

# UNITED STATES PATENT OFFICE.

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## METHOD OF MANUFACTURING CHILLED-IRON GLOBULES.

SPECIFICATION forming part of Letters Patent No. 446,986, dated February 24, 1891.

Application filed March 17, 1890. Serial No. 344,232. (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.

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. They then 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-hard-

ened and unpolished but bright and 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 forms 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 subjecting the globules, after removal from the chilling-tank and until dried, to conditions which preclude the formation of rust—as, for instance, by drying them in an atmosphere deprived of oxygen—which, as a specific process, will form the subject-matter of another application; but preferably we prevent the formation of rust in the following way—namely, we wet the globules with a solution of alkali which will be sufficiently strong to neutralize any carbonic acid which may be absorbed in the water or subsequently absorbed from the air. Preferably we use lime-water containing a slight excess of finely-divided lime, a very



weak whitewash. After wetting the globules with this solution they can be dried without any risk of rusting, for the reason that the oxygen of the air will not act upon iron, except in the presence of free carbonic acid, and free carbonic acid cannot exist in the presence of a saturated solution of alkali, the acid combining with the alkali to form, for instance, carbonate of lime, and the place of the lime thus neutralized being supplied from the small percentage of undissolved lime in suspension. This wetting of the globules with the lime-water we prefer to accomplish after the globules are removed from the water of the chilling-tank, the lime-water being then poured over them; but of course the water used to give the chill may itself be saturated with lime in the way described and with the same results.

The treatment with alkali is, in some ways, the most important part of the process, as the prevention of the formation of the red friable rust is a great improvement, even where some dark scale is formed.

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 with bright metallic surfaces, which consists in atomizing melted

metal in a non-oxidizing atmosphere, chilling the resulting globules by immersion in water, and subsequently drying them under conditions which preclude the formation of rust.

2. The described method of manufacturing chilled-iron globules with bright metallic surfaces, which consists in atomizing melted metal in a non-oxidizing atmosphere, chilling the resulting globules by immersion in water, removing the globules from the water and wetting them with a saturated solution of lime or its equivalent, and then drying them.

3. The described method of manufacturing chilled-iron globules with bright metallic surfaces, which consists in atomizing melted metal, chilling the resulting globules by immersion in water, removing the globules from the water and wetting them with a saturated solution of lime or its equivalent, and then drying them.

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