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A. R. RAUSING

3,106,330

FOLDING BOX SHEET BLANK

Filed Oct. 25, 1961

Fig. 1

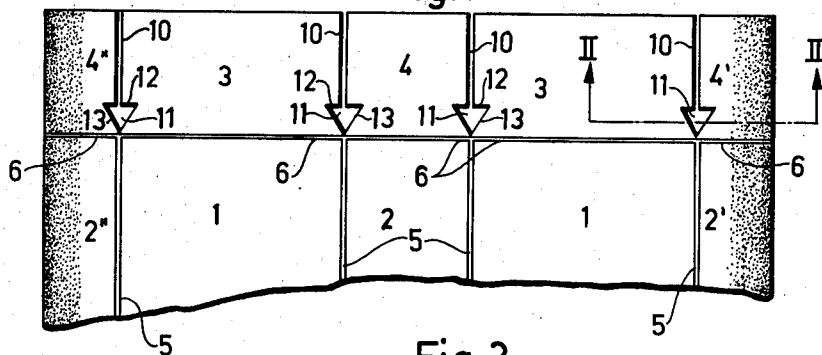


Fig. 2

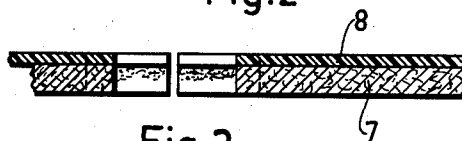


Fig. 3

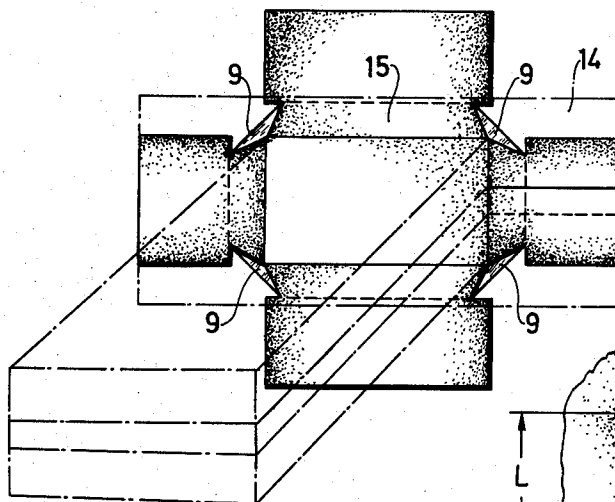
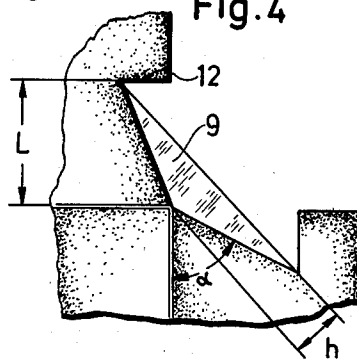


Fig. 4



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FOLDING BOX SHEET BLANK

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The present invention relates to a folding box sheet blank of the kind constituted of, on one hand, a carrier sheet material such as cardboard, and, on the other, a stretchable heat-sealable plastic layer laminated to one face of said carrier sheet material in a substantially whole-covering relationship thereto, and comprising—in addition to side wall panels hinged to each other in succession along lateral crease lines or the like—a corresponding number of end closure panels, which in turn are hinged to said side wall panels along crease lines or the like defined by equidistant side wall panel ends, and border upon each other substantially along imaginary extensions of said lateral crease lines, the blank being adapted, through folding about said lateral crease lines and the extensions thereof, said plastic layer facing inwards, and through joining laterally to each other the two outermost side wall and end closure panels, respectively, possibly by means of corresponding seaming flaps likewise defined by said lateral and said end crease lines, to set up into a sleeve open at the two ends thereof and having said end crease lines contained in one and the same plane, and, subsequently, to close into a container through folding said end closure panels outwards into said plane, thereafter sealing, in a flat shape and to a re-entrant rim zone of said plastic layer, a sealing sheet extending beyond the sleeve end opening rim defined by said end crease lines, and, finally, folding said end closure flaps inwards over said sleeve end opening while securing them in their in-folded position.

At least in an indirect way, folding box sheet blanks of the kind in question are previously known e.g. through U.S. specification No. 2,886,231 relating to filled and sealed folding box packages produced from a sheet blank the end closure panels of which as well as the associated lateral end closure flaps are separated from each other through cuts in the extensions of the lateral crease lines. The cuts in question pass through the carrier sheet material as well as through the plastic layer of the laminate sheet material and extend from the adjacent outer edge of the blank to a point at a distance from the end crease lines transverse to said side crease lines, defining between the inner end of the respective cuts and said end crease lines an intact gusset of said laminate sheet material. When setting up the blank into a box sleeve and closing the ends thereof the body portion of said gusset will fiber, while its plastic layer portion will stretch thereby to form, at each corner of said package end opening, a plastic covered fibre tuft to the plastic film of which the sealing sheet may be sealed.

When fibering into a tuft the gusset body portion still laminated to said plastic layer there can hardly be avoided that the fibres, due to stress concentration or penetration will cause holes or pores in the plastic film simultaneously stretched. As in many cases these holes will be concentrated to the proximate vicinity of the box corner and

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even to said end crease lines, the application of the sealing sheet over the end opening and its sealing to the plastic layer margin surrounding said end opening are likely, in many cases, not to yield a liquid-tightly closed box end.

5 The folding box sheet blank according to the present invention will avoid such drawback. Thus, the folding box blank in question has as its main feature that said end closure panels and possible associated lateral seam flaps are, with respect to said body layer, completely separated and severed from each other and having lateral edges of such a shape determined by the severance that overturning outwards the end closure panels of the sleeve as set up will, without rupturing, stretch the intact plastic layer portion between adjacent end closure panels to form an outwardly projecting gusset.

15 In the following the invention will be described in greater detail reference being made to the accompanying drawing, wherein

20 FIG. 1 is a plane view of a folding box sheet blank according to the invention,

FIG. 2 is a cross-sectional view of a portion of the sheet material from which the blank is produced,

25 FIG. 3 is a perspective view of the box set up from the sheet blank and having its end closure panels overturned outwards, and

FIG. 4 illustrates in perspective view and on a larger scale one corner of the folding box as set up and with its end closure panels overturned outwards.

30 The folding box sheet blank according to the invention comprises a plurality of side wall panels 1, 2, 2' and 2'' as well as a corresponding plurality of end closure panels 3, 4, 4' and 4''. The side wall panels connect consecutively to each other along lateral crease lines 5, the end closure panels being hinged to equidistant side wall panel ends along end crease lines 6 transverse to the lateral crease lines and, in addition, bordering upon each other substantially along imaginary extensions of the lateral crease lines 5.

40 The folding box blank is assumed to be produced from a laminate material constituted of a carrier sheet material 7 and a stretchable plastic layer 8 laminated to one face of said carrier sheet material in a substantially whole-covering relationship thereto and comprising e.g. polyethylene, as shown in FIG. 2.

45 When setting up into box shape the blank is intended to fold along the lateral crease lines 5 and their extensions with the plastic layer 8 facing inwardly, and thereafter to have its two outer side wall panels and end closure panels, respectively, joined in a lateral seam. In the present case illustrated such lateral seaming implies that the partial panels 2' and 2'' and the partial panel portions 4' and 4'', respectively, in overlapping relationship and along their free side edges are joined to form a side wall panel 2, and an end closure panel 4, respectively.

50 However, the lateral seam might as well be positioned in the vicinity of a folding box corner instead of substantially along the axis of said side wall panel 2, and said end closure panel 4, respectively. However, this will require that no side wall panel 2 be divided into two partial panels 2' and 2''; that no end closure panel 4 be divided into partial panels 4' and 4''; and that, furthermore, the blank along one of its side edges have seam flaps defined by lateral crease lines and end crease lines

in the same way as the side wall panels and the end closure panels.

With respect to the plastic layer 8 the end closure panels and possible lateral seam flaps are integral along at least that portion of the imaginary extensions of the lateral crease lines 5 closest to the end crease lines 6. With respect to the carrier layer 7, however, they are completely separated or severed from each other all the way from the corresponding outer edge of the blank to the end crease lines. In addition, their lateral edges determined by the severance are of such a shape that overturning outwards the end closure panels 3 and 4 of the laterally seamed sleeve set up from the blank will, without rupturing, stretch the intact plastic layer portion between adjacent end closure panels to form an outwardly projecting gusset 9, see FIGS. 3 and 4.

In the case illustrated, the end closure panels up to a distance L (FIG. 4) from the end crease lines 6 are completely separated from each other by a cut 10 through both the carrier layer 7 and the plastic layer 8 and in the extensions of the lateral crease lines 6. At the inner end of the cut 10 there is provided in each end closure panel a triangular notch 11 affecting only the carrier layer 7 of the end closure panel margin. That is to say, as regards the carrier layer 7, adjacent end closure panels are separated along both the cut lines 10 and notches 11, but as regards the plastic layer 8, the adjacent end panels are separated only along lines 10. Said notch 11 is defined, on one hand, by a line 12 substantially parallel to the respective end crease line and extending through the innermost end of the cut 10, and, on the other hand, by a line 13 extending from the intersection of the respective end crease lines and lateral crease lines at an inclination angle α with respect to the end crease line, where should fulfil the following requirement, viz.

$$\arctg(S\sqrt{2}-1) > \alpha > 45^\circ$$

where S=the elongation or stretch coefficient of the plastic layer.

Plastic layers of the kind in question have an extensibility of about 3 to 5 times its original dimension. In the present case, to utilize such extensibility, however, the intact plastic layer in question between adjacent end closure panels should in the direction of stretching have a definite original dimension at points outside the intersection between the end crease lines and the lateral side crease lines. It is easily understood that the transverse original dimension of the plastic layer should grow as a linear function of the distance from said intersection.

When setting up the blank into sleeve shape the end crease lines 6 will be positioned in one and the same plane, the end closure panels 3 and 4 being subsequently overturned outwards substantially to lie in said plane, as indicated above. For sealing closed the box end in question there is applied over the opening defined by the end crease lines a flat sealing sheet 14 (FIG. 3) extending beyond said opening in all points therealong. Suitably, such sealing sheet constitutes of or is coated with a plastic layer heat-sealable to the plastic layer 8. The sealing sheet 14 is sealed to the plastic layer 8 in a re-entrant seal 15 extending along the end opening. The seal 15 also includes at least a portion of each gusset 9.

In a conventional manner the end flaps 3 and 4 are folded to lie over the end opening and are secured to each other thereby to yield a container sealed closed at the corresponding end thereof.

The gussets 9 offer a relatively large sealing surface, and therefore a liquid-tight container (or package, in case of a folding box closed at both ends thereof in the same way) results. In FIG. 4 this is illustrated by dimension h which may be expressed by

$$h = \frac{L}{tg \alpha} \sqrt{\frac{tg^2 \alpha - 1}{2}}$$

The above specific embodiment may, of course, undergo modifications in several respects within the scope of the present invention. For example, only one of two opposite carrier layer edges of adjacent end closure panels 3 and 4 need be provided with a substantially triangular notch, the inclination angle α in that case, however, possibly requiring a corresponding change and, of course, calling for other limits. Furthermore, it should be understood that the sheet blank according to the invention along two opposite ends may be provided with end closure panels corresponding to the end closure panels 3 and 4 disclosed above and shown in the drawing, in which case the blank may be set up and sealed closed into a completely sealed container.

Though, for sake of simplicity there has been disclosed herein a folding box blank to be set up and sealed into parallelepipedon shape the invention, of course, is applicable to blanks for folding boxes of a cross-section successively growing from one box end to the other. Nor need the side wall panel number correspond to four side wall box but may vary for obtaining folding boxes having a side wall panel number less than or exceeding four.

In principle, the blank according to the invention may be produced by two different methods. According to one method the carrier sheet material 7, before laminating or coating the plastic layer 8 thereto, will be provided with through-apertures corresponding to the notches 11. Subsequently, the plastic layer 8 is applied. In a final operation, the laminate material is then provided with the lateral crease lines 5, the end crease lines 6, and the cuts 10. In case the coating or laminating of the plastic layer may be limited in such a way as to leave uncoated or exposed those sections of the end closure panels 3 and 4 outside of or beyond the notch cut edge portions substantially perpendicular to the extensions of the lateral crease lines 5, of course, the cuts 10 may be provided more or less in direct connection with the provision of the notches 11.

According to the other method above indicated the notches 11 of the carrier layer 7 may be provided on the finished laminate material proper. For that purpose, there may be utilized a milling or cutting operation making possible the substantially complete removal of the carrier sheet material portion corresponding to the notches 11, the corresponding portion of the plastic layer 8 being left substantially intact. The crease lines 5 and 6 as well as the cuts 10 may be provided in connection with the provision of the notches 11 but might as well be provided separately both with respect to each other and in relation to the removal of the carrier sheet material of the notch areas 11.

I claim:

1. In a carton blank, the combination comprising a laminate material constituted by a carrier sheet of paper-board and a heat sealable stretchable plastic layer bonded to said paper-board sheet and substantially coextensive in area therewith, a first set of spaced longitudinally extending crease lines on said laminate material defining therebetween a plurality of side wall panels, end closure flaps provided on at least one end of said side wall panels and hingedly connected thereto along transversely extending co-linear crease lines, the paper-board sheet portions of adjacent end closure flaps being separated from each other by a cut extending from the outer ends of said end closure flaps to said co-linear transverse crease lines and an inner portion of said cut diverging outwardly from the point of intersection of the appertaining longitudinal and transverse crease lines to establish a notch portion, and the plastic layer portions of said adjacent end closure flaps also being separated from each other along said cut from the outer ends of said end closure flaps inwardly but only so far as said notch portion, whereby upon a turning outward of said end closure flaps from the corresponding side wall panels during the process of erecting

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the carton, that portion of said plastic layer overlying said notch portion will stretch without rupturing to establish an outwardly projecting gusset between adjacent outwardly turned end closure flaps.

2. A carton blank as defined in claim 1 wherein said notch portion has a substantially triangular configuration with the base edge thereof parallel to said transverse crease lines. 5

3. A carton blank as defined in claim 1 wherein said notch portion has a substantially triangular configuration 10

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and the remaining portion of said cut is rectilinear and in alignment with the appertaining longitudinally extending crease line.

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