

Oct. 3, 1950

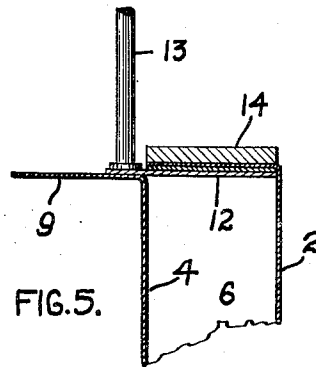
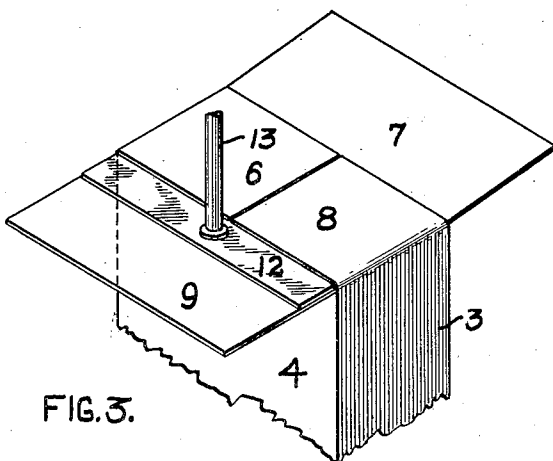
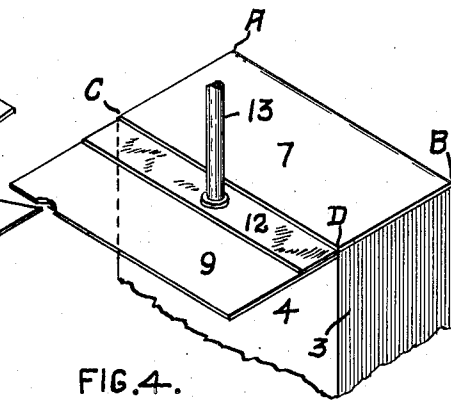
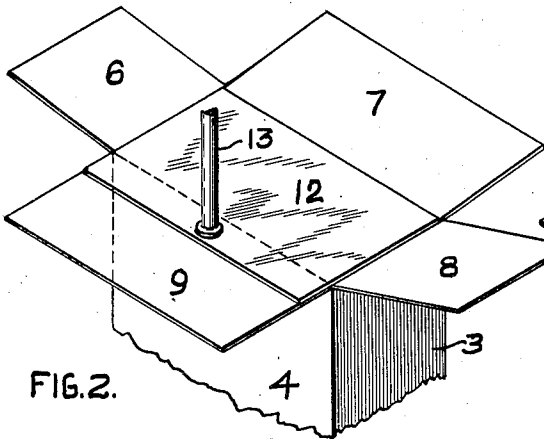
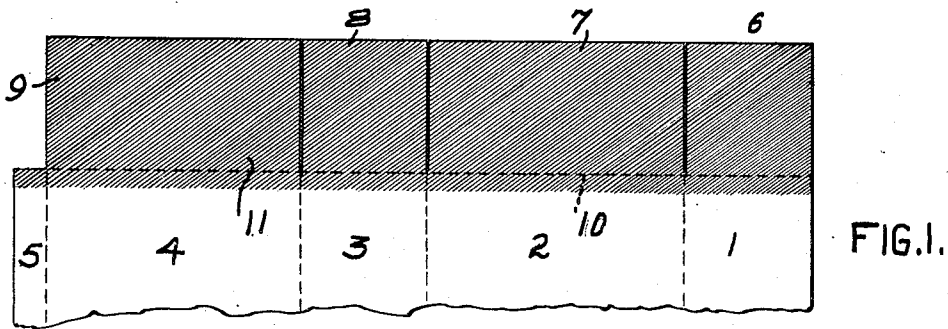
L. BACK

2,524,032

SEALING METHOD FOR CARTONS

Filed June 7, 1945

2 Sheets-Sheet 1



LEONARD BACK
INVENTOR.

BY *Allen & Allen*
Attorneys

Oct. 3, 1950

L. BACK

2,524,032

SEALING METHOD FOR CARTONS

Filed June 7, 1945

2 Sheets-Sheet 2

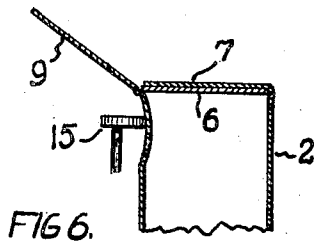


FIG. 6.

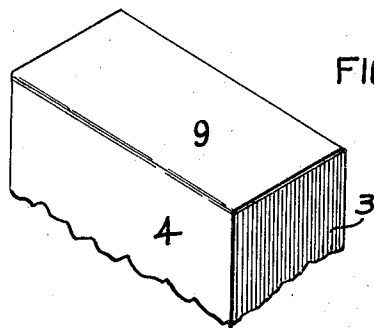


FIG. 7.

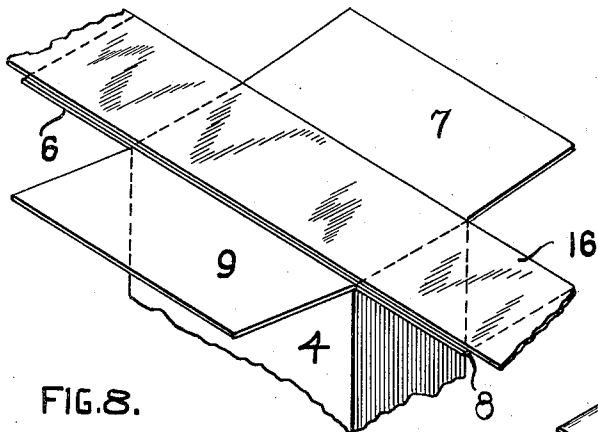


FIG. 8.

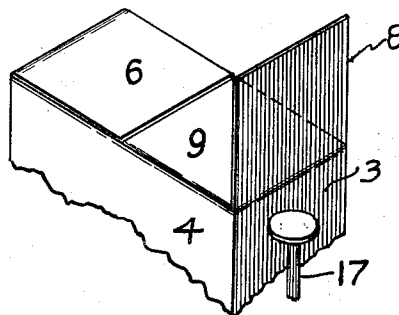


FIG. 9.

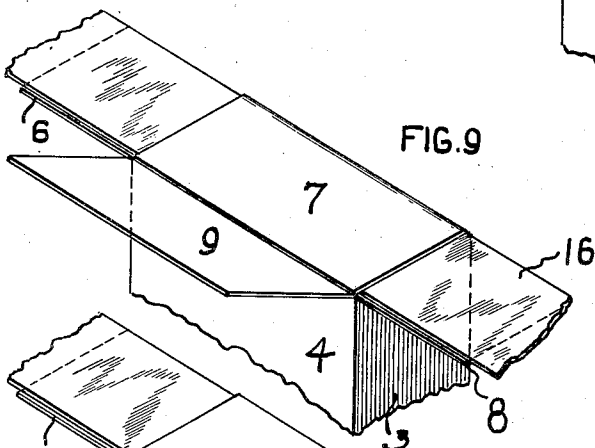


FIG. 10.

LEONARD BACK
INVENTOR.

BY *Allen & Allen*
Attorneys

UNITED STATES PATENT OFFICE

2,524,032

SEALING METHOD FOR CARTONS

Leonard Back, Middletown, Ohio, assignor to The
Interstate Folding Box Company

Application June 7, 1945, Serial No. 598,063

10 Claims. (Cl. 93—6)

1

My invention relates to the problem of producing tight closures in seal end cartons. Seal end cartons are a well recognized type of folding paperboard box having a tubular body formed of body walls in articulation with each other and closure means consisting of flaps articulated to the ends of the body walls, which flaps are bent over inwardly, interfolded, and adhesively secured to form the closure. In the term "tight closures" I mean to include closures ranging from those which are siftproof as respects finely powdered contents to those which may be liquid or gas tight and constitute hermetic seals.

The seal end carton has long presented a distinct problem in the carton industry. The usual commercial practice is to up-end the erected tubular cartons over a sealing mandrel, apply adhesive to the sealing flaps, interfold them accurately and then press them between the internal mandrel and an external pressure element. In this way a reasonably siftproof result may be obtained with accurately cut cartons, although for many uses closures so formed are not as tight as they should be. But this method of sealing is capable of use only on the bottom closure of a seal end carton or on that carton closure which is made first, for the reason that in making the second or last closure after contents have been introduced into the cartons, an internal mandrel can no longer be used. The practice has been to fold a pair of flaps inwardly while another pair is outwardly folded, to apply adhesive at least to the outfolded flaps, and then to fold these flaps inwardly successively. There is nothing, however, to support the flaps from beneath when they are in folded position. Thus, no effective pressure can be exerted on them from without. The flaps, particularly the innermost flaps, tend to curl or become depressed and hence to spring away from overlying flaps so that no good adhesive bond can be obtained. As a consequence, the last formed seal end closure of a seal end carton is likely to be not only imperfect in physical construction but also perforate, particularly at the corners of the closure, so that such cartons are frequently found not to be satisfactory carriers even for coarse grained granular materials.

Since a carton is no better than its poorest closure, those intended for use with powders now employ, wherever cost will permit, either an inner liner or an outer wrap or both.

What is needed, as a first consideration is a procedure, applicable to both ends of a seal end carton, which will result in enforced physical con-

2

formation of all flaps in the closure so that an all-over, permanent adhesive bond may be obtained.

A fundamental object of this invention is to secure by simple means and methods a closure in a seal end carton in which all flaps are in enforced surface conformity.

It is an object of the invention to provide a tight closure without the use of the conventional internal mandrel. Hence, it is an object to provide closures on both ends of a seal end carton which are equally tight, and to provide means and a mode of closing such cartons tightly without using a conventional mandrel on either end.

It is an object of my invention to provide means and a method which, while they can be carried on without mechanism other than a simple tool hereinafter described, are nevertheless well adapted for use in connection with mechanical carton closing and sealing equipment.

It is also an object of my invention to provide means and a method applicable to the sealing of either or both ends of a seal end carton irrespective of the position of the carton, so that the operation of inverting the carton, hitherto generally used in carton sealing, may be eliminated with attendant economies in both time and equipment.

These and other objects of my invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications I accomplish by that mode of operation and by that means of which I shall now describe certain exemplary embodiments.

Reference is made to the accompanying drawings wherein:

Figure 1 is a partial plan view of an exemplary seal end carton.

Figure 2 is a partial isometric view of the erected carton ready for closure by my method and showing a means which I may use.

Figures 3 and 4 show successively intermediate stages of closure.

Figure 5 is a partial sectional view of the carton and closure means in the stage shown in Figure 4.

Figure 6 is a partial sectional view showing an expedient employable in the last step of the closure operation.

Figure 7 is a partial isometric view of the closed carton.

Figures 8, 9, 10 and 11 are isometric views showing successive stages in a modified mode of sealing a similar carton.

Referring to Figure 1, I have shown an ordi-

nary type of seal end carton comprising body walls 1, 2, 3 and 4 and a glue flap 5 in articulation. Seal end closure means are shown on one end of the carton consisting of seal end flaps 6, 7, 8 and 9 articulated respectively to the body walls and severed from each other. The lower end of the carton blank has not been shown. It may have a similar seal end structure or it may be provided with other closure means depending upon the service to which the carton is to be put. It is characteristic of my invention, however, that the sealing method and means hereinafter described and illustrated as applying to the seal end closure shown in Figure 1 is similarly and even simultaneously applicable to a seal end closure on the other end of the carton blank.

From the form of the carton blank illustrated in Figure 1, it will be apparent to one skilled in the art how the blank may be folded or tubed in the ordinary way by being bent upon a pair of the score lines articulating the body walls to each other, with the adhesive attachment of the glue flap 5 to the outer edge of the body wall 1. The size of the cartons, the number and shape of the enclosing body walls and seal end flaps, and the specific cross sectional shape of the erected tubular structure do not constitute limitations upon my invention and may be varied as desired in accordance with known practices. For purposes of my invention I prefer accurately made and accurately cut cartons having seal end flaps which are also accurately cut and of as full a size as is consistent with good carton practice and board economy. Two at least of the flaps constituting an opposed pair are preferably of sufficient size to extend across the entire end of the erected carton.

In forming my cartons I prefer to make the horizontal score 10 by means of a continuous rule, the vertical scores and vertical cut lines being made by rules butted against the first mentioned rule. This insures that the cut lines demarking the seal end flaps from each other do not extend into the area of the score by which these flaps are articulated to the respective body walls.

Otherwise, my seal end cartons may be the same as any commercial seal end structure, and may be printed or not, as desired. In order to make the tightest possible closures, even for sift-proofing, I prefer to impose upon the board from which the cartons are made areas of thermoplastic adhesive so placed that in the finished carton the seal end flaps, the score lines by which they are articulated to the body walls, and adjacent areas of the body walls themselves are continuously coated with the adhesive substance as indicated at 11 in Fig. 1.

Where the cartons are to hold liquids, the board should be treated so as to be impervious to the liquids and so as to have its capillarity destroyed, as in the copending application of Samuel Bergstein entitled Liquid Tight Seal End Cartons, Serial No. 600,754, filed June 21, 1945. One exemplary way of doing this is to impose upon one side of the board a proofing substance which is driven into the board to the extent of saturating it through or nearly through to the other side, after which on the other side a continuous coating of thermoplastic proofing and adhesive substance is applied. However, where liquid tightness is not a necessity, I may make my cartons of untreated board.

My procedure is based upon a concept of inter-folding and adhesively securing at least a pair of opposed flaps in a seal end carton while these

flaps are supported from within by a thin but sufficiently stiff metal plate, having a mounting portion extending outside the carton at the same end. The plate operates to keep all the flaps (so interfolded) in accurate over-all face-to-face contact until the adhesive bond has sufficiently formed. It prevents any of the flaps from springing or curling away from others and serves as an inner pressure element against which interfolded flaps may be compressed by means of an outer pressure element. It is manipulated and may be inserted and withdrawn from the end of the carton upon which the interfolding and sealing operation is being performed. It does not employ any means such as a mandrel inserted into the carton from the other end. Consequently, it may be used on either end of the carton, and in particular may be employed for forming the last closure on cartons which have already been filled.

The first essential is the bringing about of complete conformity and good adhesion between the initially folded flaps; but when at least two opposite flaps have been so folded and secured, they form, as hereinafter more fully explained, a platform or bridge extending across the carton onto which another flap or flaps may be folded and adhesively secured, the platform at this time furnishing sufficient support for the last folded flap or flaps so that external pressure means can bring the last folded flaps into complete conformity and adhesive union with the first folded flaps.

Referring to Figure 2, when the carton has been erected, I place across the open end of it a thin but relatively stiff metal or other plate 12, the seal end flaps having been folded sufficiently out of the way. The plate may be moved and positioned entirely by hand, if desired, but it is also readily susceptible of mechanical operation. I have shown it mounted upon a rod or shaft 13 which may be regarded either as a handle for manual operation or as a means for mounting the plate 12 upon mechanical agencies to move it.

The plate 12, being wider than the carton in one dimension, will overlie a seal end flap such as the flap 9, so that the flap 9 must be bent outwardly and downwardly sufficient to permit the positioning of the plate. The manner in which the plate is moved into position is not a limitation on the invention. It may be brought in from the side by a sliding motion transverse to the outfolded flap 9. It may simply be lowered into position. It may be brought into position by a downward and inward movement. It may be located at a fixed station in a carton sealing machine at which the carton itself is brought to rest, or it may be so mounted in the machine as to travel along with the carton.

Preferably the plate 12 is so shaped and dimensioned as to cover accurately the whole end of the carton, and so that its edges can act as abutments to enforce accurate folding of the flaps 6, 7 and 8.

The first sealing operation after the positioning of the plate may be the inward folding of flaps 6 and 8, as shown in Figure 3. The dimensions of the plate are such that it extends across the end of the carton and therebeyond in one direction at least as indicated. When the flaps 6 and 8 have been folded as shown, adhesive may be applied to them and/or to the outwardly folded flap 7 by means in current use on carton sealing machines. If, as I prefer, the carton has

5

already been provided with an area 11 of thermoplastic adhesive, this adhesive is reactivated, as may be done by applying radiant heat to flap 7 prior to its folding.

The flap 7 may then be folded over as shown in Figure 4, covering flaps 6 and 8. Pressure to cause the flaps to conform with each other may then be exerted by an external pressure means 14 (Figure 5). The plate 12 insures an accurate folding of the flaps 6, 8 and 7 holds the flaps together when interfolded by clamping them between itself and the external member 14. Under the action of the external pressure means 14, the inner end of the plate can depress slightly, as shown in Figure 5, permitting tight closure to be made at the corners A and B of the carton; but the clamping pressure will be sufficiently positive to enforce surface conformity of the flaps throughout their area.

Where the carton has been precoated with the adhesive 11 the corners are sealed by the flow of the softened adhesive. This is of the greatest importance in producing closures which are completely and hermetically tight. It is to be pointed out, however, that the accurate folding and inward support of the carton flaps insures their complete surface conformity and accurate adhesive union, and even with adhesive applied in the ordinary way at the time of closure produces a result superior to results hitherto obtained, where internal mandrels could not be used, as for example, on the top closure of a carton.

Where adhesive is applied at the time of closure, I may use the means and method of Bergstein Patent 1,976,980, dated October 16, 1934, resulting in the depositing of extra quantities of adhesive adjacent the corners of the flaps.

I have encountered no problem of adhesion of carton parts to the supporting plate. When adhesive is applied to flap 7 during the process of effecting closure, it will be understood that the flaps 6 and 8, if they meet, overlie the plate completely and protect it from contact with the adhesive. In cartons of certain shapes, as for example a carton which is quite wide in relation to its depth, the inner, first folded flaps will not meet unless extra board is used to make them longer. When the inner flaps do not come together, and a heavy application of hot melt or other adhesive is made to flap 7, I may relieve my supporting plate in the space between the ends of the inner flaps, or even cut it away altogether in this area.

In the case of cartons which have been precoated with thermoplastic adhesive, as in my preferred practice, the under sides of flaps 6 and 8 may be coated on their under sides with adhesive. Also the score lines may be covered as described. The application of heat to flap 7, by radiant or other means, softens the adhesive on this flap and along its score line and at the corners; but is quite easily so applied as not to soften the adhesive on the other flaps. When flap 7 is folded over, the adhesive on it will be in a condition to adhere to the flaps beneath, and upon cooling to form a firm bond with them; but it does not follow that sufficient heat is transmitted through these flaps to effect great softening of the adhesive on their under sides. On the contrary, the adhesive upon flaps 6 and 8 is not much affected, especially since the supporting plate and the pressure element are preferably not in a heated condition.

6

The amount of pressure on the flaps between plate 12 and the external pressure member 14 need only be that sufficient to overcome the tendency of the flaps to curl, warp or become inwardly depressed. When a sufficient bond has been formed, the plate 12 is withdrawn by moving it horizontally in a direction transverse the flap 9. Now, the interfolded and adhesively secured flaps 6, 7 and 8 form a platform across the end of the carton. The flap 9, if it has already been coated with thermoplastic adhesive will have that adhesive activated, as by radiant heating means brought close to its upper surface, or if the flap 9 has not previously been treated with adhesive, it will now be coated as by a suitable roll coating device. When the flap 9 is folded over onto the rigid platform formed of flaps 6, 7 and 8, it can be brought into accurate registry with them and made to have complete surface conformation with them by external pressure means through the supporting effect of the platform.

It will be seen that the result is a seal or closure of seal end type in which all flaps have complete and accurate surface conformation. None of the flaps spring, bend or twist away from others during the sealing and hence cannot fail to be adhered throughout to the other flaps.

At the corners C and D of the carton (Figure 4), the act of infolding the flap 9 and drawing it over the platform compresses the board and forms a tight closure at these corners also. The pre-applied thermoplastic adhesive at these points, in my preferred practice, again flows to fill all interstices and provides an hermetic closure.

I prefer also to employ an expedient taught in the copending application of Samuel Bergstein, Serial No. 586,970, filed April 6, 1945, now abandoned, and effect a slight inward bowing of the body wall 4 of the carton adjacent the line of articulation of flap 9. This may be accomplished by a finger or the like on means for holding the carton as illustrated in Figure 6 at 15. The result of bowing the wall 4 inwardly is to provide a ledge at the score line of flap 9 upon which the edge C—D of the platform will rest. Then when the flap 9 is folded inwardly, the platform is not only supported at its otherwise free edge but the adhesive treated surface of flap 9 is drawn tightly over the said free edge of the platform making a tight adhesive closure all along this edge and inclusive of the corner portions C and D.

By the means and mode of operation hereinabove described, I have succeeded in producing tight and siftproof closures on seal end cartons without the use of internal mandrels. Where the board of the cartons is precoated with liquid proof thermoplastic adhesive as described, the closure itself becomes liquid tight. Where the board of the cartons has also been treated so as not to be softenable by liquids, a carton so sealed is capable of holding liquids for long periods of time and is in effect hermetically sealed.

In Figures 8 to 11 inclusive, I have indicated a modified procedure. A thin metal strip or plate 16 is caused to extend over the open end of the carton. It should not be wider than the carton. If the carton has not previously been treated with thermoplastic adhesive, a suitable adhesive (thermoplastic or solvent) may be applied to either of flaps 7 and 9. In Figure 9 I have shown the flap 7 folded over onto the plate 16, and in Figure 10 the flap 9 infolded to overlie the flap 7.

The two flaps are thus adhered together in accurate surface conformation while supported by the plate 16. An external cooperating pressure element may, of course, be used. After the adhesive has set, the plate 16 is withdrawn endwise.

Flaps 7 and 9 in adhesive union form a platform extending across the carton end from side to side, and supported by the carton side walls 4 and 2. With an application of adhesive to flaps 6 and 7, if they have not previously been coated, these flaps are folded over onto the platform. In doing this, I prefer to indent the end walls 1 and 3 adjacent the lines of articulation of their flaps as by fingers, one of which is shown at 17 in Figure 11. The result is that the ends of the platform are not only supported, but the flaps 6 and 7 are drawn tightly over the edges of the platform, forming a very tight closure at the corners. The stiffness of the platform supports flaps 6 and 7 and enables an external pressure element to produce accurate surface conformation between these flaps and the platform until the adhesive has set.

It will be clear from the teachings herein that my means and modes of sealing are applicable to either or both ends of a seal end carton irrespective of the position of the carton. Hence both ends of the carton may be closed and sealed while the carton is in a single orientation, and no up-ending of the carton is necessary between closure operations. I may, for example, position a carton vertically, close it on the bottom and then close and seal it on the top, all without turning it end for end, and with or without moving it from station to station in a machine.

Modifications may be made in my invention without departing from the spirit of it. Having thus described my invention in certain exemplary embodiments, what I claim as new and desire to secure by Letters Patent is:

1. The method of producing uniform adhesion between and surface conformation of sealing flaps articulated to the end of a carton body, which method includes supporting a pair of initially infolded flaps over a relatively thin plate extending across the carton body at said end and extending beyond the carton body at one side thereof over an outfolded flap, adhering at least one remaining flap to the previously infolded flaps in superposed position thereon while all of said flaps are so supported, thereupon withdrawing said plate over said outfolded flap and from beneath said infolded flaps and adhering the previously outfolded flap in superposed position over said previously adhered flaps.

2. A method of sealing flaps at the end of a carton body, which includes as separate stages of folding and adhesively securing, the folding in of a pair of opposite flaps and the adhering of another flap thereto while said flaps are supported by a plate extending across the carton end and therebeyond at one side, and located on the inner side of the said flaps, and when an adhesive bond has been secured, withdrawing the said plate transversely of the carton end and folding inwardly and adhesively securing another flap to said previously folded and adhesively secured flaps.

3. A method of sealing flaps articulated to an end of a carton body, which includes positioning across the open end of a carton body a platelike member extending transversely of the carton body therebeyond at one side edge, folding inwardly over said plate a pair of opposite sealing flaps, folding inwardly and securing to the first men-

tioned flap another flap, thereupon withdrawing said supporting plate transversely of the carton end to provide across the end of the carton a supporting structure formed of infolded flaps secured together in complete surface conformity, and thereafter folding in and adhesively securing to said previously folded and secured flaps another carton flap to complete the closure.

4. A process of closing seal end cartons which comprises interfolding and adhesively securing some but not all of the seal end flaps of such cartons, two at least of said flaps being attached to opposite carton walls, pressing said flaps so as to secure surface conformity against a platelike member positioned transversely inwardly from the same end of said carton so as to lie beneath said flaps, whereby to form of said adhesively secured flaps a platform extending across the end of said carton, then transversely withdrawing said plate-like member, and interfolding and adhesively securing the remainder of said flaps, said remainder being supported by said preformed platform and pressed thereagainst so as to be brought into surface conformity therewith.

5. A process of closing rectangular seal end cartons which comprises interfolding and adhesively securing a pair of opposite seal end flaps plus a third seal end flap of such cartons, pressing said flaps so as to secure surface conformity against a plate-like member positioned from the same end of the said carton so as to lie inwardly of said flaps with a portion projecting beyond the carton in the direction of the remaining unfolded flap, whereby to form of said adhesively secured flaps a platform extending across the end of said carton, then withdrawing said plate-like member from the carton in the direction of said unfolded flap, and folding over and adhesively securing said last mentioned flap, said flap being supported by said preformed platform and pressed thereagainst so as to be brought into surface conformity therewith.

6. The process claimed in claim 5 including the step of applying adhesive to certain at least of said flaps after the positioning of said plate-like member.

7. A process of closing seal end cartons which comprises positioning a thin plate-like member so that it extends across an open end of said carton with a portion projecting at one side at least beyond said open end, applying adhesive to some but not all of the seal end flaps of the carton and interfolding said flaps, two at least of said flaps being attached to opposite carton walls, pressing said flaps so as to secure surface conformity against said plate-like member which is located inwardly of said flaps, and holding said flaps together in this fashion until an adhesive bond has been secured whereby to form of said adhesively secured flaps a platform extending across the end of said carton, then withdrawing said plate-like member substantially in the plane of the carton end, applying adhesive to the remainder of said flaps and folding them while supporting them by and pressing them against said preformed platform so as to hold them in surface conformity therewith.

8. The process claimed in claim 5 in which the cartons have preformed coatings of thermoplastic adhesive on the flaps thereof and in which just prior to interfolding the adhesive is reactivated by heat on a sufficient number of flaps to produce the adhesive unions set forth.

9. A process of closing rectangular seal end cartons which comprises positioning a thin plate-

9

like member across an open end of said carton so that it extends beyond said open end at two opposite sides and at least partially overlies two opposite seal end flaps which are in outfolded condition, folding inwardly and adhesively securing together the remaining pair of opposite flaps while pressing them against said plate-like member so as to secure surface conformity, whereby to form of said adhesively secured flaps a platform extending across the end of said carton, then withdrawing said plate-like member in an endwise direction, and then folding over onto said platform and adhesively securing thereto said first mentioned pair of opposite flaps, pressing said flaps against said platform as a support so as to secure surface conformity between said platform and said flaps.

10. A process of closing seal end cartons without inverting them, which comprises effecting closure on both ends by steps involving folding some but not all of the seal end flaps of the cartons at each end over plate-like members positioned from the same ends of the carton inwardly of the folded flaps, and adhesively securing said flaps so as to form platforms extending across the ends of said carton, then withdrawing said plate-like mem-

10

bers transversely and adhesively securing the remainder of said flaps to said preformed platforms and pressing them thereagainst.

LEONARD BACK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,365,415	Lawrence	Jan. 11, 1921
1,577,850	Peters et al.	Mar. 23, 1926
1,634,073	Labombarde	June 28, 1927
1,965,897	Jurgens et al.	July 10, 1934
2,074,357	Bergstein	Mar. 23, 1937
2,206,203	Richard	July 2, 1940
2,217,757	Lindley	Oct. 15, 1940
2,266,054	Lowey et al.	Dec. 16, 1941
2,328,758	Vergobbi	Sept. 7, 1943
2,330,466	Bergstein	Sept. 28, 1943

FOREIGN PATENTS

Number	Country	Date
281,794	Great Britain	Dec. 15, 1927