

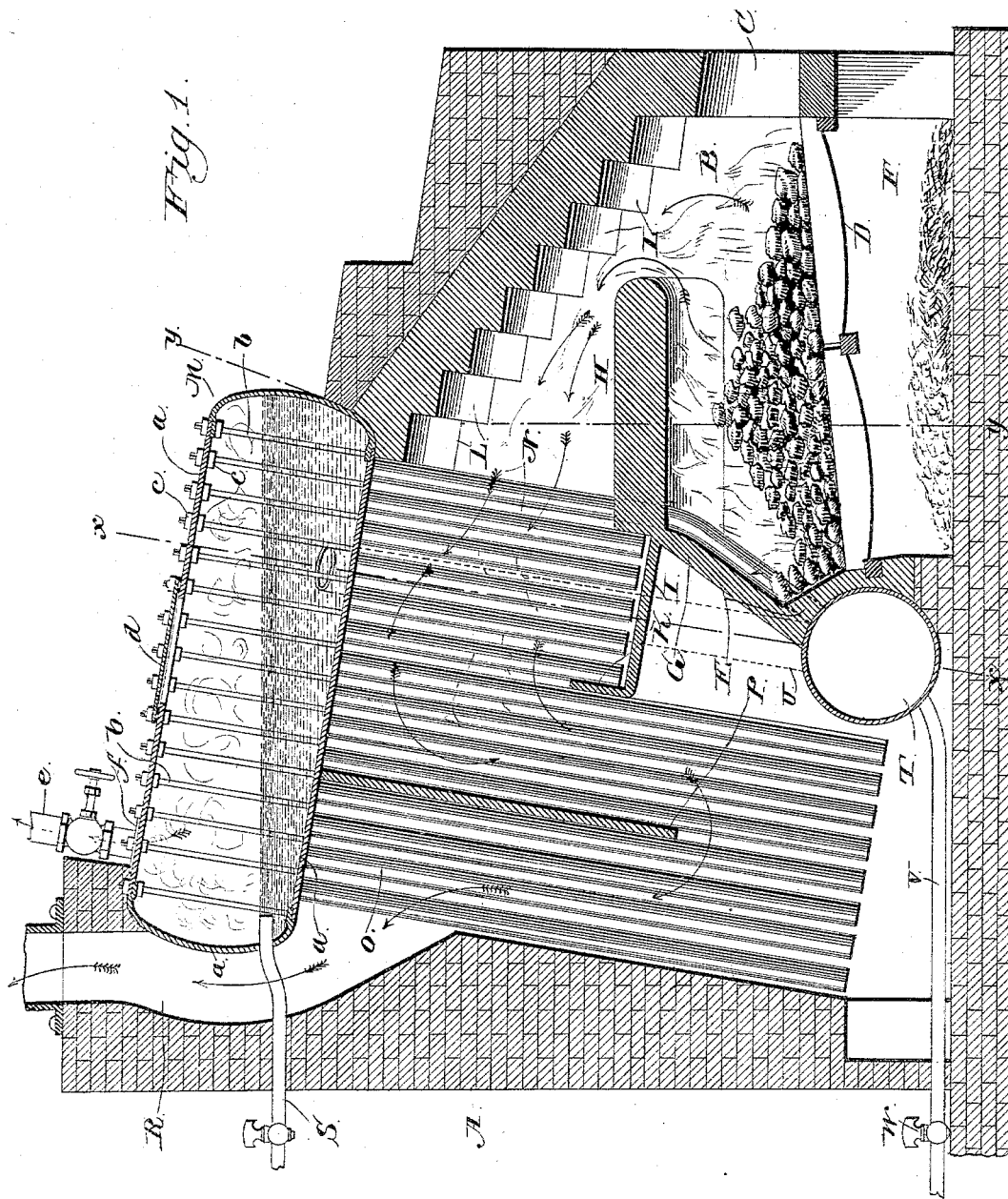
(No Model.)

3 Sheets—Sheet 1.

A. STIRLING.
BOILER AND FURNACE.

No. 381,595.

Patented Apr. 24, 1888.



Witnesses.
N. Fowler.
E. J. Siggers.

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his Attorney

(No Model.)

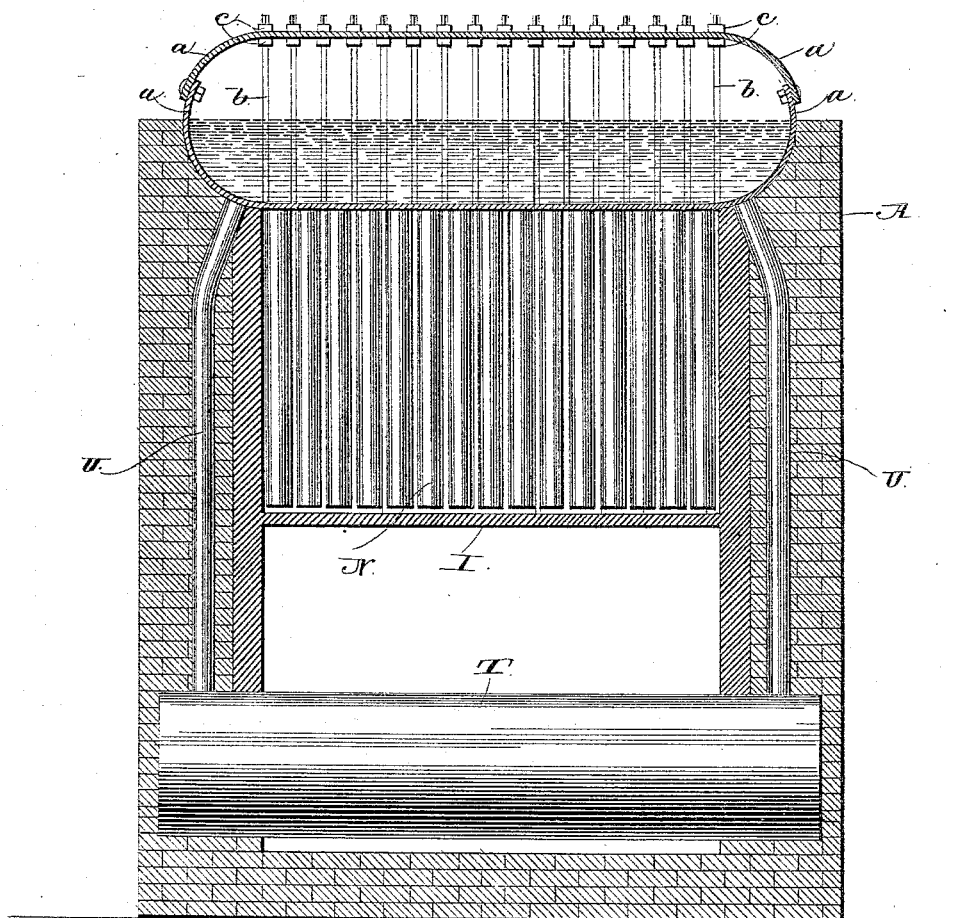
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Fig. 2.



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Fig. 3.

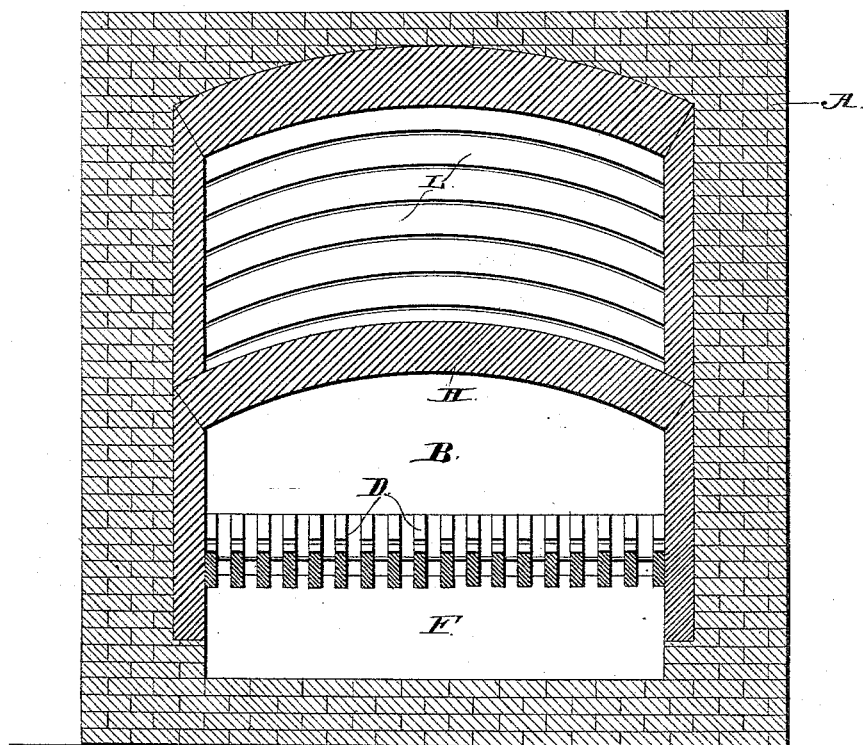


Fig. 4.

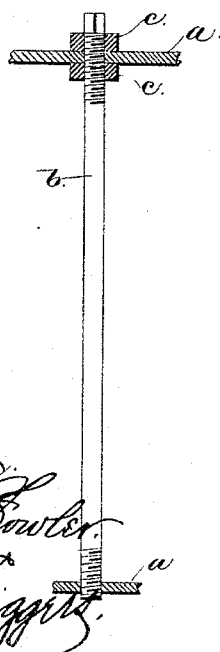


Fig. 5.

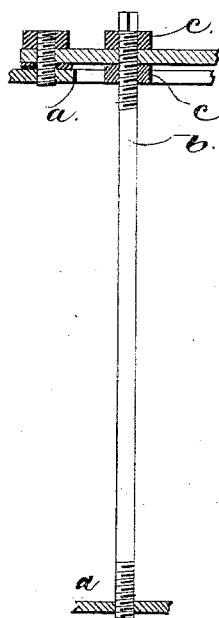
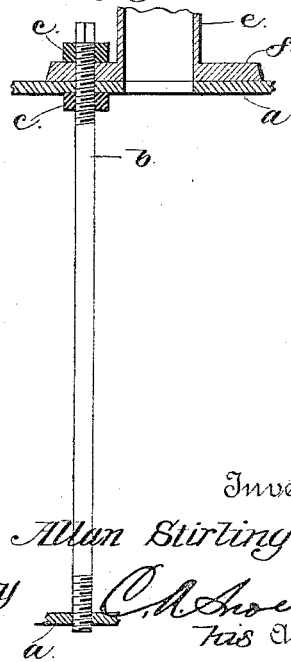


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALLAN STIRLING, OF YONKERS, NEW YORK.

BOILER AND FURNACE.

SPECIFICATION forming part of Letters Patent No. 381,595, dated April 24, 1888.

Application filed January 24, 1888. Serial No. 261,773. (No model.)

To all whom it may concern:

Be it known that I, ALLAN STIRLING, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Steam Boilers and Furnaces, of which the following is a specification.

My invention relates to an improvement in steam-boilers and furnaces therefor; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a steam-boiler and furnace embodying my improvements. Fig. 2 is a vertical transverse sectional view of the same, taken on the line *y y* of Fig. 1. Fig. 3 is a similar view, taken on the line *x x* of Fig. 1. Fig. 4 is an enlarged detail view of a portion of the boiler. Fig. 5 is a similar view showing the means for securing the man-hole plate to the boiler. Fig. 6 is a similar view showing the means for securing the steam-pipe to the boiler.

A represents the furnace or setting, which is built of masonry, and is of the form here shown. In one end of the furnace or setting is a fire-box, B, having a door, C, for the admission of fuel. The bottom of the fire-box is formed by a downwardly and rearwardly inclined grate, D, the rear end of which is supported by a transverse wall, E, which forms the rear side of the ash-pit F and of the fire-box.

G represents a transverse plate, which extends upward and forward from the wall E, and is arranged at an angle, as shown in Fig. 1. From the upper side of this plate or partition G projects a forward and upwardly inclined arch, H, which is arranged over the major portion of the fire-box. Extending rearward from the said arch is a plate or partition, I, which is arranged at a slight inclination, as shown, and has its rear side turned upward to form the flange-plate K.

The upper portion or roof of that portion of the furnace which is arranged over the fire-box is inclined upward and rearward, as shown in Fig. 1, and is arched concentrically with the arch H, as shown in Fig. 3, and is pro-

vided on its under side with a series of ascending shoulders or steps, L.

M represents the body of the boiler, consisting of plates *a* riveted together, as shown, and the said body of the boiler is supported in the upper portion of the furnace or setting at such an angle that the water in the front portion of the boiler is deepest where it is exposed to the greatest degree of heat. The upper and lower sides of the boiler are connected by a series of bolt or brace rods, *b*, which have their lower ends screwed into the lower side of the boiler, and their upper ends provided with screw-threads and extending through openings in the upper side of the boiler, as shown. Nuts *c* are screwed onto the said upper portions of the bolt or brace rods, and bear against the upper and lower sides of the top of the boiler, so as to secure the same from expansion under pressure. On the top of the boiler is the usual man-hole, which is covered by a plate, *d*, and a steam-escape pipe, *e*, having a flange, *f*, at its base. The upper ends of some of the brace or bolt rods *b* pass also through the man-hole plate and through the flange of the steam-pipe, so as to secure the same firmly in position on the boiler, as shown in detail at Fig. 4.

N O represent two series of water-tubes, which depend from the lower side of the boiler and are arranged at right angles thereto. The lower ends of the said water-tubes are closed, and the upper ends thereof are open and communicate with the boiler. The series of tubes N are shorter than the tubes O, and the lower ends of said tubes N are almost in contact with the upper side of the plate I.

P represents a partition-plate, which extends downward from the bottom of the boiler at a suitable distance in rear of the flange-plate K, the lower end of said plate P extending to within a suitable distance of the lower ends of water-tubes O. The said plate or partition P, together with the plates K I G, arch H, and steps L, are made of any suitable refractory material which will withstand the action of intense heat.

At the rear upper corner of the furnace or setting is the escape-flue or chimney R.

S represents a water-supply pipe which communicates with the body of the boiler.

T represents a mud-drum, which is cylindrical

cal in shape, is arranged transversely on the rear side of the wall E, and is connected to the body of the boiler by means of pipes U. A blow-off pipe, V, extends from the said mud-drum and is provided with a stop-cock, W.

The operation of my invention is as follows: The heat and products of combustion are deflected forward from the fire-box by the plate or partition G and the arch H, and pass upward and rearward under the steps L, around the tubes N and O, are then deflected downward by the partition P, and pass upward in rear of said partition to the flue or chimney R, from which they escape. The partition-plates and arch H, by intercepting the caloric-currents, utilize the heat to the highest degree. The steps L form heating-surfaces, which become intensely heated by the fire, and the gases generated by combustion come in contact with the said steps and are caused to burn and give out additional heat, and are thereby prevented from escaping idly from the furnace, and consequently the fuel is entirely utilized.

The peculiar construction of the boiler, hereinbefore described, provides the same with a maximum amount of heating-surface. The water-tubes increase the heating-surface of the boiler and maintain a constant circulation of water, and by inclining the boiler, as shown and described, the water therein is deepest at the point where the boiler is exposed to the most intense heat, and a large space is formed at the rear upper side of the boiler for steam, thus obviating the necessity of employing a steam-dome in order to obtain dry steam. The drum T receives the sediment deposited by the water in the boiler, and when a quantity of mud or sediment collects in the drum the same may be blown out by opening the valve or stop cock W in the blow-off pipe V. Having thus described my invention, I claim—

1. The setting, the boiler supported thereon, the fire-box in the front of the setting and having the arch H over its rear portion, and the rearward and upward inclined series of steps L, extending from over the front portion of the fire-box to the boiler, substantially as described.

2. The combination of the boiler having the depending water-tubes and the furnace or setting in which the boiler is located, provided with the fire-box having the arch H, and the partitions I P, to direct the caloric-currents between the water-tubes, substantially as described.

3. The steam-boiler having the man-hole plate and the steam-pipes provided with the flange f, and the brace or bolt rods connecting the sides of the boiler and extending through the man-hole plate and the flange f, substantially as described.

4. The combination of the inclined boiler, the setting supporting the same, and having the rearward and upward inclined series of steps L, extending to the lower portion of the

boiler, and the fire-box arranged under the series of steps L, whereby the latter direct the most intense heat to that portion of the boiler where the water is deepest, substantially as described.

5. A steam-boiler furnace having the fire-box provided with the grate D, the wall E, supporting one end of the grate and forming the rear side of the fire-box, the forwardly-inclined and upwardly-extending plate or partition G, rising from the wall, and the forward and upwardly inclined arch H, extending from the partition or plate and arranged over the major portion of the fire-box, as set forth.

6. A steam-boiler furnace having the fire-box provided with the grate D, the wall E, supporting one end of the grate and forming the rear side of the fire-box, the forward-inclined and upwardly-extending plate or partition G, rising from the wall, and the forward and upwardly inclined arch H, extending from the partition or plate and arranged over the major portion of the fire-box, and the plate or partition I, extending rearwardly from the arch H, as set forth.

7. A steam-boiler furnace having the fire-box provided with the grate D, the wall E, supporting one end of the grate and forming the rear side of the fire-box, the forward-inclined and upwardly-extending plate or partition G, rising from the wall, and the forward and upwardly inclined arch H, extending from the partition or plate and arranged over the major portion of the fire-box, the upper portion or roof of the furnace over the fire-box being inclined upward and provided on the under side with the ascending shoulders or steps L, as set forth.

8. A steam-boiler furnace having the fire-box provided with the grate D, the wall E, supporting one end of the grate and forming the rear side of the fire-box, the forward-inclined and upwardly-extending plate or partition G, rising from the wall, and the forward and upwardly inclined arch H, extending from the partition or plate and arranged over the major portion of the fire-box, the plate or partition I, extending rearwardly from the arch H, the upper portion or roof of the furnace above the fire-box being inclined both upward and rearward and provided on the under side with ascending shoulders or steps, as set forth.

9. In combination with the furnace having the arch H over the fire-box, the roof over the fire-box being arched concentrically with the arch H, and provided with the steps L, as set forth.

10. The combination of the boiler having the depending long tubes O at its rear portion, and the depending shorter tubes, N, at its front portion, with the furnace supporting the boiler, and having the fire-box at its front end and the partition I, extending rearward therefrom under the short tubes N, and the depending partition P, arranged among the tubes O, substantially as described.

11. The steam-boiler having the man-hole

plate, and the steam-pipe provided with the flange *f*, and the bolt-rods *b*, having one end screwed to one side of the boiler and projecting through the opposite side thereof and
5 through the flange of the steam-pipe, and the man-hole plate, the said projecting ends of the bolts having the nuts *c*, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ALLAN STIRLING.

Witnesses:

JOHN FRASER TORRANCE, M. E.,
CH. THOS. CHARBONNEAU.