This invention relates to shipment and display or storage devices, and more particularly to an improved box having three or more sides and including features adapted for simple manufacture, ease of shipment in the disassembled state, ready hand assembly, rigidity of construction, and variety of use.

In the design and development of shipment and display devices, a number of problems are presented. For instance, it is highly desirable to provide a box which may be shipped to the user in the "knocked down" or flat state in order to save shipping costs. Likewise, ease of assembly thereafter is a major factor, and the way in which these things are obtained must not be permitted to detract from the rigidity of the box after it is assembled. In the use of boxes having covers, a major problem has to do with what is known as "telescoping." Such boxes are often shipped fully loaded and arranged in stacks, of sufficient height to subject the lowermost boxes to heavy compression. Under such conditions, if a box cover is permitted to slip laterally and collapse or "telescope" into the bottom section of the box, not only is the box harmed but the merchandise therein may be damaged. Another problem has to do with the provision of attractively embossed surfaces. Often, boxes which have been capable of shipment in the flat state for subsequent assembly have not been readily adapted for decorative embossing. Other considerations have to do with the accommodation of variations in shape or size.

Accordingly among the objects of this invention is the provision of a box which will at one and the same time be strong and rigid and still be adapted for flat shipment and ready assembly. Another object is to provide a box which is adapted to withstand heavy compression without telescoping. Still another major object is to provide a construction which meets the foregoing objects and at the same time combines with it an adaptability for variations in size and shape at the manufacturing level.

Lesser objects are to provide a box having a single wall member and a single bottom or top member for each box section. Another subsidiary object is to provide such a box wall member with joining means which securely fasten its ends together. Still another object is to provide means for forming such a box wall member inexpensively in one continuous operation. Yet another object is to provide a box wall member fitted to receive hinges so that two such members used in combination will form a box with a hinged top.

These and other objects and the features of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings, in which:

FIG. 1 is a view in perspective of a box made in accordance with our invention showing a bottom and top in hinged relation;

FIG. 2 is a view in perspective of a box wall member prior to folding;

FIG. 3 is a cross sectional view in end elevation taken along lines 3—3 of FIG. 1;

FIG. 4 is a vertical section taken along lines 4—4 of FIG. 3;

FIG. 5 is a fragmentary view in perspective of the corner of a folded box member showing the relative position of the support flanges; and

FIG. 6 is a fragmentary view in perspective of the ends of a box wall member showing the means for joining the ends.

Having reference to the drawings for a more particular description, we employ an appropriately formed die to stamp a box wall member 10 out of the desired material, which in this case is light-weight sheet metal. The box wall member 10 appears as in FIG. 2 when it leaves the press. No further tooling is necessary, and thus complete fabrication in one series of stamping operations may be achieved.

Beginning at the female end 22 of the box wall member 10 as shown in FIG. 2, the material is formed into a segment equal in length to an end wall 12. Two transverse narrow slots 14 and 16 are formed through the box wall member 10 at the line of the intended corner of the end wall 12 and an adjoining side wall 18. The narrow slots 14 and 16 weaken the box wall member 10 sufficiently to allow it to be bent at the intended corner, yet still provide sufficient steel surface for rigid alignment of the end wall 12 and side wall 18.

Also formed in the end wall 12 at the end of the box wall member 10 are two retaining members 24 and 26 shown in FIG. 6 for the purpose of receiving a tongue member hereinafter to be described.

The segment of the box wall member 10 adjacent and connected to the end wall 12 is a side wall 18. The side wall 18 is set off by another set of transverse narrow slots 28 and 30 shown in FIG. 2, similar to the slots 14 and 16. The transverse narrow slots 28 and 30 form the intended corner line between the side wall 18 and the following section of the box wall member 10.

The section in succession is an end wall 32 of equal length to the end wall 12. The intended corner line of the end wall 32 and the next side wall is formed by two transverse narrow slots 36 and 38, similar to the narrow slots 14, 16, and 28, 30.

The section of the box wall member 10 following the end wall 32 is a side wall 34. As shown, the side wall 34 is of equal length to the side wall 18. Of course it will be understood that shapes other than rectangular are feasible and the opposite sides need not be identical in length. One of these is formed to receive hinge members if it should be desired to combine two such box wall members to provide a larger box which may be hinged to open and close. In the preferred embodiment, the hinge receiving means comprises transverse perpendicular right-angle flanges 40 and 42 and locking tabs 44 and 46, shown in FIG. 3 and small raised portions 48 and 50 shown in FIG. 2, all in a spaced relationship to receive a hinge mechanism which may be of the type described and claimed in our Letters Patent which issued August 27, 1957, under the No. 2,804,229. The die used to form the box wall member 10 may be cut to form a box wall member adapted to receive hinge members of this type thereby making no additional tooling necessary. In the preferred embodiment the side wall 34 is formed to receive two such hinge members 52 and 54 shown in FIGS. 1 and 3. If desired, the side walls may be provided with ribs parallel to the sides of the box wall member 10. FIGS. 1, 2, and 3 disclose two narrow ribs 56 and 58 parallel to the sides of the box wall member 10 in the segment forming the side wall 34. The ribs are located midway between the sides of the side wall 34 and extend slightly more than the width of the hinged segment 52 under which they are located. The desirability of the ribs 56 and 58 will be dictated by the rigidity required, the particular material from which the box wall member
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10 is stamped, and the strength of the hinge spring employed.

The box wall member 10 is further formed to provide a tongue segment 60 adjacent to the side wall 34 and provided with narrow transverse slots 62 and 64 similar to the narrow slots 14, 16, 28, 30 and 36, 38 enabling the tongue segment 60 to be bent at a right angle in relation to the side wall 34 as is shown in FIG. 6. The tongue segment 60 is also formed with slightly inclined locking surfaces 66 and 68 along one side edge and similar surfaces 70 and 72 along the other side edge. The surfaces 66, 68, 70, and 72 are inclined in the direction of the side wall 34 and are spaced in pairs in a relationship such that when the tongue segment 60 is inserted between right angle flanges 24 and 26 on the end wall 12 which forms retaining members to receive the tongue segment 60, the flanges 24 and 26 will ride up and over the inclined surfaces 68 and 72 and be caught by them preventing disengagement of the tongue segment 60 and end wall 12. The tongue segment 60 is urged outwardly from the end wall 12 by a pair of raised humps 20 which are positioned in the path of the segment 60 along its lateral margins. The action of the humps 20 is both to lift the segment 60 and to bend it transversely along its terminal margin. The tongue segment 60 is of less width than the side wall 34 to which it is attached and is dimensioned to engage the flanges 24 and 26.

The stamping of the box wall member 10 also forms flanges 74 and 76 which extend upwardly from the side edges of the box wall member 10 and consequently inwardly in the assembled box as shown in FIG. 1. The flanges 74 and 76 are beveled 45° at the intended corner lines in order to permit bending of the box wall member 10. The flange 74 is not formed along the edge of the box wall member 10 at the points on the side wall segment 34 where the hinge assemblies are to be inserted. The flanges 74 and 76 serve various purposes. They provide extra support for the box wall member when the box walls are assembled, adding to the rigidity of the structure and preventing telescoping. They also provide means for supporting the base members when the box is assembled. In addition they cooperate with the base members in rendering the assembled structure rigid against torsional forces applied to the box.

In manufacture, the die stamps a sheet of material, preferably steel, into a box wall member which is substantially flat. This box wall member is thus suitable for storage in areas where space is limited, and for shipping at a reduced cost. Also, since the walls are formed in the flat state, it is relatively easy to emboss them with decorative patterns.

When it is desired to assemble the box, the box wall member 10 is bent at right angles at the narrow slots 14, 16, 28 and 30, 36, 38, and 62 and 64. Thus end walls 12 and 32 and side walls 18 and 34 are formed.

The end wall 12 and the tongue segment 60 are thus positioned relative to each other suitably for engagement as shown in FIG. 6. After inserting a bottom panel 59, the tongue segment 60 is inserted between the flanged 24 and 26, and locked by the inclined surfaces 66, 68, 70 and 72 as shown in section in FIG. 4. A set of rigid box walls is thereby formed with the bottom panel 59 as an important element in achieving structural rigidity.

The one-piece corners are formed as shown in FIG. 5 where end wall 12 and end wall 32 are shown. The presence of the narrow slots 28 and 30 allows the box wall member 19 to bend at right angles to itself, and the flange 76, shown in FIG. 5, comes into juxtaposition with itself due to the cooperating 45° bevels at the corner line. The bottom panel may consist in an outer element 78 (see FIG. 5), a core element 80 and an inner element 81, or it may simply be an integral piece with a grooved edge adapted to receive flange 76.

Two such containers may be fitted together by hinges

52 and 54 as shown in FIG. 1, providing a closed container with hinged top.

An important aspect of our invention relates to its adaptability to variation. It will be noted that each corner is formed by a flange, cut-out and bent element. Also the interlocking end portions will be the same regardless of the length or width of the box. Thus the dies for manufacturing this box may be fitted with adjustably positioned cutting elements which may be moved longitudinally to accommodate different end and side lengths. Likewise, locations of the sets of holes and odd numbers of sides are also feasible. The flanges 76 may also be bent into shape by adjustably positioned die elements.

It is our intention to cover all changes and modifications of the example herein chosen for purposes of disclosure which do not constitute departures from the spirit and scope of the invention.

Having thus described and illustrated a preferred embodiment of our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. A box comprising: a continuous strip of sheet metal defining at least three straight vertically disposed continuous side walls for said box; an upper and a lower inwardly extending horizontal flange on said strip adjacent to and co-extensive with each said side wall; a bend in said strip at the junction point between adjacent side walls; a tongue segment formed in one end of said strip; at least two inclined locking surfaces provided in said tongue segment, said locking surfaces up to or incline rearwardly from the leading edge of said tongue segment; at least one pair of angled flanges provided on the other end of said strip, said pair of flanges positioned in a facing relationship to engage the said locking surfaces in a locking arrangement; a bottom comprising a flat horizontally disposed member cut to the inside plan dimensions of said box; and means for anchoring the margins of said box against motion relative to said flanges.

2. The box defined in claim 1 further characterized by score lines in said strip at each said corner.

3. The box defined in claim 1 further characterized by each said flange bevelled at its terminal point adjacent to each said corner at an angle equal to one half of the angle of the said corner.

4. The box defined in claim 1 further characterized by a second complementary set of elements slip-in hinge means joining the two.

5. The box defined in claim 1 further characterized by at least one indentation in said other end of said strip positioned to abut said tongue segment, said tongue segment being bent inwardly toward the opposed side wall member of said box.

6. A knock-down box element combination comprising: a box bottom; a flat single piece sheet metal wall element having in contiguous and integral relation end and side sections corresponding to end and edge ends of said bottom; perforations in said wall element coinciding with the line of connection therebetween said side and end sections; a longitudinal reinforcing flange for each said side and end section of said wall element notched adjacent to said perforations; a female fitting at one end of said wall element; a male fitting at the other end thereof adapted to interlock with said female fitting; the end side edges of said bottom provided with a peripheral groove adapted to receive and engage said longitudinal reinforcing flange; whereby said combination may be shipped flat in a disassembled state and subsequently set up for use by bending said wall element along the lines of said perforations, inserting said longitudinal reinforcing flange within the peripheral groove of said bottom and interlocking said male and female elements.

7. The combination of claim 6 further characterized by a second set of said combined elements; a hinge; and
slip-in locking means on a wall section of each said set of combined elements; whereby a hinged box may be set up for use.

8. A knock-down box element combination comprising: a box bottom; a flat single piece sheet metal wall element having in contiguous and integral relation end and side wall sections corresponding to and of a length equal to side and end margins of said bottom; means for making an accurately located corner bend between said side and end wall sections including a longitudinal flange substantially normal to the plane of said side and end wall sections and notched adjacent to each junction of said side and end wall sections; a tongue segment formed in one end of said wall element; at least two locking surfaces provided in said tongue segment, said locking surfaces upset so as to incline rearwardly from the leading edge of said tongue segment; at least one pair of angled flanges provided on the other end of said wall element, said pair of flanges positioned in a facing relationship to engage said locking surfaces in a locking arrangement.

9. The box defined in claim 8 further characterized by longitudinal flanges substantially normal to the plane of said side and end wall sections and integral with the upper and lower margins of said side and end wall sections.

10. The box defined in claim 8 further characterized by at least one indentation in said other end of said wall element positioned to abut said tongue segment, said tongue segment being bent inwardly toward the opposed side wall section of said box.

11. The combination of claim 8 further characterized by a second set of said combined elements; a hinge; and slip-in locking means on a wall section of each said set of combined elements; whereby a hinged box may be set up for use.

12. A method of assembling a box wall and base combination comprising a wall element; upper and lower flanges integral with and normal to the margins of said wall element; tapered slots in said marginal flanges; a bottom panel; a tongue segment integral with said wall element; a wall element locking means located on said tongue segment and said other end of said wall element; said method including bending said wall element to form accurately located corner bends, said corner bends made in said wall element about vertical axes extending between the apices of said tapered slots on said upper and lower marginal flanges; placing said bottom panel upon said bottom marginal flanges; positioning said tongue segment between the upset facing flanges of the adjacent side wall section; locking said tongue to said adjacent side wall section by causing the upset inclined surfaces of said tongue segment to pass beneath and beyond said upset facing flanges of said adjacent side wall section.

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