The present invention relates to packages and more particularly to non-bulging folded packages and a method of making them.

There are many types of packages formed from folded paperboard or other sheet material which have relatively long side walls or end walls or similar panels which are folded generally at right angles to another surface of the package. In such packages an objectionable bulging or flaring out of these folded walls or panels occurs at portions of the walls remote from the fold line. For example, it is a characteristic of presently manufactured box tops and bottoms that the side walls bulge or flare outwardly along their free edges giving the box a bulging shape and appearance. This effect is particularly pronounced in packages made of relatively thin and flexible material such as the thinner paperboards. In these packages, containers or other similar products, the side walls tend to follow the shape of the fold lines adjacent to the connecting panel such as the container bottom, but tend to bend or bulge outwardly at the portions remote from the fold lines.

Accordingly, the object of the present invention is to provide an improved package and a method of making it.

Another object of the present invention is to provide a method of forming a container having more regular form.

Another object is to provide an open tray type of container having a generally rectangular upper rim.

Another object of the present invention is to provide a method of making a more attractive box bottom or cover from paperboard.

Another object of the present invention is to provide a relative simple method usable on present container cutting, scoring, folding and gluing machinery to provide an improved package.

Another object of the present invention is to provide an improved non-bulging carton and method of making it.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a plan view of a carton blank made in accordance with the present invention;

FIG. 2 is a perspective view partially cut away of the carton erected from the blank of FIG. 1;

FIG. 3 is a top plan view partially in section of the carton of FIG. 2;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3; and

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 3.

The invention will be described in connection with the double side wall tray or box bottom type of carton shown in the drawing; however, it is obvious that the invention may be used with other shapes and forms of cartons, packages, and sheet material products.

A cut and scored blank 1 formed from a suitable paper cardboard or other sheet material is shown in FIG. 1. The blank 1 is shaped to provide suitable panels divided by fold or score lines which provide guides and weakened fold lines to assist in the folding and gluing operations.

Thus, the blank 1 has a bottom panel 2, side panels 3 and 4, as well as reinforcing side and end panels 5 and 6 respectively. Flaps 7 and 8 on the side panels and the reinforcing panels, respectively, are provided to fasten the end panels to the side panels.

Score lines 9 and 10 are provided at the junction of the bottom 2 with the side panels 3 and the end panels 4 respectively. Score lines 11 are provided between the side panel 3 and the reinforcing side panel 5 to permit the two panels to be folded against each other. Similarly, a score line 12 is provided between the end panel 4 and the reinforcing end panel 6 to permit panel 6 to be folded and glued against the end panel 4. As seen in FIG. 1, the score lines 9 are curved within their curved portions spaced closer together than their end portions. This inward curving of these score lines 9 provides the non-bulging package construction of the invention, as will be more fully discussed below.

FIG. 2 is a perspective view of the blank 1 of FIG. 1 folded and glued to form a tray or open box. Side panels 3 and 5 have been folded together to form side wall 14 perpendicular to bottom panel 1. The end walls 4 are folded at right angles to the bottom 2, and the flaps 7 on the opposite ends of the side panels 3 are glued to the end wall 4. The flaps 8 on opposite ends of the reinforcing panel 5 are glued against the flap 7.

The reinforcing end panels 6 are folded downwardly against the end panels 4 and the flaps 7 and 8 are fastened thereto to form end walls 17.

In a conventional tray or box bottom constructed in a generally similar manner, the side walls 14 formed by the overlapping side panels 3 and 5 tend to bulge outwardly, especially at the upper portions midway between the end walls 17. In the present invention this outward bulging is eliminated by the provision of the inwardly curved score lines 9 in the bottom panel 2. The corrective action of the score lines 9 is indicated in an exaggerated manner in the plan view of the package shown in FIG. 3. The lower portion 15 of the side walls 14 formed by the overlapping side panels 3 and 5 tends to curve inwardly due to the inward curvature of the score lines 9. The upper portion 16 of the side wall 14 tends to bulge outwardly from the inwardly curved bottom portion 14 to an extent sufficient to result in a generally straight top edge. In the use and handling of the tray, the shape of the upper portion 16 of the side walls 14 is of greater importance both for the sake of appearance and for convenience. Thus, a tray having a generally rectangular upper edge gives the appearance of a neat, attractive, and well-made article. The minor curved edges in the bottom 15 of the side wall 14 and in bottom panel 2 which provide for the corrected upper edge are not noticeable and do not detract from the appearance of the tray.

The corrective effect of the inwardly curved score lines 9 is also shown in exaggerated form in the sectional FIG. 4 taken across the center of the tray of FIG. 3. As seen in FIG. 4, the inward displacement of the lower edges 15 of the side walls 14 compensates for the tendency of this side wall material to warp or bulge outwardly towards its top as it tends to reduce the shape of the original flat blank 1. The result of the inward displacement of the bottom 15, thus, is to provide for the correct spacing of the upper portion 16 of the two side walls 14 and to maintain the upper portions of the side walls 14 are equally spaced throughout the length of the tray. A relatively narrow tray is shown in the drawings in which the side walls 14 are relatively long compared to the end walls 17 which are formed by the overlapping end panels 4 and 6.
such a tray the short length of the end panels 17 tends to minimize their bulging effect. This bulging effect of uncorrected panels is shown in FIG. 5 in an exaggerated manner, where the bottoms 18 of the end walls 17 are equally spaced as a result of the score lines 10 on the blank 2 being generally straight and parallel. The upper portions 19 of the end walls 17 tend to bulge outwardly away from each other as shown in FIG. 5 due to the inherent tendency of the blank 1 to assume its flat shape in the portions remote from the restraining action of the corners or the bottom panel 2.

Where the end panels 17 are relatively long, it is obvious that the score lines 10 may also be curved inwardly toward each other to provide the same bulge preventing action on the end walls 17 as was shown and described in connection with the side walls 14. It is also obvious that the correctly curved score lines may be used in trays, cartons, or boxes having side walls of a single layer. The same corrective action is provided by the inward displacement of the lower portion, which compensates for the outwardly bulging effect of the upper portions, causing them to have generally straight upper edges. Thus, it is clear that the inwardly curved score line may be used to provide a corrective action wherever two adjacent panels are folded at an angle with respect to each other. The score line is curved away from the panel having the bulging tendency in the plane of the other panel. The bulging panel normally is one which has an edge generally parallel to the scored folding line and which is unsupported or unfastened along a substantial portion of its length.

In addition to the corrective effect of the inward curvature of the lower portions of the side wall 14, as described above, a stiffening effect in the side wall 14 and the bottom panel 2 results from the deformation of the portions of the bottom panel 2 and the side wall 14 adjacent to the curved score line 9 to the curvature of the score line 9. Thus, as seen in FIG. 3, the side wall 14 is curved along its lower portion in accordance with the shape of the curved score line 9. In addition, the bottom panel 2 is curved downwardly to conform to the curved lower edge of the side panel 3 defined by curved score line 9 when side panel 3 is folded at right angles to bottom panel 2, as shown in FIG. 4. This stiffening action in the side wall 14 due to the curvature in the bottom panel 2 also tends to reduce the bulging tendencies of the side wall 14. This stiffening effect is obtained whether the score lines 9 curve inwardly as shown in the drawing or outwardly in the opposite direction.

The curvature of the score lines 9 in FIG. 1 and the corrective action of the curved score lines shown in FIGS. 3 and 4 have been slightly exaggerated in order to more clearly demonstrate the corrective effect in a particular carton. It has been found that a maximum inward displacement at the center of the curved score line 9 approximately equal to the width of the paperboard or other sheet material being used provides an adequate corrective effect. The amount of the curvature of the score lines 9 will necessarily vary, depending on the thickness and stiffness of the material used for the package blank, and the degree of curvature may be adjusted as desired from a maximum deviation greater or less than the thickness of the blank material, as is necessary.

It will be seen that the present invention provides an improved non-bulging package and a novel and relatively simple method of forming the package. The package is made without the addition of material and can be cut, scored, folded, and glued on presently used packaging machinery. The improved carton presents a better appearance due to its generally rectangular appearance and where used as a portion of a two-piece box is more easily handled due to the elimination of the grooving and bulging tendencies of the package side walls. The carton of the present invention also provides a more attractive and more easily handled tray or box from more resilient and less expensive sheet material so that an attractive package may be produced at lower cost. The method of manufacturing the improved carton is relatively simple and is also readily adaptable to presently existing package designing methods and machinery.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

1. A folded package formed of flexible paperboard having a first panel and surrounding substantially perpendicular second panels defined by score lines at the edges of said first panel and said second panels meeting one another at lines of intersection which are perpendicular to said first panel and at least one opposite pair of said second panels being relatively elongated along said score lines as compared with their height in a direction perpendicular to said first panel whereby said pair of elongated second panels tend to bow outwardly at their central portions, the improvement which comprises a relatively slight inward curvature toward the center of said first panel in each score line for said pair of elongated second panels whereby the central portions of said curved score lines are closer together than the end portions, the lower portions of said elongated second panels bending inwardly, and the upper edges of the elongated second panels being substantially straight lines whereby the elongated second panels give the appearance of being flat and vertically disposed with regard to the said first panel.

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