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Panel tightening device for wrap-around cartons.

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Description

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 been locked together by co-operating locking means provided by the panels.

This 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 panel to be engaged by relative sliding movement into a co-operating locking aperture provided by an adjacent base panel.

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.

GB-A-1046121 relates to a carton closing machine according to the pre-characterizing part of claim 1 and including a carton clamping mechanism which comprises 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. These pressure bars are positioned in a vertical position which corresponds to the lower part of the carton and they impart, when actuated in order to move towards one another, an inwardly directed force to the carton, so that juxtaposed base panels of the carton are moved towards one another. The mechanism further comprises control means to cause said linear parallel movement of said pressure bars.

The object of the present invention is to provide an improved control means.

To this end, 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 packaging process, the mechanism having 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 moved towards one another, said mechanism further comprising control means to cause said linear parallel movement of said pressure bars, characterized in that said control means comprises 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, in that said cam means comprises a pivotally mounted plate, 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 and having cam follower located in respective ones of the slots and 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.

According to a feature of the invention 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 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 another through linear distance 'd', and said cam plate is caused to move through a further angular distance α^2 in which $\alpha' = \alpha^2$ to displace said pressure bars towards one another through a linear distance 'd' in which 'd', $> 'd^2'$.

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

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

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 32, 34 movable tightening arms 16, 18 incorporating pressure bars 20, 22 and guide rails 24, 26.

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.

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.

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. Like-

wise, pressure bar 22 is detachably mounted on the upper surface of tightening arm 16 and has an inwardly directed face 62 which is crenallated 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 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.

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. 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 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 'd₁', whereby the pressure bars are brought in contact with the carton 'C'. Further rotation of the cam plate through angle 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 'd²' whereby pressure is applied by the pressure bars to the carton 'C' as previously mentioned. The rotation of the cam plate is smooth and constant and whereas $\alpha_2 = \alpha^2$, the displacement 'd' of the pivot pins is such that 'd₁' > 'd²'.

Claims

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 having 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 control means to cause said linear parallel movement of the pressure bars, characterized in that said control means comprises rotatable cam means (12) having a cam track (36, 38) for each pressure bar and actuating means (32, 34) to rotate said cam thereby to cause said linear parallel movement of said pressure bars, in that said cam means comprises a pivotally mounted plate, 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 cam follower (52, 56) located in respective ones of the slots and 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.

2. A panel tightening mechanism according to claim 1, 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.

3. A panel tightening mechanism according to claim 2, 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 'd₁' > 'd₂'.

Patentansprüche

1. Festziehvorrichtung (10) zum Bewirken eines Aufeinanderzubewegens der Bodenwandabschnitte einer Kartonfalthülle während eines Verpackungsvorganges mit einem Paar von Druckbalken (20, 22), die auf Stützeinrichtungen (24, 26) zur linearen Parallelbewegung zueinander und voneinander relativ zu einer Kartonzuführbahn angebracht sind, um dadurch eine nach innen gerichtete Kraft auf den Karton auszuüben, so daß sich gegenüberliegende Bodenwandabschnitte des Kartons aufeinander zu bewegt werden, welche weiterhin eine Steuereinrichtung zum Bewirken der linearen Parallelbewegung der Druckbalken aufweist, dadurch gekennzeichnet, daß die Steuereinrichtung eine drehbare Steuerkurveneinrichtung (12) aufweist, die für jeden Druckbalken eine Kurvenbahn (36, 38) hat, sowie eine Betätigungseinrichtung (32, 34) zum Drehen der Steuerkurve, wodurch die lineare Parallelbewegung der Druckbalken bewirkt wird, daß die Steuerkurveneinrichtung eine schwenkbar gelagerte Scheibe aufweist, daß die Kurvenbahnen ein Paar von in die Kurvenscheibe eingearbeiteten Abstandsschlitz darstellen, wobei jeder der genannten Druckbalken gleitend auf einer Führungseinrichtung (24, 26) angebracht und mit Kurvenfolgern (52, 56) versehen ist, die sich in den jeweiligen Abstandsschlitz befinden, und daß die Kurven-

scheibe unterhalb der Führungseinrichtungen angebracht ist, welche ein Paar von parallelen Schienen aufweisen, auf denen die Druckbalken querliegend angebracht sind.

2. Festziehvorrichtung gemäß Anspruch 1, dadurch gekennzeichnet, daß die Kurvenschlitze so geformt und ausgerichtet sind, daß durch sukzessive gleiche Winkelbewegungen der Kurvenscheibe in die gleiche Richtung die Kurvenfolger und dadurch die Druckbalken zueinander hin und relativ zu den Schlitzen um sukzessive lineare Wegabschnitte bewegt werden, die ungleich sind.

3. Festziehvorrichtung gemäß Anspruch 2, dadurch gekennzeichnet, daß die Kurvenscheibe um ein erstes Winkelinkrement α_1 gedreht wird, um die Druckbalken um einen linearen Wegabschnitt 'd₁' zueinander hin zu versetzen und daß die Kurvenscheibe um ein weiteres Winkelinkrement bewegt wird, wobei $\alpha_1 = \alpha_2$ ist, um die Druckbalken um einen weiteren linearen Wegabschnitt 'd₂' zueinander hin zu versetzen, wobei 'd₁' > 'd₂' ist.

Revendications

1. Mécanisme de serrage de panneaux adapté pour amener les panneaux de base d'un carton d'enveloppement à se déplacer l'un vers l'autre pendant un processus d'emballage, ce mécanisme comportant deux barres de pression (20, 22) montées sur des moyens de support et de guidage (24, 26) pour faire des mouvements linéaires parallèles de rapprochement et d'écartement entre elles par rapport à un chemin d'alimentation de carton, afin de fournir sur chaque carton un effort dirigé vers l'intérieur, de façon que les panneaux de base juxtaposés de celui-ci soient déplacés l'un vers l'autre, ce mécanisme comprenant, en outre, des moyens de commande conçus pour provoquer lesdits mouvements linéaires parallèles des barres de pression (20, 22)

et étant caractérisé par le fait que ces moyens de commande comprennent des moyens de came pivotants (12) comportant une voie de came (36, 38) pour chaque barre de pression et des moyens de commande (32, 34) adaptés pour faire pivoter les moyens de came (12) et provoquer, par l'intermédiaire de ceux-ci, lesdits mouvements linéaires parallèles des barres de pression (20, 22), ces moyens de came (12) étant constitués par une plaque montée de manière pivotante et dans laquelle sont pratiquées les voies de came (36, 38) sous forme de fentes espacées, chaque barre de pression étant montée de manière coulissante sur les moyens de guidage (24, 26) et étant pourvue d'un suiveur de came (52, 56) engagé dans la voie de came correspondante de la plaque pivotante, laquelle est située en dessous des moyens de guidage qui sont constitués par deux barres ou rails parallèles sur lesquels les barres de pression sont montées transversalement.

2. Mécanisme de serrage de panneaux selon la revendication 1, caractérisé par le fait que les fentes constituant les voies de came (36, 38) sont conformées et orientées de manière que les mouvements angulaires égaux et successifs de la plaque de came, dans la même direction, forcent les suiveurs de came (52, 56) et, par suite, les barres de pression (20, 22) à se déplacer, l'une vers l'autre et par rapport aux fentes, suivant des distances linéaires successives qui sont inégales.

3. Mécanisme de serrage de panneaux selon la revendication 2, caractérisé par le fait que la plaque de came est amenée à pivoter, d'abord suivant une distance angulaire initiale α_1 , afin de déplacer les barres de pression (20, 22) l'une vers l'autre suivant une distance linéaire d₁ et, ensuite, suivant une autre distance angulaire α_2 , égale à α_1 , par laquelle les barres de pression se déplacent l'une vers l'autre suivant une autre distance linéaire d₂ qui est inférieure à d₁.



