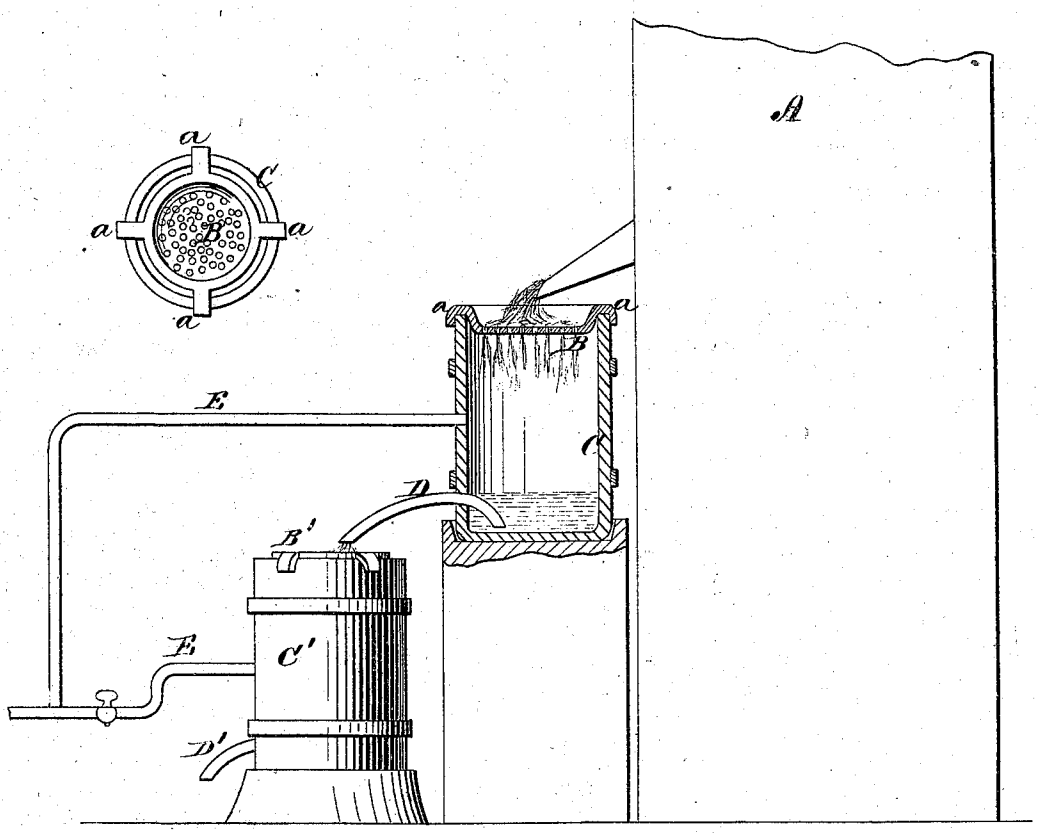
A. C. RAND.

Converting Cast-Iron into Wrought-Iron and Steel.

No. 137,025. Patented March 18, 1873.



Witness:

Henry N. Miller

C. L. Evert

Inventor.

Alonzo C. Rand.

per Alexander Mason

Attorneys.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

ALONZO C. RAND, OF AURORA, ILLINOIS.

IMPROVEMENT IN CONVERTING CAST-IRON INTO WROUGHT-IRON AND STEEL.

Specification forming part of Letters Patent No. **137,025**, dated March 18, 1873.

To all whom it may concern:

Be it known that I, ALONZO C. RAND, of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Process and Apparatus for Converting Cast-Iron into Wrought-Iron and Steel; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The object of my invention is to convert cast-iron into wrought-iron or steel, as may be desired, directly from the molten iron, as it flows from the cupola.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe my process, and the apparatus by which the same may be carried out, referring to the annexed drawing which represents a side elevation, part in section, of my apparatus.

The old methods or processes for converting cast-iron into wrought-iron or steel are either forcing atmospheric air into a mass of the molten metal, for the purpose of taking the carbon out of the iron by its union with the oxygen in the air, or by dividing the iron into small particles by the force of a jet of steam having a sufficient impetus to break up the iron into minute particles, and then subjecting the iron thus divided to the action of the oxygen contained in the oxide of iron or other like substances. This latter method of course requires the iron to be re-heated, and if, peradventure, all the carbon should be taken out, the metal would require an additional treatment of carbon that the proper percentage may be introduced into the iron to convert it into either wrought iron or steel, as may be required.

One of the greatest objections to the former process is that the molten mass is all subjected to the air-blast, and before the proper or desired amount of carbon is taken from the iron the loss by oxidization of the iron is very great, being from twelve to eighteen per cent., or thereabout, by weight. By my process the loss by oxidization is very small.

The iron, in my process, having been melted in any of the cupolas, A, of modern construction, it is allowed to flow into a fire-clay perforated pan, B. The perforations in this pan are very small, and the pan rests upon a fire-clay cylinder, C, having a tight bottom, and provided with an outlet-pipe, D. This pipe is bow-shaped, the inlet end of the same looking downward, and near the bottom of the cylinder. This prevents the escape of the impurities in the iron, and allows nothing but the pure iron to flow from the cylinder. The cylinder C is also provided with an air-pipe or pipes, E, the object of which is to introduce air into the cylinder, that it may come into contact with the fine streams of iron as they flow through the perforations. Introducing air in this manner has the effect of forming the same union with the carbon in the iron as the method now used, forcing air into the mass, without the great loss by oxidization already spoken of. The escape of the resultant gases generated by this union (carbonic acid and carbonic oxide) is provided for by having the clay-pan B of a lesser diameter than the cylinder C, and supporting the same with lugs *a a* on the side of the pan resting on the top edge of the cylinder.

The air may be furnished to the cylinder by the use of any of the ordinary air-pumps, and of course the power to drive the same may be quite limited, as unlike the other process mentioned, the specific gravity of the iron has not to be overcome.

It may be advantageous to unite an additional quantity of oxygen to the air furnished the cylinder. If so, it may be procured cheaply by the process of Tessie du Motay, now being used by some of the gas-companies in this country. The union of the air with the carbon in the iron increases the temperature of the iron, and if the quantity of carbon taken from the iron is not sufficient, the addition of auxiliary cylinders will accomplish all that may be required to either convert the iron into wrought or malleable iron, or cast-steel.

In the drawing, C′ represents such an auxiliary cylinder, with pan B,′ outlet-pipe D′, and air-pipe E′.

The color of the flame escaping between the edges of the pan and cylinder will determine the comparative quantity of carbon remaining in the iron. The impurities in the

iron having a lighter specific gravity than the iron itself, will remain on the top of the pure iron in the bottom of the cylinder, and may be skimmed off by taking the pan off the cylinder, or by having an opening with door or slide on the side of the cylinder. If the iron has not parted with a sufficient amount of carbon after having passed through the series of cylinders, it may be taken from the last receptacle and again passed through the series of cylinders, and the operation repeated until it shall have been sufficiently decarbonized.

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

1. Passing the molten iron from the cupola onto and through a perforated pan upon the top of a cylinder provided with an air-pipe and an eduction-pipe, substantially as and for the purposes herein set forth.

2. Passing a blast of air laterally into the molten iron while it is in fine streams, and falling into the cylinder under a perforated pan, substantially as and for the purposes herein set forth.

3. The combination of a cupola, one or more cylinders, C, with closed bottom and open top, a perforated pan, B, an air-pipe, E, and an eduction-pipe, D, all substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of February, 1873.

ALONZO C. RAND.

Witnesses:
C. L. EVERT,
EDM. F. BROWN.