

UNITED STATES PATENT OFFICE.

HUGH McDONALD, OF PITTSBURG, PENNSYLVANIA.

IMPROVED FIXING FOR PUDDLING-FURNACES.

Specification forming part of Letters Patent No. 50,483, dated October 17, 1865.

To all whom it may concern:

Be it known that I, HUGH McDONALD, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improved Fixing for Puddling-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My improvement consists in the mode of preparing and applying the fixing, whereby I am enabled to effect a great saving in time and fuel.

It is well known that puddling-furnaces need to be lined at the sides and boshed with some material to prevent their rapidly burning out, and the material thus used is called the "fixing." For this fixing the materials ordinarily used are cinder or iron ore and scrap-iron, first partially melted or softened in the furnace, and then applied to cover the sides and boshes of the furnace. The mode of preparing and applying this fixing is as follows: The iron ore to be used for fixing is first broken up to the size of walnuts or larger, and is then placed in the bottom of the working-chamber of the furnace with scrap-iron or cinder mixed with it. The furnace is then allowed to heat up for from two to five hours, in order partially to melt and soften the iron or cinder. When sufficiently soft and plastic the furnace-door is opened and the fixing is pushed with a proper tool up against the boshes and sides of the furnace, so as to cover the parts which need protection. During the time which is employed in softening the fixing the furnace cannot be used for the purpose of puddling, and the time required to soften the ore and scrap is lost to the workman, besides which at least ten bushels of coal are consumed in the heating of the furnace during the process of preparing the fixing, and as this is only done when parts of the furnace are exposed and need protection, it is manifest that the furnace is liable to be burned and injured by exposure to the heat during this time.

By my improved mode of preparing and applying the fixing not only are these difficulties entirely obviated, but my improved fixing is more durable and better than that in ordinary use. I prepare my fixing without the use of scrap or any other article which requires to be

melted or softened by heat before being applied. The article which I use is any description of iron ore which may be ground up fine—such as the Lake Superior ore or Missouri ore, the former kind being preferable—to which I sometimes add fire-clay or powdered charcoal or powdered coke, if found desirable, for the reason hereinafter stated.

To enable others skilled in the art to make use of my invention I will proceed to describe it more fully.

As just stated, I use any kind of iron ore which is susceptible of being ground fine, and which, when mixed with water, will stick together and form a pasty mass; but the red ores—such as that known as "Lake Superior ore"—will, I think, be found best suited for the purpose. The ore is pounded or ground to powder, and is then mixed with a sufficient quantity of water to make a pasty mass of about the consistency of dough. If any other substance is used with the ore—such as fire clay, coke, or charcoal—it is also first powdered and mixed with ore.

The fixing thus prepared does not need to be melted or even heated before being applied to the furnace. The mode of using it is as follows: As soon as the balls of metal are removed from the working-chamber of the puddling-furnace, and while the chamber is yet hot, the fixing, in the shape of pasty lumps, prepared as before described, is applied by the workman with a proper tool directly to the part or parts of the furnace which need protection, and is plastered down smoothly. This may be done in a few minutes, as the fixing will adhere to the sides and boshes of the furnace and harden by the heat like fire-clay.

If the fixing shows any disposition to crack off, owing to the sudden conversion of its water into steam, this may be at once prevented by covering it with the melted cinder, which remains in the bottom of the working-chamber after the iron is removed, which may be splashed up over the fixing by the workman with the tool he is using.

As some descriptions of ore may be less inclined to adhere together and may more easily crack when applied in the furnace than others, I mix with the ore, when making the fixing, a little fire-clay or a small quantity of coke-dust

or powdered charcoal, as the indications may require; but with the red ore, which makes a fine powder, this will not be required.

As soon as my improved fixing is applied to the furnace the puddling-chamber may be charged, and the operation of puddling carried on with the loss of only a few minutes of time and without any waste of fuel or injury to the furnace.

Having thus described my improvement, I do not claim, broadly, the use of iron ore as a fixing for furnaces; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The use of iron ore in its raw or unmelted state, previously ground fine and mixed into a thick paste or dough with water, as a fixing for puddling or boiling furnaces, and used in the manner substantially as hereinbefore described.

In testimony whereof I, the said HUGH McDONALD, have hereunto set my hand in presences of witnesses.

HUGH McDONALD.

Witnesses:

ALLAN C. BAKEWELL,
W. D. LEWIS.