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CARTON BLANK

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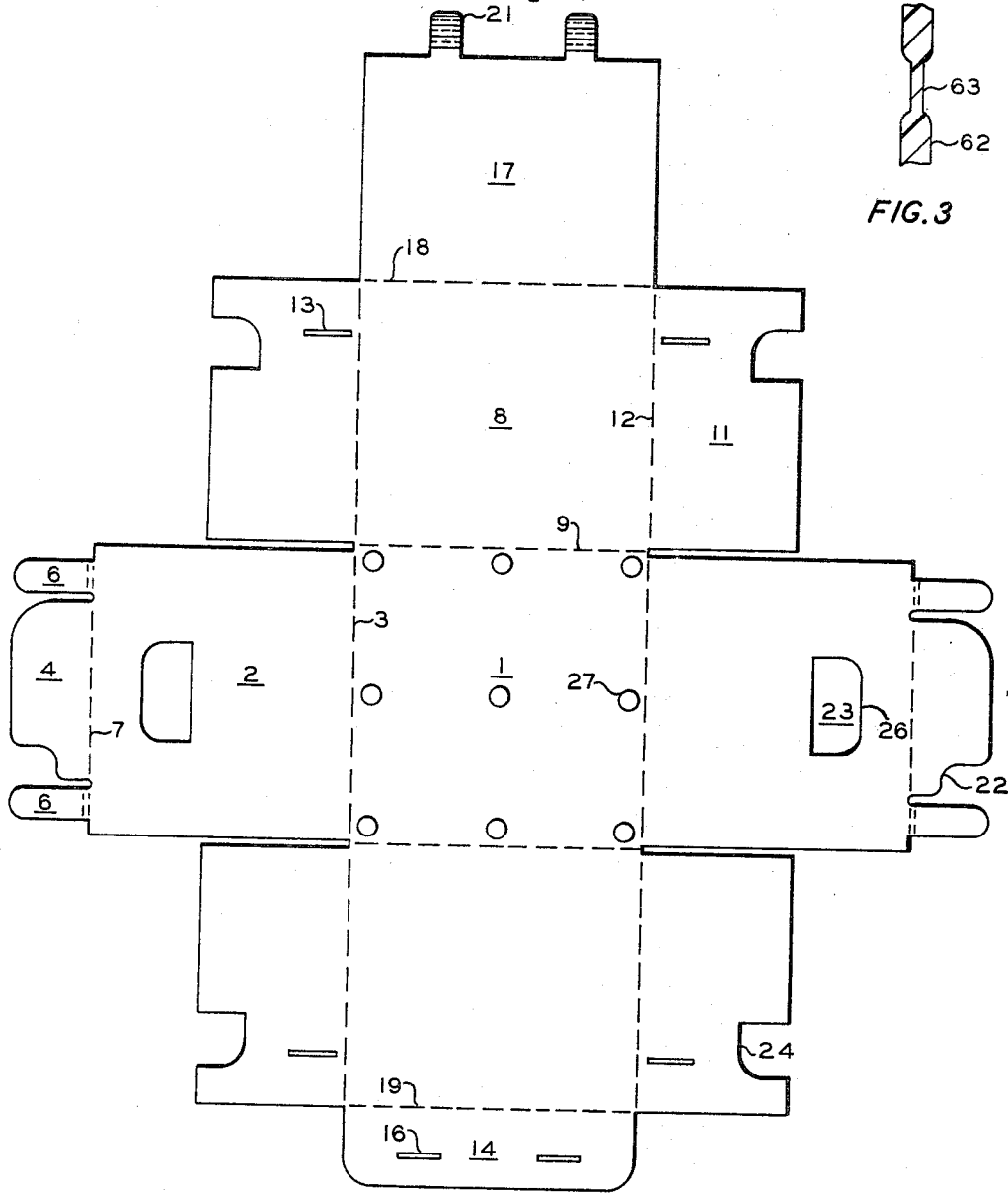


FIG. 1

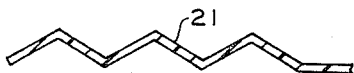


FIG. 2

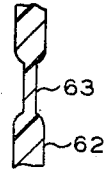


FIG. 3

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CARTON BLANK

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4 Claims. (Cl. 229-36)

ABSTRACT OF THE DISCLOSURE

A blank formed from a single sheet of material foldable into a self-supporting box to receive a plurality of articles is assembled without the use of external fasteners. The box comprises a bottom panel, exterior end panels, side panels, interior end panels, and interior top panel and flaps cooperating to provide a single thickness of material overlying the articles in the box, and an exterior top panel.

This invention relates to a blank suitable for folding into a box-like container. In one aspect, it relates to a blank of one-piece construction suitable for forming a carton. In another aspect, it relates to a blank which can be folded and interlocked to form a carton without the use of staples, glue, or other fastenings. In another aspect, it relates to a blank which can be folded to form a carton, used for carrying articles, and knocked down to a flat blank again a great plurality of times without damage to the blank. In still another aspect, it relates to a carton formed from a single blank of thermoplastic material. In still another aspect, it relates to a knocked-down crate suitable for repeated use in transporting perishable goods. In yet another aspect, it relates to a carton specially designed for transporting gallon jars of soft drink syrups which stack evenly because exactly two layers of material overlie the top of each container.

Box-like containers are generally supplied to manufacturers and packagers as flat blanks which can be assembled at the point of use. Generally, this assembly requires the use of glue, staples, or other fastening devices, although blanks which interlock without fastening devices are also known. A blank which can be interlocked without the use of external fastening devices or tools has the obvious advantage of being capable of being assembled at any point in the field where tools or fastening devices may not be readily available. Furthermore, boxes which are held together by interlocking parts rather than external fasteners can generally be knocked down to a completely flat blank after use. This is a distinct advantage for reusable containers which are shipped to the user flat, assembled and packed by him, and shipped to the consignee of the goods who can remove the articles and return the carton to the supplier in a completely knocked-down, flat condition. When such reuse is contemplated, one-piece construction of the carton is extremely desirable.

It is therefore an object of this invention to provide a blank suitable for folding into a container without external fasteners. It is a further object of this invention to provide a reusable container which can be readily knocked down to a completely flat blank. It is a further object of this invention to provide a sturdy container suitable for a great number of reuses. It is a further object of this invention to provide a reusable carton for transporting gallon jugs of soft drink syrups.

Other aspects, objects and the several advantages of this invention are apparent to one skilled in the art from a

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study of this disclosure, drawings and the appended claims.

According to the invention, we provide a blank of a single piece of material, having integrally formed hinges, which folds and interlocks to form a carton by means of co-acting tabs and slots, and which requires no external fasteners. In a preferred embodiment, the carton is formed of synthetic thermoplastic material.

The novel features of our invention can be readily seen by reference to the appended drawings. FIGURE 1 is a plan view of the blank of our invention. FIGURE 2 is a cross-section view of the tabs provided on the blank. FIGURE 3 is a cross-section of an integral hinge formed when a thermoplastic material is used in the blank of our invention.

Referring now to FIGURE 1, the blank of our invention has a bottom panel 1. Exterior end panels 2 are attached to bottom panel 1 along longitudinal fold lines 3. Top flap 4 and tabs 6 are attached to the opposite edge of exterior end panel 2 along longitudinal fold line 7. Each exterior end panel 2 is provided with two tabs 6 at opposite sides of the end panel.

Side panels 8 are attached to bottom panel 1 along transverse fold lines 9. Interior end panels 11 are attached to each edge of side panel 8 along longitudinal fold lines 12. Each interior end panel is provided with transversely disposed slot 13 which will co-act with tab 6 when the carton is assembled.

Attached to one side panel 8 along transverse fold line 19 is an interior top panel 14 which is provided with one or more transversely disposed slots 16. These slots are for the purpose of receiving tabs 21, as will be discussed below, and will serve to maintain the exterior top panel of the box in closed covering relationship to the box. While slots 16 are shown in this embodiment to be formed in interior top panel 14, it should be recognized that they could as well be formed in side panel 8 somewhat below the transverse line 19, or could be formed equally as well along transverse fold line 19. The opposite side panel 8 is provided with exterior top panel 17 along transverse fold line 18. Exterior top panel 17 is provided with one or more tabs 21 which will co-act with slots 16 when the carton is assembled to lock the top in position.

The embodiment shown in FIGURE 1 is a blank designed to contain four one gallon narrow-mouth jugs of soft drink syrup. The particular configuration of the blank shown is so designed that exactly two layers of material will overlie the top of each jug. Thus, a plurality of assembled cartons containing the jugs can be stacked evenly. In order to accomplish this, interior top panel 14 has a width slightly greater than one-quarter width of bottom panel 1, so that it will just cover the tops of the two jugs which will be on the lower half of the bottom panel in the drawing. It will be noted that flap 4 has a cut-out area denoted on the drawing as 22, such that the material of flap 4 will overlie the jugs on the upper half of the bottom panel in the drawing but, because of cut-out 22, will not overlie the jugs on the lower half of the bottom panel when the carton is assembled. Therefore, upon assembly, the two jugs on the upper half in the drawing will be overlain only by flap 4 and exterior top panel 17.

The two jugs on the lower half of the bottom panel in the drawing will be overlain by only interior top panel 14 and exterior top panel 17. It is thus seen that each jug in the container is surmounted by two layers of plastic material, and the assembled cartons can thus be stacked evenly.

In order to aid in the interlocking of the carton parts,

tabs 6 and 21 are conveniently corrugated, as is shown in FIGURE 2. The corrugations make an angle approximately 45° with the horizontal. The size of the corrugations will depend upon the size of the container. In the case of a container designed to hold four gallons of syrup, it has been found that corrugations of approximately one-quarter (¼") inch distance between peak and valley are satisfactory.

Tabs 6 can alternately be provided with fold lines whereby the tab can be inserted through slot 13 and reverse folded upwardly inside the carton to provide interlocking.

Exterior end panels 2 are provided with hand holes 23. Interior end panels 11, which in this embodiment extend only half way across the assembled carton, are provided with half hand holes 24 which will come into registration with hand holes 23 when the carton is assembled. The material punched out of hand hole 23 can remain attached to the exterior end panel along fold line 26 at the top edge of the hand hole. In this case, the dependent material will be folded upwardly inside the carton to provide a smooth gripping surface at the upper edge of the hand hole.

If desired, the outer surfaces of bottom panel 1 and exterior top panel 17 can be roughened or knurled to minimize slippage when cartons are stacked on top of each other.

It is generally desirable to provide vent holes 27 in bottom panel 1. These holes will provide ventilation if perishable goods are stored or transported in the carton, and provide drain holes in the event water or syrup from a broken bottle gets into the carton.

The carton of our invention can be manufactured from any material which has sufficient rigidity to be formed into a self-supporting carton of the size desired. The carton can thus be of cardboard, coated cardboard, metal, or plastic. When the blank is formed of cardboard, metal, or other nonresilient material, the various transverse and longitudinal fold lines illustrated on the drawings will generally be formed by creasing the material as is known in the art.

In a preferred embodiment, the carton of our invention is made of a synthetic thermoplastic material. Because of their strength and toughness, cartons made of thermoplastic materials have been shown to be capable of making more than 100 round trips, whereas cardboard cartons are suitable for only about 10 trips. Furthermore, the thermoplastic cartons can be washed if they become soiled. They can be sterilized if desired. Furthermore, when perishable goods are shipped under refrigeration, cartons made of thermoplastic material will not be weakened because of the dampness inherent in the refrigeration process, as will cardboard cartons.

Any synthetic plastic material can be used to form the blank of our invention, provided it has sufficient flexibility to form a hinge structure, as will be discussed below, and has sufficient rigidity to provide a self-supporting box. Impact polystyrene, plasticized polyvinylchloride containing small amounts of filler, and polyolefins have been proven satisfactory. The preferred plastics are polymers and copolymers of ethylene, propylene and butene. The materials which are currently most preferred are polypropylene and high density polyethylene (0.95-0.96 density). The polymer can contain pigments, anti-oxidants, ultra-violet light stabilizers, destatisizing agents, and the like.

In one embodiment, a strong light-weight carton is made by forming the blank from a foamed plastic material. Foamed polyethylene or foamed polypropylene are satisfactory, as is foamed semi-flexible polyurethane. Laminates can also be used in the process of my invention, including a sandwich-type construction having solid skin and a foam core. A structural laminate having a thermoplastic core and metal skin layers, which is described in copending application Serial No. 574,081 filed

Aug. 22, 1966, are also useful in forming the carton of this invention.

The sheet stock for the blank is formed by any known means. In the case of thermoplastics, extrusion is ordinarily used, although calendering is also possible. The blank is normally die cut from sheet stock on either a flat or cylindrical die.

The thickness of the material will be dependent upon the size of the carton, and the weight which it is designed to carry. For cartons suitable for transporting four gallons of syrup, the blank can be cut from sheet material of one-sixteenth (1/16") inch thickness. If plastic containers are used for the syrup, no center divider is needed. When foamed sheet stock is used, the thickness of the material may have to be increased in order to gain additional strength.

When the blank is made of thermoplastic material, the various transverse and longitudinal fold lines which have been discussed in connection with the drawings will comprise integral cold formed hinge structure. These integral hinges are formed by cold rolling the thermoplastic along a line in order to thin out the material. As orientation of the material takes place in this thinning, and subsequent flexing, the hinge structure is quite strong. The hinges will generally be formed at the same time that the blank is die cut from sheet stock.

FIGURE 3 shows a cross-section of a hinge structure. As seen in this drawing, the walls of the carton 62 are thinned down at the hinge 63 to a thickness of approximately 25 percent of their original thickness. As a matter of hinge design, the width of the hinge is generally approximately equal to the thickness of the material.

As has been indicated, the cartons formed according to this invention have found utility for transporting gallon jugs of syrup. A carton suitable for holding four one-gallon jugs is 13×13×12½ inches.

Since the cartons can be readily cleaned, and are not adversely affected by dampness, are not readily soiled, and can be knocked down completely flat for return trips, they have proved quite economical in use. Cartons which have been most successful in this application have been made from a homopolymer of ethylene having a density of 0.960 and a melt index of 0.1, and sold under the trademark Marlex 6001.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawings and the appended claims to the invention, the essence of which is a one-piece blank suitable for folding into a carton and interlocking by means of tabs and slots to form a rigid container without use of external fasteners.

We claim:

1. A blank formed from a single sheet of material foldable into a self-supporting box to receive a plurality of articles, said box being assembled without use of external fasteners, comprising:

- (a) a bottom panel;
- (b) exterior end panels attached to each end of said bottom panel along longitudinal fold lines;
- (c) tabs attached to the edge of said exterior end panels opposite the edge which is attached to said bottom panel;
- (d) side panels attached to said bottom panel along transverse fold lines;
- (e) interior end panels attached to said side panels along longitudinal fold lines;
- (f) slots in said interior end panels to receive the tabs on said exterior end panels;
- (g) an interior top panel attached to one of said side panels along a transverse fold line, said interior top panel overlaying a portion of the articles in said box when said box is assembled;
- (h) flaps attached to said exterior end panels which cooperate with said interior top panel to provide a single thickness of material overlaying all of said articles;

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- (i) an exterior top panel attached to the other of said side panels along a transverse fold line; and
- (j) at least one tab on said exterior top panel for insertion into a slot provided so that said exterior top panel is maintained in covering relation to the assembled box.
2. The blank of claim 1 wherein said interior top panel extends at least one quarter of the way across the assembled box, and said flaps each extend at least one quarter of the way across said box.
3. The blank of claim 1 wherein said material is thermoplastic and said fold lines comprise integral hinges.
4. The blank of claim 3 wherein said thermoplastic is selected from polystyrene, polyvinylchloride, and polymers and copolymers of ethylene, propylene, and butene.

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