

12

EUROPEAN PATENT SPECIFICATION

45 Date of publication of patent specification: **02.12.87**

51 Int. Cl.⁴: **B 65 B 7/24**

21 Application number: **84302440.7**

22 Date of filing: **10.04.84**

54 Improvements in carton-closing machine.

43 Date of publication of application:
30.10.85 Bulletin 85/44

45 Publication of the grant of the patent:
02.12.87 Bulletin 87/49

84 Designated Contracting States:
DE FR GB IT

58 References cited:
US-A-2 340 835
US-A-3 049 847
US-A-4 441 303

73 Proprietor: **H.J. Langen & Sons Limited**
6420 Viscount Road
Mississauga Ontario L4V 1H3 (CA)

72 Inventor: **Langen, Marinus J. M.**
21 Chilcot Avenue
Rexdale Ontario (CA)

74 Representative: **Abbie, Andrew Kenneth et al**
A.A. THORNTON & CO. Northumberland House
303/306 High Holborn
London, WC1V 7LE (GB)

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).

Courier Press, Leamington Spa, England.

Description

This invention relates to improvements in a carton-closing machine. In particular, this invention relates to the provision of a dynamic setting and tucking mechanism for setting the tabs of the closure panel of a carton and tucking the tabs of the closure panel of a carton into a closed position in the end of a carton.

Prior Art

The most inexpensive closure of a carton is achieved using tabs on the end of the closure panel which are inserted within the open end or openings in the end of a carton to secure the closure panel in a closed position. Difficulty is, however, experienced in obtaining a reliable closure of the carton during the carton-loading operation using this carton construction. Because of these difficulties, some users prefer to employ alternative carton constructions including the use of adhesives for securing the closure panels in a closed position. The mechanism required for closing by adhesives is, however, more complex and expensive than that required for tab closures.

A mechanism which is intended for use when closing the end of a carton which has closure tabs which are connected to the closure panel is disclosed in US—A—3,049,847. In this mechanism the setting and tucking members are mounted in series on an arm which is mounted on an eccentric mechanism so as to be cyclically movable toward and away from the end of the carton which is to be closed. In this mechanism the tabs or flaps are repeatedly tapped or hammered into position. It follows that, at several points in the cycle all of the setting and tucking members are withdrawn from engagement with the tab of the carton which they are attempting to insert. In contrast in the present dynamic system once contact is made between a tucking blade and a tab the contact is maintained until the tab is fully seated in its associated slot.

It has been found that many of the problems described above can be overcome if the setting and tucking of mechanisms are dynamic thereby eliminating or substantially eliminating relative movement between the plough mechanism and the closure tab during the setting and tucking operations.

Summary of Invention

According to one aspect of the present invention, there is provided in a carton closing machine for closing a closure panel which is hingedly connected along a first hinge line to an open end of a carton, the closure panel having a closure tab hingedly connected thereto along a second hinge line, the closure tab being insertable within an opening in the open end of the carton to retain the closure panel in a closed position, said machine having a final closing station, in a first section of which the closure tabs are initially set by bending along the second hinge line and in a second section of which the tabs are tucked into the open

end of the carton, said machine also having a primary conveyor for conveying cartons through the final closing station with the open ends of the cartons being continuously driven in a closure path in which the openings extend in a tucking plane, first plow means in said first section, said first plow means being arranged to fold the closure panel about said first hinge line to an intermediate position, folding ledge means having a folding edge arranged to underlie said second hinge line when the closing panels are in the intermediate position, and a dynamic setting and tucking mechanism for setting and tucking said tabs characterized in that; the setting members are each mounted on an endless transporter for continuous movement therewith through said first section, and the tucking members are each mounted on an endless transporter for continuous movement therewith through said second section, and wherein first activating means is provided for activating the setting members as they are driven through said first section to cause the setting members to initially move laterally toward the closure plane to engage a carton tab and bend it over said folding edge along its second hinge line to its set position in which it is directed toward the open end of its associated carton, and second activating means is provided for activating the tucking members as they are driven through the said second section to cause the tucking members to move laterally toward the closure plane, independently of the setting members, to engage the closure panel and move it toward the closure plane and thereby cause the tab to be driven into said openings to close the carton.

The invention will be more clearly understood after reference to the following detailed specification read in conjunction with the drawings wherein:

Figure 1 is a pictorial view of a carton-closing station of a carton loading machine constructed in accordance with an embodiment of the present invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1 illustrating the closure panel of a carton in a first hinged position;

Figure 3 is a sectional view taken along the line 3—3 of Figure 1 showing the closure tab in a set position;

Figure 4 is a sectional view taken along the line 4—4 of Figure 1 showing the tab in a tucked position;

Figure 5 is an enlarged detail view of the portion A of Figure 4 showing the final tuck position;

Figure 6 is an enlarged plan view of one of the dynamic setting and tucking mechanisms of the present invention, and

Figure 7 is a pictorial view of one end on the underside of a carton of the type which may be closed by the mechanism of the present invention.

With reference to the Figure 1 of the drawings, the reference numeral 10 refers generally to a

carton closing section of a carton loading machine. The carton loading mechanism forms no part of the present invention and will not, therefore, be described.

The carton-closing mechanism of the present invention will be described and illustrated in a form suitable for closing a carton of the type identified by the reference numeral 20 in Figure 7 of the drawings to which reference is made. As shown in Figure 7, the carton 20 is an end closure carton which has a closure panel 22 hingedly connected to an upper wall along a first hinge line 24. Closure tabs 26 are connected to the closure panel 22 along second hinge lines 28. An inner closure wall panel 30 is connected to the bottom wall 32 along a third hinge line 34. Openings 36 are formed in the inner end wall 30 and open inwardly to the open end of the carton above a narrow lip 38. End flaps 40 are connected to the end walls 42 of the carton and are folded inwardly to underlie the end walls 30 and 22.

The carton-closing machine has a pair of primary conveyors 50 each of which consists of two chain members mounted for movement along guide plates 54. The chains 50 extend around sprockets 56 at one end thereof and around further driven sprockets (not shown) at the other end thereof. Carton pusher member 58 are mounted on chains 60 and retainer blades 62 are mounted on chains 64. The carton pusher blades 58 serve to push the carton along the chain through the closing station and the retainers 62 prevent forward movement of the containers relative to the conveyor in use.

The conveyors 50 extend through the final closing station generally identified by the reference numeral 70 to drive the open ends of the cartons 20 along closure paths extending at opposite sides of the carton-closing station. Top rails 66 extend above the carton-closing station so as to retain the cartons against upward movement during passage through the closing station. The top rails 66 are supported by suitable supports (not shown).

The end flaps 40 of the carton are tucked inwardly by means of any conventional tucking mechanism prior to entry into the final closing station. Similarly, the end wall 30 is folded along its hinge line 34 by a suitable plough means downstream of the final closing station to the position shown in Figure 1 of the drawings.

A pair of outrigger support rails 72 are supported by brackets 74 which are mounted on the support rails 54 and project laterally therefrom. In order to provide a bending edge over which the closure panels 22 may be folded along their hinge line 24, a rail 76 supported on a post 78 which is mounted on the bracket 74 so as to be positioned to underlie the hinge line 24 of a carton passing through the closure station. Plough bars 80 are mounted on support bars 82 which are supported by brackets 84 mounted on outrigger rails 72. The plough bars 80 form the first plough means arranged to fold the closure panel 22 about its first hinge line 24 to an intermediate

position as shown in Figure 2 of the drawings. The plough bar 80 is height and laterally adjustable by means of the bracket 84 and is longitudinally adjustable along the length of the outrigger rail 72.

A folding ledge 90 is formed at the upper edge of a rail 92 which is mounted on the support rails 54. The ledge 90 has an outer folding edge 94 which underlies the second hinge line 28. The folding edge 94 is inwardly and downwardly inclined in the downstream direction so as to facilitate setting of the tabs 26 along the hinge line 28.

The dynamic setting and tucking mechanism of the present invention is generally identified by the reference numeral 100. Each dynamic setting and tucking mechanism comprises an upper cam track plate 102 and a lower cam track plate 104 (Figures 3 and 6). The cam track plates 102 and 104 are mounted on an underlying support (not shown) which may be in the form of a bracket mounted on the guide rails 54 or a ground supported pedestal. A pair of sprockets 106 are keyed to a drive shaft 108 which is connected to the main power source in any suitable manner. The side edges of the cam plates 102 and 104 form guide rails along which a first endless chain 110 and a second endless chain 112 are guided. The lower guide plate 104 has an inner side edge 114. The upper guide plate 102 has an inner side edge 116. The inner side edge 114 of the lower guide plate extends toward the closure plain 120 in advance of the edge 116 of the upper plate. A plurality of setting blades 122 are mounted on the lower chain 112 and project laterally therefrom. The blades 122 are in the form of narrow sheet metal fingers which are riveted directly to the chain links. Pusher blades 124 are mounted on the upper chain 110 and project laterally therefrom. The pusher blades 124 have a downwardly projecting arm portion 126 at the outer end thereof which projects downwardly toward the lower blades 122.

The pusher blades 126 are supported during their travel through a major portion of the tucking section of the closure station by a platform bar 128 which is supported by an arm 132 which is mounted on a spacer block 130 which is secured to the underside of the plate 102. Similarly, a support platform 134 is supported by an arm 136 which is mounted on the underside of the plate 104. The platform 134 extends through the setting portion and has a terminal end 138 underlying the platform 128. Thus, the platforms 128 and 134 serve to provide underlying support for the tuck blades 124 and the setting blades 122 during a major portion of the operation.

The side edges of the cam plates 102 and 104 are designed to provide a camming surface for the chains 110 and 112 as they are driven therealong. The edges 114 and 116 which extend in the direction of the forward run extend in a path such that the setting blades 122 initially project a substantially distance beyond the tucking blades 124 and, subsequent to initial setting of the tabs,

the tucking blades will be advanced to engage the set closure panel and push it into its associated passage 36. It will be noted that the edge 114 of the lower plate continues to move toward the closure plane 120 until it extends to overlie the lip portions 38 of the carton passing through the closure station.

The setting blades 122 and tucking blades 124 are, preferably, made from a sheet metal material, such as stainless steel or the like, having sufficient rigidity to cause setting of the paperboard along the hinge lines and tucking of the tabs into their associated openings without deflection thereof.

In use, open-ended cartons are mounted on the primary conveyor and loaded. The end flaps 40 of the carton are, then, tucked in by conventional tucker mechanisms and the inner side wall 30 is folded upwardly by means of a conventional plough blade the downstream portion of which may form the underlying support 76. The support 76 provides a bending edge over which the closure panel 32 is folded along hinge line 24 as shown in Figure 2 of the drawings. The bending edge 94 of the support ledge 94 underlies the hinge line 28 when the closure panel is in its intermediate position. Continued movement of the carton through the closure station brings the setting blades 122 into contact with the tabs 26, as shown in Figure 3 of the drawings, causing the tabs 26 to bend about their hinge line 28 along the bending edge 94. Once the tab 26 has been moved to the set position illustrated in Figure 3, further movement of the carton through the closure station causes the tucker blades 128 to engage the closure panel 22 and, simultaneously, causes the setting blade 122 to move forward to overlie the lip 38 shown in Figure 5 of the drawings. Continued movement of the carton through the closure station causes withdrawal of the tucking and setting blades thereby allowing the closed cartons to be discharged.

The cartons are discharged by engagement with belts 200 mounted one on either side of the discharge end of the conveyor. The belts 200 are rotatably driven on pulleys 202 and 204 so as to impart a linear speed to the carton which is greater than the speed of continuous movement of the primary conveyors whereby the closed packages are accelerated away from the discharge end of the carton-closing machine.

From the foregoing, it will be apparent that the setting blades and tucking blades move continuously through the final closure station as does the carton 20 which is being closed. The speed-up movement of the setting and tucking blades is such that it closely matches the forward speed of the cartons with the result that the relative movement between the setting and tucking blades and the end closure flaps is minimised. The dynamic carton-closing mechanism provided by these setting and tucking fingers serves to provide a positive setting and tucking of the tabs. The fact that the setting and tucking blades are driven through the closing station at a forward speed which is substantially equal to that of the carton,

there is little or no drag applied to the end closure wall and closure tabs unless there is little or no tendency for the tabs or flaps to be distorted. The absence of distortion of the tabs during movement through the closing station facilitates the entry of the tabs into their mounting passage. By extending the setting blade so that it overlies the lip formed at the lower end of the mounting passages, the tab is guided into the passage above the lower wall thus preventing the tab from passing underneath the lower wall and thus missing the mounting passage.

The fact that little or no relative movement occurs between the surface of the paperboard and the tucking and setting blades, there is little or no accumulation of the surface material of the paperboard on these blades.

Various modifications of the present invention will be apparent to those skilled in the art without departing from the scope of the invention as claimed. For example, the dynamic setting and tucking mechanism of the present invention could be used for the purposes of closing a carton in which the closure tab extended along the full length of the edge of the closure flap and was inserted into the open end of the carton rather than narrow slots.

Various other modifications of the invention will be apparent to those skilled in the art.

It will be apparent that the machine of the present invention may be used for the purpose of closing containers, such as cardboard boxes, plastic containers, containers made from corrugated paperboard or rigid and semi-plastic material all of which are considered to be cartons within the meaning of the term as used in the present specification.

Claims

1. A carton closing machine for closing a closure panel (22) which is hingedly connected along a first hinge line (24) to an open end of a carton, the closure panel having a closure tab (26) hingedly connected thereto along a second hinge line (28), the closure tab being insertable within an opening (36) in the open end of the carton to retain the closure panel in a closed position, said machine having a final closing station, in a first section of which the closure tabs are initially set by bending along the second hinge line and in a second section of which the tabs are tucked into the open end of the carton, said machine also having a primary conveyor (50) for conveying cartons through the final closing station with the open ends of the cartons being continuously driven in a closure path in which the openings extend in a tucking plane (120), first plow means (80) in said first section, said first plow means being arranged to fold the closure panel (22) about said first hinge line (24) to an intermediate position, folding ledge means (90) having a folding edge (94) arranged to underlie said second hinge line (28) when the closure panels are in the intermediate position, and a setting and tucking

mechanism (100) for setting and tucking said tabs (26) characterized in that:

the setting members (122) are each mounted on an endless transporter (112) for continuous movement therewith through said first section, and the tucking members (124) are each mounted on an endless transporter (110) for continuous movement therewith through said second section, and wherein first activating means (104, 114) is provided for activating the setting members (122) as they are driven through said first section to cause the setting members (122) to initially move laterally toward the closure plane (120) to engage a carton tab (26) and bend it over said folding edge (94) along its second hinge line (28) to its set position in which it is directed toward the open end of its associated carton, and second activating means (102, 114) is provided for activating the tucking members (124) as they are driven through the said second section to cause the tucking members (124) to move laterally toward the closure plane (120), independently of the setting members (122), to engage the closure panel (22) and move it toward the closure plane (120) and thereby cause the tab (26) to be driven into said openings (36) to close the carton.

2. A carton closing machine as claimed in claim 1 characterized in that said endless transporter (112) is in the form of an endless chain (112) and said endless transporter (110) is in the form of endless chain (110).

3. A carton closing machine as claimed in claim 2 further characterized in that said endless chain (112) has a portion of its forward run mounted on a first guide rail (114) which extends through said first section and has a first extent which is inclined towards said closure path to locate the setting members (122) in the closure path to set the tabs (26) along the second hinge line (28) and a second extent parallel to said closure path.

4. A carton closing machine as claimed in claims 2 or 3 further characterized in that said endless chain (110) has a portion of its forward run mounted on a second guide rail (116) which extends through said second section and has a first extent which is inclined towards said closure path to locate the tucking members in the closure path downstream from the setting position to tuck the tabs after setting thereof and a second extent which extends parallel to said closure path to retain the tabs in their respective openings.

5. A carton closing machine as claimed in claim 3 or 4 further characterized in that said first guide rail (114) extends in a guide plane which is inclined toward said tucking plane whereby the setting blades are guided away from the folding edge (94) toward said tucking plane (120), after setting of their associated tab (26), to extend through said second section proximate a tucking opening to underly the tabs (26) during their insertion into their associated tucking opening.

Patentansprüche

1. Karton-Verschließ-Vorrichtung, um eine Ver-

schlußplatte (22) zu schließen, welche schwenkbar entlang einer ersten Scharnierlinie (24) mit einem offenen Ende eines Kartons verbunden ist, wobei die Verschlußplatte eine Verschlußlasche (26) aufweist, die mit ihr schwenkbar entlang einer zweiten Scharnierlinie (28) verbunden ist, wobei die Verschlußlasche in eine Öffnung (36) im offenen Ende des Kartons einsetzbar ist, um die Verschlußplatte in einer geschlossenen Stellung zu halten, wobei die Vorrichtung eine letzte Verschließstation aufweist mit einem ersten Abschnitt, in dem die Verschlußlaschen anfänglich gerichtet werden, indem sie entlang der zweiten Scharnierlinie umgebogen werden und mit einem zweiten Abschnitt, in dem die Laschen in das offene Ende des Kartons gesteckt werden, wobei die Vorrichtung weiterhin einen ersten Förderer (50) aufweist, um Kartons durch die letzte Verschließstation zu fördern, wobei die offenen Enden der Kartons kontinuierlich in einen Verschlußpfad geführt werden, in welchem sich die Öffnungen in einer Einsteck-Ebene (120) ausdehnen, sowie erste Falt-Elemente (80) in dem ersten Abschnitt, wobei diese ersten Falt-Elemente angeordnet sind, um die Verschlußplatte (22) an der ersten Scharnierlinie in eine Zwischenstellung zu falten sowie eine Leiste (90), die eine Faltkante (94) aufweist, welche so angeordnet ist, daß sie der zweiten Scharnierlinie (28) von unten anliegt, wenn sich die Verschlußplatten in der Zwischenstellung befinden, sowie eine Ausricht- und Einsteck-Vorrichtung (100), um die Laschen (26) auszurichten und einzustecken, dadurch gekennzeichnet, daß Ausricht-Elemente (122) jeweils auf einem Endlos-Förderer (112) angeordnet sind zum Zweck einer kontinuierlichen Bewegung mit diesem durch den ersten Abschnitt, und daß Einsteck-Elemente (124) jeweils auf einem Endlos-Förderer (110) angeordnet sind zum Zweck einer kontinuierlichen Bewegung mit diesem durch den zweiten Abschnitt, und worin erste Betätigungsmittel (104, 114) geschaffen sind, um die Ausricht-Elemente (122) zu betätigen, während sie durch den ersten Abschnitt bewegt werden, damit die Ausricht-Elemente (122) anfänglich seitlich auf die Schließ-Ebene (120) zu bewegt werden, um eine Karton-Lasche (26) zu beaufschlagen und über die Faltkante (94) entlang ihrer zweiten Scharnierlinie (28) in ihre ausgerichtete Position zu biegen, in welcher sie gegen das offene Ende ihres zugehörigen Kartons gerichtet ist, und worin zweite Betätigungsmittel (102, 114) geschaffen sind, um die Einsteck-Elemente (124) zu betätigen, während sie durch den zweiten Abschnitt bewegt werden, damit die Einsteck-Elemente (124) unabhängig von den Ausricht-Elementen (122) seitlich auf die Schließ-Ebene (120) zu bewegt werden, um die Verschlußplatte (22) zu beaufschlagen und sie zu der Schließ-Ebene (120) zu bewegen und dadurch die Lasche (26) in die Öffnungen (36) zu treiben, um den Karton zu schließen.

2. Karton-Verschließ-Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Endlos-Förderer (112) als endlose Kette (112)

ausgebildet ist und daß der Endlos-Förderer (110) als endlose Kette (110) ausgebildet ist.

3. Karton-Verschließ-Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die endlose Kette (112) einen Abschnitt in ihrer Lauf-
5 richtung auf einer ersten Führungs-Schiene (114) angeordnet aufweist, welche sich durch den ersten Abschnitt erstreckt und einen ersten Abschnitt erstreckt und einen ersten Bereich auf-
10 weist, welcher schräg auf den verschlußpfad zu verläuft, um die Ausricht-Elemente (122) im Verschlußpfad anzuordnen, um die Laschen (26) entlang der zweiten Scharnierlinie (28) auszurichten sowie einen zweiten Bereich parallel zu dem Verschlußpfad.

4. Karton-Verschließ-Vorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die endlose Kette (110) einen Abschnitt in ihrer Laufrichtung auf einer zweiten Führungs-Schiene (116) angeordnet aufweist, welche sich durch den
20 zweiten Abschnitt erstreckt und einen ersten Bereich aufweist, welcher schräg auf den Verschlußpfad zu verläuft, um die Einsteck-Elemente im Verschlußpfad in Förderrichtung hinter der Ausrichtstellung anzuordnen, um die Laschen nach ihrer Ausrichtung einzustecken, sowie einen
25 zweiten Bereich, welcher parallel zu dem Verschlußpfad verläuft, um die Laschen in ihren jeweiligen Öffnungen zu halten.

5. Karton-Verschließ-Vorrichtung nach Anspruch 3 oder 4, dadurch gekennzeichnet, daß die erste Führungs-Schiene (114) sich in einer Führungs-Ebene erstreckt, welche schräg auf die Einsteck-Ebene zu verläuft, wodurch die Ausricht-
30 klingen von der Faltkante (94) weg geführt werden auf die Einsteck-Ebene (120) zu, nach der Ausrichtung ihrer zugeordneten Lasche (26) um sich durch den zweiten Abschnitt hindurch nahe zu einer Einstecköffnung zu erstrecken, um unter den Laschen (26) zu liegen, während ihres Ein-
35 setzvorganges in ihre zugeordneten Einstecköffnungen.

Revendications

1. Machine à fermer les boîtes en carton, permettant de fermer un volet de fermeture (22) qui est articulé sur une extrémité ouverte d'une boîte en carton le long d'une première ligne d'articulation (24), ce volet de fermeture présentant une
45 patte de fermeture (26) articulée sur lui le long d'une seconde ligne d'articulation (28), cette patte de fermeture pouvant s'insérer dans une ouverture (36) ménagée dans l'extrémité ouverte de la boîte afin de retenir le volet de fermeture en position fermée, cette machine comportant un
50 poste de fermeture finale dans une première section duquel les pattes de fermeture sont initialement mises en position d'alignement par pliage le long de la seconde ligne d'articulation et dans une seconde section duquel ces pattes sont
55 emboîtées dans l'extrémité ouverte de la boîte, la machine comportant aussi un premier transporteur (50) permettant de transporter des boîtes en carton à travers le poste de fermeture finale de

façon que les extrémités ouvertes des boîtes soient entraînées de manière continue suivant une trajectoire de fermeture sur laquelle les ouvertures s'étendent dans un plan d'emboîtement (120), un premier moyen formant frotteur d'appui (80) disposé dans ladite première section, ce premier moyen frotteur étant agencé de façon à plier le volet de fermeture (22) autour de la première ligne d'articulation (24) jusqu'en une position intermédiaire, un moyen formant nervure de pliage (90) présentant une arête de pliage (94) agencée de façon à venir se placer au-dessous de la seconde ligne d'articulation (28) lorsque les volets de fermeture sont dans la position intermédiaire, et un mécanisme (100) permettant de mettre en position d'alignement et d'emboîter les
60 pattes (26).

caractérisée en ce que les éléments de mise en position d'alignement (122) sont chacun montés sur un transporteur sans fin (112) de façon à se déplacer de manière continue avec celui-ci à travers la première section et les éléments d'emboîtement (124) sont chacun montés sur un transporteur sans fin (110) de façon à se déplacer de manière continue avec celui-ci à travers la seconde section, tandis que des premiers moyens d'actionnement (104, 114) sont prévus pour actionner les éléments de mise en position d'alignement (122) pendant qu'ils sont entraînés à travers la première section de façon à faire se déplacer initialement ces éléments (122) dans le sens latéral et en direction du plan de fermeture (120) de manière qu'ils viennent au contact d'une patte de boîte (26) et la plient par-dessus l'arête de pliage (94) le long de sa seconde ligne d'articulation (28), jusqu'à sa position d'alignement dans laquelle elle est orientée en direction de l'extrémité ouverte de la boîte qui lui est associée, et qu'il est prévu de seconds moyens d'actionnement (102, 116) permettant d'actionner les éléments d'emboîtement (124) pendant qu'ils sont entraînés à travers la seconde section de façon à faire se déplacer ces éléments (124) dans le sens latéral et en direction du plan de fermeture (120), de façon indépendante par rapport aux éléments de mise en position d'alignement (122), de manière qu'ils viennent au contact de volet de fermeture (22) et le déplacent en direction du plan de fermeture (120), en faisant ainsi s'enfoncer la patte (26) dans l'ouverture (36) pour fermer la boîte en carton.

2. Machine à fermer les boîtes en carton telle que revendiquée dans la revendication 1, caractérisée en ce que le transporteur sans fin (112) se présente sous la forme d'une chaîne sans fin (112) et que le transporteur sans fin (110) se présente sous la forme d'une chaîne sans fin (110).

3. Machine à fermer les boîtes en carton telle que revendiquée dans la revendication 2, caractérisée en outre en ce que la chaîne sans fin (112) présente une partie de son brin avant qui est montée sur un premier rail de guidage (114) qui s'étend à travers la première section et présente un premier tronçon qui s'incline en direction de la trajectoire de fermeture de façon à placer les

éléments de mise en position d'alignement (122) sur cette trajectoire de manière à mettre les pattes (26) en position d'alignement le long de la seconde ligne d'articulation (28), et un second tronçon qui est parallèle à cette trajectoire de fermeture.

4. Machine à fermer les boîtes en carton telle que revendiquée dans les revendications 2 ou 3, caractérisée en outre en ce que la chaîne sans fin (110) présente une partie de son brin avant qui est montée sur un second rail de guidage (116) qui s'étend à travers la seconde section et comporte un premier tronçon qui s'incline en direction de la trajectoire de fermeture de façon à placer les éléments d'emoûttement sur cette trajectoire, en aval de l'emplacement de mise en position d'alignement, de manière à emboîter les pattes après leur mise en position d'alignement, et un

second tronçon qui s'étend parallèlement à la trajectoire de fermeture de manière à retenir les pattes dans leurs ouvertures respectives.

5. Machine à fermer les boîtes en carton telle que revendiquée dans la revendication 3 ou 4, caractérisée en outre en ce que le premier rail de guidage (114) s'étend dans un plan de guidage qui est incliné en direction du plan d'emboîtement, de sorte que, après que leur patte associée (26) ait été mise en position d'alignement, les lames de mise en position d'alignement sont guidées de manière à s'éloigner de l'arête de pliage (94) en direction du plan d'emboîtement (120), de façon à venir se placer, à travers la seconde section, à proximité d'une ouverture d'emboîtement pour être situées au-dessous des pattes (26) au cours de leur introduction dans leur ouverture d'emboîtement associée.

20

25

30

35

40

45

50

55

60

65

7

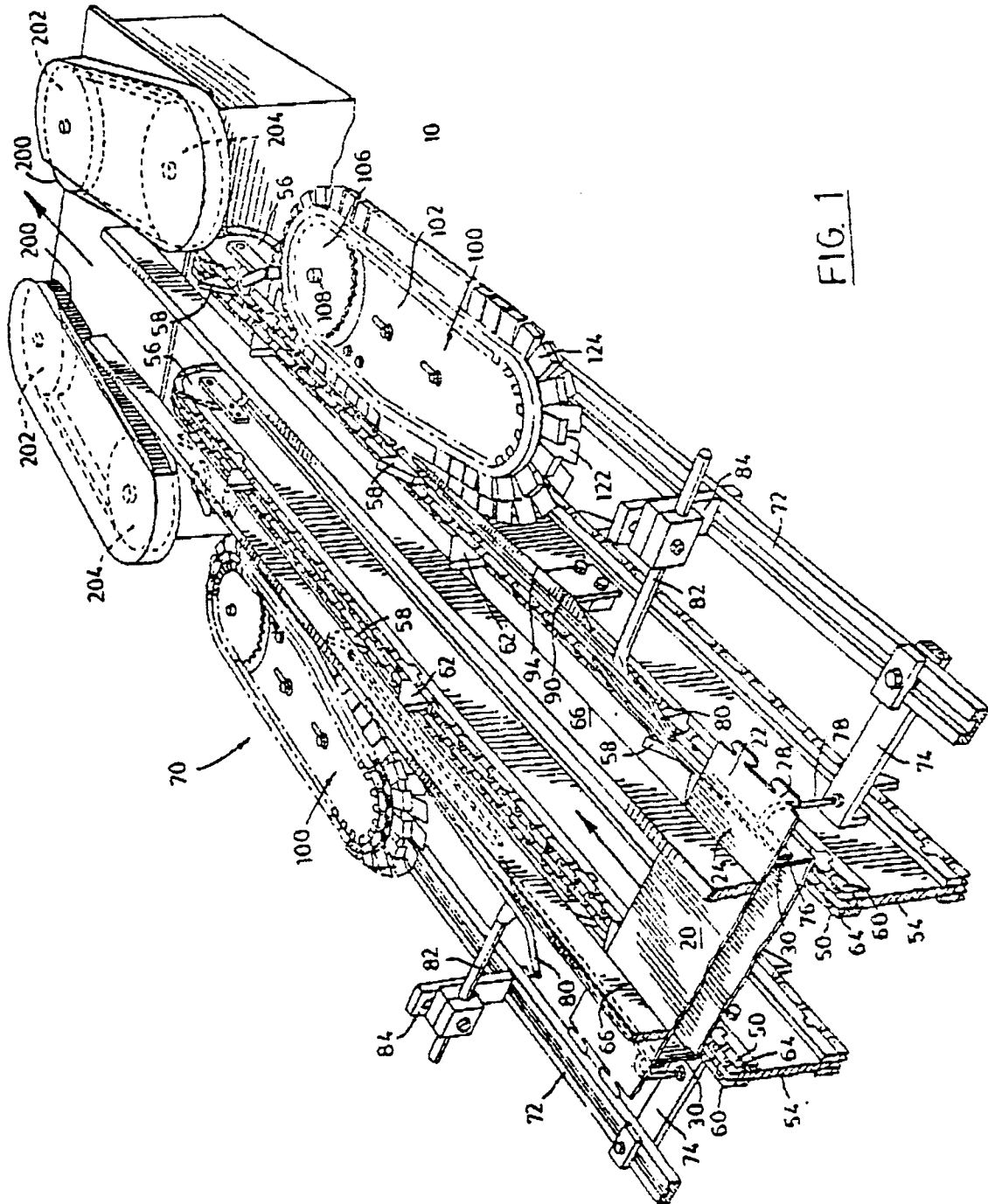
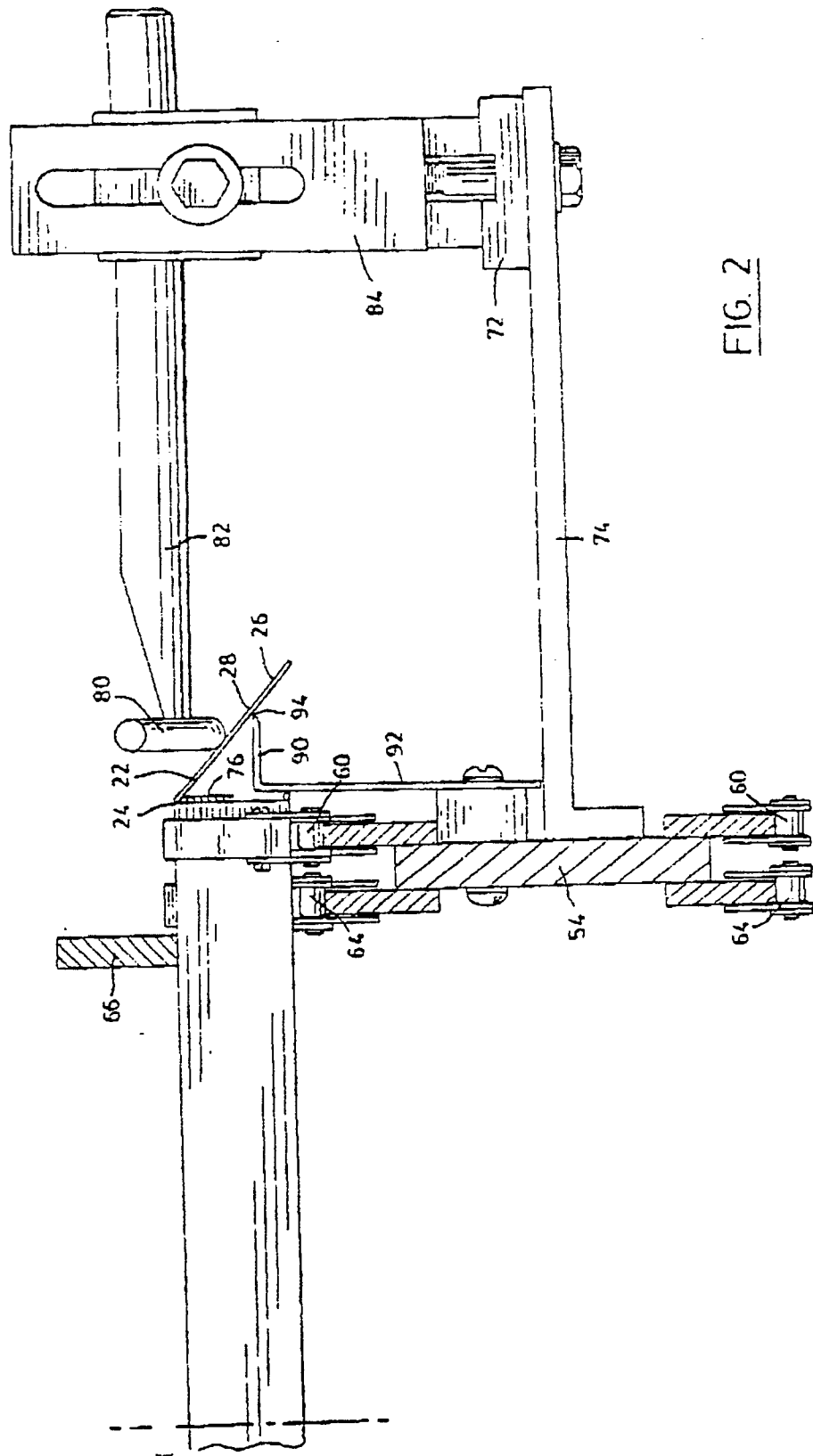


FIG. 1



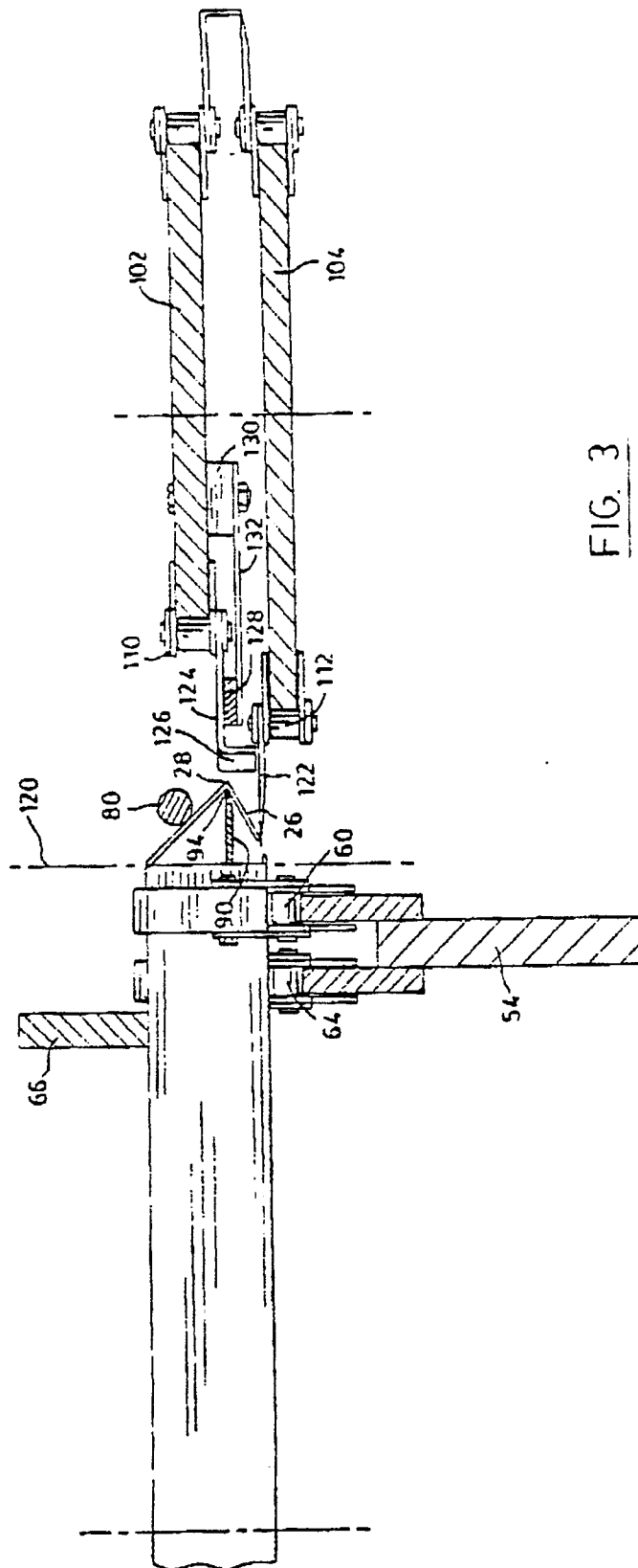


FIG. 3

