No. 774,491. PATENTED NOV. 8, 1904.

C. F. PFALZGRAF.

ENAMELING METAL.

APPLICATION FILED DEC. 16, 1903.

NO MODEL.

Fig. 1.

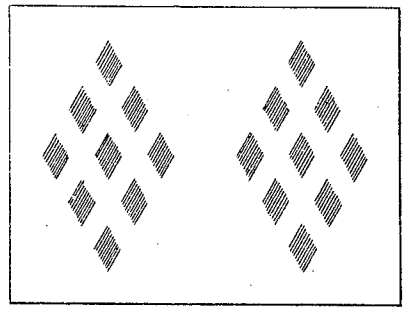


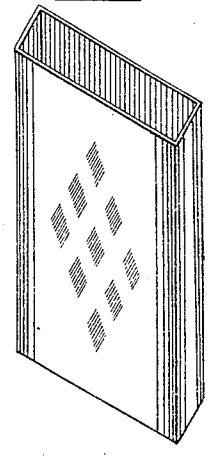
Fig. 2.



Fig. 3.



Fig. 4.



Witnesses.
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No. 774,491. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

CHARLES F. PFALZGRAF, OF BALTIMORE, MARYLAND.

ENAMELING METAL.

SPECIFICATION forming part of Letters Patent No. 774,491, dated November 8, 1904.

Application filed December 16, 1903. Serial No. 185,336. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. PFALZGRAF, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Enameling Metal, of which the following is a specification.

This invention relates to a new and useful article of enameled sheet metal and to a method of producing the article.

One object of this invention is to prepare the surface of sheet metal either in the form of sheets or in the form of ware, vessels, or other articles of utility to receive a coating of enamel, which is then to be subjected to heat. In this preparation of the metal practically the entire surface is provided with minute cavities or crevices having undercuts.

Another object of this invention is to provide sheet metal either in the form of sheets or in the form of ware, vessels, or other articles of utility with a coating of enamel, the enamel covering the metal surface, which has previously been provided with minute cavities and crevices, which will have undercuts, all of said cavities and crevices being arranged to produce a predetermined design, such as figures, outlines, or ornamentations, which may be seen through the enamel coat.

In carrying out the inventive idea here involved the sheet metal may be subjected to the necessary operations to produce the cavities or crevices with undercuts either before the stamping operation for giving form to the article or after the article has been shaped. I prefer to employ mechanical means to produce the cavities or crevices with undercuts and to do this while the metal is in the sheet—that is, prior to being shaped or stamped—as the metal sheets may while either hot or cold be run through suitable rolls in order that the upraised particles of metal along the lines of the incision will be "upset" or compressed sufficiently to cause said particles to partly overlap the grooves of the said incised lines, and thereby produce undercuts or cavities. For some purposes it may be desirable to do the work of providing the undercuts or cavities after the sheets have been pickled and cleaned preparatory to enameling. There is no limit to any specific depth or angle of cut for the lines of etching or incising to produce the desired undercuts or cavities; but I prefer to have these cuts as deep as will enamel smoothly by the application of one coat.

The enamel employed may be smelted, ground, applied to and burned on the metal articles by any of the methods now employed. Any of the enamel compounds now or formerly made can be utilized and a much improved article produced by fusing to the metal base after the latter has been prepared as herein described. I may use either opaque or transparent enamels; but by omitting from the enamel formula opacity-producing ingredients I get a comparatively transparent or stained enamel, through which when burned the design will be visible and appear ornamental and decorative.

By etching or incising mechanically—that is, by the use of gravers, rolls, &c.—it is possible to produce cheaply exact duplicates of any predetermined designs.

Referring to the drawings, Figure 1 illustrates a piece of a plate of sheet metal having on its surface etchings and incisions and forming a predetermined design. Fig. 2 shows an enlarged sectional view through an incision in a plate. Fig. 3 shows a similar view after the metal at the edge of the incision has been compressed to form the undercut. Fig. 4 shows a vessel with an etched design and enameled.

The rough-line incision and subsequent compression of the upraised or rough edges along the lines of incision form cavities or undercuts which bind the enamel coating after it is fused to the metal base with a tenacity yet unequaled.

If the metal sheets are to be used for stamping, the operation of compressing or upsetting after making the line-incisions may sometimes be omitted, as in some articles the stamping operation has a tendency to compress or upset and divert the rough metal along the incised lines sufficiently to produce minute cavities and undercuts.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent, is—

1. An enameled article having a metal base provided with incisions extending partly through said metal and having the edges of the metal at said incisions projecting partly over the incisions, and a vitreous enamel coating the entire surface of said article and filling said incisions.

2. An article of enameled metal ware whose metal surface has incisions and cavities provided with undercuts and forming ornamental designs, and a coating of enamel covering the entire surface and filling the incisions and cavities and through which enamel the said design may be seen, as set forth.

3. The method of preparing sheet metal for a coating of enamel consisting of first preparing the surface of the sheet metal by forming thereon incisions having upraised particles of metal along the lines of the incisions; and then "upsetting" or compressing the said upraised particles sufficient to cause them to overlap the minute grooves of the incisions and create undercuts.

4. The method of applying vitreous enamel to thin sheet metal, consisting of first preparing the surface of the sheet metal by forming thereon incisions and cavities which have undercuts; then coating the entire surface with liquid vitreous enamel so as to fill the said incisions and cavities, and finally subjecting the sheet metal to heat in a muffle to convert the enamel into a glazed surface.

5. The method of enameling sheet metal, consisting of first preparing the surface of the sheet metal by forming thereon incisions having upraised particles of metal along the lines of the incisions; then "upsetting" or compressing the said upraised particles sufficient to cause them to overlap the minute grooves of the incisions and create undercuts; then coating the entire surface of the metal with enamel and filling the incisions and undercuts with enamel, and then fusing the enamel.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES F. PFALZGRAF.

Witnesses:
CHARLES B. MANN, JR.,
WM. D. POULTNEY.