

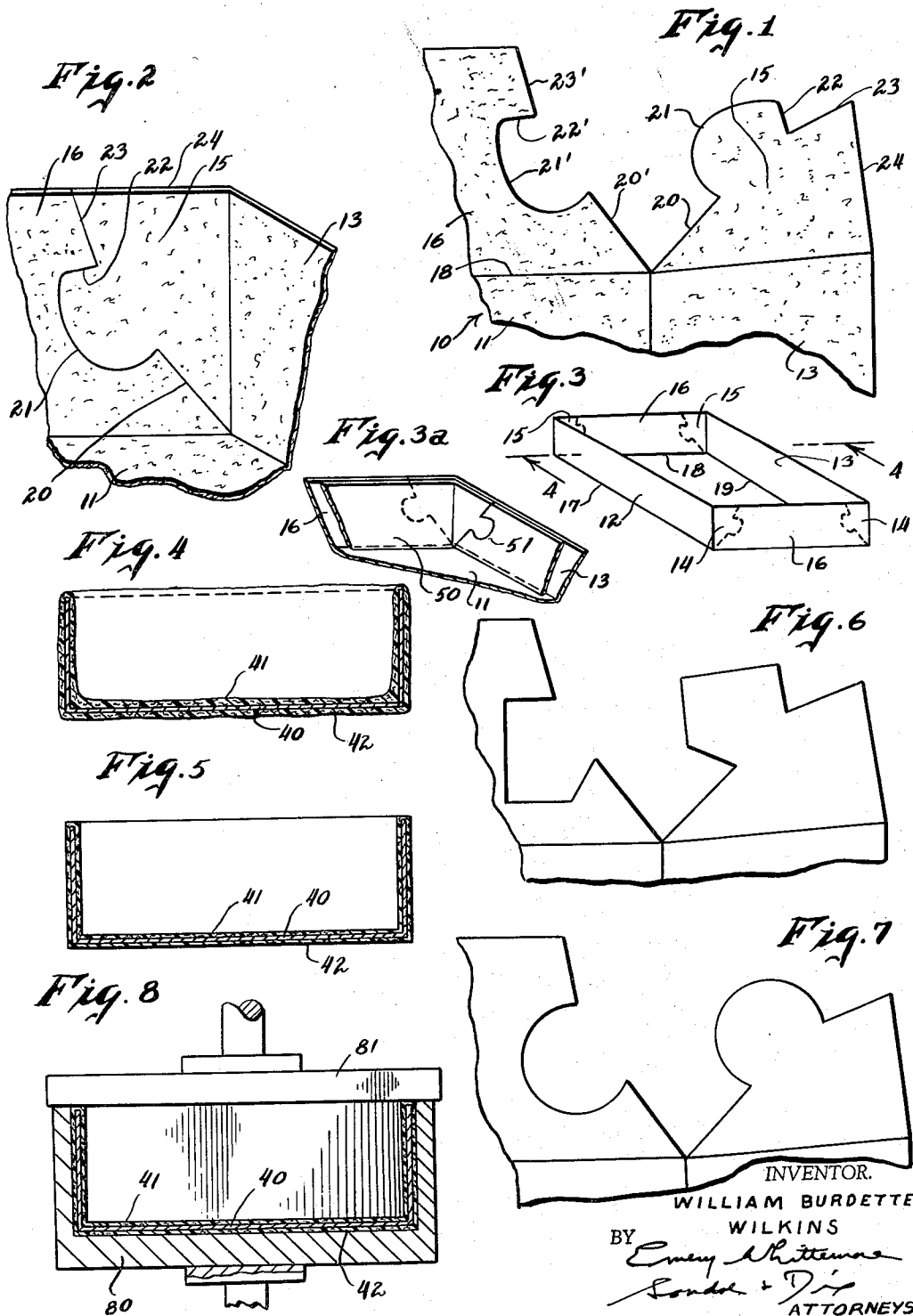
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W. B. WILKINS

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LAMINATED CONTAINER

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LAMINATED CONTAINER

William Burdette Wilkins, Roxboro, N.C.

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3 Claims. (Cl. 229—35)

This invention relates to a laminated product and in particular to a laminated product made in the form of a container.

Containers or cartons used for a large variety of purposes are made of paperboard or similar material. The general structure of such containers is familiar, for it involves a planar sheet of material, scored to form the geometric outline of the container; the sides are then turned up and the ends overlapped and glued or stapled. Such containers are somewhat fragile and the overlapping portions are objectionable for many purposes.

It is an object of the present invention to provide a container comprising a skeleton or shell of paperboard, which said skeleton or shell is covered or encased in a sheath or coating of fibrous reinforcing material impregnated with a thermosetting resin.

It is a further object of the invention to provide for forming the paperboard skeleton or shell in such manner as to avoid overlapping portions which result in non-uniform wall thicknesses.

The invention, accordingly, is embodied in a container of a form such that it is adaptable to fabrication from sheets of paperboard by appropriate scoring of the surface and cutting of the corners so that it may be folded to the contour of a box, for example, whereupon the box is then subjected to a laminating process in which it is enveloped in a layer of fibrous material impregnated with a thermosetting resin, after which it is passed to a molding stage, in which the box is placed in a mold and baked to cure the resin. Thus, there is formed a box having its bottom, sides and ends formed from paperboard laminated with a layer of plastic impregnated fibers, the box being further characterized by the fact that the layer of plastic impregnated fibers forms an outer sheath or coating for the paperboard skeleton and that substantially no impregnation of the paperboard skeleton itself with the plastic material occurs.

Reference to the drawings will illustrate the invention in further detail, wherein—

FIGURE 1 illustrates a layout of a corner of the box to show an inside corner formed in accordance with a preferred example of the invention;

FIGURE 2 is a perspective view of the inside corner shown in FIGURE 1;

FIGURE 3 is an illustration of the completed box with the external resin impregnated fibrous laminate;

FIGURE 3a shows a reinforced corner;

FIGURE 4 is a section taken along the line 4—4 of FIGURE 3 after application of the resin impregnated fibers, but before molding;

FIGURE 5 is a similar section after molding and showing the form of laminations in the completed box;

FIGURES 6 and 7 illustrate alternative versions of the corner structure; and

FIGURE 8 illustrates the box in section, in a heat curing apparatus.

Referring now to FIGURE 1, 10 represents the body of the box which is made up of bottom 11, side walls 12 and 13, each of which terminates in an ear 14 and 15. The bottom has an extension 16 which may be considered the end for purposes of this illustration. Also for purposes of illustration, details of the description are applied only to one corner of the box, because the others would be substantially identical.

In laying out the sheet appropriately for the bottom, the widths of the projections 12, 13 and 16 are made the

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same, because when turned up along the score lines 17, 18 and 19, they form the sides and end of the container. At each corner, for example, in the corner carrying the ear 15, the side flap is cut in an outline which commences with a diagonal line 20 substantially at 135° to score line 18. An extension therefrom, in this figure, is cut as an arcuate section or ear 21, which is turned back on itself at 22 substantially at 45° to line 20 and is then completed on the diagonal line 23, which may be an extension of the 45° line or may be at any desired angle. If the box is to be made as a straight sided parallelepiped, the angle to be formed by the side flaps 12, 13 and 16 with the bottom 11 is a right angle and edge 24 becomes an extension of the edge of the flap 13.

If it is desired to have the box with slightly tapered side walls, an appropriate orientation of the angle of the edge 24 is made so that the corner on the line 24 and 23 will be a continuation at the same level as the outer edge of the flap 16. This latter is a requirement of geometry of the box and the exact angle at which line 24 is sloped is determined by the form of cut worked into the flap for assembly of the end and the angle at which the incision 20 approaches the score line 18.

To correspond to the flap 15 appropriate incisions are made in the flap 16; thus 20' matches cut 20; the outline 21' matches the ear 21; 22' matches the cut 22; and 23' matches the cut 23. When the side is assembled, the flap 15 with the arcuate projection 21 fits against the corresponding flap 16 to form a continuous planar side, as shown in FIGURE 2.

In laying out the corner, the exact form of cut is not critical; rather it is important for purposes of the invention only that the contour of the end of flap 15 conform to and match the contour of the abutting end of flap 16.

In the form of the box shown, the planar sheet of paperboard is cut out, scored, and the corners cut in accordance with the outline described. In the second operation of forming the box, the side flaps are folded up and fitted together, as shown in FIGURE 2. In general the natural thickness and rigidity of paperboard of this form is such that the box may be loosely assembled with the sides and end flaps in proper relation. It then passes to the third step of formation in which fibrous materials, for example, glass fibers, which will provide tensile strength, are wrapped in a thin layer around the bottom and all of the sides of the box.

The fibrous materials are first impregnated with a thermosetting resin to form the basis for the lamination which will be the finished box. The product, thus assembled, is then passed to the heat treating stage, which involves fitting it into a die 80—81, as shown in FIGURE 8, where it is heated to a temperature of the order of 200–250° to cure the resin. With the curing, the resin and the box form a complete assembly in which the side walls are of uniform thickness and, particularly, the ends have no projections caused by overlap of corner flaps. The butt joints thus formed at the ends may be characterized as such and derive their strength from the presence of the fibrous materials in the external plastic layer and the interlocked form of flap.

For forming the external plastic layer, glass fibers are first wetted with resinous material so that they are covered with a layer of plastic before being wrapped around the sides of the box. By this technique a complete assembly with virtually no impregnation of the board is accomplished.

FIGURES 6 and 7 illustrate other geometrical forms of cut-outs for the sides. Thus, in FIGURE 6 the side is formed by means of a strip scored at intervals defining the dimensions of the box and having the ends cut with straight projections and matching indentations on the

other are made for complete assembly. FIGURE 7 illustrates the addition of diagonal cuts.

FIGURE 3a illustrates another form of the box which is characterized by having the sides and ends formed of a double layer of box stock with the butt joints in each layer being offset from each other. Thus, in FIGURE 3a the parts corresponding to each of FIGURE 3 are correspondingly identified. An inside layer, which consists of box stock strip 50, corresponding in width to the height of the box and having, for example, a single butt joint 51 therein, is fitted into the box, joint 51 being on the side adjacent to that in which a joint in the box side is formed.

It is apparent, of course, that if an exceptionally high strength, heavy box is needed, three, four or more layers or plies of box stock could be laminated to form the sides and ends, the butt joints in the layers being oriented to alternate sides of a corner. Likewise, the bottom of the box may, if desired, be reinforced by one or more additional layers of box stock.

When extra layers or plies are used to form the sides, ends or bottom of the box, the facing surfaces of adjacent plies or layers are preferably not bonded together. This not only results in a saving in cost but also results in an increase of impact strength in the finished box.

For purposes of the invention, the lamination of a plastic-wetted fibrous material may be carried out not only with glass fibers but other fibrous materials such as cotton, rayon, nylon, sisal, or the like, which are sufficiently heat resistant to withstand molding temperatures as high as 225 to 250° C. A similar requirement, of course, applies to the resins and for the purposes of the invention, I prefer plastisols composed of polyester resins, such as those available commercially in liquid form from Rohm and Haas Co. epoxy type resins also obtainable in liquid form from the Bakelite Company, or the Shell Chemical Company, phenol formaldehyde resins, urea formaldehyde resins, etc. That is, the resin to be used may be any resin suitable for heat polymerization and setting or any plastisol which is cured by heating to a temperature to about 225-250° C. The characteristic form of the completed box is that the product is formed without material penetration of the box stock itself by the resin which forms the adhesive layer around the fibers. The box as shown in FIGURES 4 and 5 characteristically consists of the central internal core 40 of box making stock, e.g., paperboard or other similar sheet material, and an inner layer 41 and an outer layer 42 consisting essentially of fibers and the resin. No material penetration of resin into the box stock appears. It is also to be understood that the fibers when used are preferably oriented across the cut which is used to form the corners.

That is, referring to FIGURES 1 and 2, one cut formed by the lines 20, 21, and 23 forming the joint may be said to be approximately at a 45° angle to the score line 18. The fibers forming the laminate around the side of the box are preferably oriented parallel to the score line 18 so that such tension as is applied to the joint when the box is packed is a tensile force applied to the fibers along the direction of their maximum strength. It will also be understood that when extra layers or plies are used, as shown in FIGURE 3a, the opposed facing surfaces of the strip 50 and sides 13 and ends 16, are preferably not bonded together, except insofar as the wrapping of fibers and resin may cause adhesion at the edges.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

What is claimed is:

1. A unitary container formed from a fibrous sheet material to provide a relatively shallow tray having a bottom formed of a central layer of said sheet material and outwardly extending sides from each of the sides of said bottom, said fibrous material being a box forming material which is cut from a sheet to form the said central bottom with the outwardly extending sides integral therewith, the said sides defining the depth of the container, the said sides further being characterized by being of uniform thickness throughout their full length around the container, joints connecting the said sides being formed by abutting and interlocking edges formed in a plane, the said edges being held in fixed matched relationship by an externally-applied, fibrous, plastic-impregnated reinforcing layer, wherein the fibers of said layer extend essentially transversely across the said abutting, interlocking joint.

2. A container in accordance with claim 1, wherein said external fibrous material is a layer of glass fibers.

3. A container in accordance with claim 1, in which the sides are reinforced and formed of a plurality of layers of box forming material.

References Cited in the file of this patent

UNITED STATES PATENTS

147,710	Thomson	Feb. 17, 1874
377,813	Munson	Feb. 14, 1888
981,993	Gair	Jan. 17, 1911
1,006,722	Claussen	Oct. 24, 1911
1,303,687	Leffler	May 13, 1919
2,341,845	Mark	Feb. 15, 1944
2,751,109	Moore	June 19, 1956
2,777,626	French	Jan. 15, 1957