

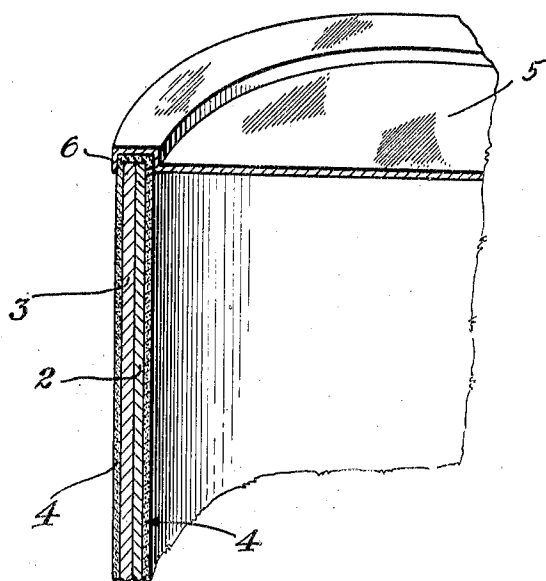
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LAYERED STRUCTURE AND PROCESS OF MAKING THE SAME

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LAYERED STRUCTURE AND PROCESS OF
MAKING THE SAMEAlexis E. Meade, Lakewood, Ohio, assignor, by
mesne assignments, to International Container
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10 Claims. (Cl. 229—3.5)

Many efforts at the utilization of paper and cardboard containers for such penetrating materials as petroleum oils have been made, but have failed in one or more essential requirements, and particularly because, however treated, they fail to prevent the oil from soaking through or penetrating the walls thereof or wicking out through the joints of the body walls, in between the laminations thereof or between the body and walls and the end closures of containers. Other efforts have failed to produce requisite results, due to prohibitive cost or time required for treatments; or the coatings employed either discolor the lubricating oils, combine with them in breaking down or dissolving the coating material, crack, chip or crease under handling, or fail to withstand the temperatures to which the containers are subjected while in use. No expense or talents have been spared by the larger manufacturers and refiners in their efforts to produce a satisfactory oil-proof paper or cardboard sealed container which will prevent substitution or "boot-legging", discoloration or corruption of their highly prized brand named oils generally marketed to the public at premium prices, and yet allow of manufacture at a price sufficiently low to enable the desirable practice of destroying the containers by burning after they have had their contents dispensed. In accordance with the present invention however, containers may be made to most satisfactorily meet all of these various requirements and the rigid specifications of the largest refineries.

In customary practice at refineries, petroleum lubricating oils and greases are filled into their packaging containers at a temperature more or less above normal; and even if initially filled at temperatures of around 70° F. or lower, the packaged product is prone to encounter elevated temperatures under ordinary exposures and when stored or stocked by dealers and consumers in unfavorable exposure to summer heat, winter cold, or artificial heat and cold, and this further aggravates the capillary-penetration action of the oil contents of the containers.

Although laminated paper structures are thus inherently particularly vulnerable both in body joints and seams, I have found however, that such containers may be suitably built to successfully resist oil penetration.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth

in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

The sole figure is a broken sectional view showing structure in accordance with the invention.

A cellulose chip-board or paper cylindrical container is built up, as for an example, by winding spirally or convolutely. Desirably, the inner layer 2 may be of kraft paper or parchment paper, although in some instances chip paper or manila paper of caliper about 0.003 to 0.005 inch may be employed, the inner layer being wound preferably with a lapped seam of approximately one-eighth inch. Then successively any desired number of paper laminations are further laid on, such layers being of chip board, manila, chestnut board, or kraft, etc., with the seams of the outer layers abutting, but each lamination 3 covering the seam of the lamination beneath, for rendering the container sufficiently strong for handling purposes. Any suitable adhesive for the layers may be employed.

The containers, or cylinders as they are at this stage, are then faced or dipped or sprayed with an impregnating and coating composition which under a specific heat treatment and action of a volatile solvent carries an inert material in to fill and seal voids and seams so that the other ingredients form an impervious sheet skin or film 4 completely enveloping the inner and outer surfaces and extending over the end edges of the cylinder and firmly keyed into the pores, seams and edges thereof to form a surface coating.

This composition is thermo-plastic in character and is prepared from a drying oil and a combinable resin, preferably in the following manner: one hundred (100) parts, by weight, of a soluble phenol-formaldehyde condensation product (resin) and one hundred (100) parts of China-wood oil are heated together in a suitable container, the temperature being rapidly raised to about 230° C. and requiring about twenty minutes to reach this temperature. This temperature is then held while a reaction occurs between the China-wood oil and the resin, requiring about 15 minutes, and the mass is more or less fluid. A dryer in a small amount, for instance 400 grams of lead-acetate is then rapidly stirred into the batch. The lead rapidly goes in with the polymerized oil and resin with the liberation of acetic acid vapor. When this reaction is completed, the batch is cooled quickly to a temperature of around 215° C. at which it is held to prevent the batch

from gelatinizing. At this point a volatile solvent or thinner is slowly stirred in to fix the composition in such form that a finely divided mineral anti-wicking agent can be thoroughly incorporated. This solvent is preferably composed of one hundred (100) parts, by weight, of mineral spirits and one hundred (100) parts, by weight, of a coal tar solvent, such as xylol or toluol. At this stage glycerine or castor oil is added in the amount of about 1 to $\frac{3}{8}$ part, by weight, and the finely divided mineral anti-wicking agent, as for example titanium dioxide is then incorporated to the amount of from about 5 per cent to 25 per cent, by weight, and desirably, thorough mixture being obtained by grinding, as in pebble, stone or roller mills. The batch is then further thinned or diluted to the consistency desired for application purposes, as for instance by incorporation of additional thinners such as xylol or toluol in the amounts of from 10 per cent to 50 per cent, by weight.

The container structure, of hollow tubular form, is faced sprayed or dipped or suitably coated or surfaced with the composition, the facing sheet extending over the edges of tubes at their ends; and in cases where desired, this composition without the titanium dioxide may be incorporated as an inter-layer or adhesive between the paper laminations of said tubes.

The containers, immediately after coating, are then subjected to heat treatment, and I have found that this polymerized material is caused, by the action of the volatile solvent, to drive or force the anti-wicking agent or titanium dioxide into the pores or voids of the paper and preclude excessive absorption by the paper of the resinous mixture, which latter is thereby held on the surface and baked into a condensed tough and elastic thermo-plastic film or skin layer, for instance by baking the tubes at 80-85 C. for approximately 25 minutes or at approximately 140° C. for about 15 minutes. This results in driving the anti-wicking or titanium dioxide content into the interstices of the paper while the solvents are working out and opening the pores for thorough incorporation of the mixture and the formation of a tenacious tough film highly impervious to external moisture and to petroleum oils later to be stored or packaged in the containers.

The incorporation of the titanium dioxide also colors the coating white and provides a surface upon which labeling or advertising may be directly printed without necessitating additional expense for labels on containers.

The cylinders are finally headed or closed at both ends by closures 5, desirably by sheet metal heads, such as tin, or paper coated with the body coating, tightly crimped or flanged as at 6 over the ends of the container body. The crimping or flanging may be accomplished in the presence of heat to render the ends of the coated cylinders "tacky" for closer adhesion to the closures. The container may be filled prior to the placement of the second end or closure, or one of the heads may be provided with a sealing opening to be subsequently sealed if preferred.

By crimping or flanging the final closing head at the time of sealing, a factory-sealed container is had, with all the advantages and safeguards of an originally-packaged product free from contamination or substitutive adulteration.

Where desired, in manufacturing large containers, requiring extra reinforcing strength, the cellulosic layer body may include textile material or woven wire fabric or perforated or "keyed"

paper for further strengthening and reinforcing cylinder walls or closures.

Container walls so produced are particularly advantageous in preserving any contents and particularly oil or grease contents of varied character free from contamination or change and without effect on the container by saturation, seam-leakage, cracking, or deterioration. The surface or facing layer retains an elastic resistant character, greatly conducting to effective pore-closure throughout and sealing of the entire structure as well as providing a smooth surface to facilitate emptying the entire petroleum contents of the package in a speedy manner without excessive adhesion of same to side walls.

These containers before being coated, can be embossed by means of embossing dies so that letters composing advertising matter, trade names, etc., stand out in relief on exterior of package, whereby their outer surfaces can be given a different color than that of the background by passing an inked belt or roller over said embossed letter surfaces, or by any other suitable means.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet of lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil impervious surface membrane completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

2. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous liquid-impervious surface membrane containing a phenolic resin and drying oil completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

3. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil-impervious surface membrane containing a polymerized phenolic resin and oil completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

4. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil-impervious surface membrane containing a phenolic resin, drying oil and an anti-wicking agent completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane

coacting to produce a substantially rigid oil-impervious container.

5. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil-impervious surface membrane containing a phenolic resin, drying oil, an anti-wicking agent and a pigmentizing agent completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

6. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil-impervious surface membrane containing a phenolic resin, a drying oil and titanium dioxide completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

7. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous oil-impervious surface membrane containing a phenolic resin, a drying oil and a pigmentizing agent completely enveloping and keyed into the

inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

8. In a sealed container comprising a tubular, open ended paper shell and ends seamed thereto, said shell being of a porous nature, a flexible sheet lining of relatively less porosity bonded to the shell to form a body structure and a continuous liquid-impervious surface membrane containing a phenolic resin, a drying oil, lead acetate and an anti-wicking agent completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

9. In a sealed container, an open ended paper shell and ends seamed thereto, said shell being of a porous nature, and a continuous liquid impervious surface membrane completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

10. In a sealed container, an open ended paper shell and ends seamed thereto, said shell being of a porous nature, and a liquid impervious surface membrane completely enveloping and keyed into the inner and outer surfaces and end edges of said body structure, the body structure and membrane coacting to produce a substantially rigid oil-impervious container.

ALEXIS E. MEADE.