Nov. 5, 1946. V. A. RAYBURN 2,410,681

CONTAINER AND METHOD OF MAKING IT

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FIG. 1

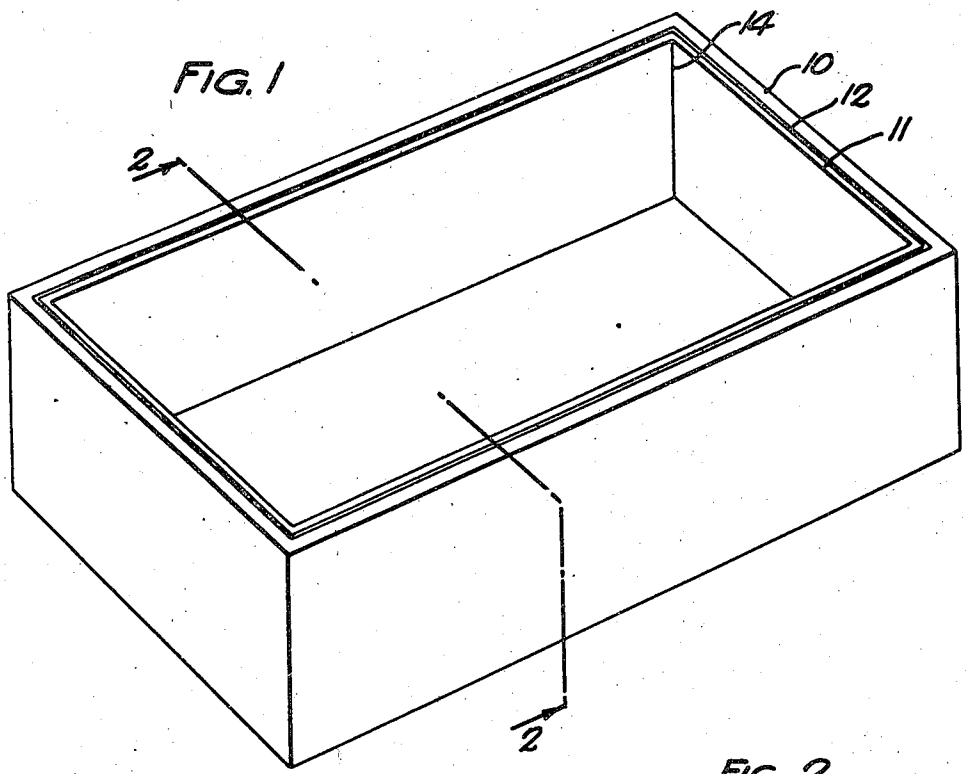
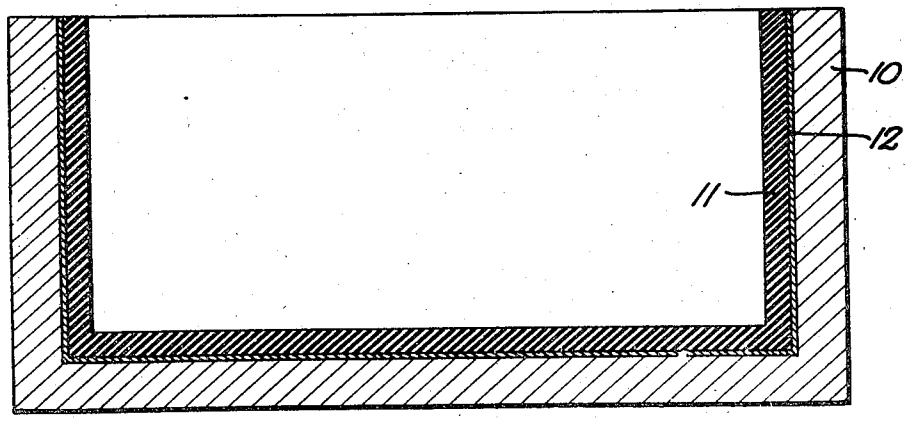


FIG. 2



INVENTOR
V. A. RAYBURN
BY
ATTORNEY

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CONTAINER AND METHOD OF MAKING IT

Vincent A. Rayburn, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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10 Claims. (Cl. 206—2)

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This invention relates to containers and methods of making them, and more particularly to containers for retaining corrosive liquids and methods of making such containers.

A large variety of corrosive liquids, such as strong acids, strong bases, and corrosive salts, are employed as electrolytes in electroplating processes. The tanks employed for retaining these electrolytes are subject to corrosion both from the electrolytic action of the electrolytes when an electric potential is impressed upon the tanks, and from the purely chemical action of the electrolytes. Since such tanks are generally made of metal, it is necessary to line them with some material that has a low conductivity factor and is unaffected by the corrosive liquids to be retained therein. In the past, rubber sheets have been used to line electroplating tanks because rubber is a well known insulating material and is not affected chemically by most electrolytes. It is difficult to obtain a good bond between the rubber sheets and the metal tank and adhesives used to secure the rubber sheets to the tank absorb moisture. Furthermore, the rubber sheets themselves absorb moisture and so tend to blister and warp and thus tend to become disengaged from the walls of the tank. Then, too, rubber is, at present, in great demand, and is unavailable for many purposes for which it was heretofore commonly used.

Objects of this invention are to provide new and improved containers for retaining corrosive liquids and to provide novel and effective methods of making such containers.

In general, the invention contemplates the provision of a container for retaining corrosive liquids, such container having a hollow body and a solid lining covering the inside of the body to protect the body from liquids retained therein, said lining comprising a composition consisting of reclaimed rubber, clay, hard bitumen, resin and paraffin.

Other features and advantages of the invention will become apparent from the following detailed description thereof when read in conjunction with the accompanying drawing, in which

Fig. 1 is a perspective view of an electroplating tank embodying the invention, and

Fig. 2 is an enlarged sectional view thereof taken on line 2—2 of Fig. 1.

In the particular embodiment of the invention shown in the accompanying drawing, a tank for containing a corrosive liquid comprises a hollow body 10 having an inner lining 11 secured

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to the inner walls thereof by a layer 12 of adhesive. The body 10 preferably is made of a suitable metallic material such as steel or copper, although materials other than metal may be employed.

The lining 11 is made of a thermoplastic composition containing reclaimed rubber, clay, hard bitumen, resin and paraffin. In making up this composition, the ingredients are thoroughly mixed in a Banbury mixer or rubber mill and are formed by calendering into non-porous pliable sheets which are almost unaffected by corrosive liquids, such as those generally employed in electroplating solutions.

The lining 11 may be prefabricated to fit the inside of the body 10 and thus provide a continuous seamless protective shield, or a sheet or sheets of the thermoplastic material may be cut to fit the inner surfaces of the body 10. Since it is more economical to produce sheets of the thermoplastic mixture than it is to produce prefabricated linings of such material, and since no particular advantage is gained by prefabricating the lining 11, the lining 11 is usually composed of several sheets of the thermoplastic material fitted together. In Fig. 1, the lining 11 is produced from a single sheet of thermoplastic material, so that there are only four seams 14 in the entire lining.

Although the proportions of the thermoplastic material may be widely varied, it is preferable to mix the ingredients in proportions falling within the following ranges:

	Per cent
Reclaimed rubber	30 to 50
Clay	33 to 53
Hard bitumen	5 to 20
Resin	2 to 6
Paraffin	1 to 5

A particular thermoplastic material that has proved to be especially satisfactory consists substantially of about 40% reclaimed rubber, about 43% clay, about 12% hard bitumen (mineral rubber), about 4% cumar resin and about 1% paraffin.

The adhesive material 12 is preferably a mixture of the thermoplastic mixture above described with a suitable carrier. A carrier that has proved to be satisfactory consists of a mixture of rosin oil and a viscous asphaltic material, such as that known as "Asphalt Flux A," sold by the Standard Oil Company of New Jersey. The term "viscous asphaltic material," as used herein and in the annexed claims, is in-

tended to mean a refined asphalt product having a viscosity similar to that of heavy molasses.

The thermoplastic material, rosin oil and asphaltic material, are mixed in a heated mixer in such proportions that the adhesive produced may be brushed upon surfaces to be coated, when heated to a temperature of from about 225° F. to about 250° F. A very satisfactory adhesive may be produced by mixing the ingredients in the proportions of about 38% thermoplastic material, about 57% viscous asphaltic material and about 5% rosin oil.

To apply the lining 11 to the body 10, the body and the lining are separately heated to a temperature of from about 140° F. to about 175° F. The adhesive is heated to a temperature of from about 225° F. to about 250° F. and brushed onto the heated surfaces of the body to which the lining is to be applied. The heated lining is then pressed against the adhesive layer and rolled to force out any air that might have been trapped between the lining and the adhesive layer. The lining is finally clamped in position so as to hold it in tightly against the adhesive layer and the entire tank is allowed to cool. The finished tank preferably should not be used for a day or so to permit the adhesive to set firmly.

Tanks protected with a lining of a thermoplastic material such as that above described are almost unaffected by the corrosive liquids contained therein, the only apparent effect being that the lining appears to harden slightly and to adhere more firmly to the inside of the body 10. The adhesive, like the lining itself, is impervious to moisture and thus will not absorb water and cause the lining of the thermoplastic mixture to warp away from the body 10. Tanks protected with these linings are particularly effective for retaining solutions containing fluosilicic acid, such as are used as electrolytes in lead plating baths.

The electroplating tank shown in the accompanying drawing is merely illustrative of the invention, and variations in the construction thereof may be made without departing from the invention. Obviously, other suitable carriers may be used in making up the adhesive employed and other suitable adhesives may be substituted for the one described hereinabove.

What is claimed is:

1. In a container for corrosive liquids having a hollow metal body, means to protect the body against corrosion by liquids contained therein, comprising a lining of a solid thermoplastic material consisting of about 40% reclaimed rubber, about 43% clay, about 12% hard bitumen, about 4% cumar resin and about 1% paraffin, and a layer of adhesive material interposed between the body and the lining consisting of about 38% of said thermoplastic material, about 5% rosin oil and about 57% asphaltic material.

2. A container for retaining corrosive liquids which comprises a metal tank, a lining of solid material covering the inner surfaces of the tank and consisting of from about 30% to about 50% reclaimed rubber, from about 33% to about 53% clay, from about 5% to about 20% mineral rubber, from about 2% to about 6% cumar resin and from about 1% to about 5% paraffin, and a layer of adhesive interposed between the lining and the tank and consisting of about 38% of said lining material, about 57% asphaltic material, and about 5% rosin oil.

3. A container for corrosive liquids, which

comprises a metal tank, a lining of solid material for protecting the metal tank against corrosion by the liquids contained therein made of a thermoplastic material consisting of from about 30% to about 50% reclaimed rubber, from about 33% to about 53% clay, from about 5% to about 20% mineral rubber, from about 2% to about 6% cumar resin and from about 1% to about 5% paraffin, and a layer of adhesive material interposed between the tank and the lining composed of about 38% of said thermoplastic material and the balance rosin oil and asphaltic material in the ratio of about 1 to 10.

4. The method of making containers for corrosive liquids, which comprises coating the inside of a hollow metal body with a layer of an adhesive consisting of about 38% thermoplastic material and the balance consisting of a viscous asphaltic material and rosin oil in the ratio of about 10 to 1, said thermoplastic material consisting of from about 30% to about 50% reclaimed rubber, from about 33% to about 53% clay, from about 5% to about 20% hard bitumen, from about 2% to about 6% cumar resin and from about 1% to about 5% paraffin, and pressing a solid lining made of said thermoplastic material against the layer of adhesive.

5. The method of making containers for corrosive liquids, which comprises coating the inside of a hollow metal body with a layer of an adhesive about 38% of which consists of a thermoplastic material containing about 40% reclaimed rubber, about 43% clay, about 12% hard bitumen, about 4% cumar resin and about 1% paraffin, and the balance consisting of a viscous asphaltic material and rosin oil in the ratio of about 10 to 1, and pressing against the layer of adhesive a solid lining made of thermoplastic material substantially identical in composition with the thermoplastic material used in making the adhesive layer.

6. The method of making containers for corrosive liquids, which comprises separately heating to a temperature between about 140° F. and about 175° F. a metal tank and a solid lining made of a thermoplastic material consisting of about 40% reclaimed rubber, about 43% clay, about 12% hard bitumen, about 4% cumar resin and about 1% paraffin, heating to a temperature of from about 225° F. to about 250° F. an adhesive consisting of said thermoplastic material, rosin oil and viscous asphaltic material, applying the hot adhesive to the surfaces of the heated tank to be protected, placing the heated lining over the adhesive coated surfaces of the hollow body, rolling the lining to force any entrapped air from between the adhesive layer and the lining, pressing the lining tightly against the adhesive layer, and allowing the container thus assembled to cool.

7. The method of making containers for holding corrosive liquids, which comprises applying a hot, flowable coating of an adhesive to the inner surface of a metal tank, which adhesive consists of about 38% thermoplastic material, about 57% viscous asphaltic material and about 5% rosin oil, applying over the layer of hot adhesive a heated solid lining made of a material substantially identical in composition with the thermoplastic material employed in said adhesive, and allowing the assembly to cool, the thermoplastic material employed consisting of from about 30% to about 50% reclaimed rubber, from about 43% to about 53% clay, from about 5% to about 20% mineral rubber, from about 2%

to about 6% cumar resin and from about 1% to about 5% paraffin.

8. The method of making containers for holding corrosive liquids, which comprises applying an adhesive to the inner surface of a metal tank, which adhesive consists of about 38% thermoplastic material, about 57% viscous asphaltic material and about 5% rosin oil, and applying over the layer of adhesive a solid lining made of a material substantially identical in composition with the thermoplastic material employed in said adhesive, the thermoplastic material employed consisting of about 40% reclaimed rubber, about 43% clay, about 12% mineral rubber, about 4% cumar resin and about 1% paraffin.

9. A container for retaining corrosive liquids, which comprises a hollow metal body, a lining of solid material for protecting the metal body against corrosion by the liquids contained therein made of a thermoplastic material consisting of from about 30% to about 50% reclaimed rubber, from about 33% to about 53% clay, from about

5% to about 20% hard bitumen, from about 2% to about 6% cumar resin and from about 1% to about 5% paraffin, and a layer of adhesive material interposed between the body and the lining consisting of about 38% of said thermoplastic material, about 5% rosin oil and about 57% viscous asphaltic material.

10. A container for retaining a corrosive electrolyte, which comprises a metal tank, a solid thermoplastic lining material positioned within the tank to prevent contact between the tank and the electrolyte, consisting of about 40% reclaimed rubber, about 43% clay, about 12% mineral rubber, about 4% cumar resin and about 1% paraffin, and a layer of adhesive material interposed between the tank and the lining consisting of about 38% of a thermoplastic material similar to said thermoplastic lining material and the balance rosin oil and viscous asphaltic material in the ratio of about 1 to 10.

VINCENT A. RAYBURN.