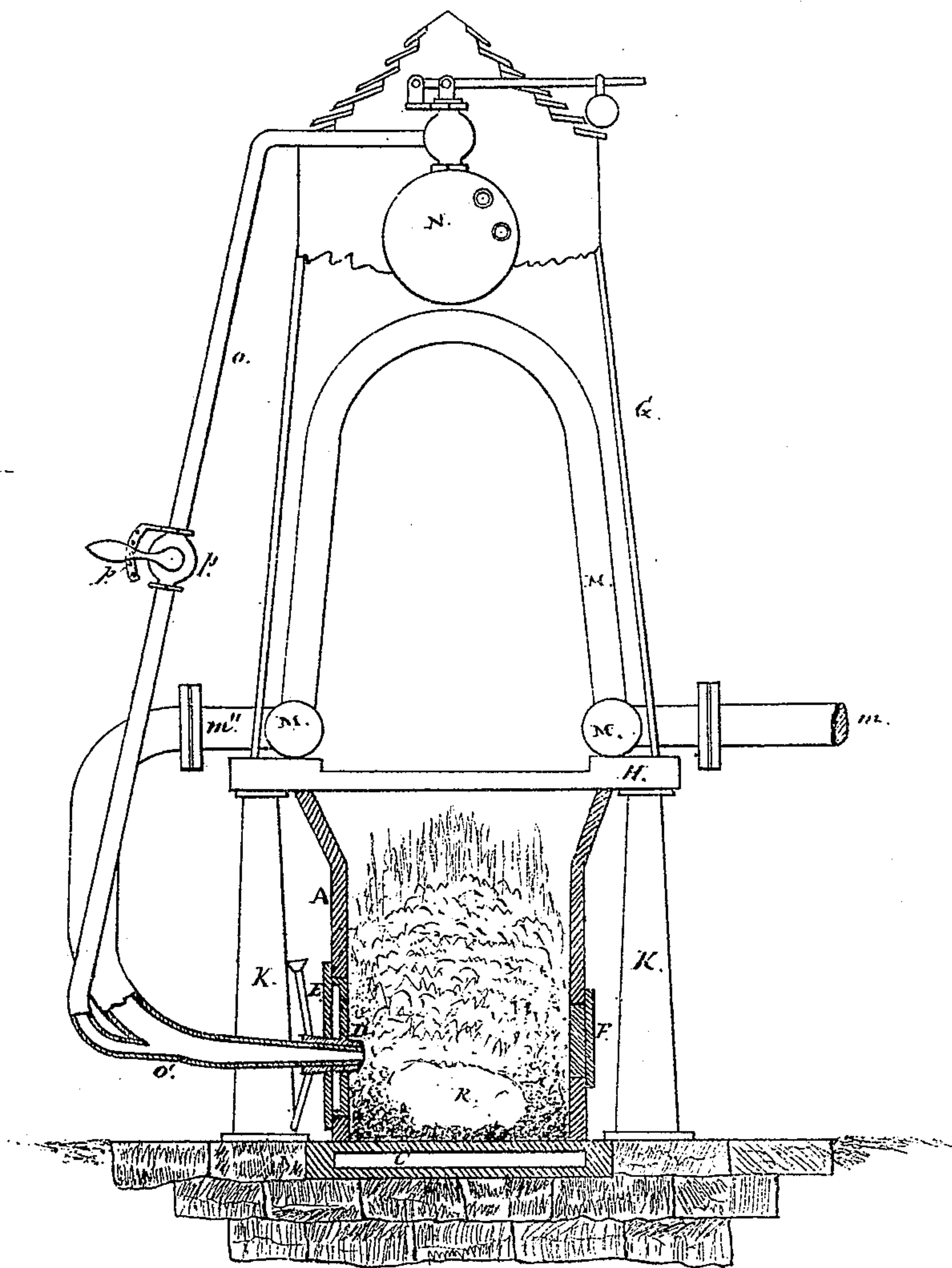


*J. J. G. Collins,*  
*Refining Iron & Steel.*  
*No. 102,501.      Patented May 3. 1870.*

**Fig 1**



*Inventor.*

*John J. G. Collins*

*Witnesses* { *Edw. Brown*  
*Jos. Raby*

# UNITED STATES PATENT OFFICE.

JOHN J. G. COLLINS, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN THE MANUFACTURE OF MALLEABLE IRON.

Specification forming part of Letters Patent No. 102,501, dated May 3, 1870.

*To all whom it may concern:*

Be it known that I, JOHN J. G. COLLINS, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain Improvements in the manufacture of Iron, of which the following is a specification.

The nature of my invention consists in the introduction of a current of steam, in conjunction with the blast to the ordinary Catalan or bloomery fire, and thereby to manufacture a more perfect wrought-iron direct from the ore or pig metal.

To enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

Referring to the drawing accompanying this specification, the figure is a general elevation of the furnace, with some of the parts in section.

The Rogers furnace (an improvement on the old Catalan furnace) is shown surrounded by walls of cast-iron A, and a hollow hearth-plate, C. The tuyere D enters through the water-plate E. A blank water-plate, F, is shown bolted to the opposite side for replacement as it is worn out. The chimney G is carried upon a base-plate, H, resting upon pillars K, and the whole upon a bed of masonry. Within the chimney are placed the hot-blast pipes M, resting upon the base-plate H.  $m'$  is the inlet for the cold air.  $m''$  is the outlet for the hot-blast. In the chimney, above the blast-pipes, is fixed a steam-boiler, N, the steam from which passes down the pipe O through valve  $p$ , and enters

the bottom of the hot-blast pipe at  $o'$ , and from thence passes along beneath the blast into the furnace. Cold-blast may also be used. R represents the bloom of iron in a state of semi-fusion. Above it is the ore and charcoal. The effect of the steam playing on the metal or bloom has the effect of more thoroughly deoxidizing and decarbonizing the metal and reducing it to a more ductile state, termed in the trade "bringing to nature," at one operation. The quantity of steam admitted is regulated by the valve  $p$ , the handle of which,  $p'$ , passes over a graduated arc, so that the workman can control the amount according to the working of the metal. The advantage and beneficial result of this process is most perceptible on magnetic and titaniferous and all refractory ores.

I make no claim to the particular arrangement of the blast-pipes or the position of the boiler, as steam may be taken from any usual source.

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

The application of steam, combined with the blast in the tuyere or pipes connected therewith, for the purpose of reducing magnetic and other refractory ores to a malleable state, as herein described.

JOHN J. G. COLLINS.

Witnesses;

EDWD. BROWN,  
JOS. RABY.