

Jan. 5, 1965

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3,164,284

KNOCK-DOWN BOX CONSTRUCTION

Filed Feb. 7, 1963

3 Sheets-Sheet 1

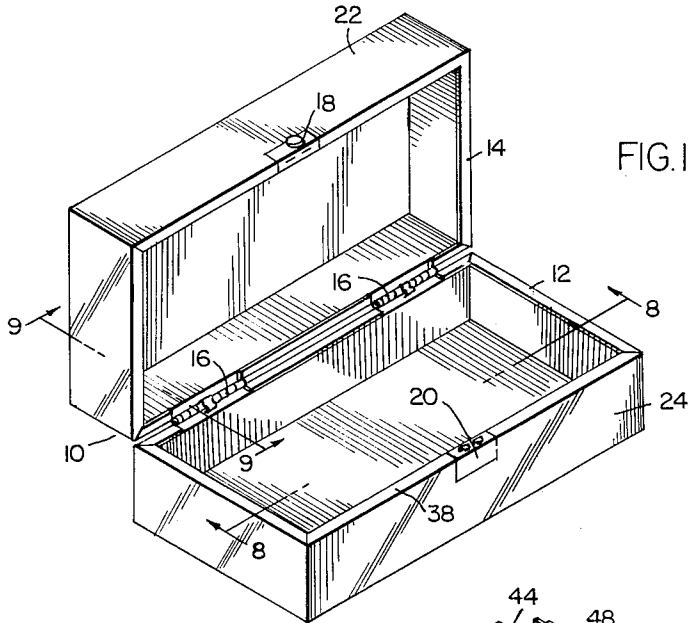
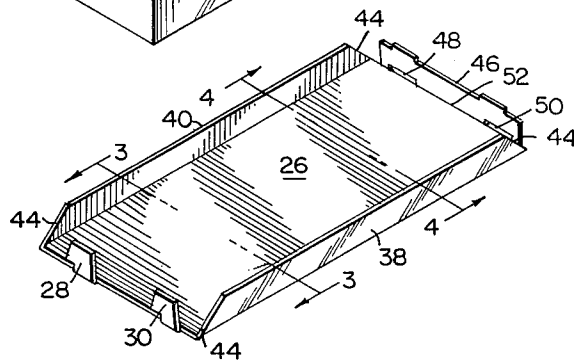
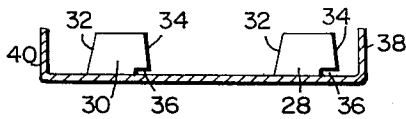
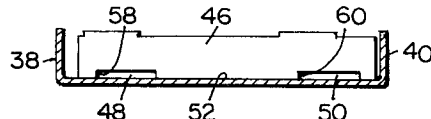


FIG. 2



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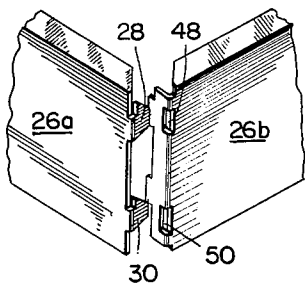


FIG. 5

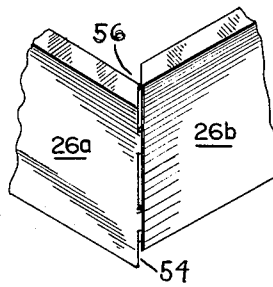


FIG. 6

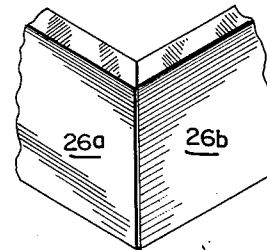


FIG. 7

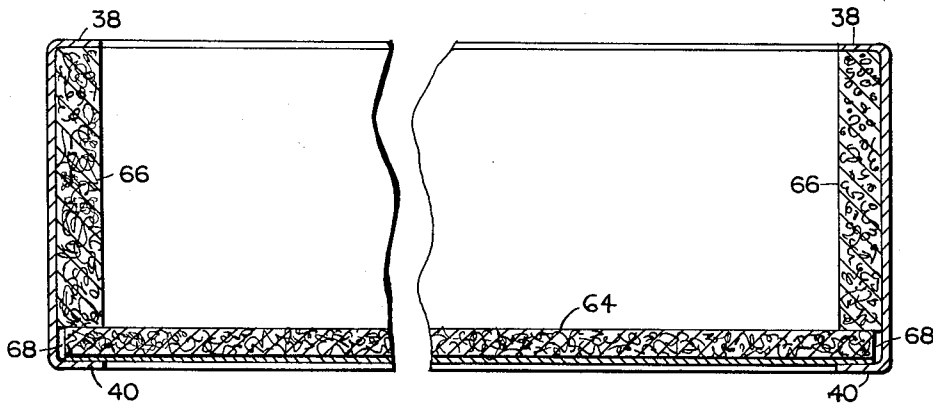


FIG. 8

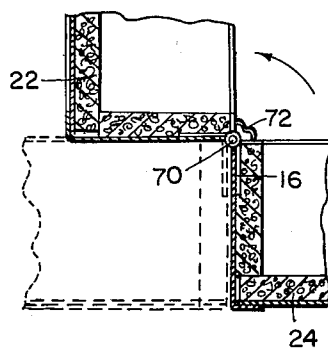


FIG. 9

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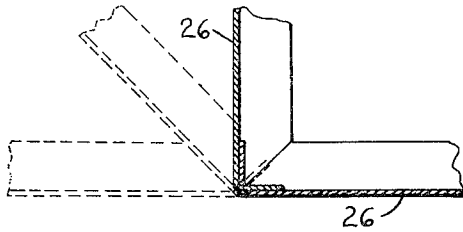


FIG. 10

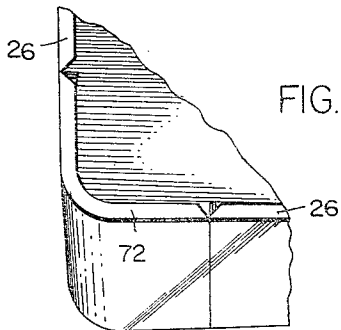


FIG. 11

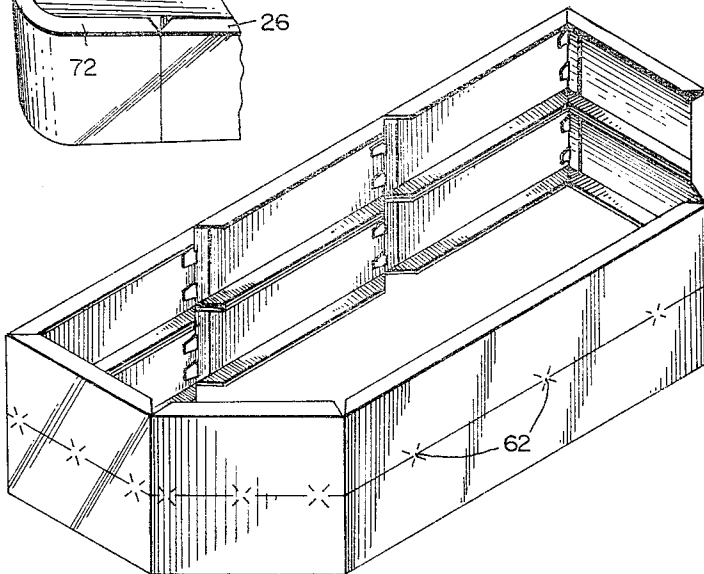


FIG. 12

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KNOCK-DOWN BOX CONSTRUCTION

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Filed Feb. 7, 1963, Ser. No. 257,042
2 Claims. (Cl. 220-4)

This invention relates to containers used for the shipment, storage and display of various products and more particularly, to an improved knock-down box construction capable of being shipped in a disassembled state and subsequently assembled without the need of tools immediately prior to its intended use.

The knock-down feature of a box construction is extremely desirable since it enables a manufacturer to reduce space requirements when shipping boxes to customers.

Although box construction embodying knock-down features have been developed in the past, several major problems have remained unsolved.

For example, the knock-down box constructions presently in use are not capable of being assembled to form boxes of varying sizes and configurations following the initial fabrication of their component parts. Consequently, a manufacturer must frequently "re-tool" when orders are received for boxes of sizes and shapes other than those capable of being assembled with components presently in stock.

In addition, a bending operation is usually required at the assembly stage of existing knock-down box constructions. Since bending will often crack or mar painted or coated surfaces, final exterior finishing of box components by the manufacturer prior to shipment to customers is made impractical and must be done by the customer following assembly.

Furthermore, knock-down box assemblies presently in use usually provide for the positive attachment of the bottom and top panels to the wall members. Several undesirable results flow from this feature of construction. Once assembled, the box cannot be later knocked down for storage. In addition, any expansion or contraction of the bottom and top panels caused by environmental changes in moisture and temperature will produce distortion and warping of all box components.

Accordingly, a primary object of the present invention is to provide a knock-down box construction having extreme flexibility of size and configuration at the assembly stage.

Another object of this invention is to provide a box capable of withstanding warping and distortion during environmental moisture and temperature changes.

A further object of this invention is to avoid the necessity of bending box components during the process of assembly, thereby enabling the manufacturer to completely pre-finish each box component prior to shipment.

Another object of this invention is to provide a simple and inexpensive method of covering the unfinished edges of assembled box components and to provide a box capable of being constructed of various materials in combination, thereby increasing the manufacturer's ability to produce a more attractive box without a corresponding increase in expenditures of time and money.

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

FIG. 1 is a perspective view of a hinged box having bottom and cover portions;

FIG. 2 is a view in perspective of a typical wall member;

FIG. 3 is a sectional view taken along line 3-3 of FIG. 2.

FIG. 4 is a sectional view taken along line 4-4 of FIG. 2.

FIG. 5 is a perspective view showing the positional relationship of male and female ends of two wall members immediately prior to the end engagement thereof.

FIG. 6 is a perspective view showing the positional relationship of male and female ends of two wall members following the initial engagement thereof but immediately prior to their subsequent transverse displacement to a locked position.

FIG. 7 is a view in perspective showing the positional relationship of male and female ends of two wall sections in a locked position.

FIG. 8 is a sectional view taken along line 8-8 of FIG. 1.

FIG. 9 is a partial sectional view taken along lines 9-9 of FIG. 1.

FIG. 10 is a partial sectional view illustrating the range of angular displacement made possible subsequent to the locked end engagement of two wall members.

FIG. 11 is a view of a wall member bent to form a rounded corner element.

FIG. 12 is a view in perspective illustrating the use of standard wall sections in the construction of an irregularly shaped box.

Reference will now be made to FIG. 1 wherein 10 generally indicates a typical box construction containing the embodiments of the invention chosen for purposes of disclosure.

Box 10 is comprised of a bottom portion 12 pivotally secured to a cover portion 14 by hinges 16. Interlocking latch members 18 and 20 are located on the forward wall sections 22 and 24 of cover and bottom portions 12 and 14 respectively in order to provide a means of securely maintaining the box in a closed position.

The various components of box 10 and its method of assembly will now be described. An appropriately formed die is used to stamp wall members 26 indicated typically in FIG. 2. Although the wall members chosen for purposes of disclosure are stamped from a thin strip of light-weight corrosion resistant sheet metal, it should be understood that other materials may be substituted without departing from the scope of the present invention. In addition, it should be understood that the individual wall members can be fabricated of any desired length in order to produce boxes of varying shapes and configurations, as will be more specifically discussed in subsequent parts of the description.

Beginning at the male end, the wall member 26 is provided with upwardly disposed tongue segments 28 and 30. As shown in FIG. 3, tongue segments 28 and 30 are of a trapezoidal configuration having the two non-parallel sides 32 and 34 of equal length. A locking slot 36 is provided along the base line of each tongue segment extending inwardly for a limited distance towards the center thereof. Each wall member 26 is further provided with upper and lower longitudinal flanges 38 and 40 extending upwardly from the plane of the wall surface as shown in FIG. 2 and consequently inwardly when incorporated in an assembled box as illustrated in FIG. 1. The flanges are bevelled at a 45° angle at their extremities as at 44 in order to permit end engagement of the wall members during assembly of the bottom or cover portions.

Wall member 26 terminates at the opposite extremity in a female end (see FIG. 4) comprising an upwardly disposed lip portion 46 containing narrow receiving slots 48 and 50 positioned along fold line 52.

Referring now to FIGS. 5-7, the method of assem-

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bling wall sections by placing them in locked end engagement will now be described. FIG. 5 illustrates the male end section 26a of one wall member and the female end section 26b of another wall member held in angular spaced relationship. As can be seen in this figure, the receiving slots 48 and 50 are oppositely disposed to tongue segments 28 and 30 although the upper and lower longitudinal flanges 38 and 40 of each wall member are not yet in proper vertical alignment. FIG. 6 is an illustration of the next step in placing the wall sections in locked engagement wherein tongue segments 28 and 30 are inserted into receiving slots 48 and 50. It becomes important at this point to note that the wall sections are still not in locked end engagement and may be pulled apart. Furthermore, they have not yet been properly aligned as can be seen by the vertical distance 54 and 56 between the upper and lower flanges 38 and 40 of each wall member.

FIG. 7 is an illustration of the final locking step wherein the female end 26b has been displaced downwardly with respect to male end 26a in a direction normal to the longitudinal axis of both wall members. This in turn has caused the inner end edges 58 and 60 (see FIG. 4) of receiving slots 48 and 50 to be positively engaged within locking slots 36, thereby preventing the possibility of subsequent disengagement of the wall members by simply pulling them apart.

In order to disassemble the wall members for subsequent storage, the above-mentioned procedure is simply reversed. Inner end edges 58 and 60 of receiving slots 48 and 50 are disengaged from locking slots 36 by transversely displacing the wall members in the opposite direction. Following this step, the wall members are easily pulled apart.

As can be seen in FIG. 10, following the locked end engagement of two wall members, they may be angularly displaced through any selected angle from 90° to 180°. In addition, as previously stated, the wall sections may be fabricated of any desired length. Consequently, a user is provided with optimum flexibility by simply combining wall members of equal and varying length to produce boxes having unlimited variations in size and configuration. FIG. 12 is one illustration of such a variation wherein the user has combined wall sections of different lengths and has utilized the above-mentioned range of angular displacement of the wall members to produce a six-sided box. In addition, two completely assembled wall sections have been combined and spot welded as at 62 to produce a box of greater depth. Thus it can be seen that a manufacturer may utilize wall members presently in stock to produce strong light-weight boxes of greatly varying size and shape without resorting to expensive and time-consuming retooling operations.

Another advantage inherent in this type of wall construction is the ability to subsequently assemble boxes without the necessity of bending wall members. In this manner, the boxes may be easily shipped in a disassembled state and subsequently assembled by hand without the need of expensive jigs and fixtures. Furthermore, since the surfaces of the wall members will not be distorted, scratched or marred by subsequent bending, they may be painted or coated by electrolysis and fitted with handles and other ornamentations at the manufacturing stage and need not be re-finished by the user subsequent to the process of assembly.

The method of assembling the remainder of the box components will now be described. Following the assembly of the individual wall members 26, a bottom member 64 is positioned on the lower inwardly disposed flanges 40. The peripheral dimensions of bottom member 64 will be governed by the number and lengths of side members 26 used in assembling the sides of the box, and its configuration will in turn govern, strengthen and stabilize the over-all shape of the completely assembled box.

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As can be seen in FIG. 8, bottom member 64 is held against lower flanges 40 by a plurality of side filler pieces 66 tightly wedged between the upper edge of bottom member 64 and the lower surfaces of inwardly extending upper flanges 38.

A space 68 is provided between the outer edges of bottom member 64 and the inner surfaces of side members 26. Several important advantages flow from this particular type of construction. Since the bottom member 64 is frictionally engaged between the lower edges of filler pieces 66 and the lower flanges 40 and not positively pinned or glued, its expansion and contraction caused by environmental changes of temperature or moisture are not hindered. The bottom member 64 may expand freely into space 68 or contract by simply pulling further away from the wall members. In this manner, distortion of the side walls and warping of the bottom member is prevented, resulting in the fabrication of a more satisfactory box. In addition, filler pieces 66 act to prevent any relative transverse motion of the side members 26 at the corners. In this manner, accidental dislocation of the side members is prevented.

Secondly, the channel construction provided by the upper and lower flanges 38 and 40 greatly facilitates the task of "finishing" the inner surfaces of a box intended for display purposes. Boxes presently in use are restricted as to the materials that may be used in their construction. For example, the inner surface of boxes presently being manufactured could not easily be lined with material such as mirrors or veneered woods since the exposed edges of these materials are "raw" and unfinished. Great care and considerable expense would be necessitated in covering these exposed edges, thereby considerably increasing the cost of the finished box.

However, with a box construction as described in the present invention, no such material limitations are present. The channel construction provided by upper and lower flanges 38 and 40 provide an easy method of covering the unfinished edges of filler pieces 66 and bottom member 64. The edges of bottom member 64 are hidden by the inner surfaces of wall members 26 and the edges of filler pieces 66 are hidden by bottom member 64 and the inwardly extending upper flanges 38. Thus it can be seen that materials capable of being cut and inexpensively finished may be easily incorporated into the box construction presently being described without undue expenditures of time and effort.

Furthermore, the positioning of filler pieces 66 within the wall members 26 adds considerably to the over-all strength of the completely assembled box. The added thickness enables the boxes to be piled upon one another without the danger of having the lower boxes collapse or "telescope." Consequently, through the use of the above-mentioned construction, more attractive boxes of lighter weight and greater strength can be produced without the need to resort to expensive and time-consuming production techniques.

Referring now to FIG. 9, the hinge assembly of the box chosen for purposes of disclosure will now be described. In conventional wooden boxes now being used, the side walls are of a considerable thickness. Consequently, special provisions must be made in order to provide for a hinged cover portion. For example, if a conventional hinge is used, its pintle will be located on the inner edges of the wall members. Therefore, the outer edges must of necessity be bevelled in order to permit the cover portion to open without creating a wedging action. This in turn results in an unsightly outer groove when the box is closed. In order to avoid this groove, some conventional boxes employ special "offset hinges." The use of these special hinges require the cutting of recesses in the wall members and the subsequent use of special longer and more expensive C-springs.

As can be readily seen in FIG. 9, a box constructed according to the present invention successfully avoids the above-mentioned hinge difficulties. Because wall members

26 have relatively little thickness prior to the insertion of filler pieces 26, the hinge pintle 70 of a conventional hinge 15 can be placed in substantial alignment with the outer edges of the wall member by simply cutting away a portion of upper flanges 38. In this manner, the cover portion can be fully opened and laid flat without the necessity of bevelling the outer edges of the box, thereby avoiding the need of unsightly outer grooves. In addition, by using standard hinges, the need of special C-springs is avoided and the standard shorter and less expensive springs 72 can be used. Following the attachment of the hinges 15, filler pieces 66 can then be inserted, thereby completely covering the details of construction as can be seen in FIG. 1.

FIG. 11 is a further illustration of the varied box configurations that may be obtained through the use of standard wall sections. By bending a wall section through any selected angle, rounded corner elements 72 can be fabricated and used in combination with straight wall sections 26.

Other advantages made possible through the use of the box construction chosen for purposes of disclosure include a greatly improved method of fabricating perfectly matching cover and bottom portions. When fabricating expensive high-quality wooden boxes, in order to insure perfect edge alignment of both bottom and cover portions when the box is in a closed position, it is now necessary to first fabricate a fully enclosed one-piece box and then to saw it into two matching bottom and cover portions.

However, since wall sections 26 of constant dimensions can be easily produced through a conventional stamping process, and since bottom and top members can be easily held together and shaped as one piece, the need for completely fabricating a one-piece box and subsequently cutting it in two has been avoided. As previously mentioned, since the configuration of the bottom and top members will govern, strengthen and stabilize the over-all shape of the completely assembled box, care need only be taken in the initial shaping of these two pieces, thereby enabling subsequent separate assembly of bottom and cover portions.

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

We claim:

1. A knock-down box construction comprising the combination of: a plurality of prefinished wall members having upper and lower flanges extending inwardly from the upper and lower edges thereof; means for intercon-

necting said wall members to provide a continuous side wall enclosure for said box; a bottom member subject to dimensional changes caused by variations in environmental conditions positioned within said wall enclosure and supported by said lower flanges, the peripheral edge of said bottom member spaced from the inner surface of said wall enclosure; and means for wedging said bottom member downwardly against said lower flanges while permitting free expansion and contraction thereof.

2. A knock-down box combination comprising at least three wall members of prefinished sheet metal having longitudinal upper and lower flanges integral with the upper and lower edges of said wall members, said flanges extending inwardly in a direction normal to the plane of each said wall members, each said wall members provided at one extremity with an end lip bent inwardly along a line perpendicular to said upper and lower longitudinal flanges and containing narrow receiving slots positioned along said line, the other extremity of said wall members provided with inwardly disposed tongue segments, each said tongue segments provided with a locking slot extending inwardly along the base thereof to a point intermediate the extremities of said base in order that when the tongue segments of one said wall member are inserted into the receiving slots of another said wall member and transversely displaced, the inner edges of said receiving slots will be engaged by said locking slots and said wall members placed in interlocked relationship with their upper and lower flanges in alignment, a bottom member subject to dimensional changes caused by variations in environmental conditions positioned on said inwardly disposed lower longitudinal flanges, the peripheral edge of said bottom member spaced from said wall members, and a plurality of filler pieces tightly positioned between said bottom member and said inwardly disposed upper longitudinal flanges to strengthen said wall members and prevent subsequent transverse displacement in a reverse direction thereof, said bottom member frictionally held in place between said lower flanges and the bottom edges of said filler pieces in a yielding manner in order to permit expansion and contraction thereof without warping.

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