

April 16, 1929.

W. W. WHITE
SHIPPING CONTAINER

1,709,510

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2 Sheets-Sheet 1

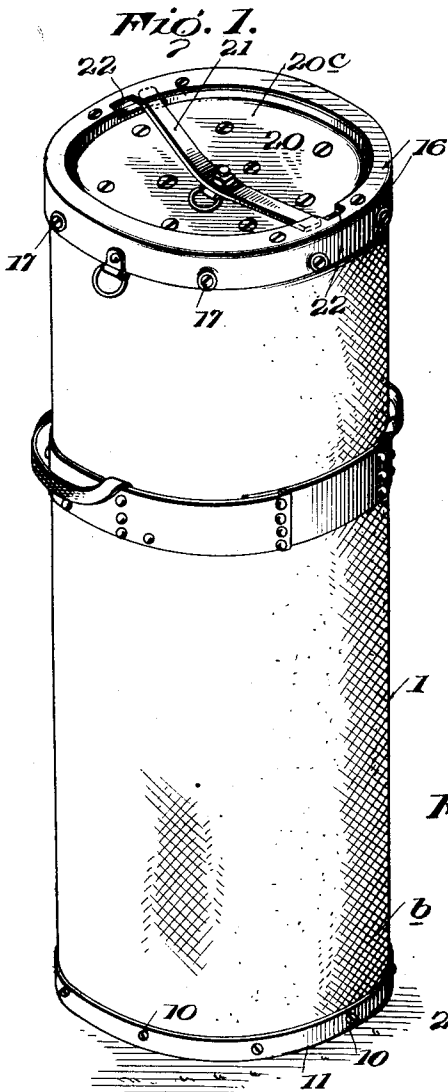


FIG. 2.

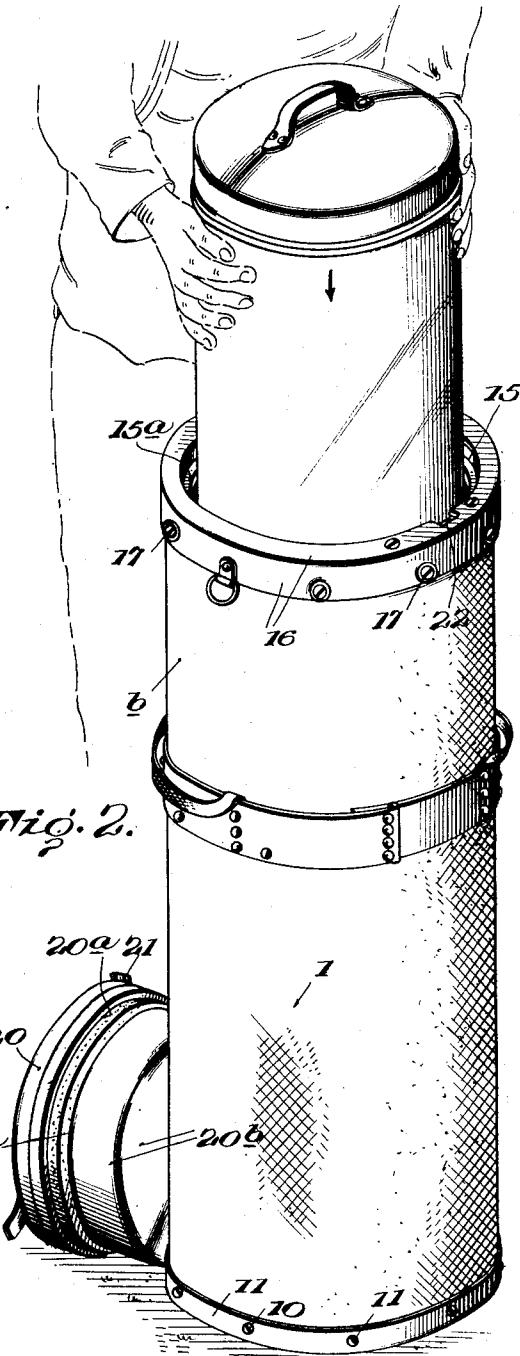
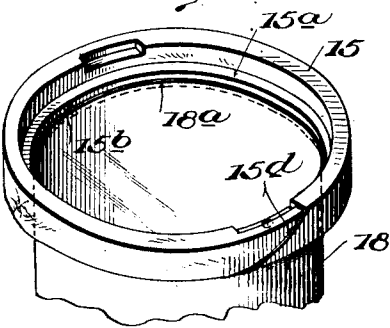


FIG. 3.



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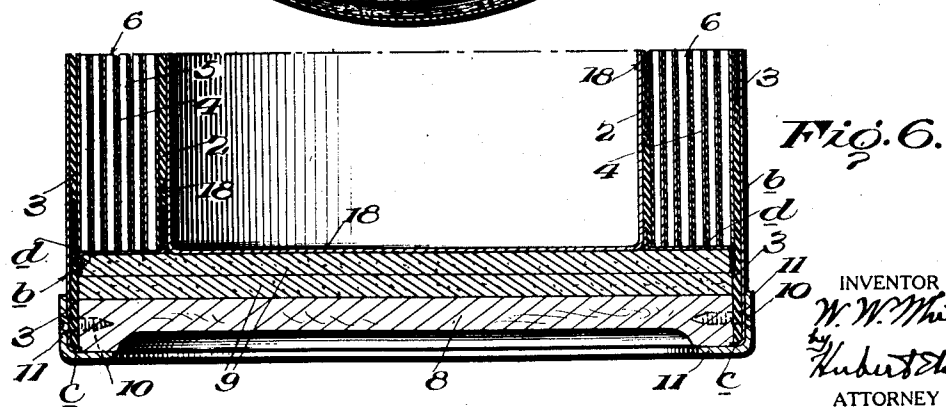
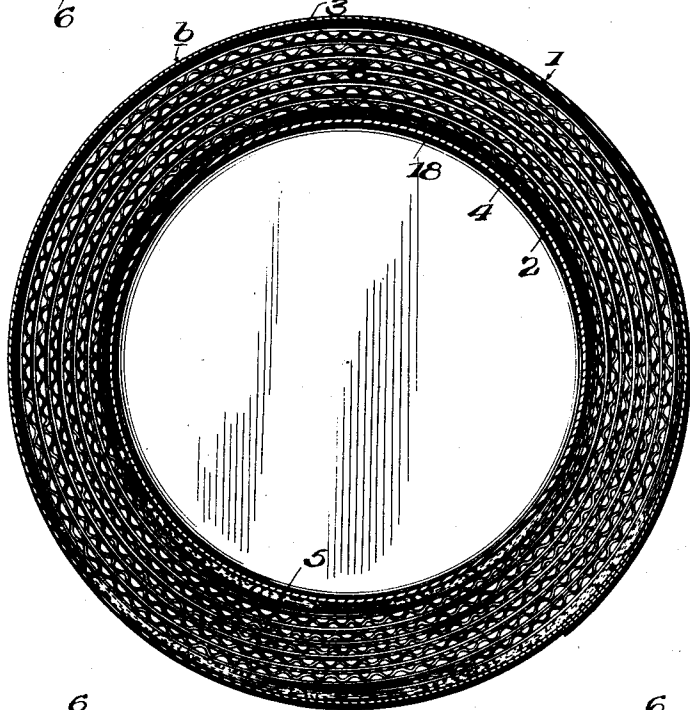
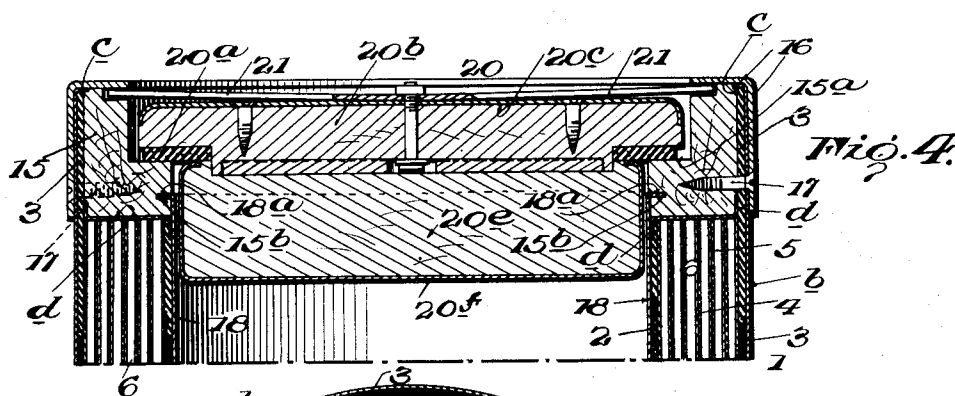
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SHIPPING CONTAINER.

Application filed April 29, 1927. Serial No. 187,623.

5 This invention particularly relates to the insulation of containers and the like against temperature exchange, while the particular example illustrated for purposes of explanation happens to show a container for storing, shipping, and delivering products and for other purposes where it is desired to protect such products against temperature exchange; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following explanations of the accompanying drawings that illustrate what I now believe to be the preferred mechanical expression or embodiment of the invention from among other forms, constructions, materials and arrangement within the spirit and scope of the invention.

0 A specific object of the invention is to provide a so-called shipping container and the like, wherein the great strength, comparative-lightness, durability, moisture-resisting and insulating qualities, cushioning or semi-elastic qualities, toughness, and stiffness, of the commercial product known as sheet vulcanized fibre, other sheet or material possessing substantially like characteristics, are utilized to the maximum, in connection with the insulating qualities and low cost of so-called corrugated paper or substantially similar sheet fibrous material of cellular formation or that will form in the completed wall layers of insulating air cells.

5 A further object of the invention is to provide various novel features in structure, arrangement and/or combination for the production of an improved and advantageous durable semi-elastic or cushioning, strong insulating wall or barrel for containers.

0 With the foregoing and other objects in view, my invention consists in certain novel features and in structures and arrangements, and/or in combinations, as more fully and particularly set forth and specified hereinafter.

Referring to the accompanying drawings, forming a part hereof:—

Fig. 1 shows a container of my invention in perspective, the cover being shown locked in closed position.

Fig. 2 is a perspective showing the container being loaded, say with a can of ice cream, the container cover being shown detached.

Fig. 3 is a detail perspective showing the split mouth ring and the flanged upper portion of the inner can embraced thereby and interlocked therewith.

Fig. 4 shows the mouth and cover portions of the container in longitudinal section.

Fig. 5 shows the insulating barrel of the container in cross section, somewhat diagrammatically to bring out the peculiar inner and outer and intermediate wall formations with the continuous stiff strong sheet forming the inner and outer walls with its intermediate portion extending throughout the intermediate wall composed of overlying plies of said sheet faced by intervening cellular sheet material.

Fig. 6 shows the bottom portion of the insulating container in vertical section.

The particular embodiment of my invention illustrated as an example for purposes of explanation, embodies the container body or barrel, indicated in Fig. 1 of the drawings, by the reference numeral 1, and this barrel, in this example, is cylindrical and as an entirety constitutes not only the strong, rigid backbone or main frame unit structure of the container, but also the surrounding insulating wall of the container.

This barrel is built up to form what might be termed a unitary structure, that embodies strong stiff insulating more or less resilient or elastic inner and outer concentric spaced walls or cylinders 2, 3, tied together by intervening stiffening and insulating plies 4.

For instance, the inner and outer cylinders or walls 2, 3, and in part the intervening insulation, are all formed, preferably, by one continuous rolled or convolutely wound sheet of vulcanized fibre of the desired thickness, tensile strength, and hardness or stiffness. For instance, a sheet of, say .010", more or less, vulcanized fibre, produced by well known or other suitable methods (as by the treatment of sheet paper material with acid and subsequent treatments to remove or neutralize the acid, and amalgamation by heat and pressure into laminated or multiply sheet formation) can be utilized to form said barrel unit with the addition of other insulating material between the inner and outer connected walls of the barrel. To accomplish this result, I have employed a driven rotary collapsible mandrel having an ex-

terior diameter to form the inner container wall of the desired internal diameter; a roll of sheet vulcanized fibre of the desired characteristics and dimensions; a roll of common or commercial sheet corrugated paper such, for instance, as employed for packing purposes of approximately the same width as the vulcanized fibre sheet, adhesive applying means, and suitable controlling devices. I then start to tightly wind one end of the rolled vulcanized sheet, on the mandrel to form the laminated inner wall 2, of several tightly wound convolutions or plies of vulcanized sheet fibre, the plies of which have adhesive applied thereto to adhere together but not to the mandrel. When the inner cylinder 2, is thus formed, one end of the rolled corrugated paper sheet 5, is then started with the vulcanized fibre sheet, to wind on the cylinder 2, that remains on the mandrel, to form a radially thick wall or layer composed of a multiplicity of overlying double plies (of vulcanized fibre 4, and corrugated paper 5) cemented together and surrounding the cylinder 2. Adhesive is applied to the stiff fibre sheet and the corrugated paper sheet that move together in parallelism onto the inner wall 2, on the mandrel and are tightly wound thereon until wall 2 is surrounded by a thick concentric insulating and stiffening wall generally indicated by 6, in certain views of the drawings. When this insulating wall has reached the desired thickness, the corrugated paper sheet is cut from its roll to stop the feed of corrugated paper to the mandrel, so that continued rotation of the mandrel continues the winding of the vulcanized fibre sheet alone on the insulating wall 6, to form the thick strong laminated outer wall or cylinder 3, of the container body, of the required number of overlying convolutions to provide the outer wall of the cylinder of the desired thickness and strength. The vulcanized fibre sheet is then cut from the roll. Adhesive is applied to the vulcanized fibre sheet to cause the multiplicity of tightly wound convolutions thereof to adhere together.

It will be noted that the water resistant hard stiff vulcanized fibre sheet that forms the stiff yet semi-elastic inner and outer walls of the container barrel, is continuous throughout the insulating wall and extends from the inner wall to the outer wall of the barrel and thereby not only adds materially to the water resistant and insulating value of the structure but greatly strengthens and stiffens the unit and protects, sustains, and backs the more or less weak flexible compressible, absorbent corrugated paper sheet.

The corrugations of the corrugated sheet extend transversely thereof, and are fed to the mandrel with the vulcanized backing

sheet so that in the finished container barrel the corrugations extend longitudinally of the barrel to form a great multiplicity of air cells intervening between and separating the vulcanized fibre sheets, constituting an exceedingly efficient insulation, particularly in the completed container wherein the air cells are closed at the ends to form dead air cells.

The outer cylinder of the barrel constitutes the outer wall of the container, and if so desired can be provided with an exterior covering of duck or other suitable fabric adhering thereto and shrunk thereon, although I do not wish to so limit my invention.

This container barrel is provided with a suitable permanent bottom closure, and a suitable top structure and mouth formation.

For instance, in the example shown, the permanent bottom closure of the container embodies a thick strong imperforate bottom disk 8, inset within the lower end of the barrel outer or main wall 3, and, if so desired, several parallel insulating disks 9, cemented or otherwise secured together and to the top face of bottom 8 and to the inner surface of wall 3, and to the lower ends of walls 2 and 6 of the container barrel, and a heavy exterior flanged metal ring 11, exteriorly fitting the lower end of barrel wall 3, and the circumferential portion of the under face of bottom 8, and secured by screws 10, or other suitable fastenings extending radially through the vertical flange of the ring 11, into the bottom 8.

After the insulating and container barrel unit, is removed from the mandrel on which it is formed, such unit is interiorly and annularly rabbeted within both ends, so that the thick strong outside wall 3, will project beyond the ends of the inside wall 2, and intermediate wall 5, which walls 2 and 5 are coextensive in length and terminate in squarely cutoff ends to form flat annular shoulders within the wall 3.

Before the bottom closure is inserted in the lower end of the barrel and insulating unit, I prefer to coat the inner surface of the projecting lower end of wall 3, and the adjacent internal shoulder formed by the cutoff ends of walls 2, 5, with any suitable waterproofing sealing adhesive such as pitch, bitumen, etc. and then insert the disks 9, applying the sealing adhesive as the disks 9, are inserted, and finally inserting bottom 8, although I do not wish to so limit my invention. I desire, however, to provide an insulating sealed liquid tight exceedingly durable bottom closure for the barrel and insulating unit.

The top of the barrel and insulating unit is provided with a neck or mouth ring 15, that surrounds the top opening or mouth of the container, and provides a seat for the

removable closing and sealing cover, and also provides for securing the upper end of the inner can or metal lining and for the provision of a liquid tight joint between said ring and the upper end of said inner can.

In the particular example illustrated, the mouth ring 15, is composed of a suitable hard strong wood preferably treated to render the same water resistant, although I do not wish to so limit my invention. This ring is preferably formed with a cylindrical vertical outer surface and a flat lower end. The ring is internally rabbeted from its upper end to provide a depressed internal upwardly facing annular shoulder 15^a. The ring is inset in the upper end of the barrel and insulating unit to snugly fit within the projecting upper end of outer wall 3, with its lower end resting on and covering the internal annular shoulder formed by the cut off ends of the inner walls 2, 5, the inner surface of projecting end of wall 3, and the ends of walls 2, 5, having first been covered with and sealed by a suitable sealing and waterproofing adhesive, such for instance as hereinbefore described in connection with the container bottom closure, although I do not wish to so limit all features of my invention.

A strong metal ring 16, angular in cross section is preferably fitted on the upper end of the container with its inturned horizontal flange fitting down on the top face of mouth ring 15, and with its cylindrical vertical flange snugly and exteriorly fitting the outer surface of the upper end of wall 3. This metal ring can be secured by suitable means such as screws 17, extending radially and inwardly through the metal ring 16, and into the mouth ring 15.

The liquid tight lining of the container is in the form of a durable sheet metal cylindrical can 18, fitted down within the inner wall 2, and having a liquid tight flat bottom resting on and backed by the container bottom, as by the top disk 9. The upper end of this can fits snugly within the bore of the mouth ring 15, and terminates in said ring preferably a slight distance below the ring shoulder 15^a. The can 18, is open at the top, and its cylindrical wall at the top is turned outwardly to form a horizontal annular flange 18^a, and the upper end of the can is interlocked with the mouth ring 15, through the medium of this flange and a complementary annular groove 15^b, in the mouth ring to form a liquid tight joint between the ring and can. The horizontal annular groove 15^b, opens into the bore of the mouth ring a distance below shoulder 15^a, and extends radially outwardly through but a portion of the radial thickness of the ring and hence is closed except where it opens into the ring bore. This groove is narrow to snugly receive the can flange

which is preferably sealed therein against passage of moisture into the groove along and around the outer edge of the flange.

It is highly advisable to prevent passage of liquid by seepage, capillary action or otherwise into the insulating barrel of the container, or into the container at the exterior of the inner metal can, and hence said can is liquid tight and a liquid tight joint is formed between the mouth ring and upper end of the can, and the flange and groove interlock between the can and mouth ring is very effective for this purpose. Said interlock also provides a strong and effective structural supporting joint between the upper end of the can and the upper end of the remainder of the container, while the container is upheld at its lower end with respect to the container by the rigid inset bottom 8, 9, on which the can seats.

To provide for convenient assembly of the mouth ring and can, so that the can having the mouth ring applied to its upper end, can then as a unit be inserted in the upper end of the barrel unit and assembled therewith, I preferably diagonally split the wood mouth ring that has been previously completed and formed with the inner can flange receiving groove. This split is shown at 15^c. By reason of this split, the ring is rendered expansible and hence can be expanded and pushed down over the can flange until the flange enters the groove and the ring surrounds the upper end of the can. The ring will then spring back to closed position and normal diameter and the ring ends at the split can be tightly secured together with proper adhesive and one or more wood screws or by other means or method. The ring will then tightly fit on and around the can end. The can with the ring secured and sealed on its upper end, is then inserted in the barrel to its proper permanent position therein as hereinbefore described.

Any suitable removable cover, such as 20, is provided to tightly close the mouth or open end of the container. In the example illustrated, this cover is in the form of an insulating plug fitting within the mouth ring and depending into the upper end of the can and having a horizontal rubber or other packing ring 20^a, arranged to fit down on the annular shoulder 15^a, of the mouth ring for tightly sealing the container against entrance of air. This plug 20, is shown provided with a well known form of diametrically arranged spring metal fastening bar 21, projecting at its ends to pass down through notches 22, in metal ring 16, and swing laterally under the top flange of the ring to lock the cover in the container. The bar tends to spring up at its ends and is fastened at its central portion to the cover by a vertical bolt so that the bar can swing to and from locked position, all as will be readily understood by

those skilled in the art. My invention is not concerned with the particular means employed for locking the cover.

A can of frozen ice cream or any other product to be transported in and insulated by the container, is introduced into the inner can, and sealed therein by applying and locking the cover. Any suitable refrigerant can also be located in the inner can with the product, if so desired.

Frozen brine or other chemicals sealed in small containers, or carbon dioxide ice, can be employed as such refrigerant, particularly where ice cream or other frozen food products are to be shipped long distances or are to be kept in edible condition for many hours.

By utilizing vulcanized fibre to form the main structural backbone of the shipping container, I gain insulating qualities, semi-elasticity to absorb or cushion blows, strength and durability with long life, decreased weight, and saving in cost, and this is particularly true where the barrel walls are composed of wound or rolled sheet vulcanized fibre to form multi-ply walls with intervening insulation forming in effect an integral part of the barrel approximately as hereinbefore set forth.

The protective exterior covering *b*, of duck or other heavy suitable treated fabric, that is permanently shrunk on and adhering to the exterior surface of the semi-elastic strong vulcanized fibre wall 3, is of advantage particularly where it is applied to completely cover the exterior surface of the wall and lap inwardly over the end edges thereof, and thus abut the inner horizontal surfaces of the horizontal flanges of the metal protecting rings 11, 16, and serve to seal the joints, at *c*, against passage of moisture.

As hereinbefore described, the ends of the radially thick insulating wall 6, are sealed against passage of moisture, and preferably to cause the ends of said walls to adhere to the flat bottom face of top ring 15, and to the top face of top disk 9, respectively, to form liquid tight joints. I find applications of asphalt in liquid condition, satisfactory for this purpose, particularly where the ends of wall 5, are completely covered with one or more layers of suitable fabric thoroughly impregnated with the asphalt, so that the ends of wall 5 are rendered so far as possible liquid and air tight by fabric and fabric seals *d*, which if so desired can lap over onto the adjacent cylindrical vertical surfaces of the walls 2 and 3. This end sealed formation, is of peculiar advantage where corrugated paper or its equivalent constitutes the insulating filling intervening between the overlapping wound plies of stiff strong sheet material, such as vulcanized fibre, even though the insulating wall 5, should be formed separately from outer wall

3, and then be applied thereto for assembly in the container.

In the particular example illustrated, the protecting bottom disk 8, is composed of some suitable material such as hard wood treated to render the same water resistant. The insulating material 9, superimposed between disk 8, and the lower end of insulating wall 5, and the bottom of inner can 18, is composed of one or more disks of strong material to form a proper supporting and cushioning backing for the can bottom and possessing a high degree of insulating property. I find on the market, exceedingly porous boards or sheets composed of matted or felted vegetable fibres, that are highly desirable for this purpose, and hence the disks 9, are cut from such boards, say about $\frac{1}{2}$ inch in thickness more or less, although I do not wish to so limit my invention.

The cover 20, in the particular example illustrated comprises a flat disk 20^b, of strong thick material such as hard wood having a top metal facing 20^c, secured thereon. This disk 20^b, is of a diameter to freely enter the enlarged upper portion of the bore of the mouth ring and rest on the ring shoulder 15^a. The packing or flat rubber ring 20^a, faces the circumferential portion of the under face of the disk, the annular flange portion of the cover, to seat down and be compressed against the ring shoulder 15^a. The depending plug or reduced lower end of the cover that depends through the reduced lower portion of the ring 15 and into the upper end of the inner can 18, is composed of balsa wood 20^e, fitted within a cup like metal housing 20^f, having its upper end flanged or turned inwardly. This metal housed depending plug is suitably secured and fixed to the cover top or disk 20^b, to cooperate therewith in forming a surrounding horizontal annular groove in which the inner annular portion of rubber ring 20^a, is seated and confined. The upper end of the housing 20^f, is flanged inwardly into the groove that retains the packing ring 15, and this flange constitutes the bottom wall or ledge of the groove to engage and uphold the packing ring. The duck covered insulating wall or enclosure consisting of the laminated outer wall, the laminated cellular intermediate wall and the laminated inner wall can be of various formations in cross section, and in some instances can be composed of heavy cheap sheet paper cemented and wound as hereinbefore described with its intermediate adhering convolutions faced by corrugated or air cell forming sheets of fibrous sheet paper like material, such as asbestos paper, or common or other forms of corrugated paper or papers otherwise formed to provide the masses of air cells.

It is evident that various changes, modifications and variations might be resorted to

without departing from the spirit and scope of my invention and hence I do not wish to limit myself to substantially the exact disclosures hereof.

5 What I claim is:—

1. A container embodying a barrel unit having inner and outer walls and an intervening insulating wall, said several walls including and tied together by sheet vulcanized fibre, said intervening insulating wall sealed at its ends and including insulating material in addition to said sheet vulcanized fibre.

2. A container barrel unit comprising a heavy enclosing outer wall and an inner wall both composed of plies of wound sheet vulcanized fibre, and an insulating wall intervening between said inner and outer walls and embodying plies of spaced sheet vulcanized fibre integral with said inner and outer walls.

3. A container having its barrel outer wall built up of sheet vulcanized fibre wound into a multiplicity of overlying convolutions and a thick insulating wall within said outer wall and embodying vulcanized fibre convolutions integral with said outer wall and intervening air cell forming sheets intervening between the vulcanized fibre convolutions.

4. A container comprising an insulating protective barrel having a permanent bottom and a top mouth ring and an inner open-top can resting on said bottom and fitting in and secured to said ring, and a removable top closure, said barrel embodying an outer wall, an inner wall and a thick intervening insulating wall, said outer and inner walls embodying a wound sheet of vulcanized fibre that extends through the intervening insulating wall.

5. A container barrel having a strong protective non-metallic sheet outer wall of several tightly wound cemented convolutions and a thick insulating inner wall sealed at its ends and tied to the outer wall and composed of alternating convolutions of said wound sheet and several convolutions of intervening air cell forming sheet material.

6. A container comprising an insulated protective barrel having a bottom closure and a mouth ring formed with an annular radial groove open through the annular inner vertical surface of the ring intermediate the vertical length of said surface, a fixed metal can arranged longitudinally within said barrel and extending part way through said ring and having a top exterior annular flange fitted within said radial groove and thereby interlocking the can and ring, the upper end of the can being snugly surrounded by the ring and inset down in the ring, and a removable cover seated down in the ring and projecting down into the can.

7. A container comprising a barrel composed of stiff strong water-resistant sheet

material wound to form a thick strong outer wall, an inner wall, and a thick intervening insulating wall, said intervening wall embodying a multiplicity of wound plies of corrugated paper backed by said sheet material extended from the outer wall, the ends of the outer wall projecting beyond the ends of the inner and intervening walls, the ends of the intervening wall being sealed, a permanent bottom fitting the ends of the inner and intervening walls inset in the outer wall, a mouth ring inset within the outer wall and fitting the ends of the inner and intervening walls, and an inner metal can within the inner wall and secured to said ring to form a tight joint therewith.

8. An insulating and supporting-structure-forming barrel for a container composed of stiff strong water-resistant non-metallic sheet material forming inner and outer walls of tightly wound secured overlying plies and also forming the supporting structure of an intervening insulating wall composed of overlying wound convolutions of said sheet material and air cell forming insulating material intervening between said convolutions, said insulating wall at its ends sealed against entrance of liquid, and terminating short of the outer wall ends.

9. A container comprising a barrel having a strong semi-elastic non-metallic outer wall and a thick inner insulating wall secured thereto and having end fabric and asphalt seals, a permanent bottom inset in the bottom wall against the lower end of said insulating wall, a mount ring inset in the upper end of the outer wall and seated against the upper end of the insulating wall, and an inner can within the insulating wall with its lower end seated on said bottom and at its upper end fitting and interlocked with said mouth ring to form a liquid tight joint.

10. A container comprising a barrel having an outer wall composed of overlying wound secured convolutions of stiff semi-elastic strong non-metallic sheet material, an exterior permanent fabric covering projecting over the end edges thereof, a permanent inset bottom in the lower end of said wall, a metal protective ring exteriorly surrounding the lower end of said fabric covered wall and lapping under said bottom and fitting the bottom fabric covered edge of said wall, a mouth ring inset in the upper end of said outer wall, a metal protective ring exteriorly surrounding the fabric covered upper end of said wall and overhanging said mouth ring and fitting the fabric covered top edge of said wall, and inner insulating wall at its ends fitting said mouth ring and said bottom, and an inner fixed can between said bottom and mouth ring.

11. An insulating container comprising a

barrel having a bottom closure and top mouth ring with an intermediate annular shoulder, an inner can within the barrel and at its open upper end fitted to the mouth
5 ring, and a removable cover having a main portion providing an annular flange, a packing ring facing the bottom side of the flange, said cover providing an annular retaining groove for said packing ring, said cover
10 having a depending insulating plug embodying insulating material and a metal housing for said material, the upper end of said housing being flanged inwardly into said groove and forming the bottom ring
15 engaging ledge of said groove, said cover formed to enter said mouth ring with said packing ring fitting down on said shoulder

and with said insulating plug depending through said mouth ring into said can.

12. A container having a surrounding enclosure, said enclosure embodying a protective exterior tightly-wound-sheet wall, an inner tightly-wound sheet wall, and a thick intermediate insulating wall, said protective exterior wall at its ends projecting beyond the ends of the inner wall and insulating wall, the ends of the exterior, inner and insulating walls being sealed by coverings of fabric and waterproof adhesive, said exterior, insulating and inner walls being tied together through the insulating wall.

Signed at city of Washington, District of Columbia, this 14th day of April, 1927.

WILLIAM W. WHITE.