

UNITED STATES PATENT OFFICE.

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ENAMELIZED STEEL OR HOMOGENEOUS IRON.

SPECIFICATION forming part of Letters Patent No. 643,726, dated February 20, 1900.

Original application filed January 19, 1899, Serial No. 702,634. Divided and this application filed March 6, 1899. Serial No. 708,007. (Specimens.)

To all whom it may concern:

Be it known that we, WILLIAM F. NIEDRINGHAUS and GEORGE W. NIEDRINGHAUS, citizens of the United States, residing at the city of St. Louis, State of Missouri, have invented and discovered a certain new and useful Enamelized Steel or Homogeneous Iron, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make the same.

Our product is the result of the initial or sub process in the enameling of steel and homogeneous iron described and claimed in our application for patent, Serial No. 702,634, filed January 19, 1899, of which this application is a division.

Our invention has for its object to produce "enamelized" steel or homogeneous iron specially adapted for taking and retaining an adherent superposed coating of enamel. This object is attained chiefly by our discovery that by introducing into the steel or homogeneous iron after the same is made, but while still in a molten condition, a flux or fluxes of a nature similar to the flux or fluxes used in the composition of enamel, preferably those containing no water in their structure, the metal is rendered most suitable for taking and retaining an adherent coat of enamel. The enamel coating by reason of the peculiar condition of the metal base and its affinity for the enamel will be free from the objectionable chips, flakes, pits, and smutty blotches frequently occurring upon enameled-steel articles. The operation of bringing the metal to this condition of affinity for enamel we term "enameling," and metal in such condition we term "enamelized" steel or homogeneous iron, by reason of the fact that the said operation brings about in the metal a condition of peculiar adaptability for taking and retaining a coat of enamel free from objectionable flaws above mentioned. This result is highly desirable and yields a superior enameled article.

The steel or homogeneous iron article which we produce is distinguishable on the market

from other steel or homogeneous iron by the fact that it will receive and retain a single adherent coat of mottled enamel free from objectionable flaws and defects. This is one distinguishing test by which it may be known. The metal is also harder in texture and less ductile than metal made by analogous processes in which the enameling step is omitted. The metal also has a lower limit of elasticity, a lower per cent. of elongation, and a higher per cent. of reduction of sectional area when put under strain than ordinary steel.

In practicing our present invention we take one or more of the well-known enamel fluxes—such as silica or silicious material, boracic acid or borax, and cryolite or fluor-spar, or any of the well-known enamel fluxes—and mingle one or more of the said fluxes, as hereinafter described, with the molten steel or homogeneous iron after the steel or homogeneous iron is made, either while the metal is in the ladle or ingot-mold or in the presence of air. The effect of this operation is to enamelize the metal, rendering it particularly capable of receiving and retaining an adherent coat of enamel free from objectionable flaws or defects. The enamelized steel or homogeneous iron may be cast and rolled in the usual manner and formed into the desired shape or article by cutting, stamping, seaming, or otherwise, but by reason of the qualities above mentioned must be handled more kindly than ordinary commercial steel. The article may be pickled and coated with any suitable enamel, preferably enamel containing the flux with which the steel has been enamelized or analogous fluxes, which enamel is then fused on the metal in the usual way.

In carrying out the enameling operation we preferably employ fluxes, per ton of steel, in the following proportion: (a,) one and one-half pounds silica or two pounds feldspar; (b,) two pounds boracic acid or three pounds of borax; (c,) one-half pound cryolite or fluor-spar.

Instead of the above composition we may enamelize the steel or homogeneous iron with boracic acid or borax alone. Boracic acid or

borax when used for enameling the steel or homogeneous iron is superior to the individual use of silica or silicious material.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. As a new article of manufacture "enameled" steel or homogeneous iron especially adapted for enameling purposes.
2. As a new article of manufacture, steel or homogeneous iron prepared for enameling by "enameling" the same by pretreatment in a molten condition with an enameling flux or fluxes whereby the said metal is specially adapted for retaining an adherent coating of enamel containing such or analogous fluxes.

3. As a new article of manufacture, steel or homogeneous iron having its surface when in a solid state in an enamelled condition, the said steel having a great affinity for enamels containing a flux or fluxes of a character similar to the flux or fluxes producing the enameling of the steel, and adapted to receive and retain an adherent coat of enamel containing such fluxes, free from objectionable flaws and defects.

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Witnesses:

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