 4) eine Breite besitzen, die geringer ist als die der zweiten Fördereinrichtungen (3).

4. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** die dritten und vierten Fördereinrichtungen (4, 5) eine größere Länge als die Längsabmessung der Verpackung (100) aufweisen.

5. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** sie mindestens erste und zweite bewegliche Halteeinrichtungen (6, 16) aufweist, die an den Seiten der dritten und vierten Fördereinrichtungen (4, 5) angeordnet sind und dazu dienen, die Verpackung (100) während ihrer Bewegung zu zentrieren und seitlich zu lagern.

6. Maschine nach Anspruch 5, **dadurch gekennzeichnet, dass** die Halteeinrichtungen (6) selbstzentrierend sind und entsprechend einer jeden Seite der Fördereinrichtungen (4, 5) motorisierte Bandführungen oder einen glatten Gleitblock oder freie Räder umfassen, um die Bewegung der Verpackung (100) zu erleichtern.

7. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jeder verlängerbare erste und zwei-

te Abschnitt (12, 13) entsprechende erste und zweite Schlitteneinrichtungen (20, 30) aufweist, die mindestens von dritten, vierten und siebten und achten freien Förderscheiben (21, 22, 31, 32) gebildet werden, wobei die Schlitteneinrichtungen (20, 30) motorisiert sind, um sich zwischen den beiden Extremzuständen (A, B) zu bewegen.

8. Maschine nach Anspruch 7, **dadurch gekennzeichnet, dass** die ersten und zweiten verlängerbaren Fördereinrichtungen (2, 3) jeweils erste und zweite Trägereinrichtungen (23, 33) und jeweils eine erste motorisierte Förderscheibe (24), eine zweite freie Förderscheibe (25), eine fünfte motorisierte Förderscheibe (34) und eine sechste freie Förderscheibe (35) umfassen, wobei die Trägereinrichtungen (23, 33) die entsprechenden motorisierten Förderscheiben (24, 34) und freien Förderscheiben (21, 22, 25; 31, 32, 35) umgeben.

9. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** sie erste und zweite Falteinrichtungen (17, 18) zum Umfalten von ersten und zweiten Längsklappen (103, 104) der Verpackung (100) entsprechend den dritten und vierten Fördereinrichtungen (4, 5) umfassen.

10. Maschine nach den vorangehenden Ansprüchen, **dadurch gekennzeichnet, dass** sie eine Rechen- und Prüfelektronik zum Prüfen der Phasenbeziehung mindestens zwischen den Fördereinrichtungen (2, 3, 4, 5), den Halteeinrichtungen (6, 16) und den Falteinrichtungen aufweist.

11. Verfahren zum Falten von Bodenklappen einer Verpackung (100) unter Verwendung der Maschine nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** es die folgenden Phasen umfasst:

- Bewegen der Verpackung (100) auf den ersten verlängerbaren Fördereinrichtungen (2) im Zustand der minimalen Verlängerung (B) des ersten verlängerbaren Abschnittes (12) unter Betätigung der entsprechenden Trägereinrichtungen (23);
- Bewegen des zweiten verlängerbaren Abschnittes (13) der zweiten Fördereinrichtungen (3) in Richtung der ersten Fördereinrichtungen (2) aus dem Zustand der minimalen Verlängerung (B) in den Zustand der maximalen Verlängerung (A), um eine vordere Querklappe 101 der Verpackung (100), die über die ersten Fördereinrichtungen (2) vorsteht, partiell nach unten zu falten;
- Halten der ersten und zweiten Trägereinrichtungen (23, 33) der ersten und zweiten Fördereinrichtungen (2, 3) in Bewegung, um die Be-

wegung der Verpackung (100) und das gleichzeitige Umfalten der vorderen Querklappe (101) zum Verschließen innerhalb dieser Verpackung (100) bis zu deren Lagerung durch die zweiten Fördereinrichtungen (3) zu ermöglichen;

- Stoppen der zweiten Trägereinrichtungen (30) und Bewegen des zweiten verlängerbaren Abschnittes (13) aus dem Zustand der maximalen Verlängerung (A), bis die hintere Querklappe (102) vorsteht und nach unten gefaltet wird;
- Bewegen des ersten verlängerbaren Abschnittes (12) der ersten Fördereinrichtungen (2) in Richtung der zweiten Fördereinrichtungen (3) beginnend vom minimalen Verlängerungszustand (B) bis zur Anpassung an die hintere Querklappe (102) in der Nähe der zweiten Fördereinrichtungen (3);
- Bewegen der verlängerbaren Abschnitte (12, 13) mit einer kontinuierlichen und konstanten Vorwärtsbewegung in der gleichen Richtung bis in die Zustände der maximalen Verlängerung (A) und minimalen Verlängerung (B) und gleichzeitiges Bewegen der Trägereinrichtungen (23, 33) in entgegengesetzter Richtung, um die hintere Querklappe (102) nach innen umzufalten;
- entsprechend dem Zustand (B) minimaler Verlängerung des zweiten verlängerbaren Abschnittes (13), Umkehren der Bewegungsrichtung der Trägereinrichtungen (23, 33), um die Packung (100) auf die zweiten Fördereinrichtungen (3) und danach auf die dritten Fördereinrichtungen (4) zu überführen.

12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, dass** es die folgenden Schritte umfasst:

- Bewegen der dritten Fördereinrichtungen (4), die die Verpackung (100) in Verbindung mit den ersten Halteeinrichtungen (6) lagern, um eine erste Längsklappe (103) mit den ersten Falteinrichtungen (17) nach innen umzufalten;
- Bewegen der vierten Fördereinrichtungen (5), die die Verpackung (100) in Verbindung mit den zweiten Halteeinrichtungen (16) lagern, um eine zweite Längsklappe (104) mit den zweiten Falteinrichtungen (18) nach innen umzufalten.

13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** die entsprechenden ersten und zweiten Halteeinrichtungen (6, 16) während der Bewegung der dritten und vierten Fördereinrichtungen (4, 5) so bewegt werden, dass sie die Verpackung (100) zentrieren und seitlich lagern.

Revendications

1. Machine de pliage de pattes inférieures d'un embal-

- lage (100) **caractérisée en ce qu'elle** comprend au moins un premier (2) et un second (3) moyens de convoyeur extensibles, longitudinalement alignés et dotés de première (12) et seconde (13) portions extensibles respectives, se faisant mutuellement face ; lesdits moyens de convoyeur (2, 3) supportant et déplaçant ledit emballage (100) et chaque portion extensible (12, 13) pouvant être actionnée entre deux conditions extrêmes, respectivement d'extension maximum (A) et d'extension minimum (B), pour replier les pattes transversales (101, 102) vers l'intérieur de l'emballage (100).
2. Machine selon la revendication 1, **caractérisée en ce qu'elle** comprend des moyens de convoyeur, troisième (4) et quatrième (5), déplacés en aval du second moyen de convoyeur (3) et réciproquement parallèles et décalés dans la direction du mouvement longitudinal de l'emballage (100).
3. Machine selon la revendication 2, **caractérisée en ce que** les moyens de convoyeur, troisième (4) et quatrième (5), ont une largeur inférieure au second moyen de convoyeur (3).
4. Machine selon la revendication 2, **caractérisée en ce que** les moyens de convoyeur, troisième (4) et le quatrième (5), ont une longueur supérieure à la dimension longitudinale de l'emballage (100).
5. Machine selon la revendication 2, **caractérisée en ce qu'elle** comprend des moyens de retenue mobiles, au moins un premier (6) et un second (16), positionnés sur les côtés des moyens de convoyeur, respectivement le troisième (4) et le quatrième (5), et destinés à centrer et à supporter latéralement l'emballage (100) pendant sa translation.
6. Machine selon la revendication 5, **caractérisée en ce que** les moyens de retenue (6) sont à centrage automatique et comprennent, au niveau de chaque côté des moyens de convoyeur (4, 5), des guides de courroies motorisés ou un bloc de coulissement lisse ou des roues libres, afin de faciliter la translation de l'emballage (100).
7. Machine selon la revendication 1, **caractérisée en ce que** chacune des portions extensibles, première (12) et seconde (13), comprend des moyens de support respectifs, premier (20) et second (30), dotés au moins de poulies libres, respectivement la troisième (21), la quatrième (22) et la septième (31) et la huitième (32) ; lesdits moyens de support (20, 30) étant motorisés pour se déplacer entre les deux conditions extrêmes (A, B).
8. Machine selon la revendication 7, **caractérisée en ce que** les moyens de convoyeur extensibles, premier (2) et second (3), comprennent respectivement des moyens de support, premier (23) et second (33), et respectivement une première poulie motorisée (24), une seconde poulie libre (25) et une cinquième poulie motorisée (34), une sixième poulie libre (35) ; ledit moyen de support (23, 33) enveloppant les poulies motorisées respectives (24, 34) et les poulies libres (21, 22, 25 ; 31, 32, 35).
9. Machine selon la revendication 1, **caractérisée en ce qu'elle** comprend des moyens de pliage, premier (17) et second (18), adaptés pour replier les pattes longitudinales première (103) et seconde (104) de l'emballage (100), au niveau des moyens de convoyeur respectivement troisième (4) et quatrième (5).
10. Machine selon les revendications précédentes, **caractérisée en ce qu'elle** comprend des arrangements de calcul et de vérification électroniques pour vérifier la relation de phase au moins parmi les moyens de convoyeur (2, 3, 4, 5), les moyens de retenue (6, 16) et les moyens de pliage.
11. Procédé de pliage de pattes inférieures d'un emballage (100) en utilisant la machine selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend les phases suivantes :
- la translation de l'emballage (100) sur le premier moyen de convoyeur extensible (2), en condition d'extension minimum (B) de la première portion extensible (12), en actionnant les moyens de support respectifs (23) ;
 - le déplacement de la seconde portion extensible (13) du second moyen de convoyeur (3) dans la direction du premier moyen de convoyeur (2), de la condition d'extension minimum (B) à la condition d'extension maximum (A), pour s'adapter à une patte transversale frontale (101) de l'emballage (100), qui fait saillie par rapport au premier moyen de convoyeur (2), partiellement repliée vers le bas ;
 - le maintien en mouvement des premier (23) et second (33) moyens de support des premier (2) et second (3) moyens de convoyeur, afin de permettre la translation de l'emballage (100) et le repli en fermeture simultané de la patte transversale frontale (101) à l'intérieur de l'emballage (100), jusqu'à son support au moyen du second moyen de convoyeur (3) ;
 - l'arrêt du second moyen de support (33) et le déplacement de la seconde portion extensible (13) depuis la condition d'extension maximum (A) jusqu'à ce que la patte transversale arrière (102) fasse saillie et se plie vers le bas ;
 - le déplacement de la première portion extensible (12) du premier moyen de convoyeur (2)

dans la direction du second moyen de convoyeur (3), en commençant par la condition d'extension minimum (B) jusqu'à s'adapter à la patte transversale arrière (102), près du second moyen de convoyeur (3) ;

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- le déplacement des portions extensibles (12, 13) avec un avancement continu et constant dans la même direction, jusqu'aux conditions respectivement d'extension maximum (A) et d'extension minimum (B), et simultanément le déplacement des moyens de support (23, 33) dans une direction opposée, pour replier vers l'intérieur la patte transversale arrière (102) ;

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- au niveau de la condition d'extension minimum (B) de la seconde portion extensible (13), l'inversion du sens du mouvement du moyen de support (23, 33) afin de transférer l'emballage (100) au second moyen de convoyeur (3) et ensuite au troisième moyen de convoyeur (4).

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12. Procédé selon la revendication 11, caractérisé en ce qu'il comprend:

- le déplacement du troisième moyen de convoyeur (4), qui supporte l'emballage (100) en association avec le premier moyen de retenue (6), pour replier vers l'intérieur une première patte longitudinale (103) par un premier moyen de pliage (17) ;

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- le déplacement du quatrième moyen de convoyeur (5), qui supporte l'emballage (100) en association avec le second moyen de retenue (16), pour replier vers l'intérieur une seconde patte longitudinale (104) par le second moyen de pliage (18).

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13. Procédé selon la revendication 12, caractérisé en ce qu'il propose, pendant le déplacement des moyens de convoyeur, troisième (4) et quatrième (5), le déplacement moyens de retenue, des premier (6) et second (16), de façon à centrer et à supporter latéralement ledit emballage (100).

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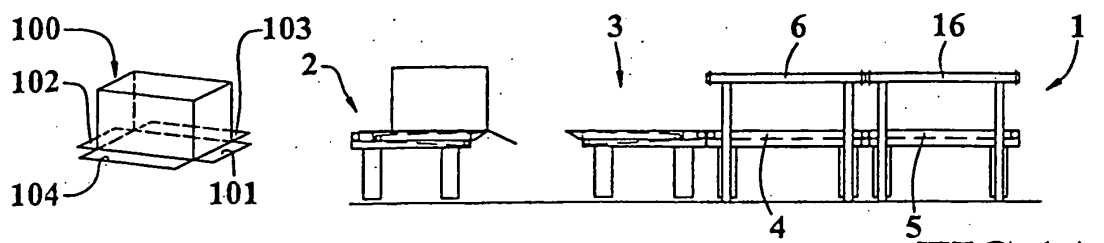


FIG. 1A

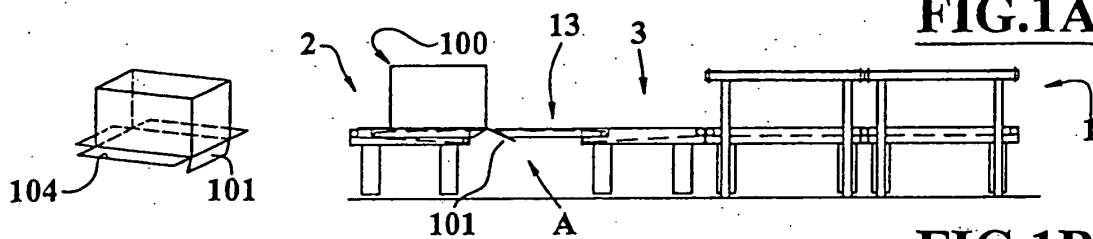


FIG. 1B

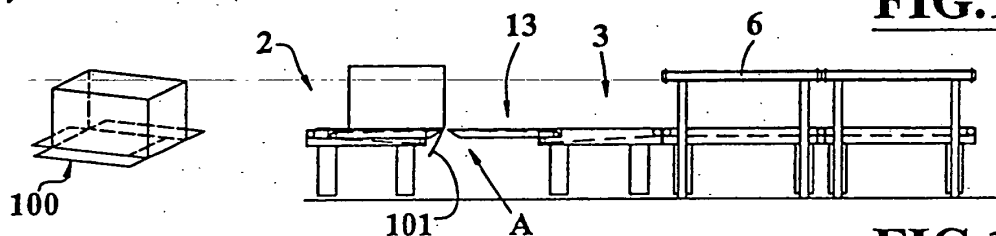


FIG. 1C

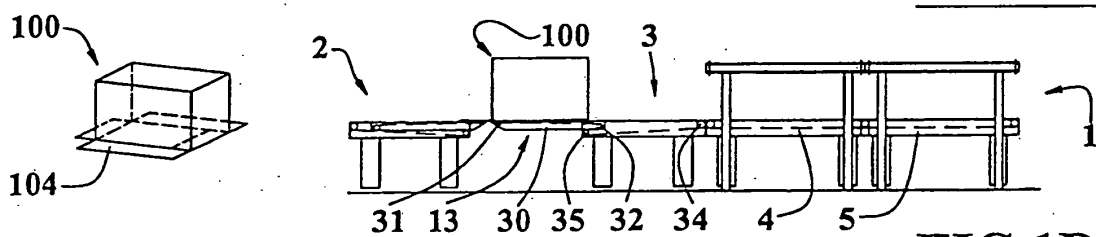


FIG. 1D

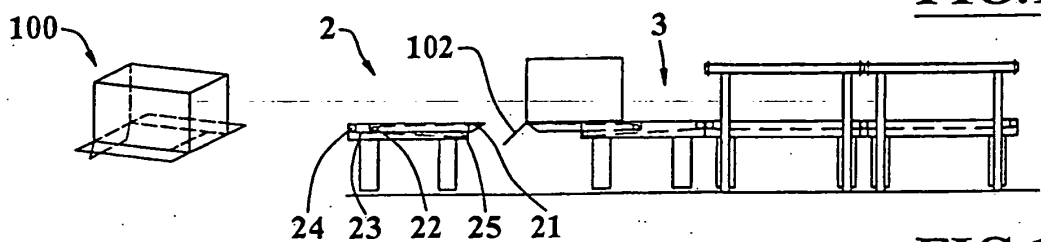


FIG. 1E

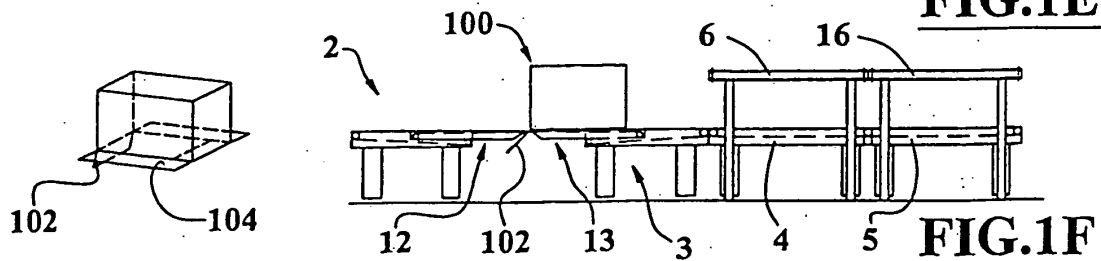


FIG. 1F

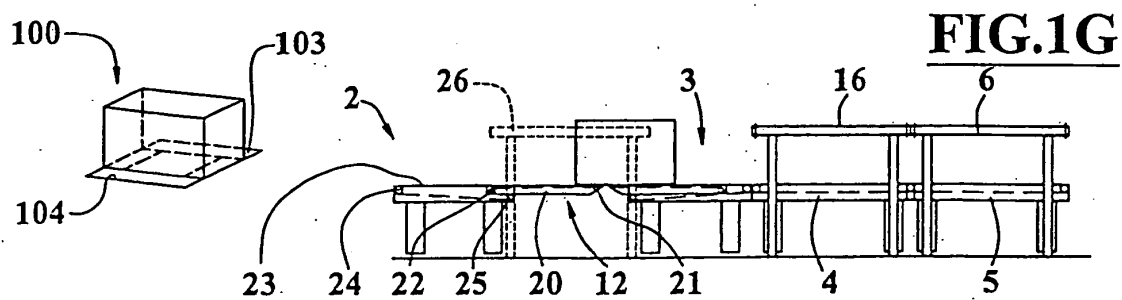


FIG. 1G

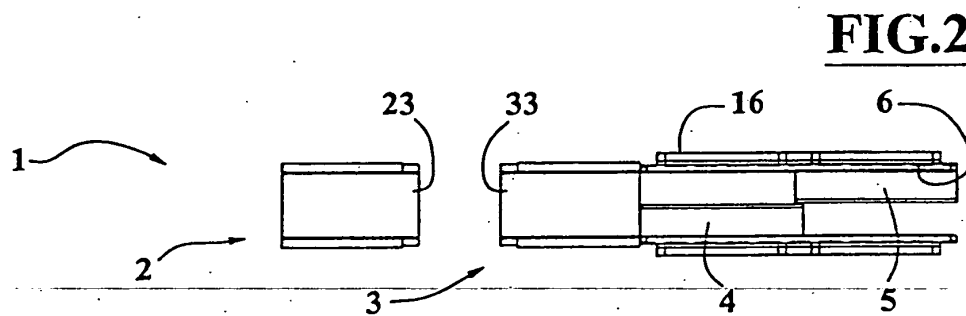


FIG. 2

FIG. 3A

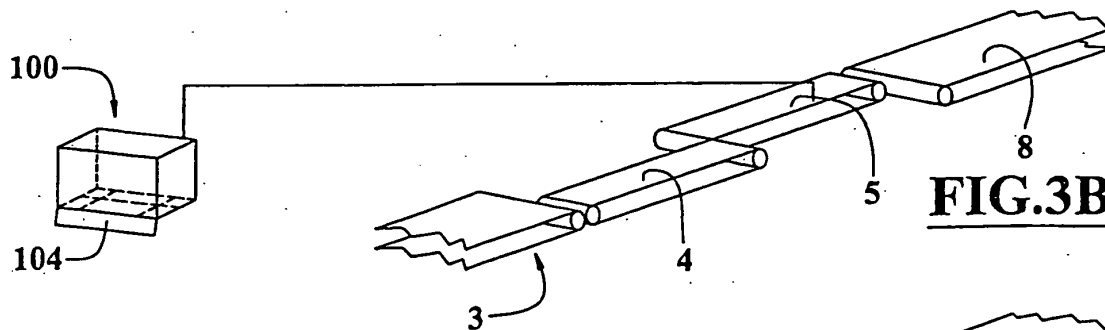
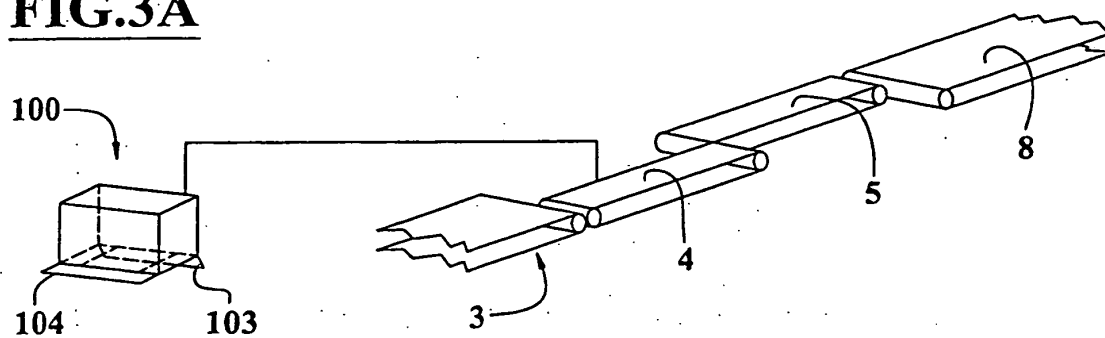


FIG. 3B

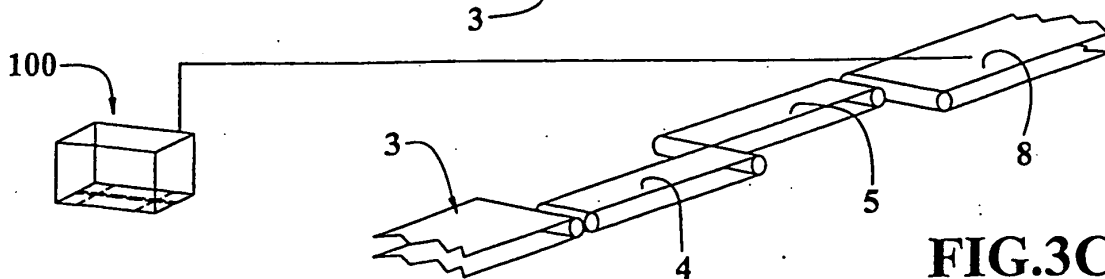


FIG. 3C

FIG.4A

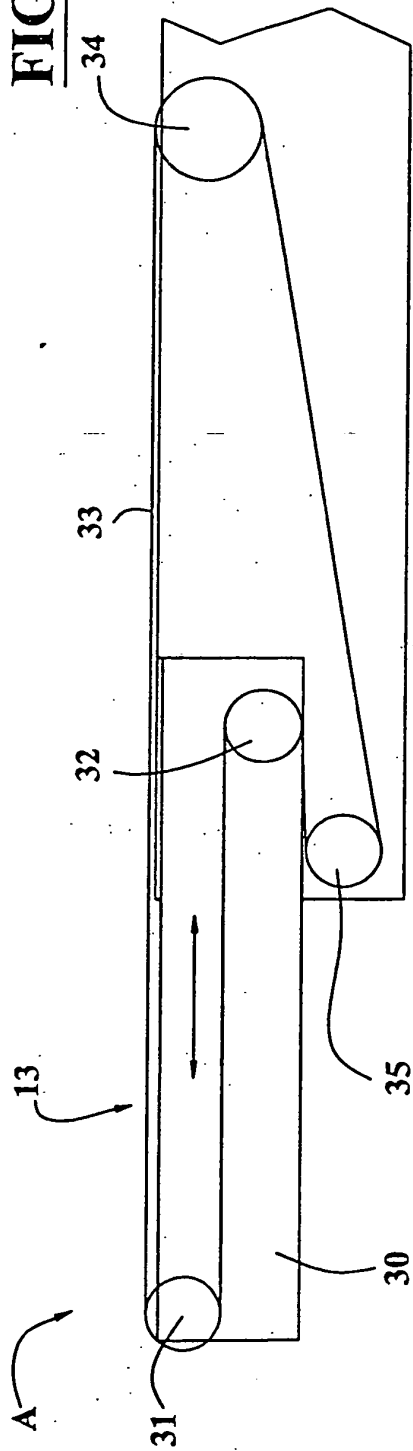
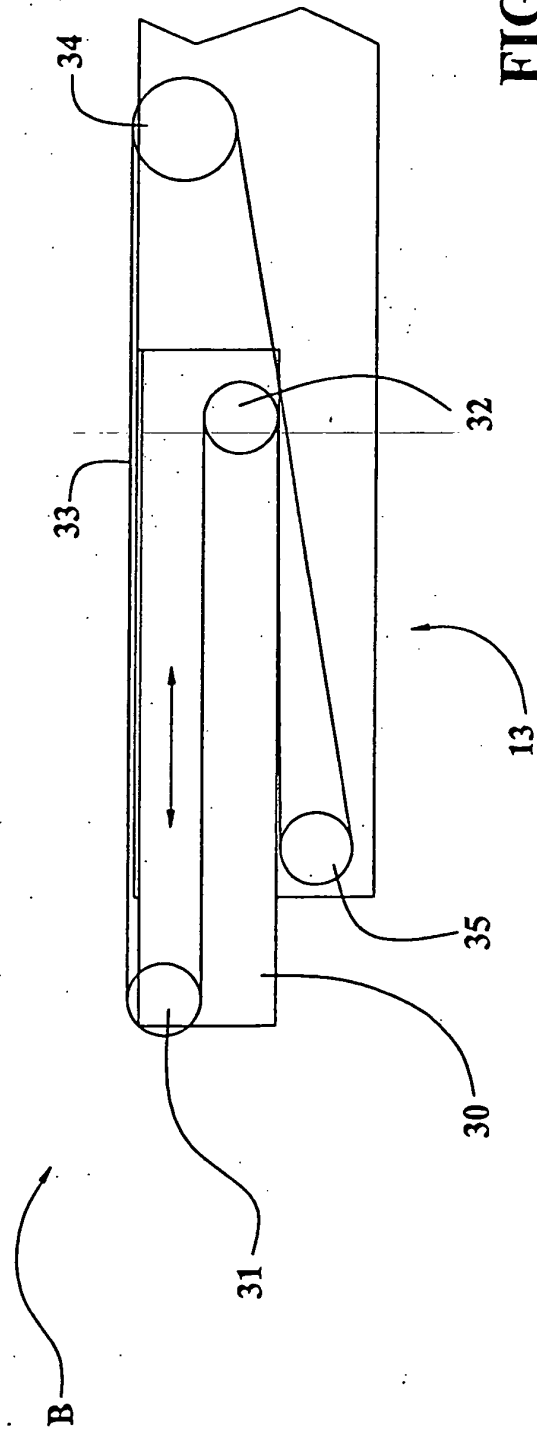


FIG.4B



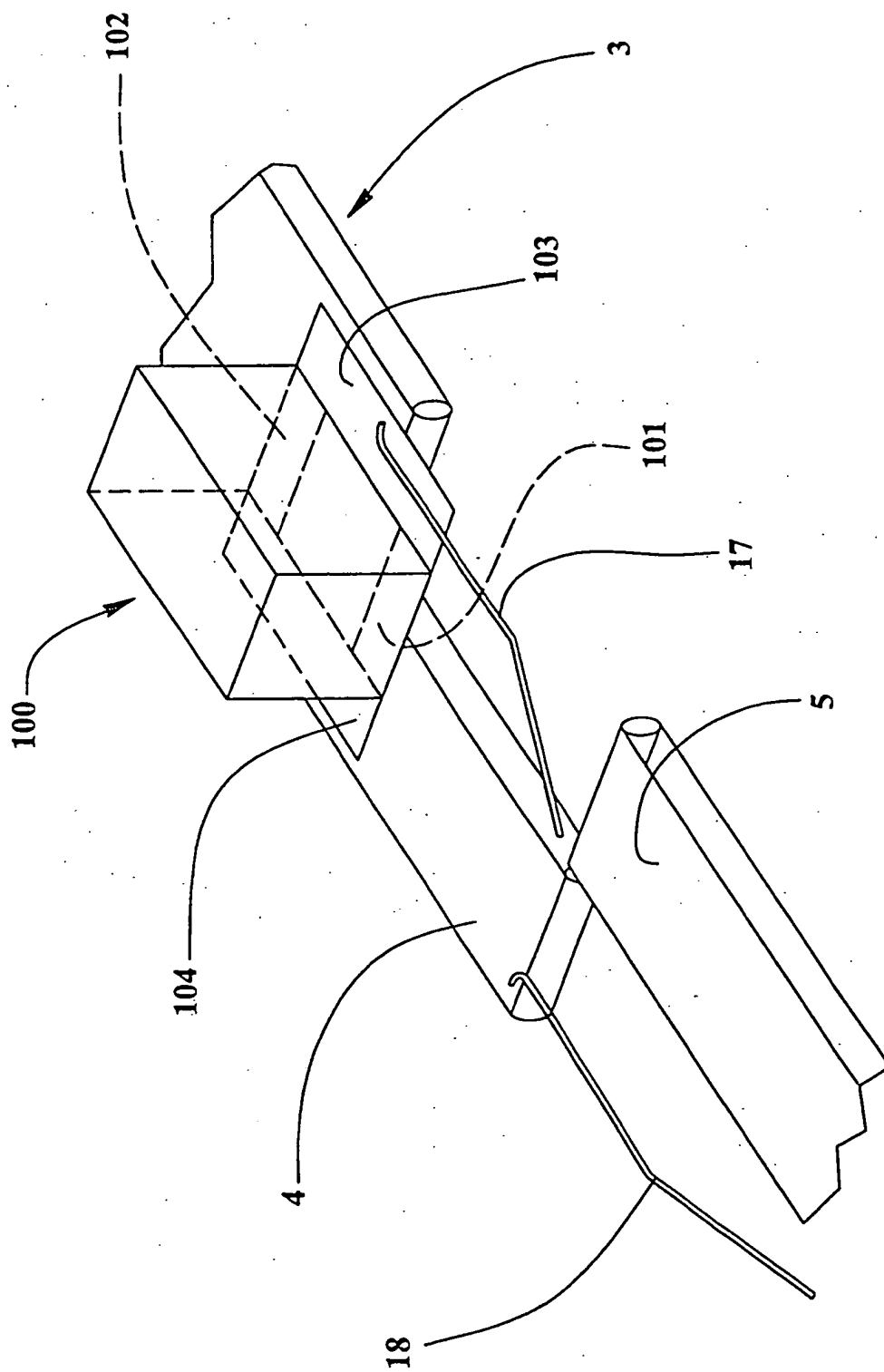


FIG. 5

FIG.6

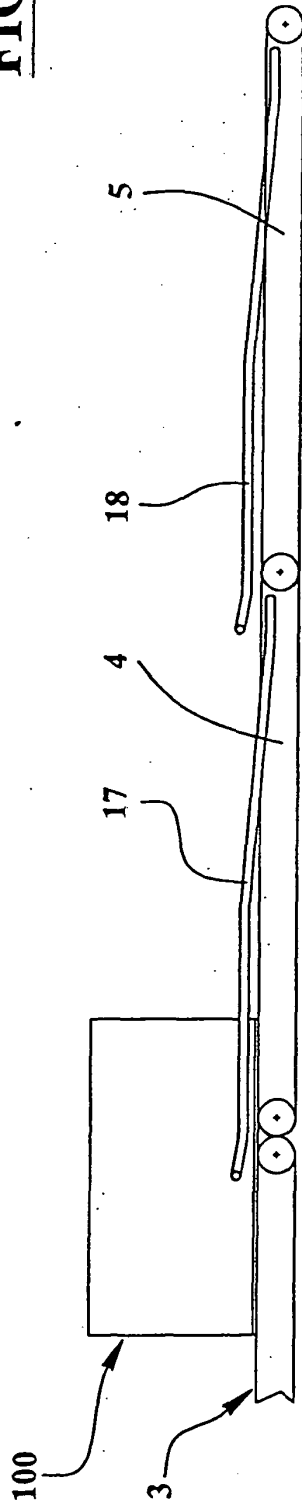


FIG.7

