Aug. 12, 1941. T. H. LUST 2,252,435

CARTON SEALING MEANS

Filed May 20, 1940 3 Sheets-Sheet 1

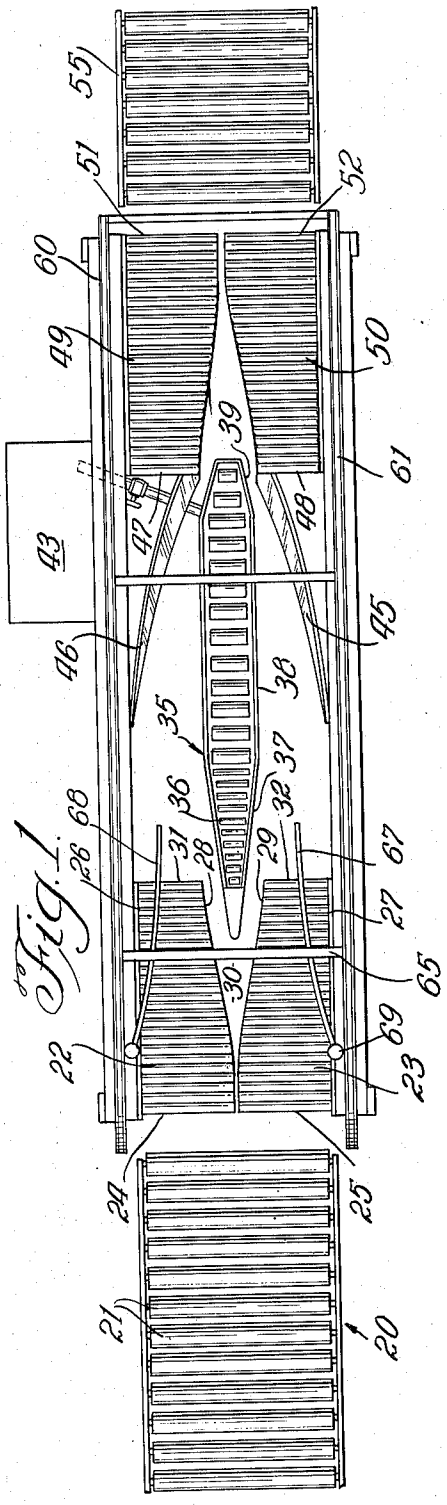


Fig. 1.

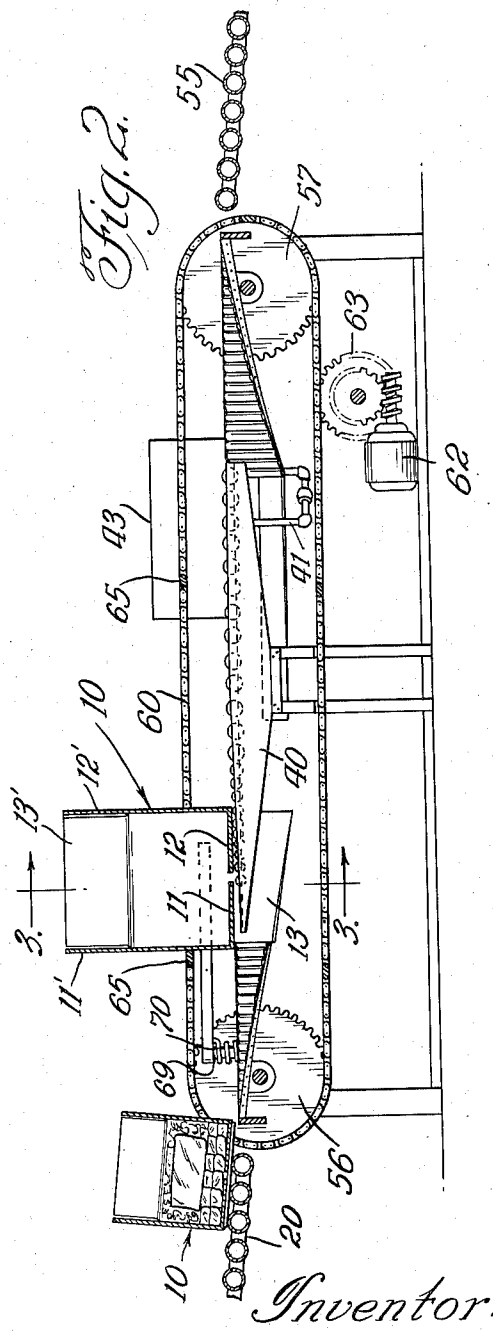


Fig. 2.

Inventor:
Tracy H. Lust.
By: Robert L. Kahn Atty.

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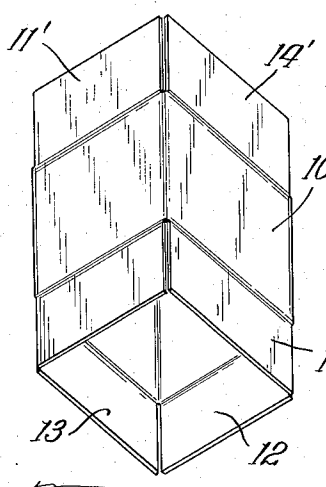


Fig. 4.

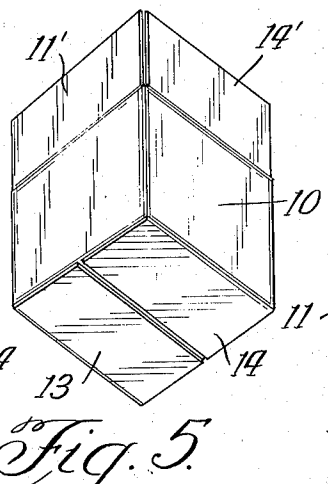


Fig. 5.

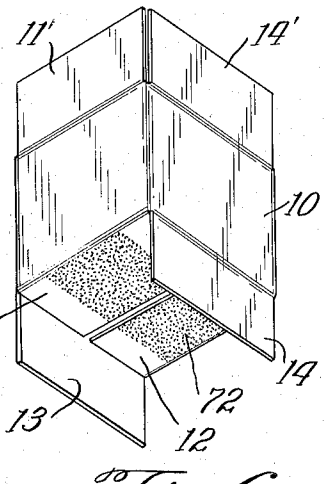


Fig. 6.

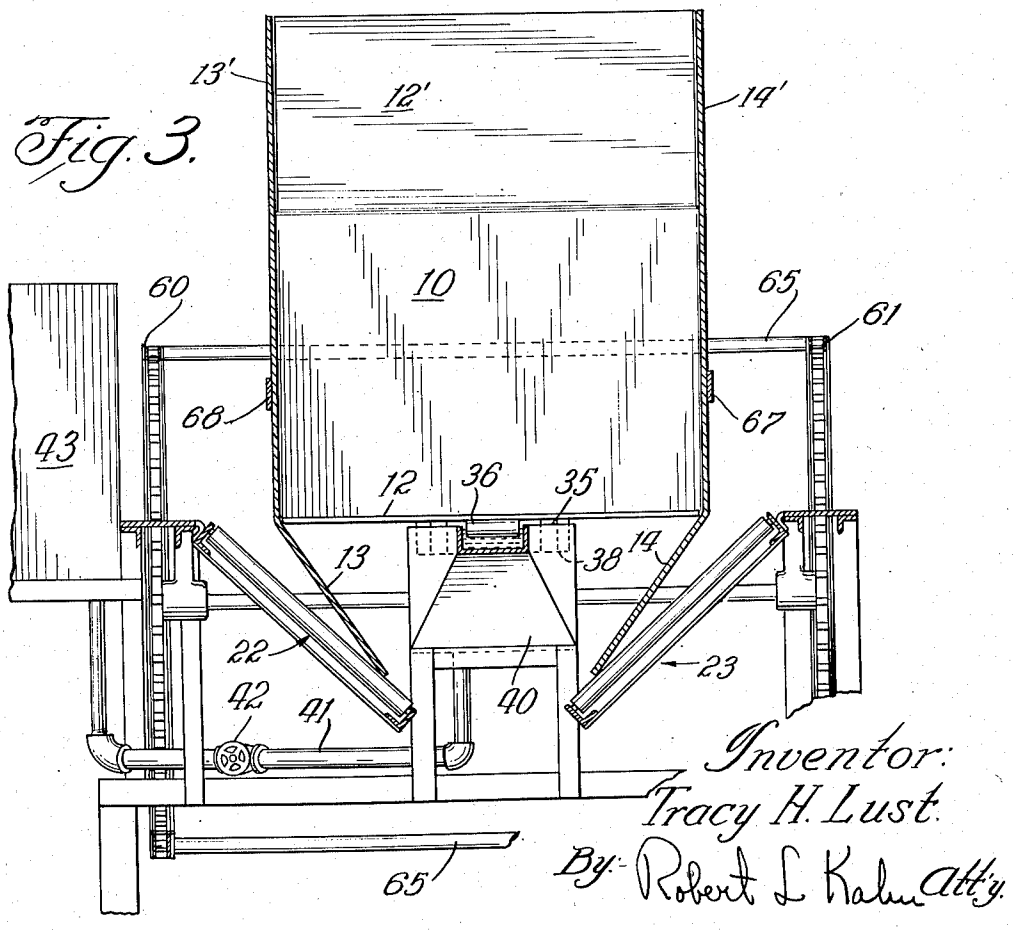


Fig. 3.

Inventor:
Tracy H. Lust.
By: Robert L. Kahn Atty.

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Fig. 7.

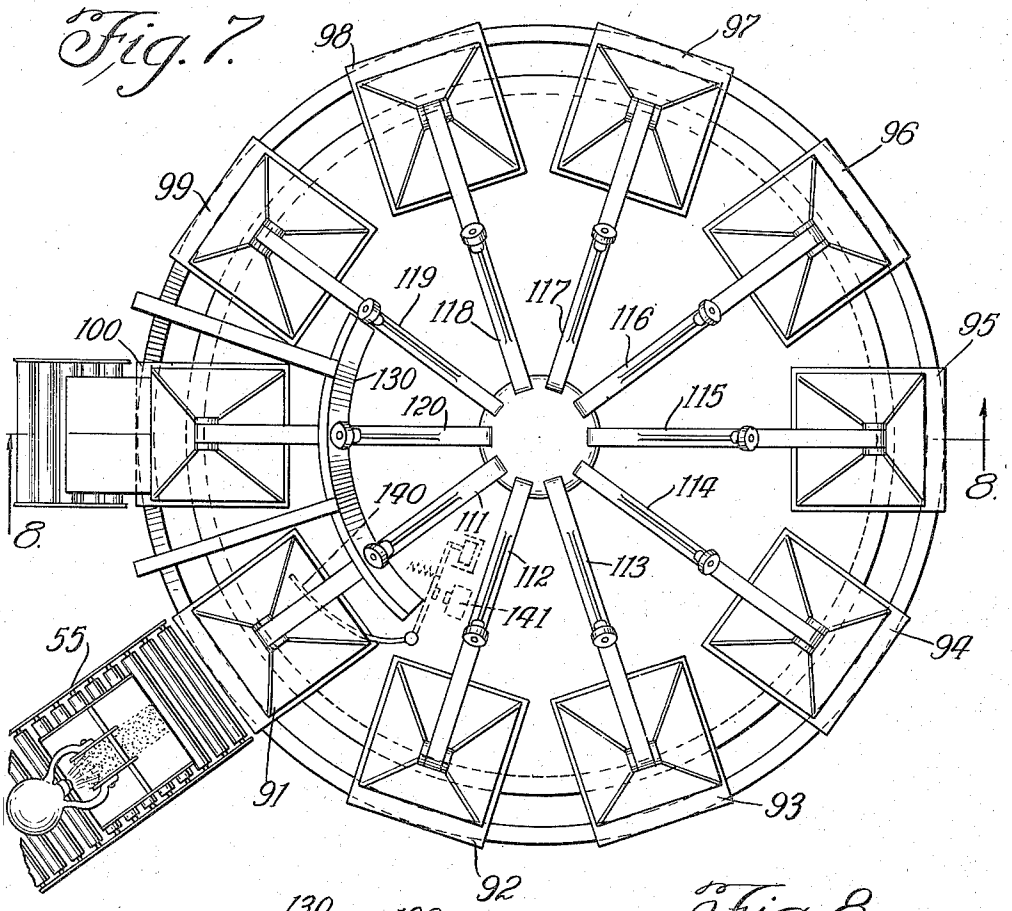
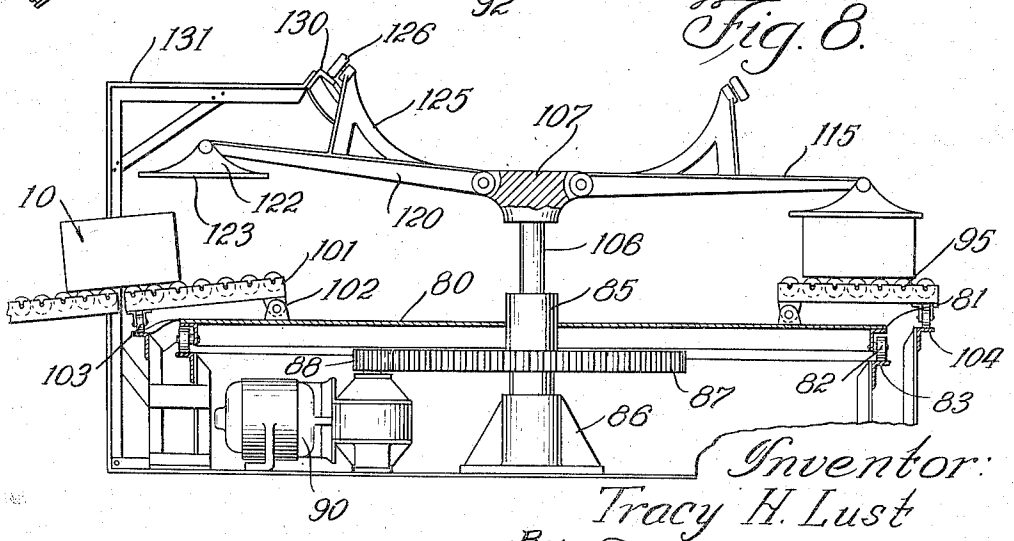


Fig. 8.



Inventor:
Tracy H. Lust
By: Robert L. Kahn Atty.

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UNITED STATES PATENT OFFICE

2,252,435

CARTON SEALING MEANS

Tracy H. Lust, Oak Park, Ill., assignor to Armstrong Paint & Varnish Works, a corporation of Illinois

Application May 20, 1940, Serial No. 336,092

7 Claims. (Cl. 93—6)

This invention relates to carton sealing means and more particularly to means for sealing knock-down type of cartons. Cartons of this type are customarily made of heavy corrugated or other board. The top and bottom of such a carton when used, are generally formed of prolongations of the sides of the carton bent over toward each other. Thus a first pair of opposing flaps are folded into position and then the other outer pair of opposing flaps are folded over them. In order to eliminate the necessity for fastening means or retaining means to hold the flaps down, it is customary to cement or glue the opposing flat faces together.

It has hitherto been the custom in the handling of such cartons to fold a bottom pair of flaps into position and then fold the remaining outer pair away from the carton in a sort of wing fashion. The carton bottom in this condition is passed over suitable means for applying adhesive to the spread flaps and thereafter the flaps are folded back 180° to the final position. Such a procedure requires adjustment of the machine for different size of cartons. As a rule, a machine of this character cannot handle a series of assorted cartons, but operates on one size at a time with an adjustment of the machine at the change of carton size.

The bottom of the cartons is treated in this fashion and after the flaps are all in position, the weight of the carton and contents are relied upon to maintain the flaps in position until the cement has dried or set.

With the top of the carton, the weight of the carton and contents cannot be utilized unless, of course, the carton is turned over. Where cartons of a uniform size are used, the problem of providing means for retaining the top flaps in position during the setting of the adhesive has not been so difficult. However, where a variety of sizes of cartons are being handled, it has hitherto been the practice to cement the top flaps by manual operation. An operator has customarily disposed a weight on top of the carton to maintain the flaps until the setting of the adhesive.

In general this invention contemplates a sealer for carton bottoms that will operate on all carton sizes between fixed predetermined limits without any necessity for adjustment. In general this is accomplished by applying adhesive along a zone with a pair of inner flaps folded in sealing position while the outer pair of flaps opened. Then the outer pair of flaps are folded into sealing position and it is only necessary to keep the cemented flaps in position for a short period of time for drying to have the carton bottom completely sealed.

The invention provides a first conveyer that supports a carton resting on it but permits the outer pair of bottom flaps to open. In this condition, a second conveyer takes up the carton and supports the same only on the inner folded flaps, leaving the outer pair free. In this condition, adhesive is applied to the inner folded flaps. Thereafter the carton is delivered to a third conveyer which operates on the outer flaps to fold them into final sealing position.

The first and third conveyers are generally similar but operate in reversed fashion to each other. Thus the first conveyer may have a carton delivered to it whose bottom flaps are unglued but folded in sealing position. The carton travels along the conveyer in a line parallel to the edges of the outer pair of flaps. The transverse region of carton support is narrowed to two regions extending inwardly from the carton edges along the line of carton travel, the center region of the carton being left free. Hence the outer flaps are permitted to open up in response to the spring of the carton material. When this occurs, the free central region of the carton bottom is taken over, for supporting purposes, by the second conveyer. After the application of adhesive to the inner flaps, the third conveyer reverses the carton handling and closes up the outer flaps.

The carton top is handled in a simple expeditious manner to retain the glued tops in setting position to leave a sealed carton top. By virtue of the invention, variations in carton height are ineffective to alter the operation of the machine.

Referring to the drawings:

Figure 1 is a top plan view of the bottom sealer;

Fig. 2 is a side elevational view of the structure shown in Fig. 1 with a carton in glueing position;

Fig. 3 is a section on line 3—3 of Fig. 2;

Figs. 4, 5, and 6 respectively are isometric views of a carton with the flaps in the open position, with the bottom flaps folded into place either prior to or after cementing, and finally with the first pair of flaps folded into position and with glue applied thereto.

Fig. 7 is a top plan view of the carton top sealing means; and

Fig. 8 is a sectional elevation on line 8—8 of Fig. 7.

Referring to Figs. 4 to 6 inclusive, there is shown a carton 10 of any suitable material such

as fibre or cardboard having bottom flaps 11 to 14 inclusive as prolongations of the sides of the carton. The carton also has top flaps 11' to 14' inclusive, the primed numbers referring to the flaps at the top but otherwise corresponding to the bottom flaps as regards location.

For convenience, we will refer to flaps 11 and 12 as the inner pair of flaps and flaps 13 and 14 as the outer pair due to the order of folding for sealing. The same applies to the top flaps.

Referring now particularly to Figs. 1 to 3 inclusive there is shown a supply conveyer 20 having a plurality of cylindrical rollers 21, the entire conveyer being inclined somewhat toward the machine proper. The bottom sealer proper has a first conveyer formed of a pair of conveyer sections 22 and 23 side by side. Each conveyer section includes side frame members and cylindrical rollers similar to conveyer 20. Conveyer sections 22 and 23 have their receiving ends 24 and 25 substantially alined transversely and extending in a horizontal plane across the machine. As will be evident from Fig. 1, the receiving ends 24 and 25 each extend a substantial way across the machine so that the two conveyer sections at this end take up most of the space across the machine. From the receiving ends 24 and 25, the plane of each conveyer section gradually twists down as shown in Fig. 2 to leave the outer sides 26 and 27 of the conveyer section in the plane of the receiving ends 24 and 25 but with the inside edges 28 and 29 dipping down.

It will also be noted that the twisting of the conveyer sections leaves a space 30 between the conveyer section and generally in the plane of the outer edges 26 and 27. Extending from space 30 and overlapping the delivery or discharge ends 31 and 32 of the conveyer sections is a smaller centrally disposed second conveyer section 35. This central conveyer section 35 consists of a plurality of rollers 36 tapering in length from a forward receiving section 37 until the main central section 38 is reached and then tapering down again to a rear discharge section 39. As is evident from Fig. 2, forward section 37 dips down below the plane determined by the conveyer sides 26 and 27. The amount of dip of the forward section 37 as well as the amount of overlap for these two conveyer sections may be adjusted to suit individual requirements and depends upon the size of cartons, the characteristics of the carton with regard to stiffness and tendency to unfold, the speed with which the cartons are fed and other factors. The dip will accommodate any slight opening movements of the inner carton flaps.

Rollers 36 of central conveyer section 35 are supported in a tank 40 which may be maintained full of glue or cement by means of a pipe 41, valve 42 and supply tank 43. As is customary in such devices, the adhesive level is maintained sufficiently high so that the rollers may dip into the adhesive and in turning apply adhesive to the carton traveling thereover. It is understood that other adhesive applying means independent of the conveyer, such as a spray gun, may be used.

At any convenient points opposite the conveyer section 35 a pair of guide rails 45 and 46 are disposed. These guide rails extend from the side of the machine and curve inwardly toward the center until their ends are disposed against the ends 47 and 48 of a third conveyer having a pair of sections 49 and 50 similar to sections 22 and 23. These sections 49 and 50 twist similarly to sections 22 and 23 until they become substantially flat in a horizontal plane to determine discharge ends 51 and 52 adjacent a conveyer 55. As is clearly evident, the discharge end of the second conveyer overlaps the receiving end of the third conveyer.

Guides 45 and 46 may be considered either as part of the second conveyer or third. As part of the second conveyer, the guides are means to prevent excessive opening of outer flaps as regards the operation of the third conveyer. As part of the third conveyer, the guides are preliminary flap folders so that the third conveyer proper may accommodate the carton. The guides may extend the full length of the second conveyer if desired. The location of the guides should be such that all sizes of cartons, within the possible limits, will be operated upon.

It is understood, of course, that the various conveyers of the entire bottom sealing machine are suitably supported in a frame. On each side of the entire machine and at each end thereof are sprocket wheels 56 and 57 over which sprocket chains 60 and 61 pass. These sprocket chains may be driven in any suitable fashion, as for example, by a motor 62 and a drive sprocket 63. At spaced intervals, the opposed sprocket chains 60 and 61 are connected by rods 65 of wood or metal or any suitable material. As is clearly evident in Fig. 2, the sprocket chains 60 and 61 extend above and below the conveyers, the portion of the chain above the conveyer being low enough so that any carton will always be higher than the sprocket.

Adjacent the receiving end of sections 24 and 25 of the conveyer sections 22 and 23 are a pair of centering arms 67 and 68 suitably mounted on pivot pins 69 and biased by springs 70 so that the arms swing toward each other and tend to occupy the positions shown in Fig. 1.

The operation of the machine shown in Figs. 1 to 3 inclusive is as follows: A carton having the bottom flaps folded as shown in Fig. 5 and preferably weighted or filled on the inside is placed on conveyer 20 with the outer flap edges along the line of carton travel and permitted to slide on toward conveyer sections 22 and 23. Sprocket chains 60 and 61 move at a predetermined speed and one of the cross bars 65 carried thereby will tend to engage a carton and push it forward.

By inclining the entire machine in a manner similar to conveyors 20 and 55 as shown in Fig. 2, it is possible to eliminate the sprocket chains and feeding bars. Gravity and a constant supply of cartons will tend to push the cartons through the sealing machine. At any rate a carton is disposed at the receiving portions 24 and 25 of the two conveyor sections 22 and 23. As the carton moves forward, the supporting area across the bottom transverse to the carton travel is narrowed due to the dropping away of the inner portions of the conveyer sections. At the same time, spring biased arms 67 and 68 will tend to center the cartons transversely of the machine.

Due to the construction of the carton and the natural spring of the paper, the outer flaps extending from that side of the carton along the direction of travel thereof will tend to open up. As shown in Figs. 4 to 6 inclusive, sides 11 and 12 will remain substantially folded while flaps 13 and 14 will tend to open up somewhat. Because of the interlocking action, a substantial opening up of two outer flaps, that is 13 and 14,

can be tolerated without any substantial opening of inner flaps 11 and 12. This of course is due to the wedging action at the base of flaps 13 and 14 acting along the sides of flaps 11 and 12.

As clearly shown in Fig. 2 the depressed advance portion 37 of the second conveyer will extend underneath inner flaps 11 and 12 and slide in between open outer flaps 13 and 14. As the support of the carton due to the first conveyer diminishes, the second conveyer section 35 supports the carton to an increased degree and finally takes over the entire support thereof. As the carton travels over this second conveyer section, rollers 36 are turned to apply a band of adhesive 72 as shown in Fig. 6.

As the carton travels on, guide rails 45 and 56 will engage the opened outer flaps at some point. The degree of flap opening is immaterial within wide limits and in general the outer flaps open up almost to a straight position after the carton has left the first conveyer. Guide rails 45 and 46 gradually close flaps 13 and 14 so that the receiving ends 47 and 48 of the third conveyer can take up the carton at the sides and complete the closure of the outer flaps to the position shown in Fig. 5 substantially the reverse of the operation of the first conveyor. The carton may then be deposited on conveyer 55. Guide rails 47 and 48 may be considered as part of the third conveyer section.

It is clear that within the limits of the machine, determined by the width thereof and the width of the second conveyer section 35, that the width of the carton is of no consequence and requires no adjustment of the machine. While it is true that the band covered by adhesive on the flaps does not extend the full width thereof, nevertheless when the bottom is finally sealed the effect is the same as if the entire bottom were cemented as far as strength is concerned. It is only necessary that the carton be pressed down either by the contents thereof or any other means so that the bottom flaps are maintained in the closed sealed position against any tendency to open, except as provided for by the machine itself.

Referring now to Figs. 7 and 8, the mechanism for maintaining the top flaps of the carton in sealed position during the time that the adhesive dries is shown. The mechanism includes a circular turn-table 80 whose rim 81 carries a plurality of rollers 82 adapted to ride on a circular track 83. The center of turn-table 80 includes a boss 85 rotatably journalled in a vertical thrust bearing 86, the boss carrying a large gear 87 by which the entire turn-table may be rotated as by pinion 88 and motor 90.

Turn-table 80 has a plurality of platforms distributed around the edge portion thereof. As shown here, there are ten such platforms spaced at equal angular intervals to determine ten index positions being numbered 91 to 100 inclusive. It is understood of course that this number is merely illustrative and may be greater or smaller depending upon other factors. All the platforms are the same and consist of a platform proper 101, having rollers, the inner end thereof being pivotally supported at 102 on the turn-table 80 while the outer end extends beyond turn-table 80 and carries a roller 103. Roller 103 is adapted to ride a track 104 extending around turn-table 80. At position 100 track 104 dips, as shown in Fig. 8, causing the platform to tilt downwardly permitting the cartons to roll away by gravity. Otherwise the track 104 is at a level to maintain the carton platform substantially horizontal.

Extending upwardly from boss 85 is a standard 106 terminating in a head 107 carrying a plurality of arms 111 to 120 inclusive, each of said arms being pivotally mounted in head 107 so as to be capable of swinging up and down. As is evident from Figs. 7 and 8, arms 111 to 120 inclusive correspond to the platforms with regard to location. Each arm carries a weight 122 pivotally mounted at the extreme end thereof, said arm being long enough so that in a generally horizontal position as shown in Fig. 8, weight 122 is over the corresponding carton platform. As shown, weight 122 has a bottom face 123 and because of the pivotal mounting thereof, the weight generally tends to maintain the face 123 in a generally horizontal plane.

At an intermediate portion of each arm there is a bracket portion 125 extending upwardly and carrying a roller 126. From index positions 99 to 91 inclusive in order of rotation, a cam track 130 supported by suitable standards 131 is provided. As is clearly evident in Fig. 8, this cam track curves upwardly from a low plane at position 99 to a maximum height along position 100 and then drops down again at position 91.

As is evident from Fig. 7, conveyer 55 from Fig. 2 supplies the cartons in readiness for delivery to position 91 of the entire top sealing mechanism. Near conveyer 55, suitable means may be provided for applying adhesive to the top flaps in preparation for sealing. Any other means may be utilized for applying adhesive to the top flaps of the carton. It is understood, of course, that during the application of the adhesive to the top flap that the outer two flaps are sufficiently clear to permit the application of the adhesive. Any manual or automatic means may be provided for operating the spray gun. Instead of a spray gun, a worker may stand with a brush and apply the adhesive either to the inner or outer flaps. A carton with the top flap having adhesive applied thereto is thereupon delivered to the platform at position 91, the four flaps being in final folded position. At position 91 and above the platform there is a switch finger 140 controlling a normally open switch 141 for motor 90. The application or delivery of a carton to the platform in position 91 results in the switch finger 140 being pushed inwardly toward the center of the turn-table and the switch 141 being closed. This switch is retained in closed position for a short time only by any suitable means to have motor 90 turn the table only one index position and stop. A dash pot for keeping the switch closed during such a time interval is shown merely as an example of a suitable control. It is understood, of course, that switch finger 140 does not turn with table 80 but remains in the position shown in Fig. 7 except for being moved in and out on its pivot, its normal position keeping the switch open. When the turn-table 80 is moved one index position the arm corresponding to that particular platform, in this case 111, drops down due to the down slope of the track 130 until in the position 92, arm 120 is unsupported except by a carton. It is understood, that the curvature of track 130 is such that within the limit of the cartons to be handled that, at some particular intermediate position between 91 and 92, the carton itself will take over the support of the particular arm and permit weight 122 to gradually go off and on the carton.

The number of index positions of the mechanism together with the speed of operation thereof may be so adjusted that a carton will be sealed by the time it reaches position 100. In that position the weight carried by the corresponding arm will be gradually lifted therefrom and when position 100 is reached the platform tilts and permits the carton tc discharge onto an outgoing conveyer.

What is claimed is:

1. In a sealer for knockdown type of cartons, each carton having four bottom flaps normally projecting in line with the sides and adapted to have first an inner opposed pair of flaps folded into sealing position and then to have the outer pair of flaps folded into sealing position, the combination of a first conveyor having receiving and discharge ends and upon which said carton is supported for travel, said carton being positioned so that the outer flaps have their edges parallel to the line of motion of said carton, said conveyor having means at the discharge end for supporting said carton bottom along two spaced regions parallel to the line of carton travel and leaving a central intermediate region free of all support, a second conveyor having receiving and discharge ends, said second conveyor having its receiving end overlapping the discharge end of the first conveyor, said second conveyor having means for supporting said carton only along the central intermediate region leaving said outer flaps free to open up in response to the normal spring of the carton material, means for applying adhesive to the surfaces of at least one pair of said flaps while the carton is supported on said second conveyor, a third conveyor having receiving and discharge ends, said third conveyor having its receiving end overlapping the discharge end of said second conveyor, said third conveyor having means at its receiving end for supporting said carton bottom along spaced regions in a manner similar to that at the discharge end of the first conveyor, and means for folding the outer flaps of said carton bottom into sealed position.

2. The structure of claim 1 wherein said first and third conveyors are generally similar but reversed with respect to the line of travel of said carton, said first conveyor having means at its receiving end for supporting the carton bottom substantially all the way transversely across and having means for narrowing the region of support of said carton bottom away from the central region of said carton toward the outer edges of said carton whereby said outer flaps may move from their folded position and be free of all restraint.

3. The structure of claim 1 wherein said second conveyor has its receiving end below the normal plane of a carton bottom while supported by the first conveyor.

4. The structure of claim 1 wherein guides are provided on both sides of said second conveyor for engaging the free outer bottom flaps of a carton and folding them inwardly sufficiently so that the carton proper may be supported at the sides by the third conveyor.

5. The structure of claim 1 wherein said second conveyor has adhesive applying means operating only upon the central region of said folded inner flaps.

6. In a carton sealing machine, the combination of a first conveyor having a pair of conveying sections divided along the line of motion of a carton, said sections at the receiving end of said conveyor having substantial support for said carton bottoms transversely of said conveyor and in a generally horizontal plane, said sections being so shaped that a central region along the line of conveyor travel is provided free of support for said carton with said central region tapering from substantially zero at the receiving end of the conveyor to a substantial predetermined value at the discharge end of the conveyor, a second conveyor having a receiving and discharge end, the receiving end of said second conveyor overlapping the discharge end of said first conveyor, said second conveyor providing a region of support for cartons substantially in line with said free region in said first conveyor system and being free of all other support for said carton bottom, means for applying adhesive to a carton bottom at said second conveyor, and a third conveyor having a receiving and discharge end, the receiving end of the third conveyor overlapping the discharge end of the second conveyor, said third conveyor having a portion substantially similar to the first conveyor but reversed with respect to the line of travel of the carton.

7. The structure of claim 6 wherein each section in the first conveyor system has the outer side wall thereof substantially in line in a substantially horizontal plane and wherein each section twists from a generally horizontal plane at the receiving end of said conveyor with the inner edges of the conveyor section extending downwardly away from the carton.

TRACY H. LUST.