

UNITED STATES PATENT OFFICE.

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PROCESS OF DECORATING ENAMELED METAL.

1,033,821.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, GEORGE R. MEYERCORD, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Processes of Decorating Enameled Metal, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to the art of decorating enameled metal, and has for its object to produce a successful method by which decorations, letters or figures of a plurality of colors may be burned into the enamel by a single operation.

It is characteristic of enameled metal that, in order successfully to burn colored decorations into it, the burning operation must take place at a high temperature which is suddenly imposed. This is for the reason that the co-efficients of expansion and contraction of the metal and the enamel are so different that the enamel will be ruined if the temperature is gradually raised from a lower degree to that which is necessary to soften the enamel. Where the decorations are in a plurality of colors, it is now the universal practice to spread upon the enamel such of the colors as do not touch each other, burn these colors in, then add further colors that overlap the others and burn those in; this process being continued until all of the colors necessary to make the completed decoration or inscription have been added. This method is slow and expensive since it may be necessary to pass the same piece of enameled ware through a considerable number of firings and besides the placing of the colors necessitates a series of separate operations.

It has been attempted to decorate enameled metal ware in overlapping colors by a single firing; using a decalcomania transfer print on duplex paper, the print being sized or cemented upon the enamel and the whole then fired in the usual way after the transfer has been made. This method has been a failure because it is necessary to use a varnish binder for the coloring matter in the decalcomania print film, especially where the colors are overlapped or double-printed, and to use a cement or size, preferably a varnish, for securing the film upon

the enamel. It is characteristic of printing sizes or varnishes that when they are suddenly subjected to the high temperature necessary for burning the colors into the enamel, they are dissipated so slowly as to give rise to a boiling or crizzling action which blisters the film and destroys the decoration. The use of these decalcomania transfer prints has therefore been unsuccessful because it is necessary that the enameled ware be subjected suddenly to a high temperature and this sudden application of heat is fatal to the decalcomania film.

It has been proposed to adopt the decalcomania transfer print to meet the requirements of furnace firing, by using a collodion film instead of the thin upper sheet of paper on which the film of coloring material lies, simply because collodion is dissipated in the intense heat of the furnace without of itself injuring the print. This expedient is not commercially successful because of various serious objections aside from the objection to the use of so dangerous a material as collodion. In the first place the same binder for the powdered coloring material is required as in the ordinary transfer print so that, unless the coloring of the print is faint and there is no overlapping of colors, the varnish binder will cause the print to crizzle during firing. Again, the process of applying the print to the ware is slow and costly; the sheet must be soaked in a tank of water, color side up, until the paper backing is loosened; the ware must then be slipped beneath the floating collodion film; film must then be carefully worked and patted into close contact with surface to be decorated; and the whole must be thoroughly dried before firing, as moisture in the film has the same effect as varnish, destroying the appearance of the print in firing. Furthermore, the use of the collodion film does not adapt the decalcomania transfer for use on concave, convex or irregular surfaces, since the film with the exposed coating of coloring matter cannot be successfully manipulated to shape it to such surfaces.

My invention or discovery has to do particularly with the production of a method of treatment which will satisfy the requirements for treating enameled metal ware expeditiously and at the same time cause the varnish or similar volatile binder in the decalcomania print film to be dissipated

in such a way that the distribution of the coloring matter in the film will not be affected; thus enabling the manufacturer of enameled metal ware to decorate his ware with decalcomania transfer prints just as is now done by manufacturers of china and pottery.

The difference between the expansion and contraction of the enamel and the metal is not enough to injure the enamel at comparatively low temperatures, it being entirely feasible to raise the temperature of enameled metal to 300° or 500° F. without cracking the enamel. Such a degree of heat is however quite sufficient to vaporize the sizing, varnish or cement without producing the violent boiling which is destructive to the print film at the high temperatures which are required for firing. I make use of this principle in this way: I size or cement the decalcomania film upon the enamel and then bake the ware slowly at a low temperature, perhaps for an hour or two, so as to permit the size or cement to soften and allow the coloring ingredients to settle down upon the surface of the enamel. The light volatile portions of the varnish, such as oils, are entirely evaporated while some of the heavier constituents bake into a hard skin which overlies the coloring matter. Thereafter I subject the ware to the usual furnace firing operation at the high temperature and the residue of the varnish burns up and disappears without disturbing the coloring matter. As the enamel softens the coloring matter sinks into the same in a perfect state as to outline and when the firing operation is completed the decoration is beautifully glazed into the enamel.

It will thus be seen that I have provided a method by which enameled metal ware may be decorated in any desired number of colors which touch each other, overlap or are double printed, with only a single furnace firing. Again, the designs may be worked out in a decalcomania print under the most perfect conditions, so that it is unnecessary to work under the difficulties which are experienced in applying intricate designs with overlapping colors to a piece of enameled metal ware as heretofore. Furthermore, by making use of the decalcomania film or duplex paper possible, it becomes feasible to decorate or mark enameled surfaces in any desired configuration or shape so that enameled metal ware may be beautifully decorated at a low cost in any shape which it is possible to give the ware; this following from the fact that the transfer print is sized or cemented upon the enameled surface face down, the workman

rubbing and pressing upon the tissue paper backing of the color film to any extent which may be necessary to make the film conform to the contour of the ware.

What I claim is:

1. The process of decorating enameled metal which consists in placing on the enameled surface a coloring material held together by a binder which will vaporize at least partly at a comparatively low temperature, heating at a low temperature, and then suddenly applying an intense heat to flux the enamel and coloring material.

2. The process of decorating enameled metal which consists of securing to an enameled surface by means of a varnish cement a transfer print composed of coloring material held together by a binder containing varnish, heating at a temperature which is high enough to volatilize the varnish but not sufficiently high to injure the enamel, and then suddenly applying an intense heat sufficient to glaze the coloring material into the enamel.

3. The process of decorating enameled metal in overlapping colors, which consists in making a film composed of overlapping layers of coloring material, the coloring material being held together by a varnish binder and the overlapping portions of the layers being secured to each other by a varnish binder, heating at a temperature which is high but not high enough to injure the enamel, and then applying an intense heat sufficient to glaze the coloring material into the enamel.

4. The process of decorating enameled metal which consists in securing to the enameled surface by means of a size varnish or cement a decorative film made up of coloring matter held together by a varnish binder, heating at a temperature in the neighborhood of 500 degrees F., and then applying an intense heat sufficient to glaze the coloring matter into the enamel.

5. The process of decorating enameled metal which consists in securing upon the enameled surface by means of a size varnish or cement a dry film made up of a plurality of overlapping colors held together by means of a volatile binder, then heating at a temperature comparatively high but not high enough to injure the enamel, and then applying an intense heat sufficient to glaze the coloring into the enamel.

In testimony whereof, I sign this specification in the presence of two witnesses.

GEO. R. MEYERCORD.

Witnesses:

WM. F. FREUDENREICH,
H. S. GAITHER.