

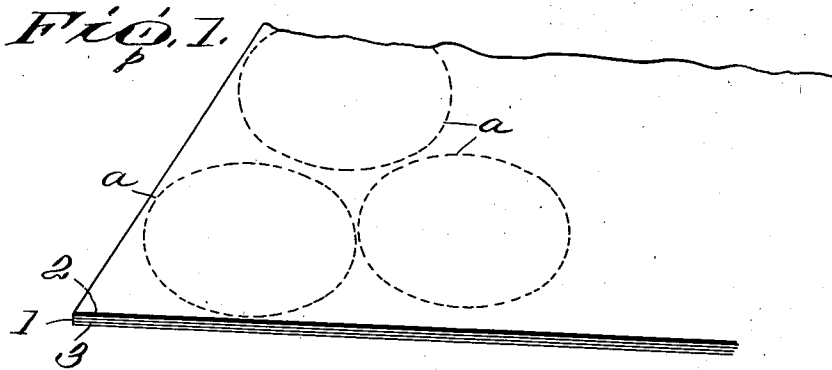
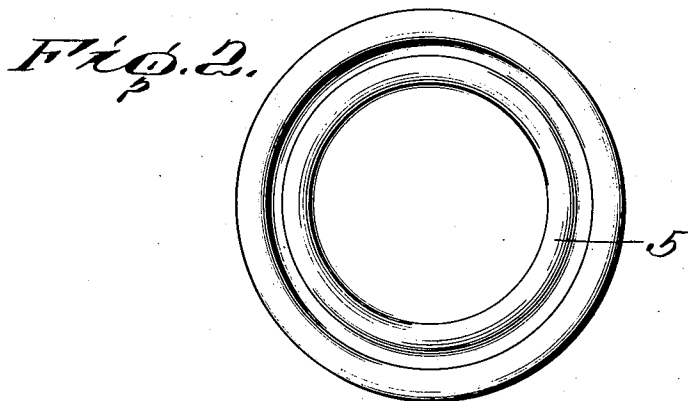
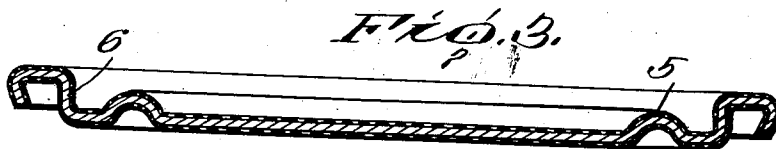
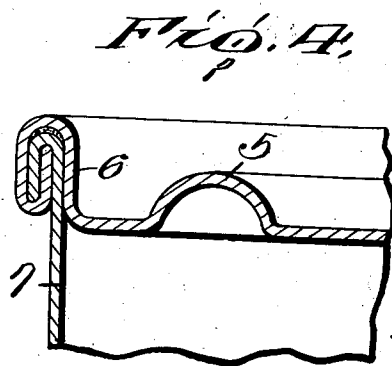
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A. L. KRONQUEST

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METHOD OF PRODUCING ARTICLES FROM ENAMEL COATED SHEETS

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METHOD OF PRODUCING ARTICLES FROM
ENAMEL COATED SHEETS

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1 Claim. (Cl. 113—121)

The invention relates to new and useful improvements in a method of producing articles from an enamel coated sheet of material and the product produced thereby.

5 An object of the invention is to provide a method of producing die-shaped articles from enamel coated sheets of material wherein the enamel coating on the finished article is continuous and unbroken throughout the entire surface
10 of the article.

A further object of the invention is to provide a method of healing or closing all cracks or scratches formed in the enamel coating on the sheet during the die-shaping of the article.

15 A still further object of the invention is to provide an article produced by die-shaping an enamel coated sheet, which article has a continuous unbroken enamel coating throughout the entire surface thereof.

20 These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawing which shows by way of illustration one form of article embodying the invention and produced by the improved method:—

25 Figure 1 is a perspective view of a portion of an enamel coated sheet indicating in broken lines the blanks which are to be cut therefrom and shaped into a can end;

30 Fig. 2 is a plan view of a can end cut from the enamel coated sheet and shaped preparatory to applying the same to the can body for double seaming;

Fig. 3 is a vertical sectional view diametrically
35 of the can end on an enlarged scale, and

Fig. 4 is a view showing a portion of a can end double seamed to a can body.

It has been a common practice to form parts of receptacles from metal sheets which have been coated with enamel for the purpose of preventing the contents of the receptacle from directly contacting with the metal. In the usual practice, the sheets of tin are coated with an enameling material while in the flat, and then heat treated
45 for a period of thirty minutes or more at a temperature of 400° F. The enameling materials are generally of the heat reactive variety, namely, those which polymerize or harden under heat treatment. When metal blanks are cut from
50 enameled tin plate of this character and shaped into some desired form by the use of dies or the like, there are small breaks in the enamel coating at the points where the tin is bent or drawn abruptly, causing exposure of the tin surface and
55 ferrous metal underneath. These minute frac-

tures of the enamel permit the contents of the container to react with the exposed base metal, which with certain products, is very objectionable. Heretofore, the only known method of avoiding this difficulty was to enamel the articles
5 after die-shaping. This method, though quite satisfactory from a service standpoint, has a limited application in modern manufacture of metal articles because of the expensive equipment and the floor space required to handle the individual
10 articles after they have been coated with the enamel for the heat treating of the same.

It has now been found that it is possible to coat the tin sheets with a thermo-plastic material, that is, a material which softens when
15 heated. Articles cut and shaped from such an enamel coated plate will have small breaks in the enamel, the same as the enamel coating which is heat reactive. The articles, however, coated with the thermo-plastic material may be given a heat
20 treatment after the article is shaped which will cause the enamel to become fluid and to flow and heal or close all breaks and fractures in the coating, so that the enameled surface of the finished
25 article is continuous and unbroken.

It is thought the invention will be better understood by a more detail description of a specific article and the method of making the same. The article illustrated in the drawing is a can end which is produced from tin coated sheet steel,
30 commonly referred to as tin plate. The tin plate is indicated as a whole at 1 in the drawing. The tin sheet is coated on both faces in the present illustrated embodiment of the invention, and
35 these coatings are indicated at 2 and 3. The sheet is coated with a thermo-plastic material. It has been found that a suitable thermo-plastic material may be produced by the use of 200
40 grams, 35% solution polymerized vinyl acetate in toluene; 100 grams, 65% alkyd resin (phthalic anhydride—fatty acid—glycerine) in toluene; 75 grams, acetone; 4 grams, liquid petrolatum. The
45 ingredients above stated may be referred to in general as a synthetic resin base, an adhesive, a solvent and a plasticizer. Other ingredients may
be used and the quantities changed. It is essential, however, that the enamel material shall be a thermo-plastic material which softens when
heated.

After the sheets have been coated with this
50 thermo-plastic material, the enamel is permitted to set or harden and low heat treatment may be used to facilitate the same. The sheets thus coated with the enamel are cut to form blanks which are indicated by the broken lines a, a.
55

These blanks are then shaped into can ends. In Figures 2 and 3 of the drawing, the finished can end is indicated. During the die-shaping of the blank to form the can end, the metal is drawn or bent so as to provide a central panel surrounded by a raised annular rib 5. This is for the purpose of strengthening the panel and preventing the same from curving one way or the other when subjected to a differential pressure on opposite sides thereof in the sealed receptacle. The can end is shaped so as to provide a wall 6 which is substantially at right angles to the plane of the can end. The purpose of this wall is to enable the end to be joined to the body of the can by a double seam. In Fig. 4 of the drawing, a can body is indicated at 7, and it is noted that this wall 6 extends down into the can end so that a chuck may be placed in the recess formed in the outer face of the end, and this chuck contacts with the wall 6 and serves as an abutment against which the metal parts are forced by the seaming rolls when the flange on the end and the flange on the body are rolled into a double seam. This forming of the wall 6 produces a severe strain on the enamel coating covering the surface of the tin plate. This enameled surface, particularly in the region indicated at 6 in the drawing, is so severely strained that minute fractures are produced in the enamel, which expose the tin surface and ferrous metal underneath the coating. There are other portions of the can end where the enamel coating is also under severe strain and minute fractures are produced therein, but this particular place referred to will be sufficient to illustrate the purpose of the present invention. After the end has been die-shaped producing these minute fractures in the enamel coating, it is subjected to a heat treatment. The heat may be applied to the ends in any suitable way. When a thermo-plastic material such as described above is used, the heat should be sufficient and for a period of time to melt or render fluid the enamel coating so that it will flow and heal or close up all minute fractures made in the coating during the die-shaping of the same. If the thermo-plastic material is raised to a temperature of 300° F., it is sufficient to render it fluid for this purpose. These fractures are not large, but are very minute, and when the thermo-

plastic material is softened and rendered fluid, it will quickly flow so as to cover the bare spots and form a continuous coating over the entire surface of the article.

While the invention is described in connection with the making of can ends, it is understood, of course, that it may be used in connection with other articles which are die-shaped from sheets of material. While the base material is described as tin plate, it will be understood that it may be in any form of metal, and from certain aspects of the invention, other material than metal may be used as a base material on which the enamel coating is placed. In describing the invention and article, the sheet is stated to be coated with enamel on both faces. It will be understood, of course, that only the face of the material may be coated which it is desired to protect. For example, in a can end, it may be desirable to coat the tin plate only on the face which becomes the inner face of the can end, and therefore, the invention is not limited to the coating of both faces of the sheet material. As has already been noted, the thermo-plastic material described above is purely for the purpose of illustrating the character of the material which is used for coating the metal sheet, and it is to be understood that other forms of thermo-plastic material may be used without departing from the spirit of the invention as set forth in the appended claim. It is desirable, however, that the thermo-plastic material be of a character that when set or hardened it will not easily scratch during the normal handling of the can ends.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent, is—

The method of producing can ends consisting in coating a sheet of metal with a thermo-plastic enamel which hardens at room temperature and softens under heat, cutting a blank from said sheet of metal and die-shaping a can end therefrom, heating the shaped article to a temperature above the fluid point of the enamel and below the melting point of the metal, rendering the enamel coating fluid, causing the same to flow and thereby close all cracks and bare spots in the enamel-coated surface.

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