2 Sheets—Sheet 1.

J. PRICE.

REVERBERATORY FURNACE.

No. 169,581. Patented Nov. 2, 1875.

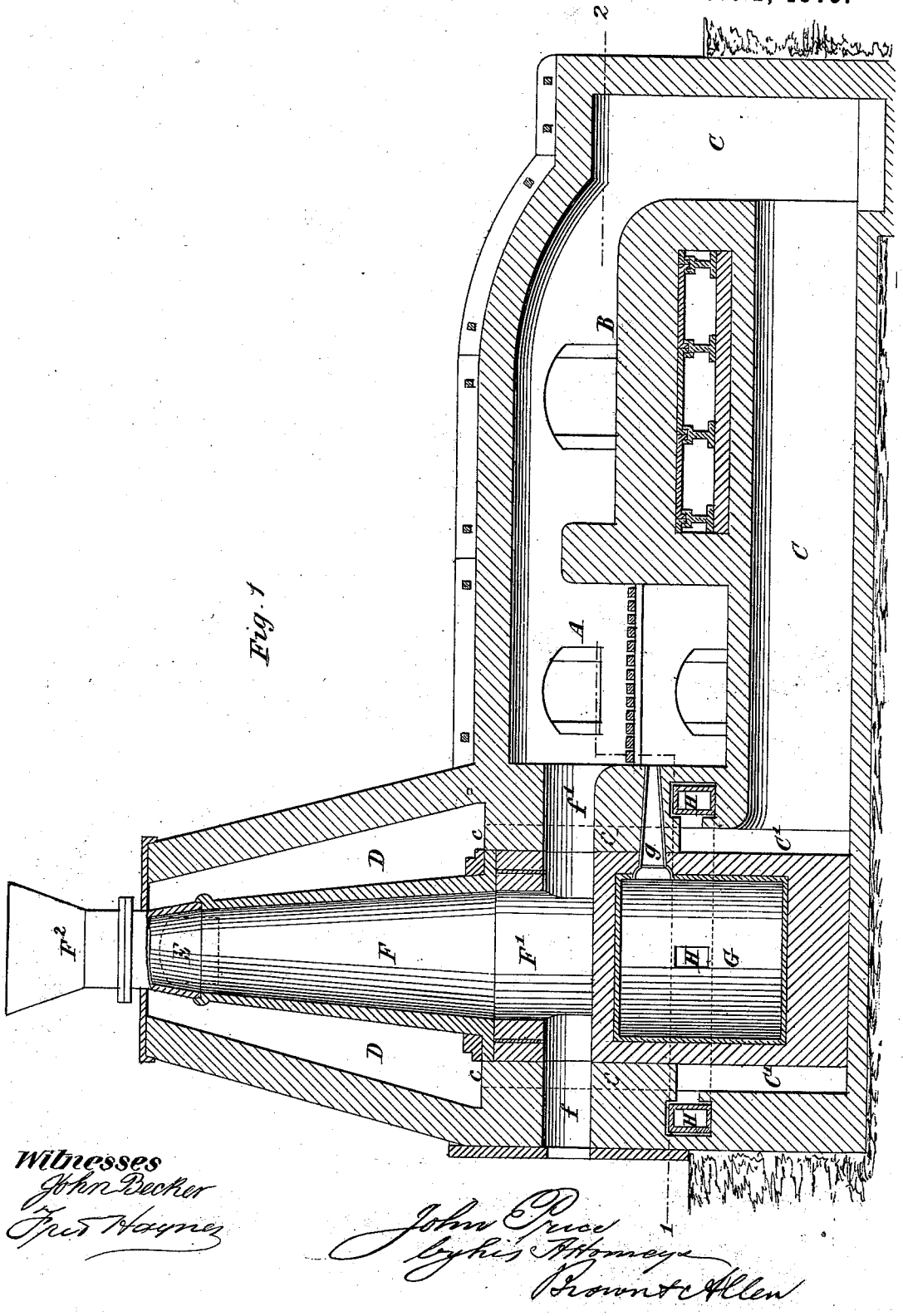

Fig. 1

Witnesses
John Becker
Fred Haynes

John Price
by his Attorneys
Brown & Allen

2 Sheets—Sheet 2.

J. PRICE.

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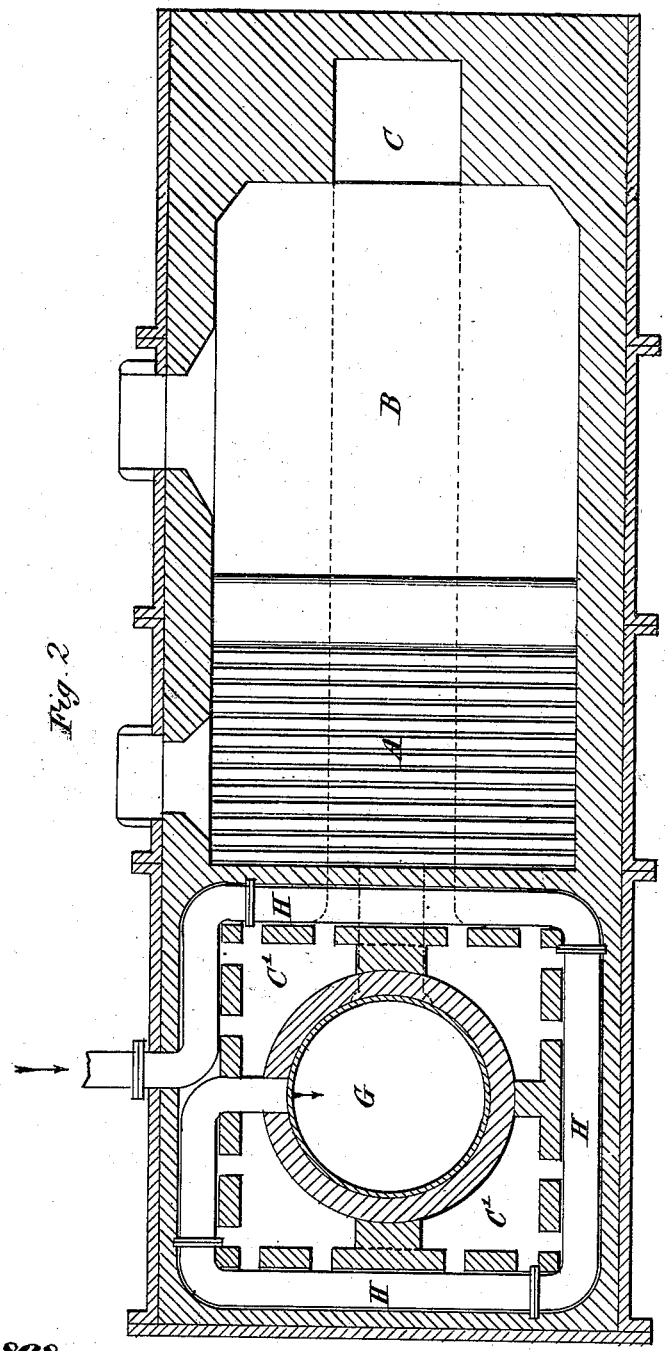

Fig. 2

Witnesses
John Becker
Fred Haynes

John Price
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

JOHN PRICE, OF SUNDERLAND, ENGLAND.

IMPROVEMENT IN REVERBERATORY FURNACES.

Specification forming part of Letters Patent No. **169,581**, dated November 2, 1875; application filed August 2, 1875.

To all whom it may concern:

Be it known that I, JOHN PRICE, of Sunderland, in the county of Durham, England, mechanical engineer, have invented certain Improved Apparatus for Burning Fuel, of which the following is a speification:

The object of this invention is to utilize a larger percentage of the heating-power of fuel than is ordinarily effected in the arts, and to extend the use of some solid fuels, which have at present but a limited application.

My invention applies to metallurgical and other furnaces, a special arrangement of which is employed. The advantages which I obtain are due essentially to the heating of a continuous supply of fuel preparatory to its combustion in the furnace, partly in the gaseous and partly in the solid form, and also to the heating the air employed in keeping up such combustion. These effects I secure by utilizing the heat of the waste products of combustion of the furnace, to which the invention is applied in the manner to be presently explained.

In the accompanying drawings my invention is illustrated in connection with a reheating-furnace; but it will be obvious that in applying it to a puddling-furnace, for example, no change in the arrangement will be required.

In Sheet I, Figure 1 is a central sectional elevation of a reheating-furnace, constructed according to my invention, and Fig. 2 is a sectional plan of the same taken about the line 1 2 of Fig. 1.

A is the fire-place or combustion-chamber, fitted with fire-bars, and B is the hearth, on which are piled the goods intended to be reheated. C C is a return-flue, by which the gases of combustion are led away to an elevated conical chamber, D, which chamber is connected near its upper end by a flue, E, with a chimney-shaft situate at any convenient distance from the furnace. Into this shaft the gases of combustion escape, and by its means the proper ventilation of the furnace is secured. The conical chamber D is constructed to receive a central conical retort, F, in which the fuel to be consumed in the furnace is intended to receive a preparatory heating from the waste gases of combustion on their passage to the chimney. The retort is open at bottom and rests upon brick-work F^1, carried by a cylindrical chamber, G, of cast-iron. This brick-work F^1 forms virtually an extension of the retort, and serves to close the bottom thereof. $f f^1$ are two horizontal passages leading from the retort in one direction to the back of the furnace, and in the opposite direction to the combustion-chamber, for the purpose to be presently explained. The retort is fitted at its upper end, externally of the chamber D, with a hopper, F^2, which may be closed at top by a lid and at bottom by a sliding valve, operated in any convenient manner. Its use is to discharge fuel into the retort from time to time, as required. The retort is made preferably of cast-iron, and in two pieces, which are socketed together. The passage *f* is closed by a door at the back of the furnace, but the other passage f^1 remains open to the combustion-chamber.

Referring now to the return-flue C, which is used to conduct the heated gases from the reheating-chamber to the back of the furnace, it will be seen that this flue terminates in a rectangular chamber of brick-work, C^1, in the center of which is situate the air-chamber G. In connection with this air-chamber is an arrangement of air-supply pipe, H, which are inclosed in the walls of the chamber C′, but are open to the action of the heated gases contained therein. This system of pipes receives atmospheric air, compressed or otherwise, which circulates through the pipes, becoming thereby heated, and enters the central air-chamber G. From this chamber the air, in a highly-heated state, is discharged through an opening, *g*, under the fire-bars in the combustion-chamber A, for the purpose of keeping up a rapid combustion. Fuel is fed to the combustion-chamber A from the retort by pushing it forward through the passage f^1, a suitable instrument being introduced to the retort through the passage *f* for that purpose.

To provide for the heating of the fuel in the retort, the waste gases are led up from the chamber C^1, through flues *c c*, into the conical chamber D, around which they circulate before escaping by the flue E to the chimney. In this way the fuel will be highly heated at the expense of the waste gases on their passage to the chimney, and the fuel will thereby be caused to discharge its gaseous products

into the fire-chamber, where they will be efficiently consumed.

In starting the furnace, it will be understood that the fire must be lighted on the grate in the usual manner, and kept up by a supply of fuel through the door of the combustion-chamber until the retort has become sufficiently heated. When this has been effected the further charging of the chamber will be from the retort. For this purpose the attendant will from time to time open the door of the passage *f* and drive forward, as before stated, the heated fuel which rests upon the bottom of the retort. The superincumbent fuel in the retort will then fall down to take the place of that which has been discharged, and room will thus be provided at the top of the retort for the admission of fresh fuel, the weight of which, assisted by the downwardly-increasing diameter of the retort, will drive down any partially-coked fuel that may adhere to the sides of the retort. In this way a supply of heated fuel to the furnace may be kept up for an indefinite length of time, thus greatly adding to the efficiency of the furnace.

It will be understood that by treating the fuel as above described, and bringing it and the air required to maintain combustion to a heated state, not only will a more perfect combustion of the fuel be effected than is now commonly secured, but the proportion of heat thereby generated will be largely increased, and very high temperatures may also be attained.

Having now set forth the nature of my invention, and explained the manner of carrying the same into effect, I wish it to be understood that I do not claim, broadly, the supplying of heated fuel to furnace-grates, as attempts have heretofore been made to that end; but

What I claim is—

The combination of the combustion-chamber A, the heating-chamber or hearth B, the return-flue C, the retort-heating chamber D, with its contained fuel-retort F, and the hot-air chamber G, for supplying heated air to the combustion-chamber, with which the fuel-retort is also in communication, substantially as shown and described, and for the purposes herein set forth.

Dated the 21st day of May, 1875.

JOHN PRICE.

Witnesses:

HENRY DIXON,
216 *High street, Sunderland.*
ARNOLD G. SIMEY,
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