J. K. CALDWELL.

FURNACE.

No. 169,338. Patented Nov. 2, 1875.

Fig. 1

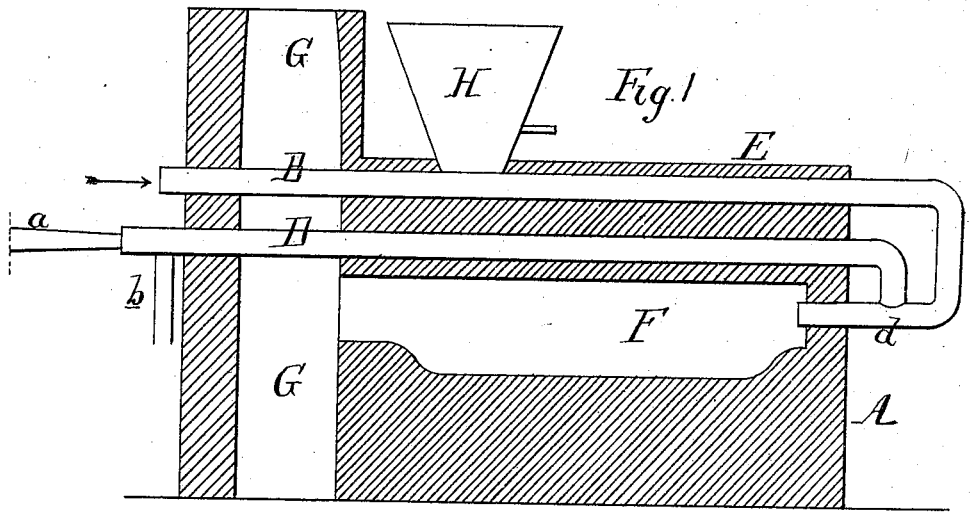
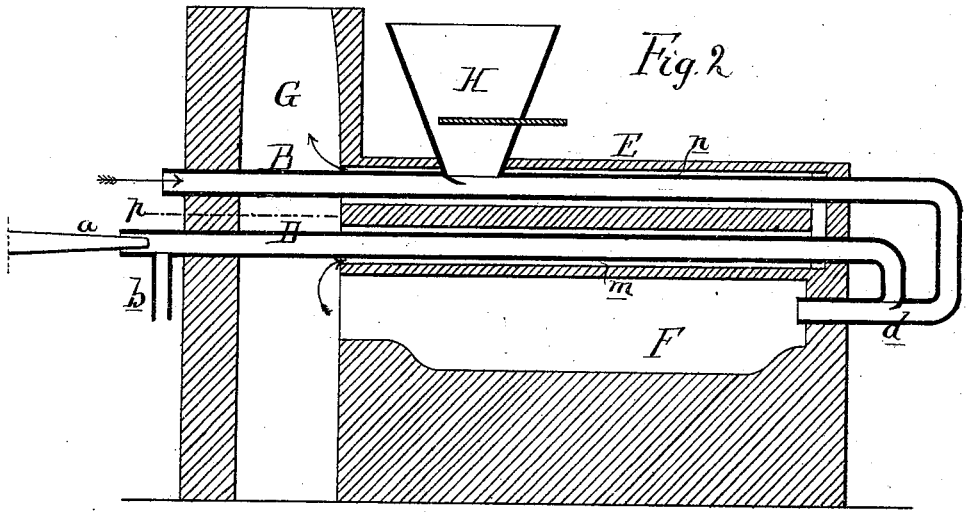


Fig. 2



Witnesses,

Thomas McIlvain

Hubert Howson

Inventor:

Joseph K. Caldwell

by his Attys.

Howson and Son

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UNITED STATES PATENT OFFICE.

JOSEPH K. CALDWELL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND JOHN L. KATES, OF SAME PLACE.

IMPROVEMENT IN FURNACES.

Specification forming part of Letters Patent No. **169,338**, dated November 2, 1875; application filed September 4, 1874.

To all whom it may concern:

Be it known that I, JOSEPH K. CALDWELL, of Philadelphia, Pennsylvania, have invented an Improvement in Furnaces, of which the following is a specification:

The object of my invention is to burn in furnaces, with effective and economical results, petroleum, or other hydrocarbons, with coal-dust, and this object I attain by combining with a furnace the system of pipes and nozzles represented in the accompanying drawing.

Figure 1 is a vertical section of a puddling or heating furnace, through the roof E of which, as well as through the chimney G, pass the two pipes B and D, the former for admitting air under pressure, and the latter for receiving a jet of steam from a nozzle, *a*, the said jet inducing petroleum or other hydrocarbon to pass from any adjoining reservoir through the branch *b* into the said pipe D. Both of the pipes B and D communicate with a short pipe or nozzle, *d*, which projects into the interior F of the furnace at the front end of the same. With the pipe B communicates a hopper, H, for containing coal-dust, more or less of which can be admitted to the said pipe by manipulating a sliding damper or other equivalent device. When the furnace is in operation the roof is always in a heated condition; hence the petroleum injected into the pipe D in the form of spray by the steam-jet must, owing to the heat imparted to the pipe, assume a gaseous form before it reaches the nozzle *d*, where it unites with the supply of compressed and heated air forced through the pipes B, the two elements forming a highly-inflammable gas, which burns with an intense heat in the interior F of the furnace. The coal-dust passes from the hopper H into the pipe B, along which it is forced by the blast, and at the same time so heated by the latter that on escaping from the nozzle *d* into the furnace it is in a condition to be instantly consumed by the flame, thereby adding to the intense heat of the same.

The sectional view, Fig. 2, of the drawing represents a modification of my invention. In this case the pipe *d* passes through a flue, *m*, formed in the roof of the furnace, this flue communicating with a return-flue, *n*, through which the pipe B passes. By placing a sliding damper, *p*, in the chimney G, between the two flues, more or less of the products of combustion from the furnace may be induced to pass in the direction of the arrow through the flue *m*, and thence through the flue *n* to the chimney, thereby imparting to the pipes a more intense heat than they can acquire by being simply embedded in the roof of the furnace.

I claim—

The pipes B and D communicating with the nozzle *d*, the hopper H communicating into the pipe B, the oil-pipe *b* communicating with the pipe D, and nozzle *a* arranged opposite the open end of the pipe D, all combined with each other and with a furnace substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH K. CALDWELL.

Witnesses:

HARRY SMITH,

HUBERT HOWSON.