2 Sheets--Sheet 1

C. D. SMITH.

Improvement in Furnaces for Steam-Boilers.

No. 130,249. Patented Aug. 6, 1872.

Fig 1.

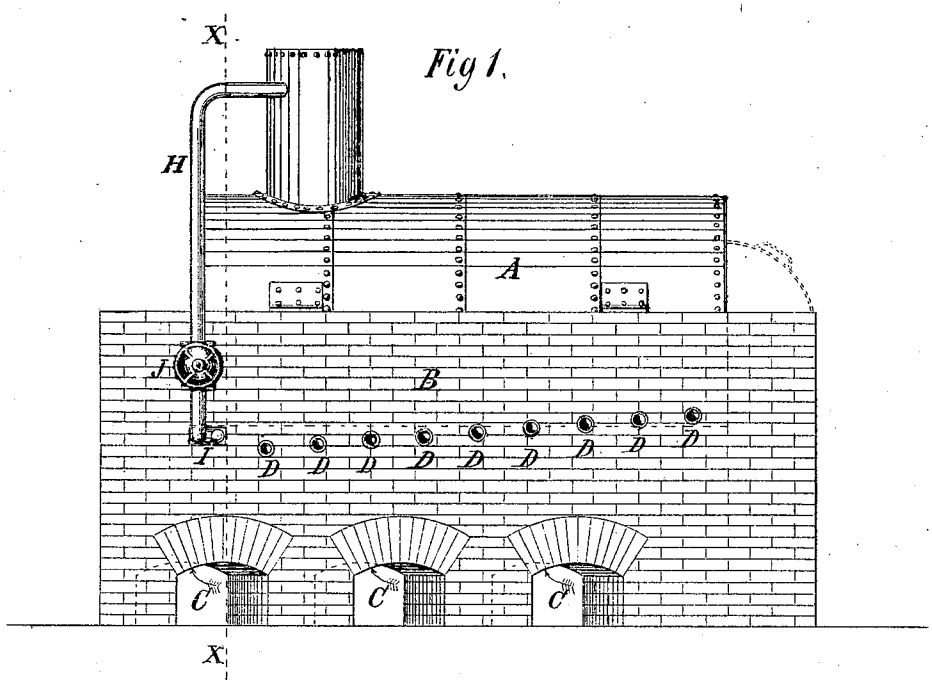
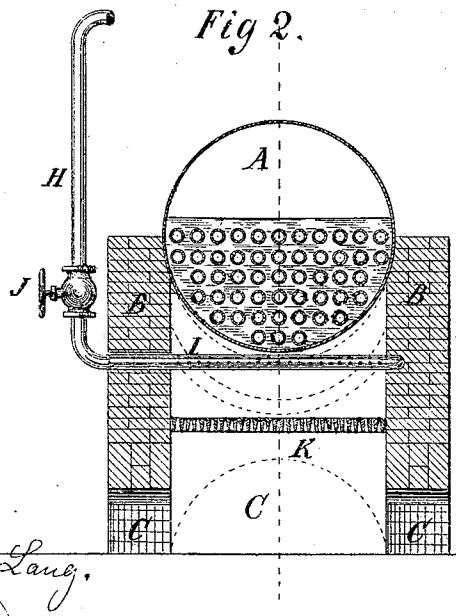


Fig 2.



Witnesses:

J. P. Theodore Lang.

Henry Mayo

Inventor:

Charles D. Smith

2 Sheets--Sheet 2.

C. D. SMITH.

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Fig 3.

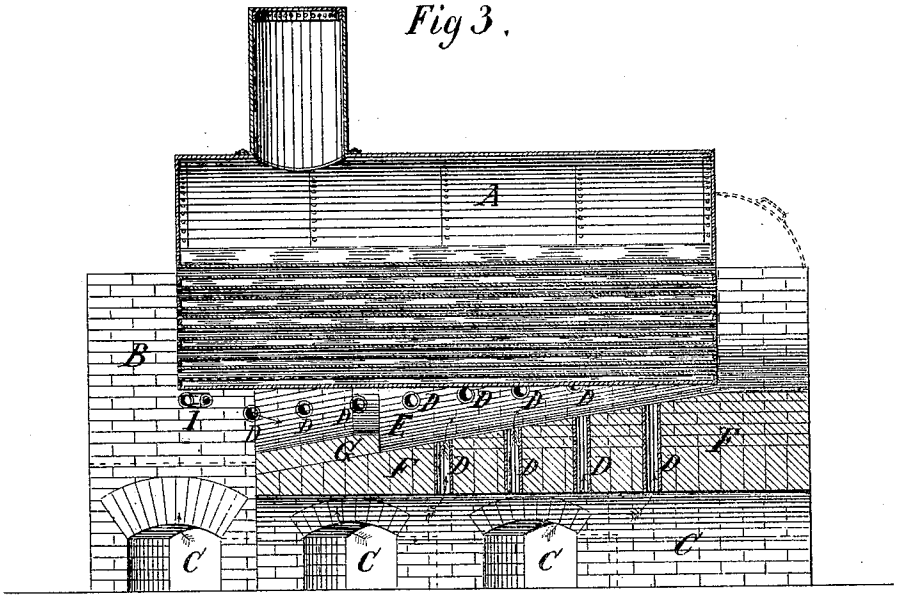


Fig 4.

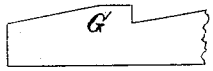


Fig 5.

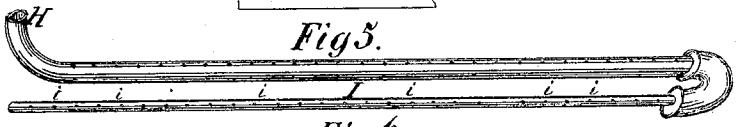
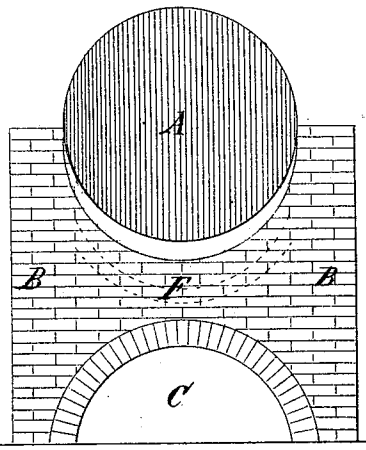


Fig 6.



Witnesses:

J. P. Theodore Lang.

Henry C. Mayo

Inventor:

Charles D. Smith

UNITED STATES PATENT OFFICE.

CHARLES D. SMITH, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **130,249**, dated August 6, 1872.

Specification describing certain Improvements in Furnaces for Steam-Boilers, invented by CHARLES D. SMITH, of Chicago, Illinois.

My invention relates to the construction of furnaces for steam-boilers, which affords a perfect combustion of fuel, smoke, and gases with the aid of atmospheric air introduced, by means of extra channels, toward the fire-surface of the boiler, and by means of superheated steam introduced into the fire-box or furnace above the grates.

Figure 1 represents a side elevation of my improved furnace with boiler. Fig. 2 represents a vertical cross-section of the same in the direction of the line X X, exposing the forward part with the coil for the superheated steam. Fig. 3 represents a vertical longitudinal section through the center of boiler and furnace. Fig. 4 represents a diagram of the bridge-wall of my improved furnace. Fig. 5 represents a perspective view of the coil for the superheated steam. Fig. 6 represents an end view of my furnace.

A represents a boiler with horizontal tubes, by way of illustration. B represents my improved furnace. C C C represent flues for conveying air beneath a sloping false bottom, F, and also beneath the grates K. D D D represent pipes for conveying air into the combustion-chamber. E represents the combustion-chamber for consuming smoke and gases which pass over the bridge-wall. F represents a sloping false bottom. G represents a sloping bridge-wall. H represents a pipe conducting steam to the superheating coil inside of the furnace or fire-box. I represents a coil for superheating steam and directing it through a row of small holes into the flames. J represents a valve for regulating the amount of steam allowed to the coil I. K represents the fire-grates.

My improved furnace has the advantage of giving admission to draft on all sides, and as every one of the flues C C C is provided with a door the draft may safely be regulated, with regard to quantity or force, by opening a certain number of the doors mentioned and keeping the rest shut. Thus an ample supply of cold air may pass through the grate-bars, keeping them cool, and thereby protecting them against warping and burning at the top, at the same time presenting more nourishment to the fire, which requires less fuel for the same effect. Whatever smoke and unconsumed gases are carried over the bridge-wall G enter the combustion-chamber E, the larger area of which retards their speed and affords a good opportunity to the fresh air collected by the flues *c c c*, and conducted in the direction indicated by arrows, through the pipes D D D, into said combustion-chamber to mingle with them and complete the process of their combustion. A part of the generated steam is conducted through a pipe, H, into a coil, I, where it is superheated or separated into its two constituent gases—oxygen and hydrogen—(both favoring combustion and both powerful generators of heat,) which are forced, in minute streams, through the holes *i i i*, into the flames.

The results of these improvements are, first, a never-failing supply of draft and heat; secondly, an uninterrupted sheet of flame under the boiler and in its tubes; thirdly, entire absence of soot along the fire-courses and in the chimney.

I claim as my invention—

1. The combination of the supply-pipe H and valve J with the superheating-coil I, having openings *i i i*, when arranged in the furnace or fire-box substantially as shown, and for the purposes herein set forth.

2. The combination of the air-pipes D D D in the bottom and sides of the furnace, when arranged substantially as and for the purpose set forth.

3. The combination, in a boiler-furnace, of the coil I, sloping bridge-wall G, sloping false bottom F, flues *c c c*, and pipes D D D, substantially as and for the purposes hereinbefore described.

4. The combination of the main flue C with the branch flues *c c c*, arranged substantially as shown, and for the purpose set forth.

CHAS. D. SMITH.

Witnesses:

JAMES S. GRINNELL,
THOS. JEWELL.