April 2, 1963 R. L. IGNELL 3,083,890

FOLDING BOX

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Fig.1

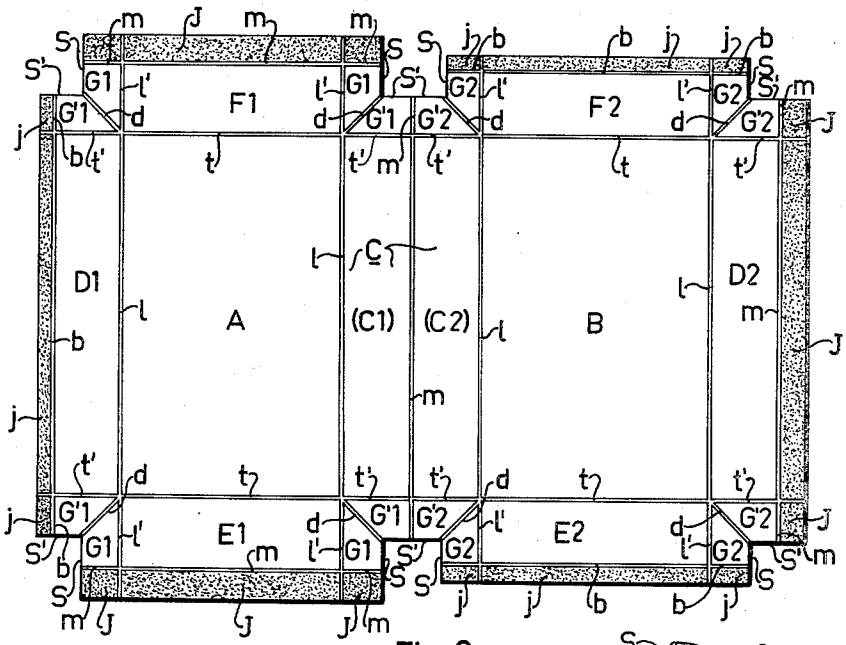
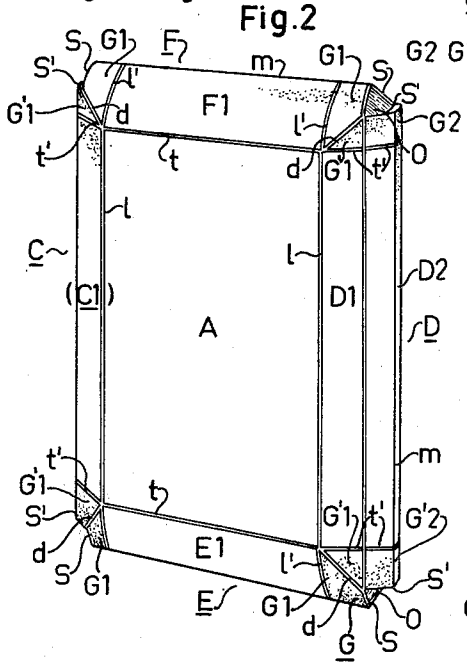


Fig.2



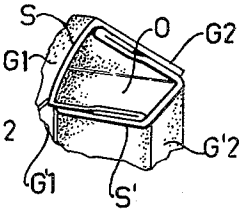
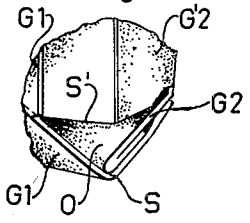


Fig. 2a

Fig.2b



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Fig. 3

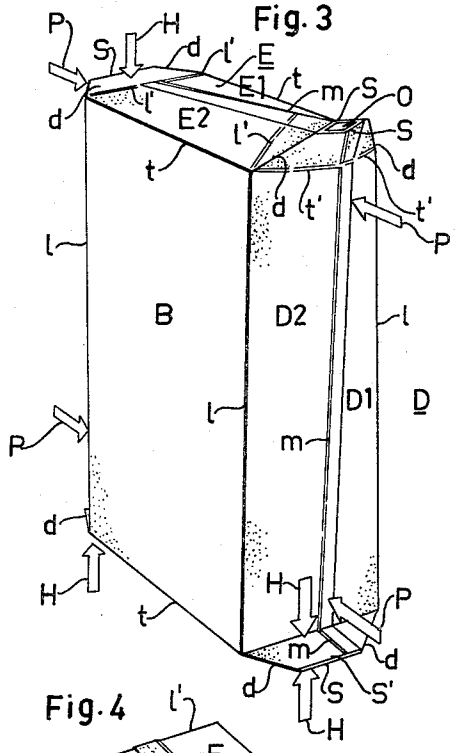
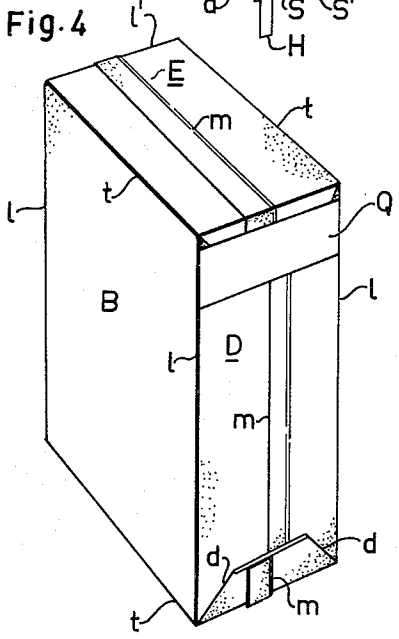


Fig. 4



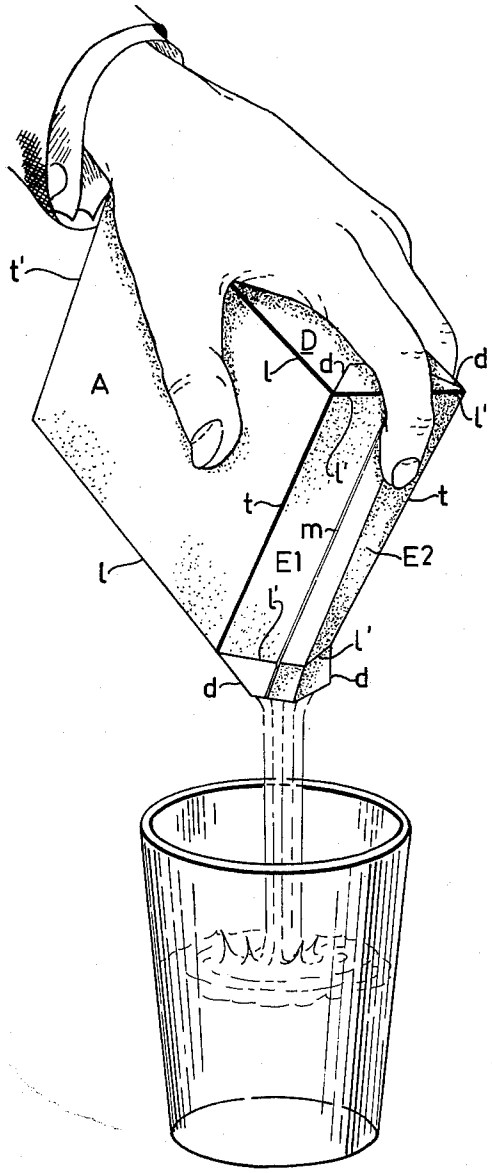
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Fig. 5



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Fig. 6

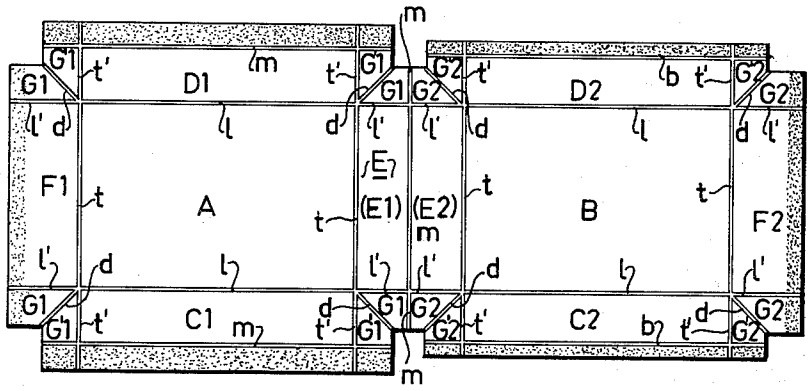
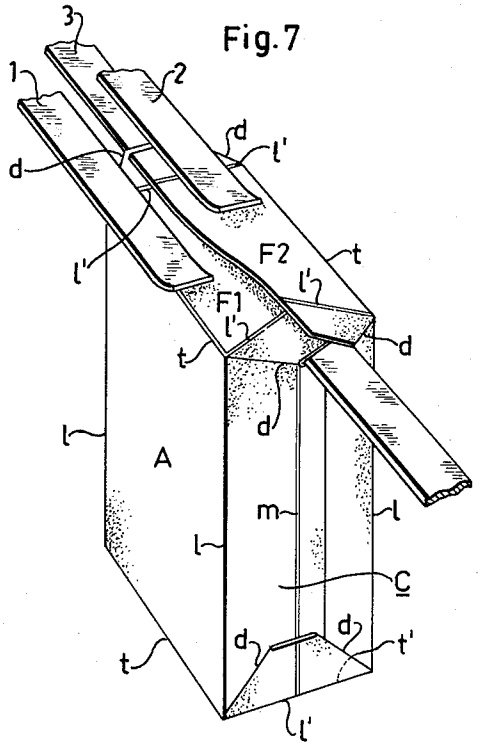


Fig. 7



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Fig. 8

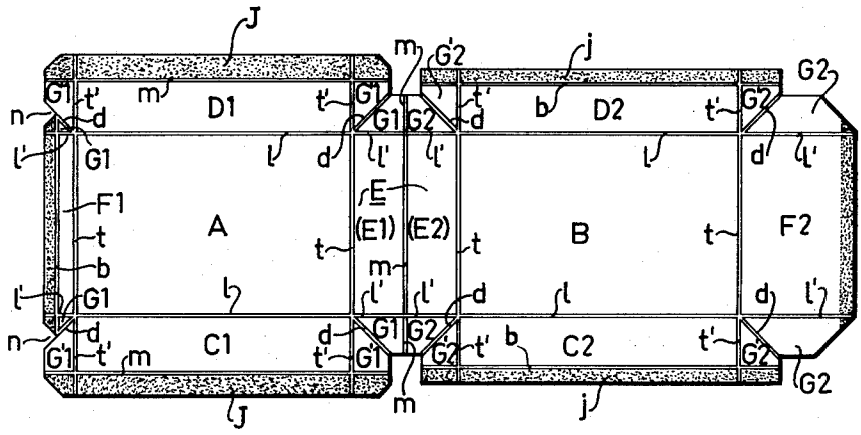
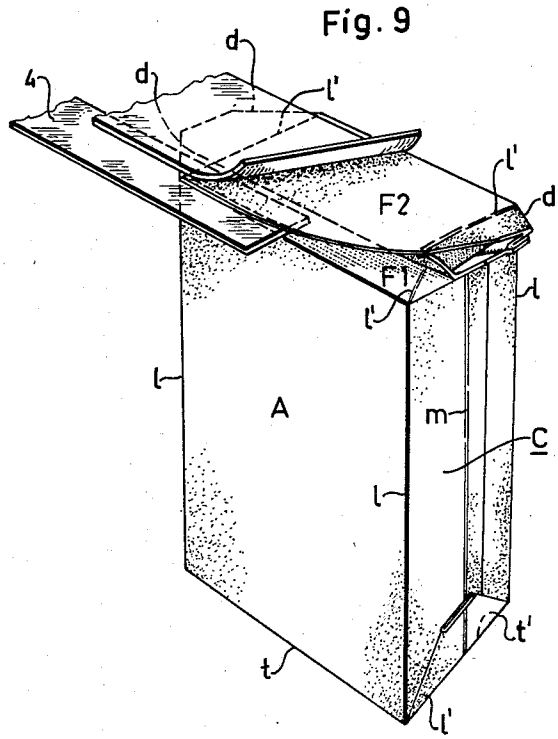


Fig. 9



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Fig.10

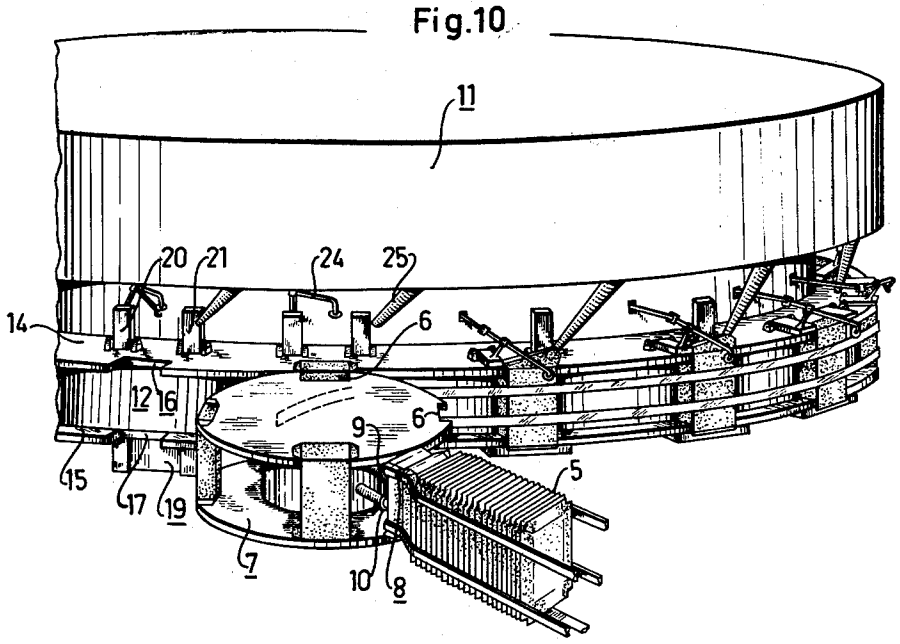
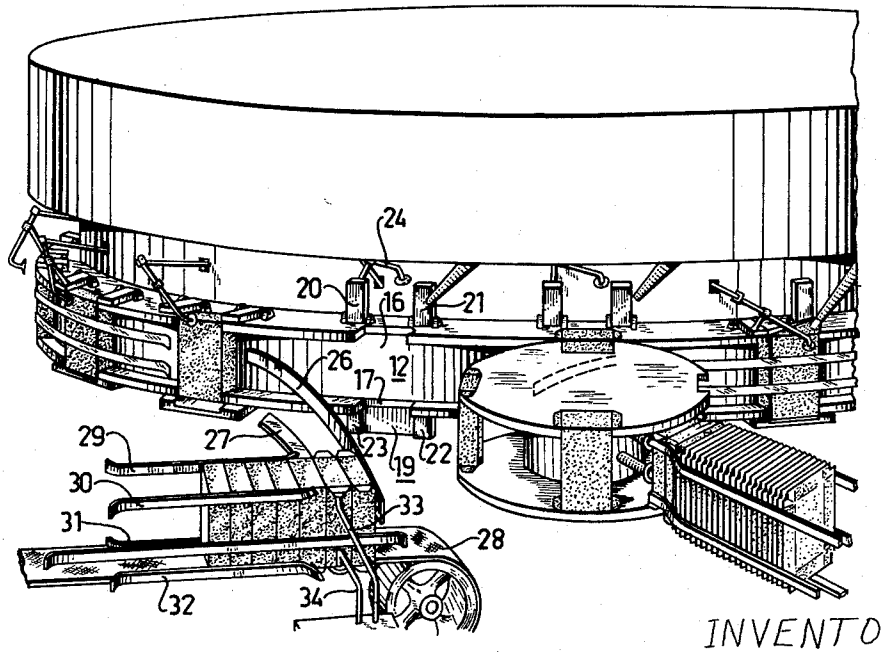


Fig.11



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United States Patent Office

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3,083,890

FOLDING BOX

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Filed July 5, 1960, Ser. No. 40,679
Claims priority, application Sweden July 4, 1959
9 Claims. (Cl. 229—16)

The present invention relates to a flat folding box of buckling-stiff card-board material or the like and of the kind to be set-up into a right-angled parallelepipedon package and having four pairwise congruent and opposite, preferably rectangular side wall panels of equal lengths, said side wall panels being hinged to each other through four parallel longitudinal score lines defining the long-sides of the side wall panels.

A main object of the invention is to provide a flat folding box which is easily openable into rectangular shape and which permits effective sealing by simple means so that it may be used as a package for liquid and flowing goods if choosing a proper wall material.

Thus, the flat folding box of the invention is characterized substantially therein that two opposite congruent side wall panels, preferably broad-side wall panels, are interconnected also through a preferably rectangular end wall panel, which is hinged to each broad-side wall panel, through a transverse score line defining one short-side thereof and the length and width dimensions of which correspond to the widths of the broad-side and the narrow-side wall panels, respectively, and that the adjacent ends of said narrow-side wall panels and of said end wall panel are interconnected through corner portions each hinged to the narrow-side wall panel and/or the end wall panel along the entire panel width through, in each case, an end score line defining the corresponding panel short-side, said narrow-side wall panels and said end wall panel each having a central score line parallel to the respective panel long-sides and extending both along the entire panel length and across the corresponding portions of the adjacent corner portions, said narrow-side wall panels, said end wall panel and said corner portions being double-foldable inside face-to-inside face about said central score lines to fold flat the folding box in a plane parallel to said broad-side wall panels, and, furthermore, said corner portions each having two diagonal score lines extending from each an individual adjacent broad-side wall panel corner across the corresponding portion of the corner portion, about which diagonal score lines said corner portions are double-foldable inside face-to-inside face, thereby to permit unfolding of the double-folded end wall and narrow-side wall panels into flat state when setting-up the flat folding box.

The invention also relates to a filled and sealed package produced from the flat folding box as well as to method and apparatus for producing such package.

In the following the invention will be described in greater detail reference being made to the accompanying drawings.

FIG. 1 illustrates a developed blank of a preferred embodiment of a flat folding box according to the invention to be used as a liquid package, FIG. 2 being a perspective view of such embodiment.

FIGS. 2*a* and 2*b* are enlarged views in perspective of upper and lower corner portions of the box as shown in FIG. 2.

FIG. 3 illustrates, in perspective, the various steps involved in setting-up, filling and sealing the flat folding box shown in FIGS. 1 and 2.

FIG. 4 is a view, in perspective, of a filled and sealed package produced from the flat folding box.

FIG. 5 is a view, in perspective, illustrating how the package of FIG. 4 is handled when emptying same.

FIG. 6 illustrates a developed blank of another embodiment of the flat folding box of the invention, FIG. 7 being a perspective view of such embodiment.

FIG. 8 illustrates a developed blank of a third embodiment of the flat folding box of the invention, FIG. 9 being a perspective view of such third embodiment.

FIGS. 10 and 11 are two schematic perspective views of an apparatus for setting-up, filling and sealing flat folding boxes of the kind illustrated in FIGS. 1 to 5, inclusive.

The flat folding box, which is shown incompletely flat-folded in FIG. 2 and opened into rectangular shape in FIG. 3 primarily intended for use in packages filled with liquid or flowing goods and is thought to be produced through folding a sheet blank shown developed in FIG. 1 along score or folding lines and joining the edges of such blank. The flat folding box is intended for a right-angled parallelepipedon package and comprises in the first place four pairwise congruent and pairwise opposite rectangular side wall panels A, B, C and D of equal lengths and hingedly conected to each other through four parallel longitudinal score lines *l* defining the side wall panel long-sides.

In addition, the broad-side wall panels A and B have their short-sides interconnected through two rectangular end wall panels E and F, which are hingedly connected each to one of the broad-side wall panels A and B, respectively, through a transverse score line *t* defining the respective short-side thereof and the length and width dimensions of which correspond to the widths of the broad-side wall panels A and B, and the narrow-side wall panels C and D, respectively.

The adjacent ends of the narrow-side wall panels C and D and the end wall panels E and F are interconnected through corner portions G. Said corner portions are hingedly connected each to both the narrow-side wall panel C or D and the end wall panel E or F along the entire panel width and in both cases through a respective end score line *t'* or *l'* defining the corresponding panel short-side.

The narrow-side wall panels C and D and the end wall panels E and F each have a central score line *m* parallel to the respective wall panel long-sides, i.e. to the longitudinal score lines *l* and the transverse score lines *t*, respectively, said central score line extending both along the entire wall panel length and across the entire corresponding portion of the adjacent corner portion G. As apparent particularly from FIG. 2, the narrow-side wall panels C and D, the end wall panels E and F and the corner portions G are foldable upon themselves inside face-to-inside face about said central crease lines *m* for flat-folding of the folding box in a plane parallel to the broad-side wall panels A and B.

In addition, the corner portions G each have two diagonal score lines *d* extending from each an individual adjacent broad-side wall panel corner across the entire corresponding portion of the corner portion G, said corner portions being foldable upon themselves inside face-to-inside face about said diagonal score lines to permit unfolding of the end and narrow-side wall panels E and F, and C and D, respectively, from double-folded into flat state when setting-up the folding box.

Of the narrow-side wall panels C and D and the end wall panels E and F the panels D, E and F are assumed to be produced each through joining two panel sections D2 and D1; E1 and E2; and F1 and F2, respectively, along seam zones J and *j*, respectively. The seam zones J and *j* are extended over the adjacent corner portions G which, thus, are produced through joining at least a pair of corresponding seam zones J and *j*. The narrow-side wall panel C, however, is integral and merely divided into

two congruent wall panel sections C1 and C2 through the corresponding central score line *m*.

In the present case, the associated seam zones J and *j* are sealed to each other inside face-to-inside face, and the fin-like seam flap thus produced is turned over to lie against the folding box outside thereby to form a so-called overturned or back seam. In certain cases, however, normal seams of the overlapping type may be used. In a seam of that kind the associated seam zones are joined inside face-to-outside face in a conventional overlapping relationship.

As shown in FIG. 2, the seam zones J are wider than the associated seam zones *j*, the result being that the seam zone J, which is outermost seam zone of the back seam in question, will extend beyond the inner seam zone *j* and may have its free inside face sealed to the corresponding portion of the box outside. Furthermore, the seam zones *j* are each through an individual seam score line *b* parallel to a corresponding central score line *m* divided from the respective wall sections D1, E2, F2, G'1 and G'2. In a seam of the normal overlapping type, of course, said seam score lines *b*, which in the finished folding box shown in detail in FIG. 2 substantially coincide with the corresponding central score lines *m*, should be dispensed with. Also in back seams, the seam zones J and *j* may, of course, be of equal widths of the overlapping seal feature of the seam zone J is dispensed with.

The corner portions G each comprise two congruent straight parallel trapezoids G1, G2 and G'1, G'2 hingedly connected to each other along the two diagonal score lines *d* forming the trapezoid legs. The parallel sides of said parallel trapezoids G1, G2 and G'1, G'2 are formed by the end score lines *l'* and *t'*, respectively, and by free cut edges *s* and *s'*, respectively. The central score lines *m* and the seam score lines *b* are perpendicular to the corresponding end score lines *l'* and *t'* and divide the corner portions G each into for substantially congruent right-angled parallel trapezoids G1, G'1, G'2 and G2 connected to each other alternatingly through a diagonal score line *d* and a central score line *m* or seam score line *b*. When folded upon itself about the diagonal score lines *d* each corner portion G forms an isosceles parallel trapezoid ear flap having the corner portion sections G1 and G2 lying flat inside face-to-inside face against the corner portion sections G'1 and G'2, respectively.

FIG. 1 illustrates a developed flat sheet blank for the flat folding box shown in FIGS. 2 and 3. Said flat blank is viewed from its inside to be in said figure and is of a substantially rectangular shape. The longitudinally extending score lines *l* and *l'* are parallel to each other and are situated in such a way that each longitudinal score line *l* at each end continues in an end score line *l'*. Each such composite score line *l'*, *l*, *l'* extends across the entire blank, the extensions extending across the seam zones J or *j* in question. Similarly, the transverse score lines *t* and the end score lines *t'* are parallel to each other and form two composite score lines *t'*, *t*, *t'*, *t*, *t'* each extended across the associated seam zones. The transverse and longitudinal central score lines *m* and seam score lines *b* are parallel to said transverse and longitudinal score lines, respectively, the diagonal score lines *d* enclosing an angle of 45° therewith. The cut edges *s* and *s'* are parallel to the longitudinal score lines *l* and the transverse score lines *t*, respectively, and are arranged in such a way that the cut edges *s* and *s'* in the flat-folded state of the folding box will define substantially congruent square cuts, one at each folding box corner, and in the set-up folding box, when the corner portions G are folded upon themselves about the diagonal score lines *d*, will together form a straight double cut edge. In the states intermediate the states of the corner portions G being folded upon themselves along the central score lines *m* and the diagonal score lines *d* the cut edges *s* and *s'* of each corner portion G define a substantially rhomboid opening O symmetric to the diagonal score line plane and the central score line plane.

The flat blank comprises a sheet or foil material of sufficient stiffness to provide buckling tendencies for reasons to be discussed below. In the folding box type in question particularly shown in FIGS. 2 and 3 and in the first place intended for liquid packages, at least the inside face of the blank is coated completely with a heat sealable coating impervious to liquid. Preferably, the flat blank consists of a laminate of e.g. paper and plastic, the plastic forming the inside face and the paper the outside face and the body.

The flat blank may be punched out of sheet material and when punching being provided with the required score lines in conventional manner. Regarding the score lines it should be noted that in case of laminate blank material the score lines should be impressed from that face of the blank to form the inside face of the finished flat folding box, i.e. that the scoring patrix should be applied from said face. This will prevent the laminate from tending to delaminate at the corresponding folds of the flat folding box and of the finished package.

However, the blanks of folding boxes of the kind in question might as well be scored in and punched out of web material. If, in the flat blank shown in FIG. 1, the associated seam zones J and *j* parallel to the transverse score lines *t* and *t'* are of equal widths a plurality of such flat blanks forming a continuous web may be obtained through scoring and punching a web of the blank material. In that case the web width will correspond to the total length of the composite transverse score lines *t'*, *t*, *t'*, *t'*, *t*, *t'*. From such web, when flat, rectangular pieces are punched out between successive blanks, thereby to make the punched apertures to define the previously mentioned cut edges *s* and *s'*. In addition, the web is provided with score lines corresponding to the score lines *t*, *t'*, *l*, *l'*, *d*, *m*, and *b*. The individual blanks, however, are not separated from each other, but the web is folded upon itself, inside face-to-inside face and along the central score line *m* dividing the wall panels C into two uniform sections. Thereafter, the longitudinal seam zones J and *j* may be joined inside face-to-inside face through heat sealing or glueing, and the seam fin thus obtained may be folded over about a corresponding seam score line *b*. This will result in a blank web in the form of a flat tube having rectangular notches along its two longitudinal edges. Of course, it is also possible in such tube web to join the double transverse seam zones J and *j* of adjacent folding box blanks, said seam zones being superposed on each other in inside face-to-inside face relationship.

In case of a web comprising a fibrous material such as paper, of course, the main fibre direction thereof should be taken into consideration thereby in conventional manner to orientate the fibre direction transversely of the flat folding boxes and not along their length dimension. Therefore, in case of fibrous webs the panel C of the blank according to FIG. 1 should form the end wall panel of the finished folding box.

The folding box blanks may be supplied in roll shape to the packaging machine, where, preparatory to setting-up the folding boxes, the blanks thereof are separated one by one from the tube web through transverse cuts between successive blanks. The registering of such cuts is easily obtainable by means of the said rectangular notches along the web tube edges. Depending upon whether or not the transverse seam zones J and *j* have been joined already when manufacturing the blanks, the seam zones in question will be joined to each other or the corresponding seam fins will merely be folded over about their seam score lines *b* in connection with the separation of the blanks from the web.

Obviously, the just-indicated way of producing folding box blanks in the form of a flat tube web is applicable exclusively to folding box blanks having a so-called back seam in the longitudinal direction of the web to be produced. Instead of through folding a flat web upon itself the tube web may also be obtained from two flat webs, which are superposed on each other inside face-to-inside

face e.g. after the punching and scoring operations and which are joined into back seams along their two longitudinal edges. Of course, this will add another seam to the individual folding boxes.

In case a flat tube web is out of question, there still remains the possibility of a normal flat blank web or of a flat blank web folded upon itself along a central score line *m* dividing a continuous side or end wall panel into two uniform sections. This will increase the number and complexity of the operations preparatory to the folding box setting-up in relation to those just-described with respect to the tube web blanks.

In FIGS. 3 and 4 is illustrated how the flat folding box shown in FIG. 2 will open into package shape. It is assumed that the finished package be filled with a liquid filling material and that hence the inside of the flat folding box is coated with a layer of heat sealable plastic material impervious to liquid.

The first phase of the setting-up will separate the broad-side wall panels A and B either through subjecting them to outwardly directed forces acting perpendicular to the planes of said panels A and B or, as indicated in FIG. 3, through applying inwardly directed forces P parallel to the planes of the broad-side wall panels A and B e.g. to the central score lines *m* of the narrow-side wall panels C and D. A combination of such measures is also possible, as will be described further below.

The result of said application of forces will be that the flat folding box will open into parallelepipedon shape thanks to the buckling-stiffness of the blank material. During such conversion the corner portions G will fold upon themselves about the diagonal score lines *d*, thereby to form "ear portions" projecting laterally substantially in the planes of the adjacent end wall panel E or F. The notches defined by the cut edges *s* and *s'* of the flat folding box will facilitate such double-folding of the buckling-stiff material.

In the next phase the two "ear portions" formed by the corner portions G adjacent to the end wall panel F forming the package bottom wall as well as one of the two remaining ear portions are sealed closed by application of a sealing pressure H and simultaneous supply of sealing heat thereto. Preferably, the heat sealing is carried out in a narrow zone extending across the entire ear portion parallel to the respective score lines *l'* and *t'*.

The package is now ready to be filled with liquid without any risk of leakage thereof through the corner ear portions. The filling takes place through the aperture O of the remaining unsealed ear portion, said aperture, through application of pressure to the adjacent corners of the two broad-side wall panels A and B, preferably being opened into its rhombic shape, so that a filling pipe may be introduced into the interior of the package without difficulty.

Subsequent to the filling operation also said remaining ear portion is sealed closed in the same way as the other ear portions were. Preferably, the ear portions as sealed closed are folded inwardly to lie flat against and secured to the respective adjacent narrow-side wall panels E and D, as illustrated in FIG. 4. However, in the finished package it is also possible to leave at least one ear portion projecting from the package body, thereby to constitute a handle permitting easy lifting of the package out of a transport case containing a plurality of packages in closed stacking relationship.

FIG. 5 illustrates how a filled package of the kind in question is emptied. When emptying the package one of the ear portions serves as a pouring spout after removing a portion thereof through cutting or tearing along a line behind the sealing zone. In case of packages for liquid foodstuffs it may be suitable and necessary to cover at least one ear portion of the finished package with a strip or the like, as shown by the cover strip Q in FIG. 4. This will permit opening of the package at said ear portion and pouring of the contents therethrough under adequate hygienic conditions. In that case the same ear portion may also be provided with suitable tearing or other opening facilities which said cover strip Q may seal off effectively during the distribution of the package.

In case of packages for products in pieces not reasonably introduceable into the set-up folding box through an ear portion aperture O the invention provides flat folding boxes to be filled through an opening corresponding to the inner cross-section of the folding box as set-up. For obtaining such opening the flat folding box should be modified with respect to the one shown in FIG. 2 in such a manner that, before the filling operation, it is completely open at one end thereof which will then correspond to a split end wall panel not yet united.

FIGS. 6 and 8 illustrate two different embodiments of flat blanks for such a flat folding box, FIGS. 7 and 9, respectively, illustrating how the corresponding packages are sealed closed after filling. For sake of simplicity, for said two embodiments use has been made of the same reference letters and numerals as those employed in FIGS. 1 to 5, inclusive, above discussed, and therefore the description may be limited to commenting on the differences.

Since the two flat folding boxes corresponding to the blanks of FIGS. 6 and 8 shall be open at one end thereof the corresponding end wall panels F lack the central scoring line *m*. The folding box shown set-up in FIG. 7 is intended, when sealing closed, to have its two end wall panel sections F1 and F2 corresponding to the opening joined to each other in normal overlapping relationship, and therefore said end wall panel sections have no seam score line *b*. When sealing closed the folding box shown set-up in FIG. 9 the two end wall panel sections F1 and F2 corresponding to the opening are joined in an overturned fin or back seam as were the narrow-side wall panel sections C1 and C2; and D1 and D2, respectively, and hence, one end wall panel section F1 has a seam score line *b* extending into and across the adjacent corner portion section G1. As shown in FIG. 8, the end wall panel section F1 provided with a seam score line *b* is of considerably less width than the end wall panel section F2, the corresponding portion G1, G'1 of the adjacent corner portions G thus in the present case lacking the previously described rectangular aperture defined by cut edges *s* and *s'* but instead, for facilitating the folding-over of the seam zone defined by the seam score line *b* of the end wall panel section F1, having a triangular notch *n* or the like having one of its cut edges along the corresponding diagonal score line *d* and its apex at the point of intersection between said diagonal score line and the seam score line *b* in question. Depending upon the width of the end wall panel section F1, the previously described rectangular or correspondingly shaped aperture may appear in the portion G1, G'1 of the corresponding corner portion G.

When opening the two flat folding boxes shown in FIGS. 6 to 9, inclusive, on the whole the same procedure is carried out as with the flat folding box according to FIGS. 1 to 5, inclusive. Thus, the folding box is opened into parallelepipedon shape and the ear portions at the bottom end wall panel F are sealed closed. On the other hand, the two sections F1 and F2 of the opposite end wall panel F as well as the corresponding corner portions G form an upwards open extension of the parallelepipedon package cavity defined by the narrow-side wall panels C and D and the broad-side wall panels A and B.

In such state of the folding box the filling material is introduced into the same through said extension. The filling material may comprise a body of e.g. a deep-frozen product and of a shape corresponding to that of the package cavity.

Subsequently, first one end wall panel section F1 is folded inwardly over the filling material and thereafter the other end wall panel section F2, so that simultaneous-

ly the corresponding corner portions G are folded upon themselves about their respective diagonal score lines *d*, thereby again to form ear portions laterally projecting in the plane of the end wall panel F. The inward folding of the end wall panel sections F1 and F2 is effected e.g. through plates 1 and 2, respectively, as shown in FIG. 7, the package being moved along such plates. After the inward folding operation or in connection therewith the end wall panel sections F1 and F2 as well as the corner portion sections G1 and G2 are joined to each other through pressure and heat. At such joining operation and in case of the package as shown in FIGS. 6 and 7, the counter-pressure means may consist of a plate 3, which, as the package moves along the plates 2 and 3, will be slipped below the end wall panel sections F1 and F2 by insertion through the aperture O of the meeting or leading ear portion parallel to the plane of the end wall panel F and by leaving the package in a similar way through the aperture O of the corresponding rear or trailing ear portion.

In the embodiment of FIGS. 8 and 9 use may be made of a counter-pressure means in the form of a plate 4 to be passed between the end wall panel section F1 and the folded-over seam zone thereof when the end wall panel section F1 has been folded inwardly into its final position.

In both cases, after said joining operation there will only remain sealing closed the two top ear portions, said sealing operation being carried out in a way similar to that one above-described in connection with the first-mentioned embodiment of the flat folding box according to the invention. If desired, in addition to the operation thus far described the ear portions may be folded over to lie against and be secured to the respective narrow-side wall panels C and D, thereby to increase the rigidity of the package obtained.

In FIGS. 10 and 11 there has been illustrated a packaging machine by which flat folding boxes of the kind shown in FIG. 2 are set-up, filled with liquid, and sealed closed.

From a horizontal supply 5 of vertically standing flat folding boxes the same are fed one by one into each an individual pocket 6 of a transfer turn-table 7. When fed into its pocket each folding box has to move broad-sideways through a guiding channel 8 of a cross-section conically tapering from that of the supply 5 into that one corresponding to the folding box broad-side cross-section, the flat folding box hence, in the manner illustrated in FIG. 3, being successively opened into its parallelepipedon shape with its four corner portions G horizontally projecting as ear portions. The force necessary for urging the folding box through said guiding channel 8 is provided by two suction nozzles 9 and 10 which are arranged radially inside the transfer turn-table and exert a suction force on the adjacent broad-side wall panel of the folding box.

The transfer turn-table substantially touches a revolving filling and sealing head 11 of a considerably larger diameter. Preferably, the transfer turn-table 11 is rotated intermittently, while the revolving filling head 11 is rotated at constant speed, the rotationary movement of the turn-table 7 being adapted in such a way to the constant rotation of the filling head that there is no speed difference when a pocket 6 of the turn-table is opposite to a pocket 12 of the filling head 11. Therefore, by suitable means such as a plate 13, a folding box in the transfer pocket 6 may be transferred into the filling pocket 12. The filling pockets 12 are formed in two horizontal and parallel annular flanges 14 and 15 of the filling head 11. The spacing between the top face of the upper annular flange 14 and the lower face of the lower annular flange 15 corresponds substantially to the package height in question and the pockets 12 proper are constituted of vertically aligned congruent rectangular notches 16 and 17 in the annular flanges 14 and 15, respectively, said notches being of a size corresponding to the package cross-section in question. Thus, when the folding box in its set-up state is introduced in the filling pocket, the two upper ear portions will overlap the adjacent portion of the top face of the upper annular flange 14, the bottom ear portions engaging the underside of the lower annular flange 15.

With each filling pocket 12 are associated three heat sealing flaps 19, 20 and 21 of which one flap 19 is swingable upwards from an inactive vertical position into a horizontal one, in which it by each one of its two sealing shoulders 22 and 23 applies sealing pressure and supplies sealing heat to each an individual one of the two bottom ear portions of a folding box in the pocket 12, the annular flange 15 serving as a counter-pressure means. The other two sealing shoulders 20 and 21 are separately swingable downwards from an inactive vertical position into a horizontal one in which they supply sealing heat to each an individual one of the top ear portions of the folding box in the pocket 12 and together with the upper annular flange 14 apply the proper sealing pressure thereto.

The first phase of the filling and sealing procedure will cause the lower sealing flap 19 and one upper sealing flap 20 to seal closed the corresponding ear portions. The flaps 19 and 20 still assuming their sealing positions, the folding box, at that corner of its outwardly facing broad-side panel corresponding to the unsealed ear portion, is subjected to a pressure force substantially perpendicular to said broad-side panel, said force being applied by a pressing arm 24 associated with the filling pocket 12. This will open the aperture O of said unsealed ear portion into rhombic shape.

As soon as this opening phase has been completed a filling pipe 25 associated with the filling pocket 12 is introduced into the folding box through said opened aperture O, and thereafter the filling operation will start.

When the proper filling material quantity has been introduced into the folding box, the filling pipe 25 will retract into its inactive position. In connection therewith or earlier also the pressing arm 24 will retract from its working position.

Now the ear portion hitherto unsealed is sealed closed by the sealing flap 21 in the same manner as with the other upper ear portion.

By means of plates 26 and 27 the filled and sealed package is deflected from the filling head 11 and simultaneously the sealing flaps 19, 20 and 21 of the filling pocket 12 are swung into their inactive positions, thereby to prepare the pocket 12 for receiving a further set-up folding box from the transfer turn-table 7.

The sealed package is passed onto a conveyor 28 on which it is carried broad-sideways and between longitudinally extending plates 29, 30, 31 and 32 arranged to fold the projecting ear portions to lie flat against and adhesively secured to the respective narrow-side panels. Before folding the ear portions downwardly and upwardly, respectively, an adhesive will be applied onto those faces thereof to engage said narrow-side panels, such application being carried out by means of applicator nozzles 33 and 34, respectively, situated along the conveyor 28.

The machine as described should be considered but as a possible embodiment for setting-up, filling and sealing the folding box of the invention. The necessary modifications for adapting the machine to those embodiments of the flat folding box illustrated in FIGS. 6 to 9, inclusive, as well as to folding box blanks in web form will be obvious to anyone skilled in the art.

Although, the three above-described embodiments of the flat folding box according to the invention assume that the corner portions G are connected to a narrow-side wall panel C or D and an end wall panel E or F they might as well be connected to a broad-side wall panel A or B and an end wall panel E or F. Within the scope of the invention it is also possible to dispense with the hinged connection between a corner portion G and either the adjacent side wall panel A, B, C or D or

the adjacent end wall panel E or F through dispensing the corresponding transverse score line *t* and the corresponding end score line *t'*, respectively. This will cause the corner portion G in question as flat folded upon itself about the diagonal score lines *d* to be contained in the same plane as the respective adjacent side wall panel A, B, C or D or the end wall panel E or F, the corner portion in such case not being intended to be folded to lie flat against the folding box body proper.

I claim:

1. A flat folding box of buckling-stiff card-board material and of the kind to be opened into a right-angled parallelepipedon package and having four pairwise, congruent and opposite elongated side wall panels of equal lengths hinged to each other along four parallel longitudinal score lines defining the long sides of said panels, said pairs of said opposite side wall panels being broad and narrow relative to each other, said pair of said broad-side panels being interconnected also through an end wall panel hinged to each broad side panel along a transverse score line defining one short side thereof, the length and width of said end panels corresponding to the widths of the broad-side and narrow-side wall panels respectively, the adjacent ends of said narrow-side wall panels and said end wall panels being interconnected through corner portions, each said corner portion being hinged to both the narrow-side wall panel and the end wall panel along the entire widths of said panels by end score lines defining the short side of the corresponding panel, said narrow-side wall panels and said end wall panels each having a central score line parallel to the long side thereof and extending for the entire length thereof and across the corresponding section of the adjacent corner portion so that said narrow-side wall panels together with said end wall panels and said corner portions are outwardly foldable upon themselves in an inside face-to-inside face manner for flat-folding said folding box in a plane parallel to said broad side wall panels, said corner portions being each provided with two diagonal score lines extending each from an individual adjacent broad side wall panel corner across the corresponding section of the corner portion, said corner portions being outwardly foldable upon themselves about said diagonal score lines in an inside face-to-inside face manner thereby to permit unfolding of the double-folded end and narrow-side wall panels into a flat state when setting-up the flat folding box, said corner portions also being each provided with a central aperture for facilitating the double-folding thereof about said diagonal score lines, and each said central aperture being defined by cut lines parallel to said end score lines.

2. A flat folding box according to claim 1, characterized therein that said broad-side wall panels, along their four sides, are interconnected through two narrow-side wall panels and two end walls panels, the adjacent ends of said four narrow-side and end wall panels being interconnected through four corner portions.

3. A flat folding box according to claim 1, and having a bottom end wall panel and two corresponding corner portions, characterized therein that its opposite filling end, is provided with end closing flaps hinged to said broad-side wall panels and said narrow-side wall panels, respectively, along corresponding transverse score lines and end score lines and to each other along longitudinal end score lines, said end closing flaps in the set-up state of the folding box being foldable and joinable to form a top end wall panel similar to said bottom end wall panel and two top corner portions similar to said bottom corner portions, said top end wall panel formed lacking said central score line.

4. A package produced from a flat folding box according to claim 1, characterized therein that, for yielding package ear portions, said corner portions are folded upon themselves about said diagonal score lines thereof and sealed closed for preventing filling material from escaping out of the package interior.

5. A package according to claim 4, characterized therein that at least those sealed ear portions at the package bottom end extend parallel to the respective narrow-side wall panels.

6. A package according to claim 4, characterized therein that at least those sealed ear portions at the package bottom end are folded to lie against and secured to the respective narrow-side wall panels.

7. A package according to claim 4, characterized therein that at least those sealed ear portions at the package bottom end are folded to lie against and secured to the respective end wall panel.

8. A package according to claim 4, characterized therein that at least one of said ear portions is provided with an easily removable protecting foil or the like for securing hygienic conditions when opening the package through separating therefrom a section of the ear portion in question for obtaining a pouring opening therein.

9. A package according to claim 4, characterized therein that at least one of said ear portions is provided with a tearing weakness line or the like for facilitating the removal of a section of or the entire ear portion for obtaining a pouring opening.

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