

April 11, 1961

E. C. PELLATON ET AL

2,979,247

HEAT SEALABLE CARTON AND METHOD OF SEALING SAME

Filed May 27, 1957

2 Sheets-Sheet 1

FIG_1

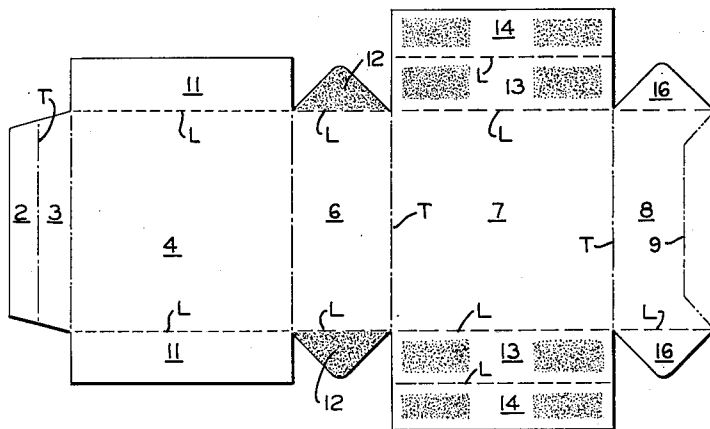


FIG_2

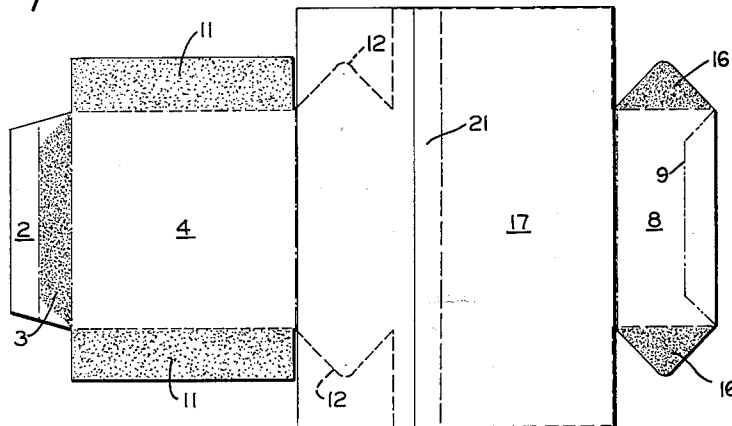


FIG_3

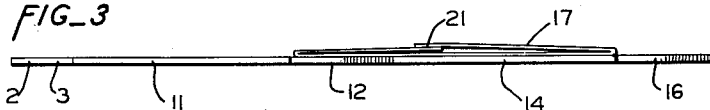
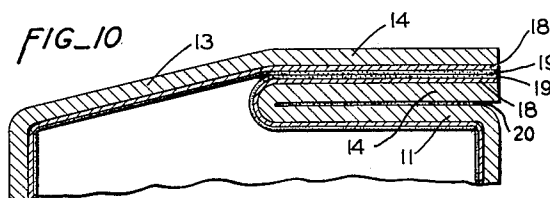


FIG_10



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FIG-4

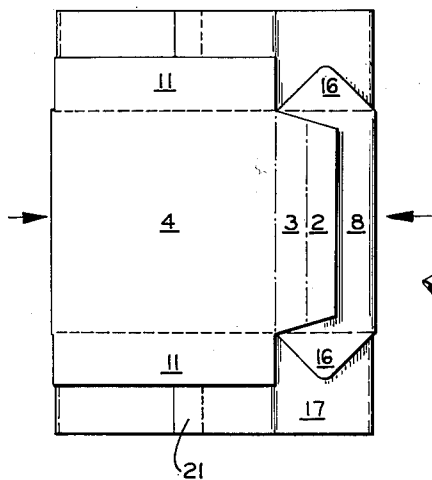


FIG-5

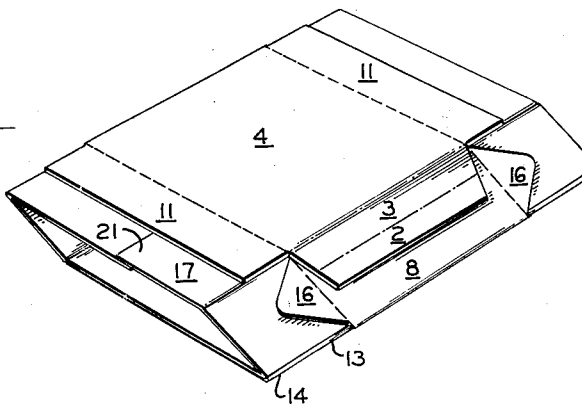


FIG-6

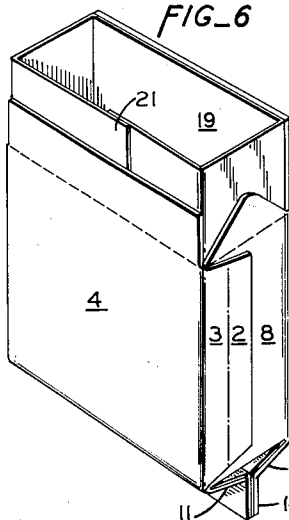


FIG-11

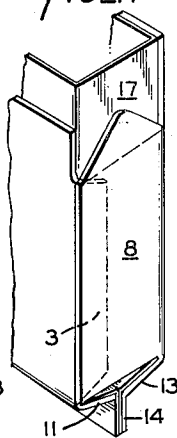


FIG-7

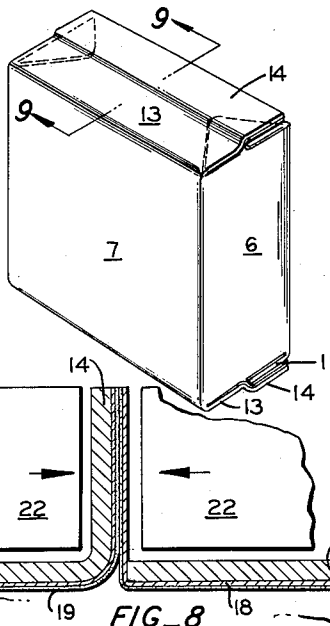


FIG-9

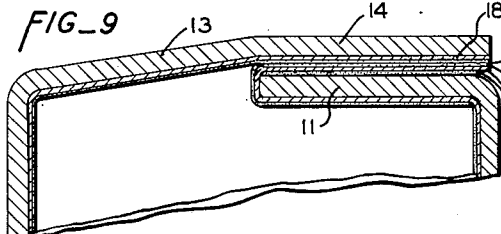


FIG-8

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HEAT SEALABLE CARTON AND METHOD OF SEALING SAME

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5 Claims. (Cl. 229—14)

This invention relates generally to cartons formed of flexible material, desirably paperboard, in which the extremities of the carton may be quickly and easily sealed thereby protecting the contents of the carton.

More particularly, this invention relates to a paperboard carton which has secured to its interior a flexible tubular liner coated on its inner surface with a heat sealable material. This invention also relates to the method in which such a carton may be sealed.

Cartons of the type herein involved are particularly well suited for packaging foods of the frozen variety, such as strawberries, raspberries, peas, beans, corn and the like. In packaging such foods it is necessary that the cartons used may be securely sealed to prevent any leakage of the contents of the carton. The carton embodying the present invention may be sealed rapidly and securely yet may be readily and easily opened by the consumer.

Summarizing this invention, it has as an object, among others, the provision of an improved heat sealable carton which can be formed rapidly and easily from readily available material, such as paperboard. Another object of this invention is the provision of a tubular liner for the carton formed from any readily available material, such as paper, the interior of which has been coated with a heat sealable and also leak proof material, such as polyethylene. Another object of this invention is the provision of a method by which the carton and the tubular liner therefor may be rapidly and easily sealed to protect the contents of the carton. Other objects of this invention will become apparent from a study of the following description.

Generally, the carton of the instant invention comprises conventional side walls and end walls which cooperate to form the body of the carton. Hingedly connected to opposite upper and lower margins of each of the side walls is a cover flap. Hingedly secured to each of the cover flaps formed on one of the side walls is a ridge flap which cooperates with the cover flaps in closing the opposite extremities of the carton. Such ridge flap also serves as a cover flap in the sealed condition of the carton. Hingedly connected to upper and lower margins of each of the end walls are cover tabs which cooperate with the above mentioned cover flaps and ridge flaps to seal the extremities of the carton. Adjacent a lateral margin of one of the side walls is a securing flap which is adapted to cooperate with the other side wall and be adhesively secured thereto to maintain the carton in closed condition. To prevent leakage of the carton and at the same time provide a ready means for heat sealing the same, a heat sealable and moisture resistant liner is provided in the body of the carton.

Reference is now made to the drawings for a more detailed description of the carton in which:

Fig. 1 is a plan view of the inner surface of a paperboard blank from which a carton is formed.

Fig. 2 is a plan view similar to Fig. 1 which shows a flattened tubular carton liner positioned on the carton blank before the carton and liner are formed into set up condition.

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Fig. 3 is an end view of the blank and liner in the flat position shown in Fig. 2.

Fig. 4 is a plan view of the carton and liner therefor in collapsed condition.

Fig. 5 is an isometric view of the carton and liner in an intermediate stage of the setting up operation in which the extremities of the carton are open.

Fig. 6 is an isometric view of the carton having one extremity thereof sealed.

Fig. 7 is an isometric view of the carton in completely sealed condition with the ridge flaps and extremities of the liner overlying and being secured to a cooperating cover flap. The carton shown in Fig. 7 is turned 180° relative to the carton of Fig. 6 to show the end wall of the carton opposite from the pull tab and securing flap.

Fig. 8 is a sectional view through a carton of this invention showing the manner in which heat is applied simultaneously to an outer surface of the upright ridge flap and to an outer surface of the upright carton liner to cause the liner coating to seal the end of the liner.

Fig. 9 is a vertical sectional view on an enlarged scale through the sealed carton taken in the plane of line 9—9 of Fig. 7; the relative proportions of the parts being exaggerated for purposes of clarity.

Fig. 10 is a vertical sectional view, similar to Fig. 9, through a carton embodying a modification of this invention.

Fig. 11 is an isometric view of a carton in partially set up condition showing a modification in the manner in which the securing flap is secured to the carton side wall.

Referring first to Fig. 1, the blank illustrated is provided with a plurality of longitudinally extending substantially parallel fold lines L and a plurality of substantially parallel transverse fold lines T. In the embodiment illustrated, the longitudinal fold lines L are formed as cut score lines to facilitate bending while the transverse fold lines are formed as score lines. It should be understood, however, that various types of fold lines well known in the art could be utilized on the blank illustrated without departing from the scope of this invention. The blank may be formed from any commercially available material but desirably paperboard is utilized.

The transverse fold lines T form in the order indicated, beginning at the left of Fig. 1, a pull tab 2 hingedly connected to a securing flap 3. Securing flap 3 in turn is hingedly connected to a margin of side wall panel 4. Hingedly connected to side wall panel 4 along an opposite margin thereof is end wall panel 6. A second side wall panel 7 is hingedly connected to end wall panel 6. A second end wall panel 8 is hingedly connected to side wall panel 7 along an opposite margin thereof. It should be noted that end wall panel 8 has formed in the outer surface thereof a partial cut which extends in the direction indicated by dot-dash line 9. The purpose of this partial cut will be set out hereinafter.

The longitudinal fold lines L extend substantially parallel to each other. Connected to side wall panel 4 along opposite upper and lower margins thereof are cover flaps 11. Hingedly connected to side wall 6 are cover tabs 12, which in the illustrated embodiment are of triangular shape. Secured hingedly to side wall panel 7 along upper and lower margins thereof are additional cover flaps 13, which are of the same dimensions as cover flaps 11, mentioned previously. Hingedly connected to each of the cover flaps 13 is a ridge flap 14, the purpose of which will be set out later. Connected to side wall panel 8 are an additional pair of triangular cover tabs 16.

It should be noted that cover flaps 11 and 13 and ridge flaps 14 all have substantially the same dimensions. Each of cover flaps 11 and 13 and ridge flaps 14 are substantially one-half the width of side wall panels 6 to 8. In this manner cover flaps 11 and 13 extend approximately

one-half the distance across a closed extremity of the set up carton and meet adjacent the middle thereof. Because ridge flaps 14 are of the same size as cover panels 11, flaps 14 overlie all of cover panels 11 when the carton is set up thereby forming a neat sealed package.

The dotted areas shown on cover tabs 12, cover flaps 13 and ridge flaps 14 illustrate layers of suitable adhesive which are used to secure a preformed tubular carton liner to the carton blank prior to the setting up of the carton.

In Fig. 2 a tubular carton liner 17 is shown overlying end wall panel 6 and side wall panel 7. The glue applied to cover tabs 12, cover flaps 13 and ridge flaps 14 secures the liner 17 in the position illustrated. It should be noted that the opposite extremities of the liner 17 lie substantially flush with the free margins of the ridge flaps 14, that is, within the marginal confines of such ridge flaps. In this manner the liner 17 is protected by the ridge flaps 14 against inadvertent tearing or other similar type deformation of the extremities of the liner 17 while the carton blank and the liner are in the flat condition illustrated in Figs. 2 and 4. It is important that the extremities of the liner be protected as much as possible against tearing in that the extremities of the liner should be in the best possible condition when the carton is sealed to insure proper closing of the carton to prevent leakage of the contents therefrom.

The liner itself may be made of any suitable flexible material and, in the illustrated embodiment, it is desirable that the liner is made from paper. As shown best in Fig. 9, the paper liner is generally designated 18. On the inner surface of the paper liner 18 is a thin coating of heat sealable and moisture resistant material, generally designated 19. The particular type of heat sealable material with which the paper liner 18 is coated may vary. However, in the illustrated embodiment it has been found that polyethylene is an advantageous material with which the liner may be coated. The liner coating material 19 which is used, however, should be non-tacky under normal conditions so that the liner may be handled and may be filled with the contents intended to be carried in the carton. However, the liner material must be responsive to heat so that the liner may be completely sealed upon heat being applied to opposite sides thereof. Upon the application of heat, the coating material on one side of the liner must adhere to the coating material on the opposite side of the liner and thereby effectively and rapidly seal the extremity of the carton thereby. As pointed out above, polyethylene is a desirable liner coating material.

The liner 17 is in preformed tubular form when secured to the carton blank in the manner illustrated in Fig. 2. In the illustrated embodiment, the flattened tubular liner 17 has been formed from a sheet of polyethylene coated paper which has been overlapped along the edges as indicated at 21, thereby forming a seam, and adhesively secured in such overlapped condition to form the tubular liner described. By forming the liner 17 in tubular form before the liner is secured to the carton blank, it is possible to position the seam 21 of liner 17 at a location intermediate the margins of side wall panel 7, as illustrated in Fig. 2. In this manner, the seam 21 is spaced from the corner of the set up carton thereby insuring proper sealing and minimizing the possibility of leakage of the carton.

While the liner 17 in the illustrated embodiment has been shown and described as consisting of a paper tube which has been internally coated with a heat sealable material, such as polyethylene, it should be understood that under certain conditions it may be desirable to use a tubular liner consisting entirely of heat sealable material, such as a preformed polyethylene tube.

After the polyethylene coated liner 17 has been adhesively secured over side wall panel 7 and end wall panel 6, with seam 21 spaced from the margins of side wall panel 7, end wall panel 8 is then folded over the top of

the liner 17 and adhesively secured thereto by means of the adhesive provided on cover tabs 16. Subsequently, side wall panel 4, carrying cover flaps 11 and securing flap 3 therewith, is folded over liner 17 and secured thereto by means of the adhesive areas provided on cover flaps 11.

Securing flap 3 additionally is provided with adhesive material and securing flap 3 is secured thereby to the outer face of side wall panel 8. Pull tab 2 contacts side wall 8 but is not secured thereto. By having pull tab 2 free the ultimate consumer of the contents of the carton is able to utilize pull tab 2 to strip the paperboard carton from the liner 17 and gain access to the contents of the carton.

Fig. 4 illustrates the carton blank and liner 17 after side wall panel 4 and end wall panel 8 have been folded into overlapping relationship relative to the liner 17. The carton of Fig. 4 is in collapsed condition ready to be set up for the filling of the contents intended therefor. Because liner 17 is intermittently adhesively secured to several internal portions of the carton, it is a simple matter to change the carton from the flat position shown in Fig. 4 to the partially set up condition of Fig. 5.

A person holding a collapsed carton of the type shown in Fig. 4 in his hand may readily transform such collapsed carton to the partially set up condition shown in Fig. 5 merely by exerting pressure on opposite edges of the flattened carton in the direction of the arrows shown in Fig. 4. Because the liner 17 is secured to inner surfaces of the carton the liner automatically moves with the carton to the partially set up open tubular condition shown in Fig. 5.

While the carton of the instant invention will be described as being set up by hand, it should be understood that such a carton is equally well adapted to be set up automatically in a suitable machine. The setting up, filling and sealing of the carton may be carried out manually or mechanically as may be desired.

After the carton has been transformed to the partially set up condition illustrated in Fig. 5, one extremity thereof is closed by depressing triangular cover tabs 12 and 16 on one extremity of the carton inwardly towards each other. By so doing liner 17 is folded inwardly along with the cover tabs 12 and 16. By applying continued downward pressure to the cover tabs 12 and 16 and, at the same time, by applying lateral pressure to the ridge flap 14 and to the outer surface of the liner 17 opposite ridge flap 14, it is possible to bring opposing wall portions of the tubular liner 17 into face to face upright contacting relationship.

In such face to face upright contacting relationship, a portion of the polyethylene coating applied to the inner surface of the tubular liner 17 is brought into intimate contact with the portion of the coating carried on the opposing wall portions of the liner 17. It is in such flattened upright condition of the liner extremity that heat is adapted to be applied to the liner in the manner illustrated in Fig. 8. As shown, a heating element, having two similar sections 22, is used to seal the liner. One element 22 is applied to the outer surface of the upright ridge flap 14. Because the instant carton possesses only one ridge flap, it is necessary that the other heating element be applied simultaneously directly to the outer surface of the carton liner 17 opposite ridge flap 14. By simultaneously applying heat and slight pressure in the direction of the arrows in Fig. 8 with heating elements 22 to the outer surface of ridge flap 14 and to the outer liner portion lying between elements 22, the polyethylene coating on opposing wall portions of the liner which are in face to face relationship adhere to each other thereby completely and effectively sealing the end of the carton. Such sealed condition of the carton with the liner extremity and ridge flap 14 in upright position is shown at the bottom of Fig. 6.

After one extremity of the carton has been sealed in the manner described, the product or contents of the carton may be filled therein and the opposite extremity

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then may be heat sealed in a manner similar to that described previously.

It should be noted that in such condition both extremities of the carton are effectively sealed and all leakage of the contents of the carton is precluded and the entrance of foreign matter into the carton is similarly precluded. It should be understood that, while this carton is well suited for packaging liquid type products, because of the complete seal obtained this carton also may be used to package minutely divided powdery materials without leakage or sifting thereof.

While the carton and the contents thereof could be shipped with the opposite extremities thereof extending upright or away from the body of the carton, as illustrated in the lower half of Fig. 6, such a carton is somewhat difficult to handle and pack due to the projecting sealed ends. In order to provide a more neat carton package, the upright sealed portions of the carton are subsequently folded over the top of cover flaps 11 as illustrated in Fig. 7. It should be noted that no part of liner 17 or ridge flap 14 extends laterally beyond the side walls of the carton when the sealed liner end and ridge flap 14 are secured in overlying relationship with cover flap 11. In this manner, a carton having substantially smooth flat extremities is produced which is neat and easy to handle and which easily may be packed and stored in quantity.

To secure the ridge flap 14 and the sealed extremity of the liner 17 in overlapping relationship with cover flap 11, a layer of appropriate adhesive 20 is applied to the outer surface of cover flap 11. Ridge flap 14 and the sealed extremity of liner 17 are then pressed down on cover flap 11, either mechanically or manually, and are thereby secured to cover flap 11. The substantially flat condition of the finished sealed carton is illustrated in Fig. 9 in which 14 is the ridge flap, 18 is the paper liner, 19 is the polyethylene coating applied to the inner surface of the liner 17 and 11 is the cover flap over which the ridge flap 14 and the sealed extremity of the liner 17 are secured. It should be noted that by forming only one ridge flap on each extremity of the carton, it is possible to heat seal the carton rapidly in that the heat must penetrate only one such ridge flap. Heat is applied directly to the carton liner 17 on one side, as shown in Fig. 8, and is quickly conducted therethrough to the polyethylene coating.

Fig. 10 illustrates a modification of the carton of this invention in which a second ridge flap 14 is secured to the margin of cover flap 11. In such modification, heat would be applied to outer surfaces of each of the ridge flaps 14 whereby heat is transmitted through both ridge flaps to the coating on the liner 17, thereby sealing the extremity of the liner. After sealing, the sealed liner extremity and the ridge flaps 14 on both sides thereof would be folded into overlying relationship relative to one of the cover flaps 11, as illustrated in Fig. 10. To secure the sealed extremity of the carton in such overlying relationship, a layer of suitable adhesive 20 is interposed between one of the ridge flaps 14 and the cover flap 11 to which it is hingedly connected. In such a modification, it will take slightly longer to seal the liner because heat must penetrate both ridge flaps 14 before it reaches the polyethylene coating on the liner.

It should be understood, however, that while it normally is desirable to adhesively secure the sealed extremity of the carton in overlying relationship relative to cover flap 11, under certain situations it may be desirable to provide a tab on the ridge flap and a slot in the carton side wall adapted to receive such tab. In such modification after the sealed extremity of the liner and the ridge flap have been folded to the overlapping position similar to that shown in Fig. 9, the tab formed on the outer margin of the ridge flap may be folded against the side wall and then may be locking engaged

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in the slot formed in the side wall, thereby securely holding the sealed extremity of the carton in overlying position relative to cover flap 11. However, because such a modified construction requires part of the carton to project beyond the carton side wall, it is less neat, and therefore somewhat less desirable than the illustrated embodiments.

Another embodiment of the carton is illustrated in Fig. 11. In such embodiment, the pull tab 2 is omitted and the securing flap 3 is adhesively secured to the inner face of end wall 8. In this manner there are no projecting tabs which may inadvertently be caught during handling of the carton which might result in accidental opening of the carton and spillage of the contents. In the absence of a pull tab, the carton illustrated in Fig. 11 may be opened readily merely by inserting a fingernail or appropriate tool under the carton liner which has been adhesively secured in the position overlying cover flap 11 as illustrated in Fig. 9.

Pull tab 2, however, is desirable in that it affords an easily and readily available means by which the carton may be opened. To facilitate opening of a carton incorporating pull tab 2 end wall panel 8 has been partially cut or weakened in its outer face along the line 9, as illustrated in Fig. 1. When the tab 2 is pulled, part of the end wall 8 separates from the remainder of the wall rather than the adhesive between flap 3 and side wall 8 giving way. In this manner, the carton may be stripped from the liner thereby making the contents of the carton readily accessible to the ultimate consumer.

Having made a full and complete disclosure of our invention, we claim:

1. A carton comprising a blank having a plurality of side wall panels and a plurality of end wall panels hingedly connected together in alternate side by side relationship, triangularly shaped like top and bottom tabs hingedly connected only to each of the end wall panels, like top and bottom cover flaps hingedly connected only to each of the side wall panels, at least one of said cover flaps having a portion extending beyond the adjacent cover flap, a preformed tubular flexible carton liner having both end portions thereof open and substantially unobstructed, said liner when flattened being of a width substantially equal to the combined widths of a pair of adjacent end and side wall panels and of a length sufficient to extend over the wall panels and the tabs and the cover flaps connected thereto and terminate within the marginal confines of the portion of the one cover flap, adhesive means securing a part of the outer surface of said liner to the inner surface of said tabs and said cover flaps, and heat sealable material on at least the inner surface of said liner, said heat sealable material being effective to both seal the open end portions of said liner and position the cover flaps over the adjacent tabs to close the blank and define the carton.

2. The carton as set forth in claim 1 wherein said portion of the one cover flap is hingedly connected thereto and defines a ridge flap that overlies the adjacent cover flap when the blank is closed to define the carton.

3. A carton comprising a blank having a plurality of side wall panels and a plurality of end wall panels hingedly connected together in alternate side by side relationship, triangularly shaped like top and bottom tabs hingedly connected to each of the end wall panels, rectangularly shaped like top and bottom cover flaps hingedly connected to each of the side wall panels, a rectangularly shaped ridge flap hingedly secured to at least one of said cover flaps, a preformed tubular flexible carton liner having both end portions thereof open and substantially unobstructed, said liner when flattened being of a width substantially equal to the combined widths of a pair of adjacent end and side wall panels and of a length sufficient to extend over the wall panels and the tabs and the cover flaps connected thereto with the adjacent open

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end portion thereof terminating within the confines of the ridge flap, adhesive means securing a part of the outer surface of said liner to the inner surface of said tabs and said cover flaps, and heat sealable material on at least the inner surface of said liner, said heat sealable material being effective to both seal the open end portions of said liner and position the cover flaps over the adjacent tabs to close the blank and define the carton.

4. A carton blank comprising a pair of side wall panels and a pair of end wall panels hingedly connected in alternate side by side relation, securing means adapted to join the outer one of said end wall panels to the outer one of said side wall panels, an end tab having converging side edges hingedly connected to an end of each of said end wall panels, a cover flap hingedly connected to an end of each of said side wall panels, one of said cover flaps having a portion extending beyond the other cover flaps, a preformed open-ended tubular flexible carton liner disposed in flattened condition on said end and said side wall panels, said liner when flattened being of a width substantially equal to the combined widths of one pair of said end and said side wall panels and of a length sufficient to extend substantially over said wall panels

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and the end tabs and the cover flaps connected respectively thereto with the open end thereof terminating within the marginal confines of the portion of the one cover flap, adhesive means adapted to secure the outer surface of said liner to the inner surface of said end tabs and said cover flaps, and the inner surface of said liner being of heat sealable material effective to both seal the open end of said liner and position said cover flaps over the adjacent end tabs to close the carton blank.

5. The carton blank as set forth in claim 4 wherein said portion is hingedly connected to said one cover flap and overlies the other cover flap when the carton blank is closed.

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