April 17, 1951 F. D. BERGSTEIN 2,549,048

LIQUID TIGHT CARTON AND METHOD

Filed May 9, 1947 2 Sheets-Sheet 1

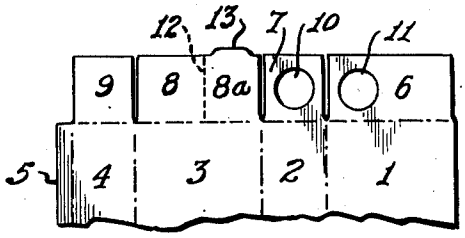


FIG. 1.

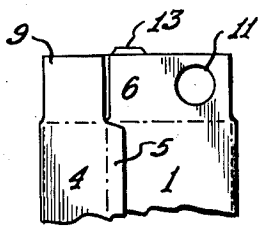


FIG. 2.

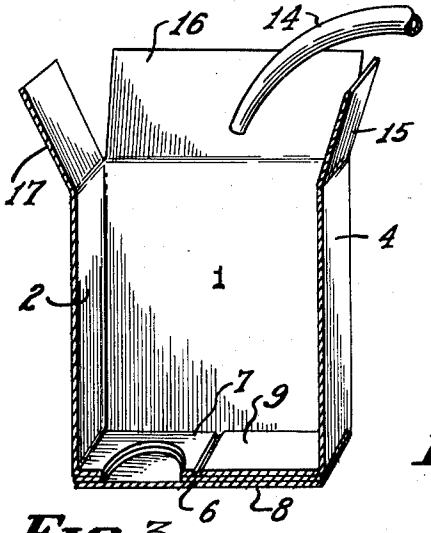


FIG. 3.

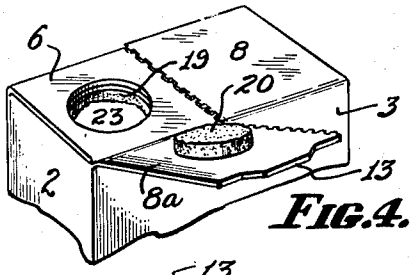


FIG. 4.

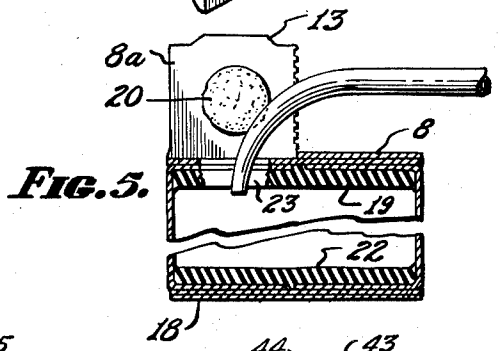


FIG. 5.

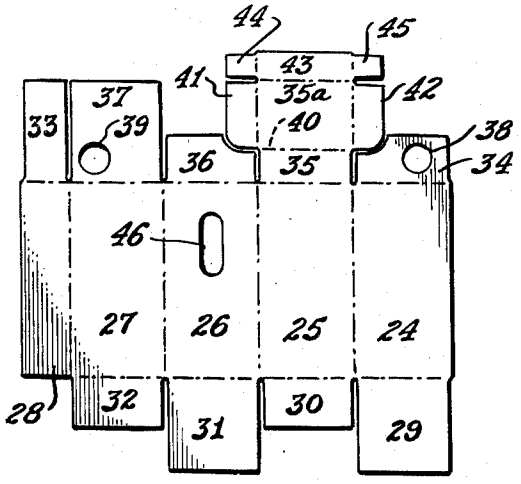


FIG. 6.

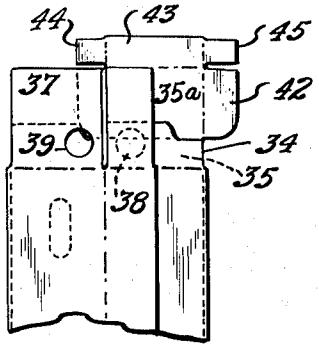


FIG. 7.

INVENTOR.
FRANK DAVID BERGSTEIN.
BY Allen & Allen
ATTORNEYS.

April 17, 1951 F. D. BERGSTEIN 2,549,048

LIQUID TIGHT CARTON AND METHOD

Filed May 9, 1947 2 Sheets-Sheet 2

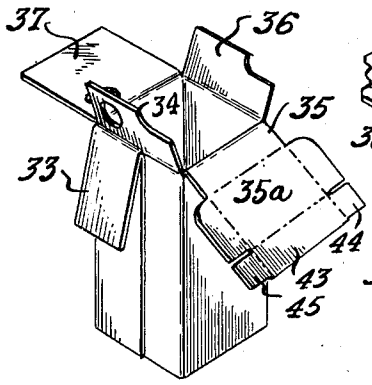


FIG. 8.

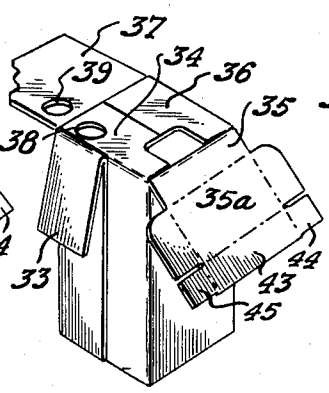


FIG. 9.

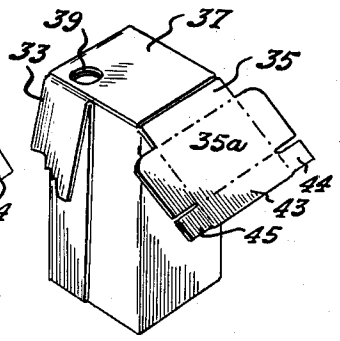


FIG. 10.

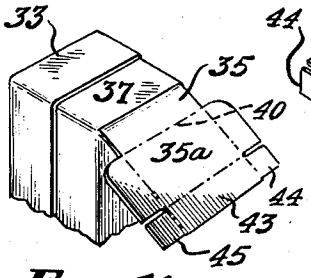


FIG. 11.

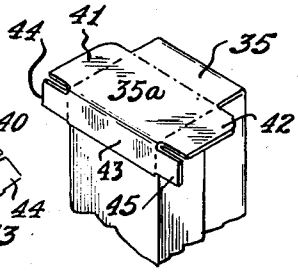


FIG. 12.

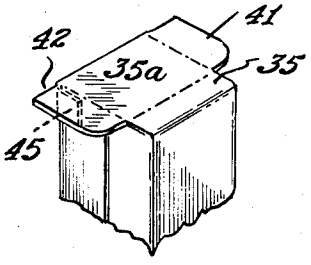


FIG. 13.

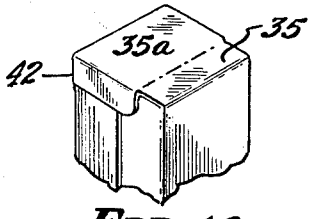


FIG. 14.

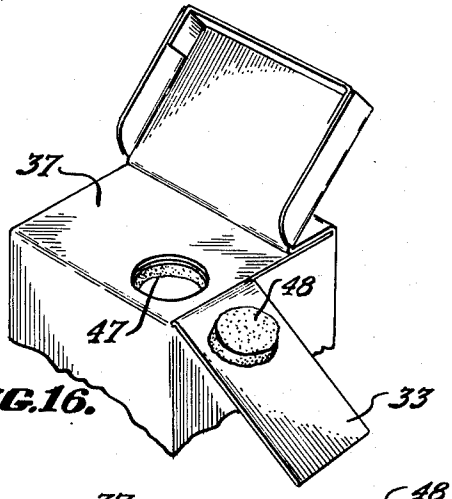


FIG. 16.

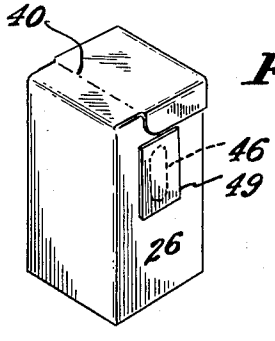


FIG. 15.

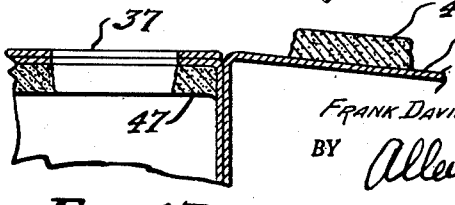


FIG. 17.

INVENTOR.
FRANK DAVID BERGSTEIN.
BY Allen & Allen
ATTORNEYS.

Patented Apr. 17, 1951 2,549,048

UNITED STATES PATENT OFFICE

2,549,048

LIQUIDTIGHT CARTON AND METHOD

Frank David Bergstein, Cincinnati, Ohio

Application May 9, 1947, Serial No. 746,965

18 Claims. (Cl. 229—5.5)

1

Cartons to which this invention relates find their principal usefulness as containers for liquids and other materials requiring a sealed condition of the container.

It is an object of the invention to provide cheaply a carton which can readily be sealed, and a method for that purpose.

It is an object of the invention to provide a new method for sealing cartons by interior end flooding, as will hereinafter be set forth.

It is an object of the invention to provide cartons which may be closed and sealed by the user either entirely by hand operations or with the simplest devices and mechanisms, so that the furnishing of his product in a sealed carton does not entail any large capital outlay for equipment.

It is an object of my invention to provide a novel type of container for milk, which is a sealed container but may be readily opened and closed, and which has means whereby the level of the cream line may be determined.

It is further my object to attain all of these features in a knock-down paperboard carton manufactured in the usual way on standard equipment and of no greater cost than conventional cartons not possessing the features set forth above.

These and other objects of the invention, which will be set forth hereinafter, or will be apparent to one skilled in the art upon reading these specifications, I accomplish in those constructions and arrangements of the parts and by those methods of which I shall now describe certain exemplary embodiments. Reference is made to the drawings which form a part hereof, and in which:

Figure 1 is a partial plan view of a blank for a liquid container.

Figure 2 is a similar view showing the blank in tubed condition.

Figure 3 is a vertical longitudinal section with portions in perspective, showing a first step in sealing the carton.

Figure 4 is a partial perspective view showing a sealed end of the carton after having been opened.

Figure 5 is a vertical longitudinal section of the same opened carton showing a second step in the effecting of an end seal.

Figure 6 is a plan view of a blank for another form of carton falling within my invention.

Figure 7 is a similar plan view showing the carton of Figure 6 in tubed condition.

Figures 8 to 14 inclusive are partial perspective views showing the various steps in forming the top end closure of this style of carton.

2

Figure 15 is a perspective view of the completed carton.

Figure 16 is a partial perspective view showing the top end of the carton in open condition.

Figure 17 is a partial sectional view of the same structure.

In a copending application in my name entitled Tight Cartons, Serial No. 740,313, filed April 9, 1947, I have shown a method whereby knock-down or folding cartons may after erection be sealed at the ends by end flooding operations. The cartons of the present invention, being primarily designed to hold liquids, are also sealed by end flooding operations, as will hereinafter be described. But in accordance with the teachings herein, I am enabled to effect the sealing in new and improved ways, and attain substantial advantages in structure.

Referring to Figure 1, I have shown a blank for an exemplary carton having a series of body walls 1, 2, 3 and 4 in articulation along score lines which are shown dotted. A glue flap 5 is articulated to the wall 4 in a similar fashion. At the tops of the body walls I provide closure flaps 6, 7, 8 and 9. These are seal-end closure flaps. The two flaps 7 and 9 of lesser area are designed to be folded first. Flap 7 is provided with an opening 10. This registers with an opening 11 in the intermediate flap 6. The portion 8a of the flap 8, which will cover these combined openings, is demarked from the remainder of the flap by a line for severance 12. The flap portion 8a may also be provided with a lip 13 to facilitate lifting.

The body walls 1 to 4 of the carton shown in Figure 1 will be provided at their bottom ends with suitable closure flaps, preferably of the seal-end variety.

The carton will be made of paperboard suitably proofed in view of the nature of the liquid which is to be transported in it. The nature of the proofing does not form a specific limitation upon this invention.

The carton blank shown in Figure 1 may be tubed in the ordinary way through the use of the ordinary carton folding and gluing equipment. Where the carton is to hold liquids, I prefer to tube it with the glue flap 5 lapped outside the free edge of the body wall 1 as shown in Figure 2. The adhesive used in tubing the carton will, of course, be one unaffected by the nature of the liquid to be transported. The tubed, knocked-down structure will be shipped to the carton user.

The carton user will erect the carton in the usual way, and will first close the flaps on the

top end. These, being seal-end flaps, may be folded with the interposition of suitable adhesive in the usual fashion. It is however advantageous to diminish the adhesion of the portion 8*a* of the flap 8 to the contiguous portion of the intermediate flap 6, so that the part 8*a* can subsequently be raised. This may be accomplished in a number of ways, by omitting to coat the part 8*a* with adhesive, or by printing a portion of the flap 6 with an adhesive-repellent ink.

When the carton has been closed on the top end, it is then inverted and sealed on that end. The manner in which this is done is illustrated in the sectional view, Figure 3. With the carton resting on its top end, a liquid sealing substance is introduced as by a spout 14. The nature of the sealing substance is not a specific limitation upon this invention.

Preferably I employ a sealing substance which is thermoplastic in character and non-brittle when set. By reason of its brittleness paraffin is not ordinarily advantageous, but mixtures of this wax with non-brittle microcrystalline waxes or the latter alone will serve. Excellent results are obtained by using microcrystalline wax with or without paraffin but with the addition of resinous substances such as polybutenes, chlorinated terphenyls and others, which act to impart resilience and strength and increase bond, while still permitting the parting of the coating as hereinafter set forth. I am not limited to heat softened materials but may instead employ solvent solutions. As will be pointed out, it is advantageous in the practice of my invention to use a material for the coating which is capable of resealing under heat.

The sealing substance is introduced in a thin and highly liquid condition through the spout 14 in a quantity sufficient to cover the then inside bottom of the carton. It flows so as to cover the then bottom; and it is of assistance in distributing the thermoplastic material to rock or tilt the carton prior to the solidification of the sealing substance. Warming the end of the carton will also assist the sealing substance in penetrating all orifices therein. A relatively thin sealing coating is thus formed over the entire inner end of the carton, the coating being bonded to end portions of the body walls thereof.

The carton may next be closed upon the opposite end, as by the interfolding and adhesive securement of flaps 15, 16, 17 and 18. This may be done in the usual way and with the usual apparatus while the carton is in the position illustrated in Figure 3.

The carton is next up-ended and is opened by lifting the flap portion 8*a*, as shown in Figure 4. This will be done after the coating 19 has solidified, but it is immaterial whether the coating shall have reached a particular stage of hardness. I have discovered that the result of lifting the flap 8*a* is to open up a pouring opening formed by the mating perforations 10 and 11 in flaps 6 and 7, the sealing substance formerly extending over this opening interiorly of the carton, and joined to the coating 19, coming out as a plug 20 in adhesive union with the raised flap 8*a*.

The carton may be reclosed by folding the flap 8*a* into its original position. The plug 20 of thermoplastic substance accurately fits the opening in the interior sealing coating 19, and the structure forms an effective, splash-proof reclosure. It may readily be resealed also by applying sufficient heat to the end of the carton to cause edge portions of the plug 20 to interfuse and join with edge portions of the coating 19.

With the carton in the opened position, as shown in Figure 4, the bottom end may be sealed by introducing a thermoplastic sealing compound through a spout 21, the end of which delivers the sealing material through the filling opening. In this way, and using the precautions outlined above, an interior bottom seal is formed in my carton, as shown at 22 in Figure 5.

Upon the solidification of this coating, the carton is now in condition to be filled with the desired liquid contents. These contents are introduced through the filling opening 23, and when the carton has been filled to the desired liquid level, it is moved from beneath the filling means, and is reclosed by folding the flap 8*a*, bringing the plug 20 into closing position as aforesaid. The flap 8*a* may be adhesively secured in the reclosing position if desired. Normally also it will be desired to reseal the carton by applying heat to interfuse the portions 20 and 19 of the top interior seal. The carton is now in condition to carry its liquid content to the ultimate consumer. He will reopen the carton in the way already described, reforming the plug 20 which thereafter will serve as a reclosure for the carton as the contents thereof are dispensed from time to time.

In Figures 6 to 17 inclusive I have illustrated the principles of this invention applied to a type of carton especially designed for the retail transportation and distribution of milk, although it is susceptible of other uses. Figure 6 illustrates a blank for such a carton having body walls 24, 25, 26 and 27 and a glue flap 28 in articulation. The lower ends of the body walls are provided with seal-end flaps 29, 30, 31 and 32. The glue flap in this instance is a fairly wide member and carries an articulated upper extension 33 as shown. At the upper ends of the body walls I locate flaps 34, 35, 36 and 37. The first of these is provided with an opening 38 which, in the erected and closed carton, will mate with a similar opening 39 in the flap 37. Flaps 34 and 36 are short flaps designed to be folded first. The flap 37 is an intermediate flap.

The flap 35 is divided transversely by a score line into two parts. The outer part 35*a* is designed to form a cover panel hinging on the score line 40. This portion is provided with side flanges 41 and 42 and a front flange 43. This front flange has articulated glue flaps 44 and 45.

For a purpose hereinafter to be described, one of the body walls, for example the wall 26, may be provided with an opening 46 located near the top of the body wall.

The blank of Figure 6 will be made of any suitable boxboard which is treated to give proofness with respect to the liquid for which the carton is designed.

In tubing the carton as shown in Figure 7, the glue flap 28 is positioned on the outside of the wall 24 and adhered thereto with a suitable adhesive. The carton may be shipped to the user in the form shown in Figure 7, or with the addition of a transparent covering for the opening 46, as hereinafter more particularly described.

Figures 8 to 14 inclusive show various steps in forming up the top closure of carton. The first step, as indicated in Figure 8 is that of erecting the carton, or squaring up the body thereof. When this has been accomplished the short flaps 34 and 36 may be folded inwardly as shown in Figure 9. Then with the interposition of a suitable adhesive, the intermediate flap 37 may be folded inwardly. With the interposition of a suitable adhesive between the free edge of the

flap 37 and the portion 35 of the top member, the top member is folded over onto the top of the carton as shown in Figure 12. The portion 35a of the top member will not be adhered, but will be free to fold or pivot on the score line 40.

The front flap 43 on the top member is next folded over against the body wall 27, as also shown in Figure 12. The glue tabs 44 and 45 are folded backwardly against the adjacent body walls and with the interposition of suitable adhesive the side cover flanges 41 and 42 are folded downwardly so as to cause them to adhere to the glue tabs 44 and 45. These steps are illustrated in Figures 13 and 14.

The result is a closed box having at the closed end a hinged cover member with side and front flanges. This cover member may be raised, as shown in Figure 16, and when so raised, will disclose the glue flap extension 33 overlying the dispensing opening described above. In its closed position the cover member will overlie the glue flap extension 33 holding it in position over the dispensing opening.

The carton, closed at its upper end, is now inverted, and an inner seal is formed at the said end by the introduction of a suitable liquid or molten adhesive. The interior sealing coating is indicated at 47 in Figure 17. When the coating has solidified or has become plastic and non-liquid, the carton may be re-inverted, the top opened as shown in Figure 16, and the glue flap extension 33 raised. This will cause a portion of the coating 47 to come away in adhesive union with the glue flap extension 33 forming a plug 48 matching the orifice in the interior coating 47. The flaps 29, 30, 31 and 32 of the lower ends of the carton body walls may now be closed and adhesively secured, whereupon a bottom sealing coating may be formed interiorly of the carton by introducing a liquid or molten sealing substance through the pouring opening.

The opening 46 in the body wall 26, where provided, is preferably covered with a sheet of transparent plastic substance 49, adhered to the wall 26 in such a way as to form a seal. In a carton designed to hold milk, the opening 46 may be so located as to give a view of the contents of the carton at the cream line. A structure of this general character is set forth in my copending application entitled Sealed Cartons and Method, Serial No. 768,150 filed August 12, 1947, now Patent Number 2,543,757. In the cartons of the present invention, however, it is not necessary to seal the ends by sealing substances introduced through the opening 46. As a consequence, the sheet 49 of transparent plastic may be affixed to the carton blank or to the tubed structure as an incident of the manufacture of the carton, and may with advantage be affixed to the inner surface of the boxboard.

The carton of Figure 16, closed and sealed on both ends can next be filled in the usual fashion through the dispensing opening. After filling, the glue flap extension 33 will be refolded, the plug 48 entering the orifice in the interior coating 47, and forming a splash-tight closure. The carton may be resealed hermetically by applying sufficient heat to the top end of it to cause the substance of the plug 48 to fuse with the substance of the coating 47.

It will be noted in this form of carton that a construction is provided in which the actual closure, comprising the glue flap extension 33 and the plastic plug 48 is covered by a cap construction comprising the top member 35a and the side and front flanges 41, 42, and 43. This provides a completely sanitary construction advantageous in the retail shipment and handling of products such as milk.

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. A carton having a wall, a perforation through said wall, an imperforate flap overlying and covering said perforation, and an interior casting of sealing substance of predetermined amount and substantial thickness covering said wall interiorly and also that portion of said flap uncovered by said perforation, so that when said flap is raised, a portion of said casting substantially outlined by the periphery of said perforation will break away from the remainder of said casting and form a plug in adhesive union with said flap, said plug being re-insertable in said opening.

2. In a carton a tubular body and end closure flaps, certain of said flaps being perforated to provide a dispensing opening for liquids, said end closure flaps including an imperforate flap overlying said opening, and a casting of sealing substance of predetermined amount and substantial thickness located interiorly of the end closure formed by said flaps, entirely covering inner ones of said perforated flaps and said additional imperforate flap as disclosed by the perforations in said other flaps, said last mentioned flap being raisable and said casting being partible along a line substantially determined by the periphery of said perforation to form a plug of sealing substance in adhesive union therewith.

3. A sealed, reclosable carton having a tubular body and end closure flaps of which a first folded closure flap and an intermediate flap have mating perforations and an outer imperforate flap has a portion covering said mating perforations defined by a line for severance from the remainder of said flap so as to be separately liftable, said flaps being in closed position, and a unitary casting of sealing substance of predetermined amount entirely covering the interior surfaces of the end closure formed by said flaps and substantially confined thereto, bonded to end portions of said body walls, and bonded directly to said covering portion of said outer flap.

4. The structure claimed in claim 3 in which the other end of said body is provided with closure flaps, said closure flaps being in closed position, with a casting of sealing substance within the carton and covering said last mentioned closure.

5. A carton having an end closure and a body, a dispensing opening formed in said end closure, a member overlying said dispensing opening, and an integral casting of sealing substance of predetermined amount and substantial thickness within said carton entirely covering the surface of said closure and the surface of said last mentioned member as exposed by said opening, and substantially confined thereto.

6. In a sealed, reclosable carton for liquids, a tubular body, closure flaps at an end of said body, said closure flaps comprising a pair of first folded flaps, an intermediate flap and a final folded flap, one of said first folded flaps and said intermediate flap having mating perforations providing a dispensing opening, a member overlying said perforations, said last folded flap having a hinged portion with side and front

flanges overlying said perforation, and a unitary casting of sealing substance in the interior of said carton overlying the closure formed by said flaps, extending in an unbroken fashion through said perforation and coating the said overlying member, bonded to end portions of the body walls of said carton, said casting having sufficient thickness to form a reclosure plug when said overlying member is raised and the portion of said casting adhering thereto is broken away from the remainder of said casting.

7. The structure claimed in claim 6 including a glue flap, and in which said overlying member is an articulated extension on said glue flap.

8. The structure claimed in claim 7 in which one of said body walls has a perforation therein and in which said perforation is covered and closed by a sheet of transparent plastic substance affixed to said body wall.

9. A process of sealing cartons which comprises providing a knock-down carton with a tubular body and end closure means, said closure means at one end of the carton comprising a series of flaps adapted to be folded into superposed position, a plurality of said flaps having mating perforations therein forming a dispensing opening, another of said flaps having a portion to cover said dispensing opening, erecting said carton and closing it on the end last described, thereupon forming over said end with the carton end down an interior casting of solidifiable sealing substance, covering said closure and extending through said perforation to contact and bond to said overlying flap, lifting said over lying flap whereby to fracture said casting along a line substantially determined by the periphery of said perforation, so that a plug-like element of said casting comes away with said lifted flap, closing the opposite end of said carton, and forming an interior seal thereover by introducing sealing substance through said opening formed in said first closed end.

10. In a reclosable carton a perforated wall, a liftable member overlying the perforation in said wall, a casting a predetermined amount and substantial thickness of sealing substance over the interior surface of said wall, said liftable member in lifted condition having a plug of sealing substance formed thereon broken away from said casting and adapted to fit into the resultant opening in said casting of sealing substance adjacent the perforation in said wall.

11. A reclosable carton having a perforated wall, a liftable flap overlying said wall and the perforation therein, a casting of sealing substance of substantial thickness on the interior surface of said wall and terminating substantially at the periphery of said perforation, said liftable flap bearing a plug of sealing substance adapted to pass through the perforation in said wall and mate substantially with the perforation in said casting.

12. The structure claimed in claim 11 wherein said casting and plug are of thermoplastic substance capable of interfusion upon the application of heat to the combined structure.

13. A process of making a reclosable carton which comprises providing a carton with a perforated wall and an articulated closure flap overlying the perforation therein, casting against said wall and said flap from the side opposite said flap a solidifiable substance in predetermined amount and substantial thickness so as to bring said substance into adhesive union with said wall and flap, permitting said substance to solidify, and thereafter raising said flap whereby to fracture said substance and form a reclosure plug on said flap.

14. A process of sealing cartons which comprises providing a knock-down carton with a tubular body and end closure means, said closure means at one end of the carton comprising a series of flaps adapted to be folded into superposed position, a plurality of said flaps having mating perforations therein forming a dispensing opening, another of said flaps having a portion to cover said dispensing opening, erecting said carton and closing it on the end last described, thereupon forming over said end with the carton end down an interior casting of solidifiable sealing substance, covering said closure and extending through said perforation to contact and bond to said overlying flap, lifting said overlying flap whereby to fracture said casting along a line substantially determined by the periphery of said perforation, so that a plug-like element of said casting comes away with said lifted flap, closing the opposite end of said carton, and forming an interior seal thereover by introducing sealing substance through said opening formed in said first closed end, thereafter filling said carton, and reclosing it so that said plug-like element resumes its position in the said casting, and resealing the carton by applying heat to interfuse the plug and casting, the sealing substance being a thermoplastic.

15. A process of sealing cartons which comprises the steps of erecting a knock-down carton having a tubular body and end closure means, the closure means at one end of the carton comprising elements with aligned perforations and a means for covering them, closing the carton on the end last described, introducing into the carton a molten sealing substance with said end in a downward position so as to cover said closure with a casting of the sealing substance bonded to end portions of the tubular body, thereafter closing the opposite end of said carton and inverting it, lifting the cover element of said previously sealed end and effecting an opening through the said casting, thereafter sealing the last closed end by depositing thereon a casting of molten sealing substance, filling the carton through the opening in the first formed casting, and thereafter resealing the carton by plugging said opening with a plug of fusible substance interfusible with said casting, and effecting a seal by interfusion.

16. A process of sealing a carton which comprises providing a carton having an end closure with a dispensing opening formed therein, and a member overlying said opening, coating said end closure and said member from the side opposite said member with a solidifiable substance in predetermined amount and substantial thickness so as to bring said substance into adhesive union with said end closure and with said member, and permitting said substance to solidify, whereby to form a casting thereon, from which casting a reclosure plug will break away when said overlying member is lifted.

17. A process of making a reclosable carton which comprises providing a carton having a tubular body and end closure flaps, certain of said flaps being perforated to provide a dispensing opening, another of said flaps including a member overlying said opening, closing said flaps just described, and thereupon covering inner ones of said flaps and said additional member as disclosed by the perforations, with a predetermined

amount of solidifiable substance in substantial thickness so as to bring said substance into adhesive union with said flaps and the exposed portion of said member, and permitting said substance to solidify, whereby to form a casting thereon, from which casting a reclosure plug will break away when said overlying member is lifted.

18. A process of making a reclosable carton which comprises providing a carton having a tubular body and end closure flaps, certain of said flaps being perforated to provide a dispensing opening, another of said flaps including a member overlying said opening, closing said flaps just described, and thereafter covering inner ones of said flaps and said additional member as disclosed by the perforations with a coating of solidifiable substance in predetermined amount so as to bring said substance into adhesive union with said flaps and the exposed portion of said member, permitting said substance to solidify so as to form a casting of substantial thickness thereon and thereafter raising said member whereby to fracture said casting along a line determined substantially by the periphery of said perforations, whereby to form a plug of sealing substance on said member.

FRANK DAVID BERGSTEIN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,247,237	Doble	Nov. 20, 1917
2,059,101	Guenther	Oct. 27, 1936
2,074,357	Bergstein	Mar. 23, 1937
2,217,142	Stedman	Oct. 8, 1940
2,218,670	Bennett	Oct. 22, 1940
2,290,185	Hinkle	July 22, 1942
2,321,050	Seymer	June 8, 1943
2,335,865	Lanigan et al.	Dec. 7, 1943
2,341,845	Mark et al.	Feb. 15, 1944