

# United States Patent Office.

JAMES R. SPEER, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 92,220, dated July 6, 1869; antedated June 26, 1869.

## IMPROVED PROCESS OF TREATING CAST-IRON FOR THE MANUFACTURE OF HORSE-SHOES AND OTHER ARTICLES.

The Schedule referred to in these Letters Patent and making part of the same.

### *To all whom it may concern:*

Be it known that I, JAMES R. SPEER, of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Process for Making Malleable and Steel Horseshoes, &c.; and I do hereby declare that the following is a full, clear, and exact description of said process.

The nature of my invention consists in treating melted pig-iron in the manner hereinafter described, and casting said metal into horseshoes, &c., and then placing said cast articles between layers of a pulverized compound, composed of a vegetable carbon, a vegetable and mineral alkali, and a hydrocarbon, and subjecting said casting, thus embedded, to heat.

To enable others skilled in the art to make and use my invention, I will proceed to describe it, and its application to the manufacture of malleable and steel horseshoes.

I treat melted pig-iron in the manner described in my application for a patent for improvement in the manufacture of "pig-iron" for making articles of malleable cast-iron and steel, which application is of even date with this application. I then take a fine moulding-sand and thoroughly moisten it with lye, consisting of one pound of common potash to five gallons of water. The sand is then "cut over" (the meaning of which term is well understood by iron-moulders) until it is of the right "temper" or condition for moulding. I then, with suitable patterns of horseshoes, &c., and "flasks" and their ordinary appendages, make moulds for the horseshoes, &c.

The pig-iron, treated as hereinbefore stated, is melted in a suitable furnace, and is then poured into moulds, (that is to say, "cast.") After the castings have become sufficiently cold, they are removed from the sand, and "cleaned" by any of the known means, care being required in the "cleaning"-process, for the castings made of the metal, and cast in the moulding-sand treated in the manner described, are very brittle and easily broken.

The aforesaid treatment of the pig-iron, and casting it in sand, "tempered" as herein described, changes the texture of the metal, giving it a white, silver-like appearance, and giving the metal that condition or property which is most favorable to making a good article of malleable iron or steel.

After the castings have been properly cleaned, they are placed in "annealing-chests," between layers of pulverized iron-ore mixed with one per cent. of common salt or its equivalent. The annealing-chests are

then sealed up, and placed in a suitable oven or furnace, and subjected to a uniform heat from four to six days, after which the fire is withdrawn from the furnace, and the furnace and its contents allowed to gradually cool off, after which the annealing-chests are removed from the furnace, and the casting removed from the annealing-chests, and again thoroughly cleaned, after which they are placed in a chamber of a furnace, between layers of a compound consisting of, pulverized wood charcoal, one hundred pounds, saturated with one gallon of lye, composed of one pound of good potash to one gallon of water. After the pulverized charcoal has become dry, it is then saturated with two gallons of hydrocarbon-oil. The chamber of the furnace is then closed up, leaving a small vent-hole (say one inch in diameter) at the top of the chamber for escape of gas. The furnace is then heated up so that the contents of the chamber shall be heated to a "dull red," and kept at this degree for from ten to fifteen hours. After the furnace and its chamber have been heated up about one hour, the vent in the top of the chamber must be closed, so as to have the chamber air-tight. After the castings have been subjected to the heat as stated for a sufficient length of time, the furnace-chamber and its contents are allowed to cool off. After the contents of the chamber of the furnace are withdrawn, and the castings separated from the charcoal, they are then cleaned and polished by any known means, such as "rattling," "water," and polishing-barrels.

Castings made in the manner, and treated and manipulated in the method hereinbefore described, will be, after being removed from the annealing-chests, superior articles of malleable cast-iron; and after being treated, being removed from the furnace-chamber, they will be found to be articles of steel of a good quality.

I wish it clearly understood that I do not claim, broadly, converting articles of malleable iron into steel, for such improvement has been made public by Christopher Siegerich Kreeft, in his application for Letters Patent in England, May 17, 1856.

What I claim as of my invention, is—

The method hereinbefore described for making malleable cast-iron or steel horseshoes, &c.

JAMES R. SPEER.

Witnesses:

JAMES J. JOHNSTON,  
AARON B. CATE.