2 Sheets—Sheet 1.

W. S. GILLEN.

Metallurgic Gas-Furnaces.

No. 199,362. **Patented Jan. 22, 1878.**

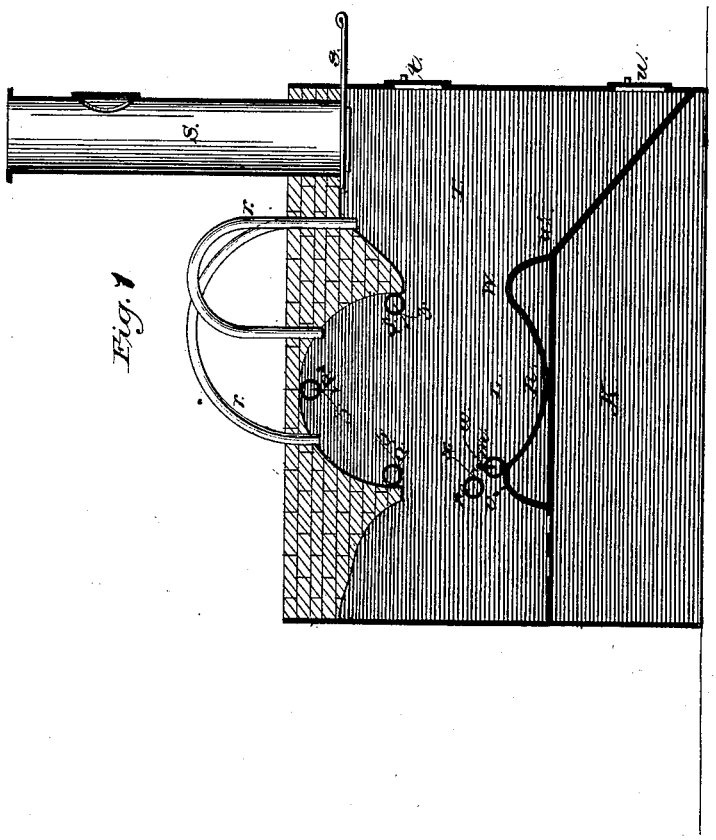

Fig. 1

Attest:

John Burke
Jno. P. Clarke

Inventor:

W. S. Gillen

2 Sheets—Sheet 2.

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Metallurgic Gas-Furnaces.

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Fig. 3.

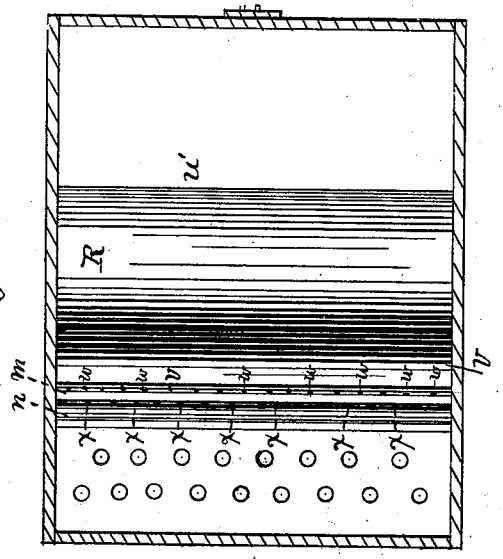
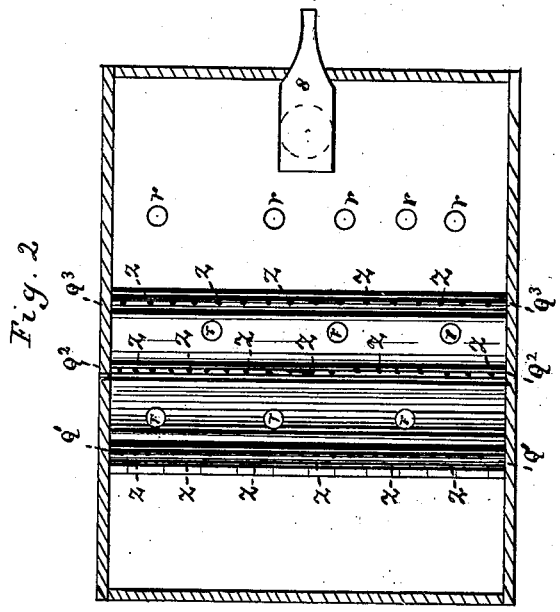


Fig. 2.



Witnesses
E. E. Masson
A. R. Cook

Inventor
W. S. Gillen
by Chas. G. Page atty.

UNITED STATES PATENT OFFICE.

WILLIAM S. GILLEN, OF PITTSBURG, ASSIGNOR OF PART OF HIS RIGHT TO JAMES S. NEGLEY, JR., AND H. C. CAMPBELL, OF SAME PLACE, AND D. B. ASHBAUGH, OF LEECHBURG, PENNSYLVANIA.

IMPROVEMENT IN METALLURGIC GAS-FURNACES.

Specification forming part of Letters Patent No. **199,362**, dated January 22, 1878; application filed February 17, 1876.

To all whom it may concern:

Be it known that I, WILLIAM S. GILLEN, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Metallurgic Gas-Furnaces; 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.

My invention relates to an improvement in metallurgic gas-furnaces; and it consists, essentially, in the construction and combination of a hearth and certain pipes, as hereinafter more fully set forth, whereby a perfect concentration of the heat and flame within the fire-chamber will be attained, and also a complete combustion of the gas be insured, all as hereinafter described.

Referring to the accompanying drawings, Figure 1, Sheet 1, is a vertical central section of a furnace with my improvements applied thereto. Fig. 2, Sheet 2, is a horizontal central section of the same, looking upward. Fig. 3 is a like section, looking downward.

The fire-chamber L has a hearth, R, of approved form, with an offset, V, several inches from the edge of the hearth to the inside of the front wall. With this offset a gas-inlet pipe, *m*, is built transversely with respect to the furnace and the length of the hearth inside the furnace, and as near the edge of the hearth as it can be without suffering injury from heat. A sufficient number of perforations, *w*, are made in the upper side of this pipe, opening into the fire-chamber in an upward direction, to permit sufficient gas to escape to supply the furnace; or the gas may be introduced into the furnace through three or more pipes opening in the offset, so as to permit the gas, &c., to ascend toward the arch of the fire-chamber. When the perforated burner *m* is used a similar pipe, *n*, is built into the front wall a few inches above the burner, with openings *x* in a downward or sloping direction toward the center of the hearth, the perforations in this pipe corresponding with those in the burner, so that a hot-air blast through a pipe connected with it in the wall will strike the flame a few inches above the burner. When, however, as above described, the gas is admitted through pipes opening into the fire-chamber through the offset V, then a corresponding number of pipes running through the front wall of the furnace should be employed, the said pipes having the same function relatively to the pipes opening through the offset as the perforations in the pipe *n* have to those in the pipe or burner *m*. These air-blasts are so arranged that they strike the inner cone of the flame, changing the direction of the flame to a horizontal or downward course, and furnishing the necessary supply of oxygen to support combustion.

Three transverse pipes, Q^1 Q^2 Q^3, are built in the arch of the furnace, having perforations *z* on the under side. The center one opens directly downward. The front one, over the burner, opens inward toward the center of the hearth. The back one is built well down in the bridge, just above the throat, likewise opening inward toward the center of the hearth. Through these pipes a hot-air blast is forced, by which, in conjunction with the blast from the front-wall pipes, the flame and heat are massed in the center of the fire-chamber over the hearth, and pressed downward, so that all the heat is concentrated on the metal or other substance to be operated upon.

Any gas escaping through the throat of the furnace is carried back into the furnace by means of arched pipes *r*, opening in the neck T of the furnace just back of the throat W, and into the fire-chamber through the arch, each alternate pipe opening in the arch of the fire-chamber by the side of the center air-blast pipe Q^2, and the others being, respectively, by the side of the front and the rear blast-pipe Q^1 Q^3. The blast through these air-pipes causes a draft through the arched pipes, thereby drawing the gas into them and discharging it mixed with oxygen, so as to support complete combustion.

The draft through the stack S is regulated by a damper, *s*, in the mouth, while an air-inlet, *t*, in the rear of the furnace, just below the

damper, admits air to the neck of the furnace, furnishing cold air to the damper as protection, and aiding to give draft to the arched pipes. Back of the throat an inclined floor is made in the furnace, which slopes to an opening, *u*, in the rear of the furnace, for dross to escape. Cold air entering this opening passes into the neck of the furnace, still further aiding to drive the heat, gas, &c., into the arched pipes.

This furnace affords perfect and complete combustion of the gas, &c., and at the same time it masses the heat and flame, pressing them down onto the metal, &c., in the hearth of the fire-chamber.

What I claim is—

1. In a metallurgic gas-furnace, the hearth R, provided with an offset, V, and perforated pipe *m*, in combination with the air-blast pipes Q^1 Q^2 Q^3, located above the hearth, and the pipe *n*, located in front of the same, the said parts being arranged and adapted to concentrate the heat, substantially in the manner herein specified.

2. In a metallurgic gas-furnace provided with the above arrangement of hearth and pipes, the arched pipes *r*, communicating with the neck T of the furnace, and with the fire-chamber L alongside of the blast-pipes Q^1 Q^2 Q^3, substantially as shown and specified.

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

W. S. GILLEN.

Witnesses:
JOHN BURKE,
JNO. P. CLARKE.