June 3, 1958 D. J. LINGENFELTER 2,837,208

SHIPPING SWING SUSPENSION FOR FRAGILE ARTICLES

Filed April 12, 1956 4 Sheets-Sheet 1

FIG. 1.

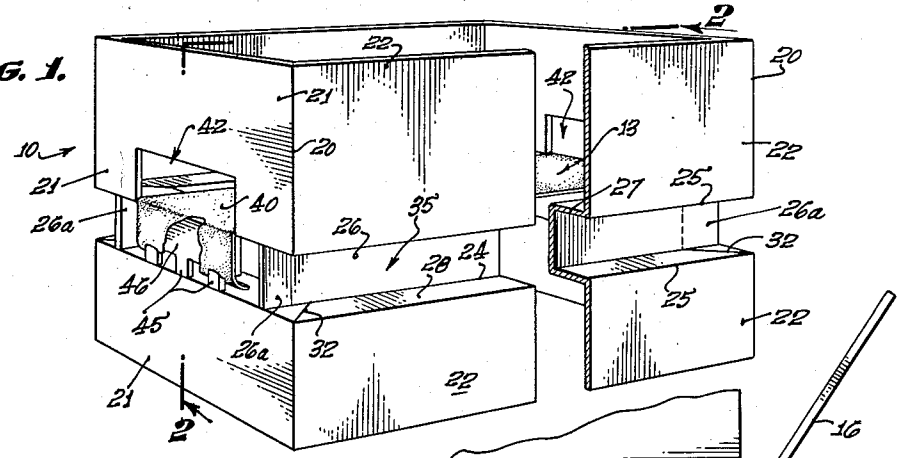



FIG. 2.

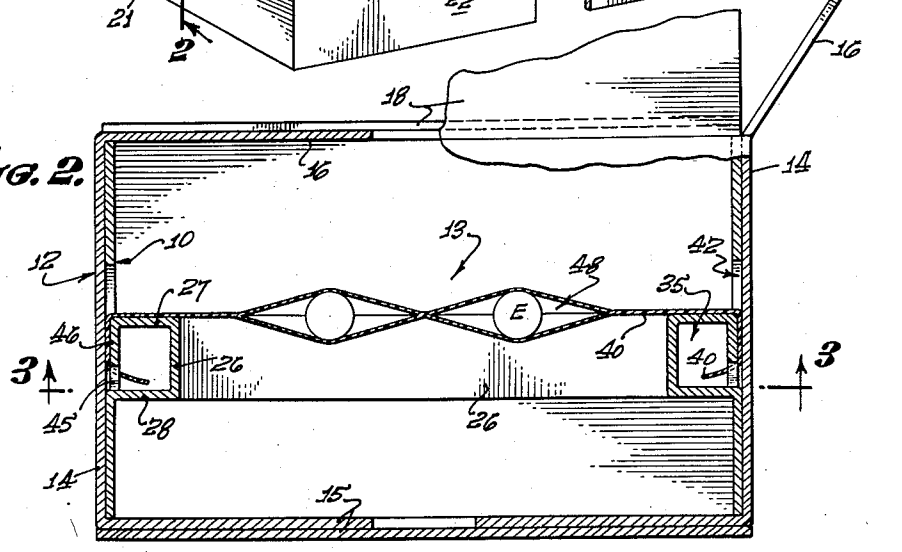
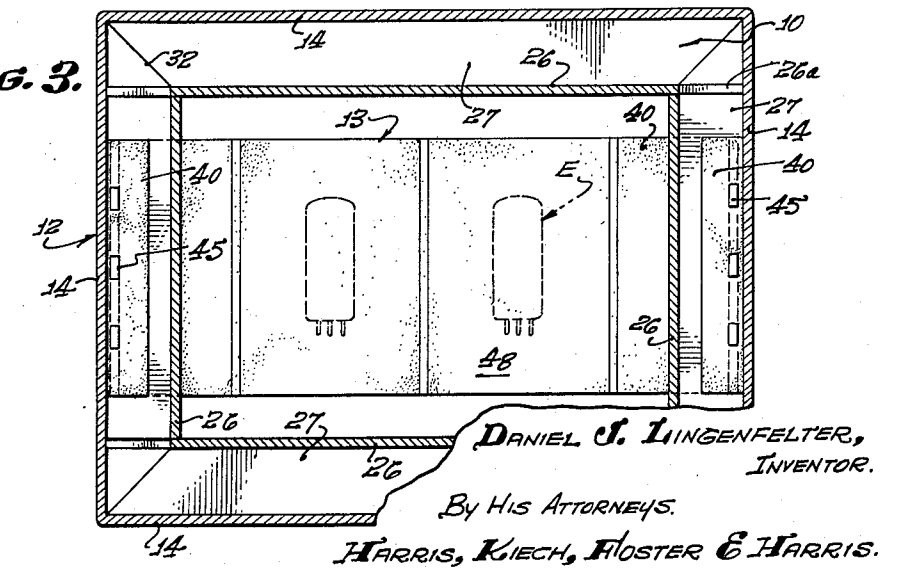



FIG. 3.




DANIEL J. LINGENFELTER,
INVENTOR.

BY HIS ATTORNEYS.

HARRIS, KIECH, FOSTER & HARRIS.

June 3, 1958 D. J. LINGENFELTER 2,837,208

SHIPPING SWING SUSPENSION FOR FRAGILE ARTICLES

Filed April 12, 1956 4 Sheets-Sheet 2

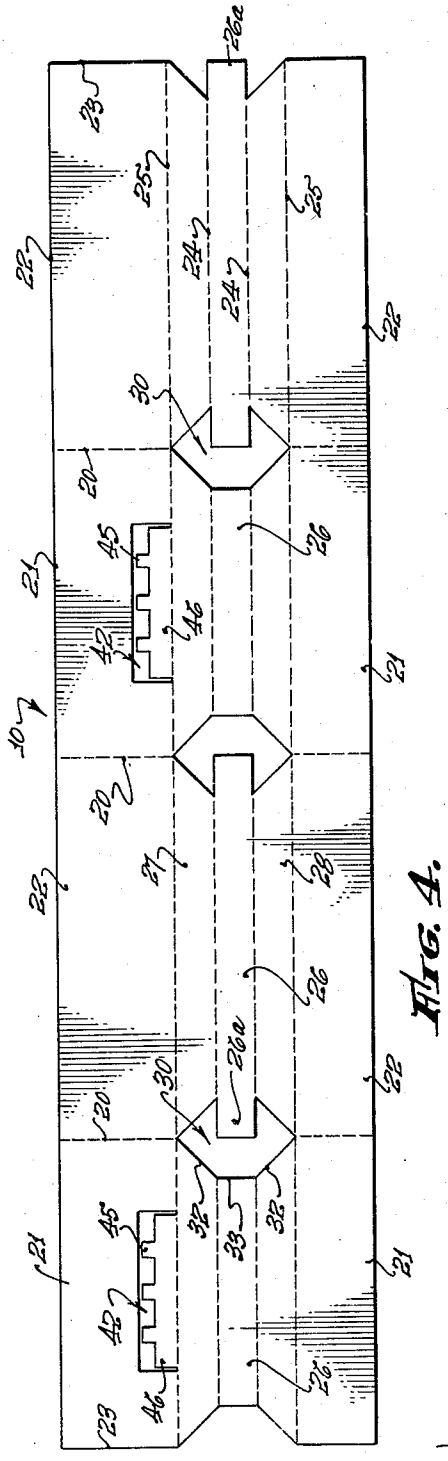


FIG. 4.

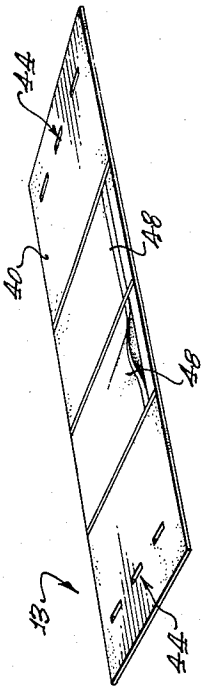


FIG. 5.

DANIEL J. LINGENFELTER,
INVENTOR.

BY HIS ATTORNEYS
HARRIS, KIECH, FOSTER & HARRIS.

June 3, 1958 D. J. LINGENFELTER 2,837,208

SHIPPING SWING SUSPENSION FOR FRAGILE ARTICLES

Filed April 12, 1956 4 Sheets-Sheet 3

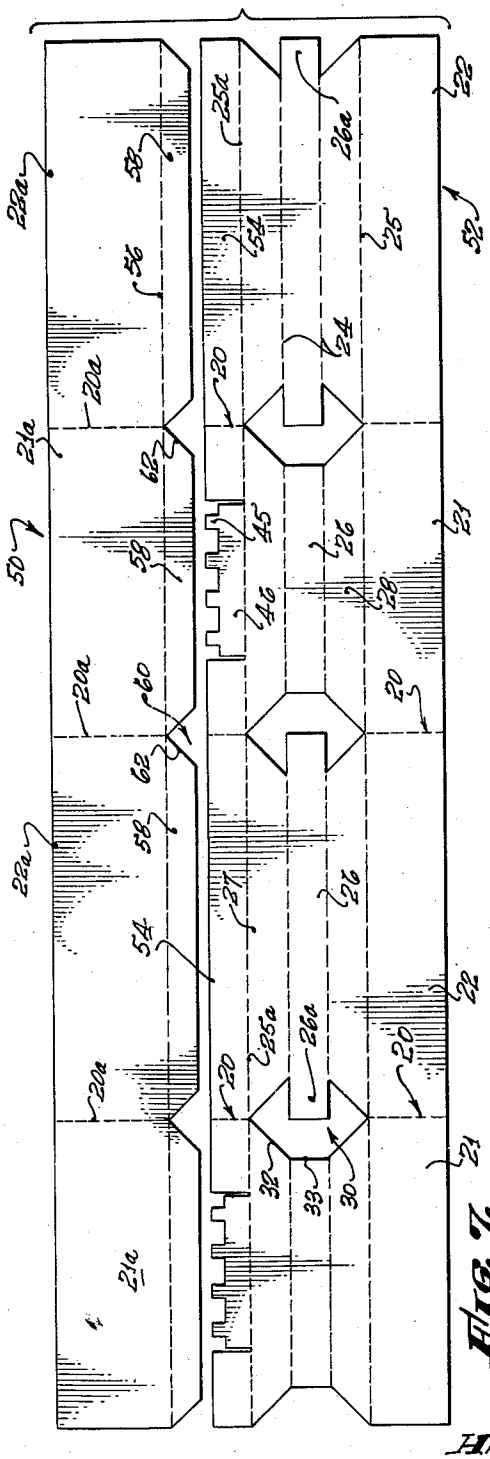


FIG. 7.

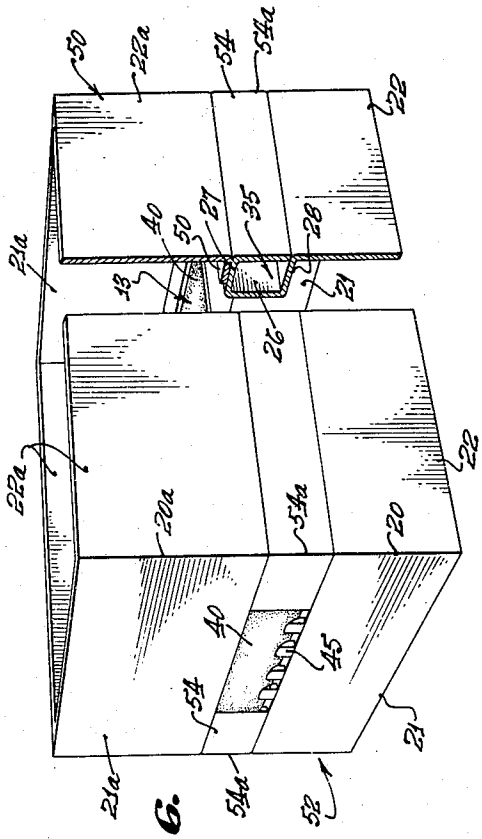


FIG. 6.

DANIEL J. LINGENFELTER,
INVENTOR.

BY HIS ATTORNEYS.

HARRIS, KIECH, FOSTER & HARRIS.

June 3, 1958 D. J. LINGENFELTER 2,837,208

SHIPPING SWING SUSPENSION FOR FRAGILE ARTICLES

Filed April 12, 1956 4 Sheets-Sheet 4

FIG. 8.

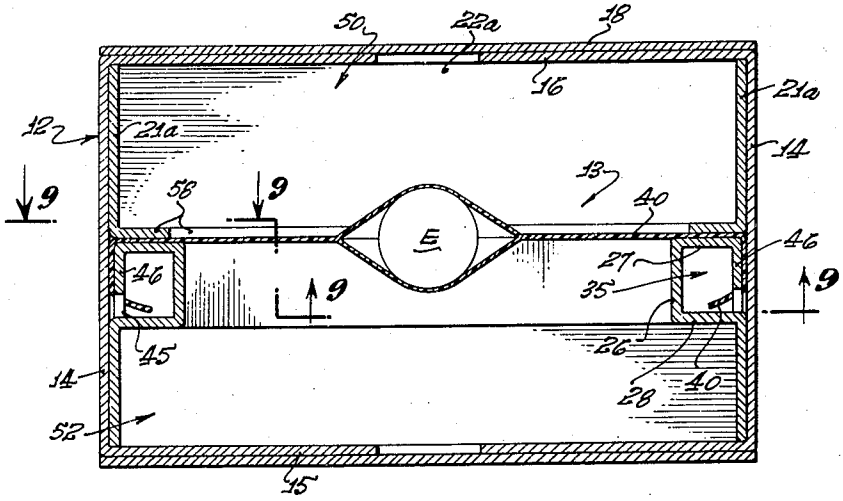
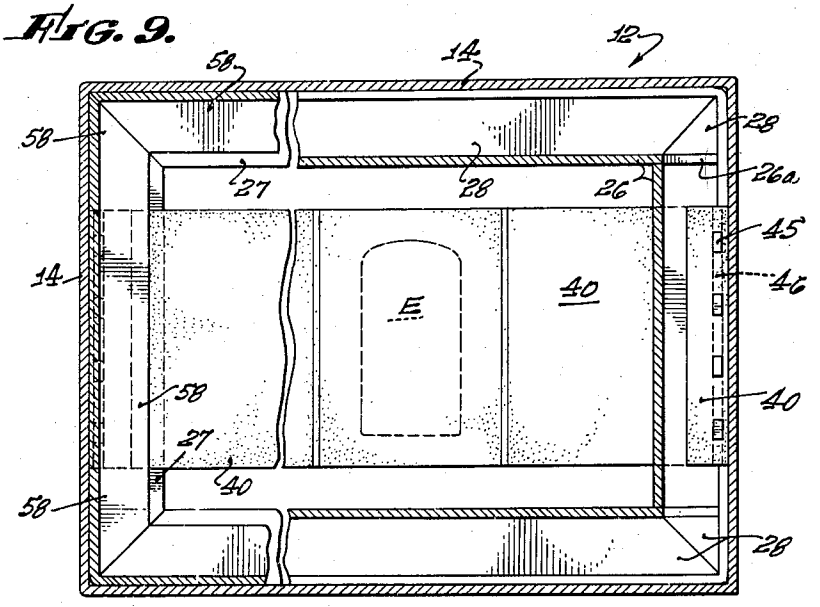



FIG. 9.




DANIEL J. LINGENFELTER,
INVENTOR.

BY HIS ATTORNEYS

HARRIS, KIECH, FOSTER & HARRIS.

United States Patent Office 2,837,208 Patented June 3, 1958



2,837,208

# SHIPPING SWING SUSPENSION FOR FRAGILE ARTICLES

Daniel J. Lingenfelter, Glendale, Calif., assignor to Polyfab Company, Los Angeles, Calif., a corporation of California

Application April 12, 1956, Serial No. 577,840

19 Claims. (Cl. 206—46)

This invention relates to containers for shipping delicate articles such as precision instruments, fragile devices and the like.

A principal object of this invention is to provide containers, such as cardboard cartons and similar receptacles, which are provided with means to suspend within such containers various articles of delicate nature so that they may be shipped and handled without danger of breakage or other injury.

More particularly it is an object of the invention to provide a ring type filler structure to be fitted within an appropriate carton or similar container and across which a flexible hammock or sling-like carrying device may be suspended or stretched much like a swing, this carrier having pockets or retaining means for the articles to be protected during transport and storage.

Another object of the invention is to provide for use by manufacturers of various devices, especially small articles susceptible to injury, a suspending structure particularly adaptable to cardboard fabrication so that the parts may be easily furnished to a packer in knock-down condition and readily shaped and assembled to receive a sling or similar flexible carrier means spanning the interior of the structure, this assembly being then fitted into a suitable cardboard carton or equivalent container.

Other objects of the invention, and various features of construction thereof, will become apparent to those skilled in the art upon reference to the accompanying drawings and the following specification in which certain embodiments are disclosed.

In the drawings:

Fig. 1 is a perspective view of a shaped suspension structure or "ring" ready to be inserted into a conventional rectangular carton, a sling carrying articles to be protected being mounted in operative position on the suspension device, a portion of one side wall being broken away in order better to indicate the various structural aspects;

Fig. 2 is a vertical section through a carton containing the suspension device of Fig. 1 in operative position, this section being indicated by the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section indicated by the line 3—3 of Fig. 2;

Fig. 4 is a plan view of a flat, suitably scored and cut cardboard or similar strip from which the suspension device of Fig. 1 is folded;

Fig. 5 is a perspective view of a flattened sling or hammock-like suspensory as used in Figs. 1, 2 and 3 to carry the fragile articles to be packed in a suspended or floating condition;

Fig. 6 is a perspective view like that of Fig. 1 showing a suspension device of somewhat modified construction;

Fig. 7 is a plan view in extended condition of two cardboard parts which are used to produce the suspension device of Fig. 6;

Fig. 8 is a vertical section showing the device of Fig. 6 in operative position in a closed carton, similar to the showing of Fig. 2; and



Fig. 9 is a horizontal section taken on the irregular broken line 9—9 of Fig. 8, the left portion of Fig. 9 being a top plan taken looking down as indicated by the arrows at the left of Fig. 8, and the right portion of Fig. 9 being a bottom plan as indicated by the arrows of the right portion of the line 9—9.

The structure illustrated in Figs. 1 to 5 includes a suspension device 10 as best seen in Fig. 1 which is fitted into a corresponding conventional carton 12 and supports a hammock-like sling or swing 13 carrying frangible articles such as pieces of electronic equipment E in appropriate pockets.

The suspension structure 10, which is in the nature of a filler or liner for the carton 12, is of a size to fit neatly in the carton and be retained therein by the usual outer side and end walls 14, closed bottom flaps or members 15, and top flaps conventionally illustrated as two inner top flaps 16 connected with the end walls 14 and outer flaps 18, these flaps 16 and 18 being shown in open position at the right of Fig. 2 and in closed position at the left of Fig. 2 to retain the suspension device 10 in position.

The suspension structure 10 is made up from a blank illustrated in Fig. 4 which is transversely scored as indicated at 20 for convenient folding to yield vertical corners of the structure as seen in Fig. 1 and also indicated by the reference numeral 20. These scorings 20 are such as to provide two end walls 21 and two side walls 22 when the device is folded, the ends 23 of the blank coming together to form a fourth corner when installed in the carton 12. The blank for the suspension structure 10 is provided also with longitudinally extending scorings, these including a middle pair of score lines 24 extending horizontally along the median or intermediate portion of the blank and disposed equidistantly between two upper and lower outer horizontal score lines 25. These score lines 24 and 25 provide for collapsing the structure as seen in Fig. 1, whereby to yield a narrow upstanding wall 26 between the score lines 24 and the corresponding corners, when folded, and an upper narrow horizontal ledge 27 and a lower horizontal ledge 28 between the respective score lines 24 and 25, for each of the end walls 21 and side walls 22. Since the parts 26, 27 and 28 are to be collapsed inward toward the center of the structure to provide an inwardly directed horizontally extending channel member for each of the walls 21 and 22, the corner portions of the blank of Fig. 4 are cut away to form diamond-shaped openings 30 having 45° edges 32 extending between the inner score lines 24 and the outer score lines 25, vertical edges 33 connecting opposite angular edges 32, except that on one side of each opening 30 the corresponding end portion of the upstanding wall 26 is retained to form a tongue extension 26a that acts, when the suspension device is in its collapsed position of Fig. 1, to overhang the ledges 27 and 28 of adjoining wall members to stabilize the collapsed structure as illustrated in Fig. 1. When so collapsed, the inwardly directed channel members formed by the narrow upstanding walls 26 and the horizontal ledges 27 and 28 result in the formation of outwardly faced elongated horizontal recesses 35 in the various side walls 21 and 22 of the suspension device 10.

The above structural arrangement of the suspension device 10 results in a very stable structure for the sling 13 carrying the fragile or delicate articles E. This sling 13, in the form illustrated, is made up from an elongated flexible strip of plastic, or cloth, or combinations of plastics, cloth or paper, or similar strip 40 as seen in Fig. 5. This strip 40 is long enough so that its ends may

be passed through openings 42 formed in opposite walls 21 (or 22) and down into the respective recesses 35 where such ends of the strip 40 are retained against the inner faces of the respective carton walls 14. For this purpose slots 44 or other appropriate openings are formed in the end portions of the strip 40 which reach the recesses 35, these slots being adapted to receive small tongues 45 of flaps 46 integrally hinged at the outer edges of the respective narrow upper ledges 27. Thus, before the suspension device 10 is placed in the carton 12, the slots 44 of the flexible strip 40 are passed over the tongues 45 of the flaps 46, the latter conveniently being disposed at an angle directed upward and outward from the hinge connection with the respective ledges 27 for installation of the tongues 45 in the slots 44. The flaps 46 are then swung downward into the outer portions of the respective recesses 35 so that the extremities of the strip 40 are disposed within the respective closed portions of such recesses, as seen in Fig. 2, as well as in Fig. 1. Desirably, the width of each flap 46 including its tongues 45 is in each instance the width of the respective upstanding narrow wall 26. Thus, the flaps 46 and their tongues 45 serve as brace means and limit means along with the tongues 26*a* previously mentioned to limit the collapsing action when the structure 10 is folded as shown in Figs. 1 and 2. It will also be noted that the 45° edges 32 of the corner openings 30 meet, as seen in Fig. 1, to form a joint 32 at a 45° angle for each corner.

When articles E to be shipped, or otherwise handled, are installed in the sling 13, as by means of pockets 48 indicated as being provided in the plastic strip 40, they are freely suspended by the flexible strip 40 in a floating condition out of contact with all parts of the package. As a consequence this suspension by the flexible sling 13, which might have a limited amount of elasticity, completely absorbs shocks which could otherwise be imparted to the articles. Since the effective attachment or mounting lines for the ends of the strip 40 of the sling 13 are at the hinge lines of the retention flaps 46 with the upper ledges 27 at the outer edges thereof, such ledges 27 connected with the adjacent portions of the respective walls 21, and reinforced and prevented from sagging by the upstanding narrow walls 26, insure positive retention of the sling 13 in the operative carrying position illustrated particularly in Fig. 2.

In Figs. 6 to 9 there is illustrated a variation of the suspension structure of Figs. 1 to 5. Here portions of the walls 21 and 22 of Fig. 1 lying above the upper narrow horizontal ledge 27 are replaced by a separate folded top member 50 of the same horizontal dimensions as those of the lower member which is generally indicated at 52. In this lower member 52 the outer edge of each ledge portion 27 is integrally provided with a flange portion, or portions, 54 which is downturned along a score line 25*a* which corresponds with the upper score line 25 of the other form so as to fill the respective outwardly facing recess 35 which is left open in the other form. These flange portions 54 have the same upstanding widths as the width of the upstanding wall 26 so that, when the structure is in the collapsed form seen in Fig. 6, the lower edges of the portions 54 bear upon the outer edges of the lower ledges 28 whereby to limit collapsing movement as the parts are being folded. In connection with this form of the invention, corresponding portions of the lower section 52 have been given the same reference characters as in Figs. 1 to 5 in order to facilitate a more ready understanding. This applies also to the flaps 46, with their narrow tongues 45, which as in the other form are integral with the outer edges of the upper ledges 27 in the respective instances. Since depending flange portions of the respective sides 21 and 22 are folded along the same score lines 20 as with the other form, their downturned condition tends to be maintained by reason of the joints at the folded corners indicated at 54*a*.

The separate upper section 50 is provided with score lines 20*a* corresponding exactly with the score lines 20 of the section 52 and is folded about such score lines to provide corresponding end walls 21*a* and side walls 22*a* indicated in Fig. 7 and to provide the folded corners 20*a* indicated in Fig. 6. To provide adequate means in the upper section 50 for bearing upon the ledge members 27 of the lower section 52, the blank for the upper member 50 is scored longitudinally, that is horizontally when assembled, as indicated at 56 in Fig. 7, so that the flanges 58 may be inwardly folded to bear upon the tops of the various ledges 27. Such folding is permitted by 90° notches 60 between the various flange portions 58, such notches providing 45° edges 62 at the ends of the flange members 58.

When the two sections 50 and 52 are folded and placed in operative position, they assume the relationship seen in Fig. 6 and also indicated in Fig. 8 where the parts are retained in their operative position in the carton 12 by means of the various walls 14 and 15 and the closed top closure walls 16 and 18. The same sling 13 in the form of a plastic strip 40 appropriately carrying a delicate article E has its ends hooked over the fingers 45 of the downturned flaps 46 so that the extremities of the strip 40 are contained within the recesses 35, their outer faces bearing against the inner faces of the end walls 14 of the carton 12. Thus, the same general assembled package is produced with the structure of Figs. 6 to 9 as with the structure of Figs. 1 to 5, and the article to be protected and shipped or otherwise handled is suspended in the desired floating relationship.

The invention claimed is:

1. In combination: a container having vertical side walls and a bottom wall; a suspension device fitting within said container and providing vertical side wall portions in face-to-face engagement with the vertical side walls of said container and thereby reinforcing said side walls of said container, said suspension device being folded vertically and providing vertical corners at said folds, said device having a pair of spaced upper and lower horizontal bends on its sides at median positions and extending peripherally around the device, and also having a second pair of horizontal spaced bends between said upper and lower bends, said device being provided at said corners with openings between said upper and lower bends, the upper and lower vertical portions of each side of said device being vertically collapsed toward each other along said bends and forming an inwardly projecting horizontal channel member on the respective side of said device and thereby providing an outwardly faced horizontal recess, the portion of each channel member between said second pair of bends forming an upstanding narrow wall connecting narrow transverse ledges between said upstanding narrow wall and said upper and lower bends, said openings accommodating adjacent end portions of said narrow wall and ledges in collapsed relation; and article-carrying means connected with ledges at opposite sides of said device.

2. A combination as in claim 1 wherein said article-carrying means includes a tongue at each of said opposite sides formed from a respective vertical side wall portion and folded toward its recess to be held by the adjacent container wall.

3. A combination as in claim 2 including a flexible support spanning and mounted on the opposite tongues of said opposite sides.

4. A combination as in claim 1 including a flexible support mounted on said opposite ledges and spanning the space between such opposite sides of the suspension device.

5. In combination a container having vertical side walls and a bottom wall; a suspension device fitting within said container and having vertical side wall portions in face-to-face engagement with the vertical side walls of

said container, opposite side wall portions of said suspension device having tongue means to receive article-carrying means, said tongue means being folded downward outside the respective wall portions of said device and in engagement with adjacent side walls of said container; and article-carrying means connected with said tongue means and spanning the space between said opposite side wall portions.

6. A combination as in claim 5 wherein said article-carrying means is flexible means having end portions engaged over and attached to said tongue means.

7. In combination: a container having vertical side walls, bottom wall means and top wall means; a suspension device fitting within said container and having vertical side wall portions in face-to-face engagement with the vertical side walls of said container, such suspension device being folded vertically to provide vertical jointed corners, said device having a pair of spaced upper and lower horizontal bends on sides thereof and extending peripherally around the device, there being a second pair of bends between said upper and lower bends, said corners being angularly cut to provide openings between said upper and lower bends at said corners, the wall portions between said bends being thereby vertically collapsed forming inwardly projecting horizontal channel members and outwardly faced horizontal recesses providing upper and lower transverse ledges and inwardly disposed narrow upstanding walls connecting said ledges, and portions of said ledges and narrow walls being accommodated by said angular openings, article-carrying flaps being integrally connected with certain of said ledges and bent over adjacent the outer walls of the suspension device adjacent the respective horizontal recesses; and means carried by the upper ledges and retained by said top wall means of said container to hold said horizontal channel members in collapsed position.

8. A combination as in claim 7 and flexible article-carrying means spanning the space between said flaps and having end portions attached to said flaps and positioned thereon by the adjacent side walls of said container.

9. A combination as in claim 7 wherein said flaps are integral with said certain ledges at the outer edges thereof.

10. A combination as in claim 7 wherein said certain ledges are the upper ledges at opposite ends of said device and said flaps are integral therewith at the outer edges of such upper ledges.



11. A suspension device for delicate articles including: a supporting frame folded from a sheet to provide vertical corners and vertical side walls, the side walls having transversely extending upper and lower spaced bends and additional spaced bends intermediate said upper and lower bends, upper and lower portions of said frame being vertically collapsed toward each other about said bends and forming inwardly directed channel members providing outwardly faced transverse recesses formed by a resultant upstanding wall and ledges between the upper and lower edges of said upstanding wall and said upper and lower bends; flaps at opposite sides of said frame and formed integrally with the outer edges of the respective upper ledges and foldable downward opposite the respective recesses, said flaps having attachment means; and frame means extending upward from said upper ledges for depression of the latter downward to maintain said recesses.

12. A device as in claim 11 including flexible suspending means having opposite ends attached to said flaps and spanning the space between said opposite sides of said frame and providing article-carrying means.

13. A device as in claim 11 wherein the corners of said frame are cut out between said upper and lower bends and accommodating adjacent end portions of the collapsed channel members.

14. A device as in claim 13 including tongues at the ends of certain of the upstanding walls of said channel members to bear on end portions of the ledges of adjacent collapsed channel members.

15. A combination as in claim 5 wherein said tongue means are struck out from said opposite side wall portions.

16. A combination as in claim 15 wherein said opposite side wall portions are formed from cardboard.

17. A combination as in claim 1 wherein said suspension device is formed of cardboard.

18. A combination as in claim 9 wherein said suspension device is cardboard.

19. A suspension device as in claim 11 wherein said sheet is cardboard.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,808,833 | Brack | June 9, 1931 |
| 2,134,908 | Copeman | Nov. 1, 1938 |