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E. B. & C. R. MANNING.

METHOD OF PRODUCING ENAMEL LINED ARTICLES OF HOLLOW WARE.

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Fig 1.

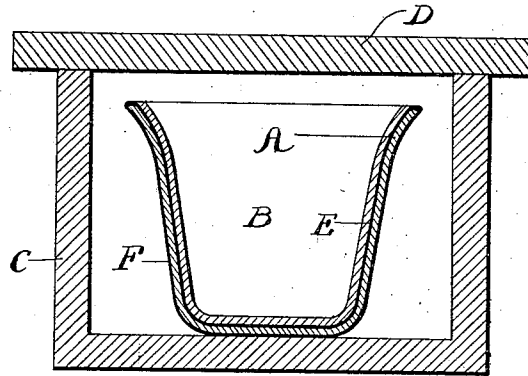
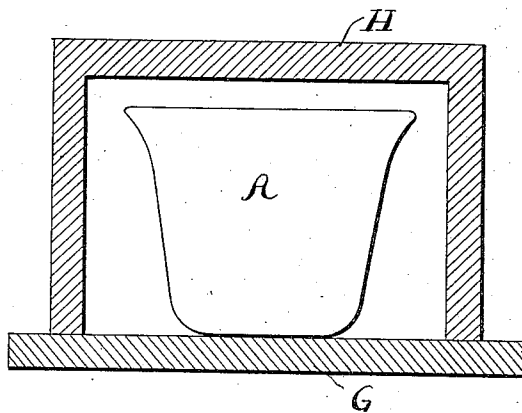


Fig 2.



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METHOD OF PRODUCING ENAMEL-LINED ARTICLES OF HOLLOW WARE.

No. 875,667.

Specification of Letters Patent.

Patented Dec. 31, 1907..

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To all whom it may concern:

Be it known that we, EDWARD B. MANNING and CHARLOTTE R. MANNING, citizens of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented a new and useful Method of Producing Enamel-Lined Articles of Hollow Ware; and we do hereby declare the following, when taken in connection with the accompanying drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a sectional view of a bowl inclosed in a receptacle ready for the furnace or kiln. Fig. 2 a similar view showing the bowl in the receptacle which in this instance is inverted over it.

Our invention relates to an improved method of producing enamel-lined hollow-ware, the object being to prevent the oxidation of the unenameled surfaces of the articles and thus avoid the expense and danger of polishing those surfaces after the application of the enamel lining.

With this object in view our invention consists in the method to be hereinafter described and pointed out in the claim.

For the illustration of our invention, we have chosen a small bowl A, but it will be understood that our invention is applicable to the production of any description of enamel-lined hollow-ware articles. This bowl A first has its exterior surfaces highly polished. Its interior surfaces are then furnished in any approved manner, with a coating B of raw enamel of any desired composition. The bowl is now ready for firing during which it must be subjected to a heat intense enough to cause the enamel to flux. The time required for each firing and the heat to which the bowl will be subjected, will be varied according to circumstances, but ordinarily three or four minutes and a temperature of about 1800° will be required. The bowl having been thus prepared for firing is now placed in a suitable receptacle C having a cover D and in this receptacle subjected to the heat required for fluxing the enamel, whereby its polished exterior surfaces will be protected from being pitted, blistered or otherwise disfigured by oxidation due not only to contact with the hot air in the kiln but also to contact with the fresh

air which rushes into the kiln when the door thereof is open. The article will, it is true, be surrounded by so much air as is contained in the receptacle which on this account should be made as small as it can well be made and conveniently receive the article. The amount of air confined within the receptacle will then contain so little oxygen that it will not appreciably injure the polished exterior surfaces of the article. After the enamel has been melted the receptacle is removed from the furnace and allowed to cool without the removal of its cover and with the article still in it; for otherwise the exterior surfaces of the article would, while intensely hot, be attacked by the oxygen of the outer air.

When the article is taken from the receptacle its polished exterior surfaces will be found little affected, if at all, whereas if the exterior surfaces of the article are allowed during the process of firing to be oxidized they cannot be polished without seriously injuring the brittle enamel lining for the reason that the metal being thin will spring enough to cause the enamel to crack and flake off, or at least to crack and "craze."

The importance of providing as above described for the protection during firing of the exterior surfaces of enamel-lined articles of hollow-ware becomes more apparent when it is remembered that ordinarily three coats of enamel must be applied, requiring the article to be subjected three times to the intense heat required for firing the enamel, and therefore subjecting its polished exterior surface three times to the danger of oxidation.

It will be understood from the foregoing that the operation of enameling is so expensive that any subsequent operations which endanger the enamel are virtually prohibitory from which it follows that the exterior surfaces of the article must be polished before its interior surfaces are enameled.

If desired, the interior surfaces of the article may be provided prior to enameling with a thin coat of nickel or other suitable material to act as a binder E between the enamel and the body of the article itself. This is not essential, but it is thought that superior results are secured by using such a binder as the adherence of enamel to nickel for instance, is better than between enamel and sheet-steel from which the articles of hollow-

ware now under consideration are generally made.

In case it is desired to furnish the interior surfaces of the article with a binder E, it may be found expeditious to immerse the entire article in the plating solution so as to give its exterior surface a similar coating F which will act as an additional safeguard to prevent the oxidation of its polished exterior surfaces. In case this coating is employed it may be removed by buffing or otherwise from the polished exterior surfaces of the article without danger to the enamel.

The receptacle may of course assume a variety of different forms and be made to contain one or more articles as found expedient.

As shown in Fig. 2 of the drawings the bowl is placed upon a tray G and covered with an inverted receptacle H the protection afforded the exterior surface of the bowl being the same as when it is set into a receptacle C having a cover D. If desired also the receptacles themselves may be nickel-plated to prevent their surfaces from oxidizing and flaking off in which case the flakes would be likely to fall on the enamel and disfigure it.

We have by our improved process as above described, solved, as we believe, the problem of producing at a reasonable cost sheet-metal hollow articles lined with enamel and having polished exterior surfaces rather than enameled exterior surfaces.

We are of course aware that it is old, as for instance, in china kilns, to exclude the flames and products of combustion, and hence the air, from the china during the

process of firing. We do not, therefore, broadly claim the idea of protecting an article from the air while exposing it to the heat required for firing it.

We claim:—

The herein described method of producing enamel lined articles of sheet-metal hollowware consisting in first polishing the exterior surfaces of the article, then applying raw enamel to those surfaces of the article which are to be enameled, then placing the article in a relatively small portable receptacle, then closing said receptacle and introducing it into a previously heated kiln in which it is allowed to remain for the brief period required for fluxing the enamel, then removing the said receptacle and its contained fired article from the kiln and allowing the article to gradually cool in the receptacle without uncovering the same, then removing the article from the receptacle, and finally finishing the polished unenameled exterior surfaces of the article, whereby by protecting the polished exterior surfaces of the article from the action of the air, while the article is being heated, and while it is cooling, the oxidation of its polished exterior surfaces is avoided.

In testimony whereof, we have signed this specification in the presence of two subscribing witnesses.

EDWARD B. MANNING.

CHARLOTTE R. MANNING.

Witnesses for Edward B. Manning:

CHARLES H. PECK,

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JOSHUA W. JONES,

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