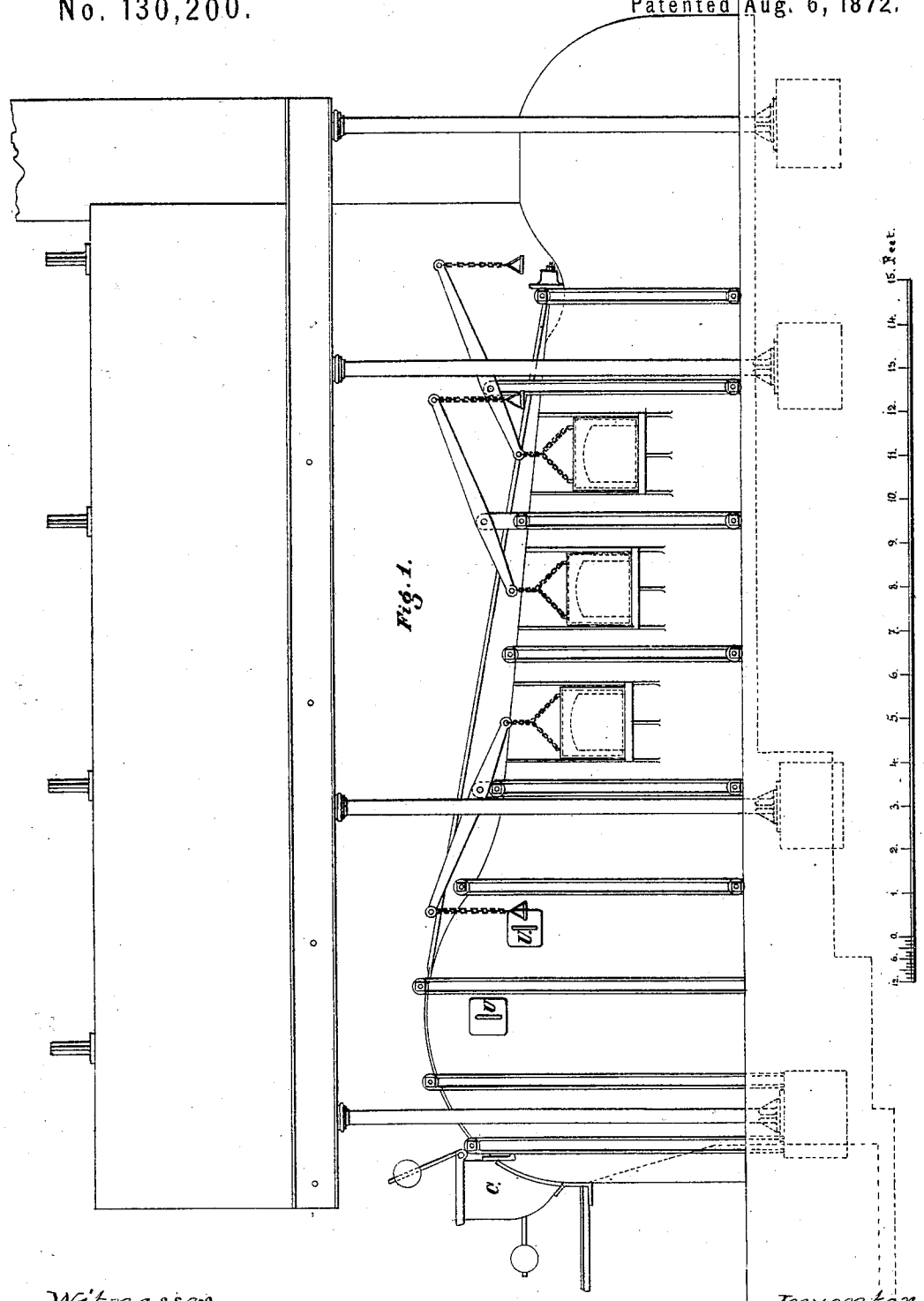


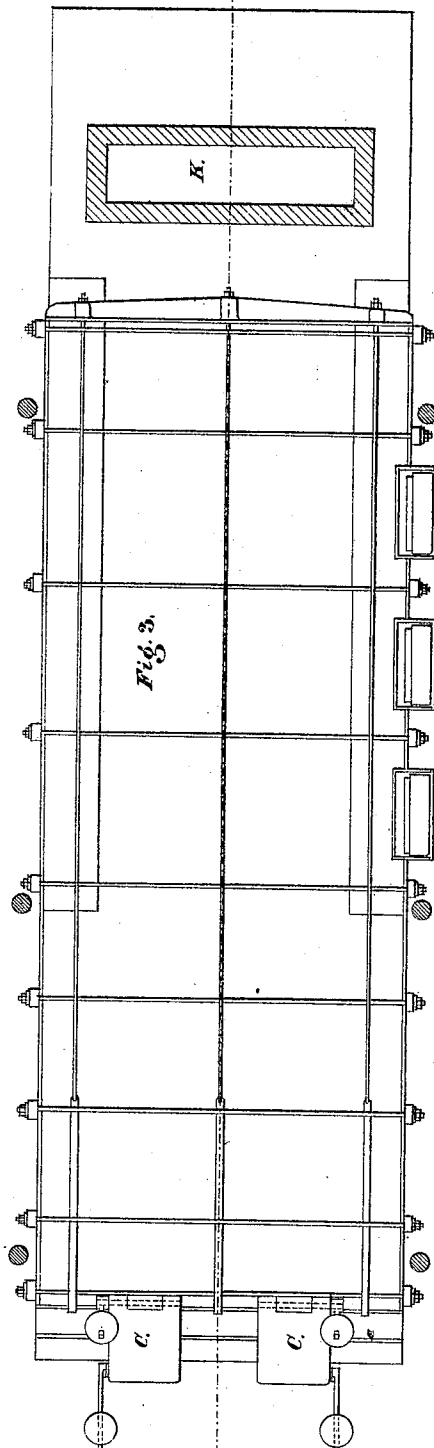
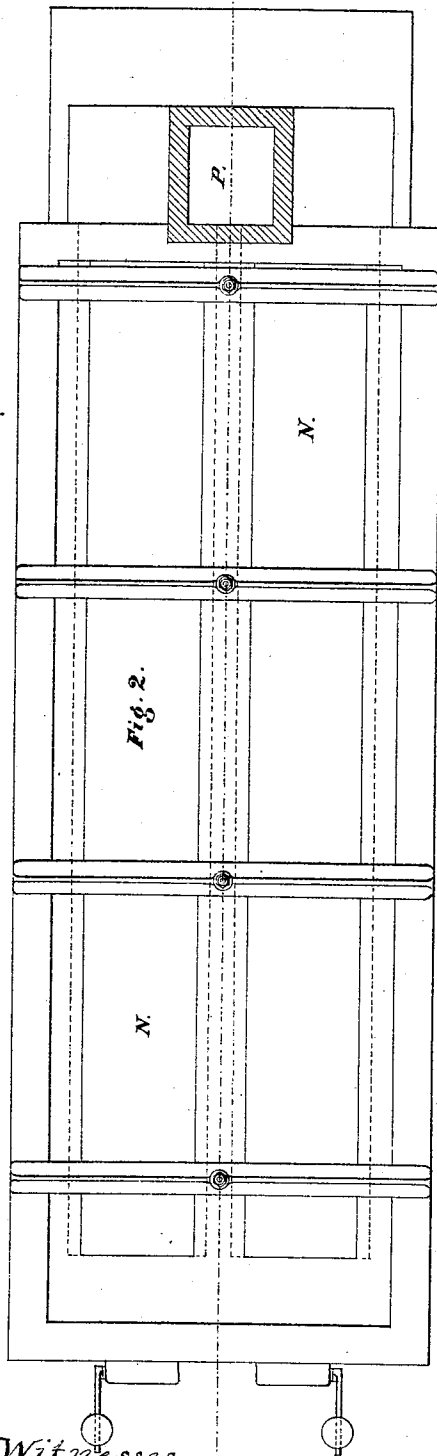
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Improvement in Metallurgic-Furnaces.
No. 130,200. Patented Aug. 6, 1872.



Witnesses.
Chas. H. Ladd
Emil Heisner

Inventor.
Z. S. Durfee

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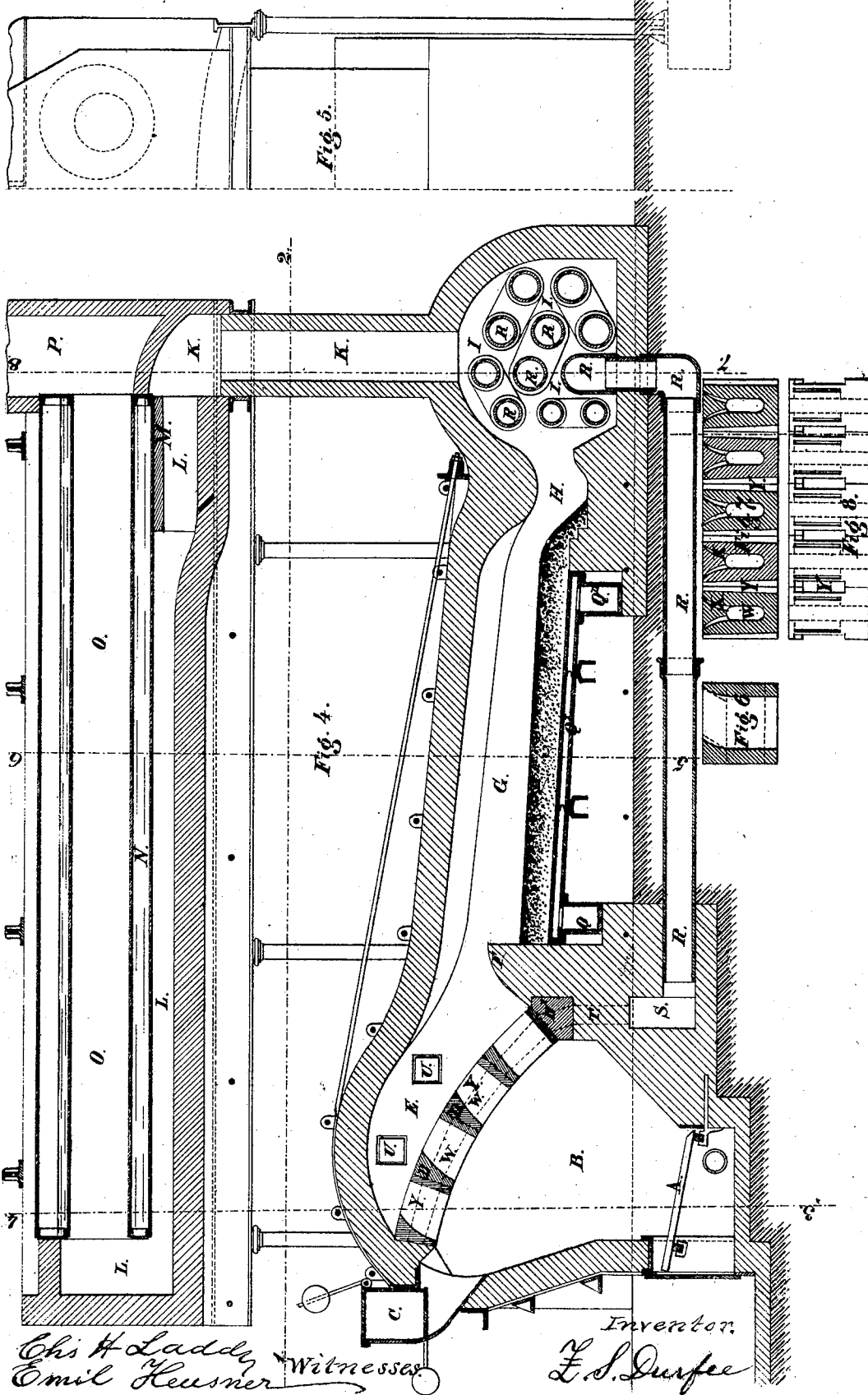
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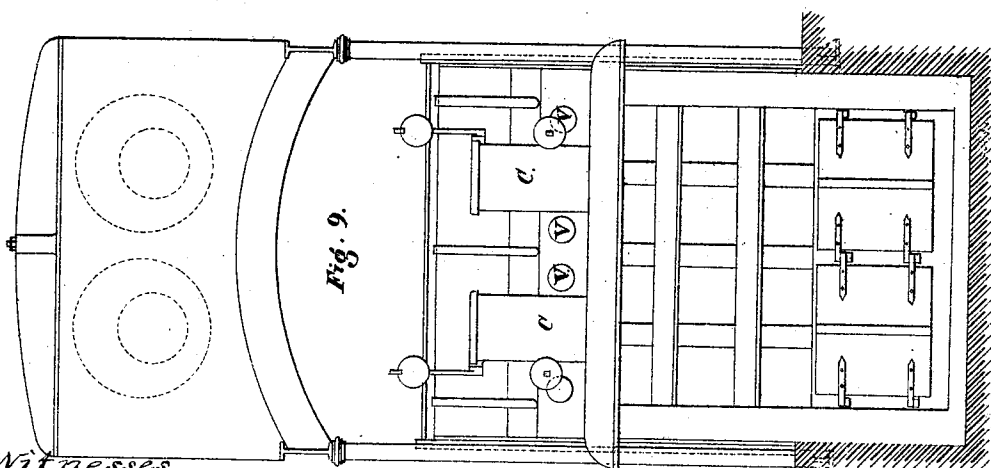
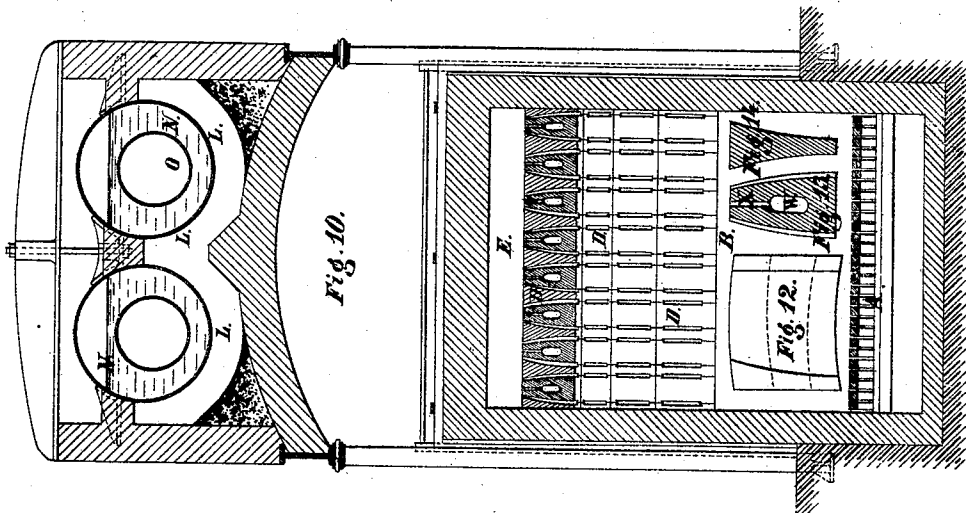
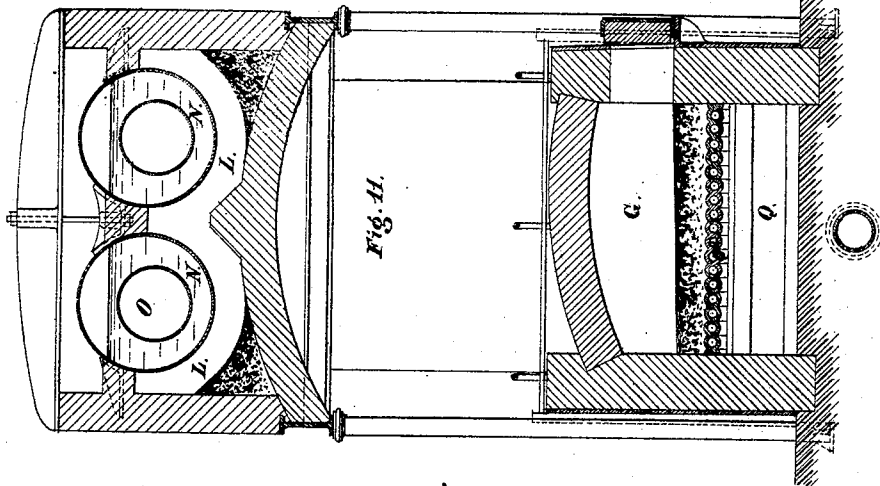
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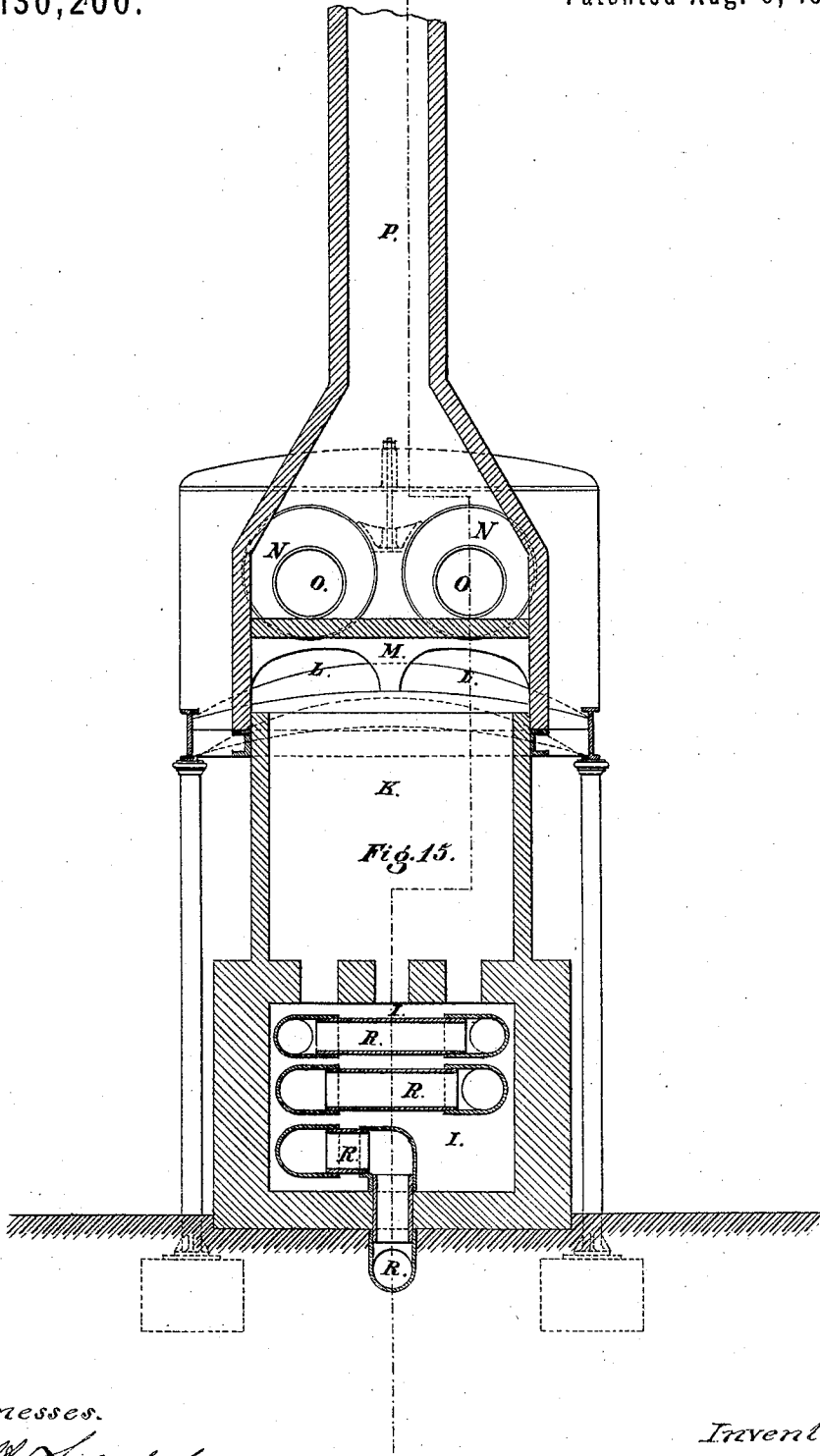


Witnesses.
Chas H. Ladd
Emil Hauser

Inventor.
Z. S. Durfee

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Chas. H. Ladd
Emil Heusner

Inventor.
Z. S. Durfee

UNITED STATES PATENT OFFICE.

ZOHETH S. DURFEE, OF NEW YORK, N. Y.

IMPROVEMENT IN METALLURGIC FURNACES.

Specification forming part of Letters Patent No. 130,200, dated August 6, 1872.

I, ZOHETH S. DURFEE, of the city of New York, have invented certain Improvements in Furnaces for Metallurgical and other uses.

My invention consists principally in a new plan of constructing the fuel-chambers of furnaces, in which the fuel is first developed, by partial combustion, into combustible gases, and then the combustion of these gases is completed by an additional supply of air introduced into a combustion-chamber.

Figure 1 shows an elevation; Figs. 2 and 3, plans of the top of the furnaces and of the boilers over them; Fig. 4, a vertical longitudinal section; Fig. 5, a half end view of the back of the furnace; Figs. 6, 7, and 8, details of one plan of the bricks for the arch over the fuel-chamber; Fig. 9, a front view; Figs. 10 and 11, vertical cross-sections; and Figs. 12, 13, and 14, details of another plan of the bricks for the arch over the fuel-chamber.

The fuel-chamber has a grate, A, of any of the usual forms. The space B for the fuel is much larger than in ordinary furnaces. The fuel is fed in by feeding-hopper C, and it is partially consumed on the grates A by air, by preference, forced in under moderate pressure. The gases developed by this partial combustion pass up through the open spaces in the fire-brick arch D D, and are consumed in the combustion-chamber E by air forced in through the pipes R R into the distributing-chamber S and up through the flues T T and passages W and X in the hollow bricks of the arch D D. These passages, and the bricks in which they are formed, are shown clearly in Figs. 6, 7, and 8, where Fig. 6 shows a vertical section of the bricks through the gas flue or passage Y; Fig. 7, a cross-section, showing the air-flues W W communicating with the flues T T, through which the air enters, and the narrow slits X X, through which it is distributed to mingle with the gases passing up through Y Y. Fig. 8 is a top view of the bricks, showing the relative positions of the air and gas passages as they communicate with the combustion-chamber E. The air-passages X X are made at such an angle as that air forced through them will commingle with the gases coming up through Y at a little distance from the top of the arch D D. Figs. 12, 13, 14 show another plan of making the bricks forming the arch D D; and

the same plan is shown in section in Fig. 10. In this plan there are two forms of bricks—one (Fig. 14) being a mere wedge to separate the gas-passages, which are formed on each side of the brick, shown in vertical section in Fig. 12 and in cross-section in Fig. 13. The proper construction of these bricks will be understood by reference to the section of the arch D D in Fig. 10. In some cases I may mold the arch D D in place in the furnace and burn it there by a fire on the grate. U U, Figs. 1 and 4, show holes for giving access to the combustion-chamber, and V V, Fig. 9, show holes through which the fuel in the fuel-chamber may be stirred from time to time, as required. The arch D D rests on an abutment-brick, D', which is built into a wall of ordinary fire-brick, forming the back wall of the fuel-chamber and the bridge F. I prefer to heat the air for completing the combustion of the gases, and to that end, and in order also to cool the bottom plates of the furnace, I make said plates hollow and support them on boxes Q Q' and usual bearers, as shown in Figs. 4 and 11, and force the air through the box Q, from which it passes, through the plates Q' and box Q', to a series of pipes, R R, in the base of the chimney, and then to the distributing-chamber S and through the passage T T and arch D D, as previously described. The waste heat from the furnace passes around the pipes R R up through the flue K and passages L L under the boiler N, which is placed over the furnace, and then back through the flue O to the chimney P, so that all or nearly all the waste heat from the furnace will be utilized. The arches M M will prevent any too severe action of the heated gases upon the parts of the boiler on which they first impinge. Those portions of the pipes R R which are exposed to intense heat may be made of or covered with fire-clay.

It will be manifest that in lieu of being combined with a metallurgical furnace, as shown in the drawing herewith, the fuel-chamber B and arch D D may be substituted for many of the ordinary furnaces for boilers for generating steam.

In a patent granted to me March 19, 1872, and numbered 124,672, for an "improvement in base-burning steam-boilers," I have shown and claimed a diaphragm intended to operate

somewhat as does the arch D D; and I do not now claim broadly such a mode of effecting complete combustion of fuel in furnaces; neither do I now claim all the details of construction shown in my drawing and described in this specification; but, reserving my right to whatever is novel in both,

What I now claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the arch D D with a fuel-chamber, B, and a furnace, G, and air-

pipes R R, substantially as and for the purposes described and shown.

2. The modes of constructing the bricks forming the arch D D, shown in Figs. 6, 7, and 8, and in Figs. 12, 13, and 14 of the drawing herewith.

ZOHETH S. DURFEE.

Witnesses:

CHI H. LADD,
EMIL HEUSNER.