Sept. 23, 1924. 1,509,735

R. H. LAUBERSHEIMER

BOX

Filed June 28, 1924 2 Sheets-Sheet 1

Fig. 2.

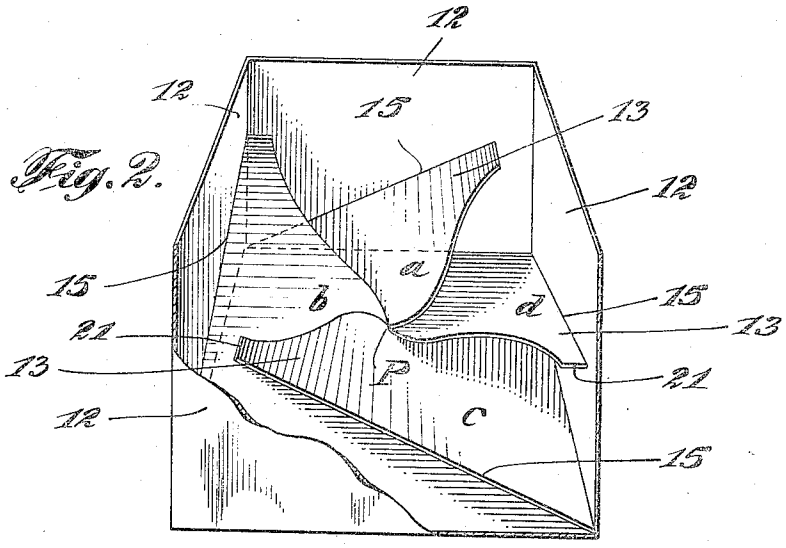
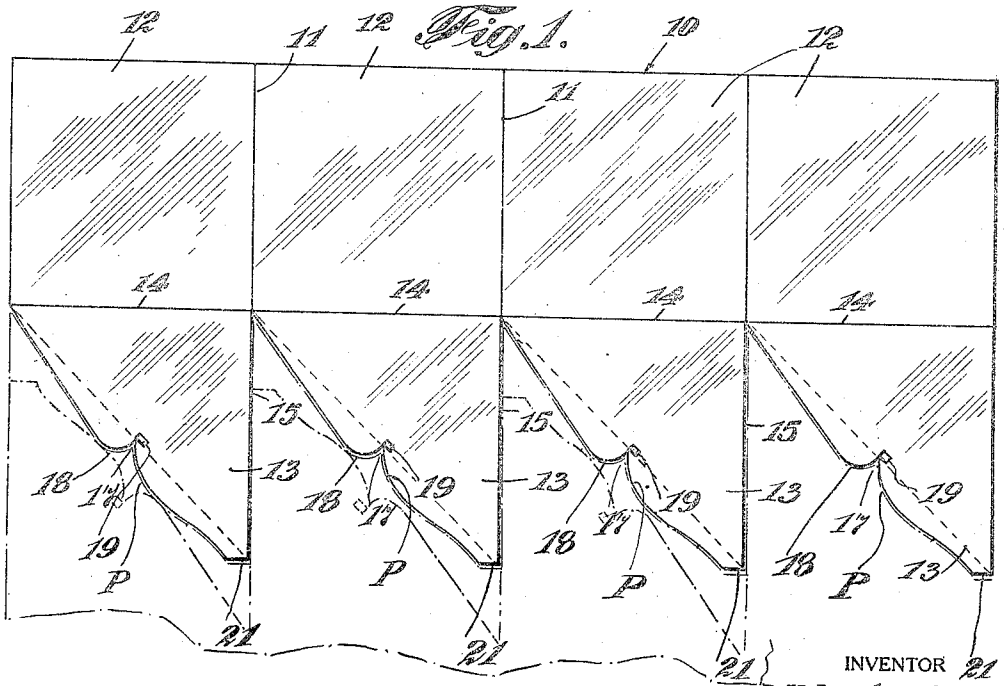


Fig. 1.



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Fig. 3.

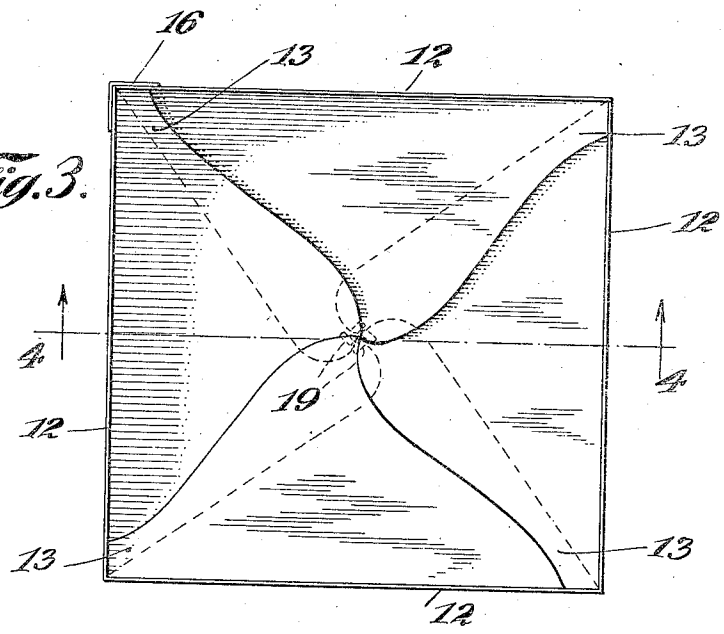


Fig. 4.

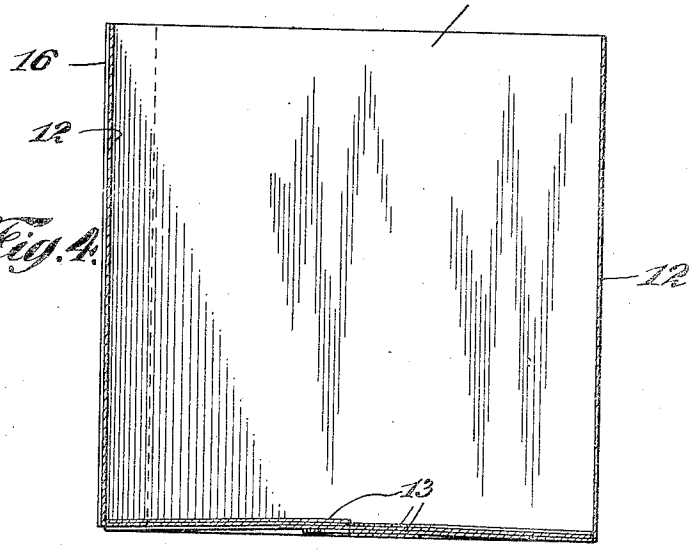
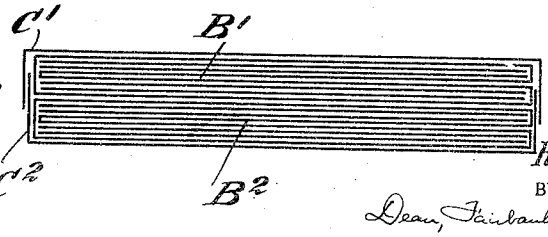


Fig. 5.



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UNITED STATES PATENT OFFICE.

RICHARD H. LAUBERSHEIMER, OF BROOKLYN, NEW YORK.

BOX.

Application filed June 28, 1924. Serial No. 722,935.

To all whom it may concern:

Be it known that I, RICHARD H. LAUBERSHEIMER, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Boxes, of which the following is a specification.

This invention relates primarily to boxes of the character to be set up from a collapsed structure, and especially of the type having flaps at the lower end, which form the box bottom.

Among the objects of the invention are to provide a box of the general character set forth, which may be blanked out with a minimum waste of material, which may be quickly and easily set up for use, and which is unlikely to collapse or come apart while in use.

In the preferred embodiment, the flaps connected to the lower edges of the side walls, move by a direct swinging action, into interlocking relationship to form the box bottom. Preferably the movement of these flaps to operative position is semi-automatic, initial movement toward such position and into overlapped relationship, occurring as a consequence of the unfolding or opening of the side walls and the only operation to complete the set up is a single direct push on the overlapped flaps to force them downward into interlocked relationship.

The box is preferably square in accordance with standard practice but the invention is applicable to other types of polygonal containers and is particularly efficacious where the cross-sectional shape of the box is a regular polygon. Certain broader features of the invention are also applicable to the cover flap structure of a box.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a plan view of the box blank,

Fig. 2 is a perspective view, illustrating the position of the parts when the box is partially set up,

Fig. 3 is a plan view of the completed box,

Fig. 4 is a transverse sectional view taken along the line 4—4 of Fig. 3, and

Fig. 5 is a diagrammatical cross-sectional view showing two boxes in collapsed condition prior to use and exaggerated in thickness to better reveal the construction.

The blank of which the box is made, as shown in Fig. 1, comprises an elongated body portion 10 transversely scored at 11 to define the four sides 12 of the box. Flaps 13 are integrally connected with the bottom edges of the several side walls 12, fold lines 14 defining the connections of the flaps and the walls. These flaps are identical and are each in the general form of a right-angled isosceles triangle. The fold line 14 defines one of the legs of the triangle and the other leg 15 forms a continuation of the corresponding transverse score lines 11 of the blank. In the developed blank, the hypotenuses of the triangles extend parallel to each other, as shown. The opposite ends of the folded blank 10 are connected by a hinge strip such as the adhesive tape 16.

The true diagonal of the bottom of the box is indicated in dotted lines at each of the flaps in Fig. 1. The free oblique edges of the flaps extend beyond said diagonal and are centrally notched as at 17. The oblique edge is reversely curved as at 18 from the apex to the notch and the inner end of the notch terminates in a locking notch 19 cut back into the flap somewhat within the diagonal line, the length of said notch extending preferably generally parallel to the diagonal. The outer half of the oblique edge is curved as at 18′ from the apex to the locking notch 19.

In normal collapsed condition of the box, the flaps are bent inward, superposed over the respective side walls and the latter are collapsed in a flat parallelogram in turn, folded in half about the superposed median score lines 11. This arrangement is best indicated in Fig. 5, in which, it will be noted, two of the collapsed box structures B' and B^2 thus described are encased in the separate telescoped flat tray cover members C' and C^2 for the boxes. Thus, for storage, the boxes take up substantially only the space required by the bulk of the material of which they are composed.

To set up the box, it is rested upon a table or bench and the side walls are distended by reversing the folding operation just described, so that the rectangular or

other side wall structure stands upon the table as a prism with the end flaps 13 extending upward thereinto from the bottom. The end flaps will now naturally fall inward, the leg or side 15 of each flap tending to fall over the oblique side or hypotenuse of the adjacent flap. Specifically, each curved flap portion 18 will ride along the similarly curved portion of the contiguous flap, while falling inward until the four flaps engage at a common point P on the vertical axis of the box, as shown in Fig. 2. This point P corresponds to the points P in the blank of Fig. 1 and it will be seen is spaced from the corresponding corner of the box by a distance greater than the semi-diagonal of the bottom, so that the flaps will naturally be arrested in their fall at a level higher than the bottom of the box, as shown in Fig. 2. Considering the flaps in the order *a*—*b*—*c*—*d*, as indicated in Fig. 2, the notch 17 of the flap *c* extends under the succeeding flap *d* at one side thereof, and over the preceding flap *b* at the other, thus, in effect, straddling the three companion flaps. The arrangement is entirely symmetrical, the notch of each flap extending under the flap at one side thereof and over the flap at the other side thereof, so that the notch of each flap straddles the three companion flaps. By a direct manual downward push upon the flaps, the contacting edges of the flaps will continue to ride inward with respect to each other, the material of the flaps flexing slightly to permit this action until when the bottom has reached its flattened position in contact with the table, the flexed flaps will have snapped by a toggle action into interlocked engagement at the locking notches 19, the locking notch of each flap straddling and locking the three companion flaps.

The locking takes place, in effect, by a combined camming or sliding and toggle action, in which the stiffness of the bottom flaps forced horizontally outward from the locking notches, causes a spreading out of the side walls, providing a bracing effect. In the preferred embodiment, as indicated, the triangular flaps are somewhat widened at their apices as at 21, to avoid any sharp or pointed end likely to curl or break and to afford a more effective and secure contact with respect to the vertical wall which is engaged by the flap end, when the box is set up for use. The structure is well adapted to resist any pressure tending either to drive the bottom upward or downward with respect to the side walls. It will be understood that such pressure on the bottom in either direction would be transformed into a tensile action lengthwise of the flaps and reacting upon the edges of the locking notches 17—19 to more securely draw them together. It will be understood that with reasonably stiff bottom flaps, it would be extremely difficult, if not impossible to release the interlocked flap without mutilating at least one of them, since each flap is interlocked with all of the others.

It will thus be seen that I have provided a box which is set up with unusual celerity, without need for any special manipulation of interleaving or interlocking of flaps. The flaps naturally and automatically drop into interlocking relationship and are firmly locked by a simple manual thrust.

By my arrangement of flaps, it will, moreover, be seen, that since each of the bottom flaps is little more than half the area of the bottom, there is provided a double thickness of bottom. Moreover, the substantial width of material beyond the true hypotenuses of the flaps provides additional thickness along the diagonals as will appear most clearly from Fig. 3. This provides a bracing or trussing effect, adding materially to the stiffness of the box bottom along the diagonals thereof, which diagonals being of maximum length, might in the absence of such stiffening, yield too easily to a force drawing together opposite sides of the box. Furthermore the curved edges 18 at the bottom of the box are reliably drawn by the locking notches into the plane of the bottom, and the hand cannot readily be placed under the edges of said flaps. The results noted are accomplished without the need for separate clips or fasteners, and by the use of a unitary blank. The bracing elements, moreover, do not interfere with the natural interlock of the notches as noted, but on the contrary, enhance the effectiveness of the camming guide edges that lead to the locking notches. It will, moreover, be seen that where paper or fabric is used, which has a grain, added stiffness is provided by my construction, in that at each region, the grain of any flap is at right angles to the grain of the flap lapped thereover. The blank shown in Fig. 1, it will be seen, is economical in material and involves little waste, as substantially all the material left between succeeding flaps 13 in Fig. 1, is formed into the flaps for the next box cut from the same roll of material, as indicated in dotted lines in Fig. 1.

Although the invention is preferably applied to the bottom of a box, certain of the broader features thereof may be also applied to a cover structure. In this case, the flaps would have to be manually raised in sequence, whereupon the cover would be locked by a single thrust.

By my invention, the need for separate manual interlocking of flaps is wholly obviated, effecting economies in time, and dispensing with the need for even the modicum of skill required in such manipulation, yet the lock is exceptionally secure. The

box, moreover, avoids the use of any separate taping or gluing operation, or the provision of glued or pasted areas that must be moistened in setting up. It will be noted that by my invention, each side of the box is a continuous wall that need not be weakened by longitudinal or other creases between its edges.

Although the invention has a desirable field of application to larger boxes, say of more than a foot cube, as, for instance, to millinery boxes, it is not limited to such use, but is applicable more especially for any box having a square or other regular polygonal bottom and of height preferably not less than the side length of the bottom. In its broader aspects, the invention may also be applied to boxes of irregular polygonal cross-sectional shape. As a specific instance, of such an application, I may mention a regular box having an oblong bottom. In this case, the folding bottom-forming flaps would be in the nature of right angle triangles, although not isosceles triangles. Certain of the flaps will be connected to the lower edges of the box walls along their longer sides and other flaps would be attached to the lower edges of the box walls along their shortest sides, the operation of folding being substantially as above described.

The invention although it finds its preferred application to paper boxes is not limited to such use but may be advantageously applied to sheet metal boxes, the interlocking flap arrangement affording a substantially pilfer-proof cover structure.

This application is an improvement upon the invention desclosed in my copending applications, Serial No. 728,554, filed July 28, 1924, and Serial No. 731,567 filed August 12, 1924, the generic subject-matter being claimed in said copending applications.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent of the United States is:—

1. A box of the class described, including side walls, flaps connected to the edges of all of the side walls, each inter-engaging all of the others by simultaneous and direct swinging movement to form an end wall, said flaps having substantially identical locking structures integral therewith, resisting stresses exerted in the planes of said flaps, all operated concurrently to interlock by a single thrust in order to form the box end wall, each of said flaps having a stiffening extension in a unitary structure therewith projecting beyond the straight line connecting the locking structure and the base corner of the flap.

2. A box of the class described, including side walls, flaps connected to the lower edges of the side walls, each inter-engaging all of the others by simultaneous and direct swinging movement from within the distended side walls to form a bottom, said flaps having interlocking means, resisting stresses exerted in the planes of said flaps, operated simultaneously by a single thrust to lock the box bottom against separation of its flaps, said flaps having integral lateral extensions projecting beyond the straight line connecting the interlocking means and the base corner of the flap, and serving as bottom stiffeners.

3. A box of the class described, including side walls, substantially triangular flaps connected to the lower edges of the side walls, each inter-engaging all of the others substantially at the center of an edge thereof, and by simultaneous and direct swinging movement from within the distended side walls of the box to form a bottom, said flaps having locking conformations near the inter-engaging parts, resisting stresses exerted in the planes of said flaps, operated simultaneously by a single thrust to lock the box against separation of its flaps, each of said flaps having an integral lateral extension on the length of the edge of the flap nearest the locking conformation, and extending from the locking conformations toward the base of the flap.

4. A box having a square bottom including side walls forming a closed prism, identical flaps hinged to the lower edges of said side walls, each of said flaps having an oblique edge, the edges of the several flaps substantially parallel to each other in the developed blank, each of said oblique edges extending beyond the straight line connecting its ends and having a notch at the middle thereof adapted to straddle the notches in the other flaps by direct swinging movement of the flaps from within the distended side walls, and locking conformations, adapted to resist stresses exerted in the planes of said flaps, said locking conformations being continuous with the several notches and contiguous to said straight line whereby the locking conformations are guided into interlocking relation by the notches, each of said flaps having an integral lateral stiffen-

ing extension projecting beyond the straight line connecting the locking conformation and the base corner of the flap.

5. The combination set forth in claim 4 in which each locking conformation comprises a notch cut inward within the straight line joining the vertices of the flaps.

6. A locking construction comprising flaps protruding from the sides of a polygonal structure, said flaps each having a central notch in one of the edges thereof, said flaps projecting beyond the straight line joining the notch and the base corner of the flap whereby when said flaps are folded inward seriatim at an acute angle to the structure, a single thrust will cause the notch in each flap to straddle the other flaps at the notches thereof, each of said straddling notches having a locking conformation rendered effective by said thrust, to interlock the flaps and by stresses exerted in the planes of said flaps to prevent said flaps opening under pressure in either direction.

Signed at New York, in the county of New York and State of New York, this 27th day of June A. D. 1924.

RICHARD H. LAUBERSHEIMER.