

Feb. 18, 1941.

H. F. WATERS

2,232,088

CONTAINER

Filed Jan. 18, 1938

2 Sheets-Sheet 1

Fig. 1.

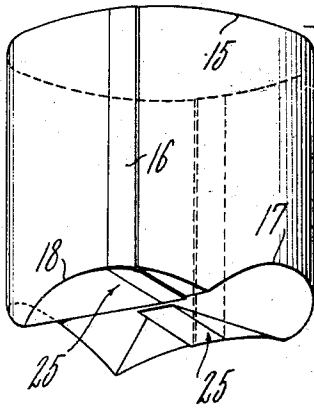


Fig. 2.

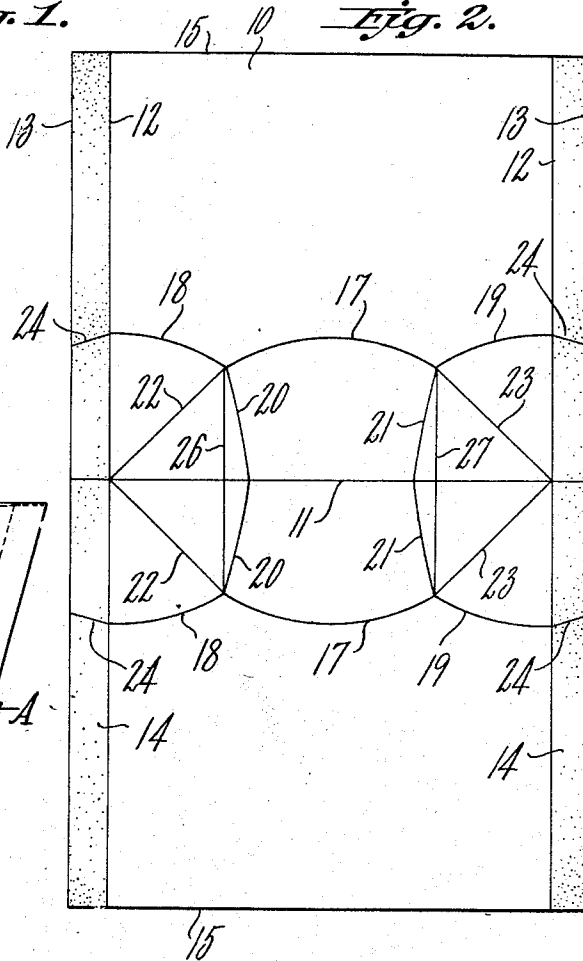


Fig. 3.

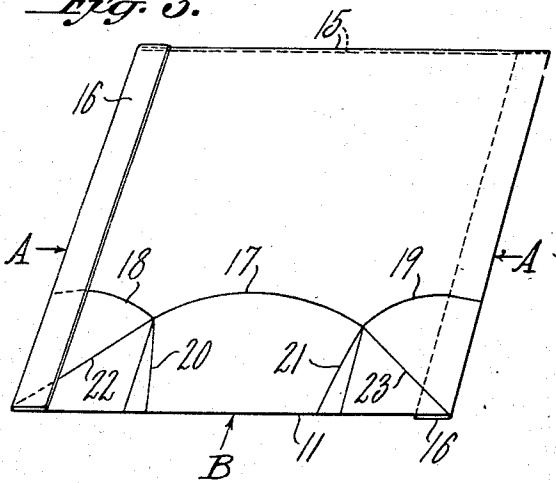


Fig. 5.

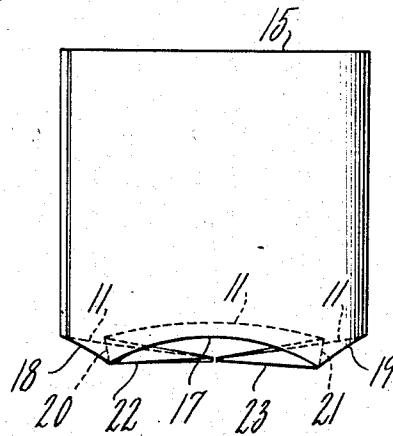
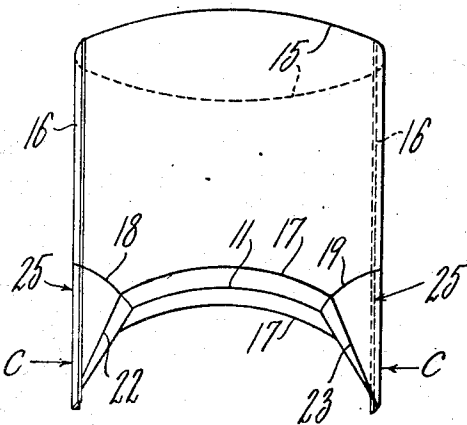


Fig. 4.



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Fig. 6.

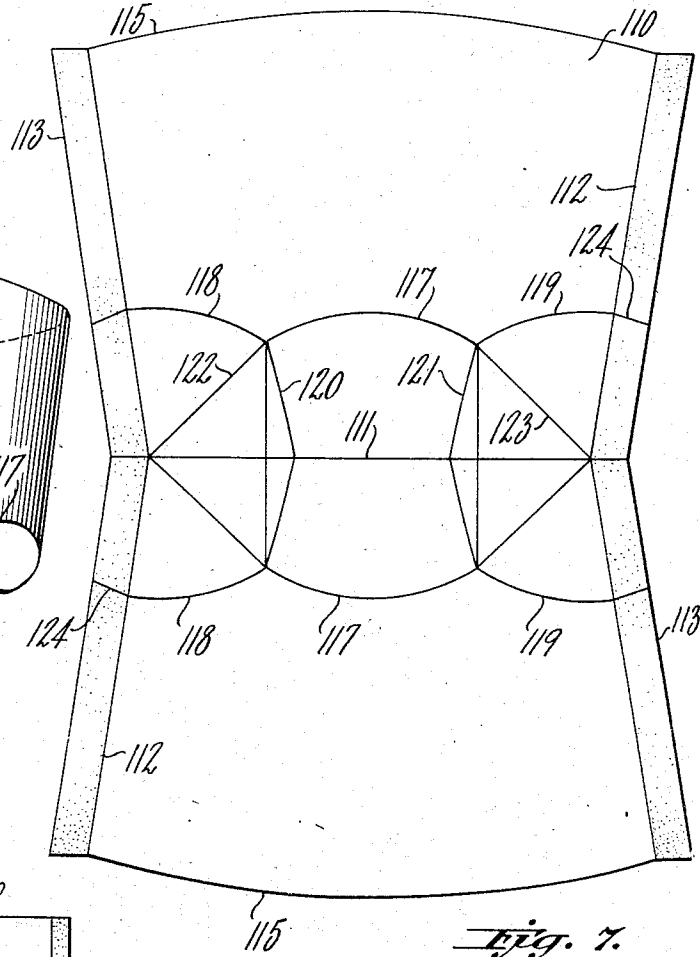
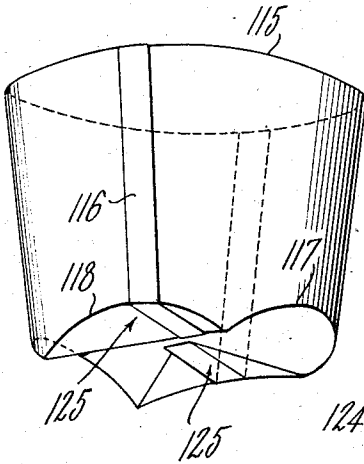


Fig. 7.

Fig. 9.

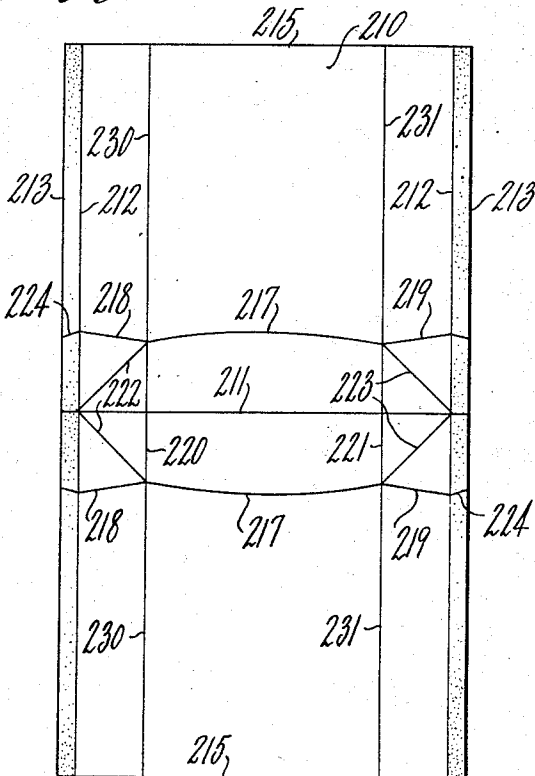
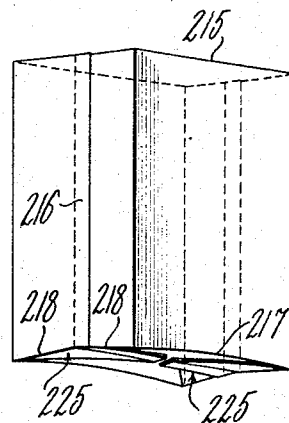


Fig. 8.



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2,232,088

CONTAINER

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Application January 18, 1938, Serial No. 185,503

6 Claims. (Cl. 229—61)

My invention relates to containers and, more particularly, to containers made of paper, cardboard and the like.

It is an object of my invention to provide containers of the class described above which may be simply and economically manufactured, which shall possess all of the advantages and desirable features of containers heretofore available but which shall not be subject to the disadvantages necessarily inherent in such containers.

A known type of container of the above class comprises a cylindrical body with a separate disc-like bottom closure which must be inserted and fastened in position. The formation of the cylindrical body and the fitting of the closure thereto is a relatively complicated and expensive procedure which must be completed at the point of manufacture. This is particularly true when the container is to be made liquid-tight. In the latter case, the closure must be carefully fitted and interlocked with the body and the interior and/or exterior must then be coated with suitable material for rendering the same resistant to the contents for which it is intended and to prevent leakage at the point of closure.

Containers of the known type just discussed must be completed at the point of manufacture and must be shipped to the user in completed form. Such containers are exceedingly bulky and fragile and the shipment and storage thereof are expensive and wasteful matters. In order to reduce the cost of shipment and storage of empty, completed containers, they are frequently made in such shape that they may be "nested." To this end, the body portions are frequently made in frusto-conical form. The nesting of such containers is an operation which adds to their cost and, while a considerable reduction in space occupancy is effected, they are still fragile and must be carefully packed in special cases or sleeves.

Another known form of container is formed from a circular blank upon dies of appropriate shape. The excess stock in the blank is formed into plaits and a lip must be rolled or otherwise formed along the open end of the container. Such containers are customarily made from wax impregnated stock and the wax must be softened by application of heat during the dieing process. As the formed containers are allowed to cool, the wax hardens and serves to hold the containers in shape. Containers of this type are exceedingly wasteful of stock since a relatively large portion of the blank is formed into plaits. These containers are very fragile and must necessarily be delivered to the user in completed form. The

problems of shipping and storage of these containers are substantially the same as discussed in the preceding paragraph.

It is, therefore, a more particular object of my invention to provide containers of the class described which may be constructed from a single piece of stock with a minimum of waste, which may be shipped flat to the point of use, and which may be set up for use by a simple manual or machine manipulation.

It is a further object of my invention to provide a container which may be shipped in the form of a flat envelope having fold lines so defined therein that a self-supporting, hollow container of predetermined configuration may be formed therefrom solely by the operation of folding the envelope along the lines defined therein.

It is a further object of my invention to provide a container suitable for the packaging of liquids, semi-liquids, oils or greases, which may be shipped to the filling point in the form of a flat envelope having fold lines so defined therein that a self-supporting, hollow container of predetermined configuration may be formed therefrom solely by the operation of folding the envelope along the lines defined therein.

Other and further objects of my invention will become apparent from a consideration of the following description taken in connection with the drawings accompanying and forming a part of this specification.

In the drawings,

Fig. 1 is a bottom perspective view of a container constructed according to my invention;

Fig. 2 is a plan view of a completed blank from which the container shown in Fig. 1 may be constructed;

Fig. 3 is a perspective view of a flat envelope, formed from the blank shown in Fig. 2, illustrating the form in which my improved container may be shipped and stored;

Fig. 4 is a bottom perspective view of my container in a partially erected condition;

Fig. 5 is a somewhat diagrammatic illustration of the positions assumed by various portions of my container when fully erected;

Fig. 6 is a bottom perspective view of a modified form of container constructed according to my invention;

Fig. 7 is a plan view of a blank from which the container shown in Fig. 6 may be constructed;

Fig. 8 is a bottom perspective view of another modified form of container constructed according to my invention; and

Fig. 9 is a plan view of a blank from which the container shown in Fig. 8 may be constructed.

Referring now to the drawings in which similar reference characters indicate similar parts throughout the several views, there is shown in Fig. 2 a blank 10 from which a cylindrical container fulfilling certain of the objects of my invention may be constructed. The blank 10 is rectangular in shape and its dimensions are chosen for the production of a container of desired size.

The blank 10 is scored or otherwise conditioned for folding along the line 11 which extends transversely of the blank as seen in Fig. 2 and divides the same into two homologous sections. Score lines 12 are formed adjacent to and preferably parallel to the edges 13. Adhesive material 14 of any suitable type is applied to the blank in the area bounded by the score lines 12 and the edges 13. The blank, as thus far described, may be folded along the line 11 to bring the edges 15 together. The adhesive bearing margins 12, 13 are brought into facewise contact and secured together by the adhesive 14 and the seams 16 thus formed may be folded along the score lines 12 and secured in the position shown in Fig. 3 by adhesive.

It will thus be seen that the blank 10, as thus far described, may be formed into a flat envelope having a seamless bottom, seamed and sealed sides and an open top.

According to my invention, the blank 10 is scored, or otherwise conditioned for folding, along lines so laid out that portions of the body of an envelope formed therefrom may be folded in a predetermined manner to form a self-supporting cylindrical container. Preferably, the scoring operations necessary for this result are performed simultaneously with formation of score lines 11 and 12 and the cutting of the blank, although it is obvious that these operations could be performed separately or that the scoring operations to be described could be performed after the blank 10 has been folded and sealed into the form of a flat envelope.

According to my invention, the score lines indicated by reference numerals 17 to 24 inclusive are provided in the blank 10 to define a self-supporting bottom formation. The score lines 17, 18 and 19 define the circular base of the container when set up while the lines 20, 21, 22 and 23 define ears of excess material which must be folded upon the base, as shown in Fig. 1. An important feature of my invention resides in the laying out of score lines 17 to 24 inclusive whereby the area of the material going into the bottom formation is greater than the area of a circle corresponding to the cross section of the cylindrical body of the container. To this end, the curved lines 17 are developments, in a flat plane, of the intersection, in space, of the cylindrical container body and another body which may be a cylinder whose longitudinal axis intersects the longitudinal axis of the container body at right angles or which may preferably be a sphere whose axis coincides with longitudinal axis of the container body. In either event, the lines 17 are spaced from the base line 11 by a distance greater than the radius of the circular cross section of the container body. The curvature and spacing of the lines 17 will, therefore, cause the material bounded by these lines to assume a generally arched formation when the container is set up.

The score lines 18 and 19 are preferably laid out as halves of the curved line 17 and their lo-

cations, relative to the base line 18, are respectively similar to the locations of corresponding parts of the curved lines 17. The lines 18 and 19 will, therefore, cause the material bounded by these lines to assume a generally arched formation in the same manner as the lines 17. The material bounded by the lines 18 and 19 is, however, formed into ears of excess material, as indicated at 25 in Fig. 4. To this end, score lines 22 and 23 are formed as diagonals extending from the intersections of the line 17 with the lines 18 and 19, to the intersections of the line 11 with the lines 12. The lines 22 and 23 may be straight, as shown, or they may be slightly curved if so desired. Score lines 20 and 21 extend from the intersections of the curved lines 17, 18 and 19 to the base line 11 and intersect the base line at a point somewhat within the area bounded by the lines 17. If so desired, additional score lines 26 and 27 may be provided to further weaken the material in this general location. The action of score lines 20, 21 and 26, 27 (if the latter are provided) will be explained hereinafter.

Score lines 24 are formed in the marginal areas 12, 13 of the blank 10. These lines preferably have a curvature similar to that of lines 18 and 19 but are laid out in reverse relationship whereby they will coincide with the lines 18 and 19 when the seams 16 are turned over, as shown in Fig. 3.

A preferred manner of manufacture and use of the container disclosed in Figs. 1 to 5 inclusive will now be described.

The blank 10 is cut from suitable stock and is scored, as outlined above. For the packaging of dry materials, an adhesive of any desired type may be applied at 14. For the packaging of liquids or oils, the stock may be coated with a suitable flexible coating material, such as a rubber hydrohalide or a suitably plasticized cellulosic material. If the coating material chosen is thermoplastic, it may be utilized as the adhesive as by providing a sufficient thickness thereof at 14. Otherwise, a suitable oil or liquid-proof adhesive may be placed on the blank within the areas 14.

The blank 10 is then folded along the line 11, sealed along the seams 16 by pressure, or heat and pressure when a thermoplastic adhesive 14 is used, and the seams 16 are turned and adhered to the outside of the envelope, as previously described. It is preferred to leave those portions of the seams 16 which extend below the score lines 22 and 23 unadhered to the body of the container in order to avoid interference with the formation of the ears 25. The container is at this time in the form of a flat envelope, as shown in Fig. 3, and is complete insofar as manufacturing operations are concerned.

The flat envelope, shown in Fig. 3, may be packed, shipped and stored with no waste of space and without the necessity of special cartons or careful handling.

When the container is to be put into use, it is set up by hand or by suitable automatic machinery by folding the envelope along the lines defined therein. No sealing, bottoming or other manufacturing operations are necessary for the conversion of the flat envelope into a self-supporting cylindrical container. To set the container up, it is merely necessary to apply pressure in the vicinity of and in the directions indicated by the arrows A and B in Fig. 3. Pressure at the points indicated by the arrows A will cause the envelope to open along the edges 15 and will cause the body of the envelope to assume an ovular

conformation. Pressure at the point indicated by the arrow B will cause the envelope to unfold along the creased line 11 and to fold along the lines 17, 20, 21, 22 and 23. Continued pressure at B will cause the material bounded by lines 17 to overcenter with a toggle-like action and assume a curvature reversed from that of the body of the container. The material will fall into this reverse curvature with a distinct snap and will thereafter remain in such condition with considerable rigidity. The material will fold along lines 22 and 23 to form the ears 25. The container at this stage of the erection process is shown in Fig. 4.

From an inspection of Fig. 4, it may be observed that the material bounded by lines 22, 18 in the left hand ear 25 and the material bounded by lines 23, 19 in the right hand ear forms a continuation of the cylindrical surface of the container body. Application of pressure, as indicated by the arrows C in Fig. 4, will cause the ears to bend inwardly along the lines 18 and 19 and will force the material bounded by lines 18, 22 and 19, 23 to assume a curvature reversed from that of the container body. The ears 25 may thus be bent substantially into the plane of the bottom of the container. During the bending of the ears 25 the reversal of curvature will occur with a distinct snap and the ears will be self-sustaining in position adjacent the bottom of the container. The material bounded by lines 22, 17, 23 will double upon itself along the lines 20 and 21. Since this doubling extends through approximately 180°, it may be of advantage to further weaken the material by the provision of score lines 26 and 27, as discussed above. When thus weakened, the material in this vicinity will not tend to straighten with sufficient force to disarrange the ears 25. The container is now completely erected, as shown in Fig. 1.

From an inspection of Fig. 1, it may be observed that the inwardly arched bottom formation caused by the curved lines 18 and 19 not only holds the ears in position but also rigidifies the container along the axis paralleling the base line 11. The inwardly arched bottom formation caused by the lines 17 rigidifies the container along the axis perpendicular to the base line 11. The two transversely intersecting arch formations cause the bottom, as a whole, to assume a generally spherical conformation. The lines 20, 21 should, therefore, define as nearly as possible the natural bend line of this spherical surface. While the lines 20, 21 may be curved, as shown in Fig. 2, a reasonable approximation of their desired configuration may be made by forming them as straight lines.

The points of intersection of the curved lines 17, 18 and 19 define feet and, in the particular container thus far described, these feet will be symmetrically disposed along the circumference of the container bottom. The curved lines 18 and 19 are so designed that the ears 25 will be held at right angles to a generatrix of the cylindrical container body and the ears will thus be prevented from extending below the feet upon which the container is designed to rest.

In Fig. 5, I have shown in diagrammatic form the disposition of various fold lines of my container when completely set up.

It will be obvious that the various score lines may be varied as to position and curvature in order to define fold lines necessary to produce containers whose cross sections are other than circular. Thus, elliptical or ovular containers and containers having unsymmetrically arranged

feet may be designed within the scope of my invention, as thus far described.

In Fig. 6, I have shown a container, embodying my invention, the body of which is frusto-conical. Containers of this shape may be set up and nested for temporary storage purposes.

A blank, suitable for the formation of the container shown in Fig. 6, is shown in Fig. 7. The outline of the blank 110, as defined by the edges 113 and 115, is designed to form a frusto-conical body of any predetermined dimensions. Curved score lines 117, 118 and 119 are laid out in accordance with the principles discussed above in connection with Fig. 2 except for variations necessitated by the fact that the body of the container is frusto-conical rather than cylindrical. The score lines 111, 112, 120, 121, 122, 123 and 124 are similarly laid out and adhesive is applied to the marginal areas beyond the score lines 112.

The blank 110 may be folded along the base line 111 and formed into a flat sealed envelope in the same manner as discussed above in connection with Figs. 2 and 3. In this form, the containers may be shipped to the point of use. The containers may then be set up exactly as described above in connection with Figs. 1, 3, 4 and 5. From an inspection of Fig. 6, it may be seen that a container constructed according to this form of my invention is rigid and self-supporting for the same reasons as pointed out above in connection with Fig. 1.

In Fig. 8, I have shown another form of container, embodying the principles of my invention while in Fig. 9, I have shown a blank from which such a container may be formed. The body portion of the container shown in Fig. 8 is rectangular in cross-section and to this end the blank 210 is provided with score lines 230 and 231 which define the angular corners of such a body. Score lines 212 define the marginal adhesive bearing areas for the formation of seams discussed above in connection with Fig. 2. In this embodiment of my invention, the bottom formation of the container is so defined by score lines as to cause the bottom to assume an inwardly arched formation for the purposes already discussed in connection with the modifications above described. Score lines 217 are so laid out as to cause the material bounded thereby to assume an arched formation which extends transversely of the face of the container. Lines 217 may be curved, as shown, or may consist of broken straight lines generally following the formation of the curved lines shown in Fig. 9. Score lines 218 and 219 are laid out according to the principles already above set forth in connection with Fig. 2. In the present form, the lines 218 and 219 may be straight lines disposed at an angle to the edges 213. Score lines 220, 221, 222, 223 and 224 are similarly laid out.

The particular curvature or angular disposition of the lines 217, 218 and 219 is not critical in this form of my invention. A curvature is selected which will produce a satisfactory arching of the bottom without extreme deformation of the plane sides of the container body.

As in the forms previously described, the blank 210 is folded along the line 211 and the marginal edges are sealed in face-wise contact. The envelope thus formed is in condition for shipment and storage. When it is desired to set the container up, the same is folded along score lines according to the principles outlined above. The material bounded by the lines 217 will assume a curvature reversed with respect to the flat faces

of the container body and, in assuming such curvature, the material will overcenter and fall into position with a distinct snap. This action will result in rigidifying the container along a line normal to the base line 211. The material bounded by the lines 218 and 219 will be formed into ears which will overcenter and snap into the position illustrated in Fig. 8. In this respect, the straight score lines 218 and 219 serve substantially the same function as the curved lines 18 and 19 described in connection with Figs. 1 to 5 inclusive. It will be understood that the container body will be folded along the lines 230 and 231 to give the same the desired rectangular cross-section.

While the above detailed description of desirable forms of my invention has been made in order to comply with the statutes, it is obvious that modifications and variations may be resorted to by those skilled in the art. Such description is therefore to be taken in an illustrative rather than in a limiting sense and it is my intention that the scope of my invention shall be limited only by the appended claims.

I claim:

1. A container in flat form capable of being erected into hollow self-supporting formation, comprising a sheet of material folded upon itself and having the opposite edges of its opposed faces secured together to provide an open mouth, means defining fold lines in said faces upon which said container may be folded to form a hollow body and a bottom integral therewith, certain of said lines being arched upwardly into the body portion of said container to force said bottom to assume a formation arched along intersecting axes and extending inwardly of said hollow body when the container is erected.

2. As an article of manufacture, a container in flat form, comprising; a sheet of relatively stiff, resilient material folded upon itself and having the opposite edges of its opposed walls secured together to provide an open mouth; score lines in said walls upon which said walls may be folded to form a container having a hollow body, a bottom lying substantially in a plane normal to the axis of said body, and ears extending from said body beyond said bottom; additional score lines in said walls upon which said ears may be folded substantially into the plane of said bottom, said last named score lines defining the intersection of a generally cylindrical body with the body of said container whereby said ears will be self-sustaining in folded position.

3. As an article of manufacture, a container in flat form, comprising; a sheet of relatively stiff, resilient material folded upon itself and having the opposite edges of its opposed walls secured together to provide an open mouth; score

lines in said walls upon which said walls may be folded to form a container having a bottom, a hollow body whose walls rise substantially vertically from the plane of said bottom, and ears extending from said body beyond said bottom; additional score lines in said walls upon which said ears may be folded substantially into the plane of said bottom, said last named score lines defining the intersection of a generally cylindrical body with the body of said container whereby said ears will be self-sustaining in folded position.

4. As an article of manufacture, a container in flat form, comprising; a sheet of relatively stiff, resilient material folded upon itself and having the opposite edges of its opposed walls secured together to provide an open mouth; score lines in said walls upon which said walls may be folded to form a container having a bottom, a hollow body whose walls flare upwardly and outwardly from the plane of said bottom, and ears extending from said body beyond said bottom; additional score lines in said walls upon which said ears may be folded substantially into the plane of said bottom, said last named score lines defining the intersection of a generally cylindrical body with the body of said container whereby said ears will be self-sustaining in folded position.

5. As an article of manufacture, a container in flat form, comprising; a sheet of relatively stiff, resilient material folded upon itself and having the opposite edges of its opposed walls secured together to provide an open mouth; score lines in said walls upon which said walls may be folded to form a container having a hollow body of polygonal cross section, a bottom lying substantially within a plane normal to the walls of said body, and ears extending from said body beyond said bottom; additional score lines in said walls upon which said ears may be folded substantially into the plane of said bottom, said last named score lines defining the intersection of a generally cylindrical body with the body of said container whereby said ears will be self-sustaining in folded position.

6. A container in flat form capable of being erected into hollow self-supporting formation comprising a sheet of material folded upon itself along a line extending transversely of the central portion thereof and having the opposite edges of its opposed faces secured together to provide an open mouth, means whereby said container may be folded to form a hollow body and a bottom integral therewith, said means including a series of score lines in said faces, all of said score lines being spaced from said fold line and each said score line being arched away from said fold line.

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