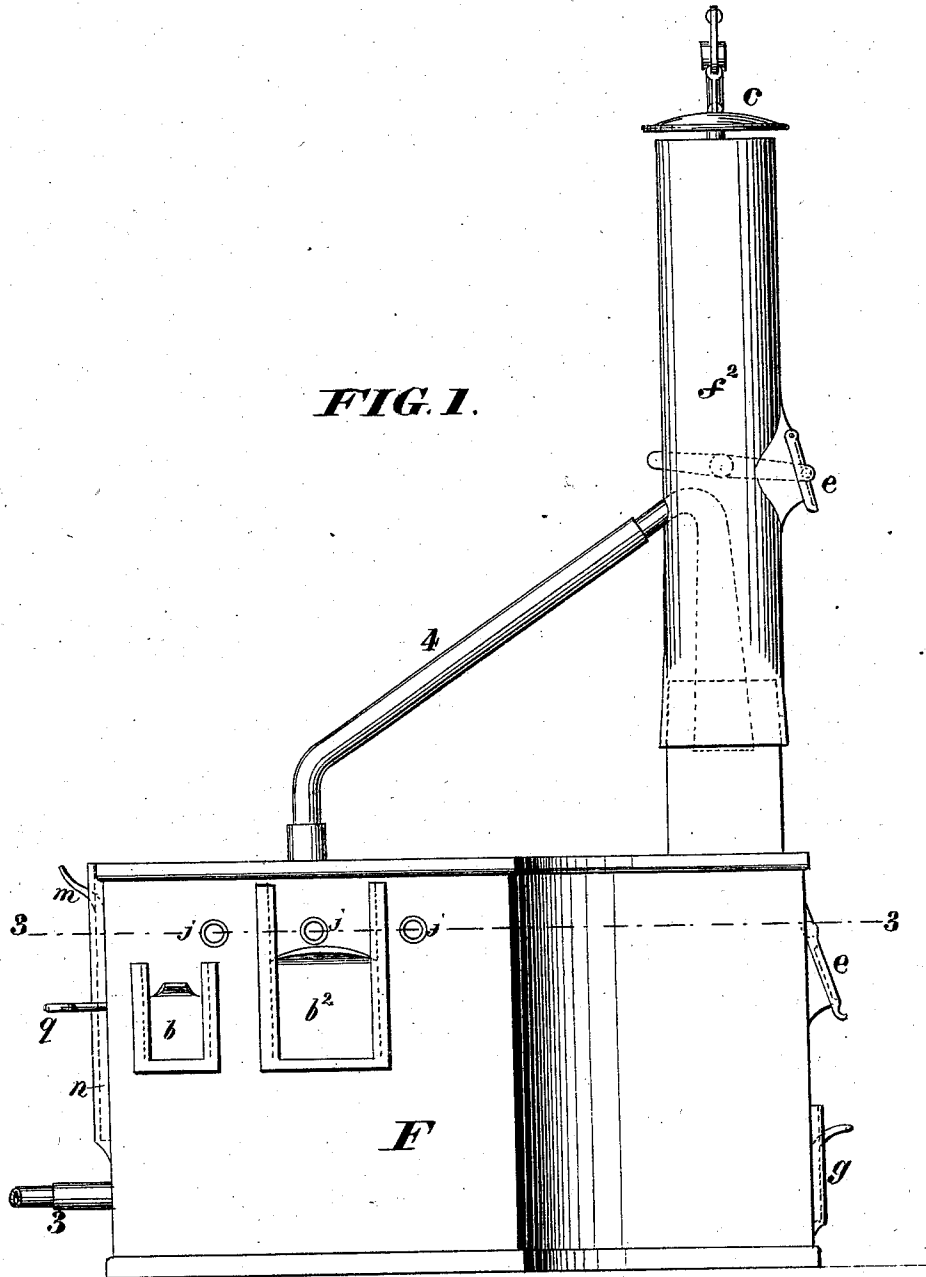


W. S. GILLEN.
Gas-Furnaces for Manufacturing Iron and Steel.
No. 155,577.

Patented Oct. 6, 1874.



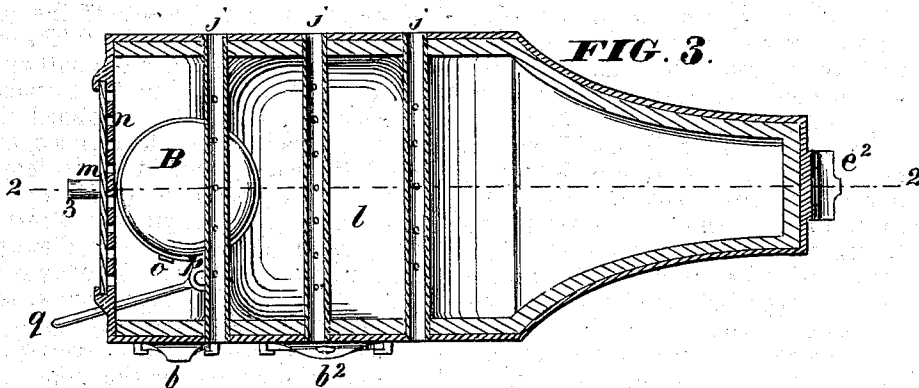
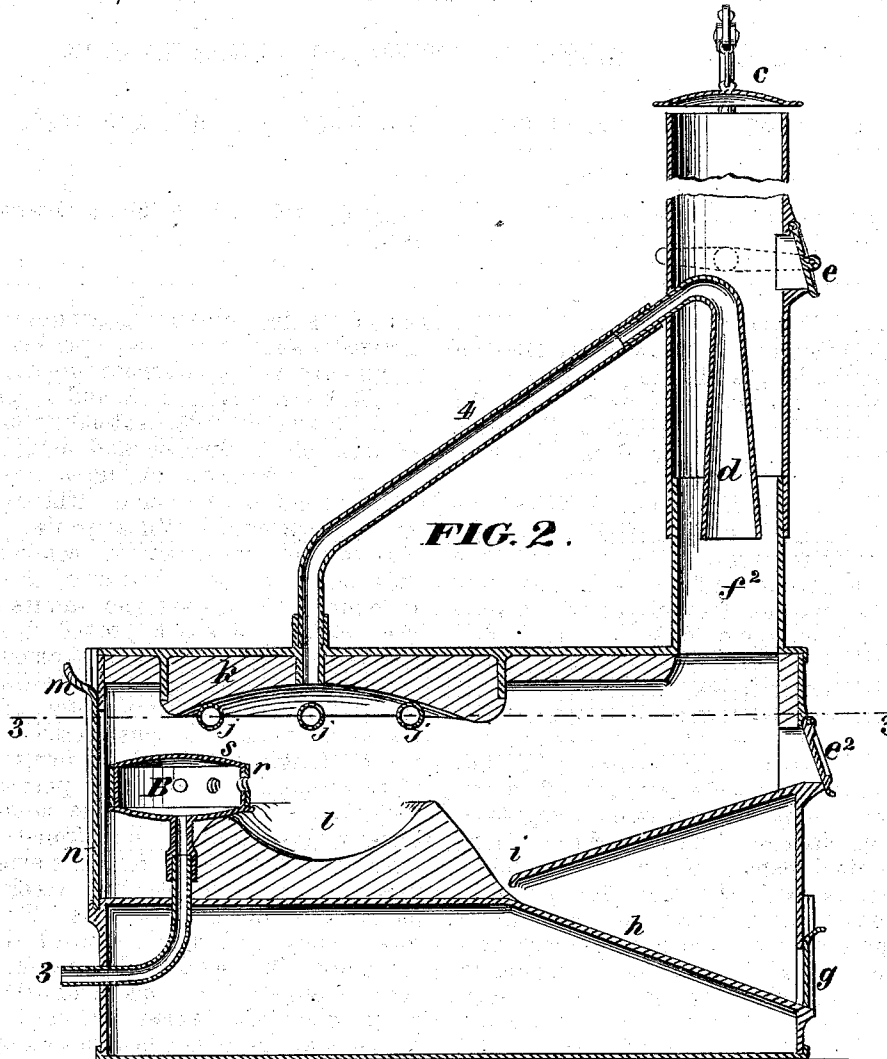
WITNESSES

Walter Allen
Henry Tanner.

INVENTOR

William S. Gillen
By *Freight & Co.* Attorneys

W. S. GILLEN.
Gas-Furnaces for Manufacturing Iron and Steel.
 No. 155,577. Patented Oct. 6, 1874.



WITNESSES

Walter Allen
Henry Farmer

INVENTOR

William S. Gillen
 By *Quigley & Prosser* Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM S. GILLEN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN GAS-FURNACES FOR MANUFACTURING IRON AND STEEL.

Specification forming part of Letters Patent No. **155,577**, dated October 6, 1874; application filed July 30, 1874.

To all whom it may concern:

Be it known that I, WILLIAM S. GILLEN, of the city of Pittsburg, and county of Allegheny, in the State of Pennsylvania, have invented a new and useful Improvement in Gas-Furnaces for Manufacturing Iron and Steel, of which the following is a specification:

This invention relates primarily to the economical use of hydrocarbon oil or gas as fuel in metallurgic furnaces. It relates further to means for applying the flame and preventing wasteful escape, and for facilitating the separation and discharge of dross, as hereinafter set forth.

The invention is embodied in a simple puddling-furnace of peculiar construction.

The gas or oil is fed to a burner of peculiar construction, the discharge being regulated by means of a register-slide or valve. The supply of air to support combustion is regulated in a similar manner. The arch of the furnace is longitudinal instead of transverse, and air is admitted beneath the arch through perforated pipes, so as to throw the flame downward upon the metal. The dross is discharged at the rear end of the hearth, and means for readily withdrawing the same is provided. Cold-air inlets, in the wall of the furnace and in the stack, produce an eddy within the latter, so as to prevent the escape of flame. An inverted funnel within the stack between the air-inlets receives the flame thus stopped, and a pipe leading from the said funnel conducts the flame or the heat thereof into the furnace at or about the center of the arch.

In the accompanying drawings, Figure 1 is a side elevation of an improved puddling-furnace illustrating this invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a horizontal section on the line 3 3, Fig. 2.

The walls and other parts of this furnace not hereinafter specified may be of any common or preferred construction.

Hydrocarbon gas or oil from any source, and treated in such manner as may be necessary or preferred, is conducted by a pipe, 3, to a burner, B, in what is termed the front end of the furnace. The burner B is constructed with a large circular head, s, having cylindrical walls, which are perforated for the escape of the gas or oil, the same being so ar-

ranged as to properly distribute the flame. A register-slide or valve, r, perforated correspondingly with the burner proper, regulates the discharge of gas or oil, and is operated by means of a handle-rod, q, extending out through the front of the furnace, and attached to an arm, p, of the valve. A lug, o, prevents any displacement of the valve. The front of the furnace is provided with a grating, n, for the admission of air to support combustion. A slide, m, covers more or less of this grating, as required to regulate the admission of air. The hearth l of any approved form is constructed within the furnace immediately behind and below the level of the burner, and this receives the charge of metal. Above the hearth an arch, k, is constructed, and this is formed longitudinally of the furnace instead of transversely, so as more perfectly to reflect the heat back upon the molten metal. Beneath this arch one or more transverse pipes, j, perforated in their under sides extend transversely of the furnace, and receive atmospheric air at one or both ends. The air from these pipes, striking downward, throws the flame upon the metal, and increases its effect, besides assisting in the combustion of the gases which are formed within the furnace. At the rear end of the hearth l an opening, i, is formed for the discharge of dross, which, owing to the arrangements of the hearth and arch, boils over at this point. The dross is received on an incline, h, at the bottom of which a door, g, is provided in the furnace-wall for withdrawing the dross. The stack f² extends from the rear end of the furnace, and is provided at about midheight with a door or valve, e, for the admission of cold air. A second door, e², for the same purpose is formed in the rear wall of the furnace immediately beneath the throat of the stack. An eddy is formed in the stack by opening these doors, and the escape of any flame which may enter the stack is thereby prevented. An inverted funnel, d, within the stack, below the upper air-door e, receives the arrested flame. A pipe, 4, extending from this funnel into the top of the furnace, at or about the center of the arch k, conducts the flame or highly-heated gases and air from the funnel d into the fire-space of the furnace, where they are again used. The or-

dinary damper *c* is applied to the top of the stack to regulate the draft. Doors *b* *b*² in the side of the furnace give access to the burner and hearth.

The improved burner provides for regulating the discharge of gas or oil with the greatest nicety; also to spread out the flame horizontally over the surface of metal.

The improved furnace as a whole operates to economize heat and to facilitate the puddling operation.

The following is claimed as new in this invention, namely:

1. As means for burning hydrocarbon gas or oil in a metallurgic furnace, the burner B having a large circular head, *s*, with lateral discharge-orifices for distributing the gas or oil, and a circumferential register slide or valve, *r*, for regulating the discharge, as set forth.

2. The combination, in a puddling-furnace, of a grated or perforated front wall, *n*, furnished with a slide, *m*, for regulating the en-

trance of air, and the burner B supplied with heated gas or oil, arranged with reference to the hearth, as herein shown and described, for the purposes set forth.

3. A puddling-furnace provided with two air-inlets, *e* *e*², arranged, respectively, in the stack and rear wall, an inverted funnel, *d*, arranged in the furnace-stack between said air-inlets, and a pipe, *4*, leading from said funnel through the side of the stack and into the top of the furnace at or near the center of the arch, the same being combined substantially as herein shown and described, to operate in the manner set forth for arresting the flame within the stack and conducting the unconsumed gases back into the furnace.

In testimony of which invention I hereunto set my hand this 14th day of July, 1874.

WILLIAM S. GILLEN.

Witnesses:

JAS. L. EWIN,

WALTER ALLEN.