

UNITED STATES PATENT OFFICE.

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PROCESS OF ENAMELING STEEL OR HOMOGENEOUS IRON.

SPECIFICATION forming part of Letters Patent No. 632,737, dated September 12, 1899.

Application filed January 19, 1899. Serial No. 702,634. (No 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 Process of Enameling Steel and 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 practice the same.

Our invention relates principally to a process of producing steel or homogeneous iron bodies with a superposed coat of adherent enamel free from objectionable flaws and defects. 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 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 "enameled" 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.

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 fluorspar, 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 homo-

geneous iron is made, either while the metal is in the ladle or ingot-mold. 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 enameled 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. The article may be pickled and is then coated with any suitable enamel, 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, and (c) one-half pound cryolite or fluorspar.

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. In another application for patent filed on the 6th day of March, 1899, Serial No. 708,007, we have claimed the enameling steel.

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

1. In the process of enameling steel and homogeneous iron, the subprocess of "enameling" the said metal, which consists of bringing steel or homogeneous iron into a molten state and introducing into the said molten steel or homogeneous iron any of the enamel-ing-fluxes thereby adapting it to retain enamel having such or analogous fluxes, substantially as described.

2. In the process of enameling steel or homogeneous iron the subprocess of enameling the metal which consists in bringing the steel or homogeneous iron into a molten state and introducing into the said molten steel or homogeneous iron a mixture of the enamel-

fluxes, thereby adapting it to retain enamel having such or analogous fluxes, substantially as described.

3. The process of producing enameled articles, which consists in first "enameling" steel or homogeneous iron as set forth, and thereupon enameling the same.

4. As a new article of manufacture, a base

of "enameled" steel or homogeneous iron carrying an adherent superposed coating of enamel, substantially as described.

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Witnesses:

RALPH KALISH,

WILLIAM SCOTT.