Patented Dec. 16, 1941 2,266,353

UNITED STATES PATENT OFFICE

2,266,353

COATING FOR METALLIC ARTICLES

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No Drawing. Application April 18, 1939, Serial No. 268,644

2 Claims. (Cl. 62—108.5)

This invention relates to methods of treating aluminum and like surfaces, and more particularly to improved methods of providing a finishing and protective coating upon the external surfaces of aluminum ice trays and grids or other objects of aluminum.

In order to obtain protective coatings on aluminum surfaces it has been customary in the past to make the aluminum object to be coated the anode in an electrolytic cell having a solution of sulphuric acid as the electrolyte. The resultant coating is a surface layer which is very porous, of varying thickness and varying hardness characteristics. When used for the manufacturing of grids or trays or similar objects the coating is washed and then the pores are sealed by the use of oils, waxes, lacquers or the like. This electrolytic treatment, the separate washing and sealing operations involve a relatively high cost of processing.

It is accordingly an important object of the present invention to provide a protective coating for aluminum surfaces which is highly resistant to corrosion and which is readily applied by a simple and relatively inexpensive coating operation.

A further object of the invention is to provide a finishing coating for aluminum surfaces which has a satiny finish very similar to that of an anodic coating.

A further object of the invention is to provide a protective coating for the above stated purpose which consists of a hard tough film of high gloss and which will readily fill the hills and valleys and pores of the metal surfaces treated and produce a thoroughly smooth surfaced product.

Other objects and advantages of this invention will appear in the following description and appended claims. Before explaining in detail the present invention it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention beyond the requirements of the prior art.

In accordance with the present invention coatings of the type described above are prepared by first subjecting the object to be coated, for example an aluminum ice tray or grid, to an etching treatment employing any suitable etching medium such as an acid or basic etching agent as, for example, sulphuric or hydrochloric acid or caustic soda. The etched object is then finished by spraying the object with a urea resin baking enamel, and then subjecting the object thus coated to temperatures in the neighborhood of 300° F. in a baking oven to fuse and finally harden the coating.

In a preferred embodiment of the invention the urea resin baking enamel may contain the following ingredients in the following approximate proportions:

	Parts by weight
Urea	60
Formaldehyde (37% strength)	321
Glycerol phthalate	60
Butyl alcohol	222

Such a coating is converted from its fluid form to a solid form by a polymerization of the resin under the influence of heat. The finish is a hard, clear finish which has sufficient strength and flexibility to withstand the strains to which it is subjected in use and is highly resistant to corrosion.

The finish effectively seals the pores in the metal surfaces which have been opened by the action of the etching medium and thus, when the finish is used on the surfaces of objects such as ice trays and grids, the coating prevents the penetration of water in the exposed pores and the subsequent freezing of the water therein as the pores have been effectively sealed by the fused material forming the finish on the surface thereof. This is very desirable in using the finish for such objects as ice trays and grids where it is desired to effect a ready removal of the ice cubes therefrom.

It is to be understood that the foregoing formula may be varied according to the particular requirements of the art and according to the knowledge of those skilled in the art, and all such substances are included within the term "urea resin enamel" as used herein.

The finish obtained in the above manner has a satiny appearance very similar to that of an anodic finish. Moreover it consists of a hard and tough film which adequately seals the pores in the surfaces of the aluminum and substantially entirely prevents corrosion. It tends to fill the hills and valleys and any rough or pitted portions of the metal treated and provides a surface which is exceedingly smooth and glossy and otherwise attractive. Although the method used to prepare the coatings involves a baking as well as a coating step, it is readily seen that the method is very simple and decidedly less expensive than the methods employed in anodizing metal objects. Moreover, the baking assists in providing a coating which is tougher and more resistant to abrasion.

It is to be understood that other coating

methods may be employed to apply the enamel, such as dipping or the like, although the use of spraying methods is preferred. Also any suitable device or method of baking may be utilized, provided the temperature can be readily maintained at about 300° F.

The methods of the present invention may also be applied to unetched surfaces, yet it has been found that a more satisfactory appearance is obtained when the objects being treated are first cleaned and prepared for the coating step by means of an etching operation. In some instance it is advantageous to anodize as well as etch, the metal prior to applying the enamel, although such combined treatments are usually to be avoided due to the increased cost.

Where the object being coated is an ice tray or other article which is exposed to cold or freezing temperatures, it is frequently desirable to supplement the enamel coating with a thin coating of wax which not only adds to the appearance of the tray but permits easier removal of its ice contents by mechanical appliances. An improved method of applying such coating, using wax in the form of a powder, is described in my copending application filed simultaneously with the present application.

Although the invention has been described as applying primarily to the treatment of ice trays and grids and similar equipment, it may be employed with equal success in connection with other aluminum objects such as the interior shells of refrigerators and various parts employed in the automobile and aeronautical industries.

I claim:

1. An aluminum tray and grid for receiving water to be frozen, said tray and grid possessing on their respective water contacting surfaces a water-repellant adherent relatively flexible protective coating, said coating comprising a baked enamel-like layer containing glycerol phthalate and the condensation product of approximately 60 parts by weight of urea and 320 parts by weight of formaldehyde.

2. An aluminum tray and grid for receiving water to be frozen, said tray and grid possessing on their respective water contacting surfaces a water-repellant adherent relatively flexible protective coating, said coating consisting of the baked enamel-like reaction product of approximately 60 parts by weight of urea, approximately 320 parts by weight of 37% formaldehyde, approximately 60 parts by weight of glycerol phthalate, and approximately 220 parts by weight of butyl alcohol.

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