

UNITED STATES PATENT OFFICE.

RICHARD YEILDING, OF NEW YORK, N. Y.

IMPROVEMENT IN THE MANUFACTURE OF SOFT-IRON AND STEEL CASTINGS.

Specification forming part of Letters Patent No. 119,682, dated October 3, 1871.

To all whom it may concern:

Be it known that I, RICHARD YEILDING, of New York city, in the county and State of New York, have invented certain Improvements in the Manufacture of Soft-Iron and Steel Castings; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming a part of this specification.

The first part of my invention consists in making soft-steel or iron castings by casting molten metal in hot molds capable of inclosing the metal so as to protect it from atmospheric action, and then placing the molds in a hot oven and letting them and the contained metal cool down gradually in such manner that the castings will be annealed when cool and thus save the expense of reheating the castings for annealing, besides making better, softer, and more homogeneous metal; and secondly, it consists in forming the molds with a lining of decarbonizing substance to more completely decarbonize the metal after being poured into the mold than it can be in the conductor and remain sufficiently fluid to pour to make soft castings of the nature of wrought-iron, or to make castings of steel with less carbon than can be cast in the ordinary way.

In carrying out the first part of my invention, I provide molds of plumbago and fire-clay, ground carbon, and other like substances capable of resisting great heat, and heat them in an oven or by any other means to a white heat or thereabout before pouring the metal into them, the oven being arranged to admit of pouring the metal to be cast into the molds while in it; or the molds may be removed for filling and then replaced; then I cover the said molds, when they are of such character as to require it, to protect the metal from the atmosphere, and close the oven; also, to exclude the atmosphere to remove any possibility of chilling the cast metal, and then let the heat of the oven gradually cool down.

In this way I produce more soft and homogeneous castings than can be done when they are allowed to cool before being annealed, and the latter operation is performed in the ordinary way; and I accomplish the same at less expense than

when the casting heat is allowed to be lost and they have to be reheated for annealing. Another point gained is, the iron, not being chilled, does not shrink as the ordinary castings do, and retains an elasticity due to the preservation of the fine pores—not being contracted as they will be when subjected to chilling—which elasticity preserves the metal from cracking and breaking when subjected to blows or pressure, as it will when hard and brittle.

Besides this I propose, also as a further means of softening the castings, decarbonizing them, to provide the molds with decarbonizing linings of such substances as bituminous coal treated with black oxide of manganese or chromate of iron, to remove the sulphur; or the coal and oxide of manganese may be used in combination, or the latter in combination with other substances; or linings of magnetic iron and clay, charcoal, or micaceous rock, saturated in alum and water, in the proportion of one to two per cent. of alum, in combination with fire-clay, or fire-brick, or ground carbon, or any other acid either solid liquid or mineral and of the requisite strength. The molds having linings of this character will also be heated to receive the molten steel first decarbonized in the refining-furnace as much as it can be and remain fluid, which, being cast in them, will be wholly decarbonized and produce very fine castings of the character of wrought-iron; or the decarbonizing may be stopped or regulated to any degree required by the time the molds are allowed to remain heated and the degree of heat they are subject to. Thus I may retain carbon enough for high or low grades of steel, or remove it altogether to make soft iron.

The linings will be renewed from time to time by washing or coating them with decarbonizing substances in a pasty condition.

Up to this time it has been impossible to produce wholly decarbonized castings, because the metal will not flow when decarbonized below two per cent. of carbon or thereabout but by my improvement.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process of making soft annealed castings by casting in hot closed molds and cooling

he same and the contained metal down slowly in a heated oven or furnace allowed to cool gradually, all substantially as specified.

2. The combination of the carbonizing substances with a mold for casting steel for the decarbonization of the steel simultaneously with the casting, substantially as specified.

The above specification of my invention signed by me this 6th day of September, 1871.
RICHARD YEILDING.

Witnesses:

T. B. MOSHER,
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