

Oct. 3, 1967

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3,344,973

LINED CONTAINER

Filed April 21, 1966

FIG. 1

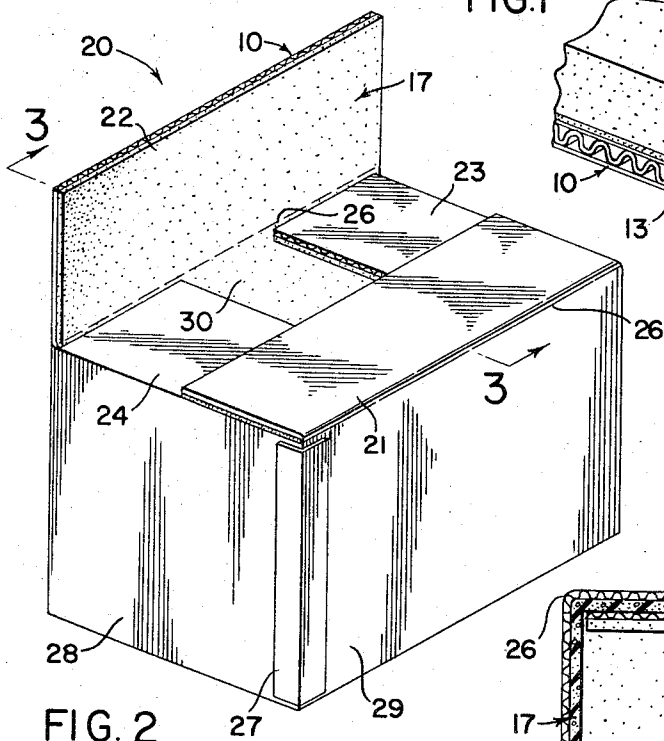
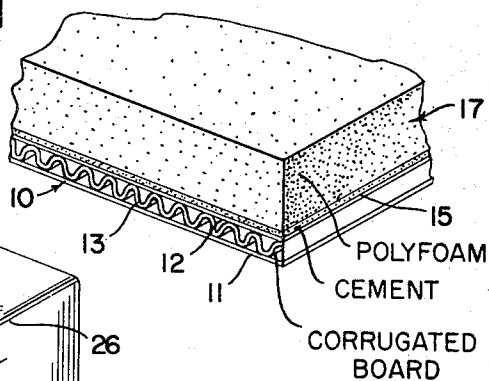


FIG. 2

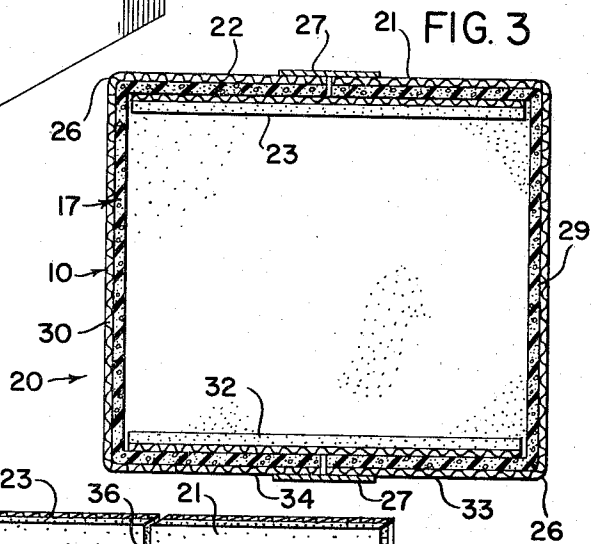


FIG. 3

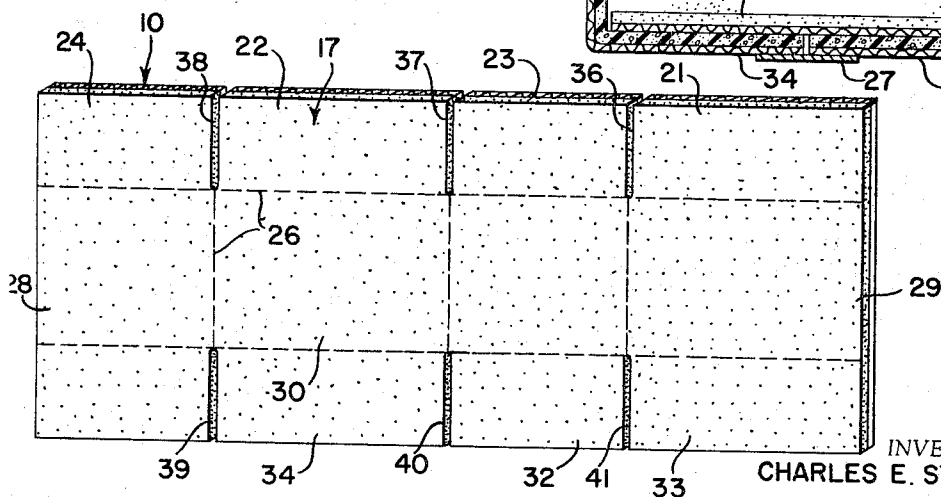


FIG. 4

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LINED CONTAINER

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Filed Apr. 21, 1966, Ser. No. 544,235

5 Claims. (Cl. 229-37)

This invention relates to a new type of container material and method of constructing the same. More specifically, this invention relates to a composite material for containers which has a resinous foam on its interior surfaces to insulate any goods contained therein from moisture and thermal and mechanical shock.

Cartons exist which are custom-made for shipping extremely delicate goods. They are usually filled or lined with some type of shock absorbent which is formed to the contour of the article to be transported. The cost of these custom-made boxes, relative to the standard cardboard box, is extremely high.

Standard cardboard boxes are usually cut in blank form and have no padding whatsoever. These boxes are usually used to ship articles which are substantially resistant to mechanical shock and temperature change.

In addition to the standard cardboard boxes, it is also known to use sections of loose resinous foam to pad the sides, top and/or bottom of the standard cardboard box. While this configuration may be useful when the box is nearly full, it has definite disadvantages when the box is relatively empty. This is because the loose resinous foam sections tend to fall away from the sides and the top when there is nothing to hold them in place. The result is that the padding is of essentially no use since it falls away from the sides of the box, thus making the contents vulnerable to the damage which would normally occur in an unpadded box. Furthermore, such loose sections of resinous foam are easily lost after the box had been opened and the contents removed for the first time.

None of the above cartons may be readily used for shipping goods which are delicate but not exceptionally fragile and/or have a need for temperature and moisture insulation. An example of this type of good is a printed circuit. Printed circuits are not what could be called extremely fragile and yet do have copper wiring so that any abrupt or hard shock, especially in extremely cold weather, would be harmful.

Another area in which this type of carton would be useful is the packaging of glass articles. Such novelty items as glass piggy banks must be shipped in padded cartons and yet are not so fragile that they require extensive padding. When shipping inexpensive items as this, the cost of custom-made containers would be prohibitive since the package would cost more than any possible breakage.

There is also a high probability that glass will break when subjected to large temperature variations over a short period of time. Proper thermal insulation greatly reduces this danger.

Thermal insulation is also important to manufacturers of frozen goods who ship their products in cartons. Frozen goods may be temporarily in a warm atmosphere, for example while sitting on docks, and it is necessary that they will not immediately thaw. The containers for such frozen goods, while not extremely fragile, are generally weak enough that they would be injured upon rough handling.

Candy is another commodity which must be insulated from higher temperatures and mechanical shocks. Candy, of course, would be severely damaged by high temperature and is also relatively fragile.

The present invention provides a carton adapted to contain the above materials and others, which is insulated to both thermal and mechanical shock as well as moisture.

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In this manner, it proposes to preserve those semi-fragile items from damage incurred by moisture, rapid temperature changes and mechanical shocks in transportation and in storage.

The present invention provides for a box blank which is formed of a composite material. The material comprises corrugated board and a resinous foam attached by a suitable cement. The resinous foam, usually an expanded polyethylene, polyurethane or polystyrene, is cut to the same area dimensions of the pieces of laminated cardboard. The resinous foam extends over the inner surfaces of the box including the walls, top and bottom and flaps.

The use of a composite material in forming a box blank provides nearly the same protection as custom fitting the foam padding in a box to fit a given commodity. On the other hand, the present invention is vastly superior to the use of loose sections of foam placed in a box around the article to be shipped or stored. By attaching the foam to the sides, a small article may be shipped in a relatively large carton without any concern whether the padding will shift or be lost. Of course, it also has the advantage in that after use, the box may be again collapsed to its blank form and stored with relative ease. In any form fitted box or where the foam is merely loose in the box, this would not be possible.

The process of forming the box is cementing of the resinous foam to the inner surfaces of the corrugated board, cutting the combined corrugated board and resinous foam to the proper size, and slitting and creasing it so that it will have the requisite flaps and sides. The boxes may then be folded according to the creases provided in the foam and corrugated board and the flaps secured by adhesive tape.

FIG. 1 is a cut away portion of a slab of the composite material provided according to the principles of the present invention.

FIG. 2 is a perspective view of a partially folded box embodying the present invention.

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

FIG. 4 is a plan view of the box blank embodying the present invention being cut and creased but not folded into the box of FIGS. 2 and 3.

FIG. 1 illustrates a corrugated board generally indicated by the numeral 10 which includes two paper strips or skins 11 and 12 separated by a fluted or corrugated internal member 13. The different parts of the corrugated board are pasted or cemented together by adhesives in conventional manner.

The corrugated board 10 has a layer of adhesive or cement 15. The cement may generally be any common type of material which will readily adhere to both corrugated board and resinous foam. The cement should have such characteristics that will allow sustained use of the box with relatively drastic thermal and mechanical shocks. That is, the cement should be able to withstand temperatures without chemical change ranging from approximately twenty below zero to over a hundred degrees Fahrenheit. Similarly, the cement should not be of the type which will readily lose its adhesion due to age or moisture to either the corrugated board or resinous foam. Examples of such adhesives are the various resin cements.

The resinous foam blank 17 is generally cut to coincide with the shape of the corrugated board blank 10. The resinous foam 17 is laminated to the corrugated board by means of the cement 15. However, it is also anticipated that the resinous foam may be attached to the corrugated boards by a mechanical means such as staples, tacks, nails, etc.

The resinous foam 17 that is generally used is expanded polyethylene, polyurethane or polystyrene. Expanded

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polyethylene or polyurethane has been chosen for use in this invention because it has a closed cell structure which is essentially moisture proof, is light weight, flexible, and has an excellent compatibility with the range of chemical and physical environments which are usually encountered in such commercial applications as are anticipated. This material also has excellent strength, chemical stability, flexibility and compressibility over a wide temperature range. Some other characteristics which are of primary interest of the expanded polyethylene and its use in the present invention include the fact that this material has a good thermal and mechanical insulation value, no odor, no toxicological effects and is easily cut and formed. Other advantages of this material is that it has a certain buoyancy and absorbs vibrations.

Expanded polystyrene is also used as the foam 17 since it has similar properties as that of the expanded polyethylene. That is, the expanded polystyrene is light weight, has a low density, is water resistant, is relatively strong, is shock absorbent, and has a low coefficient of thermal conductivity. However, it is not as easily formed by creasing and cutting as polyethylene. While suitable for most purposes, polystyrene does have a tendency to crack with repeated bending.

Furthermore, expanded polyethylene, polyurethane and polystyrene are exceptionally resistant to chemical change from solvents and other chemical substances which may be contained within the package herein described. All of the materials have a tendency to melt away from fire rather than actually burn. This minimizes any danger of loss of material due to fire. However, it has been established that when subjected to an open continuous flame, that all of the materials will burn at a slow rate of approximately 2.5 inches per minute.

FIG. 2 indicates a partially folded box embodying the present invention. That is, a resinous foam 17 is cemented to a corrugated board blank 10 over the entire inner surfaces of the box. The box shown in FIG. 2 is generally referred to as 20. The box 20 has cutouts which generally form flaps 21, 22, 23 and 24. The flaps are creased as at 26 in order to facilitate the bending of the flap to form the box. The crease would be placed in both the resinous foam 17 and the corrugated board blank 10. In order to have the box maintain a stable configuration, the sides of the box blank are usually taped such as that shown at 27. The tape 27 would hold sides 28 and 29 together. Similar tape or other means for maintaining the sides in a congruent relationship are anticipated such as staples, clamping means, and the like. A sealing strip or tape could also be used to seal the box by placing it across the flaps 21 and 22 once they are in a proximate relationship.

FIG. 3 is a sectional taken along 3—3 of FIG. 2. In FIG. 3 the flap 22 is folded down and is adjacent to flap 21. The flaps 21 and 22 are secured by a tape 27 in a down position. Flaps 23 and 24 are covered by the flaps 21 and 22.

The sides 29 and 30 are supported by the bottom of the box. It is formed similar to the top portion and has flaps 32 and 35 which are substantially covered from the sides

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by flaps 33 and 34. Tape 27 of some type again holds the longitudinal flaps 33 and 34 in adjacent relationship.

It is seen from FIG. 3 that all the inner surfaces have at least one layer of resinous foam facing the inside of the box. The top and bottom portion of the box has two layers of resinous foam because of the different flaps over some of its area.

FIG. 4 indicates the box of FIG. 3 in its blank form. That is, the box 20 has been cut at 36, 37, 38, 39, 40 and 41 to form the various flaps shown on the top portion as 21 through 24. The box 20 is then creased at 26 so that the resinous foam and corrugated board will bend at the desired places. The creases may be made along lines parallel to the top and bottom length of the blank, at a distance from the top and bottom equal to the length of the slits 36 through 41. Creases are also made along the width of the blank from the inner ends of the slits.

It is intended that the form of the box illustrated is only by way of example and the scope of the present invention should be determined only by the appended claims.

I claim:

1. A box blank formed of a composite material which acts as an insulation against moisture and mechanical and thermal shock, said composite material comprising: corrugated board; resinous foam; and cement attaching said corrugated board and said resinous foam;

2. The box blank of claim 1 wherein said resinous foam is expanded polyethylene.

3. The box blank of claim 1 wherein said resinous foam is expanded polyurethane.

4. The box blank of claim 1 wherein said resinous foam is expanded polystyrene.

5. The box blank of claim 2 wherein said expanded polyethylene is cemented over all interior surfaces of said corrugated board.

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