R. S. ROBERTSON, Jr.

GAS BURNING METALLURGIC FURNACE.

No. 180,274. Patented July 25, 1876.

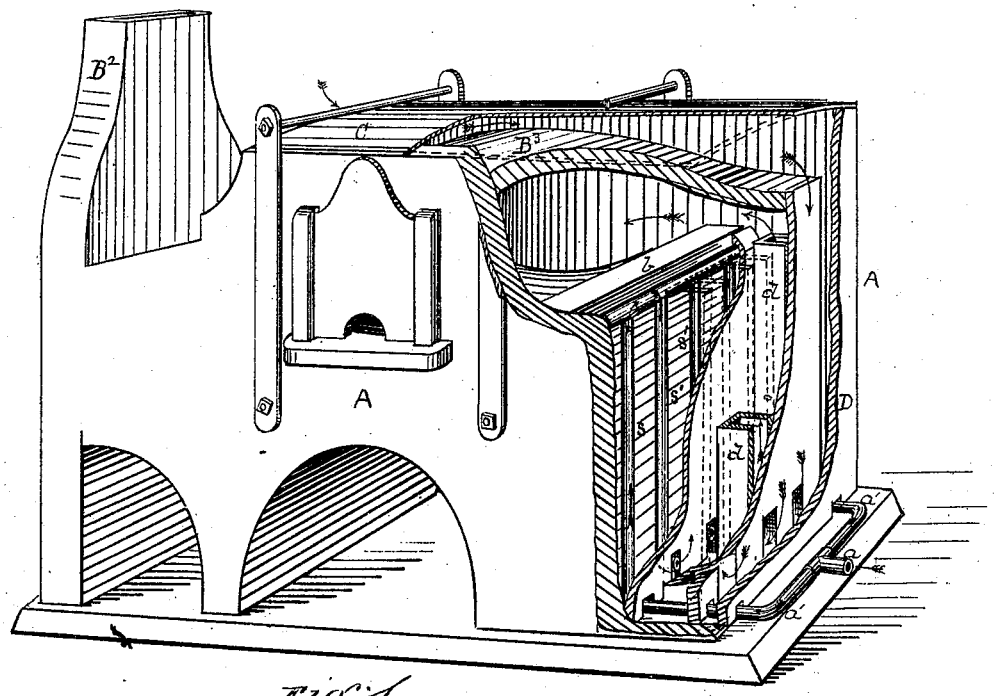

Fig. 1.

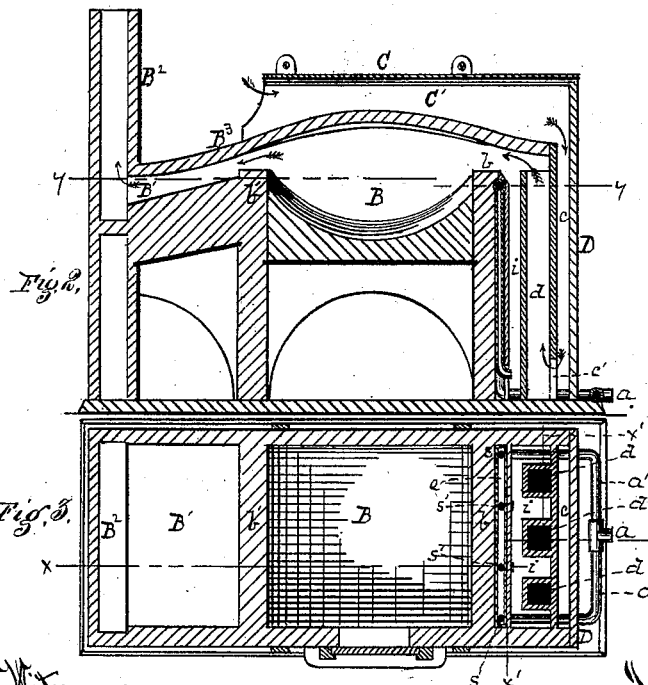

Fig. 2.

Fig. 3.

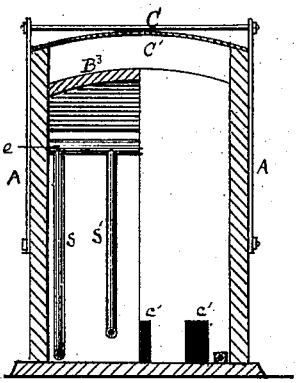

Fig. 4.

Witnesses

Robt. S. Robertson Jr.

Claudius L. Parker

Inventor

Richard S. Robertson Jr.

By George H. Christy,

his Atty

UNITED STATES PATENT OFFICE.

RICHARD S. ROBERTSON, JR., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN GAS-BURNING METALLURGIC FURNACES.

Specification forming part of Letters Patent No. **180,274**, dated July 25, 1876; application filed April 29, 1876.

To all whom it may concern:

Be it known that I, RICHARD S. ROBERTSON, Jr., of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Gas-Burning Metallurgic Furnaces; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, like letters indicating like parts.

Figure 1 is a perspective view, partly in section, of my improved furnace. Fig. 2 is a vertical longitudinal section thereof in the line *x x*, Fig. 3. Fig. 3 is a horizontal sectional view in the line *y y*, Fig. 2; and Fig. 4 is a transverse vertical section in the line *x' x'*, Fig. 3.

My improved furnace is particularly designed for the use of gas as the heat-producing agent.

The walls A are of the usual or any desired construction, as also the working-chamber B, neck B^1, stack B^2, cover or roof B^3, and bridge-walls *b b'*.

Where the fire-chamber is usually made, I inclose a space by means of a close end wall, D. I place an additional cover, C, over the usual roof B^3, so as to leave an interposed flue, C', which latter is open at the end toward the stack, and at its opposite end communicates with a diving-flue, *c*, just inside the end wall D. In the lower end of the opposite wall are the holes *c'*, which communicate with the uptake-flues *d*, the latter opening at or about the level of the bridge-wall *b*.

The flues thus far described are air-flues for the supply of heated air, the air in flowing along being raised to a high temperature, especially in passing over and along the cover B^3.

The walls of the flues *c d*, becoming heated by heat conducted and radiated from the furnace, also aid in heating the air to the desired temperature.

Gas is introduced by a connection at *a*, whence it follows the branching pipe *a'*, enters the furnace, and passes up the pipes *s s*, which are arranged against or in proximity to the vertical face of the bridge-wall *b*, so as to be heated thereby, and thence by a cross-connecting pipe, *e*, to and down the pipes *s'*, arranged in like manner as the pipes *s*, and is thence discharged into the space or open uptake-flues *i*.

The object of the comparatively large flues *i* is to allow the gas to expand before it reaches the place of ignition, as, in the class of furnaces to which my improvements are most advantageously applied, the gas is introduced under a considerable pressure; hence the flues *i* act both as conducting-flues and as expansion-chambers, and the air-flues *d* are arranged in this chamber *i* at a little distance apart, so as to give an alternate arrangement of air and gas supply at the place of ignition.

By these flues it is conducted up, and it is ignited at the level of the fire-bridge, where the desired amount of oxygen is supplied by the air entering, in the manner described, through the flues *d*.

A vivid combustion takes place, so that the desired heat is obtained for the metallurgic operations which it is desired to carry on in the working-chamber B.

With a very slight change the construction of furnace described can be applied to the ordinary reverberatory furnace, and I have found by practical experience that excellent results are produced; and I claim its application in connection with metal-working and metal-heating furnaces generally.

I claim as my invention—

1. A flue, C', over the roof of the furnace, and the diving and uptake flues *c d* arranged relatively to the bridge-wall, substantially as set forth, in combination with a gas-supply furnished at or near the level of the bridge-wall.

2. The gas-supply pipes *s s'*, arranged up and down the bridge-wall, and uptake gas-flues *i*, in combination with air-heating supply-flues, substantially as set forth.

3. The expansion gas-chamber and flue *i*, in combination with pipes *s s'*, and air-flues *c d*, substantially as set forth.

In testimony whereof I have hereunto set my hand.

RICHARD S. ROBERTSON, JR.

Witnesses:

JAMES A. McKEAN,

GEORGE H. CHRISTY.