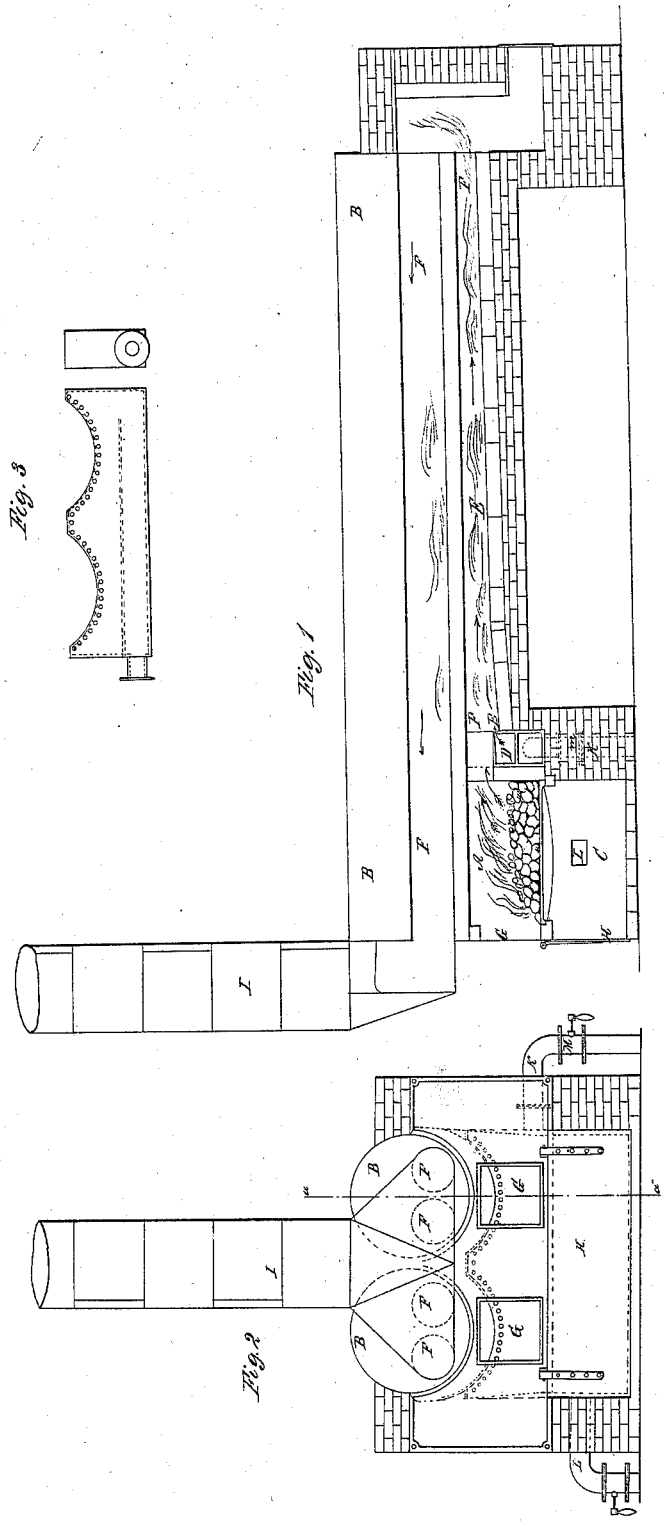
C. E. Detmold,

Steam-Boiler Furnace.

No. 3,365. Patented Dec. 4, 1843.



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UNITED STATES PATENT OFFICE.

C. E. DETMOLD, OF NEW YORK, N. Y.

METHOD OF EFFECTING COMBUSTION IN FURNACES AND FLUES OF STEAM-BOILERS, &c.

Specification of Letters Patent No. 3,365, dated December 4, 1843.

To all whom it may concern:

Be it known that I, CHRISTIAN EDWARD DETMOLD, of the city and State of New York, civil engineer, have invented a new and useful Improvement in the Construction and Heating of Steam-Boilers, of which the following is an exact and full description.

In all steam boilers hitherto employed a large portion of the combustible gases that are evolved from the fuel on the grate escape unconsumed out of the chimney, thus occasioning a considerable loss of fuel.

Now the object of my invention is to burn this otherwise lost combustible under the boiler in the simplest manner, thus effecting an important economy of fuel. It is intended therefore as an improvement upon the process of and apparatus for employing the carbonic oxid gas escaping from blast and other furnaces as a fuel in combination with highly heated and compressed air supplied in numerous small streams by means of blowpipes, invented by Wilhelm de Faber du Faur, of Wurttemberg, and for which Letters Patent of the United States were granted to me as the assignee of the said de Faber, on the 16th day of April 1842; and it consists:

In the arrangement and combination of a chamber of combustion in which the carbonic oxid gas is generated, with a hot air chamber or chambers placed immediately behind the fire in or on the bridge wall of the furnace, and which hot air chambers are perforated with numerous small holes through which heated and compressed air is forced in among the carbonic oxid gas in the flues or hearth of the boiler or furnace, thereby causing its complete combustion.

To explain more fully my improvement and to enable those skilled in the art of constructing and managing steam boilers to use it, I will proceed to describe it more particularly as applied to a boiler of an ordinary steam engine, it being understood that the same arrangement is applicable to all kinds of steam boilers whether for land or marine engines, and to other furnaces, reference being had to the annexed drawings in all the figures on which the same letters refer throughout to the same parts.

Figure 1, is a longitudinal vertical section. A, is the chamber of combustion, in which the carbonic oxid gas is generated; the fuel is charged into it through the doors G, G. B, B, are the boilers. C, is the ash pit, which may be closed by the door H. D, is the hot air chamber. For the purpose of heating the air more effectually it is cast with a division running lengthwise, dividing the chamber into two compartments, as shown more fully in Fig. 3; so that the air shall have to traverse a greater distance bebore it issues from the holes at E. F, F, F, F, are the hearth and flues of the boiler. I, is the chimney. K, is the pipe through which the compressed air is supplied from any ordinary blowing machine to the hot air chamber D; it is provided at M, or any other convenient point with a valve or stop cock, by which the quantity of air to be admitted, may be regulated with precision. L, is an opening in one of the sides of the ash pit into which cold atmospheric air is blown, for the purpose of causing combustion of the fuel on the grate, and the formation of the carbonic oxid gas. The pipe that leads the blast from the blowing machine into the opening L, is also provided with a valve or stop cock, by which the quantity of air to be admitted into the ash pit may be accurately regulated.

Fig. 2 is a front view of the boilers, and shows the position of the hot air chamber, which is dotted in double blue lines.

Fig. 3 exhibits the air chamber separately, showing the position of the holes through which the heated and compressed air issues; K is a part of the pipe through which the compressed air is supplied.

I would here remark that the sectional area of the pipe through which the compressed air is brought into the hot air chamber, should at least be double the aggregate area of all the holes in the air chamber, so that the air may issue thence with considerable pressure. I have used other modes of heating the air, such for instance as causing it to pass through a hollow grate frame; I have also placed the hot air chamber in different parts of the flues, but from experience I find the above described mode of heating the air and position of the hot air chamber to be the most effective in practice. The mode of operating with a boiler of this description is as follows: The grate of the chamber of combustion is filled with a layer of coal, not less than from 8 to 12 inches thick. I particularly recommend the use of anthracite coal as being most favorable to the formation of the

carbonic oxid gas. When ignited, the ashpit is closed, and the blast is let on under the grate; at the same time the blast is also let into the hot air chamber, which being placed immediately behind the fire, and thus exposed to a very great heat, causes the air to become sufficiently heated for the purpose required, and which issuing in numerous small streams through the holes of the air chamber becomes thoroughly mixed and incorporated with the carbonic oxid gas that is generated from the fuel on the grate, and thus effects its complete and immediate combustion, whereby steam will be generated much more rapidly and at considerably less expense than in boilers with furnaces of ordinary construction.

Unless it be required to generate steam very fast, the blowing of cold air into the closed ashpit may be dispensed with, as the combustion of the gas in the flues, will cause a partial vacuum; and the door of the ashpit being left open, a sufficient supply of air will be drawn in to cause combustion on the grate, and to generate the required quantity of carbonic oxid gas.

Having thus described my invention and given an exemplification of the manner in which I arrange the respective parts when applied to an ordinary steam engine boiler; I do not claim to have invented the use of carbonic oxid gas as a fuel in combination with streams of heated and compressed air, supplied by means of blowpipes, this being known as De Faber du Faur's invention, without the right to use which this patent would be of no practical value. Nor do I claim the supplying of atmospheric air, of atmospheric density and ordinary temperature behind the firebridge of steam boiler furnaces, this having been done by others; but

I do especially claim as my invention:

The above described arrangements for applying De Fabers invention by combining furnaces for steam boilers and other purposes with an hot air chamber or chambers, placed directly behind the grate in or on the bridgewall for the purpose of heating and introducing compressed air; and which hot air chamber is pierced on the side opposite to where the fire is or in the direction of the flues, with numerous small apertures, through which continuous jets of heated and compressed air are forced amidst the carbonic oxid gas, generated in the chamber of combustion, in the flues or hearth of the boilers, thereby causing its complete and rapid combustion.

In testimony whereof I, the said CHRISTIAN EDWARD DETMOLD, hereby subscribe my name in the presence of the witnesses whose names are hereto subscribed, on the eighth day of November A. D. 1843.

C. E. DETMOLD. [L. S.]

Signed in our presence:

W. C. MOORE,

JOHN H. HOLDANE.