

UNITED STATES PATENT OFFICE.

FREDERICK C. CURIE, OF LANCASTER, PENNSYLVANIA.

IMPROVEMENT IN THE MANUFACTURE OF STEEL AND IN CONVERTING IRON ARTICLES INTO STEEL.

Specification forming part of Letters Patent No. **80,148**, dated July 21, 1868.

To all whom it may concern:

Be it known that I, FREDERICK C. CURIE, of the city and county of Lancaster, in the State of Pennsylvania, have invented a new and useful Improvement in Converting Iron into Steel; and I do hereby declare the following to be a full and correct description of the same.

The nature of my invention consists in converting what is known as "cast malleable" or "malleableized" iron into steel by the process of cementation.

In order to enable others skilled in the art to which my invention appertains to fully understand and use my invention, I will now proceed to describe the same.

It is known that wrought-iron can be converted into steel, or at least be provided with a surface of steel, by case-hardening, which has been done in many different ways; but it has never been known to convert cast-iron or cast malleable iron into steel.

Case-hardening differs from my converting into steel in this, that a case-hardened surface can be reduced by heat or hammering back into the original condition from which it was case-hardened; but any steel converted by my process cannot thus be reduced again, but remains steel under any test.

I take cast-iron, or cast any article it may be desired to convert into steel, and, by annealing, reduce it to what is known as "cast malleable" or "malleableized" iron, in any well-known manner. This cast malleable or malleableized article I then convert into steel by the process of cementation—that is to say, I pack them first into a wrought-iron box in the following manner:

I put into the bottom of said box a compound consisting of thirty parts of charcoal, pulverized; three parts of soda or soda-ash; one part of rock-salt. On this compound I lay the articles to be converted, and sprinkle them slightly with prussiate of potash. On these articles I place another layer of articles, and on them a layer of the above com-

pound, and so on until the box is full. The box is then hermetically sealed or closed and placed in a furnace, which is also sealed, and in which the box is exposed to the heat for from twelve to fourteen hours, according to circumstances.

The above-mentioned compound I vary according to the depth to which I desire to convert the article, the proportions mentioned herein sufficing to convert three-eighth-inch iron into steel through and through.

For other depths I have used other proportions, the minimum being ninety-six parts of charcoal, three parts of soda or soda-ash, and one part of rock-salt.

The great advantage of my invention is, that articles of steel and tools, especially edge-tools, which now are worked out of steel, can be cast, reduced to cast malleable iron, and then converted into steel, at a great saving in expense, and in half the time.

Railroad-rails can be cast instead of being rolled, reduced to cast malleable iron, and then converted into steel to any depth desired, leaving a core of malleableized iron within the steel.

If I desire to convert only one part of an article, I cover the part which is not to be converted with sand, when I pack it into the box, as hereinbefore described, which will prevent any of the ingredients from acting on such covered part. For instance, I can cast an ax, and convert but the cutting part into steel, leaving the rest of the ax malleable.

The advantages of my invention are great and various, and will be easily understood.

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

Converting cast malleable or malleableized iron into steel by the process substantially as described.

F. C. CURIE.

Witnesses:

LOUIS ABRY,

JOHN C. SHOENBERGER.