ABSTRACT OF THE DISCLOSURE

A carton side wall including a handhole cut to provide an arcuate linearly-extending upper edge spaced below the upper edge of said wall and intermediate the side edges of said wall and a closure flap integral and coplanar with said wall along the lower edge of said opening permitting the hand to position by the fingers of a carton lifting hand to enable said fingers to engage said arcuate edge for lifting the carton and its contents.

Background of invention

The provision of handholes in the end walls of cartons, in itself, is old, as is the provision of a closure flap integral with such end walls within such handholes for closing the latter, until the fingers of the hands of a person bend the closure flaps inwardly.

It has been the common practice for these closure flaps to be integral with each end wall along its upper edge, and to be bendable inwardly and upwardly into the carton along a horizontal line which may be along the folding crease for one of the top closure flaps for the carton, or may be spaced below said top closure flaps. The closure flaps for the handholes, being hinged along the upper edges of the handhole, terminate at their ends at the ends of the handholes, and as each handhole is bent, when the fingers enter the handhole, to a position substantially against the inside of the wall having the handhole, or at least at a right angle to the plane of the end wall, will not return to close the handhole, when released. Thus light will enter the carton through the handhole to effect deterioration of certain bottled goods, and the partially open handhole flap is unsightly as compared to a substantially unbroken planar wall.

Another and most serious objection to the conventional handhole structure is the tearing of the portion of the carton above each handhole. The present invention minimizes this tearing of the cartons by eliminating the potential spots or points, where the tears can start. In the conventional handhole structure, this tearing usually starts at the ends of the portion of the carton wall that integrates each handhole closure flap with the wall of the carton in which the handhole is formed. A potential tearing spot ordinarily occurs along the edge of a handhole where there is an angular break in a continuous line, or where the lifting edge terminates at a point or points where the wall provided with the handhole is under a tension in a direction tending to tear the material of the wall in a direction away from said point where the container is lifted by fingers engaging said lifting edge.

In the present structure, the linear contour of the lifting surface is engaged by the fingers of the hand disposed in the handhole, is such that a cross tension is produced in the material above the lifting surface. This tension stabilizes the wall in which the handhole is formed, against lateral tearing and distributes the force from the hand, or lifting member, to the walls, predominantly by tension rather than a shearing force concentrated adjacent to the lifting force.

Also, the present structure has a superior tear resistance when a loaded carton is pulled in a direction normal to vertical by a hand in the handhole, as distinguished from a lifting force.

Hereinafter, attempts to exclude the light at the handholes in a carton have utilized a non-load bearing liner against the inner surfaces of the end walls of a carton having deflectable tabs extending across handhole openings in the end walls of the cartons, materially adding to the expense of the carton, and without eliminating the potential tear points in the end walls, whereas in the present invention no such liner is required and the potential tear points are eliminated.

Other objects and advantages will appear in the description and drawings.

Summary

This invention broadly provides handhole structure in a cardboard carton having a pair of spaced, vertically disposed walls with a load supporting bottom wall, and which handhole structure is in said vertically disposed walls. Each of said vertically disposed walls is cut through along an upwardly arched generally horizontally extending line defining the upper arcutely extending edge of a handhole through which the fingers of a hand, other than the thumb, are adapted to be engaged for engagement with the upper sides of said fingers when such hand is in a lifting position for lifting said carton by said hand. Arcuate extensions of each of said arcuate cuts at the ends of the latter are provided in an unbroken continuation thereof in a general downward direction defining linearly concavely extending end edges of each handhole, which extensions in each vertical wall terminate at horizontally aligned spaced points, and said upper arcuate edge is spaced below said top, whereby the upper and end edges of said handhole will be free from potential tear points between said spaced points upon lifting said carton by said fingers when the latter are inserted into said handholes.

Description of drawings

In the drawings:

FIG. 1 is a perspective view of a carton showing the handhole in full line in one end thereof and in broken lines at the opposite end.

FIG. 2 is a fragmentary enlarged elevational view of the handhole and closure flap in one end wall of the carton.

FIG. 3 is a fragmentary enlarged cross-sectional view along line 3—3 of FIG. 4 showing the closure flap for the handhole pushed inwardly by the fingers of a hand, one of the fingers being shown in an alternative position.

FIG. 4 is an end elevational view of a carton with the ends of a pair of conventional 6-pack holders and bottles therein being shown in broken lines.

FIG. 5 is a greatly enlarged fragmentary elevational view taken along line 5—5 of FIG. 2, which line is coincidental with a portion of the cut forming the closure flap and handhole.

Detailed description of invention

The carton illustrated is of conventional double faced corrugated cardboard and has opposed end walls 1 (FIG. 1), and the usual side walls 2, intermediate wall 3 and a top wall 2 and bottom wall 3 (FIG. 4), the top wall and bottom wall each comprising conventional overlapping closure flaps.

Each end wall 1 is of the same structure, hence the description of one will suffice for both, it being understood, however, that the exact dimensions given are not necessarily to be considered restrictive of the invention, but have been found to be satisfactory and to accomplish the desired results.

A handhole, generally designated 4, is formed in each
end wall, centrally between the opposite lateral edges thereof adjacent to and spaced below the top wall 2. Handhole 4 is normally closed by a closure flap 5, the lower edge of which is along a straight horizontal line 6 that defines the juncture between end wall 1 and the flap 5. Said flap 5 is integral and coplanar with end wall 1 when in closed position. The remaining outline of handhole 4, and closure flap 5 is defined by an arcuate upwardly curved cut 7 (FIG. 2) that may be a section of a circle developed about a center spaced below said handhole on a medial vertical line disposed between the lateral edges of said end wall, and having approximately a two and a quarter inch radius. The ends of cut 7 will connect with the ends of line 6 at points respectively below the centers about which said cuts 8 are developed.

By the above structure, the edge of wall 1 defining the upper edge of each handhole will be relatively gently curved for engagement with the fingers 9 of a hand and the maximum horizontal length of the opening at cuts 8 will be three and one-half inches to readily receive several or all of the four fingers of the hand of a person. The maximum vertical depth of the handhole will be one and one-half inches with the end portions within cuts 8 of ample depth to receive the forefinger and little finger of a large hand.

The carton itself is adapted to contain bottles 10 (FIGS. 3, 4) having necks 11 of restricted diameter extending upwardly from the bodies of the bottles to points substantially in engagement with the top wall 2 when the necks 11 are supported on the bottom wall 3. The junctures 12 between the necks 11 of said bottles may be approximately at the level of the juncture between each handhole tab 5 and the end wall of the carton, but preferably slightly lower in the form shown in FIGS. 4, 5.

As best seen in FIG. 4 the carton that is illustrated is adapted to hold a pair of conventional 6-pack bottle carriers, generally designated 13 in side-by-side relation extending longitudinally of the carton, with the pairs of end bottles of the two rows in each carrier adjacent each end wall 1.

Each such carrier is of cardboard, compartmented to provide a space for each bottle and extending across the sides of the main bodies of the bottles to a point approximately at the level of the junctures 12 between the necks of the bottles and their main bodies.

Irrespective of the specific type of carrier employed, they are relatively flexible and relatively thin and may wrap around the bottles, leaving the necks and end bottles exposed or enclosing the bodies. In any event, neither the bottles nor the carriers present any obstacle to the inward bending of the handhole tabs 5 under force applied by the fingers to the degree required for lifting the carriers by the fingers. In fact, the carriers being flexible and resilient, in springing the handhole tabs back to hole-closing position when the fingers are withdrawn, the upper portion of the carrier adjacent to the tab 5 may be sprung inwardly (FIG. 3).

Where the tabs 5 to be hinged connected to the end walls along the upper edges, in the conventional manner, the insertion of the fingers 9 to a degree necessary to obtain a firm lifting engagement with the carton, would be obstructed by the bottles unless the handholes were at the uppermost edge of the end walls, in which position the likelihood of tearing is greatest and the finger grip insecure. Furthermore, were the line of bend of the handhole closure flaps at the upper edge of the handhole, it must be bent to through at least 90 degrees for entry of the fingers into a carton-lifting position, and it will remain open after the fingers are removed, leaving an ugly gaping hole to which the eye is drawn.

Line 6 is preferably a crease line in that the inner face of the corrugated board is creased to insure bending of tab 5 along said line, but it is only necessary to spring the tab 5 into the carton the thickness of a finger 9 to insure an adequate engagement with the fingers of the hand for lifting the filled carton, or the outer or third joint may be curved upward as in the dot-dash line position 14 in FIG. 3, without springing the flap 5 a greater degree than approximately 20 degrees relative to vertical.

In many beverages it is desirable to exclude rays of outside light, such as sunlight or carton containing beverage during storage, which is automatically accomplished in the present instance due to the structure as described. The flap 5 readily returns to a position substantially coplanar with end wall 1 when released, and also the handhole is automatically closed so no un-slightly hole is seen.

One of the most important features of the present invention is freedom of the handhole from tearing of the carton when the filled carton is lifted. Nowhere along the arcately curved edges 7, 8, or at the terminal ends of edges 8 at the ends of line 6, is there a potential tear point. In careful high humidity laboratory tests, the tabs in conventional handhole structure where the tabs were hingedly connected along the upper edges of the handholes, tore after two handling cycles, whereas the handhole structure as hereinabove described in detail showed no signs of tearing along its edges after thirty handling cycles.

As clearly seen in FIG. 3 the fleshy sides of the fingers may engage the upper edge of the handhole opening, and to prevent the possibility of the paper cutting the fingers, a serrate-type rule is employed in making the cut, where-by the outer facing or layer of paper 15 (FIG. 5) is serrated, while the inner layer 16 that is adjacent the inside of the carton is straight.

Another important result from the present invention is the substantially higher resistance to tearing of the wall formed to provide the handhole, than in conventional structure, when a filled case or carton is pulled laterally from a stack or truck, by the hand of a delivery man in the handhole.

As hereinabove mentioned, it is not intended that the invention should necessarily be restricted to the precise details described, inasmuch as the dimension, and other features may vary. As already pointed out, the general principle to be observed is the lifting edge on or in a wall of a container, which edge is adapted to be engaged by the fingers of a lifting hand and is continuously curved linearly thereof, including downwardly extending end portions, to thereby distribute the lifting stresses over the entire lifting edge to the wall of the container by tension rather than a shearing force that is concentrated adjacent to the lifting force. The linear curve of the lifting and end edges of the handhole is not necessarily regular.

Accordingly, the invention is only limited by the appended claims.

1. In a cardboard carton having a pair of spaced, opposed, vertically disposed outer walls connected with a horizontally disposed load supporting bottom;

(a) each of said outer walls being cut through along an upwardly arched, generally horizontally-extending line adjacent to, but spaced below, the upper edge of each of said pair of outer walls, defining the upper arcutely extending edge of a handhole through which the fingers of a hand are adapted to be inserted for engagement of the upper sides of said fingers with said upper arcutely extending edge when said hand is in a carton-lifting position;

(b) each of said cuts having downwardly extending cuts at the ends thereof in unbroken arcuate continu-
tion thereof providing opposite end edges for said handhole in downward extension of said upper arcuately extending edge,
(c) said end edges terminating at their lower ends at horizontally spaced, aligned points, whereby said upper and end edges of each handhole will be free from potential tear points between said spaced points upon lifting said carton by said fingers when the latter are inserted into each handhole and are in said carton-lifting position.

2. In a carton as defined in claim 1;
(d) a closure flap integral and coplanar with each of said pair of outer walls closing said respective handholes and adapted to be sprung inwardly into said carton by said fingers, along a horizontal line extending between said horizontal points in each outer wall when said fingers are inserted into each handhole.

3. In a cardboard carton as defined in claim 1;
(d) said downwardly extending cuts at the ends of each upwardly arched cut being oppositely outwardly arched for receiving the end fingers inserted into each handhole, and the curve of the upwardly arched cut being relatively flat compared to the curve of each downwardly extending cut, and the curve of each downwardly extending cut being a segment of a circle that is tangential to the upwardly arched cut at each end of the latter.

4. In a cardboard carton as defined in claim 1;
(d) said pair of vertical walls, being of corrugated cardboard having inner and outer flat paper layers relative to the inside of said carton with a corrugated paper sheet between them, said upwardly arched cut extending through all of said layers and being serrated along said outer layer to prevent cutting the upper surfaces of said fingers of a hand when in said carton-lifting position.

5. In a cardboard carton as defined in claim 1;
(e) the curve of said upwardly arched cut and the curve of each of said downwardly extending cuts, being developed about different radii, with the curves of said downwardly extending cuts being developed about substantially shorter radii than the radius of said upwardly arched cut and tangential to the curve of said upwardly arched cut,
(f) said carton being of corrugated cardboard having inner and outer flat paper layers relative to the inside of said carton with a corrugated paper layer between them,
(g) said upwardly arched cut being serrated in said outer layer to prevent cutting said upper surfaces of said fingers when the latter are in carton-lifting position.

6. In a container having a pair of opposed, generally vertically disposed outer walls each provided with a downwardly facing generally horizontally-extending lifting edge;
(a) said lifting edge on each of said walls being continuously curved linearly thereof to provide a concavely downwardly facing surface adapted to be engaged by each of the fingers of a lifting hand,
(b) said edge being free from angular departures from a curve whereby the lifting force from fingers in engagement with said edge will be distributed, by tension, to said wall free from potential tear points along said edge at or adjacent to said lifting force.

7. In a container as defined in claim 6;
(c) said lifting edge having end edges at the ends thereof and said end edges being in curved downward continuation of each lifting edge and terminating at points spaced below the ends of said lifting edge.

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DAVID M. BOCKENEK, Primary Examiner
U.S. Cl. X.R.

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