Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 1

Fig. 1.

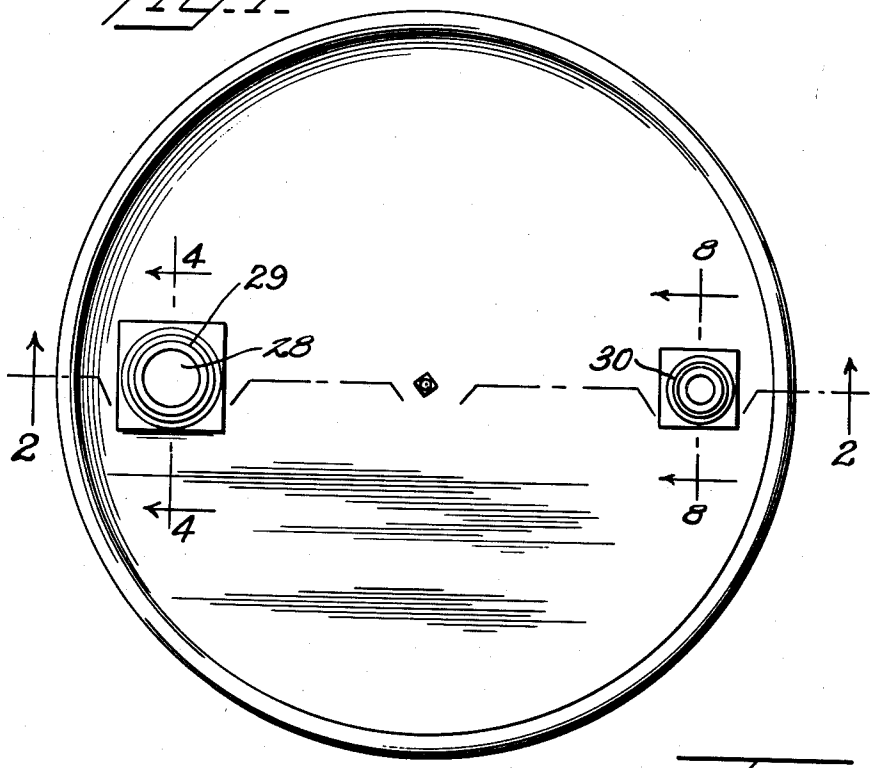
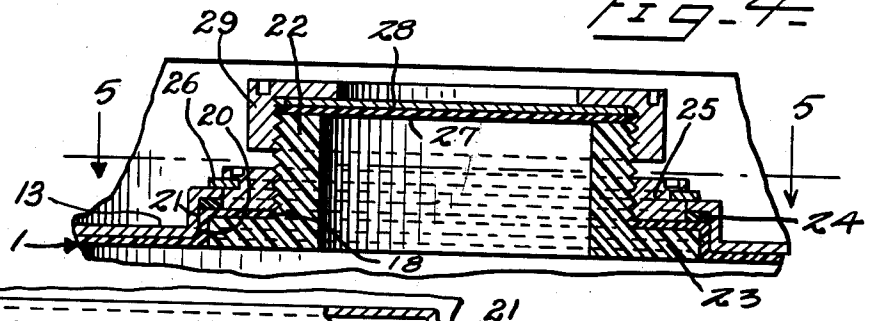


Fig. 4.



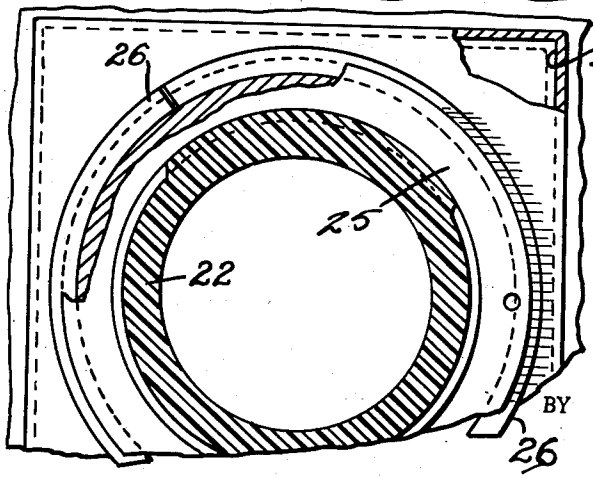
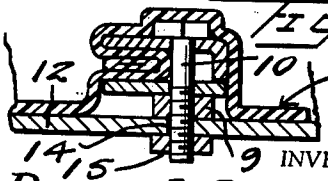


Fig. 5.

Fig. 6.



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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 2

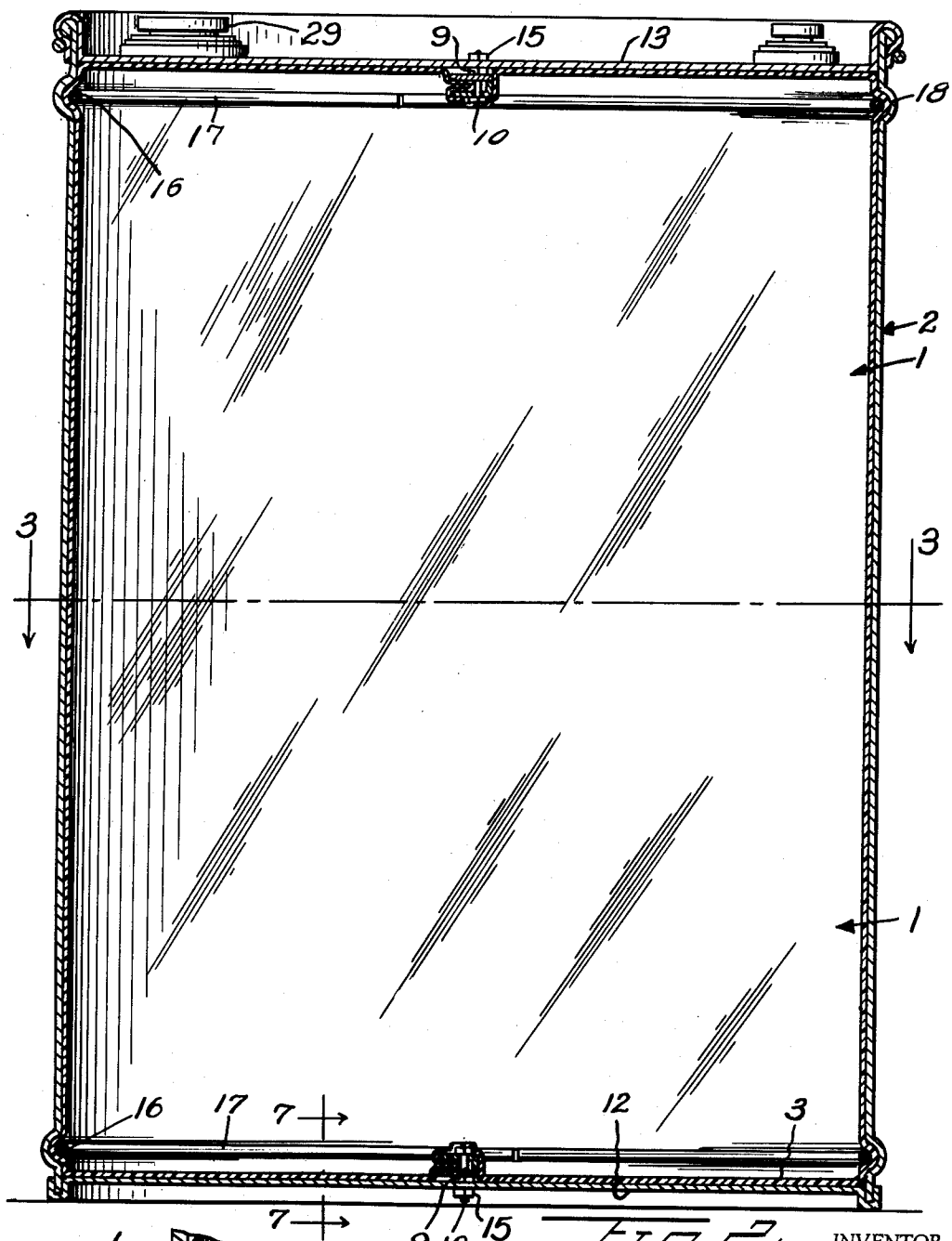


Fig. 2.

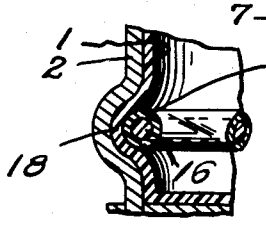


Fig. 7.

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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 3

Fig. 3.

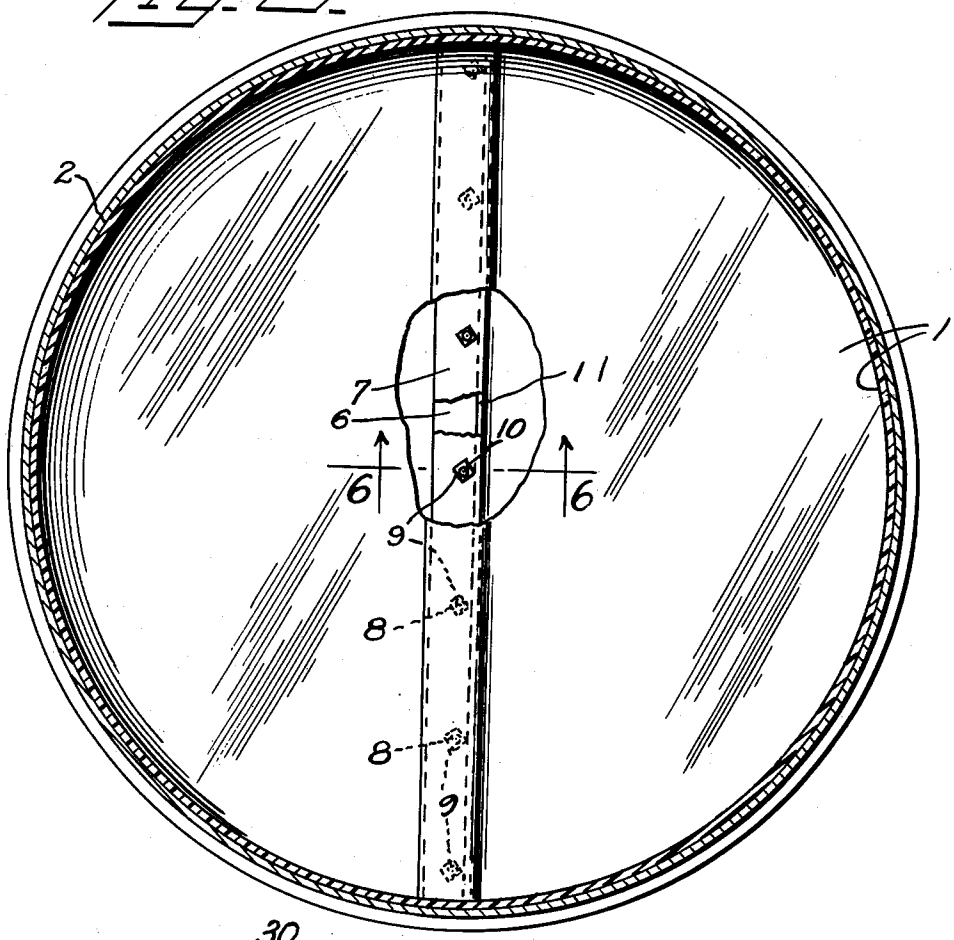


Fig. 8.

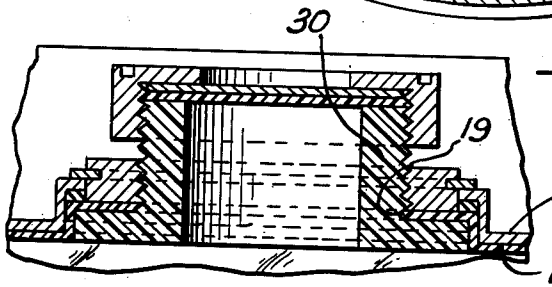
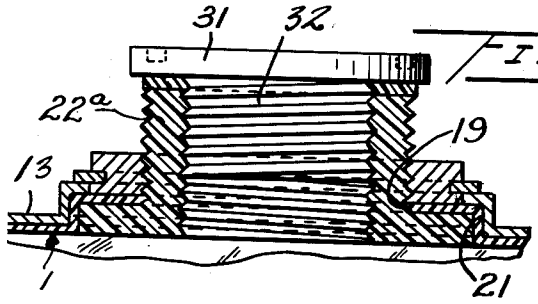


Fig. 9.



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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 4

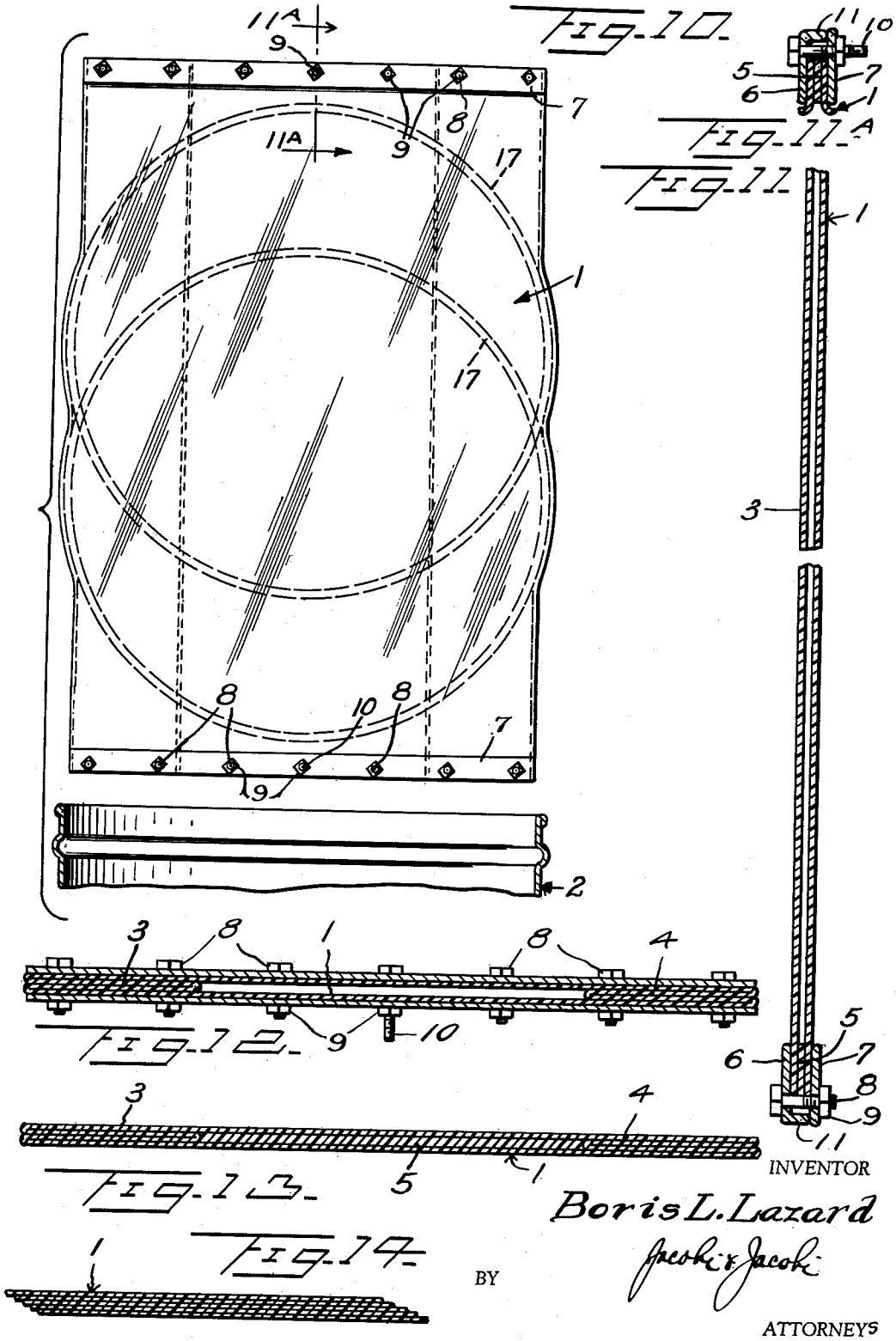


Fig. 10.

Fig. 11A.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

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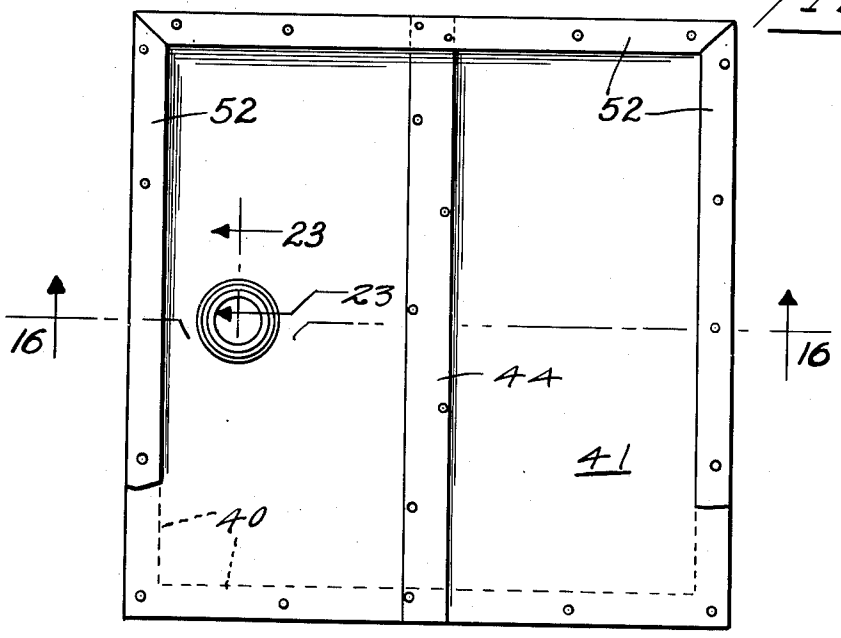
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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 5

Fig. 15



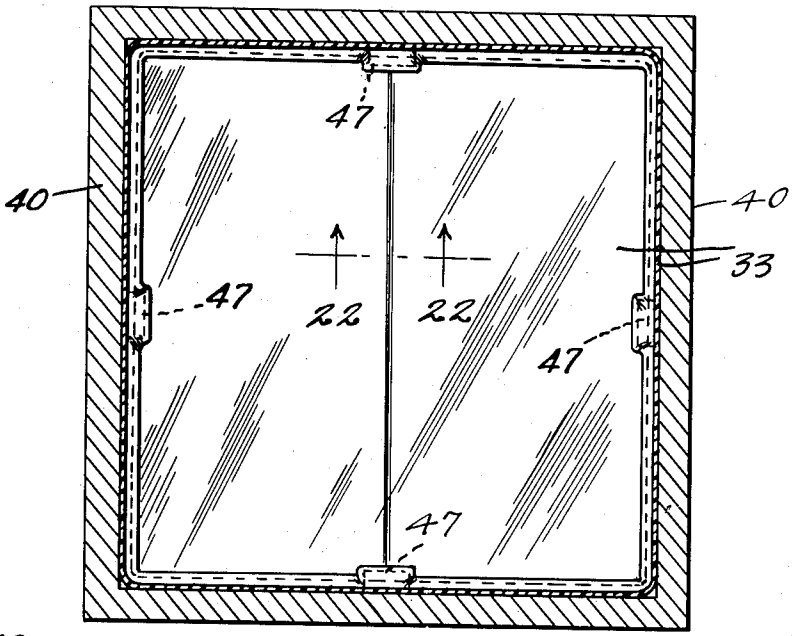


Fig. 17

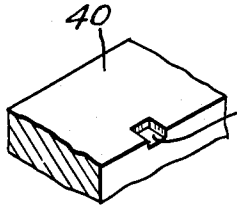


Fig. 24

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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 6

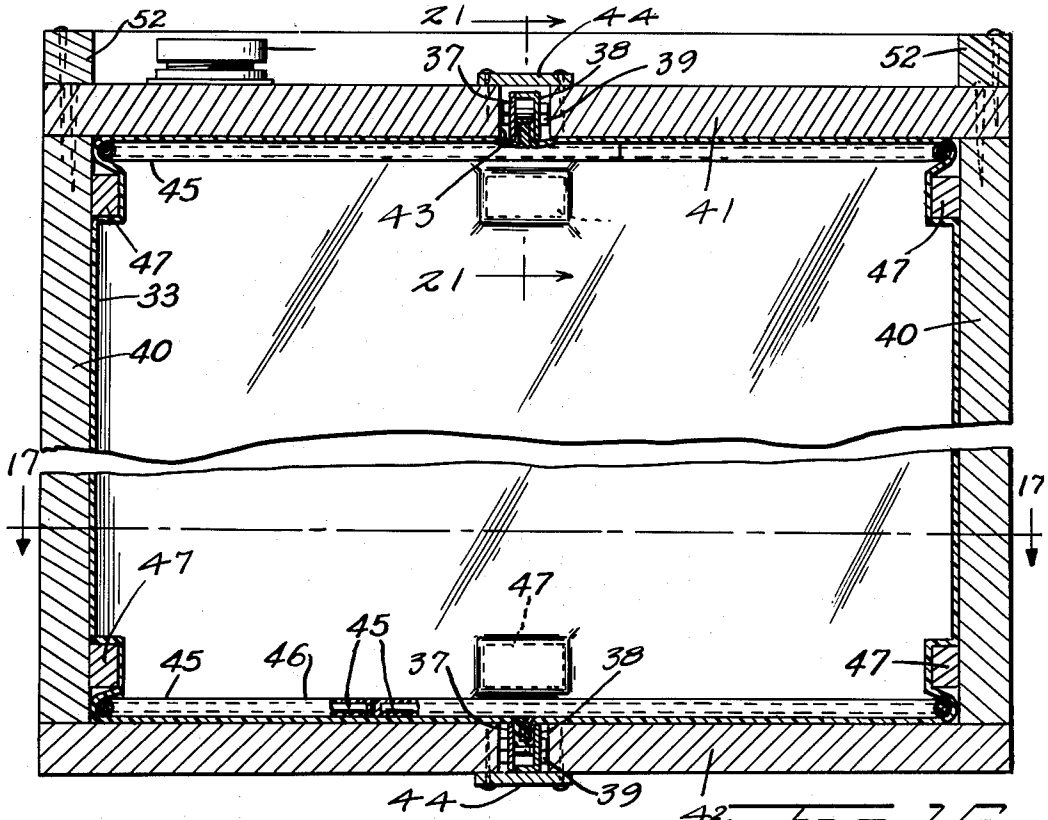


Fig. 1B.

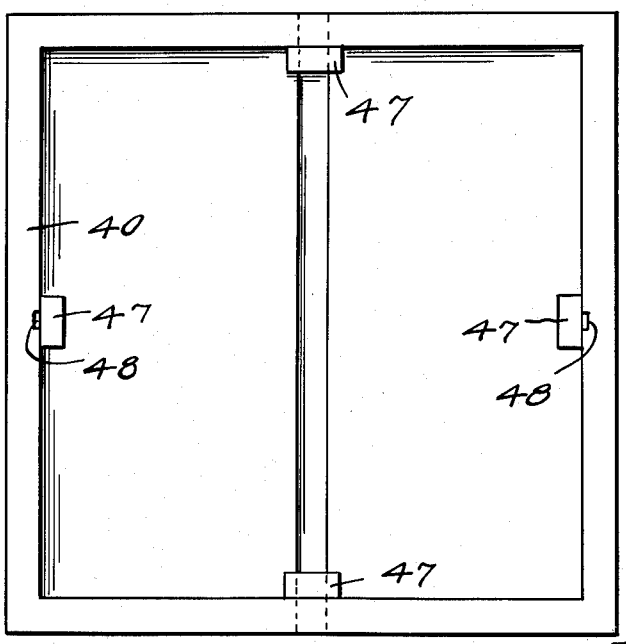
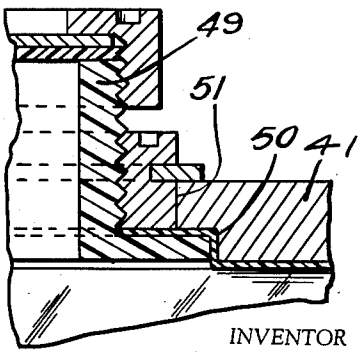


Fig. 2B.



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Oct. 25, 1955 B. L. LAZARD 2,721,674

ACID RESISTANT CONTAINER

Filed April 27, 1950 7 Sheets-Sheet 7

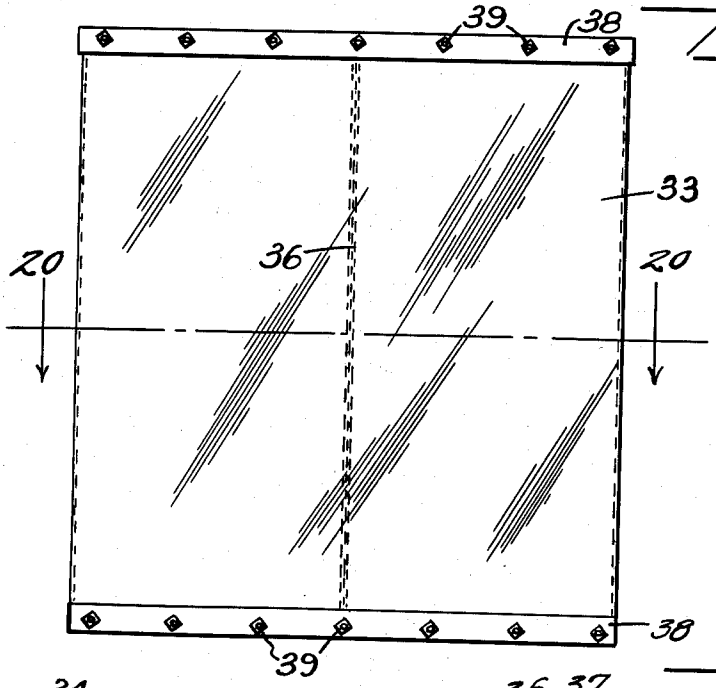


Fig. 19.

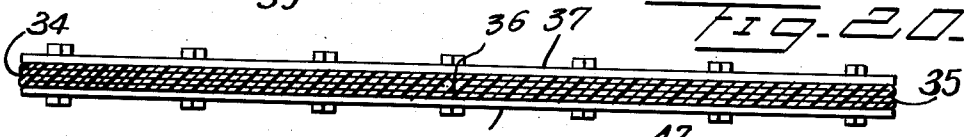


Fig. 20.

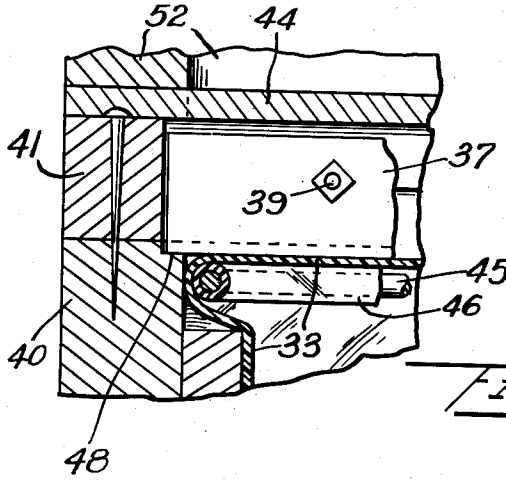


Fig. 21.

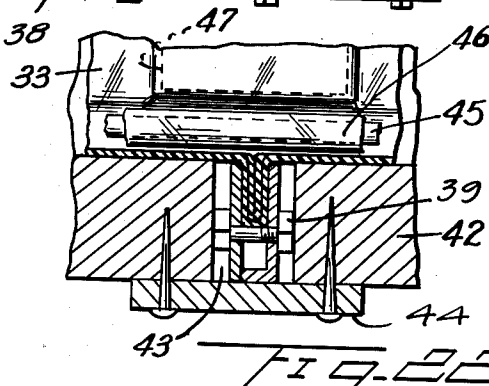


Fig. 22.

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United States Patent Office 2,721,674
Patented Oct. 25, 1955

2,721,674

ACID RESISTANT CONTAINER

Boris L. Lazard, New York, N. Y.

Application April 27, 1950, Serial No. 158,348

2 Claims. (Cl. 220—63)

My invention relates to new and useful improvements in containers and more particularly to an acid resistant container the primary object of the invention being to provide a container for the shipment of acids which is neither made of glass nor stone but which nevertheless, will meet all the requirements of the Interstate Commerce Commission and save the shipper material sums in the cost of transportation.

A further object of the invention resides in the production of a container made of a flexible plastic material protected externally by a rigid container, the entire device being constructed to eliminate the hazard of breakage and designed to materially reduce the cost of transportation.

A still further object of the invention resides in the provision of an improved means for securing the plastic container within the outer rigid container to prevent movement of the former within the latter as this device is transported, filled or unfilled with acids.

A still further object of the invention resides in the provision of an improved pouring opening and closure for the flexible plastic container, designed for interlocking engagement with the outer rigid container.

A further object of the invention resides in providing a container for shipment of acids which is simple and durable in construction, comparatively inexpensive to manufacture and one which is very efficient and useful in operation.

With these and numerous other objects in view, my invention consists of the novel features of construction, combination and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claims.

In the accompanying drawings forming a part of this application:

Figure 1 is a plan view of my improved container as applied to use in connection with a metallic outer container;

Figure 2 is an enlarged vertical sectional view therethrough, as seen on the line **2—2** of Figure 1;

Figure 3 is a horizontal sectional view through the device, as seen on the line **3—3** of Figure 2;

Figure 4 is an enlarged vertical sectional view, as seen on the line **4—4** of Figure 1;

Figure 5 is a horizontal sectional view, with parts broken away, as seen on the line **5—5** of Figure 4;

Figure 6 is an enlarged detail section, as seen on the line **6—6** of Figure 3, showing particularly the interlocking connection between the bottom of the flexible container and the bottom of the rigid outer container;

Figure 7 is an enlarged vertical section, as seen on the line **7—7** of Figure 2, showing in detail the retaining means for preventing torsional or twisting movement of the flexible container within the outer metallic container;

Figure 8 is an enlarged vertical sectional view taken on the line **8—8** of Figure 1, showing in detail the structure of the pouring spout;

Figure 9 is a view similar to Figure 8, showing a slightly modified form of spout, utilizing a plug in lieu of a cap for the closure thereof;

Figure 10 is a side elevational view of my improved flexible container preparatory to the insertion thereof in the outer rigid container;

Figure 11 is an enlarged vertical sectional view of the container in collapsed condition with the clamps applied to one end and prior to insertion of the rings;

Figure 11^A is a vertical sectional view, as seen on the line **11^A—11^A** of Figure 10, looking in the direction of the arrows;

Figure 12 is an enlarged horizontal sectional view, showing the container in collapsed condition;

Figure 13 is a view similar to Figure 12, taken through the sealed end of the flexible container, showing particularly the plastic filler or insert between the folds of the material forming said container;

Figure 14 is an enlarged sectional view through the flexible container, showing particularly the laminations or plies of material constituting the same;

Figure 15 is a plan view of a modified form of container, showing particularly the employment of a wood box-like outer container for the flexible inner container;

Figure 16 is a vertical sectional view through Figure 15, as seen on the line **16—16**.

Figure 17 is a horizontal sectional view therethrough, as seen on the line **17—17** of Figure 16;

Figure 18 is a top plan view of the box-like outer container with the top thereof removed, showing particularly the lugs or blocks for the retaining rings and also illustrating the notches in the side walls for supporting the strips at the upper end of the inner container when the latter is introduced in the outer container;

Figure 19 is a side elevational view of the inner container preparatory to insertion thereof in the box-like outer container;

Figure 20 is an enlarged horizontal sectional view through the inner container, as seen on the line **20—20** of Figure 19, showing in detail the folds of the inner flexible container before the acids are introduced in the latter;

Figure 21 is an enlarged detail vertical section, as seen on the line **21—21** of Figure 16, showing particularly the locking strips of the inner container supported in the notches of the side walls of the outer box-like container and also illustrating the plastic-covered retaining rings holding the inner container in position against the walls of the outer container to prevent twisting movement of the former within the latter;

Figure 22 is an enlarged detail vertical section, as seen on the line **22—22** of Figure 17, showing in particular the locking strips at the bottom of the inner container disposed in a slot formed in the bottom of the outer container with a covering strip therefor, and also illustrating the plastic-covered retaining ring in position below a retaining lug or block;

Figure 23 is an enlarged vertical section, in fragment, as seen on the line **23—23** of Figure 15, showing in particular the fitting of the pouring or filling spout in the top closure of the box-like outer container; and

Figure 24 is a fragmentary detail perspective view of a side wall of the box-like outer container, showing the notch in the upper edge thereof adapted to support one end of a locking strip of the inner container.

The shipment of acids is a delicate transaction, both from the standpoint of protection of the container for the acids and the protection of other goods, wares and mechandise which may be shipped or transported in a car or truck therewith. Such shipment or transportation of acids must comply with rules and regulations established by the Interstate Commerce Commission. Accord-

ing to these rules, acids must be transported in stone or glass containers and the containers must be protected by a crate made of wood. Since stone is not feasible, the containers are usually made of glass protected by a wood crate, such device in its entirety being known as a carboy. The largest size of glass bottle or container made for such carboys contains thirteen gallons of liquid and a carboy empty weighs seventy-seven pounds. Each carboy occupies seven and a half cubic feet of space. Thus, it will be seen that the transportation of such carboys, both filled and empty, is costly, since transportation companies, including railroads, steamship lines, and truck companies, have the option of charging either by weight or cubic space occupied and they usually elect the one for which the greater fee may be charged.

As aforesaid, the largest size of glass container used in carboys has a capacity of only thirteen gallons. Obviously, containers of greater capacity would be desirable, but up to the present date no larger containers have been found available. The use of metal containers for transporting acids, obviously, would not be practicable. Even with the cautious and careful handling of these carboys, there are frequent instances of breakage of the glass containers.

It is an object of this invention to eliminate the hazard of breakage, increase the capacity of containers for shipment of acids, and reduce the cost of transportation thereof. To this end I contemplate producing a plastic ontainer for the acids, the ends of which are heat-sealed and secured between strips, said container being supported within an outer rigid container of either wood or metal and held therein against torsional or twisting movement by an improved means to be hereinafter and more particularly described.

In describing the invention, I shall refer to the drawings in which similar reference characters designate corresponding parts throughout the several views and wherein the numeral **1** designates a plastic tubular inner container and the numberal **2** designates a metallic drum or outer rigid container. In the formation of this plastic container **1** a tube is molded of a predetermined size, the same being composed of a multiplicity of plies or laminations fused together, as shown in Figure 14 of the drawings. While any desired plastic material may be used, I have found that plastics such as "Polyethylene" or "Polythyn" best serve the purposes and each ply of such material used is an extruded tube of a thickness approximating .004 of an inch. Thus, the tube of plies of thin plastic tubes, the number of plies being optional, has great strength and flexibility and is capable of a certain amount of expansion under pressure from within. I have found that five plies of plastic of the character and thickness aforementioned produce a most serviceable and efficient container for the purposes desired, although it is to be understood that I am not limited to any particular number of plies.

After the tube is formed, as above described, it is flattened out with the sides thereof being folded inwardly in inverted-pleat-like formation, as shown by the numerals **3** and **4** in Figure 12. At the ends of the tube, between the folds **3** and **4**, I insert the fillers **5**, formed also of the same plastic, and then these ends of the tube are heat-sealed together. These heat-sealed ends of the tube are then clamped between pairs of metal strips **6** and **7**, said strips being secured tightly together by means of the bolts **8** and nuts **9**, the bolts extending just beyond the outer end edges of the tube, as clearly shown in Figure 11 of the drawings. The center bolt at each end, designated by the numeral **10**, is of greater length than the others, for a purpose to be hereinafter and more particularly set forth.

In order to clamp the sealed ends of the tube most securely against all pressures therewithin, the ends of the clamping strips **6** are bent angularly, as shown at **11**, to contact with the inner face of the strip **7** adjacent one edge thereof. Thus, when the nuts are turned home on

the bolts **8** and **10**, these clamping strips **6** and **7** will most effectively engage the sealed ends of the tube to secure the same against all pressures. If desired, these angular bent ends **11** may be made as separate elements instead of being formed integral with the strips **6**, and the same effect would be accomplished. Obviously, the fillers **5** will serve effectively between the folds **3** and **4** when the clamping strips **6** and **7** are secured in place at the ends of the tube.

The aforesaid flexible container, with a means for filling same, to be hereinafter and more particularly described, is adapted to be introduced into an outer rigid container. One form of outer rigid container is the metal drum **1** heretofore referred to and particularly shown in Figures 1 to 7, inclusive. This drum is provided with a bottom wall **12** and a top wall **13** and centrally of each of said bottom and top walls there is provided an opening **14**. Thus, when the plastic container is introduced into the outer container or drum, the ends of said plastic container, which are held in place by the strips **6** and **7**, are bent laterally so that the bolts **8** and **10** project vertically and said bolts **10** will be in position to project through the openings **14** of said top and bottom walls, as clearly shown in Figures 1, 2 and 6. The nuts **9**, locking the strips **6** and **7** in position on the flexible container, will then contact with the inner faces of the top and bottom walls, and, in order to secure the container in place at the top and bottom of the drum, the nuts **15** are applied to the threaded ends of the bolts **10** and when turned home will contact, respectively, with the outer faces of the top and bottom walls, as clearly shown in Figure 2 of the drawings.

While the aforesaid means of locking the ends of the plastic container to the outer rigid container serve one purpose, it is necessary, in order to provide an effectively operating structure, to present some means which will prevent torsional or twisting movement of the flexible inner container within the outer container as the device is transported. To this end I provide a pair of spring steel hoops or split rings **16**, which are coated with plastic or mounted in plastic tubes **17**, the plastic being the same as that of which the inner container is formed. These coated hoops or rings are fitted within the plastic container adjacent the top and bottom thereof and tend to hold the plastic inner container to the side walls of the drum. In order to prevent movement of these retaining rings or hoops, the drum is formed adjacent the top and bottom with annular recesses **18**, into which said hoops or rings are adapted to fit, as clearly shown in Figures 2 and 6 of the drawings. Thus, the inner flexible container will be held continuously in place against the walls of the drum against vertical, lateral or twisting movement. The split rings **16** above referred to are, in fact, spring metal strips which are bent manually into arcuate formation and inserted by hand into the plastic tube container **1** from the open end or ends of the latter. Obviously, these split rings are formed and inserted in place before the ends of the tube, or at least before one end thereof, are entirely sealed and clamped to the top and bottom of the outer rigid container.

At predetermined points in the body of the tubular flexible container **1**, there are provided the openings **18** and **19** for filling and pouring purposes, respectively. While one such opening may be provided for both purposes, I have found it desirable in the use of a drum of reasonably large size to provide separate openings. The opening **18** is circular and a circular opening **20**, of greater diameter than the opening **18**, is formed in the top wall **13** of the drum. This top wall, however, surrounding the opening **20** is offset upwardly to provide a rectangular recess or the like **21** in the underface of said top wall.

A fitting for filling purposes is provided, comprising an externally threaded collar or the like **22**, formed of a rigid plastic material, the outer diameter being substantially equivalent to the diameter of the opening **18** of the plas-

tic container through which said collar projects. The lower end of the collar **22** is provided with an outwardly projecting flange **23**, which flange is designed rectangularly to fit within the rectangular recess **21** of the top wall **13**. When so fitted, from within the flexible container, it will be seen that portions of the top of the flexible container will be fitted tightly between the flange **23** and the inner faces of the walls of the recess **21**, as clearly shown in Figure 4 of the drawings. If desired, a gasket **24** may be utilized in the recess **21** to form a more secure and tight fit. An internally threaded annulus or nut **25** is threaded on the collar **22** and when turned home engages that portion of the top of the flexible container surrounding the opening **18** between the collar and the opening **20** of the top wall of the drum, as also clearly shown in Figure 4. To prevent the fitting with the annulus thereon from dropping within the drum, said annulus is formed with a peripheral groove in which is inserted a ring **26**, which projects beyond the periphery of the annulus and is adapted to rest on the top wall **13** surrounding the opening **20**.

Applied to the top of the collar **22** is a plastic disc **27**, over which is applied a metal disc **28**, and these discs are held in place to form a closure by means of an internally threaded cap member **29** adapted to be engaged with the threads on the collar **22**. This cap member may be of any desired material. It will be seen, however, that all materials having contact with the contents of the flexible container, which contents are presumably acids, are made of or covered with a plastic wholly resistant to acids.

While the aforesaid description of the fitting, particularly illustrated in Figure 4, is referred to as a filling fitting, I have shown in Figure 8 of the drawing a similar fitting, identified by the numeral **30**, for pouring purposes. This may be referred to as the pouring fitting and is identical to the structure shown in Figure 4, with the exception that the dimensions are smaller, including the diameter of the opening **19** compared to the opening **20**.

In Figure 9 I have shown a slightly modified form of fitting for either pouring or filling purposes. The construction of this fitting and its relationship to the flexible container and the top of the drum are the same as those shown in Figures 4 and 8. However, in this form of the invention the collar **22***a* is not only externally threaded but also internally threaded and, instead of a cap with discs forming a closure, I provide in this instance a plastic plug **31**, which is provided with a depending threaded neck portion **32** adapted for threaded engagement with the internal threads of the collar **22***a*. Obviously, this modified form of fitting may be utilized for both pouring and filling purposes, if desired.

Heretofore I have described my improved flexible plastic container as applied to use in connection with a metal drum or container but, as previously mentioned, same is also applicable to use in connection with a wood box or outer container, and in Figures 15 to 24, inclusive, I have shown such application to use thereof. In this application to use, I provide a tubular plastic inner container **33**, comprising a plurality of plies, that is, a plurality of tubes of plastic situated one within the other and made of the same material as referred to in connection with the container **1**, heretofore described. This plastic tube, formed of plies as aforesaid, is flattened out and the sides thereof are folded inwardly in gusset or inverted-pleat-like formation, as shown at **34** and **35** of Figure 20 of the drawing. This simulates the formation previously described in connection with the flexible container used with the metallic drum, except that in this instance the inverted pleats or gusset folds are directed inwardly to a greater degree so that they substantially meet centrally of the tube, as shown at **36**. The reason for this difference over the previously described flexible tube is apparent when it is understood that this particular flexible container is to be inserted in a rectangular outer container, to be hereinafter and more particularly described.

The ends of the container **33** are heat-sealed, as in the previously described form, and are secured together by the metallic strips **37** and **38**, which are similar to the strips **6** and **7** heretofore referred to. Bolts **39** are used to retain the clamping strips **37** and **38** together on the ends of the container **33**.

The flexible plastic inner container **33** is fitted within a rectangular wood box or outer container **40**, which is provided with a top wall **41** and a bottom wall **42**. These top and bottom walls are provided with grooves or slots **43**, which are of a width to receive snugly therein the bolted strips **37** and **38** securing the upper and lower ends of the tubular flexible container **33**, as best illustrated in Figures 16 and 22 of the drawings. In order to prevent extraneous matter from entering the open slots **43** in the top and bottom of this wood container **40**, I provide the covering strips **44**, which are secured to the outer faces of the top and bottom over said slots, as clearly shown in Figures 16 and 22 of the drawings.

In order to retain the flexible inner container firmly against the walls of the wood outer container **40**, I provide a pair of spring steel hoops or split rings **45**, which are coated with plastic or inserted in plastic tubes **46** of the same material of which the inner container is made, just as was done in connection with the rings or hoops **16**, heretofore described. These rings or hoops **45**, within the upper and lower portions of the container **33**, are retained in their positions adjacent the top **41** and the bottom **42** of the box or outer container by means of a series of cleats **47**, which are secured to the inner faces of the side and end walls of the box adjacent the top and bottom edges thereof. This is best illustrated in Figures 16 and 17 of the drawings. The hoop ring at the top of the container, being disposed above the upper cleats and the hoop or ring at the lower end of the container being disposed below the lower cleats, it will be seen that said retaining rings or hoops will be retained in place against the walls of the outer container so as to prevent movement of the inner container in the box or outer container during transportation thereof.

In order to prevent the upper end of the inner flexible container from dropping downwardly within the outer container, the upper edges of two opposed side walls of the box or container **40** are notched, as shown at **48**, at the inner side edges thereof, and these notches are adapted to receive therein the lower edges of the strips **37** and **38** at the outer ends thereof, as clearly shown in Figure 21 of the drawings. These notches are further illustrated in Figures 18 and 24.

In this form of the invention I also provide a fitting, designated by the numeral **49**, for both filling and pouring purposes. The structure of this fitting, as shown in Figure 23 of the drawings, is the same as the structure of the fitting heretofore described and shown in Figures 4 and 8 of the drawings. In this instance, however, the top **41**, being formed of wood instead of metal, has the rectangular recess **50** formed by chamfering the underface thereof surrounding the circular opening **51** therein. Otherwise, the relationship of the fitting to the inner container and the outer container is the same as that previously described.

Secured to the top face of the top member **41** of the outer container, at the side edges thereof, are the strips **52** which form a protection for the fitting **49** and also aid in the stacking of the containers one upon the other, so that the maximum number of containers may be fitted into the minimum amount of space.

From the foregoing description of the construction of my improved container, the method of assembling the same and the application thereof to use will be readily understood, and it will be seen that I have provided a comparatively simple, inexpensive, durable and efficient

means for carrying out the various objects of the invention.

While I have particularly described the elements best adapted to perform the functions set forth, it is apparent that various changes in form, proportion and in the minor detail of construction may be resorted to, without departing from, or sacrificing any of, the principles of the invention.

Having thus described the invention, what is claimed is:

1. A device of the class described comprising an outer rigid container having a top and bottom, an inner container formed of flexible plastic material and substantially tube-like in formation the ends thereof being sealed and folded in inverted pleat-like formation, split spring rings within said flexible container adjacent the ends thereof tending to secure the latter against torsional movement within the outer container, said rings being plastic covered, means formed within said outer container and co-acting with said split spring rings to retain the latter in predetermined positions with respect to said outer container, clamping strips engaging the folded sealed portions of the inner container at each end thereof and extending substantially diametrically of the same to further seal said inner container, and means securing said strips, respectively, to the top and bottom of the rigid container to prevent longitudinal and lateral movement of the inner container therewithin.

2. In a device of the class described, an outer rigid container having a top and bottom, an inner container formed of flexible plastic material substantially tube-like in formation the ends thereof being sealed and folded in substantially inverted pleat-like formation, plastic-covered spring metal members inserted in said flexible container in arcuate formation to provide split spring rings adjacent the ends thereof, tending to secure said inner container against torsional movement within said outer container,

means formed in the walls of said outer container to retain said split spring rings in predetermined positions adjacent the ends of the last mentioned container, clamping strips engaging the folded sealed portions at each end of said inner container to further seal the ends thereof and means engaging the clamping strips at each end of the inner container and securing same, respectively, to the top and bottom of the rigid container to prevent longitudinal and lateral movement of the inner container therewithin.

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