Jan. 22, 1963 H. E. ENGLESON ET AL 3,074,326

APPARATUS FOR EXPANDING A CARTON AND INSERTING SAME INTO A CONVEYER BUCKET

Filed Nov. 18, 1960 2 Sheets-Sheet 1

FIG. 1

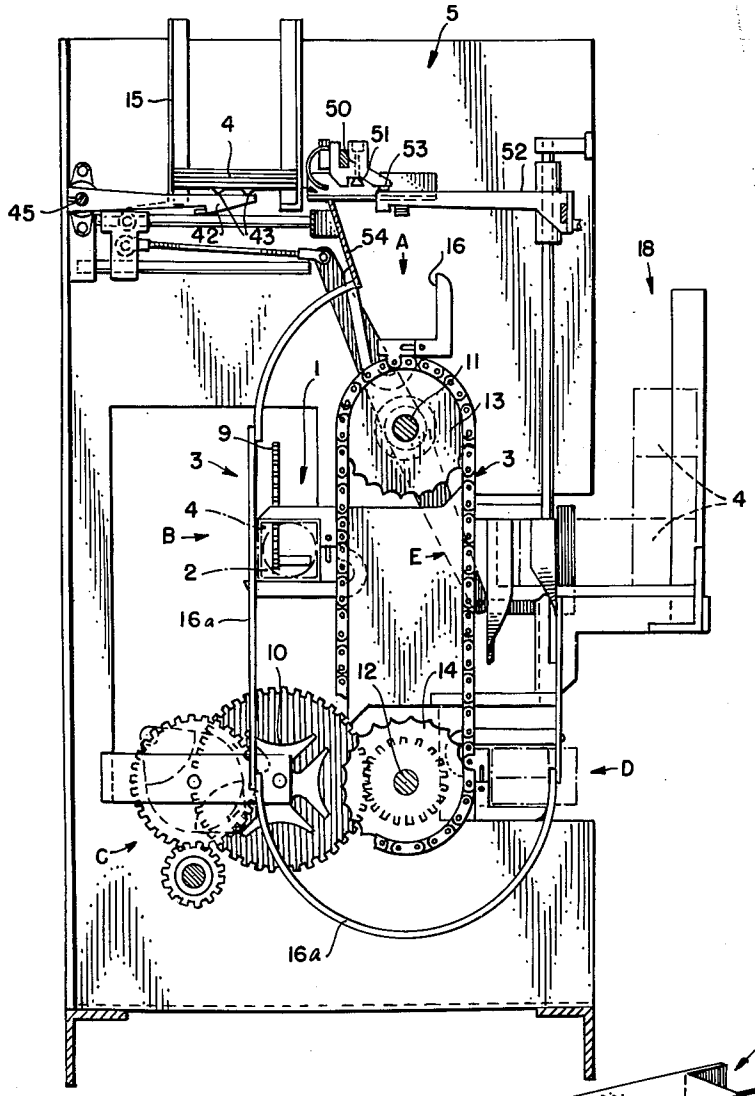
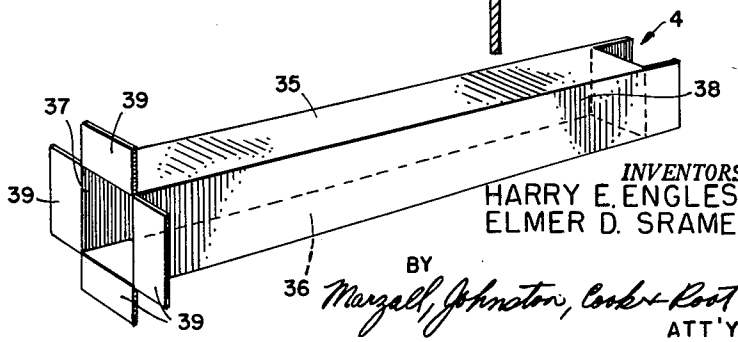


FIG. 3



INVENTORS:
HARRY E. ENGLESON
ELMER D. SRAMEK

BY Marzall, Johnston, Cooke & Root
ATT'YS

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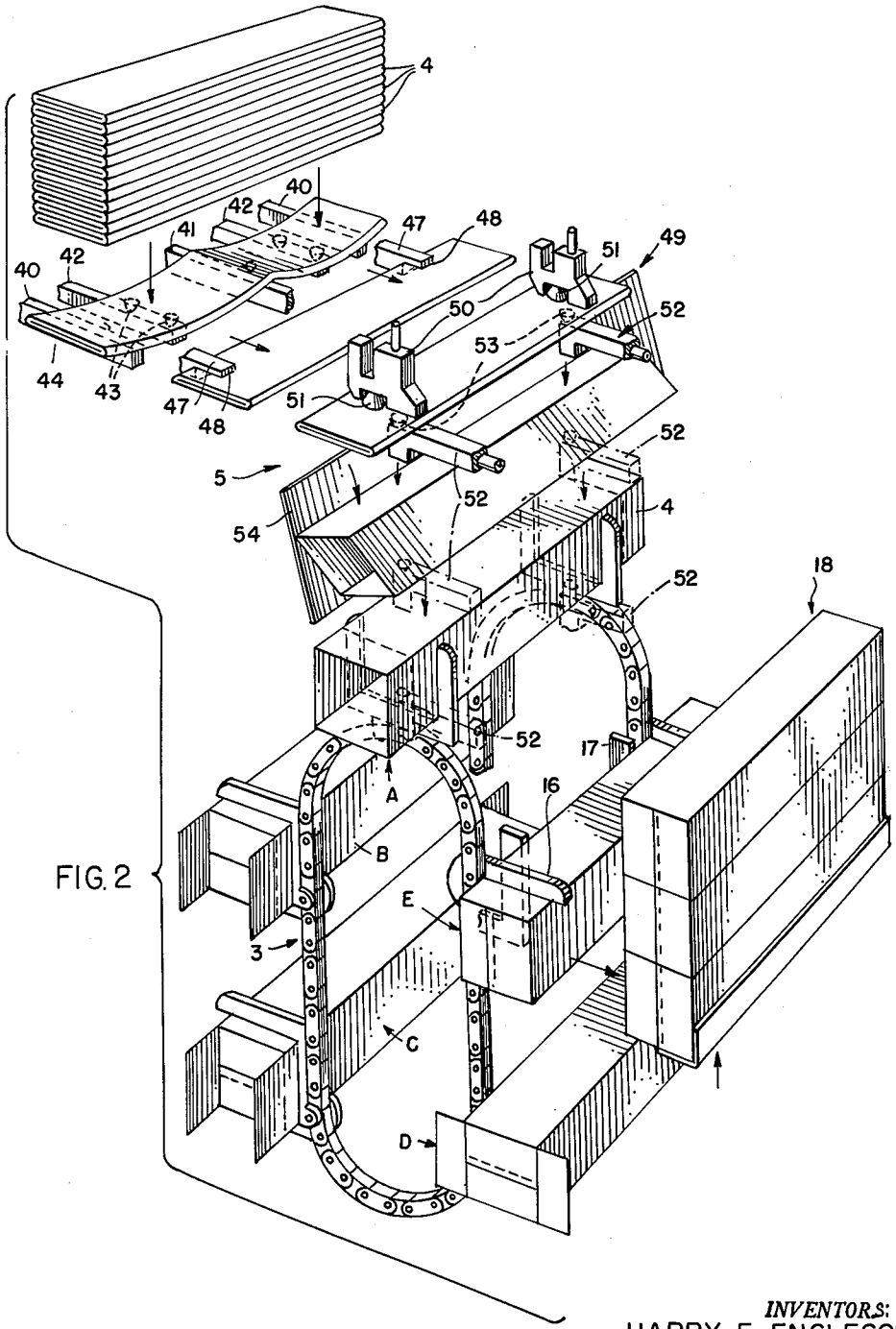

FIG. 2

INVENTORS:
HARRY E. ENGLESON
ELMER D. SRAMEK

BY
Marzall, Johnston, Cook & Root
ATT'YS

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APPARATUS FOR EXPANDING A CARTON AND INSERTING SAME INTO A CONVEYER BUCKET

Harry E. Engleson, Chicago, and Elmer D. Sramek, Cicero, Ill., assignors, by mesne assignments, to Crompton & Knowles Packaging Corporation, Holyoke, Mass., a corporation of Massachusetts

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3 Claims. (Cl. 93—53)

This invention relates to machines for packaging articles in cartons of cardboard or the like, and more particularly this invention relates to such machines for packaging elongated articles which may be stacks of paper cups or the like, stacked together and considered as a unit. Specifically this invention relates to an apparatus for expanding a flattened carton and for inserting the carton into a bucket on a conveyer.

This application is a continuation-in-part of the copending application Serial No. 645,736, filed March 13, 1957, now abandoned.

This invention involves the opening of a flattened carton by means of opposed stationary and movable suction members and the further action of maintaining the carton in opened position by an expander plate. Then the carton is inserted in opened position into a bucket of a conveyer.

It is therefore an object of this invention to provide an apparatus for opening a flattened carton and for inserting the opened carton into a conveyer pocket or bucket.

A further object of this invention resides in the provision of an apparatus having stationary and movable suction members for successively opening flattened cartons and an expander plate for retaining the cartons in opened position during insertion thereof into conveyer pockets or buckets.

A still further object of this invention is in the provision of an apparatus having opposed stationary and movable suction cups for successively opening flattened cartons and an expander plate across which the cartons are advanced by the movable suction cup and then inserted into conveyer pockets or buckets.

Another object of the invention is to provide a means for expanding a flattened carton wherein a restraining member having suction cups thereon will adhere to an upper panel of the carton while a transfer member, also with suction cups thereon, will adhere to a lower panel to pull the carton downwardly while a restraining force pulls the top panel of the carton upwardly. Thus the carton is expanded and thence is carried downwardly into a pocket of the conveyer.

Other objects, features and advantages of the invention will be apparent from the following detailed disclosure, taken in conjunction with the accompanying sheets of drawings, wherein like reference numerals refer to like parts, in which:

FIG. 1 is a side elevational view of a packaging machine having the apparatus of the invention for opening cartons and inserting same into conveyer buckets;

FIG. 2 is a generally schematic perspective view of the machine of FIG. 1, illustrating the movements of cartons as they advance from the supply magazine to the conveyer pockets; and

FIG. 3 is a perspective view of a carton expanded by the present invention.

A packaging machine in which this invention may be utilized includes generally a first conveyer 1 for transporting the elongated articles or stacks of paper cups 2, and a second conveyer 3 for holding and carrying fibrous cartons 4 into which the paper cups are to be inserted. A cycle of operation is initiated when the articles 2 move to

a terminal part of the first conveyer 1 and actuate a detector means (not shown) which in turn causes operation of an article elevating means (not shown) positioned to engage and raise the articles 2. An article transfer means such as a transfer finger 8 attached to a movable chain 9 thence moves the cups forwardly into a carton 4 held by the second conveyer 3 and positioned in axial alignment with the articles 2.

The apparatus for expanding a flattened carton and for inserting same into a bucket on a conveyer is generally designated by the numeral 5 and shown arranged in overlying relation to the conveyer 3.

The conveyer 3 is driven intermittently by a drive means including a Geneva movement 10, FIG. 1, such that the conveyer 3 will move forwardly by a predetermined or incremental amount. The conveyer 3 is supported by a pair of vertically spaced horizontal shafts 11 and 12 with sprockets 13 and 14 mounted thereon, and therefore the conveyer 3 will move vertically around the shafts 11 and 12 by incremental or discrete intervals of travel. The shaft 12 is supported by suitable bearings and the sprockets 14 are keyed thereto, while the sprockets 13 are journaled on the shaft 11.

A carton 4 is removed from a mazagine 15 and expanded and inserted into a pocket or bucket 16 which is held at rest between intervals of travel at the uppermost part of the conveyer 3 over the shaft 11, FIG. 1. After a carton is inserted into the pocket 16 at a station A atop the conveyer 3 the conveyer may move by a single increment of travel carrying the carton to a station B, FIG. 1, which is in axial alignment with the articles 2 positioned on the elevator trough.

After insertion of the article 2 the conveyer moves the carton 4 to a rest station C, FIG. 1, wherein the carton is merely held with the cups therein, without further processing. The conveyer thence moves the carton around the lowermost shaft 12 and sprockets 14 and thence upwardly to a station D. In a subsequent movement the carton is carried from station D to a station E during which interval of travel glue is applied to certain end flaps of the carton and the flaps are closed upon each other and held firmly to permit the glue to set. The cartons are thence expelled from the conveyer at station E by a pusher member 17, FIG. 2, which moves the carton horizontally from the pocket 16. The carton then passes through a discharge or delivery magazine 18 wherein each successive carton is raised by elevator fingers (not shown), thereby raising the cartons one on the other, stacking them as indicated in FIG. 2, whereupon an attendant may remove the cartons for shipping.

The erected cartons are held in the pockets 16 as they pass from station A to station E by transversely spaced retaining rails 16*a*, FIG. 1.

The cartons used by the machine of this invention may be of cardboard or other suitable fibrous material and may be rectangular in configuration when expanded. Thus the carton 4, FIG. 3, includes a top panel, 35, a bottom panel 36 and two opposed spaced side panels 37 and 38, together with two sets of end flaps 39, which when closed will form a substantially rectangular container.

When supplied to the machine, the cartons are folded flat such that the panels 35 and 37 lie against each other and the panels 36 and 38 similarly overlie each other. The end flaps 39 are simply straight extensions of the panels 35–38. The flattened cartons are thus stacked in a magazine, as shown in FIG. 2, and are supported by opposed stationary rails 40 and an intermediate stationary rail 41 which are spaced apart from each other and positioned at the bottom of the magazine. Between each pair of adjacent spaced apart rails 40 and 41, a pivotal arm

42 having a pair of suction cups 43 thereon is positioned to engage the lowermost carton 4 in the magazine 15. Each arm 42 with suction cups 43 thereon constitutes a carton engaging means to which the lowermost carton will adhere when vacuum is applied through the connecting hoses 44, FIG. 2.

When the arm 42 pivots upwardly on its mounting shaft 45 and vacuum is applied to the suction cups 43 via the hoses 44, the lowermost carton 4 will adhere thereto and then as the arm 42 is pivoted downwardly somewhat, the lowermost carton 4 will sag between the stationary supporting rails 40 and 41 thereby creating openings or gaps between the lowermost carton 4 and the remaining cartons stacked in the magazine. A stripper member 47, positioned closely adjacent each carton engaging member 42, will move forwardly and a finger 48 of each stripper, FIG. 2, will be inserted into the gap between the lowermost carton 4 and the remainder of the cartons in the magazine. The vacuum to the suction cup 43 is then broken to release the carton for removal from the magazine. As the stripper members 47 continue to move forwardly the lowermost carton 4 will slide transversely from the magazine along the rails 40 and 41 to a rest position 49 apart from the magazine 15, FIG. 2. A stationary restraining member 50, FIGS. 1 and 2, is positioned above the rest position 49 and includes a pair of spaced apart suction cups 51 supported thereon. The suction cups 51 are positioned to engage the upper or top panel 35 of the carton 4 in the rest position 49 while a transfer member 52, having upwardly turned suction cups 53 mounted thereon, is positioned to move upwardly into engagement with the bottom panel 36 of the carton 4. Thus, the cartons are essentially expanded by use of suction cups gripping the top and bottom panels, this arrangement being more efficient than the heretofore used expander needle.

While vacuum is being applied to both sets of suction cups 51 and 53, the transfer member 52 moves downwardly pulling with it the bottom panel 36, while a restraining force is offered by the restraining member 50 tending to pull the top panel 35 upwardly. As a result, the carton 4 moves downwardly against the restraining force and is expanded such that the top and bottom panels are separated from the side panels 37 and 38 respectively and the carton assumes an open or rectangular

configuration. A stationary guide or expanding plate 54 is positioned to impinge upon one edge of the carton thereby further expanding the carton after the vacuum is cut off from the suction cups 51 and the top panel of the carton is released therefrom. The transfer member 52, with the suction cups 53 thereon, continues to move downwardly and sets the expanded carton 4 in the second conveyer 3 at the rest position A, FIG. 2. The members defining the pockets 16 are arranged to follow a path outside of the plate 54 and the retaining rails 16*a*.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention, but it is understood that this application is to be limited only by the scope of the appended claims.

The invention is hereby claimed as follows:

1. Apparatus for expanding a flattened carton and for inserting the carton into a bucket on a conveyer, said apparatus comprising a stationary suction restraining means positioned to engage an upper panel of the carton and operable to offer a restraining force against movement of the upper panel of the carton, a vertically reciprocable suction transfer means positioned to move into engagement with a lower panel of the carton, and a stationary expander plate positioned adjacent the path of movement of said transfer means, said stationary expander plate being inclined to the path of movement of said transfer member, said transfer means being operable to engage and pull the lower panel downwardly thereby expanding the carton against the expander plate and thence moving the carton downwardly into a bucket on a conveyer.

2. The apparatus as defined in claim 1, wherein said restraining means and said transfer means each has at least one suction cup.

3. The apparatus as defined in claim 1, wherein said restraining means and said transfer means each has a plurality of spaced apart suction cups.

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