

June 16, 1964

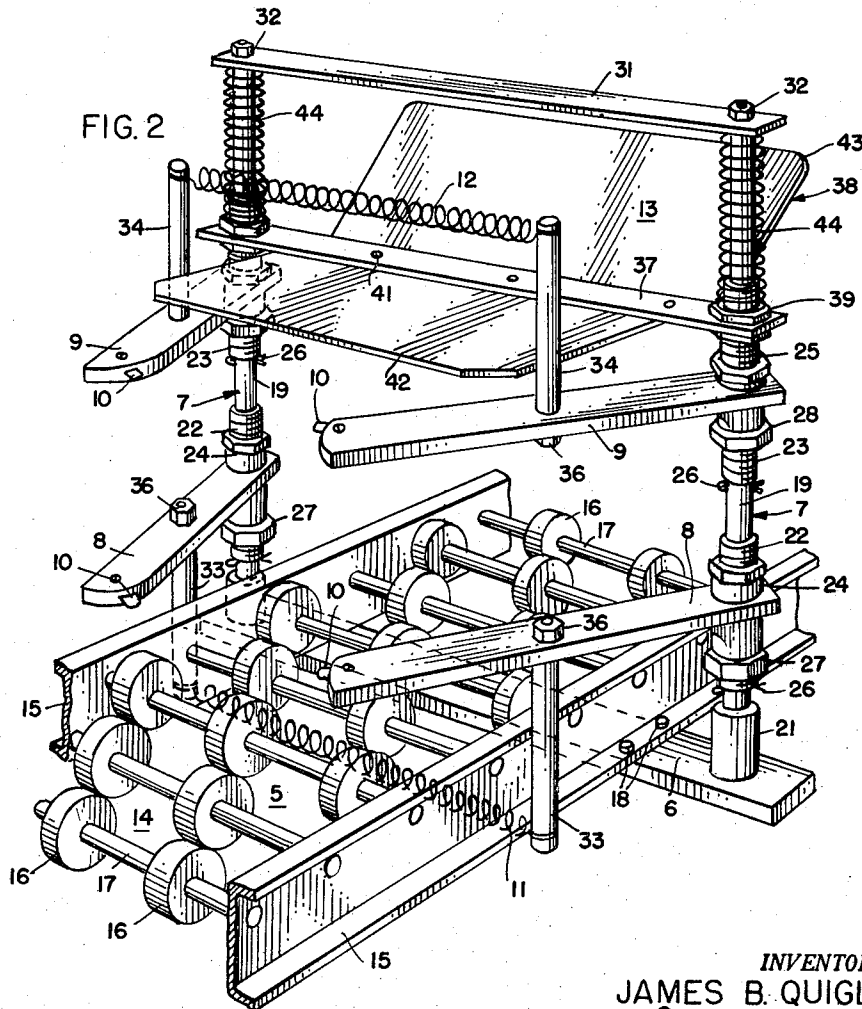
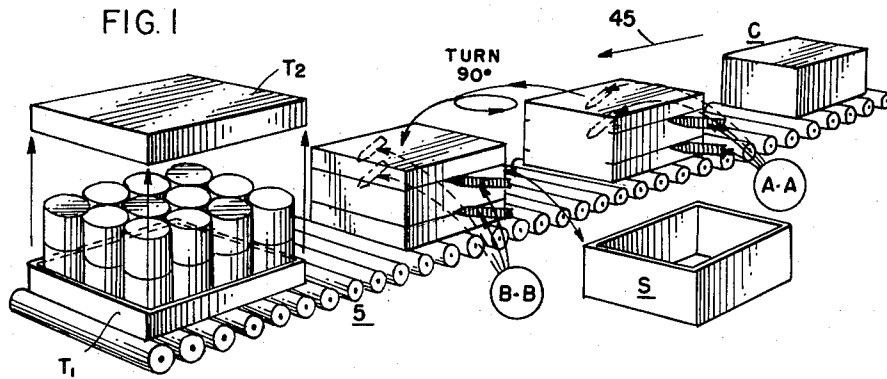
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3,137,068

CARTON-SLITTING MECHANISM

Filed Jan. 3, 1961

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3,137,068

CARTON-SLITTING MECHANISM

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Filed Jan. 3, 1961, Ser. No. 80,185

3 Claims. (Cl. 30-2)

This invention relates to carton-slitting mechanism for use on carton conveyors.

The main objects of this invention are to provide an improved carton-slitting mechanism especially adapted for use with conventional carton-conveyors; to provide a carton-slitting mechanism of this kind adapted to simultaneously slit cartons on opposite sides at predetermined uniform distances from the carton bottoms and tops respectively; to provide an improved mounting of vertically-spaced pairs of horizontally-opposed cutting-blade mountings permitting relative vertical adjustment thereof automatically whereby different size cartons will have the slits cut in the opposite sides at substantially the same distance from the carton bottoms and tops; to provide an improved carton-slitting mechanism of this kind which will insure the effective slitting of cartons advancing along a conveyor regardless of their irregular positioning on the conveyor; and to provide an improved carton-slitting mechanism of this kind of such simple construction as to make its manufacture extremely economical and permit facile attachment of two such mechanisms to conventional package conveyors for the effective slitting of varied sized cartons on all four sides to convert each carton into a pair of trays and an intermediate sleeve section.

A specific embodiment of this invention is shown in the accompanying drawings in which:

FIGURE 1 is a diagrammatic perspective of cartons moving along a conventional conveyor whereby the four sides of each carton are slit at substantially uniform distances above and below the carton bottom and top, respectively, by a carton-slitting mechanism constructed in accordance with this invention;

FIG. 2 is an enlarged perspective view showing, mounted on a conventional carton conveyor, a carton-slitting mechanism constructed in accordance with this invention; and

FIG. 3 is a further-enlarged, trailing-end view of the mechanism shown in FIG. 2 with the medial parts spanning the conveyor broken away nad with the conveyor omitted.

The essential concept of this invention is to provide a pair of base-supported standards, each mounting vertically-spaced pairs of horizontally-opposed and inwardly-biased cutting-blade arms, two sets of which standard-mounted cutting-blade arms, when attached in horizontally-spaced disposition along a conventional carton conveyor, will cause cartons, moving on the conveyor and whether centered thereon or not, to be slit on all four sides at substantially equal distances above and below the carton bottom and top, respectively, regardless of the carton width and height, so as to divide the carton into two trays of equal size and a disposable intermediate sleeve section.

A carton-slitting mechanism embodying the foregoing concept, and especially adapted for use on a conventional carton conveyor 5, comprises a base member 6 mounting a pair of standards 7, each standard swingably supporting vertically-spaced and oppositely-arranged pairs of arms 8 and 9, each arm mounting a cutting blade 10, and the opposed arms 8 and 9 being biased toward each other by springs 11 and 12, respectively; the assembly including a cutter-elevating guide 13 attached to the upper pair of opposed arms 9 to effect their automatic vertical adjustment relative to the lower arms 8 to insure the upper pair

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of blades 10 slitting cartons of various heights substantially at the same distance from the top thereof as the lower pair of blades 10 slits the carton from the bottom thereof.

A conveyor 5, suitable for use with this improved carton-slitting mechanism, may be of the type wherein closely-spaced, parallel rollers 14 are trunnioned on supporting parallel frames 15. The frames 15 here are shown as outwardly-facing channel bars. In FIG. 2 the rollers 14 are axially-spaced disks 16 on shafts 17 journaled at their ends on the frames 15. In other types of conveyor the rollers 14 would be of the form shown diagrammatically in FIG. 1. Whatever their form the rollers 14 rotate freely by the movement of cartons C along the conveyor.

As will be explained later, such conveyors 5 would have two of the now-to-be described carton-slitting mechanisms fixed thereon at longitudinally-spaced positions to effect the complete four-side slitting of each carton C to convert each carton into two trays T-1 and T-2 and an intermediate sleeve S.

The base member 6, of the carton-slitting mechanism, here is shown as a flat bar. It is of a length greater than the over-all transverse distance between the outer faces of the frames 15 and is secured to frame flanges by suitable fasteners 18, with ends of the bar extending beyond the frames 15.

The standards 7, as herein structured, each comprises a section of shafting 19 bonded at its lower end to a sleeve 21 which in turn is bonded to one end of the base member 6. The standards 7 slidably mount lower and upper externally threaded sleeves 22 and 23 whereon are slidably mounted hubs 24 and 25 to which are fixed the arms 8 and 9 respectively. These threaded sleeves 22 and 23, slidable on the shafting 19, are secured in initial axially-spaced relationship from each other and from the base member 6 by cotter pins 26.

Nuts 27 and 28, threaded on the respective sleeves 22 and 23 below the hubs 24 and 25, permit axial adjustment of the hubs 24 and 25 on the sleeves 22 and 23 to vary the vertical position of each of the arms on its respective sleeve. Once adjusted the nuts 27 and 28 are secured against altered positions by set screws 29. Such relative axial adjustment of the hubs 24 and 25 permits a predetermined vertical spacing of the arms 8 and 9, relative to the conveyor and the elevating guide 13 respectively, so that the blades 10, on the respective arms 8 and 9, will slit cartons C at predetermined distances respectively above and below the bottom and top of each carton C.

At their upper ends the standards 7 are connected together by a cross bar 31 seated on the shouldered threaded ends of each shaft section 19 and secured by nuts 32. Such a bar 31 maintains the rigid parallelism of the standards 7.

The arms 8 and 9 here are shown as rigid bars of rectangular cross-section. Obviously, such arms could take various shapes. At their outer ends, the arms 8 are bonded to the respective hubs 24 and the arms 9 similarly are bonded to the respective hubs 25.

The cutting blades 10 are fixed at the opposed inner ends of the arms 8 and 9. The precise form and material of these blades 10 is not critical. It is important, however, that the blades extend beyond the arm ends and present sharp razor-like edges to the advancing cartons C. The projection of the blade 10 should be adjustable on the arms 8 and 9 so as to insure penetration of the carton walls to cleanly sever the carton C into the respective sections T-1, T-2 and yet avoid injuring the contents of the cartons or cutting the labels thereon. Preferably the inner ends of the arms are rounded on a radius from the

axis of the respective support 7, and the blade edges are likewise curved so that penetration of the carton wall will be uniform regardless of the width of the carton and the angular position of the arms.

The springs 11 and 12, which bias the respectively opposed arms 8 and 9 inwardly toward each other, are connected to posts 33 and 34 respectively. The posts 33 depend from the lower faces of the opposed arms 8 and the posts 34 extend upwardly from the upper faces of the opposed arms 9. As herein shown, the posts 33 and 34 are located nearly medially of the respective arms 8 and 9, the ends of the posts being seated in arm apertures and secured thereto by nuts 36. These posts also serve as stop members to limit the inward swing of the respective arms, as shown, and thus their position on the arms will be determined by the length of the arms and the extent of swing desired.

The springs 11 and 12 have their ends looped around and seated in grooves adjacent the free ends of the posts 33 and 34. The lower spring 11 spans the space between the posts 33 below the frames 15 and urges the arms 8 inwardly toward each other to the limit permitted by the striking of the posts 33 against the frames 15. The upper spring 12 spans the distance between the posts 34 and urges the arms 9 inwardly toward each other to the limit permitted by the striking of the posts 34 against the carton guide 13, presently to be described.

The springs 11 and 12 are of a strength to effect two important results with each carton C, traveling along the conveyor 5. The first result is to so hold the arms 8 and 9—and especially the lower opposed arms 8—inwardly toward each other that they will tend to adjust the approach of each carton C to the end that the sides thereof will be practically parallel to the sides of the conveyor 5 as the carton comes into contact with the blades 10. The second result is to insure a penetration of the blades 10 through the carton walls without injury to the carton contents. It will be understood, however, that each arm is capable of swinging independently of its opposite arm and hence the cartons will be uniformly slit even though they may be off-center or cocked with respect to the conveyor center-line.

The automatic carton-elevating guide 13, as here shown, comprises a cross bar 37 mounting an angulated plate 38. The cross bar 37 is apertured to fit over the sleeves 23 and is clamped thereon between a pair of nuts 39 and 39'. As previously noted, the sleeves 23 and free to slide on the supports 7. The angulated plate 38 here is shown secured to the cross bar 37 by rivets 41 with the trailing section 42 substantially horizontally parallel to the base member 6 and, hence, to the conveyor frames 15. The leading or forward section 43 is inclined upwardly. Springs 44, embracing the shafts 19 between the cross bar 31 and the nuts 39 on the upper ends of the sleeves 23, serve to yieldingly hold the upper arm and guide plate assembly against its gravity-seated position on the stop pins 26. Hence, cartons C of greater height than the preset vertical spacing of the guide plate 38 above the conveyor rollers 14, as determined by the vertical spacing of the pairs of arms 8 and 9 on the standards 7, upon contacting the angulated section 43 of the plate 38 will lift the plate 38 against the action of the springs 44. The springs 44 are held compressed by their interposition between the nuts 39 and the cross bar 31. Such plate elevation will insure the automatically-adjusted vertical-spacing of the pairs of arms 8 and 9 to the end that all cartons C, advancing along the conveyor 5, will be slitted at predetermined uniform distances respectively above and below the bottom and top of the carton, as indicated at A—A and B—B in FIG. 1. Hence, the resulting trays T-1 and T-2 will be substantially the same depth.

To make possible the slitting of cartons C on all four sides, two of these improved carton-slitting mechanisms would be attached to a conveyor 5 in longitudinally-

spaced relationship. The spacing would depend upon local conditions. However, it should be such as to afford an opportunity for each carton to be turned 90 degrees between the slitting mechanisms.

The operation of a conveyor 5, equipped with two of these slitting mechanisms, would be as follows, assuming, of course, that the desired relative vertical spacing of the pairs of arms 8 and 9 has been effected:

The cartons C would move along the conveyor 5 in the direction of the arrow 45 in FIG. 1. As a carton C approaches the angulated section 43 of the guide plate 38 the cross bar 37 will be elevated automatically, against the action of the springs 44, so that during the further advance of the carton, the horizontal section 42 of the plate 38 would ride upon the top of the carton.

If, perchance, such a carton C is not set properly on the conveyor 5, with the sides substantially parallel with the frames 15, the carton C will contact the inwardly-extending, spring-biased arms 8 and 9 and the arms 8 and 9 will ordinarily shift the carton to a substantially squared position on the conveyor 5. The carton thereupon, passing between the inwardly-extending spring-pressured arms and the blades 10, will have opposite sides slitted inwardly adjacent the bottom and top of the carton. By reason of the pre-setting of the upper opposed arms 9 relative to the horizontal section 42 of the plate 38, to substantially conform to the spacing of the lower opposed arms 8 relative to the rollers 14, the slits cut in the opposite sides of the carton C will be located at substantially equal distances, respectively, above and below the bottom and top of the carton.

Before advancing for positioning and slitting by the second carton-slitting mechanism on the conveyor 5, each carton C is turned 90 degrees. Thereupon, the carton will advance and, as just explained above, first be squared on the conveyor, if need be, and then have the two other sides of the carton slitted. The second slitting will be in alignment with the first slitting, for the reasons previously mentioned.

As the completely-slitted carton C advances beyond the second slitting mechanism, it is ready for removal from the conveyor and such disposition thereof in the store as circumstances may require. In any event each carton C is cleanly severed along two lines so that the carton is divided into the two trays T-1 and T-2 of the same depth and a sleeve S. Therefore, where the contents of the carton are in more than one row, part of those contents may be placed in the inverted tray T-2. After inverting the top tray T-2, the upper row of the carton articles may be lifted out bodily by the clerk or worker embracively gripping the sleeve S between his arms, lifting the top row of articles off and then setting them on the inverted upper tray T-2. The sleeve then may be removed and discarded. The inverted tray of articles then may be handled in the usual manner for stacking on top of the remaining articles in the lower tray T-1, either for storage or for display on the store shelves.

The main advantages of this invention reside in the construction and arrangement of the slitter mechanism whereby cartons of various sizes, traveling one after the other along the conveyor, are automatically slit at two levels to form a pair of trays of uniform depth without regard to whether the cartons are centered or squared with the conveyor centerline; in the very simple and relatively low cost of the slitting mechanism; and in the ease with which the apparatus may be installed on existing conveyor equipment and used in conventional stockroom procedures.

Although but one specific embodiment of this invention has been herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A carton-slitting mechanism comprising, a supporting base member having horizontal conveyor means thereon, a pair of vertical standards secured to the base member one on each side of the conveyor means, a pair of vertically-spaced horizontally swingable arms supported on each standard above said conveyor means, an inwardly-facing cutting-blade fixed to each arm, means normally urging the pairs of arms to swing inwardly toward each other to cause the blades to slit a carton on opposite sides thereof, height control means operatively connecting together the upper arms on the two standards and engageable by the top of an advancing carton on said conveyor means for automatically adjusting the relative vertical spacing of each pair of arms to cause the slitting of a carton at predetermined substantially uniform distances respectively above and below the bottom and top of the carton as it is caused to advance between the said pairs of arms, means for adjusting the operating level of the lower of said arms relative to the conveyor means, and means for adjusting the operating level of the upper arms relative to said height control means.

2. A carton-slitting mechanism adapted for attachment to a carton-conveyor and comprising, a conveyor attachable base member, a pair of vertically parallel standards secured to the base member one on each side of the conveyor, a pair of vertically-spaced horizontally swingable arms mounted on each standard, an inwardly-facing cutting blade fixed to each arm, the upper arm on each standard being axially shiftable thereon independently of the lower arm, springs connected respectively to the opposed lower arms and to the opposed upper arms and normally urging the arms inwardly toward each other to cause the blades to slit the opposite sides of a carton moving along said conveyor, a bar connecting the upper opposed arms, and means on the bar engageable with the top of a carton for lifting the bar and adjusting simultaneously the vertical spacing of the upper arms relative to the lower

arms to cause the slitting of a carton at predetermined substantially uniform distances respectively above and below the bottom and top of the carton as it advances along the conveyor, said bar being normally urged toward a predetermined lowered position.

3. A carton-slitting mechanism for attachment to a carton-conveyor and comprising, a conveyor-attachable base member, a pair of vertically parallel standards secured to the base member one on each side of the conveyor, a pair of vertically-spaced arms rotatably supported on each standard for swinging about the axis of the standard, said pair of arms being disposed to swing inwardly toward each other above the conveyor, an inwardly-facing cutting blade fixed to the free end of each arm, the upper arm on each standard being axially shiftable thereon independently of the lower arm, springs connected respectively to the opposed lower arms and to the opposed upper arms and normally urging the arms to swing inwardly towards the center of the conveyor to cause the blades to slit the vertical walls of a carton on opposite sides thereof, a bar connecting the upper opposed arms, and a plate secured to the bar in position to engage the upper end portion of a carton advancing along the conveyor for automatically lifting and adjusting the vertical spacing of the upper arms relative to the lower arms according to the height of the carton and to cause the slitting of a carton at predetermined distances respectively above and below the bottom and top of the carton advancing along the conveyor.

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