T. D. MORGAN.

Metallurgic-Furnace.

No. 202,743. Patented April 23, 1878.

*Fig. 1.*

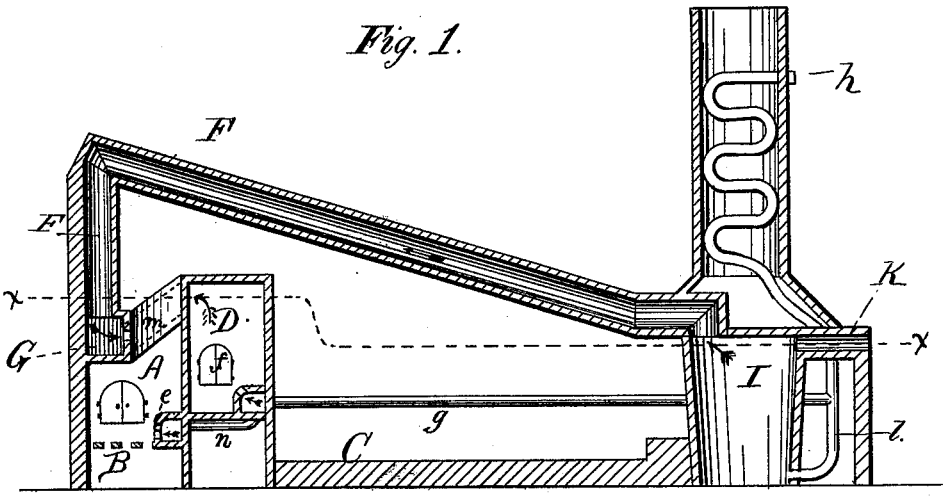
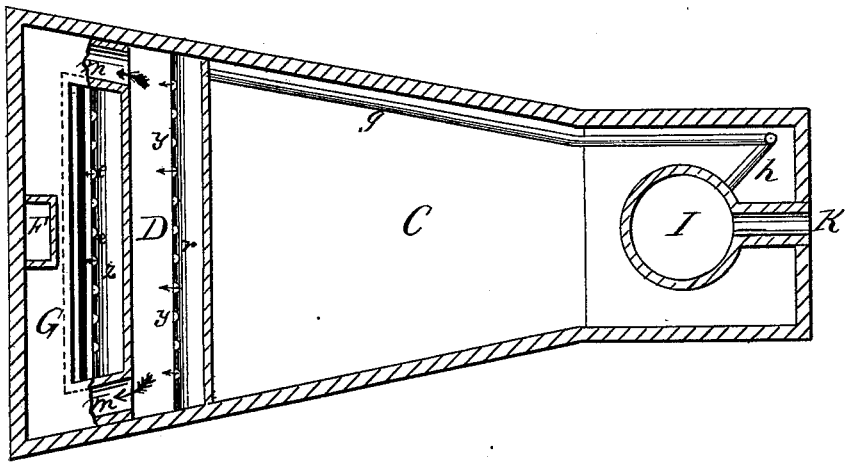



*Fig. 2.*

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# UNITED STATES PATENT OFFICE.

THEOPHILUS D. MORGAN, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN METALLURGIC FURNACES.

Specification forming part of Letters Patent No. **202,743**, dated April 23, 1878; application filed February 5, 1878.

*To all whom it may concern:*

Be it known that I, T. D. MORGAN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Metallurgic Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In the drawings, Figure 1 is a vertical longitudinal section of a metallurgic furnace embodying my improvements, and Fig. 2 is a horizontal section taken on the line *x x*.

This invention relates, mainly, to the utilization of waste heat in metallurgic furnaces, and means for increasing combustion by the employment of retorts in which hydrocarbon gases are generated and increased by the combined action of steam and incandescent coal within the retorts, substantially as hereinafter more fully described and claimed.

Referring to the drawings, A represents the fire-chamber, provided with a grate, B, and C the working-chamber, which will be constructed with a hearth in the usual way. The bridge-wall in this furnace is constructed to form a retort for coal, as shown. D represents the said retort, *f* doors for the admission of coal, and *r* a flue which extends along the bottom of said retort, and which is formed with a series of openings, *y*, for the admission of superheated steam into the retort. Steam is furnished to this flue by means of the pipe or flue *g*. Below retort D is a pipe or flue, *n*, which leads from flue or pipe *r* to a pipe or passage, *z*, which is formed with openings *e* just above the grate, so that steam will also pass from flue *g* into the fire-chamber. The same result, it is evident, might be attained by connecting pipe *n* with flue *g* outside of the retort.

The retort D has side flues *m*, which connect with a flue, G, extending across the fire-chamber, whereby the gases from the retort will pass into the fire-chamber, the direction of the passage being shown in the drawing by arrows. This flue G is merely a continuation of flue F.

I represents a retort located in the bottom of the stack or in the neck of the furnace, where it will be subjected to the heat from the working-chamber. The position of this retort, however, may be varied, my design being to so locate it that the waste heat can be utilized to heat it sufficiently to maintain in an incandescent state the coal which I propose to place therein.

Coal may be introduced into the retort through a feed-opening, K. Steam is admitted near its bottom through a pipe, *l*, which extends upward into any desired number of coils within the stack. In this way the steam will be superheated before passing into the retorts, where, in coming in contact with the incandescent coal, it is decomposed. The hydrocarbon gases which are generated in this retort pass through a flue, F, and from thence into the fire-chamber, while the gases which are generated in the retort D will pass out through short flues *m*, which conduct the same into the fire-chamber. Through the lower ports or passages *e*, however, principally steam will pass out into the grate. In this way the waste heat of the furnace is effectively employed in heating the retorts and steam-pipes, and in thereby causing the generation of gases within the retorts, which gases, as seen, are carried to the fire-chamber to be burned.

One or more retorts, I, may be employed, as found desirable, and these may be placed in any desired position about the furnace for heating purposes, the waste flame being carried to them by flues.

The grate B may be entirely closed and not used at all after the retorts have attained sufficient heat to generate gas, the furnace, in such case, being heated by the combustion of the gas from the retorts alone.

I do not claim heating metallurgic furnaces by gas; but

What I do claim is—

1. In a metallurgic furnace, a retort for distilling coal, located in rear of the hearth so as to be heated by the waste heat which escapes into the stack, in combination with the fire-chamber and a flue for conducting the hydro-

carbon gases from the retort into the fire-chamber, and also a steam-supply pipe for the admission of superheated steam into the retort, all substantially as shown and described.

2. The bridge-wall, forming a retort for distilling coal, in combination with the fire-chamber and side flues for the passage of gas from the retort into the same, and also a pipe or flue for the admission of superheated steam into the retort, substantially as described, and for the purpose set forth.

3. The combination of the retorts D and I with steam-pipes *g h* and flue F, substantially as shown and described, and for the purposes set forth.

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

THEOPHILUS D. MORGAN.

Witnesses:

DAVID MORGAN,

MATTHEW KEEP.