Dec. 13, 1927. 1,652,844

J. R. VAN WORMER

DIAGONAL BOTTOM SECTION KNOCKDOWN BOX

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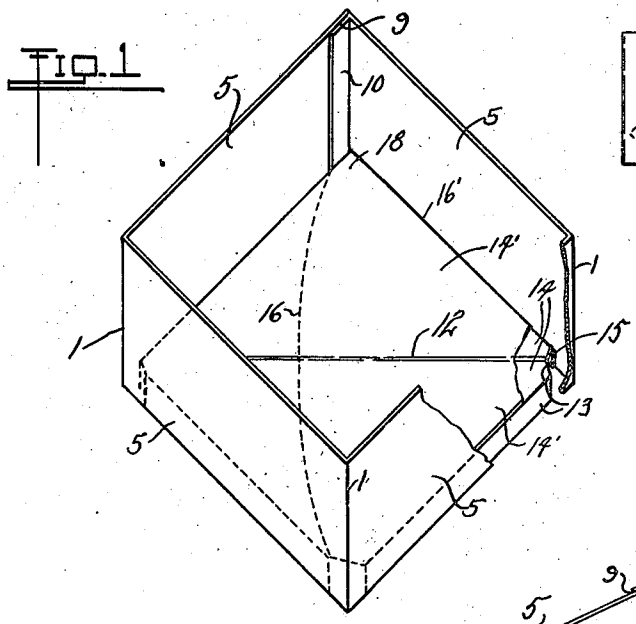


FIG. 1

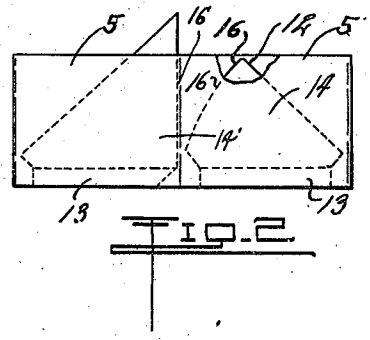


FIG. 2

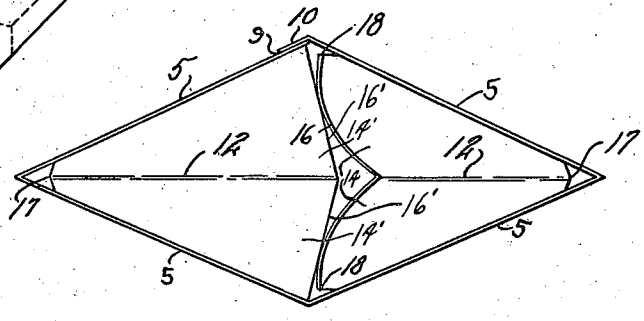


FIG. 3

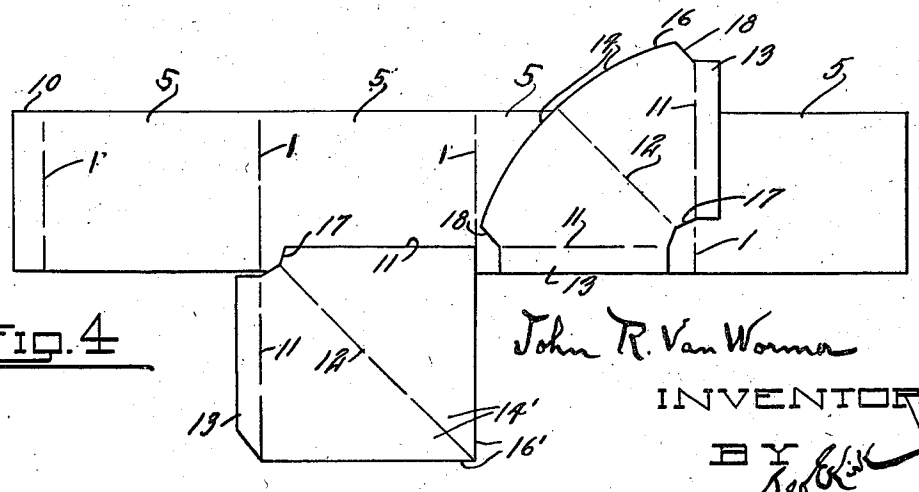


FIG. 4

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FIG. 5

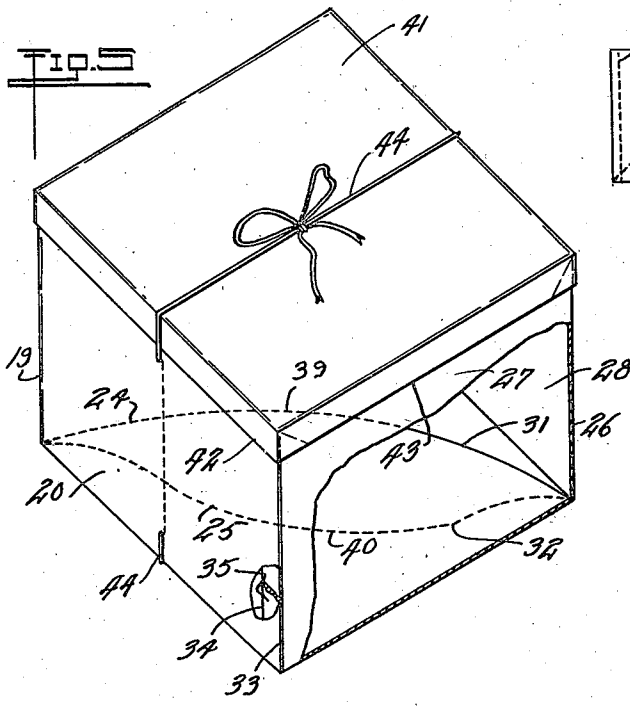


FIG. 6

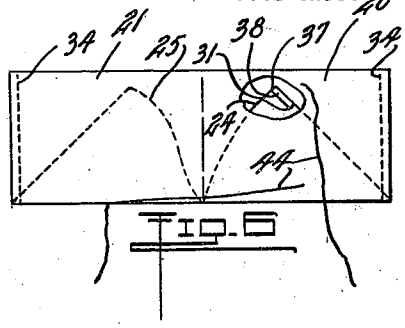


FIG. 9

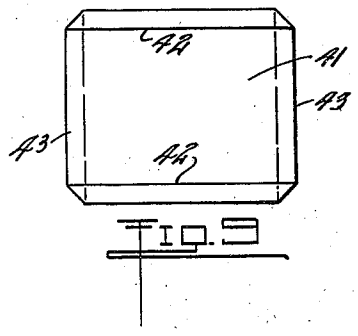


FIG. 7

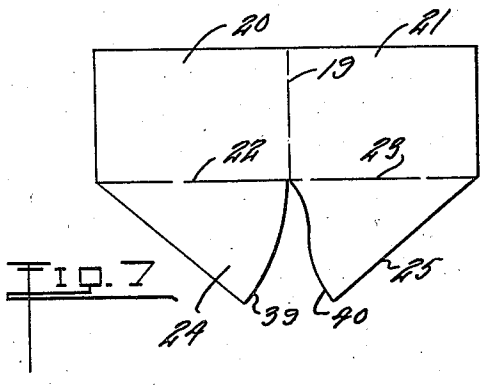


FIG. 8

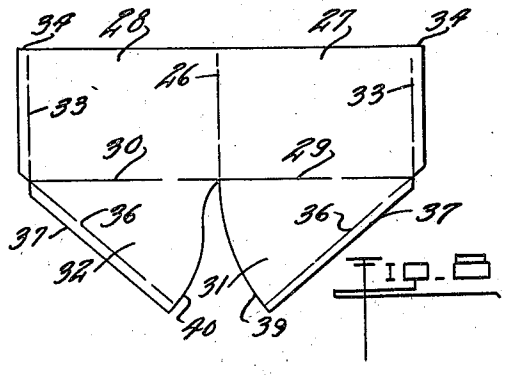
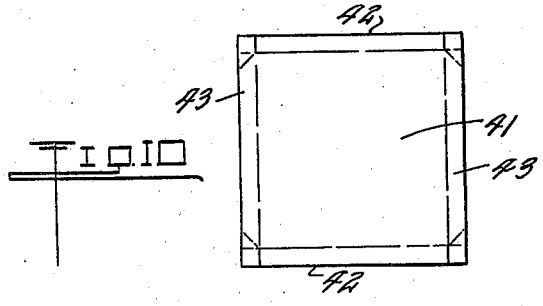


FIG. 10



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Patented Dec. 13, 1927. 1,652,844

UNITED STATES PATENT OFFICE.

JOHN R. VAN WORMER, OF TOLEDO, OHIO.

DIAGONAL-BOTTOM-SECTION KNOCKDOWN BOX.

Application filed January 24, 1925. Serial No. 4,407.

This invention relates to boxes or containers having set up locking bottoms.

This invention has utility when incorporated in paper, cardboard, or fiber boxes having a pair of overlapping medially foldable bottom sections diagonally of each other.

Referring to the drawings:

Fig. 1 is a perspective view, with parts broken away, of an embodiment of the invention in a so-called berry box type of container;

Fig. 2 is a side elevation, with parts broken away, of the box of Fig. 1, in knockdown position;

Fig. 3 is a plan view of the box of Fig. 2, in partially opened position;

Fig. 4 is a view of the box side forming blank, with the box bottom blanks attached only partially thereto and the side blank being open;

Fig. 5 is a perspective view, with parts being broken away, of an embodiment of the invention in a container of the hat box type;

Fig. 6 is a side elevation, with parts broken away, of the knock-down box of Fig. 5;

Fig. 7 is a view of one of the blanks for the side and bottom of the box of Fig. 5;

Fig. 8 is a view of the companion blank for the box of Fig. 5;

Fig. 9 is a view of a type of knock-down top for the box of Fig. 5; and

Fig. 10 is a view of the blank for the top of the box of Fig. 5.

The side blank may be an endless strip having score lines 1, 1, 1, 1, providing hinge corners connecting sides 5, 5, 5, 5, said sides being closed into an endless side wall providing structure by adhesive 9 connecting flap 10 with the end of the side 5.

In fruit and berry boxes or structures wherein the contents of one box should not rest upon that of the lower box, and it is still desirable to have the boxes carry heaping measure, a countersink for the bottom is desirable so that the bottom positions up into the side walls. To this end, foldable bottom section blanks are provided.

Diverging scoring lines 11, 12, 11, define mounting flaps 13 with intermediate bottom forming sections 14 or 14′. Adhesive 15 may assemble these flaps 13 with adjacent terminal pair of sides 5, 5, as to one section and the other sides 5, 5, as to the other section. These bottom sections, accordingly, have hinge connections 11 approximating base and altitude therefor with hypotenuse approximating free edge 16 or connecting edges 16′. In smaller containers wherein the material is not fine for sifting out, intermediate cut away portions 17 in the score lines 12 tend to minimize knock-down strain between the sides 5, 5 of each bottom section. When desired symmetry and convenience for ready slipping into overlapping relation is effected by cut away portions 18 adjacent the ends of the hypotenuse approximating edge 16.

This knock-down box as assembled may be transported to the place of use or kept in storage in flat condition occupying a minimum of space. When it is desired to use the box, it is in condition for quick easy setting up in a self-locking position as the diagonal corners 1, 1, which are in the region of the hypotenuse approximating edge 16 of the foldable bottom section, are moved away from each other, these projecting foldable sections readily pass, one by the other, into overlapping position to bring the respective sections 14, 14′ as on opposite sides of the score lines 12 into a common plane parallel to the plane of the adjacent section. Due to this overlapping, one with the other, there is stiffening for the bottom due to the edges 16, 16′ adjacent the cut away portions 18 riding close to the hinge portions 11 of the opposing section. In berry or fruit box types of structure, this locking is sufficient to carry the load for the container.

In this particular branch of use, these boxes may be stacked as filled one directly over the other independently of any intermediate slats or spacers so that the countersunk bottom boxes may be stacked to the desired heights in the fruit crates with the corner ventilation provision by the cut away portions 17, 18.

This type of bottom structure is one susceptible to wide ranges of use and capacity. The box height may be varied for a capacity change with but a single set of dies for the bottom. Furthermore, dies may be had for bottom cutting with one edge, the top, adjustable for variable size box capacity with a foldable bottom section (Figs. 7, 8) directly hinged on the sides as integral connection instead of the attached hinge connection of the countersunk bottom box. To this end, a blank may have scoring 19 determine adjacent sides 20, 21, of a box with

scoring 22, 23, determining the bottom hinge connection of the respective sides of bottom section elements 24, 25. Companion blank is provided with score line 26, separating the sides 27, 28, while score lines 29, 30, define bottom element 31 as companion to bottom element 24 and define bottom element 32 as companion element to bottom element 25.

The sides 27, 28, remote from the score line 26 have score lines 33 defining flaps 34 connectible by adhesive 35 to the free ends of the respective sides 20, 21. Score lines 36 determine fold lines for flaps 37 from the respective bottom elements 31, 32, for connection by adhesive 38 of the companion elements 24, 25 (Fig. 6). In this assembly on the score lines 22, 23, 29, 30, the bottom section comprising elements 24, 31, folds on scoring hinge line 36 to lie flat between sides 20, 27, as these sides are swung toward each other on hinge corner 33. Simultaneously the bottom section comprising elements 25, 32, swing on hinge connections 23, 30, to lie between the sides 21, 28, as these elements fold together on the fold scoring line 36. In box opening it is only necessary to move the hinge providing scorings 19, 26, as adjacent each other, apart, and the bottom sections as to their hypotenuse approximating lines 39, 40, swing into overlapping position with a partial locking of the box in such open or set up position. Such locking may be supplemented by a slip top or cover for the box. Such cover is herein shown as also knock-down. This cover 41 has its flanges 42 foldable toward each other as the flanges 43 move outwardly in the flat condition of such top. It is only necessary to move the flaps 42 away from the body portion 41 of the top to have the flaps 43 move inward to provide the flange top for the box as a closure herein. In a supplemental reinforcement, say for a hat box, a convenient means for carrying may be provided by draw string 44 threaded through the box to draw up thereover for tying.

With a common diameter or dimension for the sides and bottom independently of the height, it is possible herein to develop a range of capacity for containers in a simple, inexpensive manner. These containers are readily adapted to wide ranges of use, and according to the character of the material adopted, may be used with economy and a maximum of satisfaction. The bottom sections as of general triangular form are in these rectangular containers of the general right triangle type with the hinge mountings or connections providing the base and altitude approximating lines. The free connecting edge therebetween is a sort of plus-hypotenuse for the overlapping partially frictional locking. The recurved edge 40 allows of ready slipping of such into overlapping position as to the opposing edge 39.

What is claimed and it is desired to secure by Letters Patent is:

A collapsible box having two pairs of parallel sides forming a tube, a bottom for the box comprising two bottom sections each having a medial fold extending diagonally of the box, said sections having integral flap extensions mounted on adjacent sides of the box from which the sections are hinged offset from an end of the tube and coacting in tube collapsing to permit the sections to fold into the tube away from said end in tube opening bringing the box bottom sections into a horizontal plane, one of said bottom sections having free edges approximately overlaying hinge mounting edges of the other section and extending along sides of the box the full extent of such hinge mountings, thereby imparting set up stability to the box bottom.

In witness whereof I affix my signature.

JOHN R. VAN WORMER.