

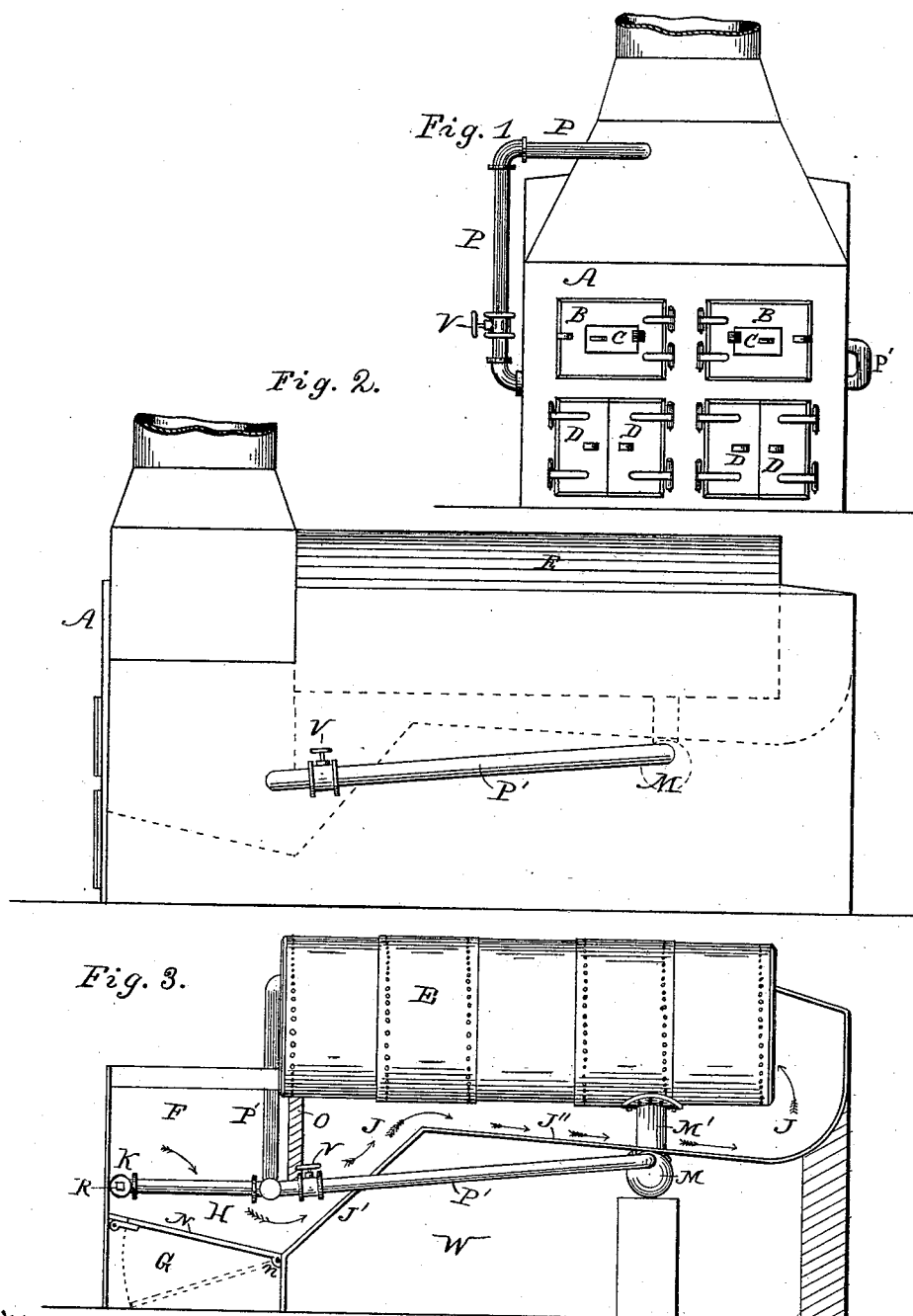
(No Model.)

2 Sheets—Sheet 1.

C. E. SOUTHARD.  
STEAM BOILER FURNACE.

No. 386,275.

Patented July 17, 1888.



Witnesses,  
Thos. A. Houghton.  
Thos. H. Young.

Inventor,  
Charles E. Southard.

By his Attorney.

Wm. R. Singleton.

(No Model.)

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Fig. 4.

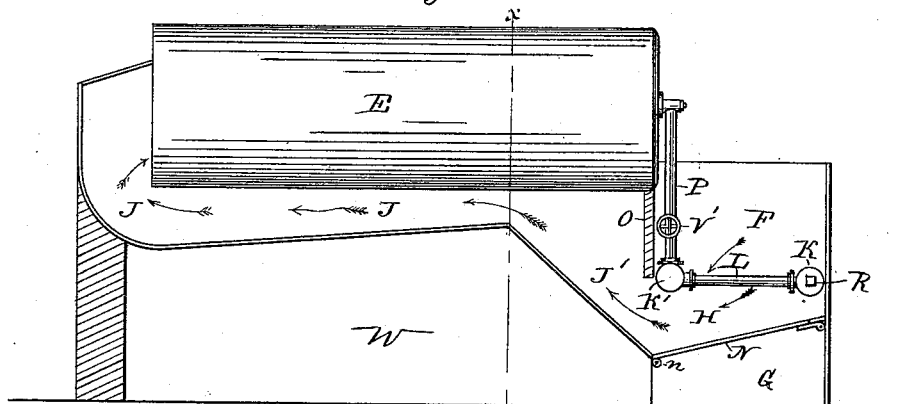


Fig. 5.

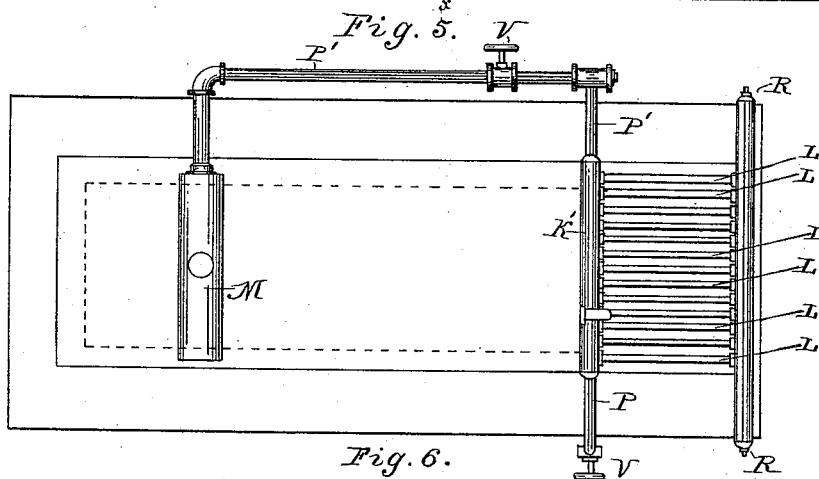
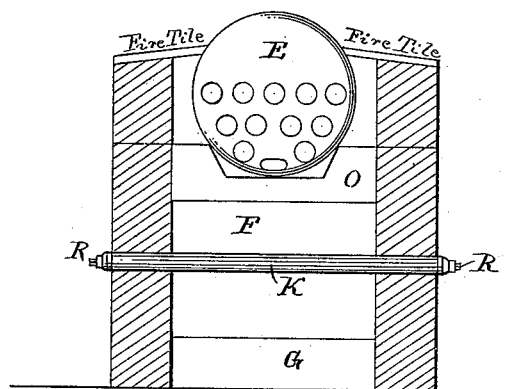


Fig. 6.



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# UNITED STATES PATENT OFFICE.

CHARLES E. SOUTHARD, OF ST. LOUIS, MISSOURI.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 386,275, dated July 17, 1888.

Application filed November 18, 1887. Serial No. 255,487. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SOUTHARD, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in furnaces for steam-boilers, which will be hereinafter more fully described, and pointed out in the claim.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of the furnace. Fig. 2 is an elevation of one side. Fig. 3 is a partial vertical longitudinal section of Fig. 2. Fig. 4 is a partial vertical longitudinal section of Fig. 5. Fig. 5 is a plan view of the grates and circulating-pipes. Fig. 6 is a transverse section on line *x x* of Fig. 4.

A is the fire-front; B B, fire doors with draft-doors C C in them. D D are damper-doors. E is the boiler. F is the fire box. G is the ash-pit. H is the gas-burning pit. J is the combustion-chamber; K, manifolds for the grate-bars; L, the grate-bars; M, the mud-drum; N, falling trap-doors to the ash-pit, represented as being closed; O, a solid screen; P P' P', the circulating-pipes. R are draining-plugs; V, the shut-off valves; W, the solid wall under the chamber.

The following is a description of the construction. The furnace is of the usual construction, and the invention can be applied to any boiler and furnace now in use:

The grates L are made of steam-pipes; the ends are joined to what are termed "manifolds" K K'. The outer manifold, K, has at each end a screw-plug, R, for the purpose of draining the grates L. At one end of the inner manifold, K', there is a steam-pipe, P, which is connected with one end of the boiler E in the steam-space. At the other end of the manifold K' there is a hot-water pipe, P', which is connected with the mud-drum M beneath the boiler, and which is connected with the bottom of the boiler by a stand-pipe, M'.

On the pipe P' is a valve, V, for controlling the admission of water from the boiler. The steam-pipe P has also a valve, V', for controlling the outlet of steam from the manifold

K', and these valves are used to shut off the steam and water in case of leakage anywhere in the apparatus.

In the fire-box F is a trap-door, N, which is hinged at *n* and by means of a lever and chain running over a pulley, which devices are not shown in the drawings. The trap-door can be let down to discharge ashes and cinders, which is seen in broken lines in Fig. 3.

H is the gas-burning pit. The rising stope J' and slightly-descending stope J'' constitute the floor of the combustion-chamber J.

O is a solid screen placed in the front of the combustion-chamber J, which directs the heat from the fire-box downwardly under it, so that the ordinary passage for the burning gases is converted into a combustion-chamber, J, to which the trap-door N is auxiliary when put up as shown in Fig. 3 in solid lines.

An inspection of the drawings readily shows the operation. The hot water from the bottom of the boiler passes through the mud-drum M, thence through pipe P into the inner manifold, K', to the hollow grates L, and into the outer manifold, K, and being heated by the fuel and expanded into steam it passes up the steam-pipe P into the steam-space in the boiler, thus creating a perfect circulation of the water in the boiler, whereby the mud or other solid matter in the water is conveyed into the mud-drum and there deposited while the pure water is conveyed into the grates and converted into steam.

I do not claim the use of hollow grates, as they are old.

The use of the screen O is to draw the flame downwardly to and through the grates L, so that all the gases and smoke may be more perfectly consumed in their passage over the grates and by the flames as they pass into and through the combustion-chamber J.

I claim—

In boiler-furnaces, the combination of the vertical screen O, grates L, drop-door N, and rising stope J', constituting a combustion-chamber, all arranged substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

CHAS. E. SOUTHARD.

Witnesses:

H. LULHES,

A. L. HARRISON.