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PROCESS OF MAKING A GREASEPROOF CONTAINER

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1 Claim. (Cl. 91—70)

My invention relates to an improvement in containers, particularly adaptable for containing liquids, greases or oils of various sorts. These containers are suitably coated or lined to resist any damaging effects, either to the container or to the contained substance.

The containers of my invention are preferably fibre or laminated paper containers, but may be of other suitable material if desired. The ends of the container are preferably reinforced to withstand shock or strain. The ends themselves may be of metal, fibre, paper, wood, or of moldable or other suitable material.

It is the purpose of my invention to disclose a manner in which the metal ends of a container can be secured to the side walls formed of fibre, cardboard or paper. By means of this simple arrangement, the metal ends may be secured in such a manner that an impact against the bottom or diagonally against the rim of the container will serve to tighten the joint between the metal bottom and the side walls of the container, rather than loosen this connection as is ordinarily the case.

It is a further object of my invention to provide a means of reinforcing the ends of the can. This reinforcement is formed in the manner of a leaf spring, with the centers of the ends formed of greater thickness than the edges of the can bottom. The ends of the container are thus reinforced very materially with a minimum of added weight.

It is a further object of my invention to coat the inside of the can, or to provide for the inside surface a lining provided with a coating which is impervious to grease, oil, or other liquids. This coating or lining imparts to the container the liquid-proofness which is required for the desired purpose. This coating or lining includes a film of material other than regenerated cellulose, which has been previously used.

It is a purpose of my invention to provide a coating which is preferably comprised of a mixture of albuminoids such as animal or bone glue, isinglass or similar substances, with a suitable plasticizer and a tanning agent. The coating thus provided is impervious to grease or oil. The coating may be applied by rollers, spraying onto the surface, or in any other suitable manner; or applied to a liner which is secured to the inner surface of the container in the formation thereof.

It is a further purpose of my invention to provide a means for mixing the ingredients in such a manner as to provide a continuous and non-porous coating upon the surface to be coated

before the tanning agent is permitted to react. Coatings of this general class have been used previously, but have not been commercially successful because of the improper process which is used during application of the coatings. I mix the ingredients and maintain the temperature below the point at which the tanning agent will react. The coated material is then immediately subjected to temperatures at which the tanning agent will act; thus forming an insoluble material possessing the properties required.

In the past, it has been customary to treat papers or materials to be liquid-proofed with animal glue by coating or dipping them, and then placing them in a bath containing formaldehyde, and then drying them. The coating formed in this manner is always porous to various degrees, depending upon the temperature at which the coated fabric is dried. At temperatures above 100 degrees F. a decided open structure of the film is obtained, in the case of glues. Formaldehyde will not react with the glue at lower temperatures. Drying at temperatures below 100 degrees F. provides a continuous structure of various degrees of compactness. As only continuous and non-porous structures are desired for manufacturing purposes of this type, my method is of extreme value as the only method which will produce a non-porous film in commercial manufacture.

Liners of the type mentioned can also be treated to be impervious to other specific materials in accordance with my invention. These liners are formed on the inner surface of the container preferably with the formation of the container.

It has previously been suggested that paraformaldehyde be mixed with glue during the coating action. This substance is not satisfactory because paraformaldehyde is not soluble in the materials used for the coating. The action of the paraformaldehyde depends upon the depolymerization of the paraformaldehyde to yield formaldehyde. But as the paraformaldehyde is solid even when dispersed finely throughout the mass, each particle is a potential source of formaldehyde, which will give rise to uneven tanning. Each particle will be surrounded by a spot of supertanned material, making it even more difficult for the tanning material to reach the untanned portions of the material. This process leaves tanned and supertanned spots in the mass.

By means of my method, and by controlling the temperature so that the tanning action will take place when desired and in the manner desired without necessitating a separate step of

dipping the material in a tanning solution, a continuous, non-porous film is formed in a continuous process. A continuous sheet of material can be coated, if desired, by dipping the sheet in a bath of solution, or applying the coating by means of rollers or scrapers, the material being maintained at a temperature too low to permit the tanning action to take place. When the continuous coating is formed, the sheet can be heated above the tanning reaction temperature, the tanning will take place, and then the sheet is dried.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claim.

In the drawing forming a part of the specification:

Figure 1 is a vertical section through a container, illustrating my manner of reinforcing the top and bottom, or the ends thereof.

Figure 2 is a cross sectional view transversely through the container on the line 2-2 of Figure 1.

Figure 3 is a sectional detail view showing an alternate type of construction for securing metal ends to side walls of other material.

Figure 4 illustrates a view similar to that of Figure 3, with the exception that the edge of the container in Figure 4 has been subjected to an impact.

In the container A illustrated in Figures 1 and 2, the side walls 10 are formed of laminations of paper or the like. I desire to have it understood that while the container illustrated is cylindrical in shape, the finished containers may be of any shape desired. Fitting within the side walls 10, and spaced from one end thereof, I provide an end wall 11. In the form shown, this end wall is made up of laminations of paper. The innermost lamination 12 of the end wall 11 extends beyond the periphery of the remaining sheets of the wall 11, forming a flange portion 13 which is glued or adhered to the inner surface of the side walls 10 between the end wall 11 and the extreme edge of the side wall 10. A tight joint is in this manner provided.

A ring 14 fits within the end wall 11, conforming to the shape of the inside of the container side wall 10. This ring is adhered to the side wall, and acts to hold the end wall 11 from being forced inwardly. A similar ring 15 extends within the side wall 10 between the end wall 11 and the extreme edge of the container, and is adhered to the inner wall of the container. The periphery of the end wall 11 is thus held securely between the rings 14 and 15, and joins the wall with a liquid-proof joint.

Another end wall 16 of a similar general character is provided at the other end of the container. This end wall 16 is also preferably provided with an inner lamination 17 which forms a flange 18 and which is secured to the inner surface of the side wall of the container. A reinforcing ring 19, secured to the inner surface of the container side wall 10 prevents the end wall 16 from being forced into the container, and a similar ring 20 extends within the side wall 10 between the end wall 16 and the extreme adjacent edge of the side wall 10. Channel-shaped metal reinforcing rings 22 engage over the extreme end of the side wall 10 and the adjacent reinforcing ring 15 or 20, as the case may be.

The end wall 11 is reinforced by concentric discs 23 and 24, graduated in size in the manner illustrated. The disc 23 secured directly to the end wall 11 is somewhat smaller in diameter

than the end wall 11. The disc 24, which is adhered to the disc 23, is smaller than the disc 23. The entire end wall forms a construction which somewhat simulates the formation of a leaf spring. The manner in which the discs act to reinforce the end walls is believed to be obvious.

The end wall 16 is reinforced in a similar manner. A disc 25 of somewhat smaller diameter than the end wall 16, is adhered to this end wall concentrically. A disc 26 smaller than the disc 25 is secured to the disc 25, providing a reinforcement for the end wall 16. In the particular modification illustrated, however, openings 27 and 28 are provided through the end wall 16. The disc 25 and 26 are notched at 29 and 30, respectively, to accommodate a plug or stopper through the end wall 16, and the notches are preferably larger than the openings 27 and 28, so as not to interfere with this plug or stopper, not shown in the drawing.

In the form of construction illustrated in Figures 3 and 4 of the drawing, the side wall 32 of the container B is formed of laminations of paper, or of pressed paper or the like. The ends 33 are of metal or some similar substance. The ends are formed with a flat portion 34 between the side walls of the container, and a substantially U-shaped or channel-shaped edge 35 extending peripherally about this flat portion.

The U-shaped edge 35 comprises a cylindrically extending flange 36 adapted to fit against the inner wall of the container B, an edge portion 37 forming the base of the U and covering the extreme edge of the side wall 32, and an outside flange 38 adapted to extend along the outer wall of the container. The flange 36 is provided with a groove 39 therein adapted to be forced into the material forming the side wall 32. The outer flange 39 is also provided with an annular groove 40 formed in the material and adapted to extend into the material forming the side wall 32. The flange 38 is also provided with an anchoring edge 42 which bites into the side wall and holds the end 33 in position. It will be noted that the outer flange 38 extends to a point beyond the plane of the flat portion 34 of the end 33, to reinforce the wall 32 beyond the point of engagement with the flat portion 34.

This type of engagement between the side wall 32 and the end 33 is practically leak-proof, even though jarred or subjected to a considerable impact. A force acting directly downwardly upon the edge portion 37 of the end 33 will merely flatten out the edge 37 somewhat, causing the grooves 39 and 40 to bite into the side wall 32 even more securely. A diagonal impact will merely bend the edge portion 37 as shown in Figure 4, and cause the groove 40, particularly to be squeezed inwardly into closer contact with the wall 32. Thus, even though the container B is subjected to considerable strain, the connection between the ends 33 and the side walls 32 will not leak, but will remain liquid-proof.

The oil, grease, or water-proofing may be applied in the form of a coat on the inside of the containers either during the process of winding the laminated containers, or after the completion, with a suitable material which will impart to the container the liquid-proofness which is desired. Or, if desired, the containers may be formed with a lining on the inside surface thereof comprising a pre-treated web or fabric of paper, cloth, or other suitable material. The inner surface can also be protected by applying a film of

materials other than regenerated cellulose directly to this surface.

The coating for the containers, or for the coated fabric of paper, cloth, or the like, comprises in general a mixture of albuminoids such as animal glue, bone glue, isinglass and all other similar products, a suitable plasticizer, and a tanning agent. As a specific example, I mention the following mixture:

Albuminoid: Animal glue..... 1 part.
Plasticizer: Glycerine..... $\frac{1}{16}$ to 5 parts.
Tanning agent: Formaldehyde..... $\frac{1}{2}$ to 15%.
Dispersing and dissolving agent:
Water..... 2 to 15 parts.

In the formation of the coating, the time at which the tanning reaction takes place is controlled by carefully controlling the temperature of the coating. In the mixing of the ingredients forming the coating, the temperature of the mixture is carefully kept below the reacting temperature of the tanning agent during the coating process, the exact temperature used depending upon the length of time of delay required in the operation. In the case of formaldehyde, the temperature is maintained below 130 degrees F. during the coating process, to prevent reaction between the tanning agent and the tannable material. When the coating operation is completed, the surface coated is immediately subjected to temperatures above the reaction temperature of the tanning agent, or above 130 degrees F. if formaldehyde is used. This promotes the tanning reaction, and an insoluble material possessing the required properties is produced. This method obviates the low temperature drying to produce a continuous film, which was necessary in previous methods. The materials are accordingly dried much faster in the present method.

Previous methods wherein the fabric to be coated was dipped into or passed through a bath of tanning material were disadvantageous for several reasons. In the first place, after the coated material had passed through the tanning bath it was necessary to wind the material tightly upon rollers in order that the formaldehyde could penetrate thoroughly through the entire coating. Unless this step was taken the formaldehyde merely reacted upon the surface of the coating and did not thoroughly penetrate the coating material. This step of the process required from fifteen minutes to four or five hours to complete. Furthermore, as high drying temperature of the coated material caused porousness in the coating, the fabric coated had to be dried at a low temperature which required an extended period of time. Therefore, the previous processes in which the tanning step was taken after completion of the coating in a separate tanning bath, often necessitated several hours longer to complete than my simplified process. These disadvantages are entirely eliminated in my method.

While I have mentioned formaldehyde as a

tanning agent, the process is not limited to the use of this substance. Other aldehydes can be used for this purpose with fine results; or the glue may be tanned by means of the action of oxidizing agents on the amino acids of the proteins. Any tanning means which will react within a predetermined temperature range is suitable for use in my method.

Similar liners may be provided to resist any liquid for which containers are to be used. The use of liners in containers is not entirely novel, it is believed, for regenerated cellulose film liners such as "Cellophane," films formed from plastic materials such as celluloid, films formed from film-forming materials such as cellulose nitrate and cellulose acetate lacquers have been used previously. The cost of such liners, however, make them utterly impractical for ordinary use. There is no liner of this type in commercial use insofar as I am aware.

The liner can be coated on one or both sides, or it can be impregnated throughout by saturation. The coating can be accomplished by means of rollers, spraying, etc., and the thickness of the coat can be regulated by doctor blades or scrapers, or by a controlled viscosity of the coating medium regulated in conjunction with the rate of coating.

As containers formed of fibre, paper, or cardboard do not lend themselves well to use in vacuum packing, it is my purpose of using, in the place of a vacuum in the container, an inert gas which will not strain the package, and yet which will protect the material contained in the package. For example, gases such as helium, nitrogen, nitrous oxide, carbon dioxide, hydrogen, methane, or other gaseous hydrocarbons as well as halogen derivatives of the latter, or any gas which is inert to the material packed in the container, and will protect it from oxidation, may be used to take the place of the air in the container.

I have described my container, and method of coating the same, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that this is only illustrative of a means of carrying out my invention, and that obvious changes may be made within the scope of the following claim without departing from the spirit of the invention.

I claim:

A process of making a grease proof container which comprises applying to the interior surface of the container a continuous non-porous grease-proof film consisting of:

	Parts
Animal glue.....	1
Glycerine.....	$\frac{1}{16}$ to 5
Formaldehyde.....	$\frac{1}{2}$ to 15
Water.....	2 to 15

subjected to a temperature above the reaction temperature of the formaldehyde with the glue for a sufficient time to produce an insoluble continuous film.

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