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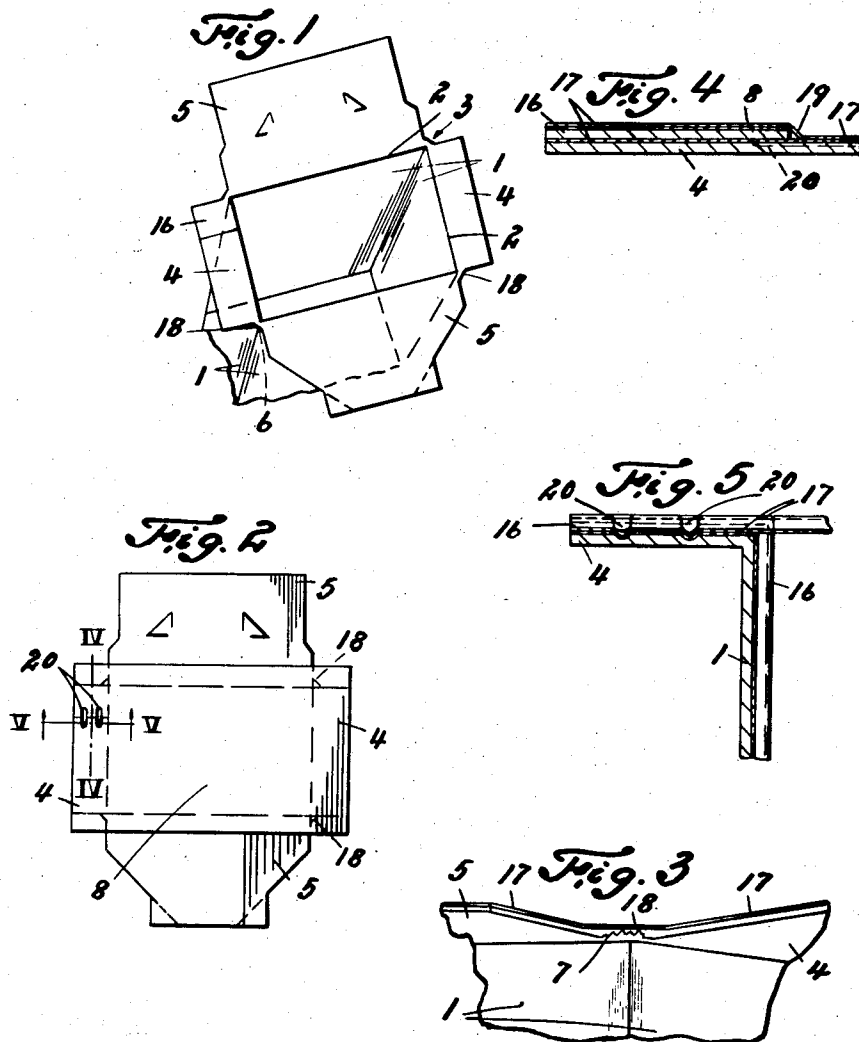
B. BENZON-PETERSEN

2,886,231

CARTONS

Filed March 18, 1957

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 6.

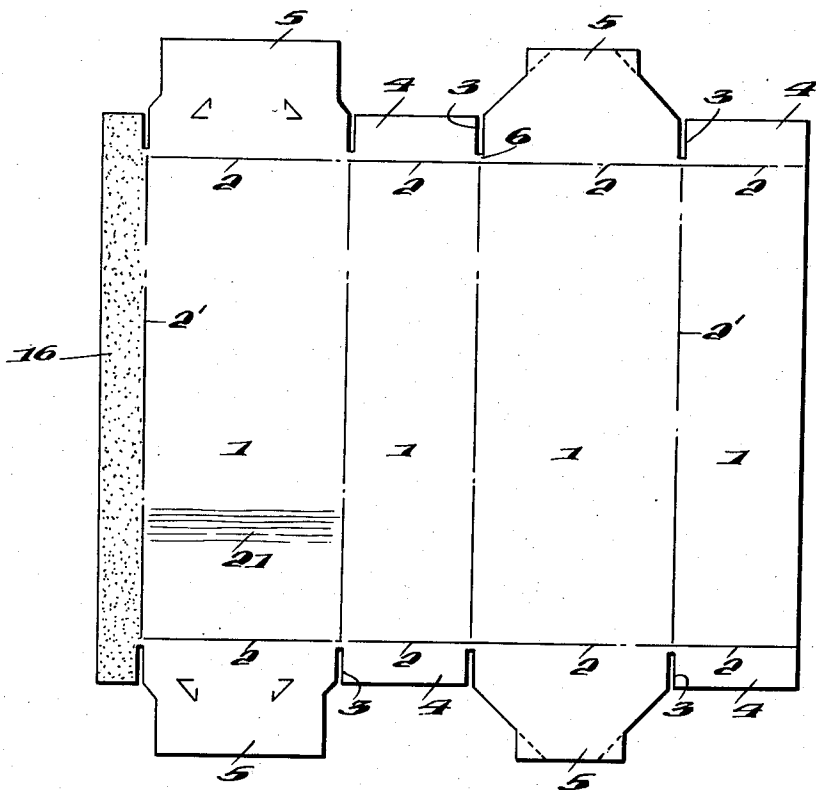
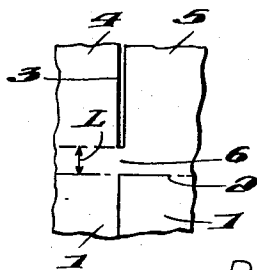


Fig. 7.



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2,886,231

CARTONS

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2 Claims. (Cl. 229—14)

This invention relates to an air and powder-tight as well as moisture-proof paperboard carton for pulverulent and like material.

The improved carton according to the present invention is basically similar to that described in my co-pending United States patent application, Serial No. 384,160 filed October 5, 1953 and which now has matured into Letters Patent No. 2,795,364 granted June 11, 1957. The blank from which the carton is made, as described in said application, is constituted by a plurality of side walls, a glue flap and end closure flaps attached to opposite ends of each side wall, there being the usual score or crease lines on the blank at the junctions of the side walls and also at the junctions of the side walls and end flaps to indicate where the folds are to be made upon erecting the carton from the blank. The end closure flaps of adjacent side walls are separated from each other by cuts which terminate a short distance from the crease lines. During erection of the carton from the blank, the end closure flaps are turned outwardly, for example, simultaneously, i.e. these flaps are bent outward along their respective crease lines at right angles to the side walls, the effect of which is to cause the carton material to tear along a line constituting an extension of the inner ends of the cuts between adjacent end flaps down to the crease line. The tearing action in effect refibrates the fibrous material from which the paperboard is made thus forming fibrous tufts or pillows at the corners of the erected carton. When next a sheet of flexible material is sealed across the ends of the carton while the end flaps are outwardly turned, in overlapping relation to the marginal portions of all end flaps, the tufts provide an improved seal at the corners with the sealing sheet thus preventing any possibility of leakage at such corners. The problem of adequate corner seals for cartons erected from blanks has been an extremely vexing one where the material to be placed in the carton is a fine powder and adoption of the principles as disclosed in my aforesaid application has made it possible to provide a carton which is virtually sift proof for finely powdered materials.

Subsequent to the filing of the first patent applications such as my aforesaid United States application, further research and experimentation have resulted in various improvements. Thus, as disclosed in my later filed United States application Serial No. 514,665 filed June 10, 1955, concerning which the present application is a continuation-in-part, it was found advantageous to apply a moisture proof, stretchable coating to that surface of the blank which, when the carton is erected, constitutes the inner surfaces of the carton. The coating being moisture-proof has the obvious advantage of preventing penetration of moisture to the contents within the carton and hence permits the carton to be filled with moisture containing materials such as frozen fruits and vegetables. What is also important, however, is the fact that when the end closure flaps are folded outwardly to tear the uncut portions between adjacent flaps and thereby establish the corner fibrous tufts, the corresponding areas of

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the coating on the carton material will be stretched, thinned and turned outwards to establish an imperforate bridge over each corner tuft thanks to the elastic properties of the coating material and to its being anchored to the fibrous tufts at the carton corners. The tufts constitute a reinforcement and effective support for the corner bridging portions of the coating when the sheets of flexible material which are provided with a similar coating are sealed to the coating on the end closure flaps in overlapping relation thereto by means of heat and pressure, the heat serving to at least partially melt the pressed-together portions of the coating on the flexible sheet material and carton coating material and cause such coatings to unite. Even in situations where a moisture-proof carton characteristic is not essential, the use of a coated carton blank is nevertheless advantageous. When an uncoated carton material such as disclosed in my prior application Serial No. 384,160 is used, the flexible sheet must be glued to the over-lapped portions of the end closure flaps by means of some adhesive. When a coated carton blank is utilized, the flexible sheet is also provided with a compatible coating having similar properties and the two coatings melt upon the application of heat and thus unite thus eliminating the necessity for using gluing agents.

Also as disclosed in my later filed application Serial No. 514,665, it had proved most difficult, upon securing the flexible sheet to the closure flaps at both ends of the carton, to make the carton completely powder-tight and moisture proof since a small channel will, in most cases, arise along the longitudinal edge of the glue flap which is used for gluing the blank into the shape of a box-like carton and which extends along one side wall of the carton up to and across the closure flaps at both ends of the carton. To overcome this difficulty at least one, and preferably two, indentations are made across the channel subsequent to application of the flexible sealing sheets to each end of the carton, whereby the sealing sheet portion extending over the angle formed between the edge of the glue flap and the end closure flap will be pressed into the body of said glue flap and partially into the underlying body of the closure flap thereby providing an effective seal across and blocking the channel.

Further experimentation and development have now indicated that while paperboard in general will lead to the establishment of the essential corner tufts when the board is torn by turning the end closure flaps outwardly, paperboard made from pulp obtained from coniferous trees of the soft wood species, such as pine, fir and hemlock give superior results. Trees of the foregoing species provide a pulp in which the fibers are relatively long, of the order of 2 to 4 millimeters in length, in contradistinction to pulp formed from deciduous trees in which the fibers are relatively short, being approximately from 1 to 1½ millimeters in length. It has been found that the longer fibers provide a better matting effect when the uncut corner portions of the carton are torn, and thereby enhance sealing when the flexible sealing sheet is sealed to the tufts and to those portions of the end flaps which said sheet overlaps.

It has also been discovered that when the grain of the paperboard is arranged to run transversely with respect to the crease lines hingedly connecting the side walls of the carton together, rather than parallel to such lines, superior results are also obtained. With the grain of the paperboard running in such transverse direction, the fiber lengths are correspondingly oriented in a transverse direction so that when the uncut corner portions of the carton are torn, the fibers will interlace much like the fingers of two hands can be interlaced, thus to form a tuft arrangement which actually bridges the corner when

turn. This provides essentially a web effect at the corner further enhancing the subsequent seal.

It has further been discovered that the length of the uncut portions of the paperboard carton blanks (from the inner ends of the cuts between adjacent end closure flaps to the crease lines between side walls and end closure flaps) in relation to the thickness (caliper) of the paperboard is also important in obtaining superior results. If the length of the uncut portion at each corner is designated "L" and the thickness of the paperboard is designated "T," it has been found that the length "L" should be of the order of from $1\frac{3}{4}$ to 2 times "T," and may be as high as 3 times "T," but for best results when adjacent end closure flaps are turned outwardly in alternation, the value of "L" should not exceed $2\frac{1}{2}$ "T" in order to assure tufts of adequate height and a tearing of the paperboard material along a straight line constituting a longitudinal extension of the cut between adjacent end closure flaps. If, in erecting the cartons from the blanks, the adjacent end closure flaps are turned outwardly simultaneously, then the length "L" may be made still longer, namely, as high as $4\frac{1}{2}$ "T," but for safety reasons to insure proper tearing of the uncut portions, the length "L" should preferably be not much more than $3\frac{1}{2}$ "T."

The foregoing features and advantages of the invention will be described in the following, reference being had to the accompanying drawing illustrating a preferred embodiment of the invention. In the drawing:

Fig. 1 is a perspective view of the carton with outwardly bent flaps;

Fig. 2 is an end view of the carton with outwardly bent flaps and a flexible imperforate sheet sealed to said flaps;

Fig. 3 is a view of a corner portion of the carton on a larger scale;

Fig. 4 is a section on line IV—IV in Fig. 2;

Fig. 5 is a section on line V—V in Fig. 2;

Fig. 6 is a view of the blank from which the carton is erected; and

Fig. 7 is an enlarged fragmentary portion of the blank at one of the corner portions subsequently to be torn as the end closure flaps are turned outwardly.

With reference now to the drawings, the four side panels of the punched and creased paperboard carton blank are thus designated 1, while the closure flaps provided at the end edges of the carton sides formed by adjacently located side panels are designated 4 and 5, respectively, said closure flaps being separated by crease lines 2 from the respective side of the carton and divided from each other by cuts 3. The longitudinal crease lines defining the longitudinal edges of adjoining side panels 1 are designated 2'. The glue flap 16 forms the longitudinal joint of the carton when the two opposed longitudinal edges of the blank are glued together so that a box is obtained when the blank is erected from its coplanar, glued-together condition to form a finished carton. The material remaining at the carton corners due to the cuts 3 not being made altogether up to the crease lines 2 for bending the flaps 4 and 5, is designated 6, and the fibre tuft formed at the inner portion of the respective cuts when the flaps 4 and 5 are bent and the cuts 3 longitudinally extended so that the material left is torn down to the crease lines 2, is designated 7.

Preferably the paperboard from which the carton blank is stamped is made from pulp of coniferous trees of the soft wood species such as pine, fir and hemlock. These trees provide pulp in which the fibers are relatively long, of the order of 2 to 4 millimeters in length, in contradistinction to pulp formed from deciduous trees in which the fibers are relatively short, being approximately from 1 to $1\frac{1}{2}$ millimeters in length. The longer fibers provide a better matting effect when the uncut corner portions of the erected carton are torn by outward turning of the end closure flaps to establish the tufts and

thereby enhance the sealing when the flexible sheet is applied over the carton end and sealed to the tufts.

As indicated in Fig. 6, the grain of the paperboard shown by the lines 21 preferably extends longitudinally with respect to the crease lines 2 for the end closure flaps 4 and 5. With the paperboard grain running in such transverse direction, the fiber lengths are correspondingly oriented in the same transverse direction so that when the uncut corner portions are torn down along an extension of the cut 3 the fibers will interlace to form a tuft which actually bridges the corner of the carton. This provides a sort of web effect at the corner further enhancing the subsequent seal.

As previously indicated, the length of the uncut corner portions with respect to the thickness (caliper) of the paperboard has also been found to be of importance in obtaining optimum results. Such length is indicated by the letter "L" in Fig. 7, between the inner ends of the cuts 3 and the crease lines 2. If the adjacent end closure flaps 4, 5 are turned outwardly in sequence, it has been found that good results are obtained when the length "L" is of the order of $1\frac{3}{4}$ to 2 times the paperboard thickness "T." The length "L" may be as great as $3\frac{1}{2}$ "T" but for best results it is preferred that "L" not exceed $2\frac{1}{2}$ "T." If the end closure flaps are turned outwardly simultaneously, then the length "L" may be made as great as $4\frac{1}{2}$ "T" but for safety reasons to always assure the proper directional tearing of the uncut portions along a longitudinal extension of the cuts 3, the length "L" should preferably be not greater than $3\frac{1}{2}$ "T."

Before the blank is punched out from the carton sheet or web, said sheet or web has been provided with a coating 17 of plastic, wax, rubber or the like composition of such properties as to permit at least a certain stretching and thereby thinning without causing the cohesion of the coating to break. Polyethylene is particularly well suited as a coating material. However, other materials which have similar characteristics of being stretchable, moisture proof and heat-sealable may be used in lieu of polyethylene, examples of such materials being Pliofilm, saran and cellophane with a sufficient amount of plasticizer to make it stretchable. The material to form said coating can be sprayed or cast onto the carton sheet or web, or be glued to the carton material in the form of a prefabricated film. When the flaps 4 and 5 are turned outwardly, the film formed by said coating on the material remaining at the inner portions of the cuts will be subjected to a stretching and thinning without breaking, however, so that outwardly facing corner bridges 18 are formed which are securely anchored to the respective corners by the fibre tufts 7 arising when the carton material left at said corners is torn by outward bending of the end closure flaps. The flexible sealing sheet 8 which has a coating identical to that of the carton material is then applied onto the open end of the carton, overlapping the marginal portion of all end flaps 4, 5 as shown in Fig. 2, and is exposed to heat at a temperature suitable for melting said coating, and at the same time the flaps and the sealing sheet are subjected to pressure. Apparatus for erecting the carton from the blank, turning the end-flaps outwardly, applying the sealing sheet and subjecting the latter to heat and pressure is described and shown in my co-pending application Serial No. 508,224 filed May 13, 1955. At said heating and pressing operation, the portions of the films on the closure flaps 4, 5 and sealing sheet 8, which lie in pressure engagement with one another will melt, as will also the bridging corner pieces 18 of the coating on the carton material so that they are effectively interconnected with the corresponding coating portions on the sealing sheet 8, whereby an efficient air and powder-tight sealing of the carton corners is obtained. When the corner pieces 18 are exposed to the pressure uniting the coatings on the carton material and the sealing sheet, the fibres which are intimately connected with said corner

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pieces 18 will serve effectively to hold up said pieces against the press members of the sealing machine used. Finally, the closure flaps are bent in over the end of the carton which has been closed by means of the sealing sheet, and are interlocked with each other, whereupon the carton is ready and the article enclosed therein can be stored for an unlimited time without damage thereto and be handled without leakage of its contents.

On one of the outwardly bent closure flaps Fig. 1 shows the joint which is formed when two adjacent side walls 1 of the carton are connected together by means of the glue flap 16 to form a box. As will appear from Fig. 4, a channel 19 will remain open under the sealing sheet 8 in the angle between the flap 4 and the glue flap 16 connected therewith. To seal said channel 19, at least one, and preferably two (or more), indentations 20 are made across the channel 19 in the carton material forming the flap 4 and the glue flap 16 when the sealing sheet portion extending over the angle between the flap 4 and the glue flap 16 is pressed into the material of the glue flap 16 and partially even into the material of the flap 4, thereby providing an effective seal of the channel 19.

The carton described above and shown in the drawing has also proved very efficient for frozen foods which in more or less liquid form can be introduced and enclosed in the carton, whereupon the carton is conveyed to the freezing plant. The seal of the carton will be quite as effective in this case as in the cases mentioned above, and the corners of the carton are so effectively sealed that a leakage in these portions of the carton which have hitherto been so sensitive, will not arise.

In conclusion, it will be understood that various minor changes can be made in the foregoing described construction and arrangement of components without, however, departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A paperboard carton comprising a plurality of side walls forming a hollow body portion of the carton, an end closure flap hingedly connected to each side wall along a crease line, said side walls forming the interior of the carton, a longitudinally extending glue flap hingedly connected to one of said side walls and extending for the full length thereof and for substantially the full lengths of the end closure flaps connected thereto so as to overlap corresponding portions of the side wall and end flaps to which said glue flap is glued, each of said end closure flaps being substantially coextensive in width with the width of the corresponding side wall of the carton at said crease line, said crease lines lying in substantially the same plane and with the adjacent ends of all adjacent crease lines adjacent the corner junctions of the carton walls, the adjacent edges of adjacent end closure flaps at each of said corner junctions being torn edges located directly adjacent such corner

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junction and providing a tuft of free fibrous strands directly at each of said corner junctions, a sealing sheet covering the hollow body portion of the carton and overlapping all corner junctions and all end closure flaps, said sheet lying in the plane of said crease lines and being sealed to said end closure flaps and glue flap whereby said carton is sealed against seepage at all of said corner junctions, and at least one elongated indentation extending transversely across the line established by the edge of that portion of the glue flap which overlaps the end closure flaps whereby said carton is also sealed against seepage beneath said sealing sheet along the edge of said glue flap, all of said end closure flaps being secured in infolded relationship over an end of said hollow body portion.

2. A paperboard carton comprising a plurality of side walls forming a hollow body portion of the carton, an end closure flap hingedly connected to each side wall along a crease line, said side walls forming the interior of the carton and the corresponding surfaces of said end closure flaps having thereon a moisture-proof stretchable heat sealable coating, each of said flaps being substantially coextensive in width with the width of the corresponding side wall of the carton at said crease line, such crease lines lying in substantially the same plane and with the adjacent ends of all adjacent crease lines adjacent the corner junctions of the carton walls, the adjacent edges of adjacent flaps at each of said corner junctions being torn edges located directly adjacent such corner junction and providing a tuft of free fibrous strands directly at each of said corner junctions, and said coating being stretched across said corner junctions and tufts, a heat sealable sealing sheet covering the hollow body portion of the carton and overlapping all corner junctions and all flaps, said sheet lying in the plane of said crease lines and being sealed to the coating on said flaps and to the stretched portions of said coating at said corner junctions, said stretched portions being sealed to said tufts whereby said carton is sealed against seepage at all of said corner junctions, all of said flaps being secured in infolded relationship over an end of said hollow body portion.

References Cited in the file of this patent

UNITED STATES PATENTS

45	1,279,589	Robson	Sept. 24, 1918
	2,107,096	Wesselman	Feb. 1, 1938
	2,485,235	Graf	Oct. 18, 1949
	2,501,852	Ringler	Mar. 28, 1950
	2,536,990	Williamson	Jan. 2, 1951
50	2,569,851	Farrell	Oct. 2, 1951
	2,761,611	Benschoter	Sept. 4, 1956
	2,795,364	Benzon-Petersen	June 11, 1957

FOREIGN PATENTS

55	159,541	Australia	Dec. 10, 1953
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