Feb. 10, 1970 G. S. ROUSH ET AL 3,494,502

TRAY

Filed March 20, 1968 4 Sheets-Sheet 1

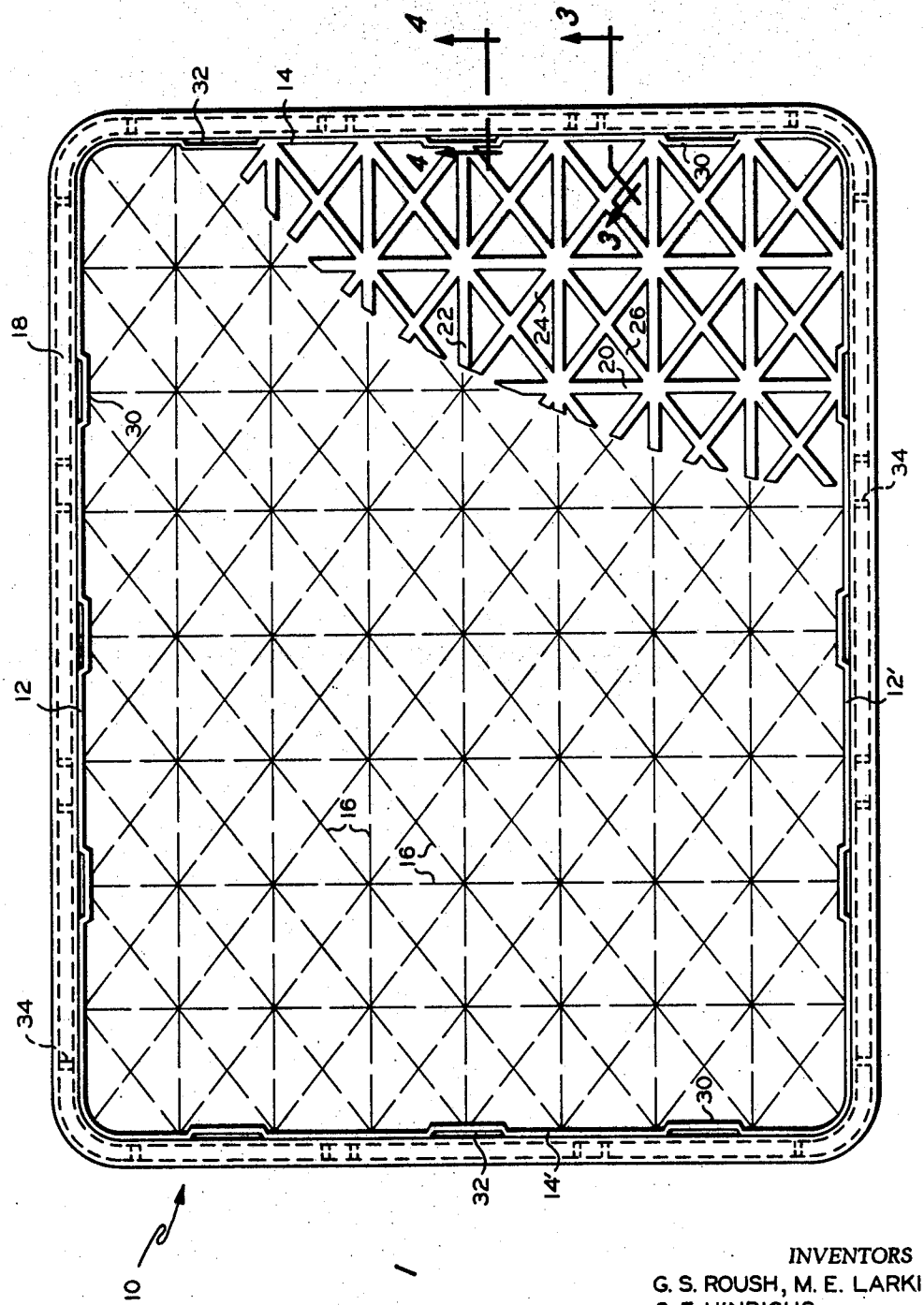


FIG. 1

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TRAY

Filed March 20, 1968 4 Sheets-Sheet 2

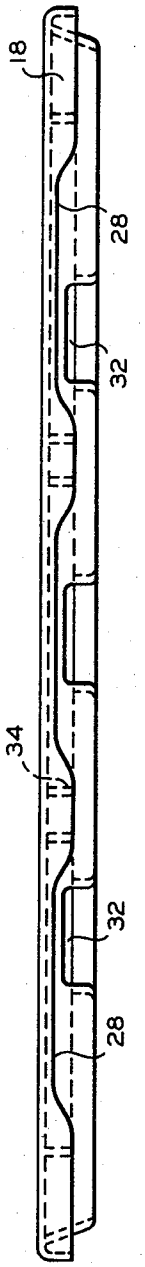


FIG. 2

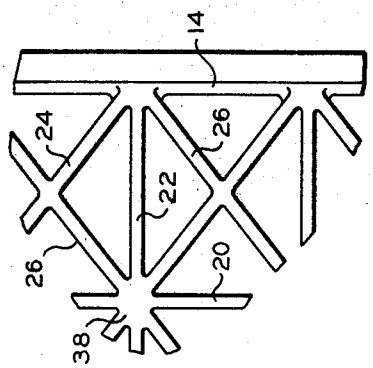


FIG. 6

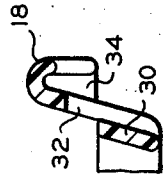


FIG. 4

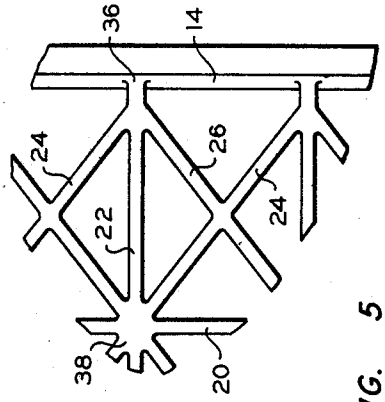


FIG. 5

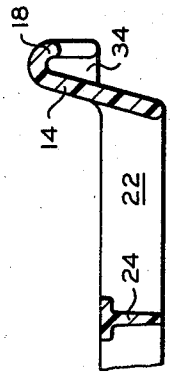


FIG. 3

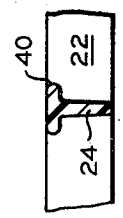


FIG. 7

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TRAY

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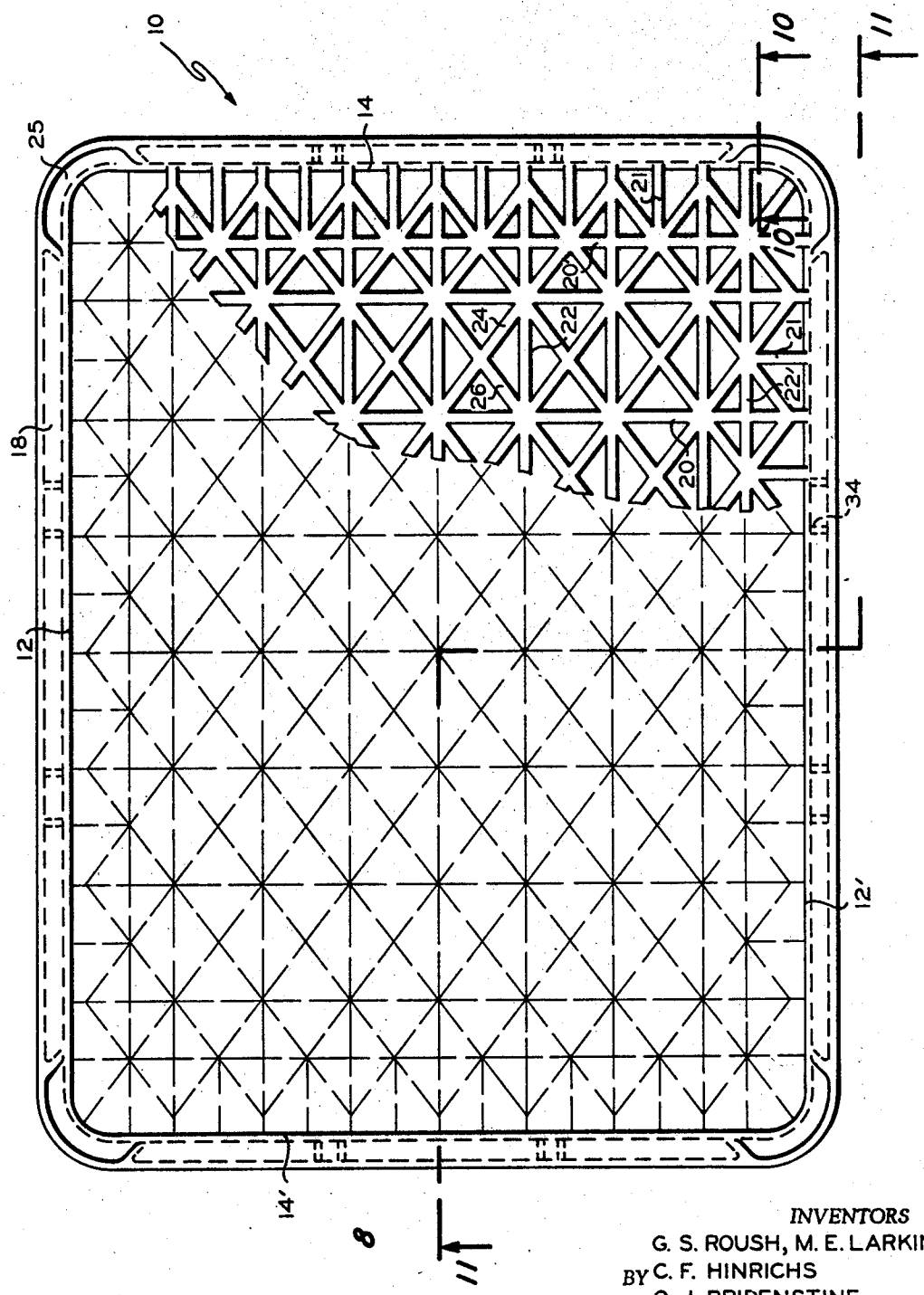


FIG. 8

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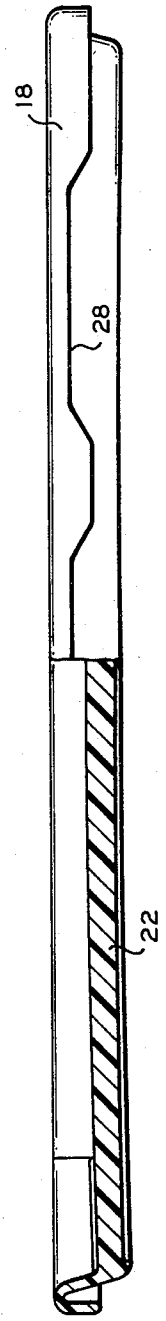


FIG. 11

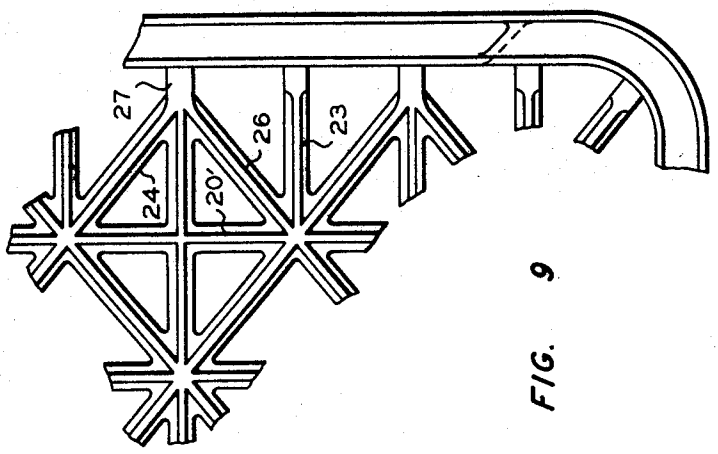


FIG. 9

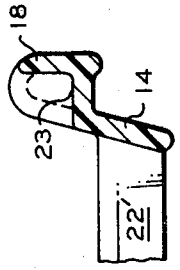
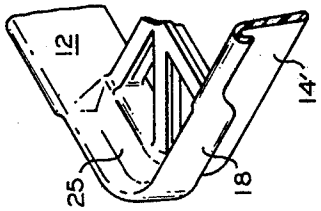


FIG. 10

FIG. 12



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United States Patent Office 3,494,502 Patented Feb. 10, 1970

3,494,502

TRAY

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Continuation-in-part application of Ser. No. 685,760, Nov. 27, 1967. This application Mar. 20, 1968, Ser. No. 716,284

Int. Cl. B65d *19/32*; A47g *23/06*

U.S. Cl. 220—66 17 Claims

ABSTRACT OF THE DISCLOSURE

A tray comprising upstanding side and end walls and a gridwork bottom disposed between the lower edge portions of said walls. Said gridwork bottom is comprised of intersecting generally T-shaped struts. Each of said walls terminates at its upper edge in an outwardly extending turned-down flange which extends around the upper periphery of the tray.

This application is a continuation-in-part of our copending application Ser. No. 685,760, filed Nov. 27, 1967, now abandoned.

Trays of various kinds have been widely employed in moving commodities, e.g., foodstuffs, from one location to another. It is highly desirable that said trays be of a durable, rigid, lightweight structure, be easy to handle in use, be easy to store when not in use, be of a simple and inexpensive construction which is easy to manufacture, and be economical in cost, regardless of size. Few, if any, trays meeting all of the above requirements have been provided by the prior art.

The present invention solves the above-described problem by providing a tray which meets all of the above requirements. The improved trays of the invention are provided with a gridwork bottom which is comprised of intersecting generally T-shaped struts and an outwardly extending turned-down flange which extends around the upper periphery of the tray. Said gridwork bottom and said flange cooperate to impart rigidity, durability, and other advantages to the tray, during both the manufacture and subsequent use thereof.

An object of this invention is to provide an improved tray which can be employed to transport commodities from one location to another. Another object of this invention is to provide an improved tray which is of a durable, rigid, lightweight structure, is easy to handle, is easy to store when not in use, is of a simple and inexpensive construction which is easy to manufacture, and which is economical in cost. Another object of the invention is to provide an improved tray which will not only readily nest with other like trays, but which will also readily nest with other generally similar but unlike trays. Another object of the invention is to provide an improved tray possessing the above-described advantages and which is adapted to be handled manually or by mechanical means. Other aspects, objects, and advantages of the invention will be apparent to those skilled in the art in view of this disclosure.

Thus, according to the invention, there is provided a tray comprising: a pair of upstanding opposed first walls; a pair of upstanding opposed second transverse walls connected to said first walls along the upstanding edges thereof; a gridwork bottom connected to the lower edge portions of said first walls and said second walls to provide an open top structure; said gridwork bottom being comprised of a plurality of intersecting generally T-shaped struts disposed with the crossbar of said T facing the open top of the tray; and an outwardly extending turned-down flange joined to the upper edges of said walls and extending around the upper periphery of said tray.

FIGURE 1 is a plan view illustrating features of improved trays of the invention and showing a fragment of the gridwork bottom structure in detail.

FIGURE 2 is a side elevation of a tray fabricated in accordance with the invention.

FIGURE 3 is a cross section taken along the line **3—3** of FIGURE 1.

FIGURE 4 is a cross section taken along the line **4—4** of FIGURE 1.

FIGURE 5 is a fragmentary plan view showing a modification of the gridwork bottom structure.

FIGURE 6 is a fragmentary plan view of the gridwork bottom of a tray generally in accordance with the tray shown in FIGURE 1.

FIGURE 7 is a view in cross section illustrating a modification of an element in a tray of the invention.

FIGURE 8 is a plan view illustrating other features of improved trays of the invention and showing a fragment of an alternate gridwork bottom structure in detail.

FIGURE 9 is a fragmentary bottom view illustrating another modification which can be employed in the gridwork bottom structure.

FIGURE 10 is a cross section taken along the line **10—10** of FIGURE 8.

FIGURE 11 is a cross section taken along the line **11—11** of FIGURE 8.

FIGURE 12 is a perspective view illustrating in detail a corner of the tray of FIGURE 8.

Referring now to the drawings, wherein like reference numerals are employed to denote like elements, the invention will be more fully explained. In FIGURE 1 there is illustrated a generally rectangular tray **10** comprising a pair of upstanding opposed first or side walls **12** and **12'**. A pair of upstanding opposed second or end walls **14** and **14'** are disposed transverse to said first walls and are connected to said first walls along the upstanding edges thereof. A gridwork bottom is connected to the lower edge portion of said first walls and said second walls to provide an open top structure. Said gridwork bottom is comprised of a plurality of intersecting T-shaped struts designated generally by the reference numeral **16** and disposed with the crossbar of said T facing the open top of the tray. An outwardly extending turned-down flange **18** is joined to the upper edge of each of said walls and extends around the upper periphery of the tray.

In one preferred embodiment, said gridwork bottom comprises a first plurality of T-shaped struts **20** which are disposed generally parallel to said second walls **14** and **14'**, are spaced apart from each other, and extend between said pair of first walls **12** and **12'**. A second plurality of T-shaped struts **22** are disposed generally parallel to said first walls **12** and **12'**, are spaced apart from each other, and extend between said pair of second walls **14** and **14'**. Said struts **20** integrally intersect said struts **22** at substantially 90 degree angles to form a plurality of rectangles. A third plurality of T-shaped struts **24** are provided with each one extending substantially diagonally across one of each of said rectangles. A fourth plurality of T-shaped struts **26** are provided with each one extending substantially diagonally across one of each of said rectangles in a direction to integrally intersect said other diagonally extending struts **24** at approximately the center of the rectangles as illustrated in the drawings. It will be noted that said rectangles are arranged in rows generally parallel with the side or end walls and that said side or end walls form one side of the outer rows of rectangles. If desired, said gridwork

bottom can be coved upwardly a small distance, e.g., 1/16 to 1/8 inch, from the outer edge toward the center of the tray. This will provide increased accommodation for heavier loads, i.e., without causing the bottom to sag.

In another sometimes more preferred embodiment, said first plurality of struts can include a first pair of reinforcing T-shaped struts **20'** which are each spaced apart respectively from one of said second walls **14** and **14'**, and generally bisect the respective outer rows of rectangles which are adjacent to said walls. Said reinforcing T-shaped struts **20'** integrally intersect said diagonally extending struts **24** and **26** at the intersections of same at approximately the center of said rectangles, see FIGURE 8. Similarly, said second plurality of struts can include a second pair of T-shaped reinforcing struts **22'** which are each spaced apart respectively from one of said first walls **12** and **12'**, and generally bisect the respective outer rows of rectangles which are adjacent to said walls. Said reinforcing struts **22'** also integrally intersect said diagonally extending struts **24** and **26** at the intersection of same at approximately the center of said rectangles. If desired, a fifth plurality of T-shaped struts **21** can also be provided. Referring to FIGURE 8, it will be noted that each one of the struts **21** included in said fifth plurality of struts extends from one of said intersections to one of said walls. It is also within the scope of the invention to provide more than one pair of said reinforcing struts **20'** and/or more than one pair of said reinforcing struts **22'**. In such instances, the additional reinforcing struts would preferably be disposed in the row of rectangles adjacent the outer row of rectangles on each side or end of the tray. It is also within the scope of the invention to include a reinforcing strut, such as **20'** and/or **22'**, in each row of rectangles across the tray. In such instances, said struts **21** included in said fifth plurality of T-shaped struts would become the end sections of reinforcing struts **20'** or **22'**, as the case may be.

The above-described reinforcing struts increase the stiffness and stability of the tray. A primary effect is the marked stiffening of the rim of the tray. This effect also extends out into the gridwork structure of the tray bottom. This reinforced structure is particularly desirable in trays subjected to heavy loads.

Preferably, said opposed first walls **12** and **12'** slope inwardly toward each other from top to bottom, and said opposed second walls **13** and **14'** slope inwardly toward each other from top to bottom. The extent to which the trays will nest one within another will be determined by the thickness and the degree of slope of said side and end walls. The taper or slope of the walls should be sufficient that the trays are easily withdrawn from nested position. Usually a slope within the range of from about 5 to about 25 degrees from the vertical will be sufficient. While it is preferred that the trays be provided with sloping walls, it is within the scope of the invention for said walls to be disposed essentially vertical.

Said turned-down flange **18** extends peripherally around the upper edge of the tray. Preferably, the turned-down portion of said flange is provided with a plurality of spaced apart recesses **28** (see FIGURE 2) therein which extend upwardly from the lower edge of the turned-down portion of the flange. Said recesses provide convenient places for insertion of fingers, either hand or mechanical, to remove the trays from nested position, or to pick up the tray and transport it from one location to another. A plurality of spaced apart reinforcing ribs **34** are disposed between the turned-down portion of said flange **18** and the side wall adjacent thereto. Preferably, said ribs can be arranged in pairs as shown in the drawings.

In one embodiment of the invention a plurality of spaced apart identations **30** extend inwardly in each of said side walls below the top level of said T-shaped struts and in alignment with said recesses **28**. While the drawings show three such indentations in each of said side and end walls, it is within the scope of the invention to employ less than three or more than three of said indentations on each wall. The number of recesses in the turned-down flange will correspond to the number of said indentations. A plurality of elongated openings **32** are also provided in each of said side and end walls, each one of said openings **32** being positioned above one of each of said indentations **30**. Said openings **32** provide a convenient location for the fingers of a mechanically operated lifting device to be inserted therethrough, either from within the upper confines of the tray or from outside the tray, and thus provide means for lifting the tray.

If desired, trays fabricated in accordance with the invention can be provided with corner ledges **25**. This feature is illustrated in FIGURE 8, FIGURE 10, and FIGURE 12. Referring to said drawings, it will be noted that the upper edge of each said wall **12**, **12'**, **14**, and **14'** is recessed in a generally vertical direction at each end portion thereof to form a generally horizontal ledge **23**. The ledges **23** of adjacent connecting walls, e.g., **12** and **14**, are joined at the connecting edges of said walls to form a corner ledge **25** at each corner of the tray. Preferably, flange **18** extends around the outer periphery of said corner ledges so as to provide additional strength. However, it is within the scope of the invention to omit said flange **18** at said corner ledges. Said corner ledges are particularly advantageous in facilitating the nesting of the invention trays with unlike trays. For example, the improved trays of the invention can very frequently be used along with other unlike trays and the different trays nested with each other in the same stack. This is a marked advantage to a tray user who wishes to convert his operations to the improved trays of the invention without the expense of immediately junking his old trays.

FIGURES 5 and 6 illustrate alternate construction in joining the gridwork bottom to the side and end walls. The choice of the structure employed will usually be determined by such factors as the strength desired in the final product and molding techniques. In FIGURE 5 the strut **22**, for example, are attached to the side wall **14** and diagonal struts **24** and **26** are joined to said strut **22** at a point spaced apart a small distance from wall **14**. It will be noted that strut **22** is coved into wall **14** at **36** as shown in the drawing. This structure provides advantages in molding as will be understood by those skilled in the art.

In FIGURE 6 struts **24** and **26** are joined to side wall **14** at a common juncture point with strut **22**. Said juncture point is coved into side wall **14** as illustrated in the drawing. This structure provides maximum strength along the side walls.

Both of FIGURES 5 and 6 illustrate the reinforcing island **38** which is integrally formed at the intersection between said struts **20**, said struts **22**, said struts **24**, and said struts **26**. The top surface area of said reinforcing island can be varied over a wide range depending upon the strength and rigidity desired in the tray. Usually the area of said island will be within the range of from about 1.5 to 12, preferably 2 to 10, times the top surface area of one of said T-shaped struts.

FIGURE 7 illustrates a modification which can be employed in forming said T-shaped struts. In this modification the upper corners of said struts are slightly rounded as at **40**. In some instances, this facilitates sliding of articles across the gridwork bottom, as in loading the tray. If desired, the bottom corners of the T crossbar can also be rounded.

FIGURE 9 illustrates another modification which can be employed in the various embodiments of the invention, if desired. In this modification, each one of said diagonally extending struts **24** and **26** is joined to a nondiagonally extending T-shaped strut, e.g., **20**, **20'**, **22**, or **22'**, a small distance from the juncture point of said nondiagonally extending struts with the side wall which forms one side of the respective outer row of rectangles. In this struc-

ture the vertical leg of the T of said diagonally extending struts is coved or blended into the vertical leg of the T of said nondiagonally extending struts. Preferably, the coved or blended portion of said struts provides a thickened strut **27** which, as illustrated in the drawing, has a width the same as or substantially equal to the width of the top of said T-shaped struts. This thickened strut provides additional strength at the junction of the nondiagonal T-shaped struts with the walls of the tray.

FIGURE 11 illustrates another modification which can be employed in forming said T-shaped struts, if desired. In this modification the T-shaped struts, e.g., **22**, increase in height from their outer extremity to the center of the tray. Said FIGURE 11 also illustrates the upward cove of the gridwork bottom from the outer edge thereof toward the center of the tray.

Trays fabricated in accordance with the invention possess a number of advantages over trays of the prior art. The trays of the invention are of a durable, lightweight structure. This is an important consideration in the use of said trays. For example, said trays are particularly well adapted for transporting bakery goods, both within the baking shop and the delivery truck. The bakery goods can be placed on the trays and the trays then placed in racks which may be easily pushed around the shop. The trays can also be readily loaded onto racks in a delivery truck. The light weight of the trays is a distinct advantage in that handling of the trays is not only less tiring for personnel handling same but also reduces the load on trucks. Thus, lighter weight trucks can be employed with obvious savings in operating expenses. The relatively broad top surface of the T-shaped struts provides a surface across which the bakery goods can be easily moved, as by sliding, and provide a surface which essentially eliminates the marking of soft goods, such as rolls, etc.

The T-shaped construction of the struts in the gridwork bottom represents an important advance in the art. Not only is a relatively broad surface provided with the attendant advantages described above, but said construction also imparts increased strength and stability to the tray. The above-described reinforcing islands also contribute materially to the strength and stability of the tray. These construction features make possible significant economies in material required for a given strength and stability in the tray structure. Thus, the tray has substantially all the advantages of a solid bottom tray without the disadvantages thereof, e.g., increased weight. The T-shaped structure is also easy to mold and easy to remove from the mold. The T-shaped structure of the struts cooperates in combination with the turned-down flange which extends around the periphery of the tray, and the other structural features of the tray, to impart rigidity and stability to the tray during both the manufacture and subsequent use thereof.

The trays of the invention can be fabricated in any suitable manner known to the art. Injection molding, for example, is one presently preferred method for fabricating said trays. Said trays can be fabricated from any suitable material. High density polyethylenes are especially desirable materials from which to fabricate said trays. The high density polyethylene and other polyolefins prepared by the methods disclosed and claimed by J. P. Hogan et al. in U.S. Patent 2,825,721, issued Mar. 4, 1958, are one group of presently preferred materials. Said trays can also be fabricated from butadiene-styrene copolymers, and other plastic materials. If desired, a reinforcing fibrous material, such as asbestos or glass fibers, can be incorporated in the plastic material. While the various plastics are presently preferred for the manufacture of the trays, it is within the scope of the invention to fabricate said trays from other materials, e.g., lightweight metals such as aluminum, reinforced pulp materials, etc.

As an example, one model of a tray fabricated in accordance with the invention had a length of about 27 inches, a width of about 22 inches, the rectangles formed in the gridwork bottom were about 3 x 2.5 inches, the top surface of the T-shaped struts was about 0.25 inch wide, and the side walls were about 1 inch in height. The remainder of the elements of the tray were generally proportional in size. These dimensions are given by way of example only, are not to be construed as limiting on the invention in any way, and all can be varied within the scope of the invention.

Herein and in the claims the word "rectangular" has been employed generically to include four-sided structures which are generally square and four-sided structures wherein one pair of sides is longer than the other pair of sides. Also, while the invention has been described and illustrated with particular reference to trays of a generally rectangular shape, the invention may be embodied in containers of a variety of other shapes. However, for most uses the rectangular shape will be found most practical and convenient. Therefore, herein and in the claims, the term "end," "side," "length," etc., should be construed broadly when applied to trays which are not generally rectangular in shape.

While certain embodiments of the invention have been described for illustrative purposes, the invention obviously is not limited thereto. Various other modifications will be apparent to those skilled in the art in view of this disclosure. Such modifications are within the spirit and scope of the invention.

We claim:

1. A tray comprising: a pair of upstanding opposed first walls; a pair of upstanding opposed second transverse walls connected to said first walls along the upstanding edges thereof; a gridwork bottom connected to the lower edge portions of said first walls and the lower edge portions of said second walls to provide an open top structure; said gridwork bottom being comprised of a plurality of intersecting generally T-shaped struts disposed with the crossbar of said T facing the open top of the tray and the outer ends of said crossbar and the vertical leg of said T directly connected to said walls; and an outwardly extending turned-down flange joined to the upper edges of said walls and extending continuously around the upper periphery of said tray.

2. A tray in accordance with claim **1** wherein: said tray is generally rectangular in shape, said opposed first walls slope inwardly toward each other from top to bottom, and said opposed second walls slope inwardly toward each other from top to bottom; and a plurality of spaced apart reinforcing ribs are disposed between the turned-down portion of said flange and the wall adjacent thereto.

3. A generally rectangular tray comprising: a pair of upstanding opposed first walls sloping inwardly toward each other from top to bottom; a pair of upstanding opposed second transverse walls, sloping inwardly toward each other from top to bottom, and connected to said first walls along the upstanding edges thereof; a gridwork bottom connected to the lower edge portions of said first walls and said second walls to provide an open top tray structure; an outwardly extending turned-down flange joined to the upper edges of said walls and extending around the upper periphery of said tray; and a plurality of spaced apart reinforcing ribs disposed between the turned-down portion of said flange and the wall adjacent thereto; said gridwork bottom comprising: a first plurality of generally T-shaped struts spaced apart from each other, extending between said pair of first walls, and disposed generally parallel to said second walls; a second plurality of generally T-shaped struts spaced apart from each other, extending between said pair of second walls, disposed generally parallel to said first walls, and integrally intersecting said first plurality of struts at substantially 90 degree angles to form a plurality of rectangles arranged in rows generally parallel with said walls, said walls forming one side of the outer rows of said rectangles; a third plurality of generally T-shaped struts, each one of which extends substantially diagonally across one of each of said rec-

tangles; and a fourth plurality of generally T-shaped struts, each one of which extends substantially diagonally across one of each of said rectangles in a direction to integrally intersect said first-mentioned diagonally extending struts at approximately the center of the rectangle.

4. A tray in accordance with claim 3 wherein a reinforcing island, having a top surface area within the range of from about 1.5 to 12 times the area of the top surface of one of said T-shaped struts, is formed at each intersection between the struts in said first plurality of struts, the struts in said second plurality of struts, and said diagonal struts.

5. A tray in accordance with claim 3 wherein, in each rectangle of said outer rows of rectangles, each one of said diagonally extending T-shaped struts is joined to a nondiagonally extending T-shaped strut a small distance from the juncture point of said nondiagonally extending strut with said side wall forming one side of said rectangle, and the vertical leg of the T of said diagonally extending struts is coved into the vertical leg of the T of said nondiagonally extending struts.

6. A tray in accordance with claim 3 wherein: at least the corners at the upper surface of said T-shaped struts are rounded; said T-shaped struts increase in height from their outer extremity to the center of the tray; and said gridwork bottom is coved upwardly from the outer edge thereof toward the center of the tray.

7. A tray in accordance with claim 3 wherein: said first plurality of struts includes a first pair of reinforcing T-shaped struts, each spaced apart respectively from one of said second walls and generally bisecting the outer row of said rectangles adjacent thereto and integrally intersecting said diagonally extending struts at the intersection of same at approximately the center of said rectangles; and said second plurality of struts includes a second pair of T-shaped reinforcing struts, each spaced apart respectively from one of said first walls and generally bisecting the outer row of said rectangles adjacent thereto and integrally intersecting said diagonally extending struts at the intersection of same at approximately the center of said rectangles.

8. A tray in accordance with claim 7 including, in further combination: a fifth plurality of T-shaped struts, each one of which extends from one of said intersections to one of said walls.

9. A tray in accordance with claim 8 wherein said upper edge of each said wall is displaced outwardly at each end portion thereof to form a generally horizontal edge, and said ledges are joined at said connecting edges of said walls to form a corner ledge at each corner of said tray.

10. A tray in accordance with claim 9 wherein, in each rectangle of said outer rows of rectangles, each one of said diagonally extending T-shaped struts is joined to a nondiagonally extending T-shaped strut a small distance from the juncture point of said nondiagonally extending strut with said side wall forming one side of said rectangle, and the vertical leg of the T of said diagonally extending struts is coved into the vertical leg of the T of said nondiagonally extending struts.

11. A tray in accordance with claim 3 wherein the turned-down portion of said flange is provided with a plurality of spaced apart recesses therein which extend upwardly from the lower edge of said turned-down portion.

12. A tray in accordance with claim 11 wherein: a plurality of spaced apart indentations extend inwardly from each of said side walls below the top level of said T-shaped struts and in alignment with said recesses; and

a plurality of openings are provided in each said side wall, each one of said openings being positioned above one of each of said indentations.

13. A tray in accordance with claim 12 wherein said upper edge of each said wall is displaced outwardly at each end portion thereof to form a generally horizontal ledge, and said ledges are joined at said connecting edges of said walls to form a corner ledge at each corner of said tray.

14. A tray comprising: a pair of upstanding opposed first walls; a pair of upstanding opposed second transverse walls connected to said first walls along the upstanding edges thereof; a gridwork bottom connected to the lower edge portions of said first walls and said second walls to provide an open top structure; said gridwork bottom being comprised of a plurality of intersecting generally T-shaped struts disposed with the crossbar of said T facing the open top of the tray; an outwardly extending turned-down flange joined to the upper edges of said walls and extending around the upper periphery of said tray; a plurality of spaced apart recesses provided in the turned-down portion of said flange and extending upwardly from the lower edge of said turned-down portion; a plurality of spaced apart indentations extending inwardly from each of said side walls below the top level of said T-shaped struts and in alignment with said recesses; and a plurality of openings provided in each of said side walls, each one of said openings being positioned above one of each of said indentations.

15. A tray comprising: a pair of upstanding opposed first walls; a pair of upstanding opposed second transverse walls connected to said first walls along the upstanding edges thereof; a gridwork bottom connected to the lower edge portions of said first walls and said second walls to provide an open top structure; a plurality of spaced apart indentations extending inwardly from each of said side walls below the top level of said gridwork bottom; and a plurality of openings provided in each said side wall, each one of said openings being positioned above one of each of said indentations.

16. A tray in accordance with claim 15 wherein the upper edge of each said wall is displaced outwardly at each end portion thereof to form a generally horizontal ledge, and said ledges are joined at said connecting edges of said walls to form a corner ledge at each corner of said tray.

17. A tray in accordance with claim 15 wherein said gridwork bottom comprises a plurality of intersecting generally T-shaped struts disposed with the crossbar of said T facing the open top of the tray and the outer ends of said struts connected to said walls.

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