March 2, 1937. H. T. KRAFT 2,072,426

CONTAINER

Filed Jan. 6, 1934 2 Sheets-Sheet 1

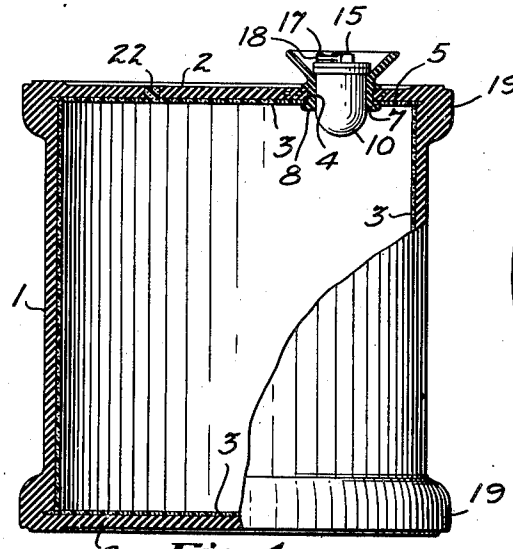


Fig. 1

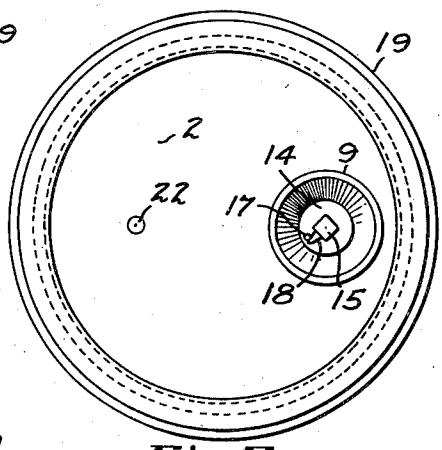


Fig. 2

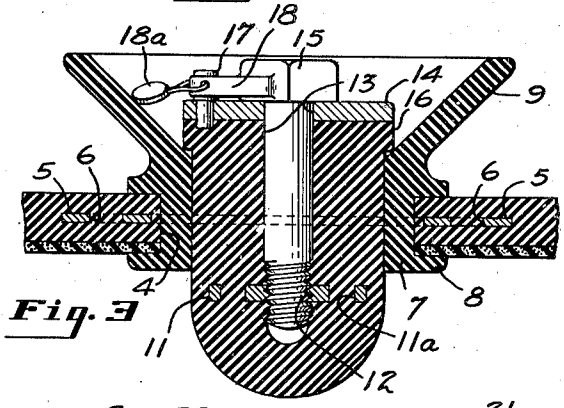


Fig. 3

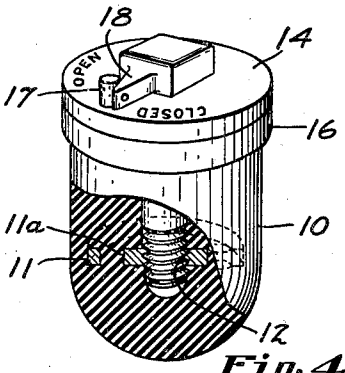


Fig. 4

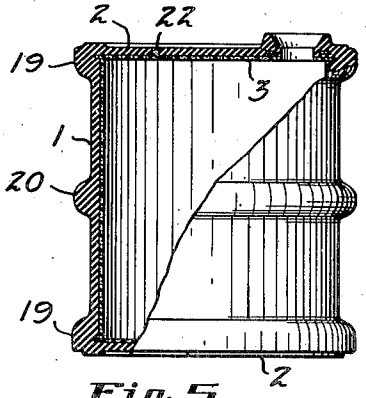


Fig. 5

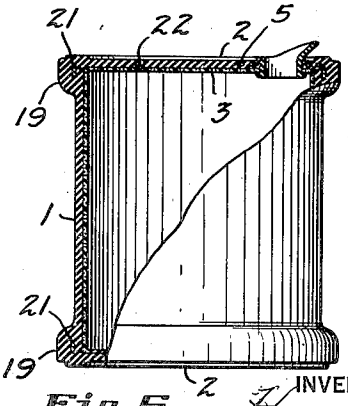


Fig. 6

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CONTAINER

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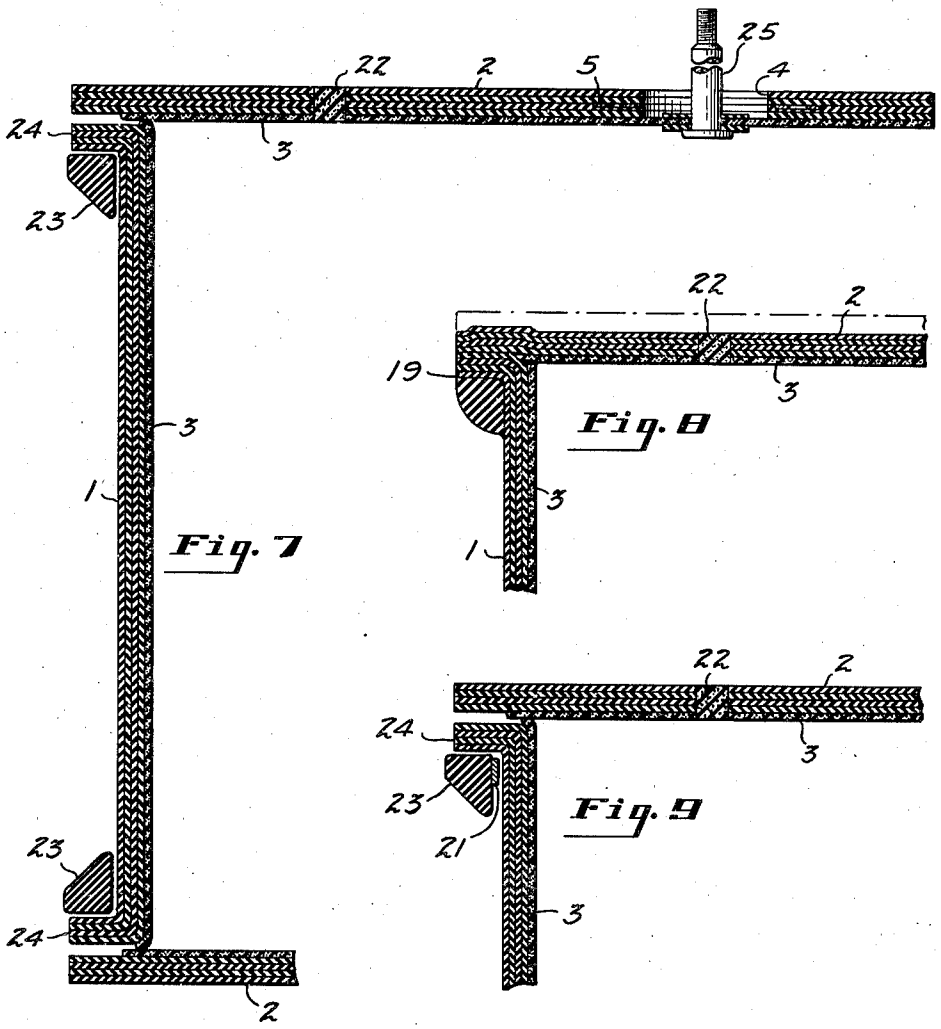


Fig. 7

Fig. 8

Fig. 9

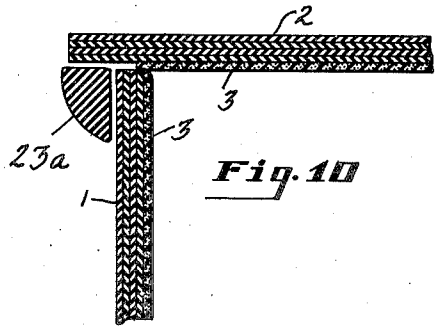


Fig. 10

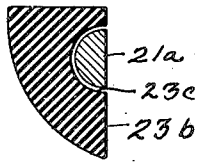


Fig. 11

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2,072,426

UNITED STATES PATENT OFFICE

2,072,426

CONTAINER

Herman T. Kraft, Akron, Ohio, assignor to The General Tire & Rubber Company, Akron, Ohio, a corporation of Ohio

Application January 6, 1934, Serial No. 705,525

10 Claims. (Cl. 206—2)

This invention relates to containers and more particularly to containers suitable for holding and shipping acids and the like.

Heretofore it has been the practice to ship acids in glass carboys which require careful handling and which, with the box necessary for holding the same during shipment, are relatively heavy and occupy considerable space. Furthermore, the freight rate for the shipping of glass carboys is relatively high.

One of the objects of the present invention is to provide a container for shipping acids which is light in weight as compared with containers heretofore employed, and which occupies less space than containers heretofore employed for the same volume of liquid.

Another object is to provide a container for shipping acids which is of such construction that the cost of shipping will be less than for containers heretofore employed.

Another object is to provide a container for shipping acids, which will withstand greater pressures than glass carboys.

Another object is to provide a container for shipping acids which is of durable and unbreakable construction and which can be easily handled.

With the above and other objects in view, the invention may be said to comprise the device as illustrated in the accompanying drawings hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention appertains.

In the drawings,

Figure 1 is a side elevation of the container of the present invention, portions of the same being shown in section;

Fig. 2 is a plan view of the top of the container illustrated in Fig. 1;

Fig. 3 is an enlarged section taken through the filler opening and showing the closure plug in section;

Fig. 4 is a perspective view of the closure plug, portions of the same being shown in section;

Fig. 5 is a side elevation of a container similar to the container illustrated in Fig. 1, but having an additional chime intermediate the ends thereof;

Fig. 6 is a section through a container of the present invention, showing the chimes as being reinforced by metal rings;

Fig. 7 is a section showing the component parts of the container in their assembled relation but prior to the molding thereof;

Fig. 8 is a section showing the arrangement of the component parts during the molding operation; and

Fig. 9 is a view similar to Fig. 7 and showing the position of the chime reinforcing ring prior to the molding operation.

Fig. 10 is a fragmentary view similar to Fig. 7 but showing a construction in which the end flange of the cylindrical wall is omitted; and

Fig. 11 is a section through a modified chime and chime reinforcement.

Briefly stated, the container of the present invention comprises a hollow drum of fibrous or other non-metallic material having a lining of acid-resistant material such as gum rubber, the body of the drum and the lining being so arranged and molded together into a one-piece unit as to provide a non-breakable leak-proof construction.

Referring to the drawings in which like numerals refer to like parts throughout the several views, the container comprises a drum having a cylindrical wall 1 and ends 2 molded together to form an integral unit. The wall 1 and ends 2 are preferably composed of non-metallic fibrous material as will be more fully described. The inside of the drum is faced with an acid resistant lining 3 preferably of pure gum rubber which covers and is bonded to the inner surface of the wall 1 and ends 2.

One of the ends 2 of the container is provided with an aperture 4 at any suitable location and the portion of the end surrounding the aperture 4 is preferably strengthened and reinforced by an annular member 5 embedded in the end material and having apertures 6 therein through which the material comprising the end is integrally united. Mounted within the aperture 4 is an annular double flanged collar 7 of rubber which is sufficiently yielding to permit the same to be inserted in the aperture with the flanges 8 thereof snugly engaged with the opposite sides of the drum and adjacent to the collar 7. The collar 7 is assembled to the container after the molding operation is completed and is preferably cemented to the wall of the aperture to provide a leak-proof seal.

The collar 7, if desired, may be contoured to provide a suitable spout 9 for filling the container and for directing the flow of acid from the container while it is being emptied.

A deformable closure plug 10 is employed to close the opening within the collar 7. Various types of closure plugs may be employed.

In the drawings the plug 10 is formed of suitable rubber and is provided with a compression plate 11 molded therein which is formed with a threaded opening 12 which is coaxial with an opening 13 extending through the outer end of the plugs. An aperture plate 14 is carried by the outer end of the plug and extending through this plate and the opening 13 is a threaded bolt 15 which is threaded into the aperture portion of the plate 11. The plate 11 is preferably provided

with apertures 11a so that it may be securely embedded in the body of the plug 10 during the molding operation. The plug 10 is preferably formed with a circumferential flange 16 which, when the plug is within the collar 7, is disposed to seat against the edge of the collar 7.

In order to close the aperture in the collar 7 and form a fluid-tight seal, the plug 10 is inserted therein and the bolt 15 threaded through the compression plate 11 which causes the plates 11 and 14 to move toward each other and expand the body of rubber lying therebetween into intimate engagement with the collar 7 and at the same time expanding the rubber collar to provide an efficient fluid-tight seal.

In order to limit the rotation of the bolt 15 and to prevent excessive expansion of the rubber, it is preferred to provide the plate 14 with a stop pin 17 which may engage with an arm 18 or other means on the head of the bolt 15 and thereby limit the degree of rotation of the bolt. The pin 17 and arm 18, if desired, may be formed with suitable means for receiving a lock or seal 18a to hold the bolt 15 against rotation.

In order to provide an efficient means of handling the container and also to strengthen the same, integral chimes 19 are provided to extend circumferentially around the container adjacent its ends. Also, if desired, and particularly in the larger sized containers, one or more additional chimes 20, as indicated in Fig. 5, may be provided around the central portion of the container, intermediate the ends.

Also, if desired, the chimes 19, as shown in Fig. 6, may be strengthened by means of annular rings 21 of metal, which may be molded therein adjacent the wall 1 of the container.

If desired, a small body 22 of rubber may be molded in the upper end of the container which may be pierced with an awl to form a small opening for allowing the escape of air from the container while it is being filled, but which is adapted to prevent the flow of the acid from the container. The body 22, however, may be formed of a ceramic or any other suitable porous material which will permit the escape of air from the container and yet prevent the escape of any of the liquid from the container.

Although any suitable fibrous or other non-metallic material may be employed for the wall 1 and the ends 2, I prefer to use rubberized fibres, such as the clippings and cuttings from rubberized fabric stock used in the manufacture of pneumatic tires. These clippings and cuttings are preferably ground into fine particles and then run through a calender mill to produce sheets of the rubberized fabric. The mill, during the sheet forming operation, tends to form a grain in the sheets ultimately produced.

In order that the wall 1 and ends 2 will be non-rupturable and hook-proof and capable of withstanding relatively high pressures, a plurality of such sheets of rubberized fibres are employed with the grain of one sheet disposed at an angle to the grain of the adjacent sheets.

The container of the present invention is preferably made by the method disclosed and claimed in my co-pending application Serial No. 753,721, filed November 19, 1934 upon which Patent No. 2,041,357 was granted May 19, 1936.

In forming the container the superimposed sheets of the rubberized material are preferably run through a pair of rolls to bring them into intimate contact with each other and are then shaped to form the wall 1 and the ends 2. Sheets of gum rubber are then applied to these faces of the sheets which form the interior of the container and are preferably stitched to these faces. As indicated in Fig. 7, the sheets of gum rubber are of slightly less area than the sheets of material to which they are applied. The sides of the sheet material which comprises the cylindrical wall 1 are flanged and this sheet of rubberized material is formed to a circular shape.

Preformed sections 23 are disposed about the cylindrical wall adjacent the flanged portions 24 which, during the subsequent molding operation, join with the flanged portions 24 and form the chimes 19 of the container. During the assembly of the individual sheets which comprise the one end wall of the container, the annular ring 5 is disposed between the sheets and the aperture 4 is formed therein in any suitable manner but within the ring 5. The sheet material is first assembled in the manner illustrated in Fig. 7 with the cylindrical wall 1 disposed on the lower end wall 2 and with the upper end wall 2 disposed on the upper surface of the cylindrical wall 1, the gum rubber sheets of the end walls 2 extending slightly beyond the interior surface of the cylindrical wall 1 and the gum rubber sheet of the cylindrical wall being of such extent that it is positioned between the flanges 24 of the cylinder wall and the gum rubber sheets of the end walls.

The sheet material, while in this assembled relation, is then disposed in a suitable mold cavity for the molding operation. The length of the molding cavity of the mold is slightly less than the overall length of the container so that when the mold is closed the sheet material will be compressed longitudinally of the cylindrical wall 1 and shaped, the dotted line in Fig. 8 representing the initial positions of the sheet material, that is, the position of the same prior to the closing of the mold. In this manner sufficient longitudinal pressure is exerted to bring the end walls 2 into intimate sealed contact with the flange portions 24 of the cylindrical wall 1.

It will be noted that the gum rubber sheet for the upper end wall 2 extends across the aperture 4. A suitable air valve 25 is mounted in the portion of the gum rubber sheet which spans the aperture 4 so that the interior of the container assembled in the foregoing manner may be subjected to air pressure during the molding operation. The molding operation, of course, is carried on while the material is subjected to heat and pressure, in such a manner that the end walls are securely and intimately bonded to the cylindrical wall 1 and also in such a manner that the gum rubber lining is intimately bonded to the interior faces of the container.

After the molding operation is completed and the container cured, the portion of gum rubber containing the air valve 5 and which spans the aperture 4, is removed.

The molding operation thus provides a container of one-piece construction having a complete internal facing of gum rubber.

The body 22, when it is desired to be employed, is disposed in the upper end wall 2 prior to the molding operation, so that it will be securely bonded to the material of the end wall 2.

When it is desired to strengthen the chimes 19 by means of annular members 21, as indicated in Fig. 6, these rings are disposed about the circular wall 1, as shown in Fig. 9, and the portions 23, which form a portion of the chimes, are disposed about the rings 21.

In Fig. 10 I have shown a modified construction

in which the flange 24 at the ends of the cylindrical wall 1, and in which the chime is formed by the projecting portions of the end wall 2 and the annular section 23a, the latter of which may be of extruded rubber.

In Fig. 11 I have shown a modified chime reinforcing ring 21a of semi-circular cross-section. The annular chime section 23b in this case may be of extruded rubber having a recess 23c therein for receiving the reinforcing ring 23b. In this case, the face of the ring lies substantially flush with the inner face of the chime section 23b.

The acid container, formed in the manner described, is rugged in construction and will withstand relatively high pressures. Furthermore, because of their non-breakable construction the containers will come within a third or fourth class freight rate classification and can be shipped at a much lower rate than the glass carboys heretofore employed.

Furthermore, these containers are approximately one-half the weight of the glass carboy and the box in which it is shipped, and a greater saving in shipping expense is, therefore, effected because of this lighter weight.

Furthermore, such containers occupy about one-half the space required by glass carboys of the same volume, and it is thus obvious that greater quantities of acid can be shipped in one car.

Another important feature is that the containers do not have to be so carefully handled and also that the containers will withstand greater pressure than the glass carboys, thus providing a greater factor of safety.

Although several embodiments of the invention have been herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined in the following claims.

What I claim is:

1. An acid container comprising a closed hollow body of vulcanized non-metallic material, a lining of acid-resistant rubber lining completely covering and securely bonded to the interior of said body, and a plurality of non-metallic circumferential chimes integral with the exterior of said body, certain of said chimes having an annular metallic reinforcing ring embedded therein.

2. An acid container comprising a closed hollow body of vulcanized non-metallic material, and a lining of acid-resistant rubber lining completely covering and securely bonded to the interior of said body, said body and lining having a bung opening extending therethrough, said body having an annular reinforcing element embedded therein and surrounding said opening.

3. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said body portion being thickened at the ends thereof, said head portions being of a diameter greater than the internal diameter of the body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion.

4. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said body and head portions being composed of laminated plies of rubber which are integrally united, said head portions being of a diameter greater than the internal diameter of body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion.

5. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said body and head portions being composed of laminated plies of rubber which are integrally united, certain of the plies being reinforced with dispersed fibers, said head portions being of a diameter greater than the internal diameter of body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion.

6. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said body and head portions being composed of laminated plies of rubber which are integrally united, certain plies of the body and head portions being arranged with the grain thereof disposed transversely with respect to the grain of a contiguous ply, said head portions being of a diameter greater than the internal diameter of body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion.

7. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said head portions being of a diameter greater than the internal diameter of the body portion and marginal portions of the inner faces thereof having an elastic and integral union with the ends of the body portion throughout its circumference, and rings of pliable rubber integrally united to the exterior of the body portion at the ends thereof to provide resilient chimes at the end edges of the drum.

8. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said head portions being of a diameter greater than the internal diameter of the body portion and marginal portions of the inner faces thereof having an elastic and integral union with the ends of the body portion throughout its circumference, and rings of pliable rubber integrally united to the exterior of the body portion at the ends thereof and to the head portions at the margins thereof to provide resilient chimes at the end edges of the drum.

9. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said head portions being of a diameter greater than the internal diameter of the body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion, and a lining of corrosive resistant vulcanizable material covering the interior of the drum and integrally united to the body and head portions.

10. A molded and vulcanized one-piece rubber shipping drum which is self-sustaining and sufficiently resilient to flex without rupture or permanent distortion when filled with liquid and subjected to sudden impacts, said drum comprising an annular body portion and circular head portions of resilient construction, said head portions being of a diameter greater than the internal diameter of the body portion and having an elastic and integral union throughout marginal portions of their inner faces with the ends of the body portion, and a lining for the interior of the drum consisting of layers of corrosive resistant vulcanizable material integrally united to the heads on the inner faces thereof, a layer of corrosive resistant vulcanizable material integrally united with the body portion on the interior thereof, the layers on the inner faces of the heads and body portion having marginal portions overlying the end edges of the body and integrally united between the said end edges and the inner faces of the heads.

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