

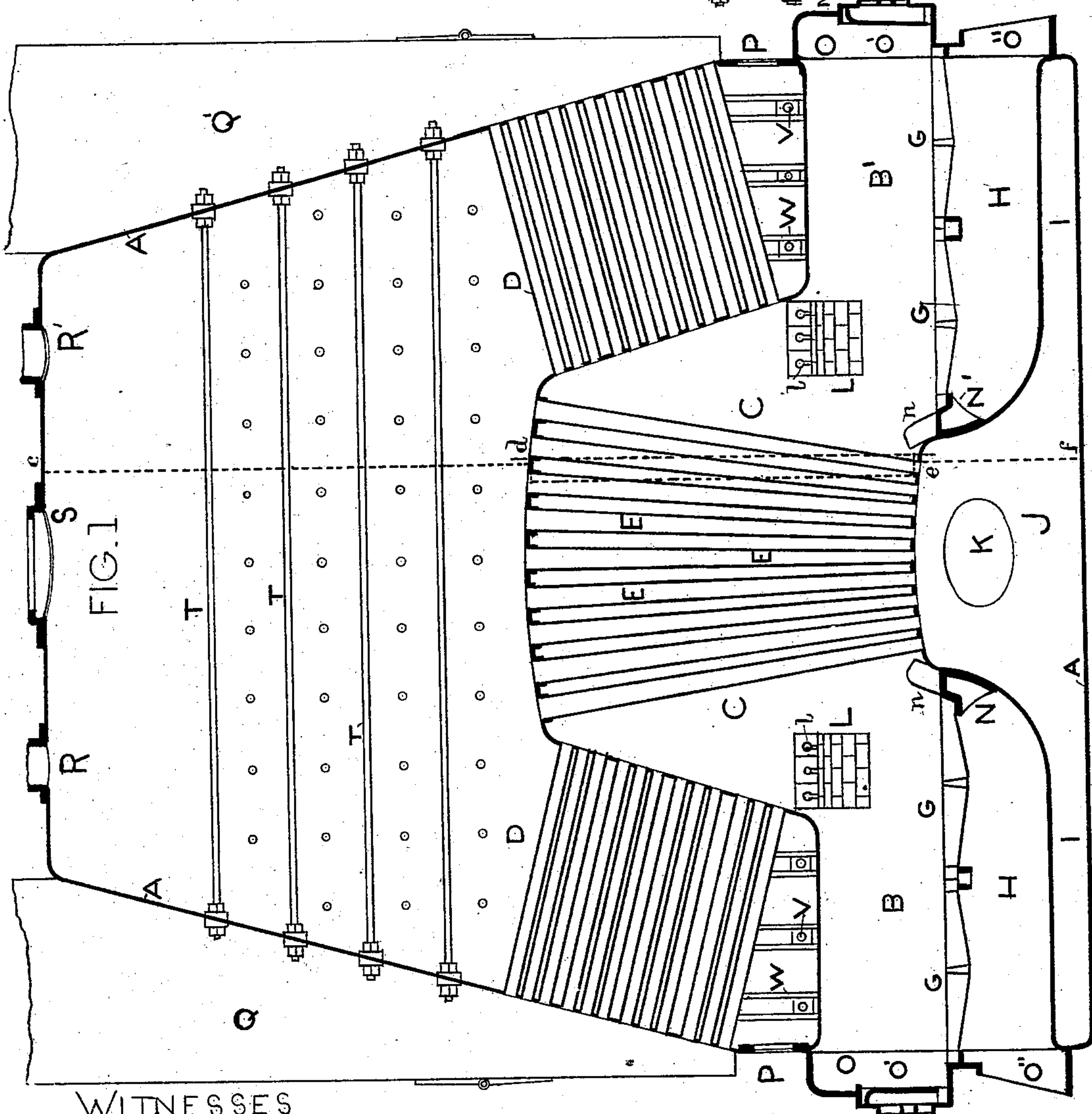
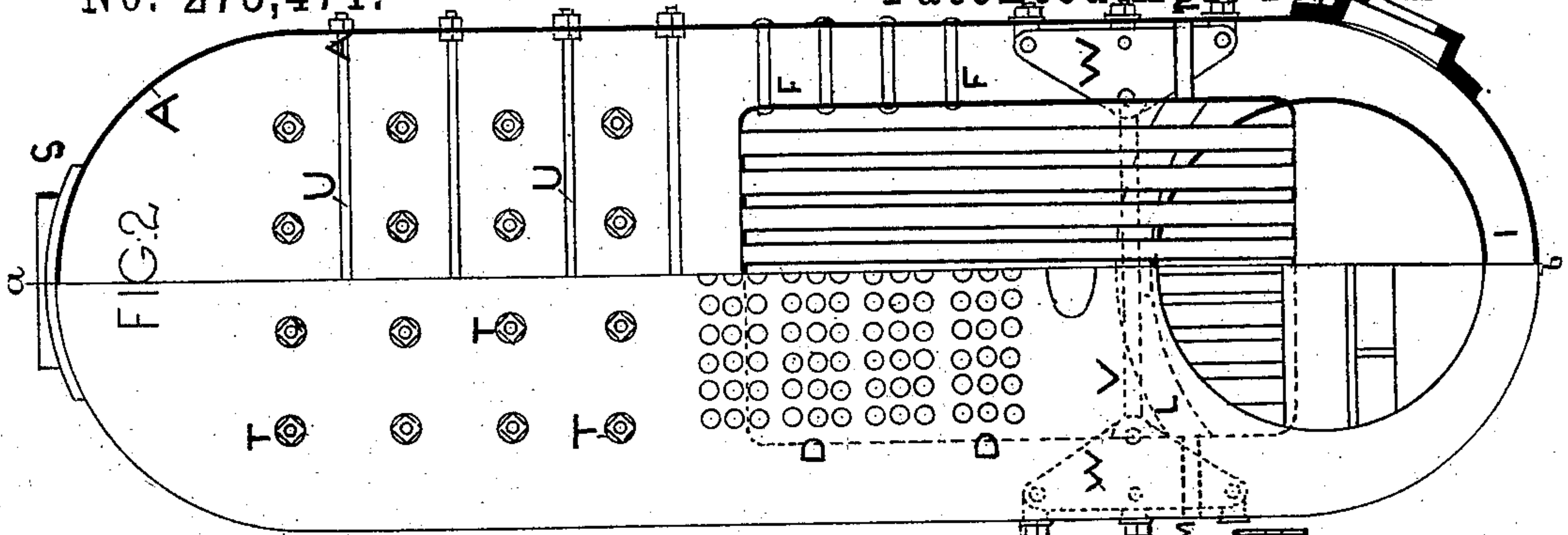
(No Model.)

G. W. DICKIE.

STEAM BOILER.

No. 275,471.

Patented Apr. 10, 1883.



WITNESSES

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# UNITED STATES PATENT OFFICE.

GEORGE W. DICKIE, OF SAN FRANCISCO, CALIFORNIA.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 275,471, dated April 10, 1883.

Application filed October 16, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. DICKIE, a citizen of the United States, residing at San Francisco, State of California, have invented a new and Improved Steam-Boiler, of which the following is a specification.

My invention relates more especially to such boilers as are used on steamships; but it is applicable to steam-boilers generally.

The objects of the invention are to obtain increased steaming capacity in proportion to the size of the boiler and fuel expended; to obtain a better disposition of the parts, so as to acquire greater strength, serviceability, and improved facilities for cleaning; and, finally, to provide a boiler of such construction as will be suitable to form one of a numerous set or series economically, so that any temporary derangement of one in a set will have a minimum effect in incapacitating the vessel or works in which they may be serving.

The invention consists in the shape and arrangement of the different parts, and in their being related to and combined with each other, so that the purposes and objects sought may be effected.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation taken through the line *a b*, Fig. 2. Fig. 2 is a half end view and half cross-sectional elevation on the line *c d e f*, Fig. 1, combined.

A is the outer shell of the boiler, having a contour as shown in the figures of the drawings, the front and rear view presenting vertical parallel sides joining a perfectly semicircular top and bottom, and the side view presenting a horizontal roof and base with opposite sides standing vertically for about one-third their total height, and then falling in at an angle of about fifteen degrees from the perpendicular to join a roof, which is about two-thirds the width of the base. From each end, at the bottom, tubular furnaces BB' enter the boiler a distance sufficient to accommodate the grate-bars, leaving about one-fourth of the total distance through, from end to end, between the opposing furnaces. This intermediate space is included in my combustion-chamber C, the bottom of which chamber is formed by a convex or crowning sheet set at about the level of the center of the tubes which form the furnaces proper, which sheet is joined to and

forms a continuing part of the floors of said furnaces. These furnace-floors curve concavely upward to meet the bottom sheet of the combustion-chamber, as shown in Fig. 1. The roofs, so to speak, of the furnaces do not extend so far into the boiler as do the floors of the same, one-fourth of the total distance through from end to end of the boiler being about the measure of their depth. At the extreme end of the roofs of each furnace the ends of the combustion-chamber are formed by the inclined sheets, which carry the lower ends of what I term the "fire-tubes," (because the fire passes through them.) These sheets are parallel with the outer inclined end sheets of the boiler, the fire-tubes D connecting between. The roof of the combustion-chamber is concave or concentric with the floor thereof, both roof and floor being struck from a common center, from which center the axes of the water-tubes E, connecting the roof and floor of the combustion-chamber, radiate. The "water-tubes" E, so called because the water passes through them, may either taper from end to end or be ordinary tubes of the same area at both ends, and, as they must act as braces to prevent both collapsing and bulging, they should be screwed into both top and bottom tube-sheets, the screw-thread being cut on the tubes within their common thickness at the lower end, but upon thickened ends or collars at the upper end, so that the lower end may be passed freely through the hole which receives the upper end. In Fig. 1 I show this collar on upper end of tubes, though the scale of drawing is too small to show the screw-thread. The sides of the combustion-chamber are, as shown in Fig. 2, parallel with the sides of the outer shell, a suitable system of socket bolt-bracing, F, joining the two together. The floor of the combustion-chamber C, being necessarily above the level of the grate-bars, and the bottom of the boiler being below this floor a distance equal to the depth of the grate-bars G, ash-pit H, and water-bottom I, there is formed between said floor and bottom a roomy water-space, J, which gives great facility for cleaning out the boiler-bottom, a good-sized man-hole, K, being provided for this purpose. This large water-space is necessary also to promote a good circulation of the water in the tubes E.

LL are fire-brick arches, which obstruct the



flames of the fire from too abruptly entering the lower fire-tubes, but deflect them to as near the center of the combustion-chamber as possible. These arches, however, must not  
 5 near the water-tubes so closely as to choke the draft. The bricks of these arches will be provided with air-conduits *l*, connecting with the exterior of the boiler through tubes *M M'*, passing through the water-space formed by the  
 10 outer sheets of boiler and side wall of combustion chamber. The air which passes through these bricks will be distributed through small perforations either down into the furnace or up into the combustion-chamber, or both, as experience may dictate.

*NN'* are cast-iron back grate-bar bearers, fastened to the rear of the furnace, a protecting-guard, *n*, being made part of them, which guard forms a protection both against the fuel  
 20 bedding against the bottom of the water-tubes and against the fire-irons striking them.

*O O* are cast-iron fire-fronts, which it is unnecessary for me to describe in detail, as any suitable pattern will answer.

25 *O'* is the fire-door, and *O''* is the ash-pit door.

*P* is a hand-hole, which, when uncovered, will give access to the interior of the boiler for the removal of any sediment accumulated on  
 30 the roof-sheet of furnace.

*Q Q'* are the ordinary breechings, conducting from the upper ends of fire-tubes into the smoke-pipe or chimney. They may arch over above the boiler to meet each other in the center and connect in suitable manner with a flue  
 35 common to a set of boilers. This is not shown in the drawings for want of space, and it is unnecessary to do so; for any suitable arrangement in this regard may be made.

40 *R R'* are the broken-off bottoms of such valves, safety or supply, as may be needed.

*S* is a man-hole plate with cover removed.

The system of bracing may be varied according to the choice of the constructor. I  
 45 show longitudinal brace-rods *T*, with beveled washers and screw-nuts on each end, bracing the inclined ends of boiler, and transverse rods *U*, of similar pattern, bracing the sides. I use  
 50 ordinary socket or screw bolts for bracing the water-walls, and in the space over the furnace-roofs I apply stout brace-rods *V*, which are fast-

ened to the center apex of pairs of triangular plates *W*, whose bases are fastened in the middle and ends to the side sheets of the boiler, as fully illustrated in drawings.

I have here described my double furnace-boiler; but to make a single furnace involving the same principles of construction, let it be supposed that the boiler is cut vertically through the line *c d e f*, Fig. 1, and vertical sheets provided to close the opening thus left from *c* to  
 60 *d* and *e* to *f*, then a detachable water-wall or fire-brick backing provided to close the opening from roof to floor of combustion-chamber. This change only will be necessary to  
 65 constitute a single furnace-boiler after my plan. Of course when I use a water-back to close the opening from floor to roof of combustion-chamber the proper circulating pipes and connections will be supplied to circulate water  
 70 from the main part of boiler through this water-back. The dotted line in Fig. 1 amply illustrates this arrangement of a single furnace-boiler.

What I claim as my invention, and desire to  
 75 secure by Letters Patent, is as follows:

1. In a steam-boiler, the combination of the shell *A*, formed with continuous sides and ends, the tubular furnaces *B B'*, arranged therein opposite to each other, the combustion-chamber  
 80 *C*, having a flat or convex floor full width of the furnace above the line of the grate-bars, to accommodate a nest of water-tubes, *E*, connecting between said floor and the roof of the chamber, and the fire-tubes *D*, leading from  
 85 said combustion-chamber into the breechings *Q Q'*, substantially as described.

2. In a steam-boiler, the combination of the shell *A*, formed with continuous sides and ends, the tubular furnace *B*, arranged therein, the  
 90 combustion-chamber *C*, having a flat or convex floor full width of the furnace above the line of the grate-bars, to accommodate a nest of water-tubes, *E*, connecting between said floor and the roof of the chamber, and the fire-tubes *D*,  
 95 leading from said combustion-chamber into the breeching *Q*, substantially as described.

GEORGE W. DICKIE.

Witnesses:

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