April 22, 1952 F. D. BERGSTEIN 2,593,834

TRANSPARENT TRAYLIKE STRUCTURE

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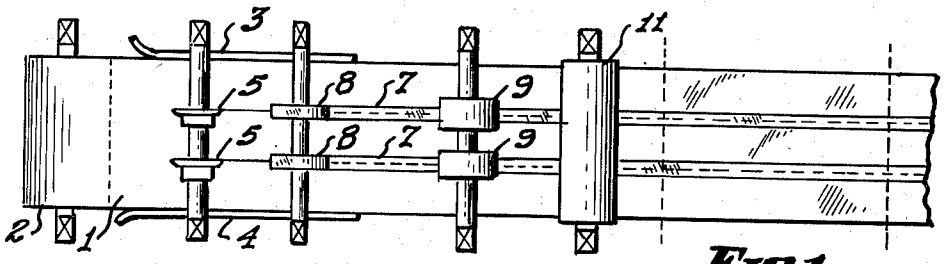


FIG. 1.

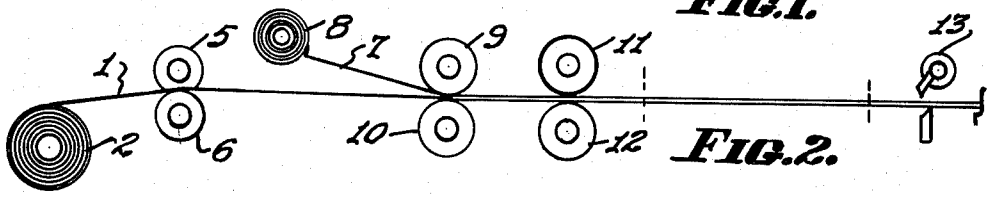


FIG. 2.

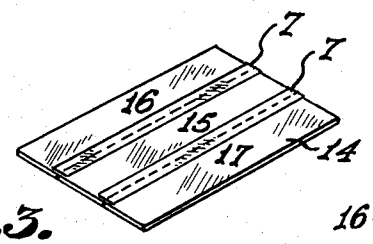


FIG. 3.



FIG. 4.

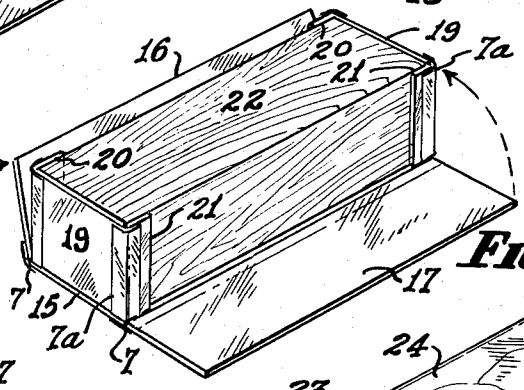


FIG. 5.

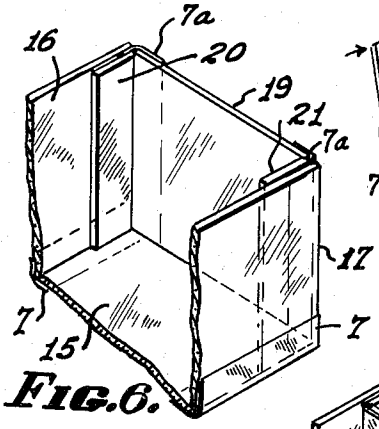


FIG. 6.

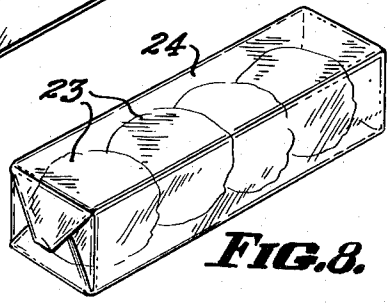


FIG. 8.

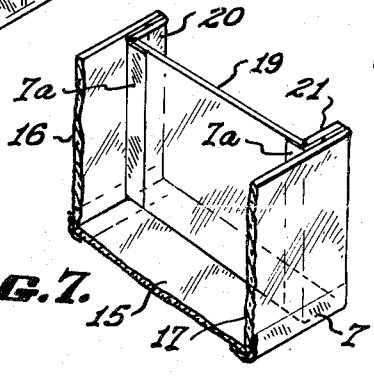


FIG. 7.

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TRANSPARENT TRAYLIKE STRUCTURE

Frank David Bergstein, Cincinnati, Ohio

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1 Claim. (Cl. 229—23)

1

My invention relates to the production of tray-like structures from "transparent sheeting," by which I mean sheeted materials of thermoplastic character, for example, cellulose acetate, Lucite, and the like, which are thick enough to be self-sustaining when made into containers, but are incapable of being scored to form lines of hinged articulation, as is done with paperboard.

Various products, inclusive of manufactured articles, fruits and vegetables, have been packaged by arranging them in paperboard trays, and then wrapping the assembly in a thin, flexible, transparent film such as cellophane, thin acetate, or other transparent wrappings of commerce. The trays may be widely varied as to shape and size in accordance with the particular products; but comprise essentially paperboard structures having a bottom and side and end walls, sometimes with partial top members.

It has been realized that a preferable package would result if the tray could be made of transparent sheeting, especially since the paperboard tray obscures considerable portions of the packaged articles and prevents the most effective display. But since transparent sheeting cannot be scored and must be formed under heat, such trays could only be made hitherto in the set-up condition, rendering them very expensive and restricting their use to classes of products which could stand an inordinately high packaging cost.

The fundamental object of my invention is the provision of trays made of transparent sheeting at greatly reduced cost.

More specifically an object of the invention is the provision of a tray which may quickly and easily be set up by the user from a plurality of articulated parts which are shipped to him in the flat or knocked-down condition.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that procedure and in that structure and arrangement of parts of which I shall now describe an exemplary embodiment. Reference is made to the accompanying drawings, wherein:

Figs. 1 and 2 are respectively diagrammatic plan and elevational views illustrative of a mode of forming articulated structures from transparent sheeting.

Figs. 3 and 4 are plan views of articulated members formed of transparent sheeting.

Fig. 5 is a perspective view showing a mode of forming a set up tray.

Figs. 6 and 7 are partial perspective views showing end constructions for the tray.

2

Fig. 8 is a perspective view of a completed package.

In a copending application of R. M. Bergstein, Serial No. 695,143, filed September 6, 1946, now matured into Patent No. 2,551,090, of May 1, 1951, and entitled Knocked Down or Folding Structures Made From Acetate Sheeting or the Like, there is taught a method of producing structures which comprise acetate panels hingedly articulated together. In the formation of my structures I employ this method for the formation of articulated parts. I form my trays from a plurality of parts as hereinafter set forth; and I have provided a structure such that while the parts may be shipped to the user in knocked down or collapsed form, the user may set them up into the form of a strong transparent tray very cheaply and without the use of elaborate tools or mechanism. In the preferred form of my invention the knocked down parts comprise a member in which the bottom panel and side walls are hingedly articulated and two additional members in which end walls are preferably articulated to attachment flaps.

Referring to Figs. 1 and 2, I have shown the preferred method for the formation of my articulated members. Transparent sheeting 1 is being withdrawn from a roll or bulk supply 2 and is carried through a suitable machine, being positioned by side guides 3 and 4. Upper and lower slitting knives 5 and 6 sever the sheeting into longitudinal strips. In the formation of the structure of Fig. 3, these strips will be of widths appropriate for the formation of the bottom panel and the two side walls of the desired tray.

During a continuation of the movement of the slitted sheeting, I apply over the lines of cut therein, strips 7 of thin, film-like substance having sufficient flexibility to act as hinges. These strips are withdrawn from rolls 8. The strips are caused to adhere to the transparent sheeting on both sides of the lines of cut therein. This may be accomplished through the application of a solvent for the sheeting or the substance of the strips or both, or through the use of solvent-softened or thermoplastic adhesives. If thermoplastic adhesives are employed, control of temperature as by heating or cooling may be practiced at the points of application of pressure. I prefer however to employ strips of film-like substance precoated with a pressure sensitive adhesive, such as is employed on the pressure sensitive cellulosic tapes of commerce. The substance of the strips may be the same as that of the sheeting or different, as desired. Since they are ordinarily narrow, they may be opaque; but I prefer to have them transparent also, and have

found that cellophane strips coated with pressure sensitive adhesive adequately serve my purpose. The strips are applied and pressed into position by pressure rolls 9 and 10, and the treated web of transparent sheeting is preferably next passed between rolls 11 and 12, which not only exert pressure on the web but also act as draw rolls.

The web is then severed into pieces of appropriate length, as may be done by a fly knife mechanism 13, whereupon the pieces may be stacked and packaged for shipment.

The piece 14, as shown in Fig. 3, comprises a bottom panel 15 and side wall panels 16 and 17 of the chosen width and lengths, and these wall panels are discrete members of non-scorable sheeting but are articulated together by means of the strips 7.

By a similar method and the use of the same or similar apparatus, I form end pieces 18 for the tray as shown in Fig. 4. These are of similar construction, but of different dimensions. They provide in articulation an end member 19 and attachment flaps 20 and 21, the members again being discrete elements of non-scorable sheeting, articulated together by the strips indicated at 7*a*. The width of the portion 19 will be the same or substantially the same as the width of the bottom panel 15 and its length will be appropriate for use with side walls of the width of members 16 and 17. The attachment flaps need only be wide enough for efficient adhesion. The parts making up a tray consist of one of the members 14 and two of the members 18, forming end pieces.

These parts are easily assembled by the user, and while the assembly may be accomplished by mechanism, it is also readily done by hand. A mandrel or form 22 is provided (which may be a block of wood or metal) and the parts 14 and 18 are assembled about the mandrel. In a hand operation, the mandrel may be placed on the bottom panel 15 of the member 14. The end pieces are then placed with their panels 19 against the ends of the mandrel and with their flanges 20 and 21 angularly bent. With the application of a solvent or an adhesive either to the attachment flanges or to the ends of the side wall members 16 and 17, the side wall parts of the member 14 are next folded into position. The parts to be adhesively secured are next pressed together. These operations complete the formation of the tray.

The adhesive or solvent is easily and conveniently applied during the setting up of the tray; but it is not a departure from the spirit of my invention to precoat the attachment flaps or the ends of the side walls with a reactivatable adhesive during the manufacture of the parts. The parts may be fastened together in various fashions. Fig. 6 is illustrative of a form of tray in which the attachment flaps 20 and 21 are inturned. They may be adhesively secured either inside or outside the ends of the side walls 16 and 17. Fig. 7 shows a form of tray in which the flaps 20 and 21 are out-turned. They are adhesively secured inside the ends of the side walls 16 and 17; and the end wall 19 is thus inset. Preferably the articulated parts of the tray are formed by folding in such a way that the strips 7 and 7*a* come at the outsides of the lines of fold, so that the cut edges of the sheeting are not exposed. Instead of providing articulated end pieces 18, I may if desired, provide solid end pieces in which narrow attachment flaps 20 and 21 are preformed to a position at right angles to the end walls. But it is less expensive and more convenient for assembly to provide articulated end pieces as described.

The resultant tray is a strong structure, usually much stronger than a paperboard tray form of comparative thickness of material, since the sheeting is much more rigid than paperboard. The ends of the end and side walls are securely fastened together in my structure, and while the bottom edge of the end wall is not attached to the end of the bottom panel, this does not substantially weaken my structures due to the inherent stiffness of the sheeting, nor is it observable in the completed package.

By the procedures and in the structures described I have provided a five-walled structure, e. g. a tray having a bottom panel and four vertical walls, from a series of articulated parts having uni-directional fold or hinge lines. Essentially my tray in its preferred form is made up of nine separate or discrete panels or pieces of non-scorable sheeting, the panels or pieces being so associated together in preformed groups that the lines of articulation in the groups are parallel. The completed, assembled structure requires connections between panels extending in a plurality of directions; yet in my procedure all articulated groups or sub-assemblies have unidirectional lines of articulation.

The importance of this lies in the facts that unidirectionally articulated sub-assemblies are easily, accurately and cheaply fabricated in commercial, quantity production; that the sub-assemblies may be handled, shipped and stored in flat or collapsed condition; and that the erection of the completed box or tray which is preferably done at the point of use, is simple and inexpensive, requiring a minimum of apparatus.

In Fig. 8, I have shown an exemplary completed package in which the tray and its assembly of contents elements 23 is enclosed in a transparent wrapping 24 of any of the commercial flexible films. It will be apparent that any parts of the assembly of Fig. 8 including the wrapper may be printed, if desired, with any suitable indicia.

Modifications may be made in my invention without departing from the spirit of it. Having thus described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

A self-sustaining box or tray assembled from three preformed units, each of said units consisting of a three-piece assembly in which each piece is a separate panel of non-scorable plastic sheeting and in which the panels of each assembly are hingedly articulated together along parallel lines of articulation by means of narrow strips of flexible material secured to marginal edge portions of contiguous panels, one of said preformed units constituting the bottom and opposite side walls of the box or tray, said side wall panels being folded at right angles to said bottom panel along the lines of hinged articulation therebetween as defined by the said strips of flexible material, the remaining two preformed units constituting the end wall panels of said box or tray and attachment panels for securing the end wall panels to said side wall panels, said end wall panels lying at right angles to said bottom and side wall panels with said attachment panels folded at right angles to said end wall panels along the lines of hinged articulation therebetween as defined by said narrow strips of flexible material, said attachment panels

being secured in face-to-face relation to end portions of said side wall panels.

FRANK DAVID BERGSTEIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
269,170	Bragdon	Dec. 19, 1882
1,371,219	Brady	Mar. 15, 1921
1,458,750	Faust	June 12, 1923
1,480,377	Daly	Jan. 8, 1924
1,655,071	Oppenheim	Jan. 3, 1928
1,735,548	Scott	Nov. 12, 1929
1,836,909	Dietmann	Dec. 15, 1931
2,130,019	Meier	Sept. 13, 1938
2,281,165	Miller	Apr. 28, 1942
2,233,207	Gillam	Feb. 25, 1941
2,425,564	Ring	Aug. 12, 1947
2,458,834	Chateauneuf	Jan. 11, 1949
2,488,194	Hunsworth	Nov. 15, 1949