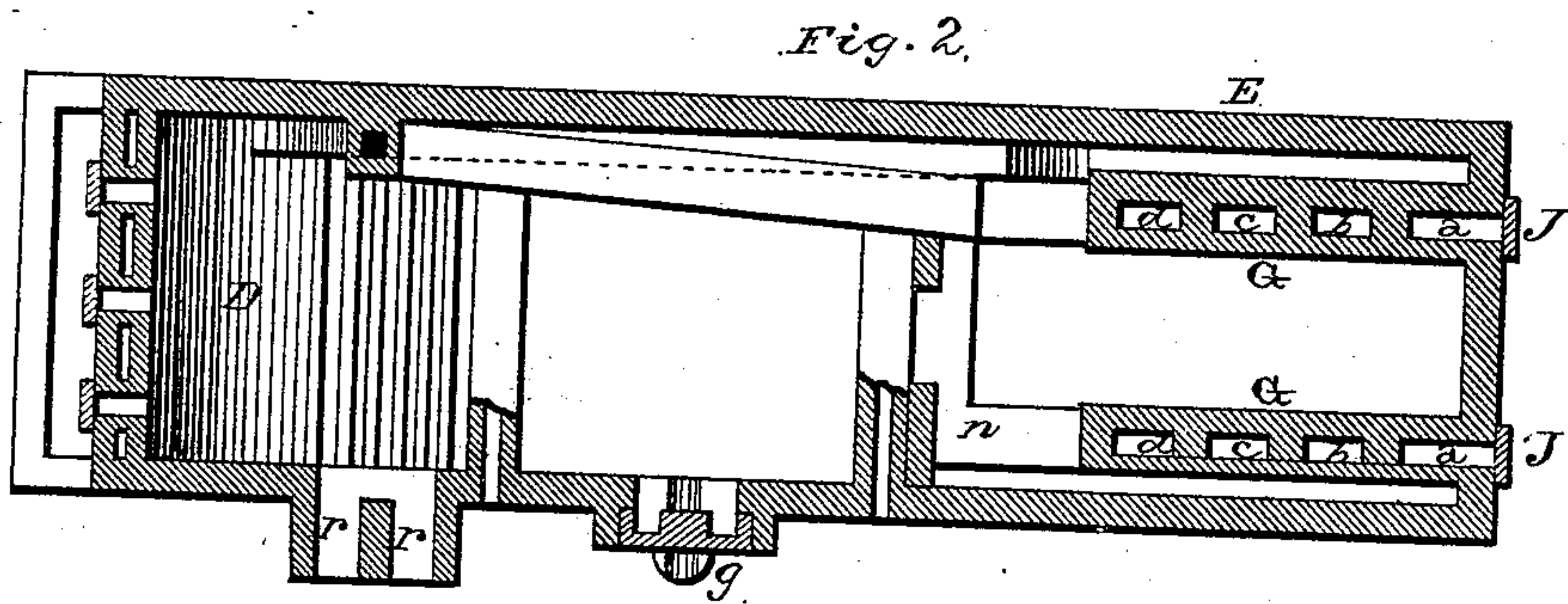
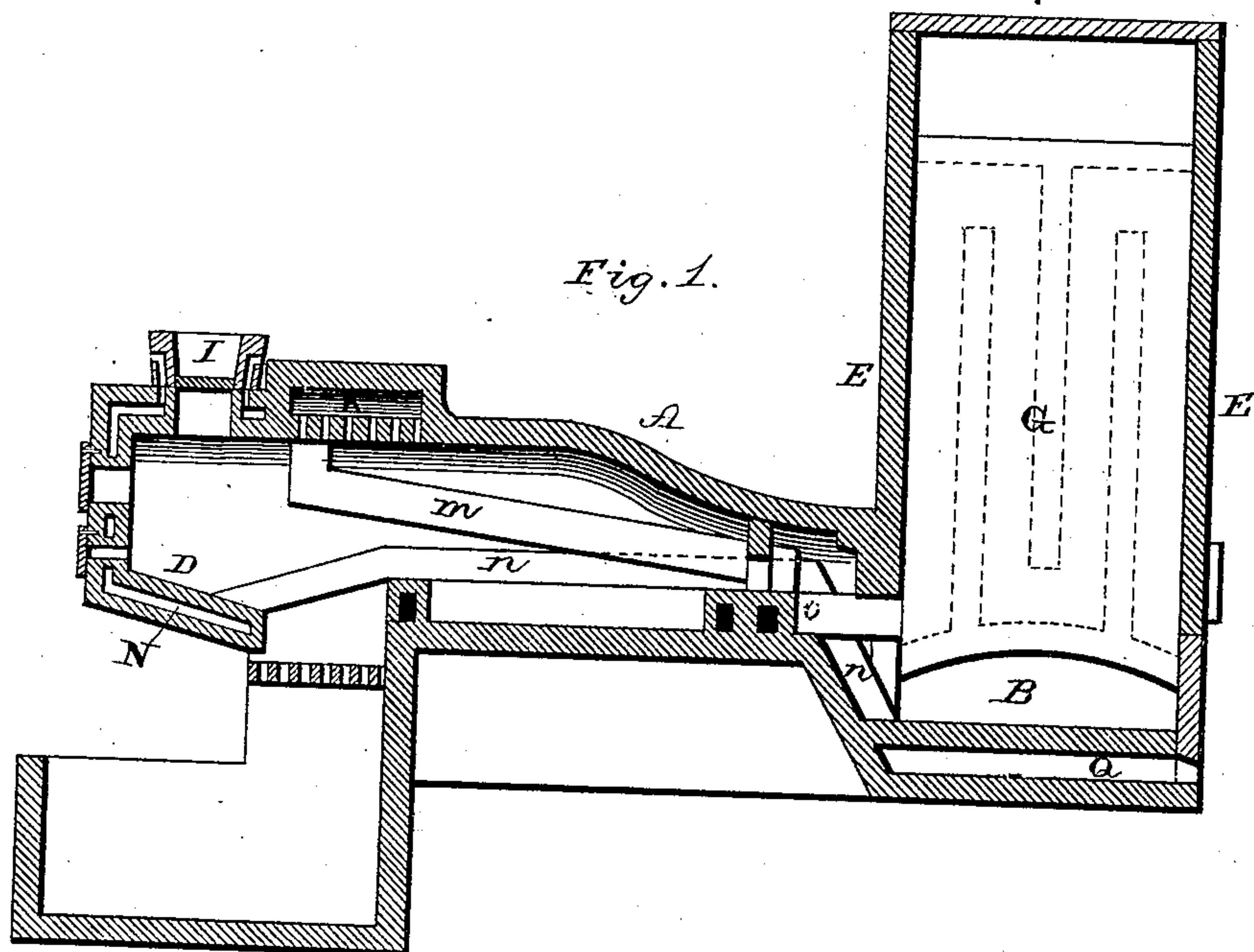


W. L. McNAIR.  
Puddling-Furnace.

No. 207,669.

Patented Sept. 3, 1878.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

WILLIAM L. McNAIR, OF ALLEGHENY, PENNSYLVANIA.

## IMPROVEMENT IN PUDDLING-FURNACES.

Specification forming part of Letters Patent No. **207,669**, dated September 3, 1878; application filed January 21, 1878.

*To all whom it may concern:*

Be it known that I, WILLIAM L. McNAIR, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in furnaces; and it consists in the arrangement and combination of parts that will be more fully described hereinafter, whereby a more perfect combustion of the fuel is produced.

The accompanying drawings represent my invention.

Figure 1 is a vertical longitudinal section of my furnace. Fig. 2 is a horizontal cross-section of my invention.

A represents a furnace with a vaulted roof, gradually lowering toward its hind part. In front of the furnace, and separated from it by the bridge, is the fire-place, with its grate below the level of the bottom of the furnace, access to it being had through the openings *r r* at the side. Near these openings *r r* is a gate or working-door, *g*, for the charge or discharge of the furnace. Separated from the furnace by the fire-place is the inwardly-slanting platform D, upon which the fuel is dropped through the hopper I, in the bottom of which hopper is a slide to open or close it, as may be desired.

The smoke-stack E has at its rear side openings J, which admit air from the outside into chambers G at the inside of the stack, provided with flues *a b c d*. These flues convey the air through flue *o* into flue *m*, from which it passes into the chamber K over the fire-place. The chamber K, having a perforated bottom, allows the air to escape downward, and to mix with the gas evolving from the fuel on the grate.

The chambers G, occupying the sides of the stack, are closed at the top and supported by arches at a suitable height from the bottom, leaving an open space, B, underneath, which space communicates with the furnace by means of a hole in the back wall of the latter. Under the chamber B in the bottom of the stack is a second chamber, Q, also provided with air-holes, which chamber communicates through a passage in rear of the

furnace, and by means of the flue *n*, with the chamber N under the platform D, and around its sides upward through the side openings in the hopper. Three sides of this hopper are double, so as to form chambers or openings to give an outlet to the air, which, in its passage, heats the hopper and the fuel contained in it, and drives off moisture. When the fuel is ignited its heat passes over the furnace, and escapes through the hole in its rear wall down into the space B at the bottom of the stack. Thence ascending in the stack, the inner walls of the chambers G become heated, and the influx of air through the openings J causes a draft, by which the heated air within the flues *a b c d* is forced through flues *o* and *m* into the chamber K, whence it escapes through the holes in its bottom, and mixes with the gas evolving from the fuel. As the air becomes heated in the flues in the stack it flows inward through the flue *m* toward the hot-air chamber with great rapidity and force, and that without the help of any blast or other external means. By means of the slides over the air-holes J the influx of the outer air is controlled.

The flames in their passage to the stack heat the air in the chamber between the furnace and the stack, and the current through the air-holes in the chamber Q forces it through the flue *n* into the space N, under and around the platform D, upon which a large supply of fuel is kept.

The fuel is thus exposed to the heat from the air before it is thrown into the grate, and from its contiguity to the fire in the grate, also owing to the effects of the fire on the grate-bars, a rapid generation of gas goes on, and this, becoming mixed with the hot air from the chamber K, causes a perfect combustion with an emission of heat not obtainable by other known means.

Having thus described my invention, I claim—

The hopper I, surrounded by the hot-air chamber, in combination with the flue *n* and chamber Q, whereby the fuel is dried and heated before it is fed upon the hearth D, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of January, 1878.

Witnesses: WILLIAM L. McNAIR.  
T. F. LEHMANN,  
JAS. T. BUCHANAN.