2 Sheets--Sheet 1.

W. SWINDELL.

Metallurgic-Furnace.

No. 165,630. Patented July 13, 1875.

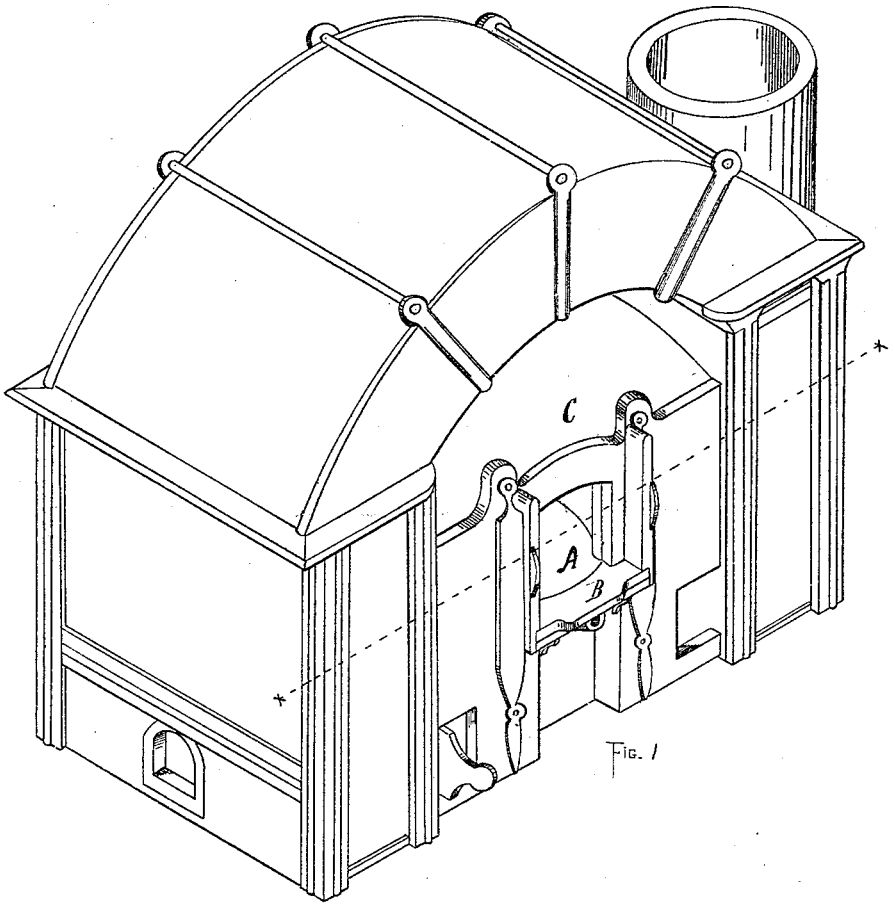

FIG. 1

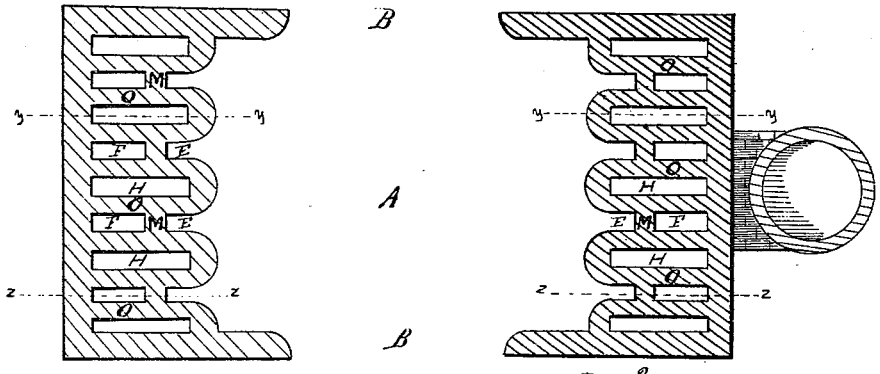

FIG 2

WITNESSES.

James L. Kay

R. H. Wrenshall

INVENTOR.

William Swindell

by Bakewell & Kerr

attys

2 Sheets--Sheet 2.

W. SWINDELL.

Metallurgic-Furnace.

No. 165,630. Patented July 13, 1875.

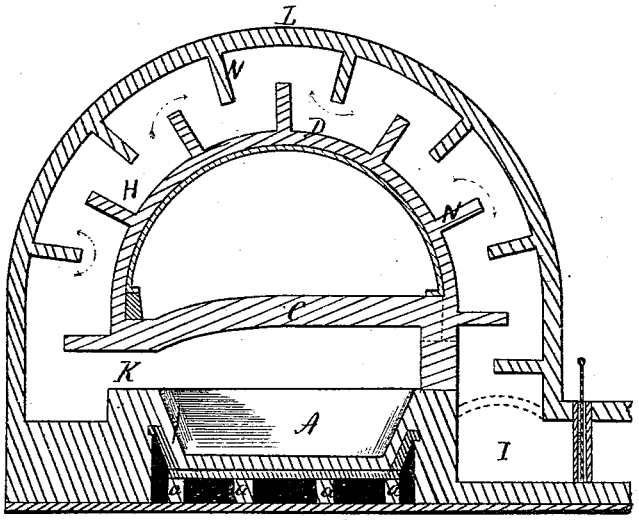

FIG. 3

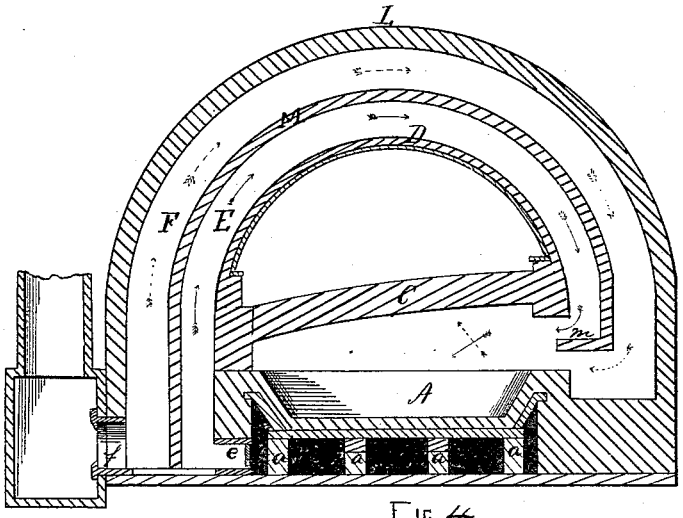

FIG. 4

WITNESSES.

James L. Kay

R. Swindell

INVENTOR.

William Swindell

by Bakewell & Kerr

Attys

UNITED STATES PATENT OFFICE.

WILLIAM SWINDELL, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN METALLURGIC FURNACES.

Specification forming part of Letters Patent No. **165,630**, dated July 13, 1875; application filed February 15, 1875.

To all whom it may concern:

Be it known that I, WILLIAM SWINDELL, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Metallurgic Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a perspective view of a furnace embodying my invention. Fig. 2 is a horizontal section on the line *x x* of Fig. 1. Fig. 3 is a vertical section on line *y y* of Fig. 2; and Fig. 4 is a similar section on the line *z z* of Fig. 2.

Like letters refer to like parts wherever they occur.

My invention relates to the construction of metallurgic furnaces of that class with which regenerators are commonly employed; and it consists in a novel arrangement of the regenerator passages for the air, gas, and products of combustion above the hearth, and in such relation thereto that the full heating effect of the products escaping from the hearth is obtained, the durability of the furnace increased, and economy of space and material effected.

Heretofore, in the construction of metallurgic furnaces having regenerators connected therewith, the regenerator has been built separately from the furnace, or the hearth has been built over the regenerator-chambers—the first form requiring greater room, and not utilizing the heat to the best advantage, and the second form productive of injury to the regenerator, on account of the weight of the superimposed furnace-hearth. These objections I overcome by constructing my furnace as follows:

In the drawing, A represents the hearth of a metallurgic furnace, supported as at *a a*, to permit the circulation of air beneath the hearth, and provided with working doors B B. C is the roof or crown, over which is sprung an arch, D, leaving a clearance between the arch and roof for the free circulation of air, so that undue heating of the furnace-walls is avoided, and provision is made for renewing the crown of the furnace and side walls. The arch D forms the floor of one set of flues E, and of the flues H for the waste gases—the whole being inclosed by a second arch, L, which forms the outer wall or roof of the flues H, and of gas flues or passages F. The space between the arches D and L is divided by cross-walls O, and the alternate flues of the series thus formed are subdivided by intermediate arches or walls M M, which separate the passages for the air and gas, while the passages traversed by the products of combustion are rendered tortuous by projecting walls or ledges N, which retard the escaping waste gases, retaining them in contact with the side walls of the gas and air flues. By this series of walls and cross-walls are formed the gas-flues F, air-flues E, and waste-gas flues H—the first two provided with suitable inlets, guarded by valves *e* and *f*, and the latter communicating with the stack through cross-flue I. The intermediate walls M are provided at the mouth of the furnace with horizontal extensions *m*, which deflect the air, causing it to enter the furnace at a point above the gas-inlet. K is the neck or throat of the furnace, and is arranged relatively to the point where the gas and air are admitted to the flues E and F, so as to always preserve the temperature of said flues E and F above the point at which carbon and soot will be deposited, whereby the clogging of the flues is prevented.

The operation of the devices is as follows: The valves *e* and *f* being raised, air will enter the passage E from beneath the hearth, where it has already absorbed some heat from the furnace-bottom, and gas will enter the flue F from a suitable generator or reservoir. The two currents, traveling in the line of the arrows, will absorb the heat from the side walls O, to which it has been communicated by the outgoing products of combustion, and the air and gas, becoming mingled at the mouth of the furnace, will burn upon the hearth. The waste gases, escaping at the opposite side of the furnace into flues H, traverse the same, in turn giving up their heat to the incoming air and gas, finally escaping into the stack through cross-flue I. The products of combustion, air, and gas all travel in the same direction, and the waste gases consequently

are hottest at the point where the gas and air first enter into the flues E and F.

From the description of the construction and operation of the above devices it will be seen that the relative position of the hearth and regenerator best adapted for convenience in working has been preserved. The location of the regenerator is such as to utilize all the heat from the waste gases, and at the same time permit a free circulation of air around the hearth to preserve it. The form of the regenerator enables the usual form of brick to be employed in its construction, and neither the hearth nor regenerator is encumbered by the extra or superimposed weight of the other.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the hearth A, the arched regenerator, located over the hearth and spanning the same, to permit a circulation of air over the hearth, substantially as specified.

2. A regenerator having air and gas flues E and F, arranged side by side, separated by a common wall, M, and alternating with flues H for the waste products, substantially as and for the purpose specified.

3. In a regenerator-furnace, the air and gas flues E F, separated by a common wall, M, in combination with the flues H, provided with deflecting-ledges N, substantially as and for the purpose specified.

4. The throat K of the furnace, in combination with the flue F, substantially as specified, so that the waste gases escaping from the hearth shall impinge upon the gas-flue near the point where the gas is admitted.

In testimony whereof I, the said WILLIAM SWINDELL, have hereunto set my hand.

WILLIAM SWINDELL.

Witnesses:

F. W. RITTER, Jr.,

W. N. PAXTON.