Oct. 20, 1964 G. O. SCHROEDER 3,153,502

CONTAINERS FOR LIQUIDS

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Fig. 1.

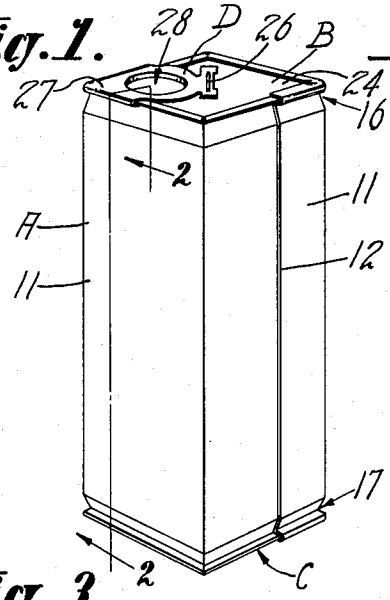


Fig. 2.

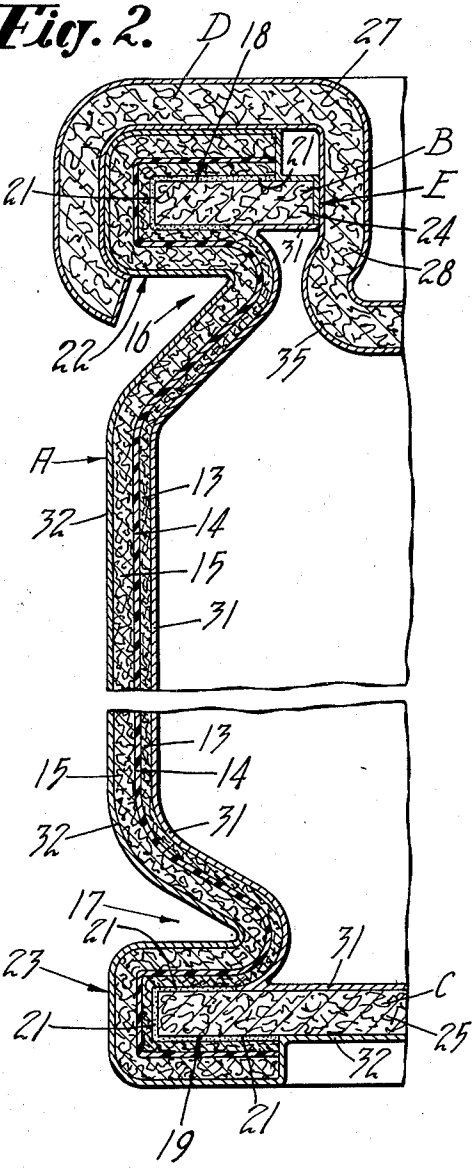
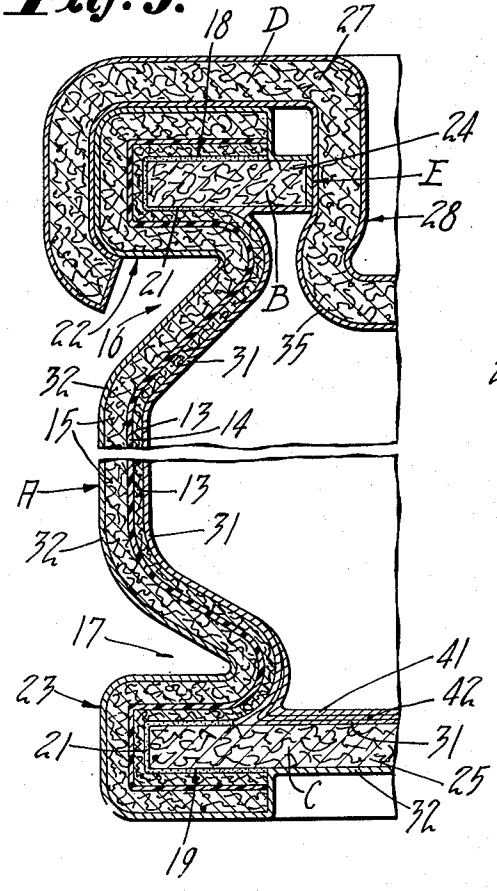


Fig. 3.



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CONTAINERS FOR LIQUIDS

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This invention relates to a laminated container structure for holding liquids, and in particular to a liquid-tight laminated container for liquids wherein the laminated construction is composed principally of fibrous material such as fibreboard, paper and the like.

Because of their relatively low cost, containers composed principally of fibrous materials such as paper and paperboard, are well suited for the marketing of many liquids, such as milk, fruit juices, and the like. Obviously for such use, these containers must be liquid-tight. Also, when so used, these containers are filled by the particular packer on automatic equipment, transported often over great distances by commercial carriers, and retailed in a mass market. This procedure involves a great deal of handling, often rough handling, thereby necessitating a fair degree of strength in the structure of the containers. Since many of the products marketed in this type of container are for human consumption, an additional requirement of the container is that it maintain the product in a reasonable sterile and uncontaminated condition.

In the past these products have been marketed principally in waxed fibreboard containers. While such containers have been commercially adequate, the manufacturers thereof have always striven to improve their strength, particularly their resistance to abuse which abuse, has been the major cause of leaks and softening of the fibre stock. Further the elimination of leaks due to breaks or cracks occurring in the wax coating or in the fibre stock of the container has been the subject of continuing research. Procedures for improving the strength, stiffness and/or rigidity of the container have been to increase the thickness of fibre-board used and to eliminate the use of wax entirely by laminating a moisture impervious plastic film such as polyethylene, to one or both sides of the fibreboard. The greater thickness of fibreboard used increases the cost of such container construction. Further, forming and sealing the side and end seam joints for such a polyethylene coated container requires special equipment and procedures. The standard machinery presently in use for the manufacture of wax coated fibre containers is not adequate for the commercial production of these plastic coated fibre containers.

An object of the present invention therefore, is to provide a liquid-tight container composed principally of fibre, having increased strength for the packing, transportation, and retailing of liquid products.

Another object of the invention is to provide a relatively high strength container for liquids composed principally of fibre which is resistant to softening.

A further object of the invention is to provide a liquidproof relatively high strength container composed principally of fibre, which can be manufactured on existing equipment used for the manufacture of waxed fibre containers.

Still another object of the invention is to provide a liquidproof relatively high strength container composed principally of fibre laminated stock for imparting stiffness and softening resistance to the container.

Still a further object of the invention is to provide a liquidproof, relatively high strength container composed principally of fibre, which is relatively inexpensive to manufacture.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

FIGURE 1 is a perspective view of a container embodying the present invention and illustrating the same in a closed and sealed condition;

FIG. 2 is a fragmentary enlarged sectional view taken substantially along a vertical plane indicated by lines 2—2 in FIG. 1; and

FIG. 3 is a view similar to FIG. 2 also taken along the vertical plane indicated by the lines 2—2 in FIG. 1, and illustrating a modified form of the invention.

As a preferred or exemplary embodiment of the instant invention the drawings illustrate a container of the general character as disclosed in United States Patent 2,085,979 issued July 6, 1937, to John M. Hothersall on Container. Such a container briefly comprise an elongated container body A substantially square or rectangular in cross-section, having top and bottom end members B, C secured to the opposite ends thereof. A plug closure element D is secured in a hinge connection to the top end member B for closing a filling and dispensing opening E located adjacent one corner of the container.

The container body A preferably is formed from a single sheet or blank of laminated fibrous material (not shown) folded to form four side walls 11. The opposite marginal edges of the blank are overlapped along one of the side walls and secured together by a suitable adhesive, such as a thermoplastic glue, to form a longitudinally extended leakproof side seam 12 (FIG. 1).

In order to accomplish the aforementioned objects, the laminated material from which the container body A is formed, generally is of fibrous material such as layers of fibreboard, paper, or combinations of the same with an interposed layer of a thermoplastic material such as a film of polyolefin and, in particular, polyethylene.

FIGS. 2 and 3 of the drawings illustrate two forms which are similar of a laminated structure used for the instant container and it includes a first fibre or paper layer 13, a thermoplastic adhesive or polyethylene layer 14, and a second fibre or fibreboard layer 15 having a thickness greater than twice the thickness of the first fibre layer.

As shown and described in the previously mentioned Hothersall patent, the container body A adjacent its upper and lower peripheral edges is bent obliquely inwardly, then horizontally outwardly at a relatively sharp angle as necked-in portions 16, 17 and then horizontally inwardly in spaced relation to the horizontal outward walls to provide upper and lower end member receiving channels 18, 19. It is into these receiving channels that the peripheral edges of the top and bottom end members B and C are positioned and adhesively secured by means of a suitable thermoplastic glue or adhesive 21 to form leakproof top and bottom end joints 22, 23.

The top end member B (FIG. 1) has the same transverse cross-sectional shape as the container body and preferably is formed of a single layer 24 of fibrous material which is similar to the material from which the container body A is formed. In order to provide the top end member with adequate strength, the fibreboard layer 24 is somewhat thicker than the combined thicknesses of the fibre layers 13, 15 of the container body A.

The bottom end member C has the same configuration as the top end member B, and also is formed of a single layer 25 of fibrous material which is similar to the material from which both the container body A and the top end member C are formed. In view of the fact that the full weight of liquid contents in the instant type container

must be supported by the bottom end member C, the fibreboard layer 25 has a thickness greater than the laminated structure of the container body A.

The hinge closure element D provided for closing the filling and dispensing opening E in the top end member B (FIG. 1) preferably is secured to the latter by means of a staple 26 prior to assembly of the top end member to the container body. The closure element D is formed of a single layer 27 of fibrous material which is similar to material from which the container body A and end members B, C are formed and, preferably of a thickness equal to that of the top end member B (FIGS. 2, 3). The closure D is provided with a drawn plug 28 which engages into the opening E for closing purposes.

Following the assembly of the container parts as hereinbefore described, the entire container is treated inside and outside for rendering them liquid and moisture-proof. Hence in order to perform this treatment, the closure element D is swung to an open position to expose the dispensing opening E so that all surfaces may be treated substantially at the same time. This may be accomplished in any suitable manner. One of the most satisfactory ways is to immerse the container in a bath of molten paraffin wax, M.P. 128 to 130° F. The overall similarity of the instant container to that of the wax-dipped prior art type, accounts in a large measure, for the ability to manufacture the instant container on existing equipment.

The container during its treatment is kept immersed in the paraffin bath for a sufficient length of time to enable the molten paraffin to fully impregnate all the fibrous parts thereof. It has been found that for any given thickness, wax impregnated fibreboard is substantially stronger than non-impregnated or merely wax coated board. Thus, the fibreboard ply or layer 15 of the laminated container body structure upon being impregnated is the basic or main structural member of the container body A, and as such provides the main strength of the container. Further, the amount of wax consumed in the manufacture of the instant container obviously will be a function of the thickness of the fibreboard. Therefore, to maintain the material costs of the instant container at a minimum, the wax impregnated fibreboard layer 15 should be no thicker than that which is necessary to provide the container with adequate strength.

It should be noted that while the inner or first layer 13 and the polyethylene layer 14 add some strength and rigidity to the main supporting layer, i.e., the impregnated basic fibreboard layer 15, the principal purpose of the layers 13, 14 is to protect the basic layer against the penetration of the liquid product from within the container into the fibre stock of the basic layer. However, since the inner layer 13 is formed of relatively thin fibre or paper and impregnated with wax, leaks may occur in the layer due to breaks or discontinuities in the fibre stock. In such instances, the polyethylene layer 14 thereupon serves as a stop or barrier against the penetration of the liquid product into the outer or basic layer 15, thereby safeguarding its resistance to softening.

When a sufficient amount of paraffin wax has been absorbed to fully impregnate the fibrous material of the container parts, the container is removed from the paraffin bath and drained. This may be done conveniently by placing the container in an inverted position, with the filling and dispensing opening E at the lowest point. With the container thus positioned, the excess paraffin will drain from all interior and exterior surfaces of the container leaving a minimum amount to remain to form an inside surface coating layer 31 and an outside surface coating layer 32. By regulating the draining period, the thickness of the inside and outside coating layers 31, 32 may be accurately controlled.

It has been found that fibrous material when fully impregnated provides a secure anchorage for these surface coating layers 31, 32. Hence, only relatively thin inside and outside coating layers thus are required for producing a liquidproof container. As a result, the reduced amount of paraffin wax used for the purpose of providing coating layers on containers of the instant type, further lessens the possibility of chipping or flaking of paraffin when such containers are subjected to excessive abuse.

The provision of a relatively thin inside coating 31 is preferred on the inside surface of the instant container as further assurance against cracks or break occurring due to chipping or flaking of paraffin from the inner or first layer 13. This greatly lessens the possibility of inside surface fracture to the inner layer 13 and the chances of liquid penetration into the fibre stock thereby preserving the resistance of the container structure to softening. This is particularly desirable for products which are retained in containers for a considerable length of time.

The container, following its impregnating and coating treatment, is subjected to a chilling step to set the wax. The opening E thereafter is closed temporarily by inserting the plug 28 of the closure element D into the opening. The container now is ready for shipment to a packer for filling thereof.

The treatment of the container as hereinbefore described has a sterilizing effect on the container and more particularly on the container interior. Since this sterilizing effect exists at the time the container is closed, a substantially sterile condition is maintained during the shipment and subsequent filling.

Upon being received at the packer's plant, the plug 28 of the closure D is again lifted from the filling opening E for filling purposes. Following this filling, the plug 28 is re-inserted for final closing of the filled container. It is at that time that the plug section 28 is slightly altered adjacent its lower periphery by a suitable expanding tool to form an outwardly extended bead 35 which projects beneath the top end member B surrounding the filling and dispensing opening E. This effectively seals the filled container and securely holds the plug 28 in closed position.

Simultaneous with or immediately following the sealing of the filled container, the shape of the outer periphery of the closure D (FIGS. 1 and 2) is altered for overlapping engagement of the top end joint 22 at the corner of the container adjacent the filling and dispensing opening E. This protects the surface of the container over which the contents is poured when the container is opened. The feature is similar to and more fully described in the United States Patent 2,182,818 issued to John H. Murch, December 12, 1939, on a Container Closure. This completes the formation of the instant container as illustrated in FIGS. 1 and 2 of the drawings.

In another form of the invention, the instant type container hereinbefore described is further treated to protect it against excessive abuse at its most vulnerable area which is along the bottom end joint 23 and more particularly, at the corners thereof. For this purpose an additional or second coating of wax or wax-like material is provided as an inner protective layer 41 directly over the inside coating 31 on the bottom end member C and the inner surrounding and downwardly curved surface of the body opposite to the necked-in portion 17 (FIG. 3). The wax selected for such use is softer, more flexible and possesses more cohesive and adhesive qualities than the paraffin wax used for impregnating and coating the fibrous material of the container.

As an example of a wax suitable for an inside protective layer is a 50/50 weight mixture of paraffin wax, M.P. 140° F., and microcrystalline wax, M.P. 145° F. Other waxes, modified waxes, or wax-like materials having similar amorphous-like properties, also are operable which, because of their characteristics insure against chipping or flaking of the wax coating into the packed product.

The inner protective layer 41 preferably is applied to

the container immediately following the draining of the excess paraffin wax from the container as hereinbefore described, and before the wax coatings 31, 32 are chilled. This is achieved by flushing or spraying the interior of the container through the dispensing opening E in any suitable manner. Due to the fact that the coating material used for the protective layer 41 has a slightly higher melting point than that of the paraffin wax of the inside coating 31, this paraffin wax coating is heated to above its melting point, with the result of an intermediate layer 42 being produced. This layer 42 is a blend of both the waxes and serves as a bond therebetween.

Following the application of the protective layer 41 to the inside of the container, the subsequent operations as hereinbefore described, such as the chilling and temporary closing of the container are performed in the same manner with this modified form of the invention whereupon, the container is ready for being delivered to the packer.

It is though that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A leakproof container for liquid products, comprising:

a tubular laminated container body having top and bottom end members secured to the opposite ends of said container body in leakproof end joints;

said container body having a first relatively thin inner layer of paraffin wax impregnated paper and a second thick outer layer of paraffin wax impregnated fibre board, said second layer having a thickness at least twice that of said first layer;

a layer of thermoplastic interposed between said first layer and said second layer for securing them together and to prevent wicking of the liquid contents of said container through the first inner layer to said second outer layer which provides the principal structural strength of said container body;

a coating of paraffin wax on the interior and exterior surfaces of said container;

and a second coating of wax, softer and more ductile than said paraffin wax coating, on the inner surface of said bottom end member and a marginal surrounding portion on the interior of said container body adjacent said bottom end member, thereby providing a reinforced bottom end portion of said container which is resistant to abuse and rough handling.

2. The container of claim 1 wherein said thermoplastic layer is polyethylene.

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