

UNITED STATES PATENT OFFICE.

GEORGE W. KETCHAM, OF NEWARK, NEW JERSEY.

ART OF ENAMELING METAL WARE.

SPECIFICATION forming part of Letters Patent No. 708,363, dated September 2, 1902.

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To all whom it may concern:

Be it known that I, GEORGE W. KETCHAM, a citizen of the United States, residing at Newark, county of Essex, State of New Jersey, have invented a useful Improvement in the Art of Enameling Metal Ware, of which the following is a specification.

My invention relates to enameling metal, and more particularly steel and iron or a metal of which steel or iron is the base. Other materials, however, may be used. Preferably I use the ordinary sheet-steel of commerce, to which after applying a coating of any suitable non-corrosive metal I apply one or more coats of an enamel composed of substances which will coact with and partially permeate the coating metal to produce after such enamel is fixed by heating an enamel characterized by a high gloss and having a peculiar mottled, wavy, or foliated effect, which adds beauty and value to the article.

My invention consists in the process herein set forth as well as the article produced.

To carry my invention into effect, I proceed as follows: The article to be enameled is first annealed and subsequently cleaned in any well-known manner—as, for instance, by immersing first in cold and then in boiling soda solutions. After all grease and dirt have been removed and the article dried I apply a very thin cohesive coating of a non-corrosive metal. For sanitary goods I prefer to use copper; but for articles employed in cooking and to avoid any possibility of poisonous effect I preferably use aluminium, although I may employ nickel or cobalt or any of the non-corrosive metals. Such metals may be applied in any suitable manner to produce a thin cohesive and smooth coating, as by immersing the article in a solution of the salt of the metal with a suitable electrode by electrodeposition or by rolling a thin film of the metal upon the article. My object in providing the metal which forms the metallic base of the article with a thin cohesive coating of a non-corrosive metal is for the purpose, first, of protecting the metal base against the action of any acid or alkali contained in or developed from the enamel after heating; second, of filling the pores, cavities, and inequalities in the surface of the article incident to the character of the base metal em-

ployed or due to manufacture, whereby when the enamel is applied it is applied to a smooth surface and to a metallic surface which is not the surface of the base metal, but an applied surface with which it will coact to produce an enameled surface for the article having a high gloss and presenting a mottled, wavy, or foliated appearance. After the layer of non-corrosive metal has been applied I then coat the article with an enamel having substantially the following formula: feldspar, five hundred pounds; borax, three hundred pounds; soda-ash, fifteen pounds; saltpeter, fifty pounds; fluor-spar, twenty-five pounds; cryolite, fifty pounds, with the addition of any suitable coloring-matter, such as cobalt or manganese. The borax mentioned in the formula will after heating produce boracic acid, which will coact with the oxidized surface of the applied cohesive metal coating and produce a chemical substance which will in turn coact with the other substances and coloring-matter mentioned in the formula of the enamel to produce after heating the peculiar high gloss and wavy or foliated appearance which characterizes the enamel produced by the method and employment of the substances specified. The amount of boracic acid which should be developed upon heating the enamel should be sufficient to act upon the oxidized surface of the metal coating, but not sufficient to perforate the coating and act upon the metal base.

I do not limit myself to the precise proportions of the different materials which compose the enamel, and I may substitute for one or more of the ingredients other suitable ingredients. I may apply one or more coatings of the enamel, as desired. After applying the enamel in the usual manner the article coated is placed in a muffle and heated in the usual way to flux and set the enamel.

The article made by the process described will have produced on it an enameled surface of high gloss with great adhesiveness and that will not split or crack and which to the eye presents a distinctive mottled, wavy, or foliated appearance.

I am aware that it has heretofore been proposed to coat the metallic base with another metal, then apply an enamel, and, fur-

ther, to coat the metallic base with another metal and then apply an enamel which will eat through the coating metal and act upon the metallic base. Such, however, I do not
5 claim to be my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The herein-described process of enameling which consists first, in coating the cleaned
10 article with a thin layer of cohesive and non-corrosive metal, then applying an enamel which upon heating will coact with and only partially oxidize and permeate the coating
15 metal.

2. The herein-described process of enameling which consists first, in coating the cleaned article with a thin layer of cohesive and non-corrosive metal, then applying an enamel
20 which upon heating will set free an acid in sufficient quantity and strength to coact with and only partially oxidize and permeate the coating metal.

3. The herein-described process of enameling which consists first, in coating the cleaned
25 article with a thin layer of cohesive and non-corrosive metal, then applying an enamel composed of feldspar, borax, soda-ash, saltpeter, fluor-spar, cryolite and a coloring-matter in such proportions that such enamel will
30 upon heating partially oxidize and permeate the metal layer, and finally heating to flux and set the enamel.

4. The herein-described process of enameling which consists in coating an iron or steel
35 body with a thin layer of cohesive and non-corrosive metal, then applying an enamel which upon heating will coact with only the outer surface of the coating metal.

40 5. The herein-described process of enameling which consists first, in coating the cleaned article with a thin layer of cohesive and non-corrosive metal, then applying an enamel

composed of fusible materials and a coloring-matter, and which enamel upon heating will
45 set free an acid which will coact with and only partially oxidize and permeate the non-corrosive coating, and act upon the coloring-matter, to produce in the finished article a surface having a high gloss and a wavy or
50 foliated appearance, and finally heating to flux and set the enamel.

6. The herein-described process of enameling which consists first, in coating the cleaned
55 article with a thin layer of cohesive and non-corrosive metal, then applying an enamel which upon heating will develop boracic acid sufficient in quantity to only partially oxidize and permeate the applied metal coating, and finally heating to flux and set the en-
60 amel.

7. As a new article of manufacture, a metallic vessel or other article carrying a superposed film of another metal partially oxidized and permeated in spots, and upon said
65 film an enamel or glaze.

8. As a new article of manufacture, a vessel or other article having a base of a corrosive metal, an enameled surface, and a layer
70 of non-corrosive metal, partially oxidized and permeated in spots, interposed between the base and the enamel.

9. As a new article of manufacture, a metallic vessel or other article having its entire
75 surface, pores, indentations and inequalities covered and filled with a thin cohesive layer of metal, said layer of metal partially oxidized and permeated in spots, and an enamel coating situated over said metal layer.

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

GEORGE W. KETCHAM.

Witnesses:

J. E. PEARSON,

C. E. STECHER.