# UNITED STATES PATENT OFFICE.

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## ENAMEL FOR COATING SHEET METAL, &c.

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*To all whom it may concern:*

Be it known that I, JOHN HENNEMAN, a citizen of the United States of America, residing at Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Enamel for Coating Sheet Metal and other Metals, of which the following is a description.

It is well known that vitreous enamel, such as is usually applied to metal, is a substance similar to and partakes of the known qualities of glass. Hence it has not been practicable to enamel other than stiff, inflexible articles, such as culinary utensils, and similar articles, as the bending of a flexible article results in cracking off the enamel. It has also been found necessary in practicing the known processes of enameling, to first prepare the metal by a preparatory coat of some kind, such, for example, as by a coat of enamel composed of white-sand, mica, and borax, after which one or more coats of finishing enamel is added.

I have discovered a process of enameling metal articles whereby the enamel produced upon said articles is flexible, and the articles enameled can be bent more or less without cracking or injuring its enameled surface; and whereby, in the manufacture of the enameled article, the preparatory coating, above referred to, may be dispensed with, and the entire work performed by one heat, thereby very largely reducing the cost of manufacture.

My improved process is substantially as follows: I use the following articles in substantially the following proportions, to-wit: Fluor-spar, two and one-half pounds; salt-peter, one and one-half pounds; white-sand, five pounds; pulverized-borax, four pounds; mica, two pounds; red lead, three pounds; carbonate of potash, three pounds; kryolite, two pounds, together with a small quantity of coloring oxide, for example, for a blue color one-half ounce of oxide of cobalt.

The above ingredients are mixed and milled in the usual manner, preferably being milled wet. The mixture is applied to the metal by pouring or dipping and allowed to dry to prevent the formation of blisters or holes in the enamel. The enameled article is then placed in an oven or furnace heated to from 1,000° to 1,500° Fahrenheit, and baked until the application of the enamel is complete. In practice, after the enamel has fused, I prefer to cool the enameled metal slowly, and for this purpose to pass it from the fusing furnace through a series of chambers, each of which is of a lower temperature than the preceding one.

Of course the metal may be subjected to the usual preparatory coat, if preferred, but ordinarily the enameling coating above described is sufficient, and the expense of a preparatory heating and coating is thereby avoided.

Articles enameled by the above described process may be bent or flexed without cracking or scaling the enamel. Hence, this process is particularly adapted to sheet-metal roofing and other flexible sheet-metal articles.

Having thus described my improved process, what I claim as new, and desire to secure by Letters Patent, is—

An enamel composed of a mixture of fluor-spar, salt-peter, white-sand, borax, mica, red-lead, carbonate of potash, and kryolite with a suitable coloring oxide, substantially as set forth.

JOHN HENNEMAN.

Witnesses:
JOHN W. HILL,
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