

No. 641,095.

Patented Jan. 9, 1900.

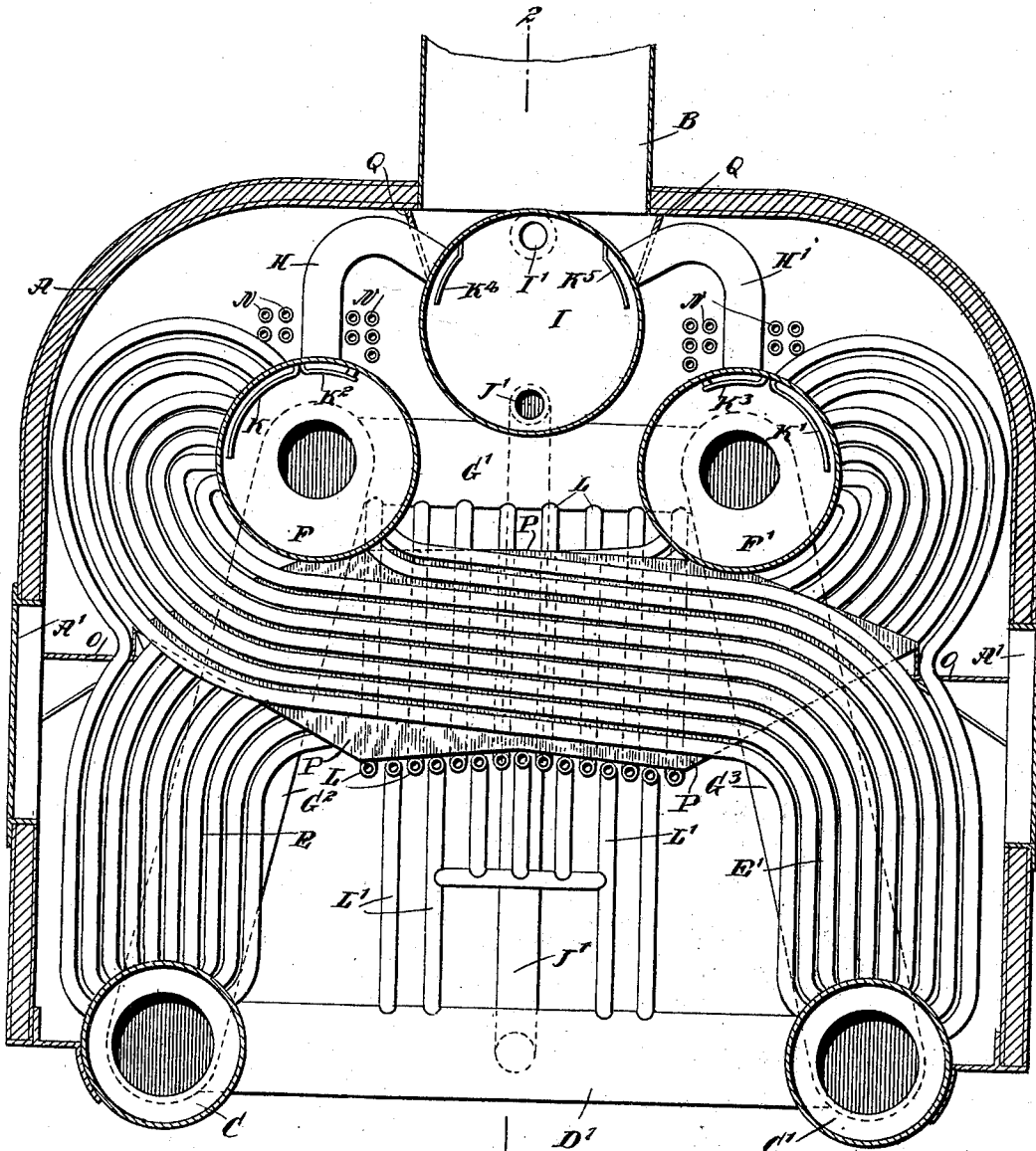
T. FRENCH.  
WATER TUBE BOILER.

(Application filed July 6, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig 1



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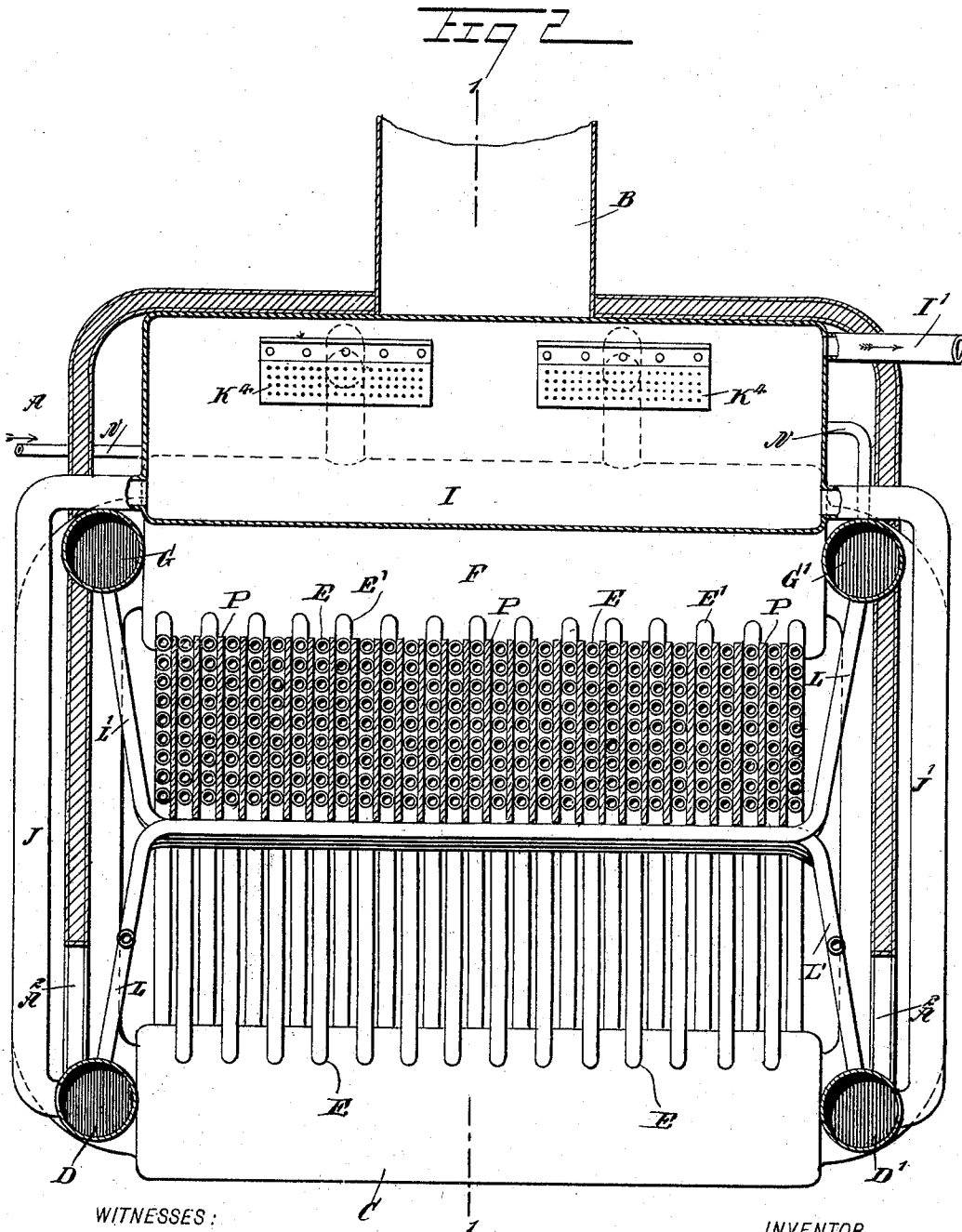
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

TOM FRENCH, OF ANDOVER, MAINE.

## WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 641,095, dated January 9, 1900.

Application filed July 6, 1899. Serial No. 722,951. (No model.)

*To all whom it may concern:*

Be it known that I, TOM FRENCH, of Andover, in the county of Oxford and State of Maine, have invented a new and Improved Water-Tube Boiler, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved water-tube boiler which is simple, durable, and compact in construction, very effective in operation, having a short and effective circulation of the water, and arranged to quickly and thoroughly separate the steam and water to insure the generation of very dry steam.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a cross-section of the improvement on the line 1 1 in Fig. 2, and Fig. 2 is a longitudinal sectional elevation of the same on the line 2 2 in Fig. 1.

The improved water-tube boiler is provided with a shell A, open at the bottom and having sides and ends and a top or roof, from which leads a smoke-stack B. The sides of the shell A are provided with doors A' for giving access to the interior of the shell for cleaning purposes, and in the ends of the shell are arranged doors A<sup>2</sup> for giving access to the fire-box.

In the shell A, at the bottom thereof, are arranged spaced longitudinally-extending mud-drums C C', connected with each other at their ends by transverse connecting-pipes D D', somewhat less in diameter than the drums C C', to cause the mud to principally settle in the drums C C'. From the tops of the mud-drums C C' lead sets of water-circulating pipes E E' to connect with the upper ends of spaced longitudinally-extending steam-drums F' and F, respectively, located a suitable distance above the mud-drums C C', as is plainly shown in the drawings. Each set of circulating-water pipes E E' consists of groups of pipes, the pipes in each group being arranged in a transverse plane and approximately par-

allel with one another, as is plainly shown in Fig. 1, with the groups of the sets of water-circulating pipes E E' alternating, said groups of pipes being close together at the point of crossing, so as to form a solid roof for the fire-box. Thus, as shown in Fig. 1, each set of water-circulating pipes E E' rises vertically a short distance, to then extend transversely in a slightly upwardly-inclined position and pass under the steam-drums F F', to finally bend over and connect with the steam-drums at the top thereof at the outer sides of the same. The ends of the steam-drums F F' are connected with each other by connecting-pipes G G', and pipes G<sup>2</sup> connect the ends of the steam-drum F with the ends of the mud-drum C, and like pipes G<sup>3</sup> connect the ends of the mud-drum C' at the junction of the pipes D G and D' G'.

From the tops of the steam-drums F F' lead steam-pipes H H' into the sides of a super-heating-dome I, having an outlet-pipe I' at one end for conducting the steam to the boiler or other place where it is to be used. The ends of the steam-dome I connect near the bottom by pipes J J' with the transverse connecting-pipes D D' for the mud-drums C C'. The steam-dome I is located directly under the roof of the shell A and somewhat above and midway between the steam-drums F F', so that the steam from the steam-drums can readily pass by the pipes H H' into the steam-dome and any water carried by the steam into the said dome can readily flow back from the latter by the pipes J J' to the connecting-pipes D D' to reënter the water circulation.

Opposite the entrance-openings of the pipes E E' within the steam-drums F F' are arranged baffle-plates K K', respectively, for deflecting entering steam and water in a downward direction in said drums, and similar baffle-plates K<sup>2</sup> and K<sup>3</sup> are arranged in said drums opposite the openings of the pipes H H', so that as little water as possible is carried by the steam from the drums F F' to the dome I. The latter is also provided with baffle-plates K<sup>4</sup> K<sup>5</sup> opposite the entrance-openings of the pipes H H' to deflect the steam and water carried thereby, so that the water readily passes to the bottom of the dome and then returns by the pipes J J' to the water circulation, as above explained. Sets of wa-

ter-circulating pipes L L' rise from the mud-drum-connecting pipes D D' to then extend longitudinally under the sets of pipes E E' at the crossing thereof, the ends of the pipes L then extending upward to connect with the connecting-pipe G' and the ends of the pipes L' extending upwardly to connect with the connecting-pipe G.

A feed-water pipe is arranged in a coil N, extending over the steam-drums F F', the ends of said pipe leading to one of the connecting-pipes for the mud-drums, as shown in the drawings the pipe D'.

In order to prevent the smoke and gases rising from the fuel in the fire-box from passing directly up into the smoke-stack B and to cause the smoke and gases to circulate more thoroughly within the shell and the parts contained therein to insure a complete utilization of the units of heat, I provide the sides of the shell A with longitudinally-extending deflecting-plates O, projecting inwardly to the junction of the pipes E, the pipes E' being at about the middle of the crossing of said pipes E, as is plainly shown in Fig. 1. The smoke and gases rising from the fuel cannot pass up between the sets of water-circulating pipes at the crossings, as the same are very close together, plates P being preferably arranged between adjacent sets of pipes, and consequently the smoke and gases travel sidewise, finally striking the under side of the deflecting-plates O, which cause the smoke and gases to turn downward and then upward into the space between the pipes E and E' and to then rise around the steam-drums F F' to the roof or top of the shell A, to be again deflected by longitudinal deflecting-plates Q, leading from the roof of the shell to the sides of the steam-dome I. Thus the smoke and gases can pass only into the space between the deflecting-plates and the top of the steam-dome from the ends of the latter, to then finally pass to the smoke-stack B and out to the air.

From the foregoing it is evident that a very large heating-surface is provided to insure a quick generation of the steam, especially as the circulation of the water from the mud-drums to the steam-drums is comparatively quick, and the heat from the fuel in the fire-box is caused to circulate in the shell to give off its heat before it finally passes to the smoke-stack, as above described.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, and sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the steam-drum on the opposite side, the pipes of the sets alternating and arranged close together at their point of crossing to form a solid roof for the fire-box, substantially as shown and described.

2. A boiler comprising spaced and connected mud-drums, spaced and connected steam-drums above the mud-drums, and sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the steam-drum on the opposite side, the sets of water-circulating pipes being alternately arranged and passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, the said pipes being close together at their point of crossing, substantially as shown and described.

3. A boiler comprising spaced and connected mud-drums, spaced and connected steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums and arranged close together at the point of crossing, to form the roof for the fire-box, and deflecting-plates extending from the sets of pipes to the walls of the shell, substantially as shown and described.

4. A boiler comprising spaced and connected mud-drums, spaced and connected steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, the sets of pipes leading from the tops of the mud-drums and entering the steam-drums near the top thereof, and baffle-plates on the inside of the steam-drums opposite the entrance ends of the water-circulating pipes, substantially as shown and described.

5. A boiler comprising spaced and connected mud-drums, spaced and connected steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, the sets of pipes leading from the tops of the mud-drums and entering the steam-drums near the top thereof, baffle-plates on the inside of the steam-drums opposite the entrance ends of the water-circulating pipes, a superheated steam-dome, steam-pipes for connecting the said steam-drums with the said dome, and baffle-plates in the steam drums and dome opposite the said steam-pipes, substantially as shown and described.

6. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, connecting-pipes for connecting the

ends of the mud-drums with each other, a superheated steam-dome, steam-pipes for connecting the said steam-drums with the said dome, and return water-pipes leading from the said steam-dome to the said connecting-pipes, substantially as shown and described.

7. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, to form the roof for the fire-box, and transverse separating-plates between the sets of pipes at their crossing, substantially as shown and described.

8. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, to form the roof for the fire-box, transverse separating-plates between the sets of pipes at their crossing, a shell, and longitudinal deflecting-plates at the sides of the shell at the beginning of the crossing of the circulating-water pipes, substantially as shown and described.

9. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, connecting-pipes for connecting the ends of the mud-drums with each other, a superheated steam-dome, steam-pipes for connecting the said steam-drums with the said dome, return water-pipes leading from the said steam-dome to the said connecting-

pipes, and feed-water pipes above the steam-drums and leading to the said connecting-pipes, substantially as shown and described.

10. A boiler comprising spaced drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, connecting-pipes for connecting the ends of the mud-drums with each other, a superheated steam-dome, steam-pipes for connecting the said steam-drums with the said dome, return water-pipes leading from said steam-dome to the said connecting-pipes, a shell for inclosing the said drums and pipes at the sides, ends and roof, longitudinal deflecting-plates projecting from the sides of the shell to the beginning of the crossing of the water-circulating pipes, and longitudinal deflecting-plates extending between the roof of the shell and the sides of the steam-dome, substantially as shown and described.

11. A boiler comprising spaced mud-drums, spaced steam-drums above the mud-drums, sets of transverse water-circulating pipes, each set leading from a mud-drum on one side to the opposite steam-drum on the opposite side, the sets of water-circulating pipes passing each other above the longitudinal plane of the mud-drums and below that of the steam-drums, transverse connecting-pipes for connecting the ends of the mud-drums with each other, connecting-pipes for the ends of the steam-drums, and sets of longitudinal water-circulating pipes, each set leading from the mud-drum-connecting pipe at one end of the boiler under the crossing of the transverse water-circulating pipes, to then open into the steam-drum-connecting pipe at the other end of the boiler, substantially as shown and described.

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Witnesses:

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