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2,122,537

METHOD OF PRODUCING COATED SHEET METAL ARTICLES

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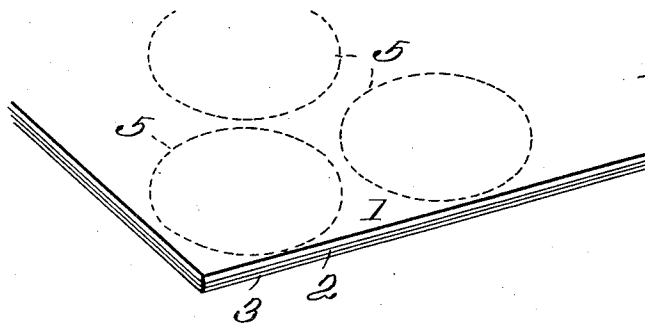


FIG. 1.

FIG. 2.

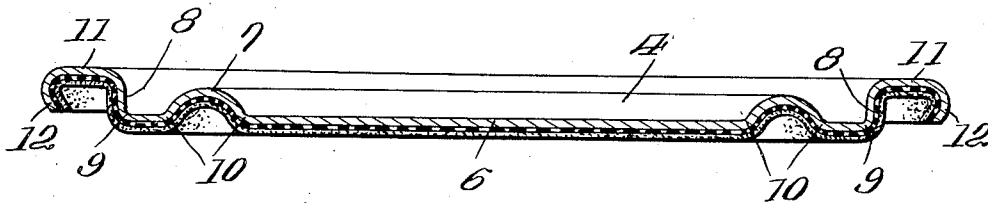


FIG. 3.

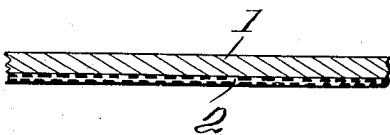


FIG. 4.

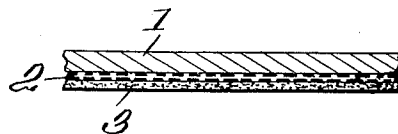
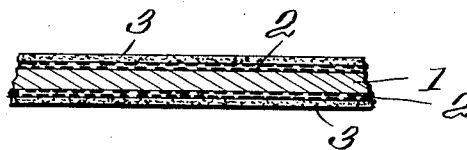


FIG. 5.



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METHOD OF PRODUCING COATED SHEET
METAL ARTICLESEdward C. Pfeffer, Jr., Oak Park, Ill., assignor to
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2 Claims. (Cl. 113—121)

The invention relates to new and useful improvements in a method of producing articles from an enamel coated sheet of metal.

An object of the invention is to provide a method of producing die-shaped articles from enamel coated sheets of metal wherein the sheets are coated in the flat with an enamel which remains intact and unbroken during the die-shaping so that the metal will be completely covered and protected throughout the entire coated surface of the finished article.

In the drawing—

Fig. 1 is a portion of a metal sheet coated with enamel on one face thereof preparatory to drawing;

Fig. 2 is an enlarged sectional view of an article embodying the invention and produced by the new method;

Fig. 3 is an enlarged section of a metal sheet with the base enamel coating applied to one face thereof;

Fig. 4 is a similar view showing the top enamel coating applied to the base coating, and

Fig. 5 is a view similar to Fig. 4, but showing the sheet as coated on both faces thereof.

It is thought the method embodying the invention will be better understood by a description of the application of the method to the producing of the specific article. The specific article, as shown in the drawing, is a can end used in the making of sheet metal cans. It is often desired to produce a container wherein the inner surface of the metal is covered by a coating of enamel which prevents the contents of the container from contacting with the metal. It has been a common practice to apply a coating of enamel to the metal sheets while in the flat and then cut the sheet, shape and join the parts for forming the container. Enamels used for this purpose are usually of the type which harden under heat treatment. It often happens that the strain imposed on the enamel during drawing breaks the enamel at points where the metal is bent abruptly causing exposure of the metal. These minute fractures in the enamel coating permit the contents of the receptacle to react on the exposed metal, which, with certain products, is very objectionable.

The present invention has to do with a method of coating a sheet of metal in the flat with an enamel so as to avoid fractures during die-shaping of the article and in the region where the metal is abruptly bent. A sheet of metal is indicated at 1 in the drawing. This sheet of metal is coated first with a thermo-plastic enamel

which is relatively soft so that it does not fracture if the metal to which it is applied is bent sharply, but which is sufficiently hard to permit the stacking of the sheets and the usual handling of the same without injury to the coating. A suitable thermo-plastic enamel for this purpose is made by compounding 100 parts of Beckasol, which is a re-action product of glycerine phthalic anhydride and a fatty acid; and three parts of Korite which is substantially of a refined pitch. These ingredients are mixed and coated on the sheet, after which the coated sheet is heat treated at a temperature of 300° F. for approximately fifteen minutes. This will drive off the solvent so that when the sheet cools, the enamel will harden. Sufficient material is applied so as to produce a coating of approximately .003 of an inch in thickness. This is referred to as the base coating of enamel and is indicated at 2 in the drawing. After this base enamel is set or hardened, the sheet is then again coated with a relatively hard thermo-plastic enamel. A suitable enamel for this purpose is made by compounding one part vinylite, which is a polymerization product of vinyl chloride; three parts of ethyl lactate, and three parts of butyl acetate. The vinylite is dissolved in the ethyl lactate and the butyl acetate is then added. This hard enamel is coated on the sheets in the usual manner and then the sheets are subjected to a heat treatment of 325° F. for about twenty minutes. This will drive off the solvent and permit the enamel to harden upon cooling. Sufficient material is used to produce a material of approximately .004 of an inch in thickness. This is referred to as the top enamel coating and is indicated at 3 in the drawing.

As shown in Figures 1, 2 and 4, the sheet is coated on one surface only. It may, however, be coated on both surfaces, as shown in Fig. 5. After the sheet is coated in the manner above described and the enamels properly hardened, then the sheet is cut into suitable blanks for forming the desired article. When making a container end 4, a circular blank is cut as indicated at 5 in Fig. 1 of the drawing. The blank thus formed is subjected to a die-drawing action which shapes the can end. The completed can end has a central panel 6 within which is an annular bead 7. Adjacent the edge of the container end is a portion 8 which extends substantially at right angles to the central panel 6. This portion 8 extends down inside of the container body and is directly inside of the parts which are rolled into a double seam. The seam-

ing chuck is placed so that it contacts with this vertical wall 8 during the seaming operation, and therefore, it is essential that it shall be substantially at right angles to the central panel 6.

- 5 This drawing of the metal to provide a wall or portion 8 substantially at right angles to the panel 6 forms a relatively sharp bend 9. There are also relatively sharp bends 10, 10 where the annular bead 7 joins the main portion of the panel. It is the forming of these sharp shoulders that produces a severe strain on the enamel covering the surface of the metal. The container end, as shown in the drawing, has a peripheral portion 11 which is curled under as indicated at 12. This is the part of the end which is rolled with the flange of the can body into a double seam. When the sheet is coated with a relatively soft thermo-plastic enamel of the above type, and a relatively hard thermo-plastic enamel also of the above type, the sharp bending of the metal at the shoulders 9 and 10 does not fracture the enamel. The soft enamel, of course, is less likely to fracture than the hard enamel. Furthermore, it serves as a sort of cushion for the hard enamel, giving so as to permit the hard enamel to partake of the new shape imparted to the article during die-drawing. If there should be a slight fracture in the hard enamel, it is not likely to extend through the soft enamel therebeneath, and if there should be a fracture in the soft enamel, it is not likely that the hard enamel will fracture at the same place.

- It has been found that relatively sharp angles can be produced in the metal by drawing, after the coating of the sheet with thermo-plastic enamels such as described above without producing a fracture which will expose the metal beneath the enamels. While the formulas given above produce satisfactory thermo-plastic enamels for the purpose described, it will be understood that other ingredients may be used and in different proportions, it being essential, however, that the enamel coatings applied to

the metal shall cooperate and re-act so as to prevent the rupturing of the enamels so as to expose the metal during die-drawing.

While a container end is shown for the purpose of illustrating one specific article which can be made according to the present method, it will be understood that the method may be applied to other articles. The specific article produced by the method is of great advantage in the construction of the container, as with its use, a container may be produced wherein all of the metal parts are covered and protected so as to prevent the contents of the container from contacting with the metal.

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

1. The method of producing a drawn sheet metal article consisting in coating the sheet from which the article is to be drawn with a base coating of a relatively soft thermoplastic enamel, heat treating the sheet to drive off the solvent and harden the enamel, then again coating the hard coated surface of the sheet with a top coating of relatively hard thermoplastic enamel, heat treating and cooling to harden said top coating, cutting the sheets into blanks and die-drawing the blanks to shape the articles.

2. The method of producing a can top having sharply bent angular portions from a sheet of metal consisting in coating a sheet of metal from which the article is to be formed with a relatively soft thermoplastic enamel, heat treating the coated surface to drive off the solvent and harden the enamel, then applying to the coated surface a top coating of relatively hard thermoplastic enamel, heat treating and hardening said top coating, cutting the sheet into a blank of the desired shape to form the can top and die-drawing the blank to the finished shape of can top.

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