J. NEVILLE.

Combined Rotary Blast and Pudling-Furnaces for Making Wrought Iron Direct from the Ore.

No. 138,429. Patented April 29, 1873.

Fig. I

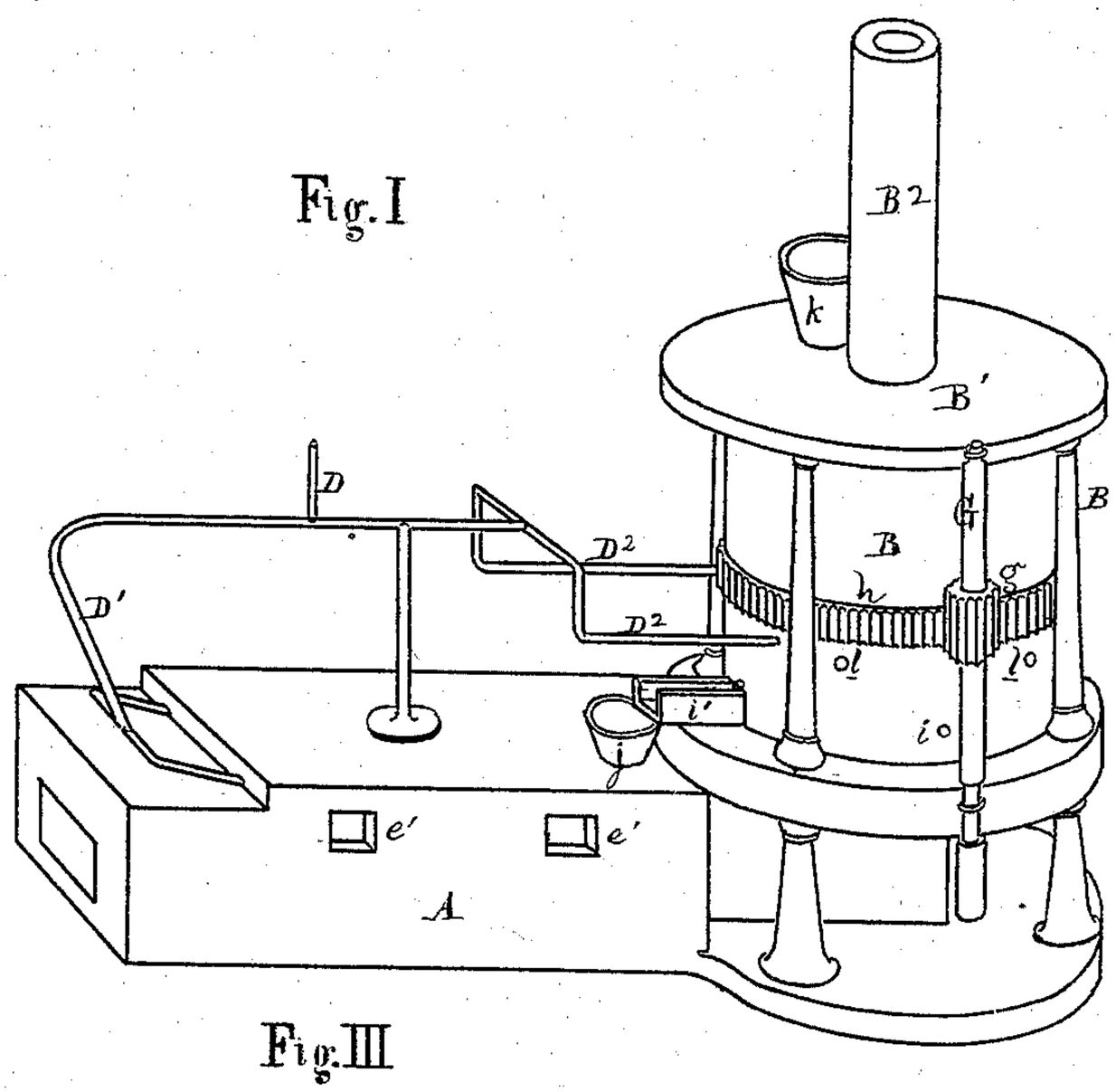

Fig. III

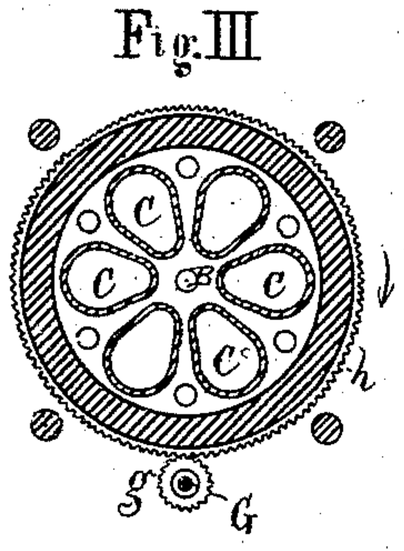

Fig. II

Attest:

H. F. Eberts.

A. J. Sprague

Inventor

John Neville

per attorney

Thos. S. Sprague

UNITED STATES PATENT OFFICE.

JOHN NEVILLE, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO THOMAS HOLIHAN, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN COMBINED ROTARY BLAST AND PUDDLING FURNACES FOR MAKING WROUGHT-IRON DIRECT FROM THE ORE.

Specification forming part of Letters Patent No. **138,429**, dated April 29, 1873; application filed March 28, 1873.

To all whom it may concern:

Be it known that I, JOHN NEVILLE, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Combined Rotary Blast and Furnaces for Making Wrought-Iron direct from the Ore; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon and being a part of this specification, in which—

Figure 1 is a perspective view- Fig. 2 is a central longitudinal vertical section. Fig. 3 is a cross-section of the rotary blast-furnace at *x x* in Fig. 2.

Like letters refer to like parts in the several figures.

This invention relates to a combined blast and puddling furnace designed for making puddled iron direct from the ore, the ore being smelted by the waste heat of the puddling-furnace, the process being continuous; also, to the employment of superheated steam in the smelting process for deoxidizing the ore, the object being to produce a superior quality of metal, with a saving of the cost of the fuel used heretofore in smelting the ore; and to this end it consists in the combination of a peculiarly-constructed rotary blast or smelting furnace with a puddling-furnace, and in the employment, in connection therewith, of superheated steam, in the manner and for the purposes more fully hereinafter set forth.

In the drawing, A represents the walls of an ordinary puddling-furnace, in which *a* is the ash-pit; *b*, the fire-place; *c*, the bridge-wall; *d*, the hearth; *c'*, the back bridge-wall; *e*, the door for charging the fire-place; and *e'*, the door in the side for working the boiling iron. *f* is the flue-opening in the back end of the furnace, discharging the waste heat into the center of a cylindrical stack, B, mounted on a foundation of suitable construction, on which it is rotated by the action of a vertical shaft driven by an engine or other motor, and provided with a pinion, *g*, which meshes with a geared ring, *h*, bolted around the stack about midheight. The cover B^1 of the stack does not revolve, but is supported on the encircling columns, as shown, and from its center a chimney, B^2, rises. Within the rotary stack are placed six or more retorts or smelting-chambers, C, egg-shaped in cross-section, and open at the top, with a tap-hole, *i*, at the lower end of each. *i'* is a stationary spout in the lower part of the stack on the plane of the tap-holes in the several retorts *x*, and discharges through a hopper, *j*, into the puddling-furnace. *k* is a hopper in the top or cover B^1, through which the retorts are successively charged with pulverized iron-ore and carbon. *l* are openings in the revolving stack on the same plane and equidistant from each other, each opening leading into a retort in the manner of a tuyere. D is a steam-pipe conveying steam from a generator and superheater, and is branched over the furnace. One branch, D^1, is again divided and inserted diagonally through the upper part of the furnace in such a manner that the several jets will issue in the direction of the back edge of the bridge-wall, mingling with the flames and gases of the fuel. Around each nozzle an annular space is left in the furnace-wall, through which air is drawn by the inflowing steam-jets, which, mingling with the gases and superheated steam, ignites the gases and produces a perfect combustion and correspondingly-high temperature in the furnace. A second branch, D^2, of the steam-pipe is led toward the stack, where it is again subdivided, each jet or nozzle being coincident with one of the openings *l* in the stack, so that a volume of superheated steam is being continually blown into two of the retorts, which present themselves to the nozzles, while the retort between these two is tapped and the fluid metal contained is being run into the puddling-furnace. During this time the empty retort beyond is being charged with pulverized ore and carbon, and, as before stated, the ore is smelted by the waste heat of the puddling-furnace.

The stack and retorts are so arranged that while one retort is being charged another is being tapped, and two or more others are be-

ing charged with superheated steam for the purpose of deoxidizing the ore by its affinity for the hydrogen of the steam.

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

1. The rotary stack B containing ore-retorts C, in combination with a puddling-furnace, when the reduction of the ore in the said retorts is effected by the waste heat of the puddling-furnace, substantially as described.

2. The arrangement of the pipes D D^2 with relation to the stack B and retorts C for supplying superheated steam thereto, substantially as described and shown.

JOHN NEVILLE.

Witnesses:
WM. H. LOTZ,
THOMAS HOLIHAN.