J. J. READ.

METALLURGIC GAS-FURNACE.

No. 184,905. Patented Nov. 28, 1876.

Fig. 1.

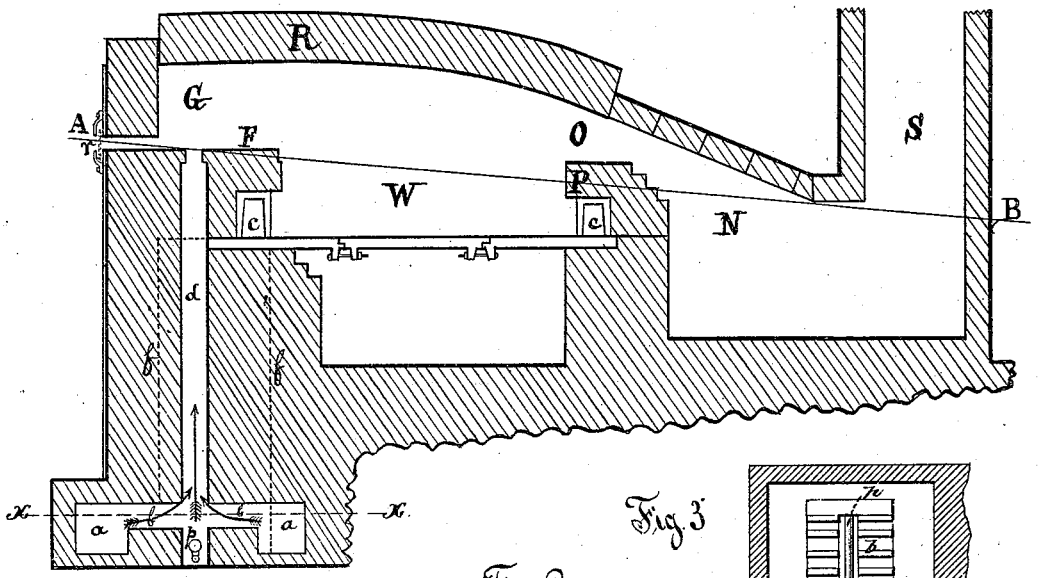


Fig. 3

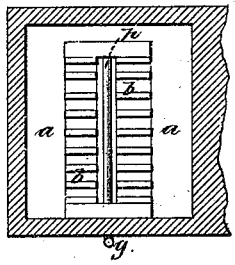
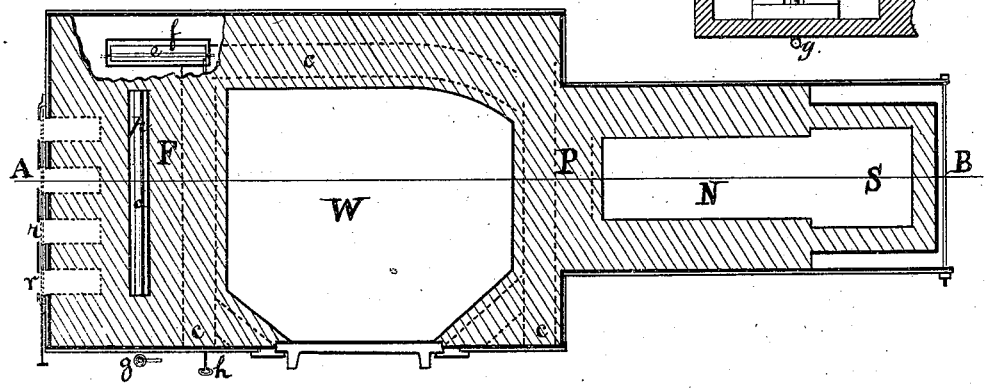


Fig. 2.



WITNESSES

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IMPROVEMENT IN METALLURGIC GAS-FURNACES.

Specification forming part of Letters Patent No. **184,905**, dated November 28, 1876; application filed March 2, 1876.

To all whom it may concern:

Be it known that I, JOHN J. READ, of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Metallurgical Gas-Furnace; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in an improvement in the construction of metallurgical furnaces in which gas is used as a fuel, having more especial reference, however, to the adaptation of existing furnaces to the consumption of natural gas, so called.

My invention consists in so constructing metallurgical furnaces that, first, a chamber is provided in which the air and gas are mixed in proper proportions before entering the combustion-chamber; second, suitable flues and passages are constructed and arranged together for conducting air heated in the chills to the mixing-chamber.

To illustrate my invention I have chosen that class of furnaces ordinarily used for puddling or boiling iron, as will appear by reference to the accompanying drawing, wherein—

Figure 1 is a vertical sectional view taken on the line A B, and Fig. 2 is a horizontal sectional view taken on the same line. Fig. 3 is a transverse section taken on the line *x x*, Fig. 1.

The letters of reference indicate parts as follows: R is the roof. S is the stack. N is the neck. O is the flue. P is the flue-bridge. W is the working-chamber. G is the combustion-chamber, or, rather, a part, (the upper part,) of the combustion-chamber for, in fact, the working chamber is the combustion-chamber. G is the point only where combustion begins, and F is the fire-bridge. These parts are old and in common use. Connecting and communicating with the chamber G is the mixing-chamber *d*, built in the back wall. This chamber, at its base, is traversed by a gas-supply pipe, *p*, which is punctured with small holes across its length. Communicating with the mixing-chamber *d*, at a point a little above the gas-pipe *p*, are the connecting air-passages *b*, formed by leaving out alternate bricks, through which the air passes from the air-chamber *a*. By the natural draft of the furnace the air and gas are drawn up and mixed in the chamber *d*. Combustion is prevented in this chamber by its form and dimensions, and by controlling the proper supply of air for dilution only. The air-chambers *a* connect at one side of the furnace with a down-flue, *f*. (Shown in Fig. 1 by dotted lines, and in Fig. 2 by brick-work being broken away.) This flue *f* connects with the hollow of the chills *c c c*, and affords a passage for the air heated in the said chills to the mixing-chamber *d*, through the air-chambers *a* and passages *b*. In the flue *f* is a valve, *e*, which is operated by a valve-rod, *h*, which passes through one of the chills. This valve is used to regulate the flow of air to the mixing-chamber. The supply of air to the combustion-chamber is regulated by the valve or register at the openings *r*. This register or valve is governed by a rod reaching to the working side of the furnace. The positions of the gas-supply pipe and valve are shown at *g*, also on the working side of the furnace. By bringing the valve-rods and gas-supply-pipe valve to the points named they are in immediate control of the workman.

I am aware that hollow chills have been used by others, and that air has been made to pass through them; but I am not aware that the hollow chills of a puddling-furnace have ever been connected together, and communicated with flues which lead to the combustion-chamber, for the purpose of accelerating combustion by the use of hot air taken from the chills, and for the further purpose of causing the draft of the furnace to maintain a constant current of cold air through the chills for their protection.

In my drawing I show the connected chills communicated with the combustion-chamber through a mixing-chamber, because I first need to use the hot air for diluting the gas; but in furnaces where no mixing-chamber is used the connected chills would communicate directly with the combustion-chamber.

I am also aware that chambers or flues have been constructed in the walls of the fire or heating chamber of puddling-furnace for the

purpose of heating air therein, to be conducted to the combustion-chamber. I claim nothing as new in the use of hot air in the combustion-chamber, nor in heating the said air in passages contiguous to the heating or fire chamber. My whole invention in this particular consists simply in adapting the chills for this purpose, by connecting them together and conducting the air therefrom to the combustion-chamber, and thus not only obtaining the hot air, but also insuring a constant current of air through the chills for their protection. This feature of my invention relates entirely to puddling-furnaces, while the other features are adapted to all kinds of reverberatory metallurgical or other furnaces in which gas is used as a fuel. My intention and aim have been to provide a furnace easily and certainly controlled in temperature and supply of constituents of caloric, and also easily and cheaply adapted to the existing furnaces in use. I claim these advantages for my improvement by the arrangement of its several parts.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The combination of the combined working and combustion chamber W, mixing-chamber *d*, air chambers or passages *a* and *b b*, and gas-supply *p*, the said parts being arranged in substantially the manner shown, and for the purposes named.

2. The combination and arrangement, substantially as herein shown, of the heating-flues *c*, down-take flue *f*, and connecting-flues *a* and *b*, for the purposes mentioned.

3. The combination, within a furnace, of the mixing-chamber *d*, air passages or chambers *a b*, flue *f*, connected with air-heating chamber *c*, and provided with valve *e*, and the gas-supply *p*, having the regulating-valve *g*, all arranged and operating together substantially as shown, and for the purposes mentioned.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN J. READ.

Witnesses:
JOHN ARTHUR,
JOHN K. HALLOCK.