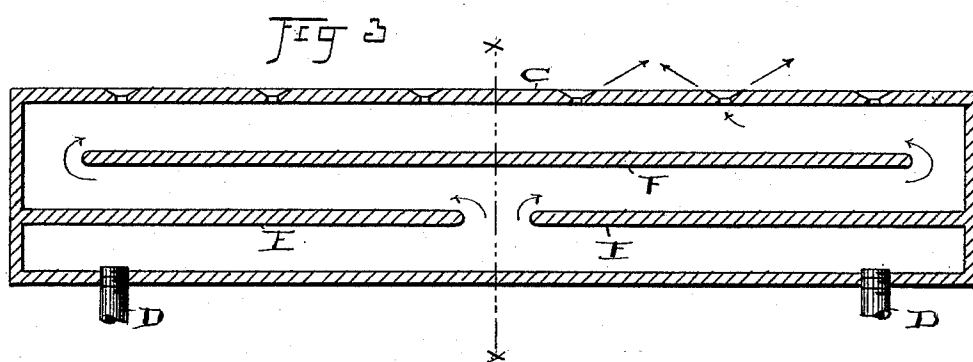
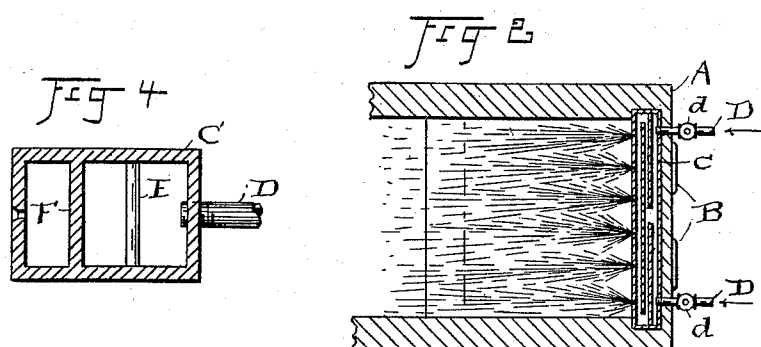
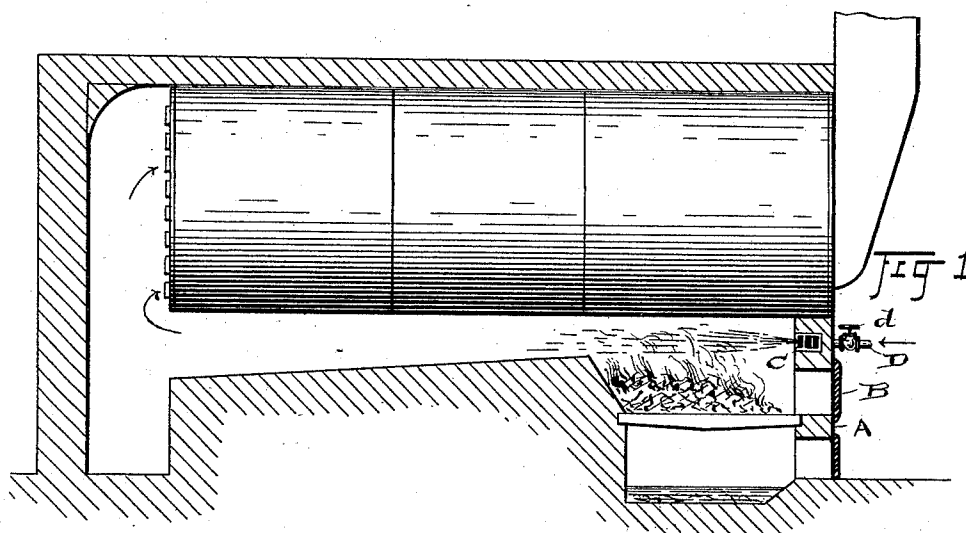


(No Model.)

H. C. METZ.
SMOKE CONSUMING FURNACE.

No. 498,959.

Patented June 6, 1893.



Attest
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UNITED STATES PATENT OFFICE.

HENRY C. METZ, OF CLEVELAND, OHIO.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 498,959, dated June 6, 1893.

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To all whom it may concern:

Be it known that I, HENRY C. METZ, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Smoke-Consuming 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.

My invention relates to means for improving combustion and preventing smoke, and the invention consists in the construction of a furnace provided with a steam superheater arranged at the front thereof to discharge the body of coal and into the fire beneath the boiler substantially as shown and described and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a furnace having a boiler and my improved superheater built into the wall thereof. Fig. 2 is a horizontal sectional view of the front part of the furnace taken substantially on the center of the superheater and looking down on the bed of coal back of the same, a fractional part of the wall at the side being shown in this connection. The idea of this view being to disclose the relation of the superheater to the furnace. Fig. 3 is a sectional elevation of the superheater corresponding to the view thereof shown in Fig. 2, but considerably enlarged over the same to more clearly disclose its construction, and Fig. 4 is a cross section thereof corresponding to line *x, x*, Fig. 3.

The idea upon which this invention proceeds is to prevent the production of smoke by materially and largely increasing combustion in the furnace. This is accomplished by the introduction of superheated steam into the furnace in such condition and in such way as to make the steam contribute very materially to the betterment of combustion and thus consume those elements largely which ordinarily are given off from the furnace unconsumed and appear at the top of the chimney in the form of smoke.

I am of course aware that the use of steam to promote combustion is not broadly new, and that it is not broadly new to employ means of superheating the steam before the

steam is admitted to the furnace, but I am not aware that there has ever before been known or used a superheating device of the character herein described and arranged in the place and serving the purpose of my invention.

It will be observed that in general particulars the character of the furnace is essentially like other furnaces hitherto built and now in common use. That is to say, I rely upon the air draft from beneath the grate bars to supply air to the furnace, and I do not here show any artificial means of introducing air, though if preferred such means might be employed. I do not, however, deem it necessary or desirable because with my invention the volume of air drawn into the furnace is as large as the furnace demands, and especially when used in connection with superheated steam supplied through my superheater.

A represents the front wall of the furnace, and B the door opening into the same.

The superheating device C is in the shape of a rectangular box inclosed about its four sides and ends, as clearly seen in the drawings, and built into the front wall A entirely across the front of the furnace and into the side walls more or less, as disclosed in Fig. 2. The object of this construction is to distribute the superheated steam uniformly across and over the entire width of the furnace so as to supply every portion of the fire equally with the steam, and not leave any portion thereof unsupplied, and hence with imperfect combustion. This rectangular box has at its front preferably two inlet pipes D, which convey the steam from the dome of the boiler or from any other place where it can be conveniently obtained, and said pipes are provided with suitable valves *d* to control the flow of steam. Of course a single pipe might be used for this purpose, but I deem a pair of pipes better because of the increased travel and better heating of the steam which I obtain thereby. Internally this superheating box has two division walls E, running from its ends near to its center where they are separated and leave a passage for the steam. Then there is another wall F traversing nearly the entire length of the inside of the box, but apart from the ends thereof leaving passages thereat for the steam, and then along the

front part of the box are a series of holes or outlets forming jets through which the steam issues into the furnace. Hence, it will be seen that as the steam enters each one of the parts D, it travels toward the center of the box and there passes on the opposite side directly against the wall F. Here it is deflected in opposite directions, as indicated by the arrows, and finds an outlet around the ends of the wall F at the ends of the box and then comes into the front chamber, so to speak, which is formed within the front wall of the box or superheater. The location of the said box or superheater is such as to expose the same to a very intense heat from the fire, and hence the said superheater becomes very hot and in condition to heat the steam to a very high temperature. The long travel of the steam in a box thus subjected to the constant heat of such intensity necessarily makes the steam very dry and decomposes it as it issues from the superheater into its organic elements, thus rendering the gases of which it is composed available for combustion and promote combustion and consumption of the volatile elements of the fuel.

It will be noticed that the superheater is arranged transversely at the front of the furnace and discharges horizontally over the fire in the direction of the draft. This I deem a very great advantage in my arrangement because the steam is thus made to operate to promote draft, but it being superheated steam, does not chill the fire as it would if it were a volume of raw steam or a blast of air. I therefore obtain a largely increased draft of air and give all the volume and strength to the

draft beneath the boiler that is required by thus injecting the steam in the line of draft, but also greatly increase the volume of heat from a given amount of fuel, thus saving in the original cost of fuel. Or, to state the fact differently, I develop a much greater per cent. of heat from a given amount of fuel than heretofore, and thus work economy of fuel besides getting rid of substantially all the smoke that ordinarily is produced from a furnace of this kind which is not equipped with a smoke preventing device.

Having thus described my invention, what I claim is—

The construction herein described consisting of the furnace having the front wall—A—, the door—B—, the superheater—C— built into said wall above door—B— and having its front flush with the inner surface of the wall and its sides covered by the wall, said superheater having division plates—E—and —F— lengthwise thereof and parallel with the face thereof and forming steam circulating channels between them, thereby exposing the steam to gradually increasing degrees of heat as it travels from its entrance to its exit, the steam supply pipe—D— at the rear of said superheater from the outside of the furnace and a series of discharge openings along its front, substantially as set forth.

Witness my hand to the foregoing specification.

HENRY C. METZ.

Witnesses:

H. T. FISHER,
GEORGIA SCHAEFFER.