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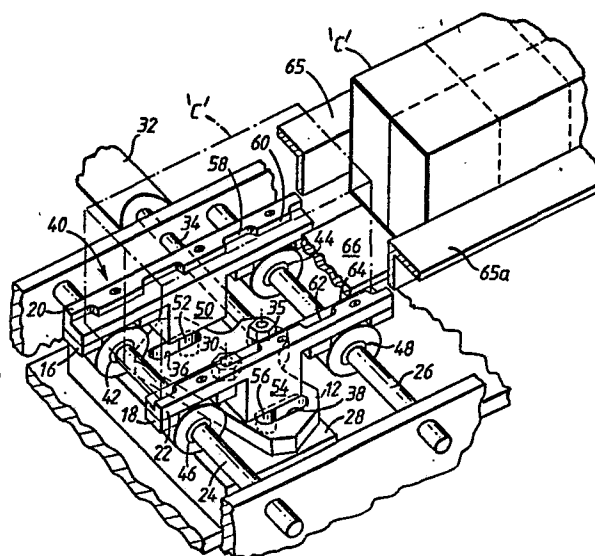
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(54) Panel tightening device for wrap-around cartons.

(57) The invention provides a panel tightening mechanism (10) for causing the base panels of a wrap-around carton to be moved towards one another during a packaging process. The mechanism comprises a pair of pressure bars (20, 22) mounted on guides (24, 26) for linear parallel movement towards and away from one another relative to a carton feed path thereby to impart an inwardly directed force to the carton so that juxtaposed base panels of the carton are moved towards one another. The mechanism includes a rotatable cam plate (12), having a cam track (36, 38) for each pressure bar and an actuator (14) to rotate the cam to cause linear parallel movement to be transferred to the pressure bars by cam followers (52, 56) located in respective ones of the cam slots.



PANEL TIGHTENING DEVICE FOR
WRAP-AROUND CARTONS

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This invention relates to a panel tightening device for wrap-around type cartons and more particularly for bringing together the base panels of such a carton in order to ensure that those panels are securely locked after having
5 been locked together by co-operating locking means provided by the panels.

The invention is particularly suitable for use with a wrap-around carton in which interlocking of the base panels is caused by a locking tab furnished on one base
10 panel to be engaged by relative sliding movement into a co-operating locking aperture provided by an adjacent base panel.

15 The device according to this invention is adapted to be mounted in the carton feed path of a packaging machine downstream (in terms of carton movement through the machine) of a static guiding mechanism for interlocking the carton base panels.

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The invention provides a panel tightening mechanism for causing the base panels of a wrap-around carton to be moved towards one another during a packing process, the mechanism comprising a pair of pressure bars mounted on

support means for linear parallel movement towards and away from one another relative to a carton feed path thereby to impart an inwardly directed force to the carton so that juxtaposed base panels of the carton are
5 moved towards one another, said mechanism further comprising rotatable cam means having a cam track for each pressure bar and actuating means to rotate said cam thereby to cause said linear parallel movement of said pressure bars.

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According to a feature of the invention said cam means may comprise a pivotally mounted plate and said cam tracks may comprise a pair of space slots formed in the cam plate, each of said pressure bars being slidably
15 mounted on guide means and having a cam follower located in respective ones of the slots. In constructions where this feature is adopted said cam slots may be shaped and orientated such that successive equal angular movements of said cam plate in the same direction cause the cam
20 followers and thereby said pressure bars to be moved towards one another and relative to said slots by successive linear distance which are unequal. Preferably, the cam plate is caused to rotate through an initial angular distance α , to displace said pressure bars towards one
25 another through a linear distance 'd', and said cam plate is caused to move through a further angular distance α^2 in which $\alpha^1 = \alpha^2$ to displace said pressure bars towards one another through a linear distance 'd' in which 'd₁' > 'd²'. Preferably, said cam plate is disposed below said
30 guide means, said guide means comprising a pair of parallel bars on which said pressure bars are transversely mounted.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

5 FIGURE 1 is a general perspective view of a tightening mechanism according to the invention; and

10 FIGURES 2, 3 and 4 are schematic plan views of the cam plate showing movement of the cam plate through three sequential positions.

Referring to the drawings, there is shown a mechanism 10 for tightening the base panels of a wrap-around type carton 'C'. The mechanism comprises a pivotal cam plate 12, cam plate actuator 14, movable tightening arms 16, 18 incorporating pressure bars 20, 22 and guide rails 24, 26.

20 The pivotal cam plate 12 comprises a flat 'T' shaped plate which is pivotally mounted to a support bed 28 centrally of the arm of the 'T' by a vertical pivot pin 30. Pivotal movement is imparted to the cam plate by an actuator which, in this embodiment, comprises a pneumatic ram 32. The ram has an extensible and retractable arm 34 which has its free end pivotally connected to the leg of the 'T' cam plate by a pivotal connector 34. Thus, linear movement of the arm results in rotational movement of the cam plate relative to the support bed 28.

30 The arm of the 'T' is formed with two parallel ovate slots 36 and 38 respectively, one on each side of the central pivot pin 30 and which are set at an inclined angle relative to the axis 'x-x' passing through both pivotal connections of the plate.

35 A tightening assembly 40 is mounted atop the cam plate and comprises a pair of fixed parallel guide rails 24 and 26 located adjacent opposed ends of the cam plate.

The tightening arms 16 and 18 are mounted transversely of the guide rails by bearings 42, 44 and 46, 48 disposed adjacent the ends of the respective arms. Tightening arm 16 is formed with a central downward extension piece 50 which carries a pivot pin 52. Pin 52 is located slidably in slot 36 of the cam plate. Similarly, tightening arm 18 is formed with a central downward extension piece 54 which carries a pivot pin 56. Pin 56 is slidably located in a slot 38 of the cam plate.

Pressure bar 20 is detachably mounted on the upper surface of tightening arm 16 and has an inwardly directed face 58 which is crenellated to form a series of spaced projecting flats 60. Likewise, pressure bar 22 is detachably mounted on the upper surface of tightening arm 16 and has an inwardly directed face 62 which is crenellated to form a series of space projecting flats 64. The projecting flats 60 are in registry with the opposing projecting flats 64. It is envisaged that the inwardly directed faces of the pressure bars may be uninterrupted to form continuous flat faces.

The tightening mechanism is located adjacent the downstream end of a packaging machine such that one pressure bar is disposed on either side of bottom guide plate 66 along which cartons 'C' are conveyed between a pair of side guides 65, 65a respectively.

The pressure bars are positioned so as to apply an inwardly directed force to the carton at or adjacent the junction between the carton side wall panels and the base panels. This has the effect of causing the adjacent edges of the base panels to move towards one another so as to ensure that locking tabs provided on one base panel of the carton are correctly inserted into complementary locking apertures provided in an adjacent base panel. The carton accommodates a series

The flats of the pressure bars apply pressure to the carton at intervals therealong which coincide with a central part of a container side wall in each of the rows.

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Referring now to Figures 2 to 4, in order to execute a working stroke of the pressure bars towards one another the cam plate is caused to pivot from the position depicted at Figure 2 to the position depicted at Figure 4.

10 The pneumatic cylinder is actuated to pivot the cam plate so that the pivot pins 52 and 56 are moved towards one another along axis 'y-y' thereby displacing the pressure bars inwardly towards one another. From the initial position shown in Figure 2, the cam plate

15 is rotated through an angle α to the position shown in Figure 3. In so doing the pivot pins 52, 56 are moved towards one another by the distance ' d_1 ', whereby the pressure bars are brought in contact with the carton 'C'. Further rotation of the cam plate through angle

20 α^2 from the position shown in Figure 3 to the position shown in Figure 4 causes the pivot pins 52, 56 to move through a lesser distance ' d^2 ' whereby pressure is applied by the pressure bars to the carton 'C' as previously mentioned. The rotation of the cam plate is

25 smooth and constant and whereas $\alpha_1 = \alpha^2$, the displacement ' d ' of the pivot pins is such that ' d_1 ' > ' d^2 '.

CLAIMS

-6-

1. A panel tightening mechanism (10) for causing the base panels of a wrap-around carton to be moved towards one another during a packaging process, the mechanism being characterised by a pair of pressure bars (20, 22) mounted on support means (24, 26) for linear parallel movement towards and away from one another relative to a carton feed path thereby to impart an inwardly directed force to the carton so that juxtaposed base panels of the carton are moved towards one another, said mechanism further comprising rotatable cam means (12) having a cam track (36, 38) for each pressure bar and actuating means (14) to rotate said cam thereby to cause said linear parallel movement of said pressure bars.
2. A panel tightening device according to claim 1, further characterised in that said cam means comprises a pivotally mounted plate and in that said cam tracks comprise a pair of space slots formed in the cam plate, each of said pressure bars being slidably mounted on guide means (24, 26) and having a cam follower (52, 56) located in respective ones of the slots.
3. A panel tightening mechanism according to claim 2, further characterised in that said cam slots are shaped and orientated such that successive equal angular

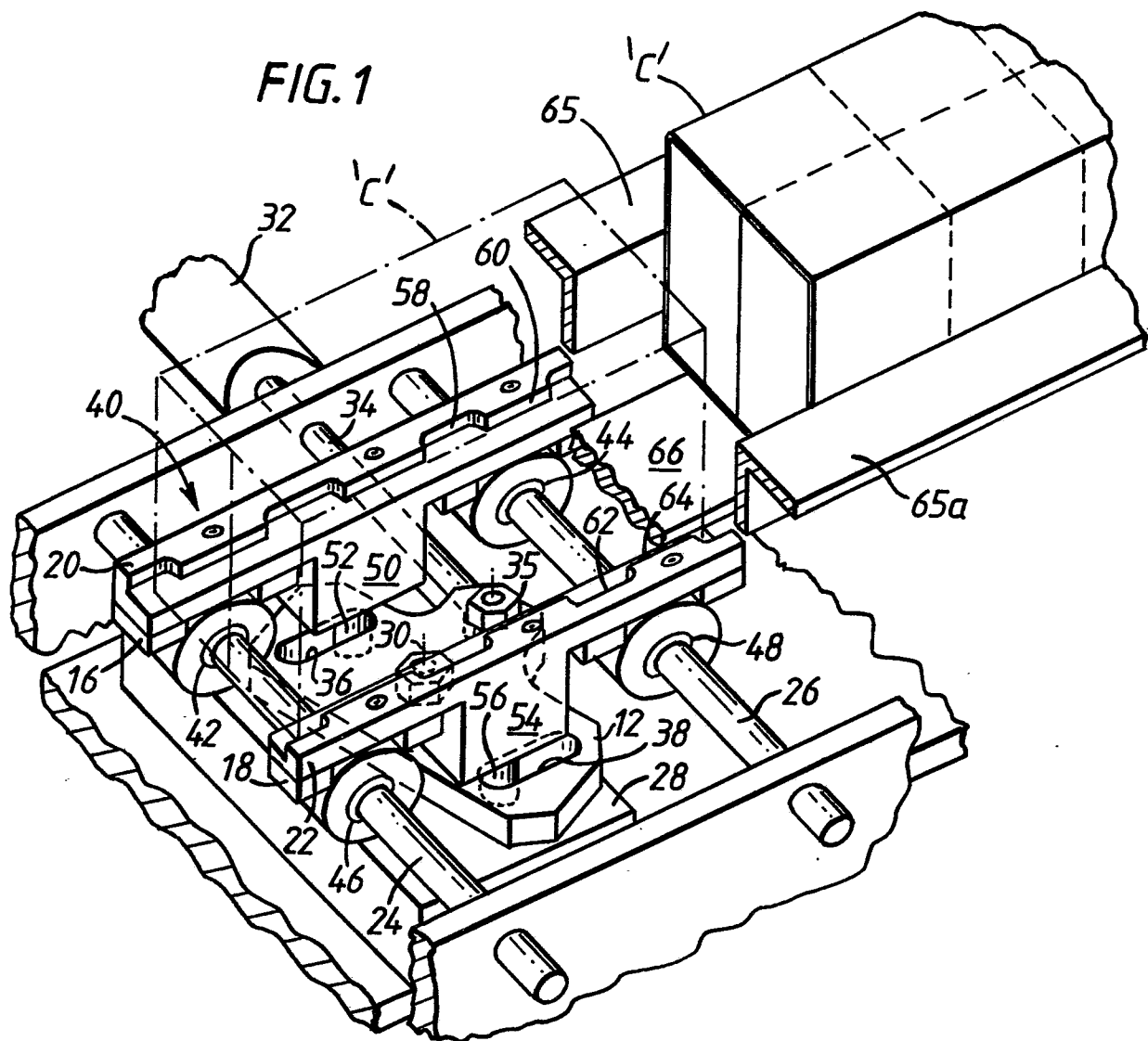
movements of said cam plate in the same direction cause the cam followers and thereby said pressure bars to be moved towards one another and relative to said slots by successive linear distances which are unequal.

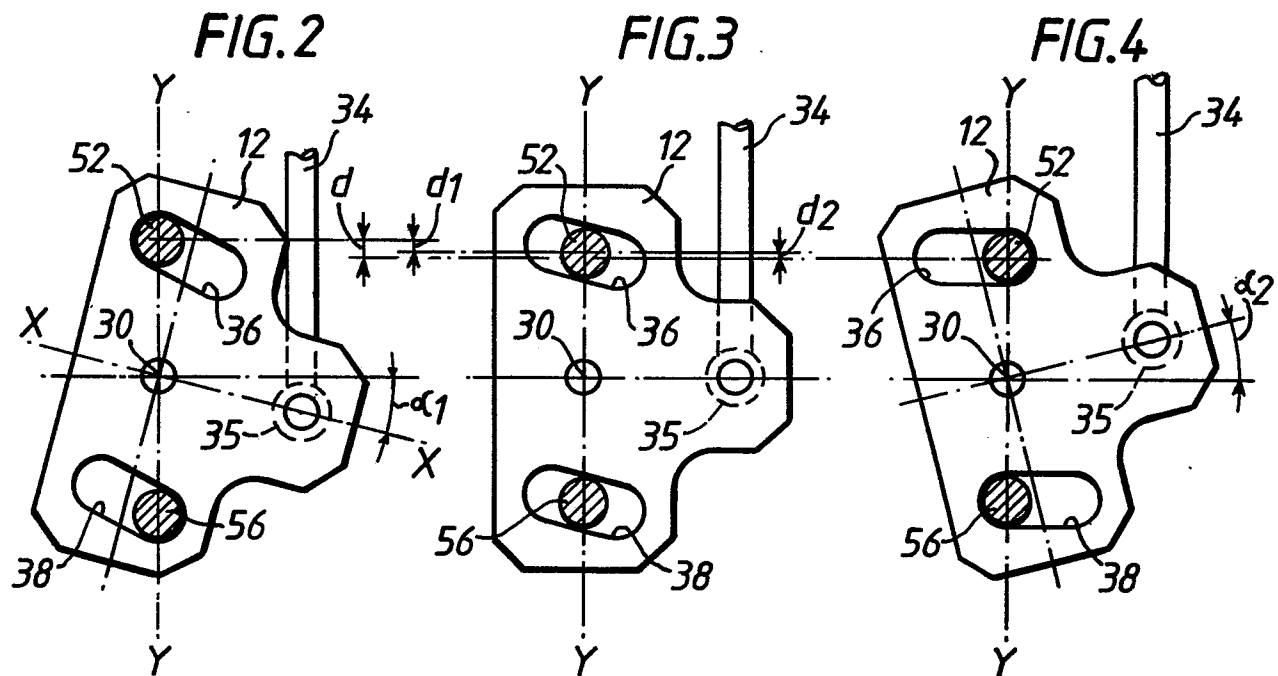
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4. A panel tightening mechanism according to claim 3, further characterised in that the cam plate is caused to rotate through an initial angular distance α , to displace said pressure bars towards one another through a linear distance 'd', and in that said cam plate is caused to move through a further angular distance α_2 in which $\alpha_1 = \alpha_2$ to displace said pressure bars towards one another through a linear distance 'd' in which ' d_1 ' > ' d_2 '.

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5. A panel tightening mechanism according to any of claims 2 to 4, further characterised in that said cam plate is disposed below said guide means, said guide means comprising a pair of parallel bars on which said pressure bars are transversely mounted.







European Patent
Office

EUROPEAN SEARCH REPORT

0198602

Application number

EP 86 30 1916

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	GB-A-1 046 121 (THE LOVESHAW CORP.) * Page 5, line 59 - page 6, line 30; figures 2,3,14 *	1,2,5	B 65 B 49/08
Y	--- Dr. RUDOLF FRANKE: "Vom Aufbau der Getriebe", vol. 1, 1943, page 29, VDI-Verlag GmbH, Berlin, DE; * Figure 46 *	1,2,5	
A	--- H.J. KNAB: "Übersicht über Kinematik, Mechanismen und Vorschaltgetriebe", 1928, page 84, Selbstverlag, Nürnberg, DE; * Figure 709 *	2	
A	--- US-A-2 062 540 (C.W. VOGT) * Figures 2,3 *	3,4	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	--- H.T. BROWN: "Bewegungsmechanismen", 2nd edition, 1925, pages 60,61, Alfred Kröner Verlag, Leipzig, DD; * Figure 208 *	3	B 65 B
A	--- US-A-3 064 404 (CHIDSEY, F.A.) * Column 13, line 20 - column 14, line 3; figure 20 * --- -/-		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30-06-1986	Examiner SCHELLE, J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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EUROPEAN SEARCH REPORT

0198602

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EP 86 30 1916

Page 2

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	NL-A-6 512 470 (UNILEVER N.V.) * Figure 10 * -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30-06-1986	Examiner SCHELLE, J.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	