(54) FOAM TRANSPORTATION TRAY

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(57) ABSTRACT

A protective transportation tray, and method of manufacture thereof, having a top foam layer, the top layer having a top and a bottom, wherein the top layer has walls that traverse substantially from the top to the bottom of the top layer and circumnavigating a plurality of tear outs. The top layer is a foam that preferably has a density greater than 1.7 lbs/ft³ and is affixed to a bottom plate, preferably substantially beneath the side wall of the top layer.
FIG 7
FOAM TRANSPORTATION TRAY

TECHNICAL FIELD

[0001] The present invention relates generally to a device for protecting delicate articles during transportation, and more specifically a stackable foam tray so that an end-user select a plurality of separate compartment within the tray.

BACKGROUND OF THE INVENTION

[0002] Quite often it is desirable to transport delicate items that vary in size. For example, in the recent years miniatures have become highly popular. Typically these miniatures are either gaming miniatures, or historical war miniatures. The owners of such miniatures often transport them to various locations for use and enjoyment. However these miniatures are fairly delicate nature as they are typically made from pewter and are often hand painted.

[0003] Currently, a foam transport tray has been utilized which has a top foam layer that is scored to have perimeter walls and scored to have a plurality of tear outs. This top foam layer is comprised of foam with a density between 1.60-1.70 lbs/ft³. This foam is affixed to a thin bottom layer of the same type of foam with a glue that is made of an olyvinyl acetate (PVA) resin emulsion. This glue is spread substantially all over the bottom layer of foam, and then the top layer of foam.

[0004] The tear outs can then be selectively removed to allow sufficient room for placement of the miniature. Typically, a plurality of miniatures are then insert into selected tear-out voids for each tray. These voids are created by the user selecting specific tear-out pieces to remove, and then removing these selected pieces, leaving a selected void. These trays then may be stacked on one another and then placed in a case.

[0005] However the olyvinyl acetate (PVA) resin emulsion typically does not spread evenly and "clumps." Additionally, as the olyvinyl acetate (PVA) resin emulsion is spread over the entire surface of the bottom layer, clumps, or globules, of the glue are left on the bottom layer in the selected voids after the tear-outs are removed. These globules tend to damage the paint on the miniatures even the miniatures themselves. Understandably, this is counter to the entire purpose of the transportation tray.

[0006] Additionally, the walls of the transportation tray tend to "fold out" as they don’t provide a significant amount of stability. This is in part due to the fact that the bottom layer is of the same material and allows for significant lateral movement with little pressure on the lateral side of the walls. Additionally the material of the walls, are “soft” enough to protect the item placed in the selected void, but not sufficiently dense enough to limit significant lateral movement.

[0007] Furthermore, the entire tray is easily bent, due to the material of the top layer and the bottom layer. This “bending” allows for “popping out” of the tear-out pieces and loss of the items in the selected void, as the void effectively grows in size.

[0008] Therefore, a feature of this invention is to provide a transportation tray that assists in protecting the items carried therein.

[0009] Another feature of this invention is the provision of a transportation tray that avoids damaging the items from the material utilized to affix the top layer to the bottom layer.

[0010] A further advantage of this invention is the provision of a transportation tray that provides an increased rigidity of the sidewalks of the transportation tray.

[0011] Still another advantage of this invention is the provision of a transportation tray that does not have affixation means substantially beneath the tear-out pieces.

[0012] Yet still another advantage of this invention is the provision of an improved transportation try for miniatures, such as gaming and historical miniatures.

SUMMARY OF THE INVENTION

[0013] The present invention assists in providing an improved transportation tray that has a top layer of foam that has walls surrounding a plurality of tear-out pieces. The wall and the tear out pieces are preferably created by scoring the foam with one or more blanks. The top layer of foam is preferably affixed about the walls to a bottom plate. Preferably this bottom plate is of a substantially higher rigidity than the top layer of foam.

[0014] A user of the tray, preferably a different person than the one that fabricated the tray, then selectively chooses which tear-outs to remove preferably based on the dimensions of the item to be inserted into the selected void. An item, such as a miniature, is placed in the void for subsequent transportation. This tray can be stacked on other trays and this stack may be placed with in a carrying case.

[0015] Generally described, the present invention is for a protective transportation tray has a top foam layer having a top side and bottom side and foam walls that circumnavigates a plurality of foam tear outs and traversing substantially from the top to the bottom of the top layer. A bottom plate is substantially affixed to the walls of the top layer. Preferably, the bottom plate is comprised of a material that has a substantially higher rigidity than the top layer. Additionally it is preferable that the foam has a density greater than 1.7 lbs/ft³ and more preferably greater than 2.0 lbs/ft³. It is also preferable that the foam has a tensile strength greater than 20 lbs/in.

[0016] This tray is preferably a cuboid, and the top layer is fabricated of a single piece of foam. Finally, it is preferable that the top layer and the bottom plate is affixed with a uniform affixator. This uniform affixator may be a spray affixator.

[0017] Another aspect of the present invention is the provision of a method of manufacturing a protective transportation having the step of scoring a piece of foam that has a top and a bottom, and the step of affixing the foam to a plate. The step of scoring the piece of foam comprises the steps of wall scoring and tear-out scoring. The step of wall scoring creates a wall that substantially circumnavigates the outer perimeter of the foam and substantially traversing between the top and the bottom of the top layer. The step of tear-out scoring the foam creates a plurality of inner tearout pieces within the wall perimeters. Additionally, the step of affixing the foam, affixes the foam substantially to the bottom of the walls of the foam to the plate. It may be preferable to selectively remove a tear-out foam piece to
provide a selected void for placement of an item to be transported. It may be more preferable to selectively remove a plurality of tear-out foam pieces to provide a plurality of a selected voids for placement of a plurality of items that are to be transported. When the latter step is performed, it is preferable to remove non-contiguous tear-out pieces.

[0018] Another aspect of the present invention is a protective transportation tray having a top layer, which has a top and a bottom, and is comprised of a foam, and has walls circumnavigating a plurality of foam tear outs. This top layer is affixed at its bottom to a bottom plate where the bottom plate has a substantially higher rigidity than the top layer. Preferably, the top layer is affixed to the bottom layer with the utilization of a uniform affixator.

[0019] Yet another aspect of the present invention is the provision of a protective transportation tray comprising a top layer, having a top and a bottom and comprising a foam. This top layer has foam walls that circumnavigating a plurality of foam tear outs. The tray also has a bottom plate, which is affixed to the bottom of the top layer with a uniform affixator.

[0020] Still yet another aspect of the present invention is the provision of a protective transportation case for items comprising a plurality of stackable transportation trays and a carrying case. The transportation trays comprises a top layer, having a top and a bottom and comprising a foam, wherein the top layer has foam walls circumnavigating a plurality of foam tear outs. The trays also have a bottom plate, which is affixed substantially at the walls of the top layer. With in the carrying case are removably inserted substantially within the carrying case. Preferably the rigidity of the bottom plate is substantially higher than the top layer. It is also preferable that the carrying case can be closed to cover all the sides of the inserted stackable trays. It is more preferably that the carrying has a closeable opening that provides clearance for removal or insertion of a stackable tray.

[0021] The specific techniques and structures employed by the invention to improve over the drawbacks of prior transportation trays and cases and accomplish the advantages described above will become apparent from the following detailed description of the embodiments of the invention and the appended drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 is a perspective view of an embodiment of a transportation tray of the present invention.

[0023] FIG. 2a is a perspective view of the embodiment of FIG. 1 depicting a removal of a tear-out piece.

[0024] FIG. 2b is a perspective view of the embodiment of FIG. 1 depicting the selected void following the removal of the tear-out piece as shown in FIG. 2a.

[0025] FIG. 3a is a perspective view of the embodiment of FIG. 1 depicting a removal of a plurality of tear-out pieces.

[0026] FIG. 3b is a perspective view of the embodiment of FIG. 1 depicting the selected voids following the removal of the plurality of tear-out piece as shown in FIG. 3a.

[0027] FIG. 4a is a top view of a first embodiment of a top layer of the tray of the present invention, where the tear-out pieces have a square shaped cross-section.

[0028] FIG. 4b is a top view of a second embodiment of a top layer of the tray of the present invention, where the tear-out pieces have a hexagonally shaped cross-section.

[0029] FIG. 5a is a depicition of a scoring blank that can be used to create the embodiment of the top layer as depicted in FIG. 4a.

[0030] FIG. 5b is a depiction of a first embodiment of a wall scoring blank that can be used to create the perimeter walls for the embodiment as depicted in FIG. 4a.

[0031] FIG. 5c is a depiction of a first embodiment of a tear-out scoring blank that can be used to create the plurality of tear-out pieces for the embodiment as depicted in FIG. 4a.

[0032] FIG. 5d is a depiction of a second embodiment of a wall scoring blank that can be used to create the perimeter walls for the embodiment as depicted in FIG. 4a.

[0033] FIG. 5e is a depiction of a second embodiment of a tear-out scoring blank that can be used to create the plurality of tear-out pieces for the embodiment as depicted in FIG. 4a.

[0034] FIG. 6 is a depiction of an embodiment of the affixation of the top layer to the bottom plate of an embodiment of the tray as depicted in FIG. 4a.

[0035] FIG. 7 is a depiction of an embodiment of stacking a plurality of the transportation trays as embodied in FIG. 4a.

[0036] FIG. 8 is a depiction of an embodiment of removably inserted into a carrying case the plurality of the stacked transportation trays as embodied in FIG. 7.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0037] The present invention meets the needs described above for a transportation tray. The present invention may be understood more readily by reference to the following detailed description of the invention taken in connection with the accompanying drawing figures, which form a part of this disclosure. It is to be understood that this invention is not limited to the specific devices, methods, conditions or parameters described and/or shown herein, and that the terminology used herein is for the purpose of describing particular embodiments by way of example only and is not intended to be limiting of the claimed invention. Also, as used in the specification including the appended claims, the singular forms “a,” “an,” and “the” include the plural, and reference to a particular numerical value includes at least that particular value, unless the context clearly dictates otherwise. Ranges may be expressed herein as from “about” or “approximately” one particular value and/or to “about” or “approximately” another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent “about” or the like, it will be understood that the particular value forms another embodiment.

[0038] The tray comprises of a scored top foam layer affixed to a bottom plate. The top layer is comprised of foam. This foam is preferably comprised of foam with a density greater than 1.70 lbs/ft$^3$, such as a polyether urethane of such
a greater density. This would make the foam “harder” or “thicker” than prior art foam trays of a similar configuration. This is in contrast to what one would typically desire in selecting a foam material for a protective transportation tray. Typically, one skilled in the art would assume a less dense or “softer” foam would provide greater protection of an item carried within the tray. For example prior trays utilize foam layers of 1.60-1.70 lb/ft$^3$. However, the present invention utilizes thicker, denser foam, preferably with a density greater than 1.70 lbs/ft$^3$ or more preferably foam with a density greater than 2.0 lbs/ft$^3$, which provides an increased stability of the sidewalls.

The bottom plate is preferably reasonably thin to provide a limited height profile, yet reasonably rigid to assist in maintaining the structure of the tray. Prior art trays utilized the same soft foam for the bottom plate with densities between 1.60-1.70 lb/ft$^3$. This allowed the tray to flex in an undesirable manner, and even cause the tear-outs and/or items in the selected voids, to pop-out. It is preferable to have the bottom plate to have a density between 2.5 and 4.0 lbs/ft$^2$ and more preferably between 2.7 and 3.2 lbs/ft$^2$. This bottom layer is preferably made of a cross-linked polyethylene.

Therefore, the prior art teaches away from the solution of the present invention as the present invention increases the density and stiffness of the top layer of foam as compared to the prior foam transport trays discussed prior. This assists in preventing flexion of the top layer of foam as well as assisting in preventing the tear-out pieces, and items with in the selected voids, from popping out. The tear-out pieces are preferably created by a scoring of the foam, typically with a blank. This blank preferably scores the foam to create the tear-out pieces and the walls at the same time. However, one skilled in the art will appreciate that multiple scorings of the foam may be used to create the tear-out pieces and the walls. The scoring for the tear out pieces for pieces with one or more corners in their cross-sections, such as triangle, squares, and the like, are preferably scored at these corners to assist in providing ease of removal of these tear-out pieces. For example, if the tear-out has a square or rectangular cross-section it would be preferable to score at the four corners, leaving uncut, unscored, foam at the middle of each edge of the square foam tear out. This can be done for any edge of nearly any cross-sectional shape that has sides. It is preferable to score the corners, rather than the sides, to assist in providing a “clean” selected void. Scoring the edges and leaving foam at the corners of the cross-sectional shape of the tear-out piece will likely lead to foam being left in the corners due to poor tearing. It is also preferable to leave a minimal amount of foam between the scores, by places the scoring blades reasonably close to one another to allow ease of removed and avoidance of additional material left in the selected void following removal of the tear-out foam pieces. Scoring may be done for cut-outs of all shapes and sizes, but it is preferable to have three or more corners for the cross-sectional shapes, to assist in removal of the tear-out pieces and leave a “clean” selected void.

Selected voids are the spaces or voids created by the user following the selection and removal of the selected tear-out foam pieces. These selected voids are preferably created to coincide with the size and dimensions of the item to be placed in the selected void.

The bottom plate is affixed to the top layer with an affixation means. This affixation is preferably a glue or a resin, but can be an liquid or semi-liquid affixation material. This material is preferably a uniform affixation. A uniform affixation is an affixation material that spreads or sprays without clumping. For example the spray affixation that is supplied by Automotive Trades Vision of the 3M Corporation under the trade name of WhisperSpray, product ID 1550, which is a combination of N-Propyl Bromide (50-60 percent by weight, tert-Butyl Alcohol (1.5%-by weight) and 1,2-Butylene Oxide (0.6250 percent by weight) maybe used. The uniform affixation preferably spreads or is sprayed on in such a manner to provide little or no residue in the selected void following removal of the tear out pieces.

These trays may be placed, or stacked, one on another, and then placed in a carrying case. This carrying case is preferably made of a light weight but strong material, such as nylons. A strap may be attached or affixed to the case to assist in transport by a user as well as a closure means, such as a zipper, hook and pile or other Velcro® type material, snaps, buttons and the like.

Now directing the reader’s attention to the figures, and specifically to FIG. 1 which depicts a first embodiment of the present invention in a perspective view, we see a transportation tray 10 which has a top layer 20 and a bottom plate 30. The top layer 20 has four sidewalls 22 about the perimeter of the tray 10 and circumnavigating a plurality of tear-out pieces 24. As shown in FIG. 2a, a selected piece 26, which is one of the tear-out pieces 24, may be removed from tray 10. Upon removal of the selected piece 26 a selected void 28 is left, as shown in FIG. 2b. A plurality of tear-out pieces 24 may be selected pieces 26 and removed from the tray 10, as shown in FIG. 3a. Removal of the plurality of pieces 26 may leave a plurality of selected voids 28 as shown in FIG. 3b.

It should be appreciated that the cross-sectional shapes of the tear-out pieces maybe varied. While the cross-sectional shape of the tear-out piece 24 of the first embodiment is a square, as shown in FIG. 4a, in a second embodiment of the top layer 20 the shape may be a hexagonally shaped cross sectional tear-out piece 24b as shown in FIG. 4b. The four side walls 22b correspond to the shape of the tear-out pieces 24b.

As shown in FIG. 5a, a scoring blank 40 for creating the top layer 20 preferably has a plurality of wall scoring blades 46 and a plurality of tear-out blades 48 shaped as to create the scores of top layer 20. As discussed prior, the scoring may be in one scoring blank 40, or as shown in FIGS. 5b-5c, a separate wall scoring blank 42, which has a plurality of wall scoring blades 46 and a separate tear-out scoring blank 44, which has a plurality of tear out scoring blades 48. An alternative is to include a part of the tear-out blade 48b on the wall scoring blade 46b as shown in FIGS. 5d-5e which depicts an alternative embodiment of the wall scoring blank 42b and tear-out scoring blank 44b.

FIG. 6 depicts the affixation of the top layer 20 of the tray 10 to the bottom plate 30 by utilization of an affixation region 32 that is substantially below the side walls 22 of the top layer 20. Preferably, no portion of the affixation region 32 is beneath any of the tear-out pieces 24. An affixation material is placed, spread, sprayed or the like in
the affixation region 32. Alternatively, the affixation region 32 may be placed on the bottom of the top layer 20, preferably only under the side walls 22.

[0049] FIG. 7 depicts a plurality of the tray 10 that are stacked, one on another, thereby forming stacked transportation trays 12. As shown in FIG. 8 these trays may be placed inside a carrying case 50.

[0050] In view of the foregoing, it will be appreciated that the present invention avoids the drawbacks of prior foam transportation tray by providing an improved foam transportation tray. The specific techniques and structures employed by the invention to improve over the drawbacks of prior trays and to accomplish the advantages described above will become apparent from the above detailed description of the embodiments of the invention and the appended drawings and claims. It should be understood that the foregoing relates only to the exemplary embodiments of the present invention, and that numerous changes may be made therein without departing from the spirit and scope of the invention as defined by the following claims.

We claim:

1. A protective transportation tray comprising:

   a top layer having a top and a bottom and comprising a foam, wherein the top layer has foam walls circumnavigating a plurality of foam tear outs and traversing substantially from the top to the bottom of the top layer; and

   a bottom plate, wherein the bottom plate is substantially affixed to the walls of the top layer.

2. The tray of claim 1 wherein the bottom plate has a higher rigidity than the top layer.

3. The tray of claim 1 wherein the foam has a density greater than 1.7 Lbs/CuFt.

4. The tray of claim 3 wherein the foam has a density greater than 2.0 Lbs/CuFt.

5. The tray of claim 4 wherein the foam has a tensile strength greater than 20 lbs/in.

6. The tray of claim 1 wherein the tray is substantially a cuboid.

7. The tray of claim 1 wherein the bottom plate has a higher rigidity than the top layer.

8. The tray of claim 1 wherein the top layer is fabricated from one piece of foam.

9. The tray of claim 1 wherein the affixation of the top layer and bottom plate comprises a uniform affixator.

10. The tray of claim 9 wherein the uniform affixator is a spray affixator.

11. A method of manufacturing a protective transportation tray, the method comprising the steps of:

   scoring a piece of foam, wherein the foam has a top and a bottom, and wherein the step of scoring has the steps of:

   wall scoring the foam wherein the step of wall scoring creates a wall that substantially circumnavigates the outer perimeter of the foam and substantially traversing between the top and bottom of the top layer;

   tear-out scoring the foam wherein the tear-out scoring creates a plurality of inner tear-out pieces within the wall perimeters; and affixing the foam substantially along the bottom of the walls to a plate.

12. The method of claim 11 further comprising the step of selectively removing a tear-out foam piece to provide a selected void for placement of an item to be transported.

13. The method of claim 11 further comprising the step of selectively removing a plurality of tear-out foam pieces to provide a plurality of a selected voids for placement of a plurality of items to be transported.

14. The method of claim 13 wherein the step of selectively removing a plurality of tear-out foam pieces comprises the step of removing non-contiguous tear-out foam pieces.

15. A protective transportation tray comprising: a top layer having a top and a bottom and comprising a foam, wherein the top layer has foam walls circumnavigating a plurality of foam tear outs; and a bottom plate, wherein the bottom plate is affixed to the bottom of the top layer and the bottom plate has a substantially high rigidity than the top layer.

16. The tray of claim 16 wherein the bottom plate is affixed to the top layer comprising the utilization of a uniform affixator.

17. The tray of claim 16 wherein the uniform affixator is a spray affixator.

18. A protective transportation tray comprising: a top layer having a top and a bottom and comprising a foam, wherein the top layer has foam walls circumnavigating a plurality of foam tear outs; and a bottom plate, wherein the bottom plate is affixed to the bottom of the top layer wherein the affixation of the bottom plate and top layer is with a uniform affixator.

19. The tray of claim 18 wherein the uniform affixator is a spray affixator.

20. A protective transportation case for items comprising: a plurality of stackable transportation trays, wherein the transportation tray comprises:

   a top layer having a top and a bottom and comprising a foam, wherein the top layer has foam walls circumnavigating a plurality of foam tear outs; and a bottom plate, affixed substantially at the walls of the top layer; and

   a carrying case; wherein the plurality of stackable transportation trays are stacked one on another, and removable inserted substantially within the carrying case.

21. The case of claim 20 wherein the rigidity of the bottom plate is substantially higher than the top layer.

22. The case of claim 20 wherein the carrying case can be closed to cover all sides of the inserted stackable trays.

23. The case of 22 wherein the carrying case has a closable opening that provides clearance for removal or insertion of a stackable tray.

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