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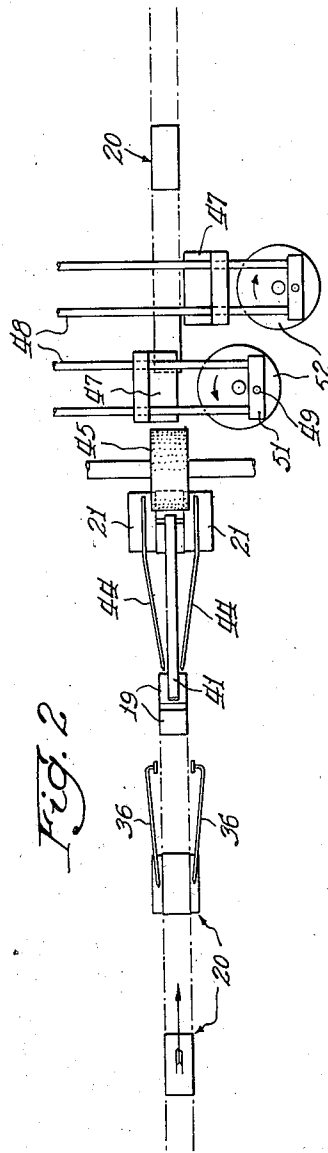
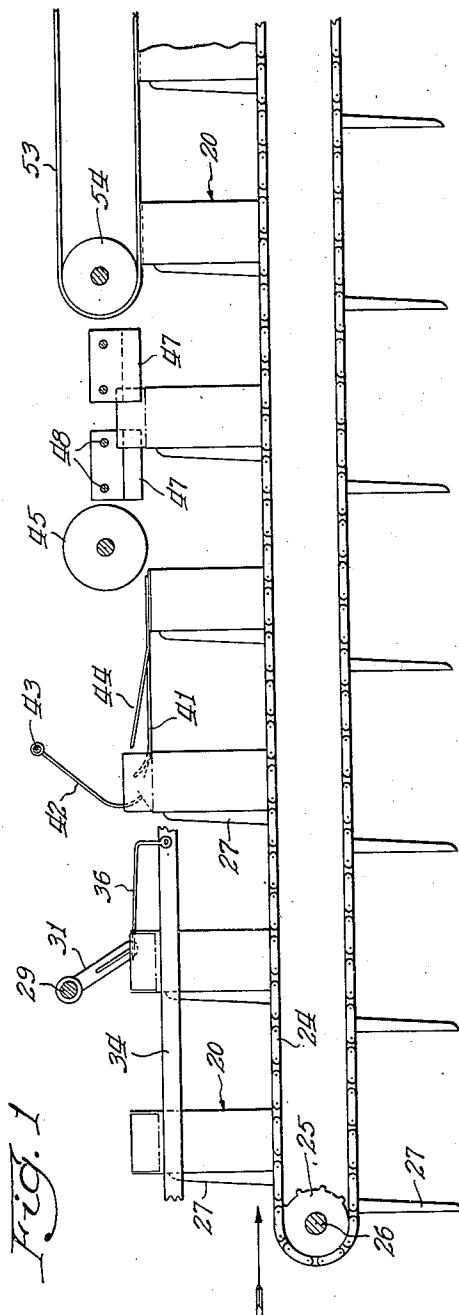
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2,485,235

METHOD AND APPARATUS FOR CLOSING AND SEALING CARTONS

Filed Aug. 17, 1945

3 Sheets-Sheet 1



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Fig. 9

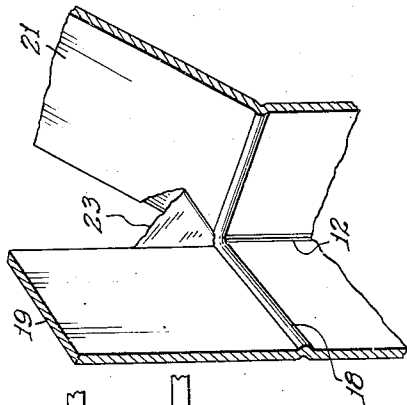


Fig. 3

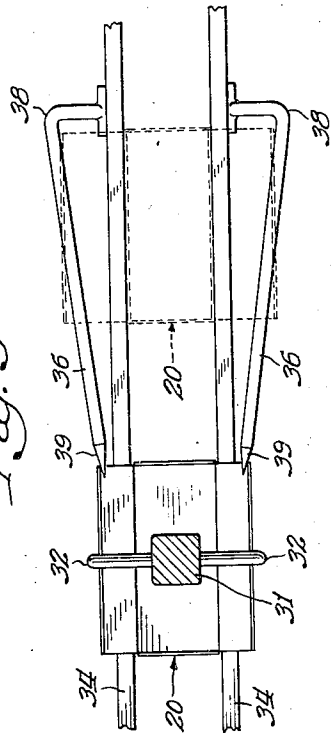


Fig. 8

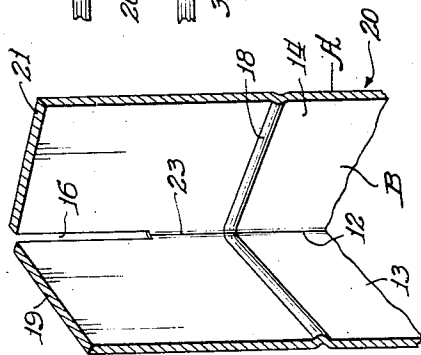


Fig. 4

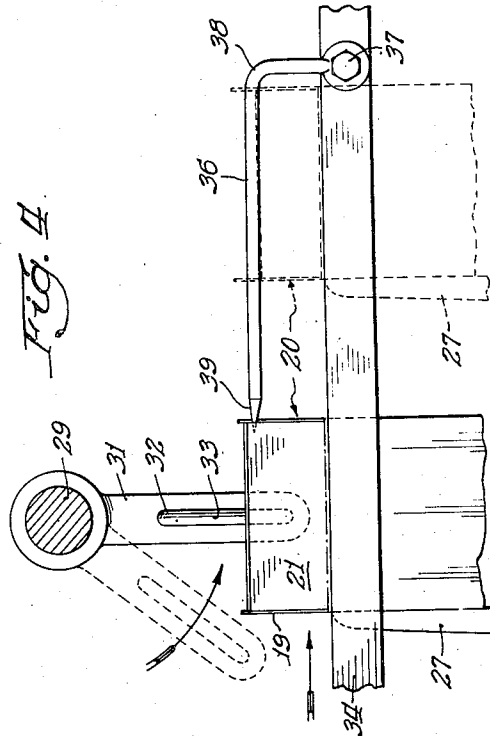
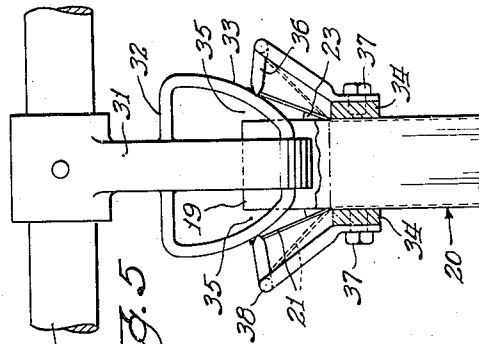


Fig. 5



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR CLOSING
AND SEALING CARTONS

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5 Claims. (Cl. 93—36.8)

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This invention relates to an improved method and apparatus for closing and sealing cartons. More particularly it relates to the closing and sealing of tubular cartons of the type having flaps on each side wall or panel at least at one end thereof which are adapted to be folded into overlapping closure-forming relation and sealed by means of an adhesive.

Various methods and techniques have been employed or suggested in an attempt to make the closures of cartons of the type mentioned above sufficiently tight to prevent the sifting of finely divided materials therefrom, but the only ones which have been generally successful have been those which employ special adhesives and sealing methods, special coatings, or such additional items as inner bags or liners or overwraps. All of these methods, however, require additional packaging equipment in the user's plant and are, of course, considerably more costly than the use of the standard seal-end carton.

One of the methods for accomplishing the desired result at low cost heretofore suggested involves the use of a folding carton made of a conventional folding boxboard which is die-cut in such a way as to leave a continuous web of the inner layer of the boxboard material joining adjacent flaps at and for a substantial distance from the hinge line defining the flaps from the side walls. For convenience and brevity, such cartons will hereinafter be referred to as "web-corner cartons." In folding the flaps of such cartons in the usual manner, however, the webs have a pronounced tendency to break rather than peel from the flap surface, thus causing an excessive proportion of sifting packages.

I have found that this difficulty may be minimized by outwardly folding the appropriate flaps sufficiently to initiate peeling of the web prior to folding the flaps inwardly in the usual order. As will be hereinafter shown, this operation can be carried out on conventional carton sealing machines with the addition of a relatively simple flap-folding device.

It is an object of the invention to provide a new and improved method of closing and sealing cartons, especially web-corner cartons and the like. Another object is to provide a novel method of closing web-corner cartons so as to obtain positive sift-proof corners with a maximum of ease and simplicity and at minimum cost. Still another object is to provide simple and inexpensive apparatus for closing and sealing cartons in accordance with the method of the invention. Further objects, advantages and uses of the in-

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vention will be apparent from the following detailed description thereof read in conjunction with drawings forming a part of this specification and in which:

Fig. 1 is a simplified and somewhat diagrammatic view in elevation of one form of apparatus suitable for carrying out the method of the invention;

Fig. 2 is a simplified and diagrammatic plan view of the apparatus shown in Fig. 1 omitting, however, the two moving flap-folding devices shown in that figure;

Fig. 3 is an enlarged plan view of that portion of the apparatus of Fig. 1 adapted to fold outwardly the carton flaps having their planes in the direction of carton travel;

Fig. 4 is an elevation of the apparatus of Fig. 3;

Fig. 5 is an end view of the apparatus of Fig. 4;

Fig. 6 shows a blank for a tubular carton suitable for use in carrying out the method of the invention;

Fig. 7 is a partial section along line 7—7 of Fig. 6;

Fig. 8 shows in perspective a portion of one upper corner of a tubular carton formed from the blank of Fig. 7;

Fig. 9 shows the manner in which the web of the inner layer of fibrous material is formed by peeling as one flap is folded outwardly;

Fig. 10 shows the carton corner of Figs. 8 and 9 upon inward folding of the adjacent flap; and,

Fig. 11 shows the carton corner of the three preceding figures after the application of adhesive to the flaps thereof including the peeled web.

Referring first to Figs. 6 and 7 of the drawings, a die-cut blank of boxboard is provided wherein the side thereof for the exterior of the carton is indicated by the letter A and the opposed side of the blank by the letter B. The blank is for a carton of rectangular transverse cross-section, as one of a variety of forms suitable for illustration of my invention. To facilitate formation of corner folds for the carton, the blank is scored by longitudinal creases 12 providing narrow side wall panels 13, wide side wall panels 14 and a glue strip 15. Slits 16 extend from opposed edges 17 toward the transversely extending creased score or hinge lines 18, providing sealing flaps 19 and 21, but the slits 16 terminate a substantial distance from the hinge lines 18. The remainder of the distance between the slits and hinge line 18 are scored by cuts 22 on side A which do not sever the blank. Thus the flaps

19 and 21 remain joined by web portions or webs 23, adjacent the cuts 22 on side B. Glue strip 15 is provided at its ends with extensions 15a which are similarly joined to the adjacent flaps 21 by webs 23. One of these webs will be noted in Figs. 8 to 11, inclusive, after the blank has been manipulated into the form of a tubular carton 20.

In accordance with the usual practice in the industry, the blank hereinabove described is folded along two of the score lines 12, and the glue strip 15 and extensions 15a adhesively secured to the panel 13 at the other side of the blank and the flaps 19 joined thereto, respectively, by the carton manufacturer, so that the carton is in flat tubular form for shipment and storage. Thereafter the user expands the carton and closes the two ends, usually with an intermediate filling step, by folding flaps 19 and 21 in that order on each end and adhesively securing them in closed position. As mentioned above, this frequently results in breakage of the web and the production of a package which is not tight at one or more of its corners.

The method of my invention broadly comprises initially folding outwardly that pair of oppositely disposed closure flaps of a web-corner carton which are to overlies the remaining pair at least sufficiently to initiate peeling of an inner layer of material from the flaps being folded so as to form a web of peeled material at the corners. In the particular carton shown by way of illustration, flaps 21 are folded outwardly to initiate the peeling of the webs, and flaps 19 and 21 are then inwardly folded in that order. Although peeling of the web or membrane may be just initiated as just described, it may be continued by the outward folding of flaps until the web extends to the hinge line 18, or only until its line of juncture with a flap 21 is at some selected angle to hinge line 18. At present it is believed that an angle of about 45° is preferable for most purposes.

Referring again to the drawings, Fig. 8 shows a portion of one upper corner of a carton 20 formed from the blank of Fig. 6 which has been expanded to rectangular cross-section, and which has flaps 19 and 21 extending upwardly in the same plane as their side walls 13 and 14, respectively. Fig. 9 illustrates the same carton corner after flap 21 has been outwardly folded in accordance with the invention so as to peel a web or membrane 23 from the inner surface thereof. A satisfactory web 23 is almost invariably produced by this procedure, since the tension on the web is perpendicular to the flap 21 when the peeling is initiated, whereas inward folding of flap 19 when the carton is as shown in Fig. 8 tends to result in tearing along the lateral edge of flap 19 without the formation of a satisfactory web.

After the web 23 has been formed or its formation initiated as hereinabove described, flap 21 is released and flap 19 inwardly folded, whereupon the carton corner appears as shown in Fig. 10. Adhesive is then applied to the flaps in any suitable manner, but preferably the strip of adhesive 46 extends over the folded web 23 as well as flap 19 as shown in Fig. 11, so that a tightly sealed corner is produced when flap 21 is finally folded over upon flap 19 and secured thereto. It will be understood, of course, that the method just described applies to all four corners at least at one end of the carton 20

and is preferably carried out so that all eight corners are so treated.

Although any mechanism which will perform the operation of singly or collectively bending the closure flaps 21 outwardly in accordance with the foregoing description may be employed to form the webs 23, desirable mechanism for performing a top-sealing operation in accordance with the invention may be as represented in Fig. 1, and include, among other elements, a mechanical conveyor comprising an endless driven chain 24, passing over sprockets 25 one of which is on a shaft 26. The conveyor includes regularly spaced pushers 27, extending from the chain 24 and against which the cartons are placed. Upwardly of the conveyor a shaft 29 is supported by some convenient means, not shown. The shaft 29 is chain-coupled or otherwise connected positively to the shaft 26, by means not shown, so that their motion is synchronized. Filled cartons 20, having been placed on the conveyor, move in a direction from left to right (Fig. 1) under the shaft 29, and are restrained from lateral displacement by guide rails or guides 34. The linear movement of the pushers 27 is so related to the rotation of the shaft 29 that an arm 31, pinned to said shaft, swings into the space between the flaps 19 on each of the cartons as they approach and pass under the shaft 29. This will be noted in Fig. 4, while in Fig. 1 is shown the arm as it is leaving one of the cartons. A pair of wings 32 (Fig. 5) mounted laterally on the arm 31, extends outwardly therefrom, thence are inclined toward the free end of said arm, providing cams 33 on the inclined sides of the wings. The over all distance across the wings, horizontally, is substantially greater than the distance between the side panels 14. Because of this the flaps 21 are adapted to be spread apart by the cams as the arm swings over the cartons. In their lowest and vertical positions (Figs. 4 and 5) the cams have spread the flaps to a maximum degree providing spaces 35 between the free ends of said flaps.

The primary purpose of the cams 33, however, is not to spread the flaps apart sufficiently to effectively peel the webs 23 from the flaps 21, since this is effected by a pair of flap-folding bars 36 (Fig. 3), mounted on the guides 34. The bars 36 are bolted or otherwise secured to the guides 34 at 37, from whence they extend upwardly and outwardly to elbows 38, thence extend substantially horizontally and converge with their free ends in the path of the spaces 35, between the flaps. The free ends of the bars 36 may appropriately terminate in pointed portions 39, for the sake of certainty of reception in the spaces 35, before the cams 33 have swung away from engagement with the flaps 21. As a carton advances, the bars 36 enter the spaces 35, spread the flaps 21 apart and thus cause formation of the webs 23 by peeling as previously described. The flaps then pass out of engagement with the bars 36. That this may be possible I have so spaced each of the elbows 38 that the distance from the hinges 13 to the free ends of the flaps 21 is slightly less than the distance from the hinges to the elbows. Owing to this construction the flaps 21 pass under and out of engagement with the cam bars, just before they reach the elbows 38.

Mechanism to prepare for and apply adhesive to the flaps comprises a closure tongue 41 (Fig. 1), adapted to depress the leading flap 19 to horizontal position, and a closure arm 42. The

arm 42 is keyed to a rock shaft 43 and swings downwardly just after passage of the trailing flap 19 which the arm 42 presses downward to horizontal position (Fig. 10) just before said flap passes under the tongue 41 (Fig. 1). Additional bars 44 spread the flaps 21 outwardly and downwardly to horizontal position preparatory to application of a suitable adhesive which is administered to the flaps by a cylinder 45. The adhesive 46, as applied to the flaps, is evident in Fig. 11.

The flaps 21 of the cartons 20 are then folded by mechanism including a pair of folders 47, adjustably mounted on bars 48 which are coupled to crank pins 49 by cross-bars 51. The crank pins are eccentric of driven wheels 52 and adapted to move, alternately, each of the folders from a position beside the flaps 21 to a position over, and approximately in the same plane as the tops of the cartons, thus bringing the flaps 21 into horizontal position overlapping flaps 19 and each other. Continued motion of the conveyor passes the containers under a driven belt 53, adapted to be pressed against the tops of the closed cartons by supporting pulleys 54, but one of which is shown. The purpose of the belt is to hold the flaps together for a short period until adhesion is more effectively established between the flaps.

While I have shown and described a preferred form of the invention, it is to be understood that I contemplate all those reasonable variations in practice which are within the scope of the appended claims.

I claim:

1. The improved method of closing and sealing one end of a tubular carton having four side walls, and a closure flap integrally joined to each of said side walls along a score line, each of said flaps being defined from adjacent flaps by slits terminating a substantial distance from said score line and by external cut scores extending from the end of said slits substantially to said score line, which comprises the successive steps of outwardly folding that pair of oppositely disposed closure flaps which are to overlie the remaining pair of closure flaps along said score line sufficiently to initiate peeling of an inner layer of material from said first-mentioned pair of flaps, inwardly folding said second-mentioned pair of flaps along said score line substantially into a plane perpendicular to said side walls, applying adhesive to at least some of said flaps including the portions of initiated peeling, and inwardly folding said first mentioned pair of flaps in position overlying said second-mentioned pair of flaps.

2. The method according to claim 1 wherein said outwardly folding step is continued until said inner layer is peeled at least to a line extending from the intersection of said score line and said cut score at an angle of approximately 45 degrees from said score line.

3. In the closing and sealing of one end of a series of tubular cartons of rectangular cross-section travelling continuously in a predetermined path the closure flaps on said end of each of said cartons being integrally joined to the side walls thereof along a hinge line and initially lying in substantially the same planes as said side walls and being defined from each other by

slits terminating a substantial distance from said hinge line and by external cut scores extending from the end of said slits substantially to said hinge line, by the method including initially folding said lateral closure flaps outwardly along said hinge line, inwardly folding the leading and trailing closure flaps on said end of each of said cartons, applying an adhesive to some of the surfaces of the closure flaps on said end, and inwardly folding the lateral closure flaps on said end, the improvement which comprises outwardly folding said lateral flaps sufficiently to cause at least partial tearing and peeling of a portion of an inner layer of material from said lateral flaps adjacent said cut scores before causing any substantial folding of said leading and trailing flaps, and applying adhesive to at least some of said flaps in locations including said partially torn and peeled portions prior to the inward folding of said leading and trailing flaps.

4. Apparatus for closing and sealing one end of a tubular carton having four side walls and a closure flap at said end integrally joined to each of said side walls along a hinge line, each of said closure flaps being defined from adjacent flaps by slits terminating a substantial distance from said hinge line and by external cut scores extending from the end of said slits substantially to said hinge line, including means for outwardly folding one oppositely disposed pair of said closure flaps sufficiently to initiate peeling of an inner layer of material from said pair of flaps, means for inwardly folding the second pair of flaps along said hinge line substantially into a plane perpendicular to said side walls, means for applying adhesive to at least some areas of said flaps including the areas of initiated peeling, and means for inwardly folding said first-mentioned pair of flaps in position overlying said second pair of flaps.

5. In apparatus for closing one end of a tubular carton of fibrous material having a closure flap integrally joined to each of its side wall panels along a hinge line and lying substantially in the same plane therewith, each of said flaps being joined to its adjacent flaps by a web of an inner layer of said material along a portion of their boundaries extending a substantial distance outwardly from said hinge line, the combination which comprises means for outwardly folding that pair of said flaps which are ultimately to overlie the other flaps at least sufficiently to initiate peeling of said inner layer from said pair of flaps, means for inwardly folding said other flaps, means for applying adhesive to at least some areas of said flaps including the areas of initiated peeling, and means for inwardly folding said pair of flaps upon said other flaps.

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