March 26, 1968 W. D. ADAM 3,374,914

SHIPPING CONTAINER AND STRUCTURAL MATERIAL THEREFOR

Filed Oct. 23, 1965

FIG. 1

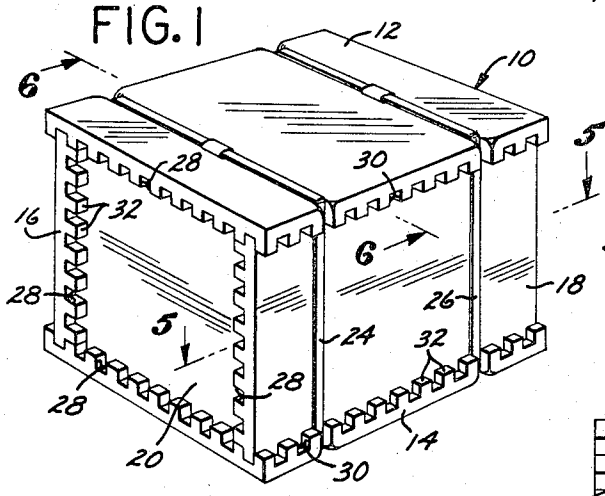
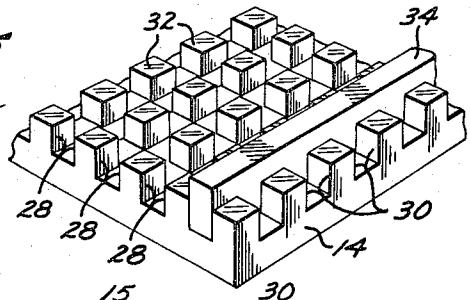
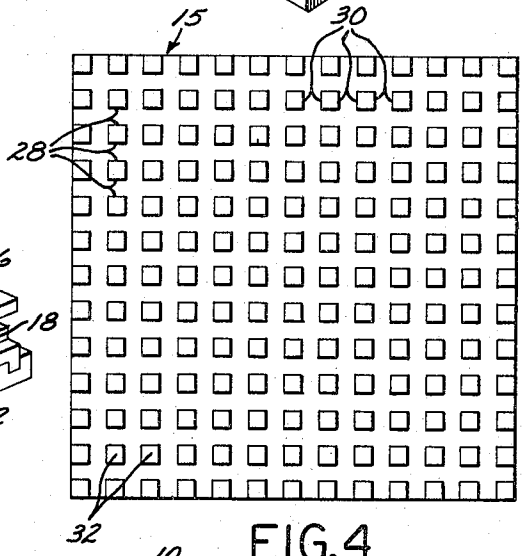


FIG. 3





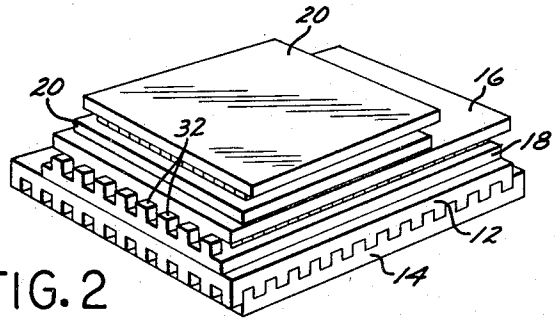


FIG. 2

FIG. 4

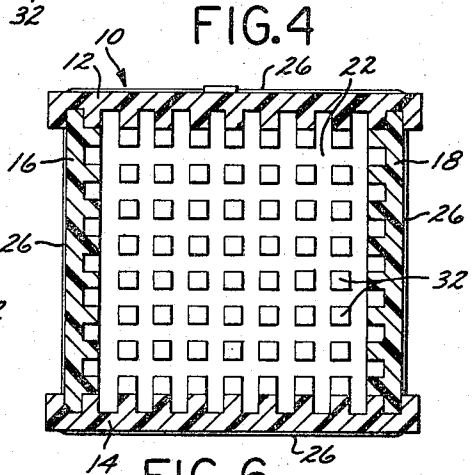


FIG. 5

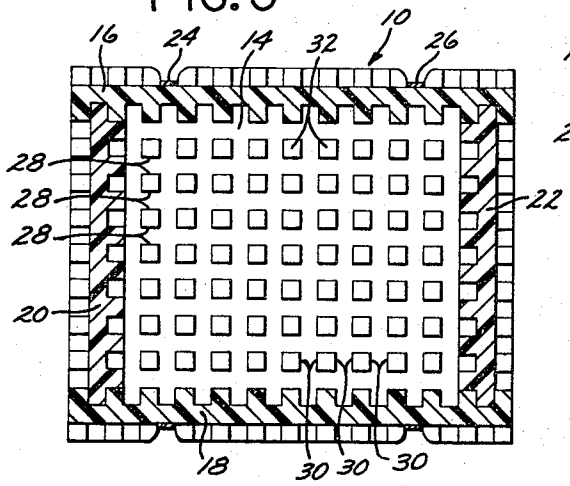


FIG. 6

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SHIPPING CONTAINER AND STRUCTURAL MATERIAL THEREFOR

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ABSTRACT OF THE DISCLOSURE

A knock-down shipping container made of sections of material provided with a uniform pattern of intersecting channels, the edges and channels of the sections being interfitted and held together to define an internal shipping space.

The present invention relates to a shipping container and to a structural material out of which the container can be made, and more particularly to a knock-down shipping container which can be quickly and easily constructed in a variety of sizes by cutting pieces or sections of appropriate dimensions from a sheet of material having a uniform pattern of channels formed therein so that the edges and channels of the cut sections may be interfitted to define the walls of the shipping container.

The present invention has particular application to shipping containers made of crushable foam material, such as expanded polystyrene material, for use in transporting delicate equipment such as electronic apparatus and the like. This type of material is popular for this purpose because it is light in weight, relatively inexpensive, and offers good cushioning for absorbing shocks. For most equipment the containers are made generally box-like in configuration, having a top, a bottom, two ends, and two sides, although the containers will of course vary in size according to the nature of the items to be shipped.

Most such containers are now molded in one or two pieces, depending upon whether identical halves are used, with each piece requiring a relatively expensive mold. Consequently, molders of such integral containers are often required to quote a price out of proportion to the number of containers needed. Moreover, because the containers cannot be disassembled or "knocked down," a high percentage of empty space is involved in shipping, and high freight costs from the molder to the potential user further add to the delivered cost of such containers.

Accordingly, it is an object of the present invention to provide a shipping container made of light-weight crushable foam material which is adapted to be constructed in various sizes from a single type of structural sheet material. Individual molds for each container size are no longer necessary since the size of the shipping container is controlled only by the size of the sections cut from the sheet material to form the six sides of the container. Only the single mold for the sheet material is required. In this regard, it is a related object of the invention to make the sheet material out of inexpensive expanded polystyrene material to permit the shipping containers to be discarded after use if desired.

Another object of the invention is to provide a shipping container which can be shipped in disassembled or knocked-down form for assembly by the user, thereby greatly reducing shipping costs. Alternatively, large sheets of crushable foam material, constituting the structural component out of which the shipping containers are made, can be shipped directly to the user so that he can construct the particular size of container which he desires.

A further object of the invention is to provide a shipping container whose sides have interiorly disposed surfaces which are identical in that they are each characterized by a plurality of intersecting channels which define a plurality of parallel, intersecting rows of spaced apart projections which are particularly adapted to cushion the contents of the shipping container against shock by reason of their relatively small cross section.

Yet another object of the invention is the provision of a shipping container whose interior walls are each characterized by an identical pattern of intersecting parallel channels having a width approximating the thickness of the edges of other walls so that the edges and channels of the walls may be interfitted in interlocking fashion to define the interior cavity. The channels are preferably spaced apart a distance approximating the width of a channel so that the length, width, and depth of the internal cavity can be altered in increments equal to twice the width of a channel. For example, the width of the interior cavity can be reduced by removing the edges of a side wall from the associated channels in the container top and bottom, and moving the side wall inwardly to the next adjacent channels of the top and bottom.

It is another object of the invention to provide a flat sheet of crushable foam material having a pattern of channels intersecting at right angles and uniformly spaced apart a distance equal to the width of one of the channels so that the sheet of material can be cut anywhere throughout its surface to provide the walls for constructing a shipping container. The molder needs to make only a single mold for the sheet, regardless of the number of different sizes of container to be fabricated.

Yet another object of the invention is the provision of a shipping container having walls which interfit and interlock to provide structural integrity, and which can be assembled and disassembled without using any tools.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a shipping container according to the present invention;

FIG. 2 is a perspective view of the six sides or walls of the container of FIG. 1 in disassembled form with the channeled surfaces of the three pairs of walls interfitted to conserve space during handling and shipping;

FIG. 3 is an enlarged perspective view of a corner of the flat sheet material used in constructing the walls of the container of FIG. 1, the showing also including a typical spaced member which may be fitted within a channel to adjustably alter the interior dimensions of the shipping cavity;

FIG. 4 is an enlarged plan view of a section of the sheet material used in constructing the container of FIG. 1;

FIG. 5 is an enlarged cross sectional view taken along the line 5—5 of FIG. 1; and

FIG. 6 is a cross sectional view taken along the line 6—6 of FIG. 1.

Referring now to the drawings, there is illustrated a shipping container **10** which comprises, generally, a top panel or member **12**, a bottom panel or member **14**, a pair of side panels or members **16** and **18**, and a pair of end panels or members **20** and **22**. Each of the members is flat, uniform in thickness, square or rectangular in shape, and characterized by straight edges. The container **10** is box-like in configuration with the opposed, spaced apart top and bottom members **12** and **14** arranged in parallel relation; the opposed or confronting side members **16** and **18** arranged in upstanding and parallel relation perpendicular to the top and bottom members **12** and **14**; and the opposed or confronting end members

20 and 22 arranged in spaced apart, parallel relation perpendicular to the top and bottom members 12 and 14 and perpendicular to the side members 16 and 18. As will become apparent hereinafter, the members interfit and interlock to define an interior space or shipping cavity for holding items during shipment and handling. If desired, a pair of usual shipping bands 24 and 26 can be disposed about the container 10, and locked or secured in a manner well known to those skilled in the art to positively maintain the members in interlocked relation during shipment of the container.

The material of which the top, bottom, side and end members are made is preferably a lightweight crushable foam material, such as relatively inexpensive expanded polystyrene material. The low cost of this material makes it possible to discard the shipping container once it has served its purpose, although of course the container components can be reused if desired. The cushioning nature of the crushable polystyrene material protects shipped items from shocks and, incidentally, permits the bands 24 and 26 to be disposed about the container 10 and tightened to crush the projecting edge portions of the top and bottom members 12 and 14 as illustrated. Thus, the top and bottom members need not be cut away to form seating recesses for the bands, the bands forming their own recesses by crushing the material in the areas in which the bands are located.

Each of the top, bottom, side and end members includes an internally disposed surface characterized by a waffle pattern formed by a plurality of parallel longitudinal channels 28 and a plurality of transverse channels 30 which intersect the channels 28 at right angles to define a plurality of intersecting rows of spaced apart square projections 32.

The identical nature of the interior surfaces of the container wall members is provided by cutting them from a single sheet 15 of polystyrene material formed with the described longitudinal and transverse channels 28 and 30.

The top and bottom members 12 and 14 are cut so that each of the four edges is bounded by a row of the projections 32. The side members 16 and 18 are also cut so that their side edges are each bounded by a row of the projections 32. However, their upper and lower edges are each cut so as to be bounded by a channel base.

In this regard, each channel of the sheet material 15 is made of such a depth that the thickness of the sheet material 15 through the base portion of the channel approximates the width of any channel 28 or 30. With this arrangement, when a container wall member is cut so as to provide an edge constituted by a channel base portion, the base portion is adapted to be closely received within the channel of another member disposed at right angles to the first member. Consequently, the upper and lower edges of the side members 16 and 18 are adapted to be received within those longitudinal channels 28 of the top and bottom members 12 and 14 which bound the outer longitudinal rows of projections 32 thereof.

The end members 20 and 22 are cut so that each of their edges is bounded by a channel base portion. Consequently, their top and bottom edges are adapted to be received in those transverse channels 30 of the top and bottom members 12 and 14 which bound the outer transverse rows of projections 32 thereof. In addition, their side edges are thereby adapted to be received in those transverse channels 30 of the side members 16 and 18 which bound the outer transverse rows of projections 32 thereof.

The channels 28 and 30 are each of identical width and are uniformly spaced apart a distance equal to the width of a channel. With this arrangement, the interior dimensions of the shipping cavity can be made larger or smaller in increments equal to twice the width of a channel. However, in the event that it is desired to adjust the internal dimensions of the shipping cavity in increments less than twice the width of one of the channels, this can be accomplished by inserting a plurality of spacers 34, as best illustrated in FIG. 3, in either the channels 28 or 30 of the member forming one of the two boundaries for the dimension involved. For example, if the channel width is one-half inch, and the closest cavity dimension that can be provided by wall member spacing is twelve inches, and it is desired to provide a cavity having a dimension of eleven and one-half inches, spacers 34 would be used having a depth such that the interiorly disposed surfaces of the spacers 34 would extend beyond the projections 32 and into the cavity area a distance of one-half inch. Various sizes of spacers 34 can also be used to provide an irregularly shaped shipping cavity for irregularly shaped objects to be shipped.

In a typical application for the present invention, the customer order placed with the container manufacturer would specify a container having certain internal dimensions. The container manufacturer, having a stock of flat sheets of the material 15 illustrated in FIG. 4, would cut six sections out of the sheet material to provide the six members 12, 14, 16, 18, 20, and 22. These materials are then stacked in nested form, as illustrated in FIG. 2, and shipped in this compact form to the purchaser-user.

The user then places the bottom member 14 on a flat surface, inserts the lower edges of the two side members 16 and 18 in the most outwardly located ones of the longitudinal channels 28 of the bottom member 14, and similarly inserts the lower edges of the end members 20 and 22 in the most outwardly located ones of the transverse channels 30 of the bottom member 14. Simultaneously the side edges of the end members 20 and 22 are inserted into the most outwardly located ones of the transverse channels 30 of the side members 16 and 18, as illustrated in FIGURESS 1, 5 and 6. If necessary, appropriately sized spacers 34 are inserted in the channels 28 or 30 to obtain a further adjustment of the size of the shipping cavity. The item to be shipped is placed in the cavity and the top member 12 then fitted into position with the upper edges of the members 16, 18, 20 and 22 located in the longitudinal and transverse channels 28 and 30 of the top member 12. The shipping bands 24 and 26 are then secured in position about the assembled members of the container 10, and the container is ready for shipment.

From the foregoing description it will be apparent that a low cost, lightweight shipping container has been provided which can be quickly and easily constructed by the user from sections formed of a single type of sheet material. The pattern of inersecting channels in the sheet material permits interfitting, interlocking cooperation of the cut sections to provide a shipping container of whatever dimensions are desired, controlled only by the size of the sections cut and, when appropriate, by the sizes of the spacers used.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A shipping container comprising:
a top member;
a bottom member;
a pair of side members;
and a pair of end members, each of said top, bottom, side, and end members including an interiorly disposed surface having a plurality of parallel, longitudinal channels and a plurality of parallel, transverse channels intersecting said longitudinal channels at right angles to provide rows of uniformly spaced square protrusions coextensive with said surface, the upper and lower edges of said side members being received within certain of said longitudinal channels of said top and bottom members, the upper and lower edges of said end members being received within certain of said transverse channels of said top

and bottom members, and the side edges of said end members being received within certain of said transverse channels of said side members to define an internal shipping space.

2. A shipping container according to claim 1 and including a plurality of elongated spacers, each having one of its side edges engaged within a corresponding channel in one of said members, said spacers having a width sufficient to project their unengaged side edges inwardly of the interiorly disposed surface of the associated one of said members.

References Cited

UNITED STATES PATENTS

870,122	11/1907	Perkins	217—12
2,112,498	3/1938	Lax	217—7
2,883,764	4/1959	Stephens	220—4
3,119,154	1/1964	Moore	46—19
3,251,460	5/1966	Edmonds	206—46

FOREIGN PATENTS

693,124	8/1930	France.

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