June 4, 1957 A. J. WEISS 2,794,587

BLANK FOR FOLDING BOXES AND THE LIKE

Filed Dec. 2, 1954 3 Sheets-Sheet 1

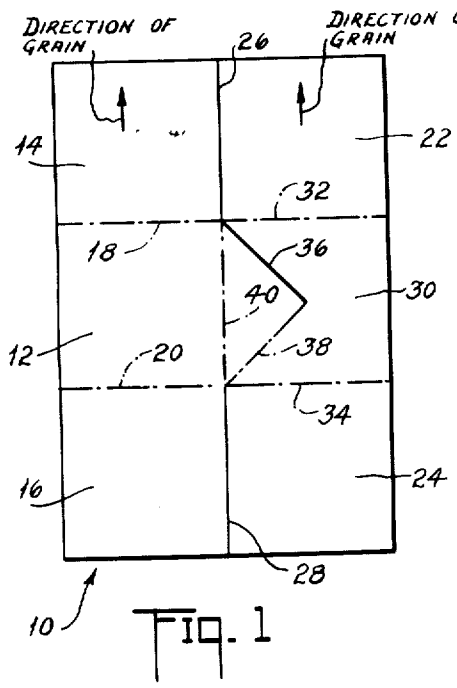



Fig. 1

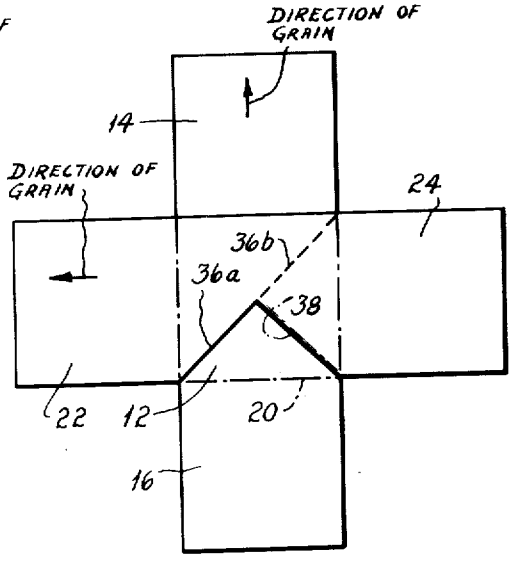



Fig. 2

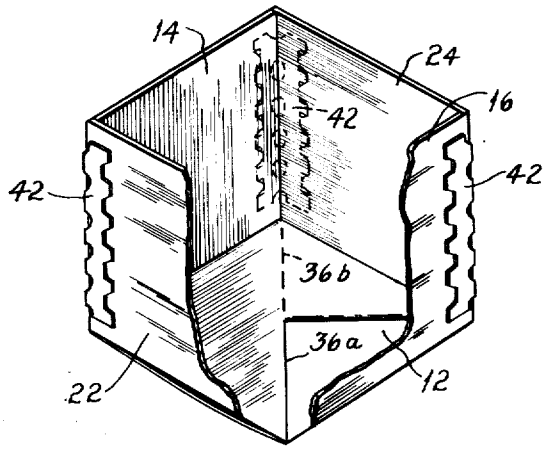



Fig. 3

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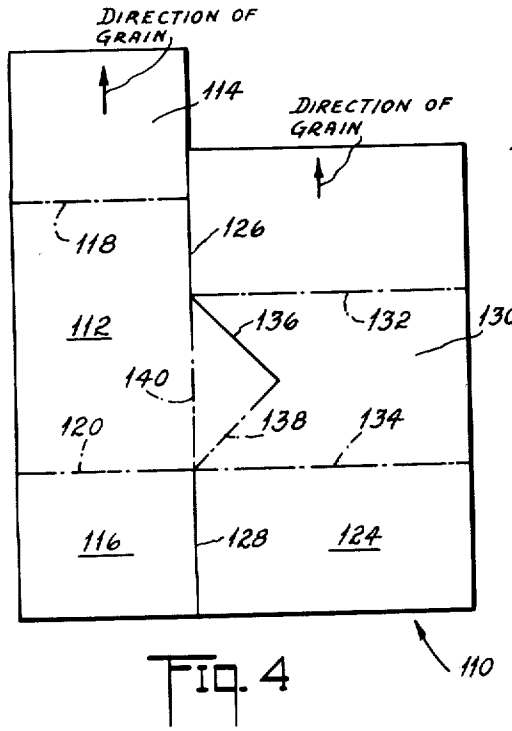



FIG. 4

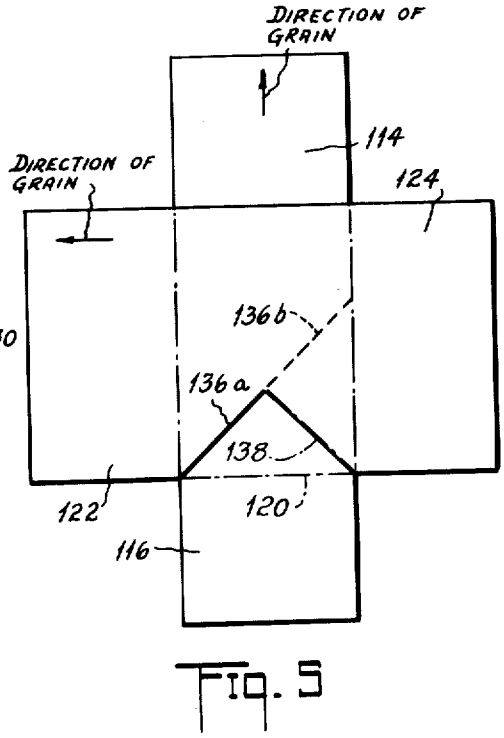



FIG. 5

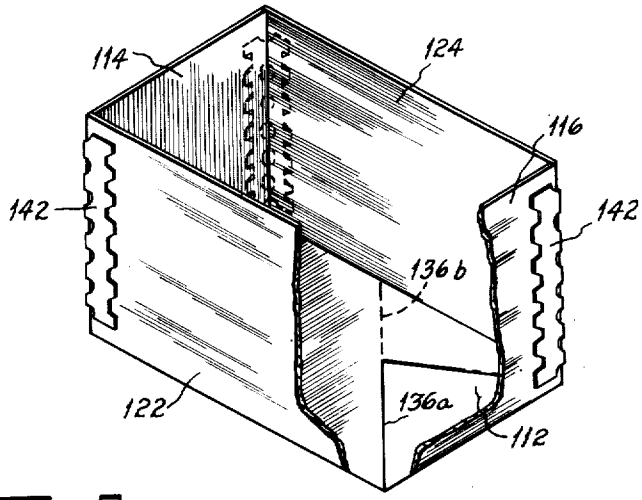



FIG. 6

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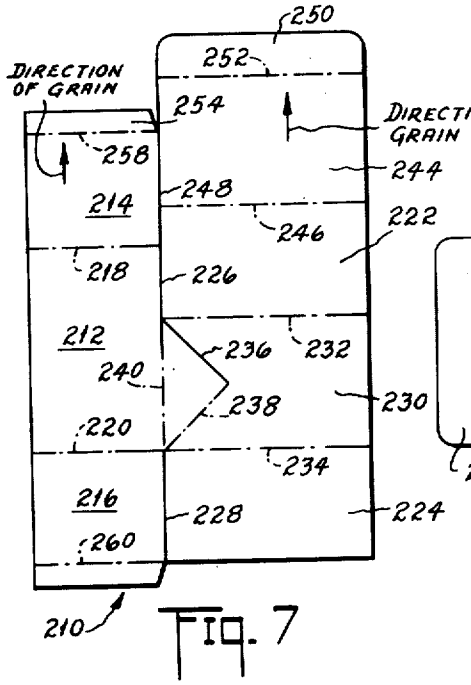



FIG. 7

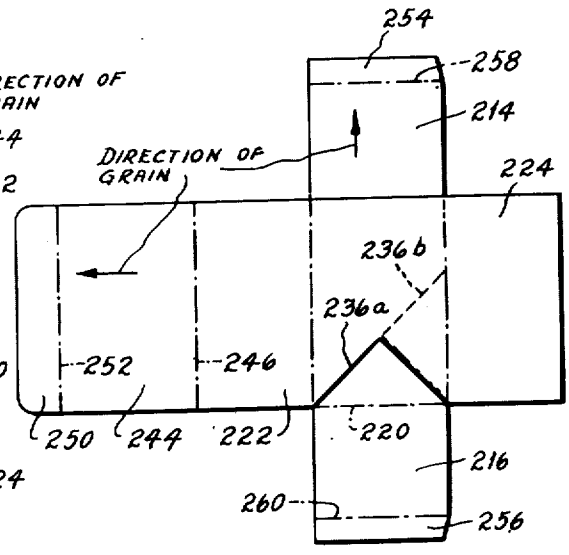



FIG. 8

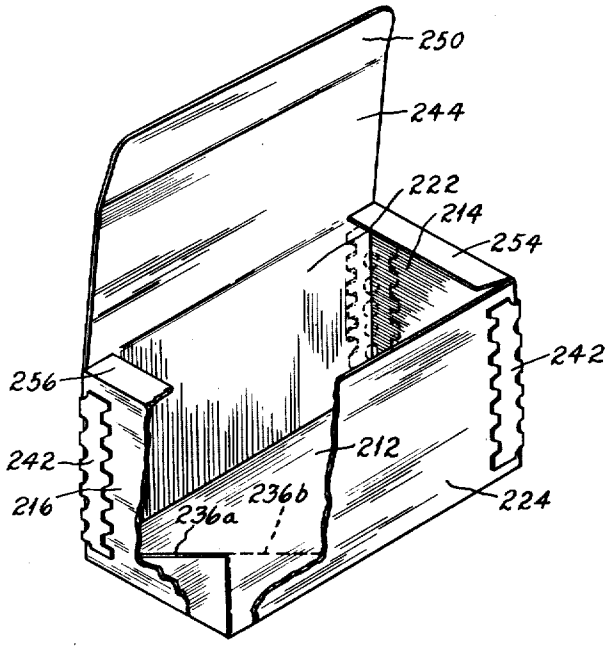



FIG. 9

United States Patent Office 2,794,587 Patented June 4, 1957



2,794,587

# BLANK FOR FOLDING BOXES AND THE LIKE

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Application December 2, 1954, Serial No. 472,647

5 Claims. (Cl. 229—30)

The present invention relates to boxes and related articles formed from blanks consisting of flat sheets of material. For example, the present invention may be embodied in boxes made from blanks which are formed by cutting and creasing a material such as paperboard. More particularly, the present invention relates to a structural feature which may be embodied in blanks of many different forms for boxes and related articles in which such structural feature offers advantages, in varying degree, in strength of the finished box or article, facilitation of setting up the same and economy in the manufacture of blanks.

The structural feature which is common to various embodiments of the present invention, several illustrative forms of which will be disclosed in detail herein, consists in the provision in one of two contiguous panels of a slit and a score line disposed at suitable angles with respect to the remainder of the blank and with respect to each other whereby said contiguous panels may be moved into superposed relation with one portion of the blank turned through an angle of say 90° with respect to the other whereby to form a substantially flat blank having portions of double thickness in the zone in which said contiguous panels are superposed with the remaining portions of the blank defining an outline which may be different from the outline of the blank as originally cut. In this manner final outlines may be achieved which might be uneconomical to achieve in the original cutting of the blank. Also certain materials exhibit different strength in different directions, for instance paperboard which frequently has a pronounced "grain" and is decidedly stiffer in the direction of the grain than it is transversely of the grain. In such instances the present invention makes it possible to provide a blank in which the grain direction in certain panels is disposed in non-parallel relation with the grain direction in other panels.

The advantages of the present invention will become apparent upon a consideration of the following detailed description of several illustrative embodiments, which represent preferred but not necessarily the only forms of the present invention, taken in connection with the drawings accompanying and forming a part of this specification.

Referring now to the drawings:

Fig. 1 is a plan view of a blank made in accordance with the present invention for forming an open-top cubical box;

Fig. 2 is a plan view of the blank of Fig. 1 with parts thereof moved into a position for erection of a box;

Fig. 3 is an elevational view, with parts broken away, of a box erected from the blank shown in Figs. 1 and 2;

Figs. 4, 5 and 6 are views respectively similar to Figs. 1, 2 and 3 and showing a modified form of blank and box; and

Figs. 7, 8 and 9 are views similar respectively to Figs. 1, 2 and 3 and showing a further modified form of blank and box.

In the drawings, Fig. 1, a blank indicated generally at **10**, may be made from any suitable grade and caliper of



paperboard or similar foldable material from which boxes are customarily manufactured. The blank **10** includes a bottom panel **12**, a side wall panel **14** and another side wall panel **16**. The panels **14** and **16** are bounded with the bottom panel **12** by score lines **18** and **20**, respectively, along which the side wall panels **14** and **16** may be folded into positions perpendicular to the bottom panel **12** for erection of the box. Side wall panels **22** and **24** are separated, respectively, from the side wall panels **14** and **16** by cuts or slits **26** and **28**, respectively, and are hinged to a secondary bottom panel **30** along score lines **32** and **34**, respectively. The secondary bottom panel **30** is provided with a diagonally disposed cut or slit **36** which extends from the intersection between the slit **26** and the score line **32**, inwardly to the center of the secondary panel **30** where it intersects a diagonally extending score line **38** which terminates at the intersection between the slit **28** and score line **34**. The angle between the slit **36** and score line **38** is a right angle and in this particular form of the invention in which the wall-forming panels are square the apex of such angle is in the center of the secondary bottom panel **30**. A score line **40** separates the secondary panel **30** from the bottom panel **12**.

When it is desired to set up a box from the blank thus described, the panels **22**, **30** and **24** are moved as a unit relative to the remaining panels causing separation to occur along the slits **26**, **28** and **36**. The unit may be moved upwardly and over the panels **12**, **14** and **16** and simultaneously turned in a counter-clockwise direction to cause bending of the blank along the score lines **40** and **38**. The triangular portion bounded by the score lines **40** and **38** and the slit **36** is folded first upwardly and then down into face contact with the bottom panel **12**. Such movement places the blank in the position shown in Fig. 2 wherein the edges **36*a*** and **36*b*** of the slit **36** are separated and extend diagonally across the bottom panel **12**. Alternatively, the unit consisting of panels **22**, **30** and **24** may be moved downwardly and beneath the panels **12**, **14** and **16** to bring the blank into a form similar to that shown in Fig. 2, except that the panel **30** will be beneath the panel **12**.

In either event the side wall panels **14**, **16**, **22** and **24** may then be folded upwardly along the appropriate score lines to assume the positions shown in Fig. 3. The side wall panels may be secured in erected position by any suitable means. For purposes of illustration they are shown secured by metal corner stay strips of any conventional form, such strips being indicated at **42**.

From an observation of Fig. 2, it will be apparent that the cruciform configuration required for the erection of the box shown in Fig. 3 is achieved by providing in the secondary bottom panel **30** the angularly disposed slit **36** and score line **38** which intersect at right angles in the central zone of the panel **12**. It also will be apparent that if the cruciform shape shown in Fig. 2 were achieved by cutting a flat five-panel blank from a rectangular master sheet, such master sheet would have an area equal at least to the area of nine panels such as the panels **14**, **16**, etc. In contrast with this the blank in Fig. 1 is rectangular and has an area equal to six such panels. While cruciform blanks are customarily "nested" on the master sheet, there is inevitably some waste and in at least some instances the blank of the present invention may be formed with less waste.

A particular advantage of the construction just described lies in the fact that blanks **10** may be so arranged on the master sheet that the grain runs in the direction indicated by the arrows positioned in panels **14** and **22**. When the blank is moved into the position shown in Fig. 2, the grain in the panel **22** runs at right angles to the grain in panel **14**. Thus when the blank of Fig. 2 is formed into a box, as shown in Fig. 3, the grain of all of

the side wall panels **14**, **16**, **22** and **24** will run vertically. This imparts greater stacking strength to the containers since in many instances the material from which the containers are made will exhibit greater crushing strength along lines parallel with the grain. In contrast with this, if a flat cruciform blank were to be cut as in the prior practice, the grain would run vertically in two of the side wall panels and inevitably would run transversely of the other two side wall panels.

It might appear that the results described above could be achieved from a blank of the same area as that shown in Fig. 1 which has been cut into two pieces along the lines **26**, **40**, **28**. These two separate pieces might be assembled crosswise with a bottom of double thickness to produce a blank of cruciform outline suitable for erection of the box shown in Fig. 3. While such operation would achieve some economy in boxboard and could result in vertical grain in the side walls, it would not lend itself to rapid and accurate erection essential to box manufacture on a commercial scale. The two separate blanks would have to be accurately positioned with respect to each other and held in some manner during the fastening of the corners. According to the present invention the blank is self-aligning. The simple folding, lifting and turning operation described above places the components of the blank in precise registry without attention from the operator. If metal corner stays are used, they are customarily applied in a hand-fed machine in which each corner is individually stayed. Thus the user of the present invention will arrange the blank as shown in Fig. 2 and will fold any adjacent pair of side wall panels, such as **14** and **24** for example, with their edges in registry and will place such edges upon the anvil of the corner staying machine. The machine is then operated to apply the stay **42** which pierces the adjacent wall areas and securely fastens the stay over the adjacent edges. The remaining corners are successively stayed in the same fashion. Since this entire operation must be performed rapidly and accurately, it is readily apparent that the self-aligning feature of the present blank is an essential and substantially indispensible attribute of the present invention.

The modified form of the invention shown in Figs. 4, 5 and 6 is very similar to the form shown in Figs. 1, 2 and 3 except that the cross-section of the erected box is an elongated rectangle rather than a square. The blank indicated generally at **110** includes a rectangular bottom panel **112** and side wall panels **114** and **116** separated therefrom by score lines **118** and **120** respectively. The relative dimensions of the panels **112**, **114** and **116** may be so chosen as to establish the desired cross-sectional shape and height of the box to be erected from the blank **110**.

The blank **110** is also provided with side wall panels **122** and **124** separated from the remainder of the blank along slits or cuts **126** and **128**, respectively, and joined along score lines **132** and **134**, respectively, with a secondary bottom panel **130**. A slit or cut **136** extends from the intersection of the slit **126** with score line **132** diagonally inwardly of the secondary bottom panel **130** where it intersects a diagonally extending score line **138**. The score line **138** extends from the intersection between the slit **128** and score line **134**. Each of the lines **136** and **138** are disposed at 45° to the score lines **132** and **134**, respectively, so as to intersect along the longitudinal center line of the secondary bottom panel **130** and to describe at that point a right angle. A score line **140** serves to separate the secondary bottom panel **130** from the bottom panel **112**.

The blank shown in Fig. 4 may be moved into the position shown in Fig. 5 by a combined lifting and turning movement imparted to the panels **122**, **124** and **130** as a unit relative to the panels **112**, **114** and **116**, as described above in connection with the modification shown in Figs. 1 through 3. Such operation separates the edges **136***a* and **136***b* of the slot **136** and places the triangle bounded by score lines **138** and **140** and slit **136** in face contact with the upper surface of the bottom panel **112** to dispose the various panels in the positions shown in Fig. 5.



The box shown in Fig. 6 may be erected from the blank shown in Fig. 5, and secured in any desired fashion, as by metal corner stays **142**, all as described above in connection with Figs. 1, 2 and 3. As in the first form of this invention it may be advantageous to arrange the grain of the material as indicated by the arrows in Figs. 4 and 5 whereby the grain will run vertically of all four side walls of the box shown in Fig. 6. Also it will be apparent that under particular circumstances the outline of the flat blank shown in Fig. 4 may be more economically cut from a master sheet than the outline assumed thereby in Fig. 5.

The modified form of the invention shown in Figs. 7, 8 and 9 constitutes a box which may be rectangular, as shown, or may be substantially cubical and it differs from the first two forms of this invention largely in the provision of a cover with tuck flap and cover supporting flaps as conventionally provided in boxes of this general type. From a consideration of the outline of the flat blank as shown in Fig. 7 and the outline of said blank when prepared for erection, as shown in Fig. 8, it will be apparent that blanking economy may be effected in many instances by the practice of the present invention.

The flat blank shown in Fig. 7 includes a bottom panel **212** and end wall panels **214** and **216** separated from the bottom **212** by score lines **218** and **220** respectively. The blank also includes a rear wall panel **222** and a front wall panel **224** separated from the end wall panels **214** and **216** by slits **226** and **228**, respectively. A secondary bottom panel **230** is separated from the front and rear walls **222** and **224** by score lines **232** and **234** respectively and is provided with a diagonally disposed slit **236** which intersects a diagonally disposed score line **238**. The slit **236** and score line **238** are laid out in the same manner as the slit **136** and score line **138** described above in connection with Figs. 4 through 7. A score line **240** serves to separate the secondary bottom panel **230** from the bottom panel **212**. The blank **210** also includes a cover panel **244** separated from the rear wall panel **222** by a score line **246** and separated from the end wall **214** by a slit **248**. The cover panel **244** may be provided with a tuck flap **250** hinged along a score line **252**. The end wall panels **214** and **216** may be provided with cover-supporting flange panels **254** and **256**, respectively, hinged along score lines **258** and **260**.

The flat blank shown in Fig. 7 may be moved into the position shown in Fig. 8 by bending along the score lines **240** and **238** with attendant separation of the edges **236***a* and **236***b* of the slit **236**, as described above in connection with either of the preceding forms of the present invention.

The box shown in Fig. 9 may be erected from the blank shown in Fig. 8 and secured in any desired fashion, as by metal corner stays **242**, all as described above in connection with the preceding forms of this invention. As in said preceding forms, it may be advantageous to arrange the grain of the material as indicated by the arrows in Figs. 7 and 8, whereby the grain will run vertically on all four side walls of the box shown in Fig. 9.

While the present invention has been disclosed in connection with cartons it will be understood that blanks embodying the same may have utility in other fields. For example, blanks having the generally cruciform outline and the multi-directional disposition of the "grain" such as shown in Figs. 2, 5 or 8 may be provided in particular form useful as spacers or reenforcing elements in packaging, or as shirt boards for laundries or shirt manufacturers, or as display signs and the like.

I claim:

1. A blank in flat form adapted to be erected into a box including at least side walls and a bottom, consisting

of a single sheet of paperboard having formed therein a first side wall panel joined along a score line with a first bottom panel, a second side wall panel joined along a second score line with said first bottom panel, said first and second score lines being spaced to define a dimension of said first bottom panel, a second bottom panel joined with said first bottom panel along a third score line, said third score line extending generally transversely to said first and second score lines, additional side wall panels joined with said second bottom panel along additional score lines, all of said side wall panels being separate from each other and having their bottom edges defined by the score lines along which each is joined to a bottom panel, a fourth score line and a slit converging inwardly from the extremities of said third score line and intersecting in one of said bottom panels, said flat blank being adapted to be folded through 180° along said third and fourth score lines to superimpose one of said bottom panels upon the other to form a substantially flat blank of generally cruciform shape having a bottom panel of substantially double thickness with said side wall panels radiating therefrom at angularly spaced intervals.

2. A blank in flat form adapted to be erected into a box at least including four side walls and a rectangular bottom, consisting of a single sheet of paperboard having formed therein a first side wall panel joined along a score line with a first bottom panel, a second side wall panel joined along a second score line with said first bottom panel, said first and second score lines being parallel and spaced to define a dimension of said first bottom panel, a second bottom panel having substantially the same dimensions as said first bottom panel and joined therewith along a third score line, said third score line extending in a direction perpendicular to said first and second score lines, a third and a fourth side wall panel joined respectively with said second bottom panel along fourth and fifth score lines extending in directions parallel with said first and second score lines, said first and third side wall panels being separate from each other and having their bottom edges defined respectively by said first and fourth score lines, said second and fourth side wall panels being separate from each other and having their bottom edges defined respectively by said second and fifth score lines, said third score line constituting the hypotenuse of an isosceles right triangle, the other two sides of which comprise a sixth score line and a slit, respectively, formed in said second bottom panel, said flat blank being adapted to be folded through 180° along said third and sixth score lines to place said first and second bottom panels in superposed registry thus to form a substantially flat blank of generally cruciform shape having a bottom panel of substantially double thickness with said side wall panels radiating therefrom at intervals of 90°.

3. A blank in flat form adapted to be erected into a box at least including four rectangular side walls and a rectangular bottom, consisting of a single sheet of paperboard having formed therein a first rectangular side wall panel joined along a score line with a first rectangular bottom panel, a second rectangular side wall panel joined along a second score line with said first bottom panel, said first and second score lines being parallel and spaced to define a dimension of said first bottom panel, a second rectangular bottom panel having substantially the same dimensions as said first bottom panel and joined therewith along a third score line, said third score line extending in a direction perpendicular to said first and second score lines, a third and a fourth rectangular side wall panel joined respectively with said second bottom panel along fourth and fifth score lines extending in directions parallel with said first and second score lines, said first and third side wall panels being separate from each other and having their bottom edges defined respectively by said first and fourth score lines, said second and fourth side wall panels being separate from each other and having their bottom edges defined respectively by said second and fifth score lines, said third score line constituting the hypotenuse of an isosceles right triangle, the other two sides of which comprise a sixth score line and a slit, respectively, formed in said second bottom panel, said flat blank being adapted to be folded through 180° along said third and sixth score lines to place said first and second bottom panels in superposed registry thus to form a substantially flat blank or cruciform shape having a bottom panel of substantially double thickness with said side wall panels radiating therefrom at intervals of 90°.



4. A blank in flat form adapted to be erected into a box and the like including at least side walls and a bottom, consisting of a single sheet of paperboard having formed therein a first side wall panel joined along a first score line with a first bottom panel, a second bottom panel joined with said first bottom panel along a second score line, said second score line extending generally transversely to said first score line, a second side wall panel joined with said second bottom panel along a third score line, said first and second side wall panels having their bottom edges defined by said first and third score lines, a fourth score line and a slit converging inwardly from the extremities of said second score line and intersecting in one of said bottom panels, said flat blank being adapted to be folded through 180° along said second and fourth score lines to superimpose one of said bottom panels upon the other of said side wall panels being adapted to be folded along said first and third score lines whereby to form a box or the like having a bottom panel of substantially double thickness with said side wall panels extending upwardly from said bottom.

5. A blank in flat form, adapted to be erected into a box including at least three side walls and a bottom, consisting of a single sheet of paperboard having formed therein a first side wall panel joined along a first score line with a first bottom panel, a second side wall panel joined along a second score line with said first bottom panel, said first and second score lines being spaced to define a dimension of said first bottom panel, a second bottom panel joined with said first bottom panel along a third score line, said third score line extending generally transversely to said first and second score lines, at least one additional side wall panel joined with said second bottom panel along a score line, all of said side wall panels having their bottom edges defined by the score lines along which each is joined to a bottom panel, a fourth score line and a slit converging inwardly from the extremities of said third score line and intersecting in one of said bottom panels, said flat blank being adapted to be folded through 180° along said third and fourth score lines to superimpose one of said bottom panels upon the other and said first, second and third side wall panels being adapted to be folded along the score lines along which each is joined to a bottom panel to form a box having a bottom panel of substantially double thickness with said side wall panels extending upwardly from said bottom.

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