(No Model.)

B. TOPMILLER.

STEAM BOILER FURNACE.

No. 303,196. Patented Aug. 5, 1884.

Fig. 1.

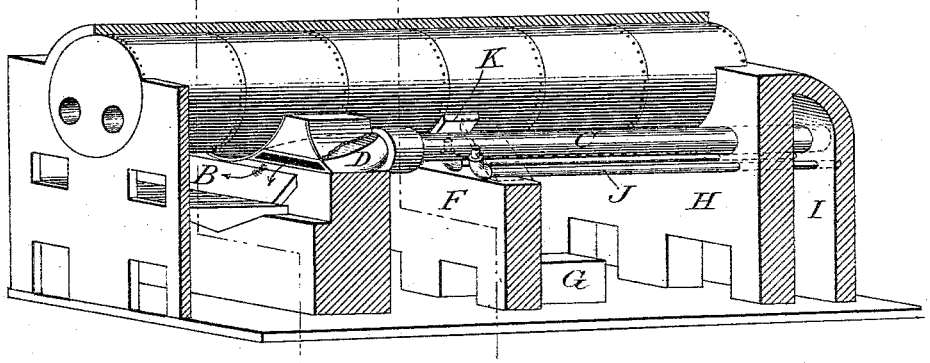


Fig. 2.

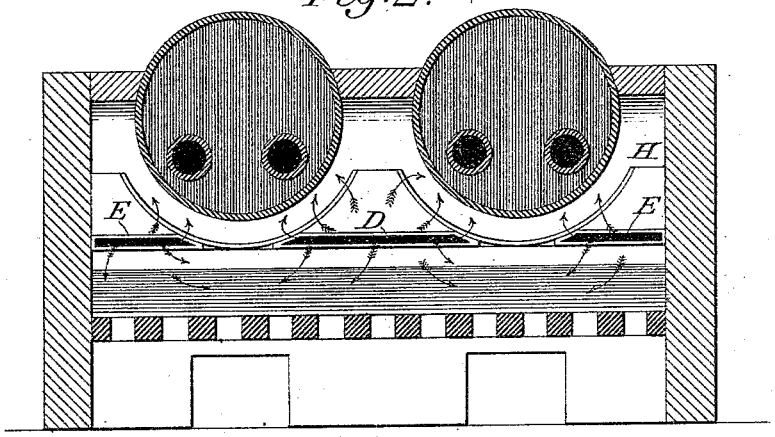


Fig. 4.

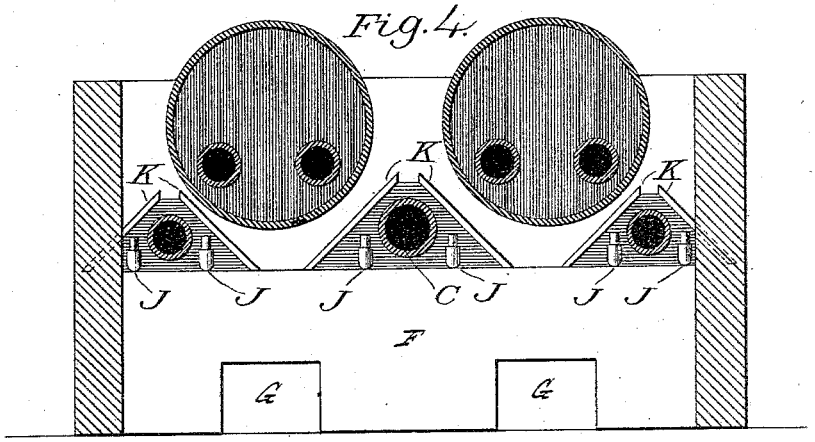
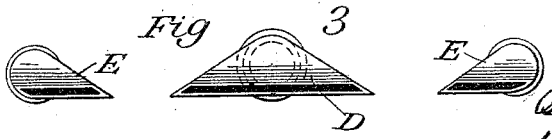


Fig 3



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UNITED STATES PATENT OFFICE.

BENNARD TOPMILLER, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO SIMON OBERMAYER AND JACOB A. HEINSHEIMER, OF SAME PLACE.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 303,196, dated August 5, 1884.

Application filed October 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, BENNARD TOPMILLER, a citizen of the United States, residing at Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

This invention is an improvement upon that shown in my Patent No. 274,854, dated March 27, 1882. Its object is to introduce directly into the fire-chamber, at the bridge-wall, atmospheric oxygen carried through the heating-chamber in pipes, which are placed directly in the line of draft, to superheat the air, so as to be more readily combined with the gases.

The invention consists, essentially, in peculiarly-shaped discharge-tubes built into the bridge-wall, and the location of pipes connecting with the tubes.

It also consists in introducing, by means of curved pipes, atmospheric air into the gases after they have passed over the fire-chamber and before they have reached the flues which carry them into the rear chamber of the furnace.

It also consists in certain peculiarities of construction, all of which will be first fully described in connection with the accompanying drawings, and then particularly pointed out in the claims.

In the drawings annexed hereto, and forming part of this specification, Figure 1 is in part a perspective and sectional view of a steam-boiler furnace embodying my improvements. Fig. 2 is a vertical section taken transversely through the fire-chamber in front of the bridge-wall. Fig. 3 shows in front elevation the tubes which discharge into the fire-chamber. Fig. 4 is a transverse section along the front of wall F.

In the different views of the drawings like parts are represented by similar reference-letters.

The outer walls of the furnace are represented by A. The wall B has an offset in front of it to support the inner end of the grate-bars, and the inclined tile B, which rests back of the grate-bars and extends up to a short distance below the boiler. The rear portion of the bridge-wall is built to curve around the boilers, leaving a space between it and the boilers for the passage of the gaseous products of combustion. Into this wall are built three (3) discharge-tubes, the inner ends of which are circular to enter sockets in the air-pipes C, which pass along backward parallel with the boilers and extend through the walls of the furnace, communicating with the air on the outside. The center tube, D, is flattened down equally from each side of the center, and the side tubes, E, are flattened only on one side, so that the forward ends of all tubes extend into the fire-chamber just above the inclined tile B, so as to discharge the air in thin sheets into the gases arising from the fuel on the grate-bars. Back of the bridge-wall is a chamber formed by the wall F. In the lower part of this wall F are two (2) return-flues, G, extending back into a larger chamber formed by the two walls F and H. The wall H has also two (2) flues in its lower part, through which the products of combustion must pass into the rear chamber, I, on their way to the boiler-flues. From the rear of the furnace also extend small pipes J, which rest upon the wall F and curve upward to discharge against tiles K, which also rest upon the wall F before arching over the pipe C, leaving between their upper edges a space, through which the air from the pipes J passes in a thin sheet into the gases passing over the wall F and tiles K. The space at the back of the tiles is closed around the pipes, forming a small chamber, into which the air is discharged, and from which it passes through the opening between the upper edges of the tiles, thus causing a partial vacuum in the chamber in front of wall F, to supply which the heavier and unconsumed gases are thrown backward through the flues G and carried up to be supplied with oxygen in their passage over the wall F and tiles K.

I have shown my improvements applied to a two-boiler furnace, in which case it is best to use the three pipes D E E, discharging into the fire-chamber; but for a single-boiler furnace I use only the pipes E, arranged upon each side of the boiler, and where more than two boilers are used; the discharge-pipe D is

used between the boilers and the discharge-pipes E between the side boilers and the side walls of the furnace.

In practice I find it best to allow but a limited amount of air to pass to the fuel through the ash-pit, and the lower doors are therefore usually closed, the necessary amount of oxygen being supplied in a highly-heated state through the pipes C and their discharge-nozzles D E into the fire-chamber. The gases in the fire-chamber are thus thrown backward toward the front of the furnace, and being supplied with the oxygen, are forced in contact with the boiler and carried back over the bridge-wall F and pipe C into the chamber formed by the walls F and H, receiving in their passage over the wall F a fresh supply of oxygen to combine with any unconsumed gases. The gases are then carried downward through the flues in wall H, the lighter portions passing into the chamber I, and thence through the boiler-flues to the uptake. The heavier or unconsumed portions of the gas, returning through the flues G, pass again over the wall F and receive a fresh supply of oxygen from the pipes J. It will thus be seen that the gases, in their passage over the fire-chamber, are thoroughly broken and mixed with oxygen before passing to the flues or chamber I, thus effecting a saving of fuel, producing nearly uniform heat in all parts of the furnace, and effectually preventing smoke.

I do not desire to limit myself to the exact location shown of the pipes C J, but believe the position shown is the best, as they are directly in the line of draft, and therefore are subjected to the most heat, and assist in breaking the volume of the gases to insure thorough mingling of the oxygen and carbonic oxide, to produce perfect combustion; and it is evident that good results would be obtained even if the wall F, flues G, and pipes J were omitted; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-boiler furnace, the combination, substantially as specified, of the fire-chamber, the flattened tubes in the upper portion of the bridge-wall, and arranged to discharge superheated air in thin sheets into the gases in the fire-chamber forward of the bridge-wall, and the pipes C, connected to the tubes in the bridge-wall, extending back to the rear and outside of the furnace, with the wall H and chamber I, said wall H having flues at the bottom communicating with the said chamber I.

2. The combination, substantially as specified, of the bridge-wall curved around, leaving a uniform space between its top and the boiler, of pipes C and flattened tubes, arranged, as shown, to conduct the air from the outside of the furnace and discharge it in thin sheets in front of the bridge-wall, the walls F and H forming chambers back of the bridge-wall, pipes J, inclined tiles K, arching over the discharge end of said pipes, the said wall H having flues to communicate with the rear chambers of the furnace, and the wall F having return-flues G, for the purpose of conducting the unconsumed gases back to the chamber formed by the walls F and bridge-wall.

3. In a steam-boiler furnace, the combination, substantially as specified, of the bridge-wall having inclined tiles B, the discharge-tubes D E E, and pipes C, arranged to conduct air from the rear of the furnace and discharge it in a heated condition into the fire-chamber, above the tile B, the wall F, and tiles K K, forming a chamber around the pipes on top of said wall, with the pipes J, extending from the rear of the furnace, and having their inner ends curved upward to discharge heated air into the chamber formed by tiles K.

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