UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING CHILLED-IRON GLOBULES.

SPECIFICATION forming part of Letters Patent No. 446,987, dated February 24, 1891.

Application filed March 17, 1890. Serial No. 344,233. (No specimens.)

To all whom it may concern:

Be it known that we, BENJAMIN C. TILGHMAN and RICHARD A. TILGHMAN, both of the city and county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Improved Method of Manufacturing Chilled-Iron Globules, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to the manufacture of chilled-iron globules such as are used in the abrading process described in the patent to Benjamin C. Tilghman, Reissue No. 7,499, dated February 6, 1877, also to some extent in the sand-blast process. These globules are manufactured in the following way: A stream of melted iron is exposed to the action of a high-pressure jet of steam or gas with the result of atomizing it, and the spray of iron particles is thrown into the air, where the particles assume a spherical form and become chilled on the surface, so as to take a permanent set or form. Then they fall into a tank of water while still intensely hot, and being small they are rapidly and thoroughly chilled, becoming intensely hard. The globules are then removed from the water and dried preparatory to being packed for shipment. At two stages of the above treatment the globules are exposed to the oxidizing influence of the air—namely, when the melted metal is sprayed into the air, when, owing to its great heat, the iron combines directly with oxygen, an actual burning taking place, with the formation of a crust or scales of dark oxide, and during the process of drying, after removal from the chilling-tank, when the wet globules are acted on by the oxygen of the air, forming a friable coat of reddish oxide or rust. This rust is objectionable for many reasons. With certain delicate stones it is liable, unless great care is used, to stain the surface of the stone, and when used for giving a frosted surface to metals by means of the sand-blast the rust is hammered into the metal under treatment, injuring its color and appearance. The rusted globules are also unsightly, and the friable reddish rust formed in drying soils whatever it comes in contact with.

The object of our invention is to manufacture globules of chilled iron having case-hardened unpolished but bright clean metallic surfaces and which will be free from the above-noted objections. Such globules are in themselves a new article of manufacture, having pronounced advantages over the globules heretofore made, and as such the subject-matter of another application for Letters Patent filed March 17, 1890, Serial No. 344,234.

Our present invention consists of the hereinafter-described method of making such globules.

We atomize the melted iron or steel by means of a high-pressure jet of steam or gas, as before, but surround the spray of metal by a non-oxidizing atmosphere—such, for instance, as the gases produced by passing air through a deep bed of ignited fuel. This is most economically and conveniently done by introducing the non-oxidizing gas around the atomizing-jet in such a manner as to supply the suck caused by the same completely. The non-oxidizing gas is then forced by the atomizing-jet to accompany and envelop the atomized material until it is received in the water of the chilling-tank. This treatment effectually prevents the burning of the surface of the hot globules, which are received in the chilling-tank free from the crust or scale formed when the atomized material is thrown into an atmosphere containing oxygen. In order to insure the production of globules having clean and bright metallic surfaces, it is now only necessary to prevent the formation of the friable red oxide in the process of drying, and this we accomplish by drying the globules in a non-oxidizing atmosphere—that is, by surrounding them while drying by an atmosphere deprived of oxygen, such as is produced by passing air through a deep bed of ignited fuel or by a gas or vapor produced in any way and which contains no free oxygen, and will while present exclude the air—such, for instance, as steam.

Among other experiments we have ascertained that by subjecting the wet globules to a high heat in drying them we not only dry them more quickly but also obtain them free from the red rust owing to the rapid vaporization of the water upon their surfaces, the

vapor or steam being driven off at once from the granules directly exposed to the heating-surface and forming a protecting atmosphere around them, and also rising through the granules above, driving off the air and effectually excluding oxygen and preventing its injurious action. The same effect of course is produced by passing steam from a boiler into the chamber containing the granules or by similarly introducing any non-oxidizing gases.

In another application which we are about to file we have claimed, broadly, the method of manufacturing globules by atomizing them in a non-oxidizing atmosphere and drying them under conditions which preclude the formation of rust, and also specifically a treatment for preventing oxidization in drying, and our present invention is limited to a treatment in which the drying is accomplished in a non-oxidizing atmosphere.

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

1. The described method of manufacturing chilled-iron globules, which consists in atomizing melted metal, chilling the globules in water, and then drying them in a non-oxidizing atmosphere.

2. The described method of manufacturing chilled-iron globules, which consists in atomizing melted metal in a non-oxidizing atmosphere, chilling the globules in water, and then drying them in a non-oxidizing atmosphere.

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