June 7, 1960 S. H. A. YOUNG 2,939,603

PLASTIC CONTAINERS

Filed Nov. 15, 1956 5 Sheets-Sheet 1

FIG. 1

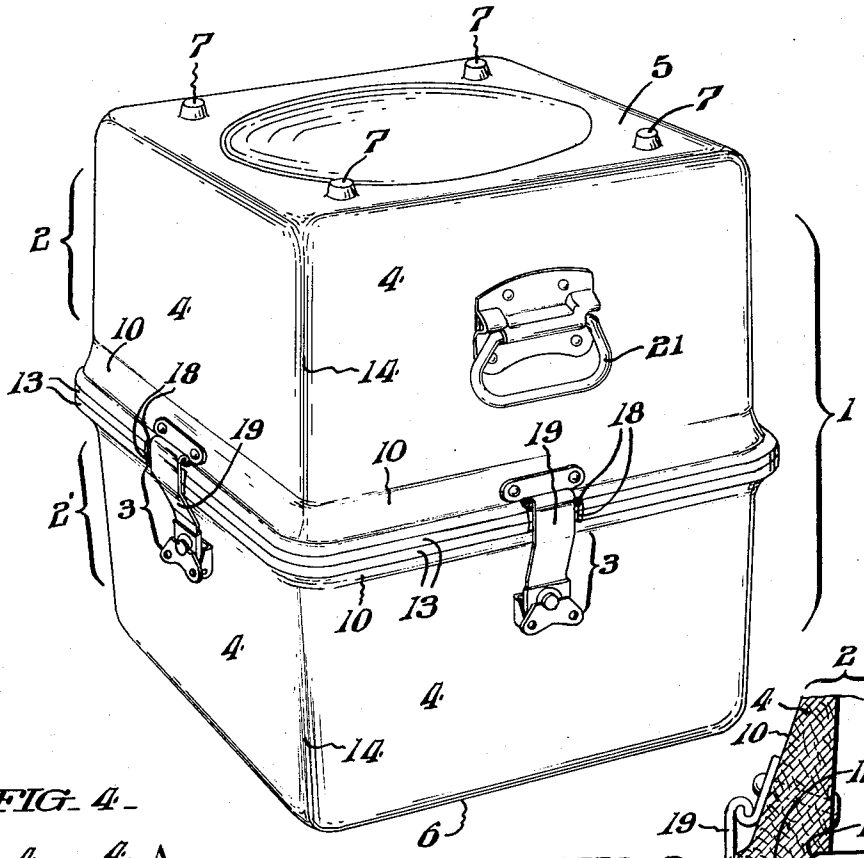


FIG. 4

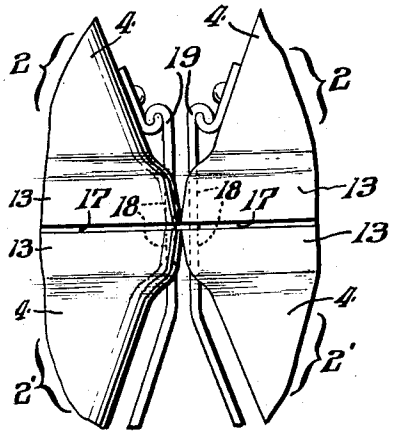
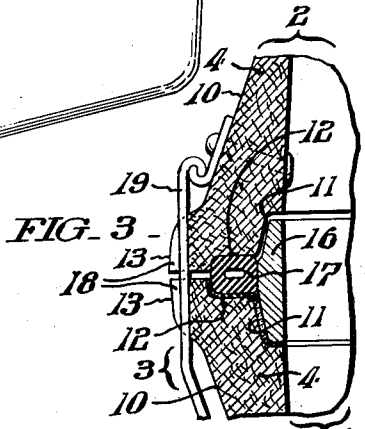


FIG. 3



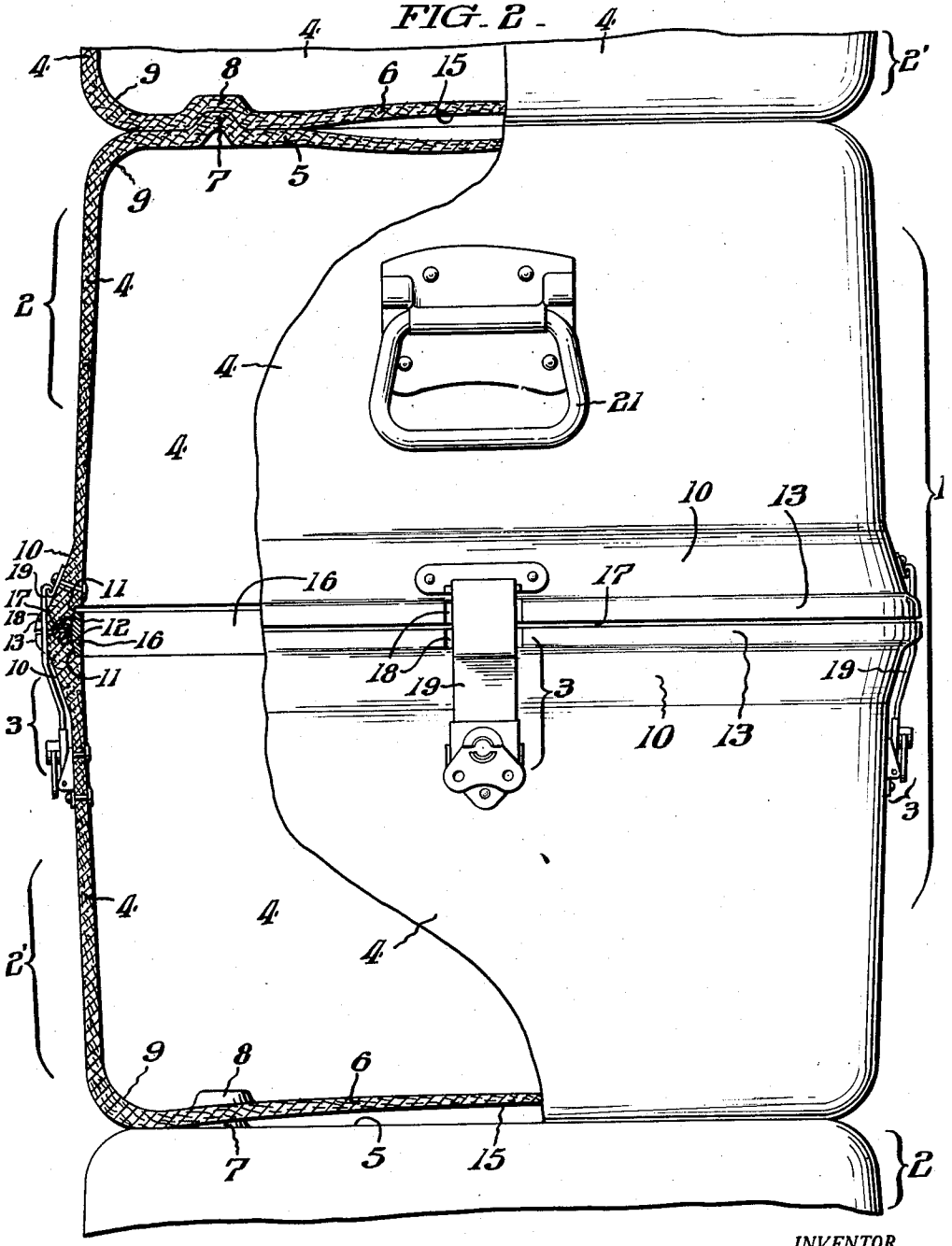
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PLASTIC CONTAINERS

Filed Nov. 15, 1956 5 Sheets-Sheet 2

FIG. 2



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June 7, 1960 S. H. A. YOUNG 2,939,603

PLASTIC CONTAINERS

Filed Nov. 15, 1956 5 Sheets-Sheet 3

FIG. 5.

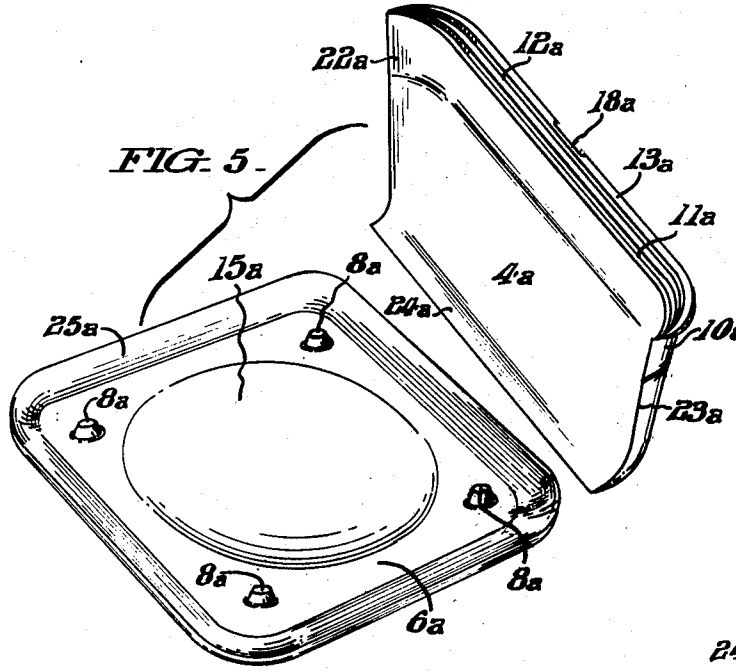


FIG. 7.

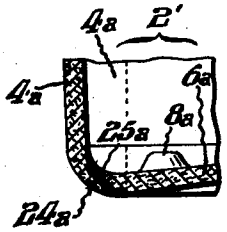


FIG. 6.

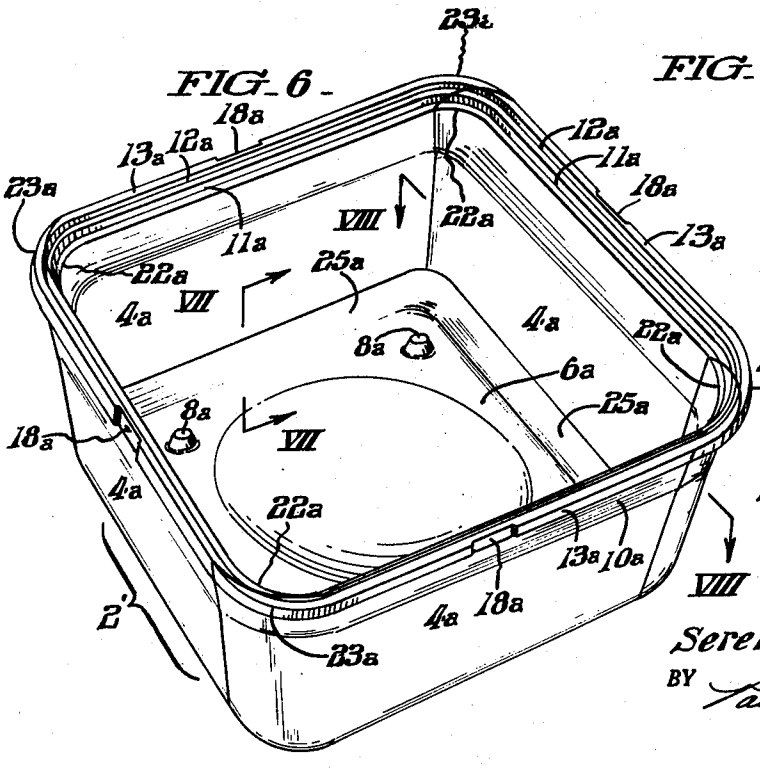
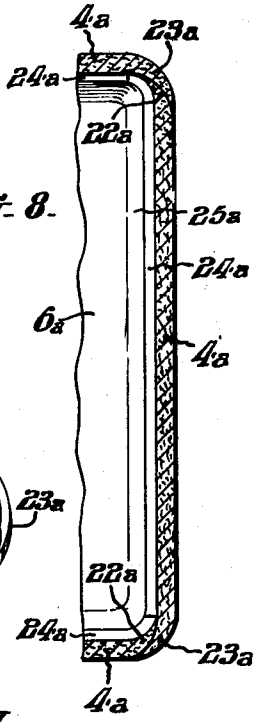


FIG. 8.



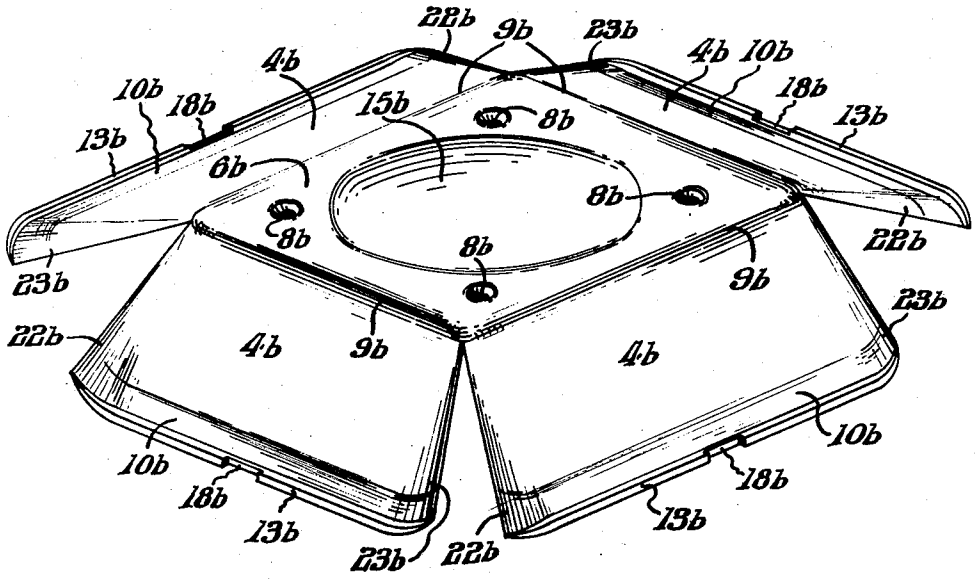
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June 7, 1960 S. H. A. YOUNG 2,939,603

PLASTIC CONTAINERS

Filed Nov. 15, 1956 5 Sheets-Sheet 4

FIG. 9



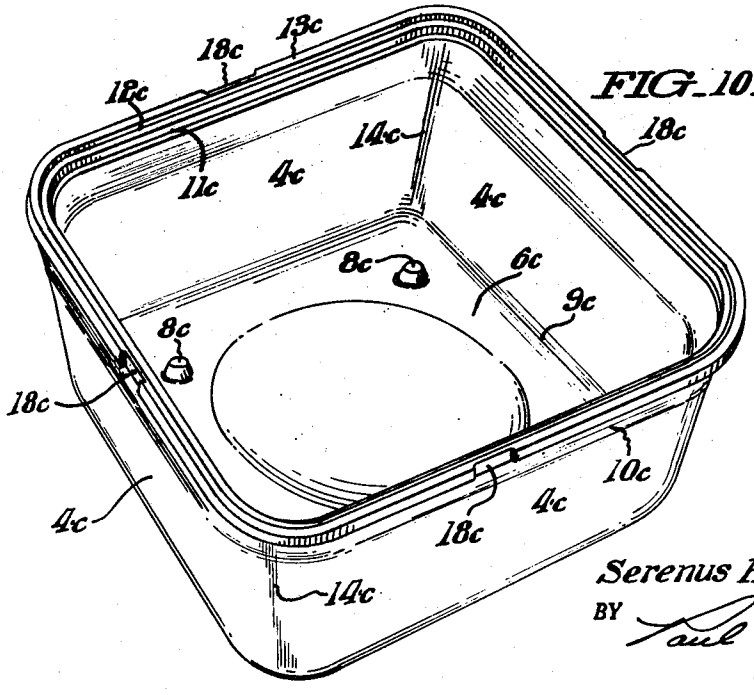


FIG. 10

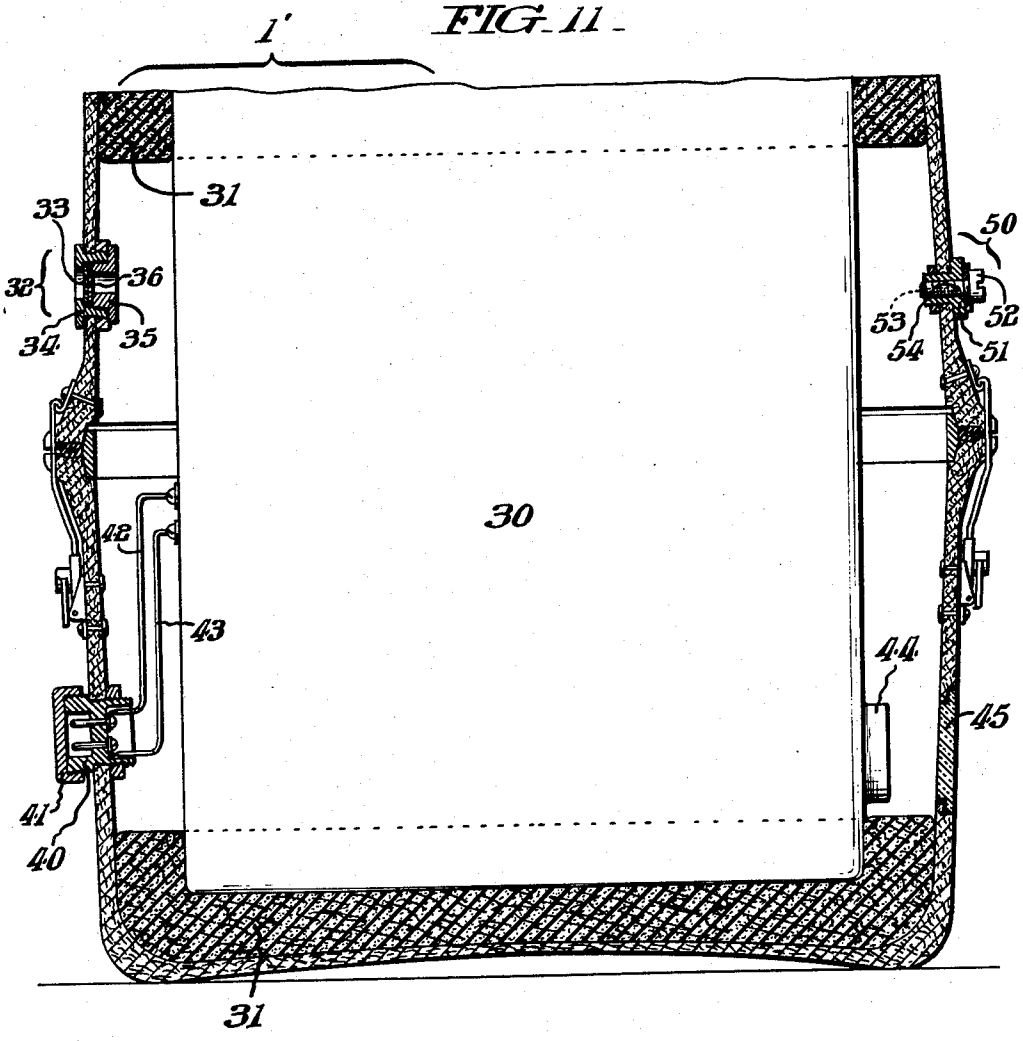
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June 7, 1960 S. H. A. YOUNG 2,939,603

PLASTIC CONTAINERS

Filed Nov. 15, 1956 5 Sheets-Sheet 5

FIG. 11.



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PLASTIC CONTAINERS

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Filed Nov. 15, 1956, Ser. No. 622,310

4 Claims. (Cl. 220—4)

My invention relates to plastic containers, and more particularly relates to fibrous reinforced plastic containers molded from fluid fibrous suspensions.

This application is a continuation-in-part of my patent application relating to improvements in molding shaped articles from fluid fibrous suspensions, filed October 1, 1956 under Serial No. 613,139.

The chief object of my invention is to provide a fibrous reinforced plastic container which is light in weight yet sturdy, and which may have non-uniform sections of uniform density and composition.

It is a further object of my invention to provide a fibrous reinforced plastic container which may be reinforced or strengthened where necessary or desired.

It is a further object of my invention to provide a fibrous reinforced plastic container wherein organic and/or inorganic fibers are uniformly dispersed throughout its structure.

It is a further object of my invention to provide a fibrous reinforced plastic container having organic and inorganic fibers uniformly dispersed throughout its structure which will have optimum physical properties.

It is a further object of my invention to provide a fibrous reinforced plastic container which is smooth and hard surfaced both inside and out, and tough against easy fracture and deformation.

It is a further object of my invention to provide a fibrous reinforced plastic container suitable for shipping delicate and sensitive electronic equipment, such as radar equipment and the like.

Briefly stated, my invention comprises an integrally formed, hollow, molded plastic product, open at one end, which may be used as a receptacle or may be assembled in pairs in reversely disposed relation with their open ends confronting to form a closed container, said product being formed with side walls thickened at their upper edges through a gradual taper and integrally joined at their lower regions to a bottom along a juncture which is reinforced or thickened for rigidity and strength.

Other objects and advantages of my invention will appear from the following description of the attached drawings, wherein:

Fig. 1 is a perspective view of a container conveniently embodying my invention.

Fig. 2 is an enlarged view in elevation showing the container in vertically stacked relationship with similar containers and with one side wall partly broken away.

Fig. 3 is enlarged, fragmentary, elevational view in cross section of the central portion of one side wall of the container.

Fig. 4 is an enlarged, fragmentary view in elevation of two containers of the type shown in Fig. 1 abutting in side by side relation.

Fig. 5 is an exploded view in perspective showing one way of constructing the container from preforms.

Fig. 6 is a perspective view showing assembly of preforms of the type shown in Fig. 5 to form the container.

Fig. 7 is a cross sectional, fragmentary view in elevation taken as indicated by the angled arrows VII—VII in Fig. 6.

Fig. 8 is a cross sectional, fragmentary view in plan taken as indicated by the angled arrows VIII—VIII in Fig. 6.

Fig. 9 shows a modified type of preform for the container.

Fig. 10 shows a second modified type of preform for the container.

Fig. 11 is a fragmentary, elevational view in cross section showing a slightly modified container packed, assembled and ready for shipment.

Referring first to Figs. 1 to 4, the container 1 as there shown comprises two opposing hollow components 2, 2' which are removably assembled in aligned relationship and latched together by releasable spring clasp means 3. Each component 2, 2' has four identical side walls 4. The component 2 has a top 5 formed with four upstanding lug projections 7 in its corner regions, while the component 2' has a bottom 6 formed with four indentations 8 which are so disposed and shaped as to complement the projections 7. By means of the complemental projections and indentations 7 and 8, the containers 1 are held against relative displacement when stacked, as shown in Fig. 2.

Each side wall 4 of the lower component 2' of the container 1 is integrally joined to the bottom 6 through a rounded juncture 9 which is thickened somewhat for strength and reinforcement. Each side wall 4 is also integrally joined to each of the next adjacent side walls 4 through similarly rounded junctures 14, which are also thickened for strength and reinforcement. The upper portion of each such side wall 4 is thickened through a gradual taper 10 and formed with perimetric recesses or steps 11 and 12 for a purpose presently to be explained. The top edge of each such side wall 4 is formed with a lateral perimetric lip or flange 13. The bottom 6 of the component 2' is formed with a slight upwardly concaved or arched construction, as at 15, for strength.

The side walls 4 of the upper component 2 of the container 1 have the same construction as the side walls 4 of the lower component 2', including recesses 11 and 12 and lips 13, and are integrally mergent with the next adjacent side walls 4 through rounded junctures 14 and integrally mergent with the top 5 through rounded junctures 9, said junctures 14 and 9 being similar to those of the component 2'. Except for the substitution of the upstanding projections 7 for the indentations 8, the top 5 of the upper component 2 is of the same construction as the bottom 6 of the component 2', although it is arched or concaved downwardly when assembled as shown in Figs. 1 and 2.

Secured within the perimetric recess 11 of the lower component 2' of the container 1 by means of an appropriate adhesive, such as an epoxy resin adhesive, is a quadrangular indexing band 16 which may be made of metal. The indexing band 16 is adapted for close fit within the perimetric recess 11 of the upper component 2 to ensure proper alignment of the component 2 with the lower component 2', and its inner surface or face is preferably flush with the inside surfaces of the container walls. While in the illustration shown, the indexing band 16 is described as being a separately incorporated element, it is within the scope of my invention to provide, in lieu thereof, an upwardly projecting perimetric flange integrally formed on the lower component 2' or a downwardly projecting perimetric flange integrally formed on the upper component 2. A sealing gasket 17, preferably of either rubber or neoprene, is inserted in the confronting recesses 12 of the components 2, 2' and secured to the half section 2' by an appropriate adhesive, such as an elastomeric adhesive. As shown, the indexing band 16 serves as a backing for the gasket 17.

The perimetric lips 13 on the components 2, 2' are formed with indentations 18 into which are disposed or received the straps 19 of the spring clasps 3. By means of the indentations 18, the spring clasps 3 of laterally abutting containers will be prevented from becoming tangled and damaged, as will be readily understood from Fig. 4. The container 1 is also provided with bale-like lift handles 21 for convenience in handling.

The container components 2, 2' hereinbefore described are made in accordance with the process set forth in my patent application Serial No. 613,139, filed October 1, 1956, wherein preforms are first molded from fluid fibrous suspensions and then assembled in a finishing press where they are molded under pressure at an elevated temperature and finished by impregnating and heat setting a thermosetting resin throughout the preform structures. The container components thus produced will be smooth and hard surfaced both inside and out, and tough against easy fracture and deformation. When the fluid fibrous suspension includes a mixture of organic and inorganic fibers, such as cotton and glass, the finished container components 2, 2' will be formed of fibrous reinforced plastic which will be of uniform density and composition throughout the container structure. By varying the proportions of organic and inorganic fibers, optimum physical properties for the container components will be achieved.

Figs. 5 to 8 show one way of constructing the container 1 from preforms. In this embodiment, each container component is produced from separate side wall preforms and either a separate top or bottom preform, as the case may be. In Figs. 6, 7 and 8 there are shown four side wall preforms 4*a* and a bottom preform 6*a* for constructing the container component 2'. The side wall preforms 4*a* have substantially the same configuration as the side walls 4 of the container of Fig. 1, including a gradually thickened taper 10*a*, recesses 11*a* and 12*a*, lip 13*a* and lip identation 18*a*. Each side wall preform 4*a* has lateral or side edge margins 22*a* and 23*a* and a bottom edge margin 24*a*, all of which are rounded and tapered off in thickness. The side edge margin 23*a* of each side wall preform 4*a* is rounded somewhat less sharply and has a somewhat longer and thicker taper than the side edge margin 22*a*, thus producing a somewhat non-symmetrical cross-sectional configuration, as shown in Fig. 8, for a purpose presently to be explained.

The bottom preform 6*a* has substantially the same configuration as the bottom 6 of the lower component 2' of the container 1, and is formed with corner indentations 8*a* and an upwardly arched construction 15*a*. The peripheral margin 25*a* of the bottom preform 6*a* is upwardly rounded and tapered off in thickness, as shown in Fig. 7.

In assembling the preforms 4*a* and 6*a*, the four side wall preforms 4a are first assembled in upstanding contiguous relation, as shown in Figs. 6 and 8, with the margin 23*a* of each preform 4*a* overlapping the contiguous margin 22*a* of the adjacent preform 4*a*. The bottom preform 6*a* is next inserted downwardly within the four side wall preforms 4*a* so that its upwardly rounded peripheral margin 25*a* overlaps the bottom edges 24*a* of each of the side wall preforms 4*a*, as shown in Fig. 7. After the preforms are thus assembled, they are molded under pressure at an elevated temperature and at the same time impregnated with a thermosetting resin which is heat set throughout the preforms to integrate them into a unitary structure along the regions of overlap. By reason of the integrated overlaps between the lateral margins 22*a* and 23*a* of the side wall preforms 4*a*, and between the bottom margins 24*a* of the side wall preforms 4*a* and the peripheral margin 25*a* of the bottom preform 6*a*, the thickened junctures 9 and 14 are formed in the component 2. Because the preforms are integrated at the regions of overlap, the junctures 9 and 14 will be homogeneous in composition and uniform in density.

The upper container component 2 may be prepared

from four separate side preforms 4*a* and a separate top preform in the same manner as that just described in respect of the bottom component 2'. In such case, the top preform will be similar in configuration to the top of the container and will be formed with a peripheral margin which will be downwardly rounded and tapered off in thickness in order to lap with the upper curved and tapered margins of the side wall preforms from which the section 2 would be constructed.

In Fig. 9 is shown a modified type of preform from which the components 2 and 2' of the container 1 may be constructed. In this preform, each side wall 4*b* is integrally joined to the bottom 6*b* through a thickened juncture 9*b* and is disposed to the bottom 6*b* at an angle of approximately 45°. Such preform would be molded as a unitary structure from a fluid fibrous suspension in one molding operation. Each side wall 4*b* would be formed with rounded and tapered off lateral edge margins 22*b* and 23*b*, similar to the lateral edge margins 22*a* and 23*a* of the preform 4*a* of Fig. 8. When the preform of Fig. 9 is assembled in the finishing press, the lateral edge margin 23*b* of each side wall 4*b* will overlap the lateral edge margin 22*b* of the adjacent side wall in the manner shown in Fig. 8. After assembly, the preform is molded and impregnated with a thermosetting resin which is heat set to integrate the side walls along their regions of overlap.

In Fig. 10 is shown another modified form of preform which may be used in constructing the components 2, 2' of the container 1. The preform of Fig. 10 has the same general construction and configuration as the container 1, having its side walls 4*c* integrally joined together along junctures 14*c* and integrally joined with the bottom 6*c* along junctures 9*c*. Since the preform of Fig. 10 is already an integrated structure, all that is required in the finishing operation is to mold and impregnate the preform with a thermosetting resin and then heat set the resin to produce the finished article.

The container 1' of Fig. 11 is of the same general construction as the container 1 of Fig. 1, but incorporates certain additional features. The container 1', for purposes of illustration, contains radar equipment 30 and, at each end thereof, is provided with dunnage to cushion the equipment 30 and prevent injury to it incidental to rough handling. The dunnage 31 may be composed of rubberized hair molded to conform to the upper and lower configurations of the equipment 30.

A humidity indicator 32 is incorporated in the container 1' for the purpose of determining the presence of moisture in the container, when assembled, packed and closed. The humidity indicator 32 includes a circular, transparent window 33, preferably made of Plexiglas or the like, held in place in the container wall by means of an internally threaded collar 34 co-acting with a hollow, externally threaded nut 35. The indicator 32 further includes a circular piece of testing paper 36 which is chemically treated, as with potassium chloride, and coated with a humectant, the paper 36 being held in contiguous relation to the glass 33 by means of the nut 35. The presence of moisture in the container is indicated by a change of color of the paper 36.

The container 1' further includes an electrical outlet 40 covered by a removable cap 41 and connected to the radar equipment 30 by means of wires 42 and 43. Upon removal of the cap 41, testing equipment (not shown) may be plugged into the outlet 40 for the purpose of testing the radar equipment 30 when packed in the closed container 1'. When thus tested, a gauge or meter 44, readable through a transparent window 45 in the container wall, indicates the operativeness of the radar equipment 30. Like the window 33, the window 45 may be made of Plexiglas or the like and is secured in the container wall by a common adhesive.

The container 1' further includes a pressure valve 50 for equalizing the pressure inside and outside of the con-

tainer when closed. The valve **50** incorporates an internally threaded collar **51** secured in the container wall into which is engaged a threaded cap screw **52**. Pressure inside and outside of the container **1'** will be equalized whenever the cap screw **52** is removed from the collar **51**. If desired, the cap screw **52** may be formed with an axial bore **53** which terminates into a transverse bore **54** adjacent the head of the screw. With this latter arrangement, the screw **52** may be withdrawn from the collar **51** only until the bore **54** is exposed to the atmosphere, at which time, by means of the bores **53** and **54**, pressure inside and outside of the container will be equalized.

While I have shown and described a container incorporating four side walls, it is to be understood that my invention is not limited to this specific construction. It is within the scope of my invention to provide containers having a single side wall, as in the case of a cylindrical container, as well as containers having multiple side walls. It is also to be understood that the single container components, such as those designated as **2** and **2'**, may themselves be useful as containers or receptacles for many purposes.

Having thus described my invention, I claim:

1. A fibrous reinforced plastic container comprising two separate complemental hollow components each molded from preforms composed of a substantially uniform intermixture of discrete organic and inorganic fibers impregnated with a thermosetting resin, each component having an open end and a closed end and at least one side wall portion integrally joined to the closed end, said components being assembled invertedly one upon the other with their respective open ends in opposing relationship, an internal perimetric recess adjacent the open

end of each component, an indexing band fixedly mounted in the recess of one component and slidably received in the recess in the other component when the two components are assembled, and releasable means for locking the two components in assembled relation.

2. The container of claim 1 wherein the indexing band is set into the recesses of the components so as to be flush with the inner surfaces of the walls thereof.

3. The container of claim 1 wherein each component comprises at least one side wall preform and a separate preform forming the closed end of the component, said closed end preform having a rounded and tapered margin disposed about the perimeter thereof adapted to complement and lap a similar margin disposed along the bottom edge of each side wall preform.

4. The container preform of claim 3 having a plurality of adjacent side wall preforms, each side wall preform having a rounded and tapered margin disposed along the opposite side edges thereof, each said margin adapted to lap a similar margin of a next adjacent side wall preform.

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