No. 650,634. Patented May 29, 1900.

C. W. COX.

STEAM BOILER.

(Application filed Sept. 29, 1899.)

(No Model.)

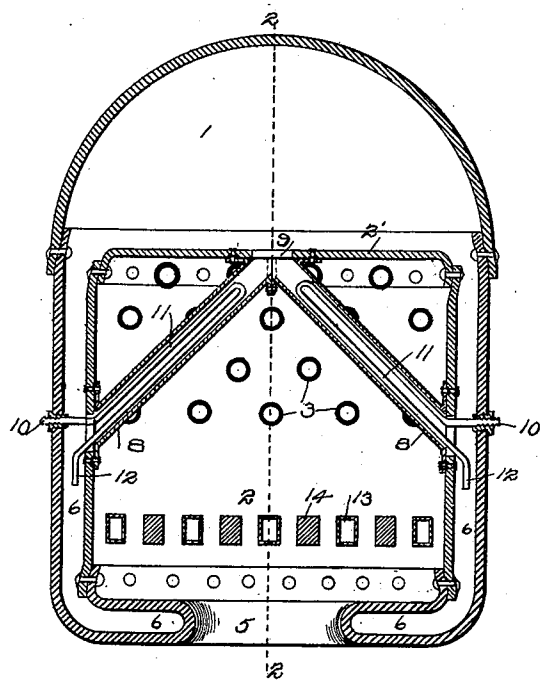

Fig. 1.

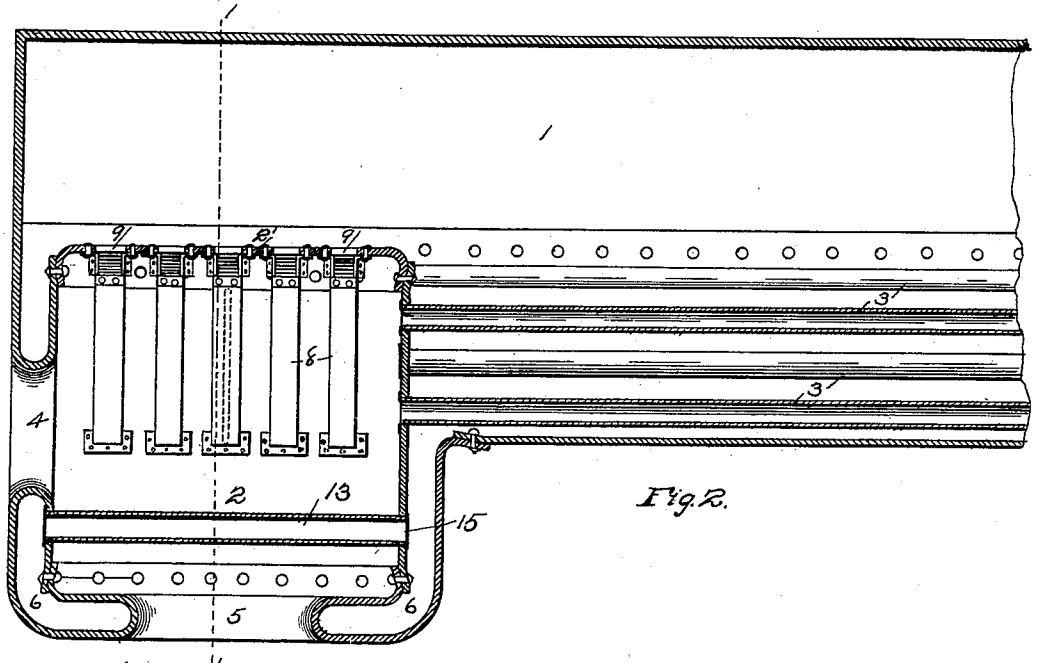

Fig. 2.

Witnesses.
W. S. Dawson,
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Inventor.
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UNITED STATES PATENT OFFICE.

CHARLES W. COX, OF SISTERSVILLE, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO GEORGE A. FRAMPTON, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 650,634, dated May 29, 1900.

Application filed September 29, 1899. Serial No. 732,002. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. COX, a citizen of the United States, residing at Sistersville, in the county of Tyler and State of West Virginia, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to steam-boilers, and has for one object to provide a boiler having a large area of water-heating surface and to arrange water-tubes through the fire-box in such manner as to induce constant and rapid circulation, with increased heating efficiency.

A further object is to admit the feed-water in a novel manner.

The invention consists in the novel features of construction hereinafter fully described and claimed, and illustrated by the accompanying drawings, in which—

Figure 1 is a vertical cross-sectional view of a boiler and fire-box, taken on line 1 1 of Fig. 2. Fig. 2 is a vertical longitudinal sectional view taken on line 2 2 of Fig. 1.

1 is the boiler proper, 2 the fire box or chamber, and 3 the flue-tubes, extending from the rear of box 2. The fire box or chamber is surrounded, excepting at charging-door 4 and ash-hole 5, with water-space 6.

Arranged within the fire box or chamber are the oppositely-inclined tubes 8. The lower ends of these tubes open through the sides of the fire-box into water-space 6. Opposite tubes, converging as shown, join just below the crown-sheet 2′ of fire-chamber 2 and open through the crown-sheet and into the upper part of the boiler at 9. Feed-water is admitted at opposite sides of the boiler through pipes 10, and each pipe has a looped or return portion 11 extending well up into one of inclined tubes 8, discharging at 12 into space 6.

The grate is made up, preferably, of hollow bars 13 and solid bars 14, arranged alternately, the hollow bars opening into space 6, as indicated at 15.

With the construction here shown and described the water is exposed to heat on all sides of the fire box or chamber. The hollow grate-bars being directly exposed to the fire, the water circulating therethrough is rapidly heated and circulated. The position and inclination of tubes 8 directly over the fire present a large heating area to and greatly facilitate the circulation of the water. With opposite tubes connected at the top, as shown, water may pass from one to the other, and hence from one side of water-space 6 to the other, without first discharging into the upper portion of the boiler.

I do not restrict myself to the exact arrangement or number of tubes 8 here shown, nor to the arrangement of feed-water inlets, nor to the exact arrangement shown of water space or jacket 6, as in these features the invention may be varied without departing from the spirit or scope thereof.

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

1. The combination in a steam-boiler, with the fire-box and the water-space extending to opposite sides of the fire-box, of water-circulating tubes traversing the fire-box and arranged in pairs, the tubes of each pair opening at their outer ends into the water-space, and at their inner ends coupled together to form a continuous uninterrupted passage from one side of the water-space to the other, said tubes at their point of union being coupled to the crown-sheet and communicating therethrough with the upper portion of the water-space, substantially as shown and described.

2. The combination in a steam-boiler, with the fire-box and the water-space extending to opposite sides of the fire-box, of water-tubes traversing the fire-box and arranged in pairs, the adjacent ends of the tubes of each pair being secured together and to the crown-sheet around an aperture in the latter, the tubes inclining in opposite directions and opening at their lower ends into the water-space on opposite sides of the fire-box, substantially as shown and described.

3. The combination in a steam-boiler, with the fire-box, and the water-space extending to opposite sides of the fire-box, of water-tubes arranged in pairs and traversing the fire-box, the adjacent ends of the tubes of each pair being flanged with the flanges secured together, the tubes at their meeting ends being secured to and opening through the crown-

sheet, and at their outer ends opening into the water-space on opposite sides of the fire-box, substantially as shown and described.

4. The combination in a steam-boiler, with the fire-box, and the water-space extending to opposite sides of the fire-box, of water-tubes traversing the fire-box and arranged in pairs, the adjacent ends of the tubes of each pair being outwardly flanged, a portion of said flanges being secured together and the remainder of the flanges secured to the crown-sheet around an aperture in the latter, whereby said tubes and the crown-sheet have direct and common union, the tubes at their outer ends opening into the water-space on opposite sides of the fire-box, substantially as shown and described.

5. The combination in a steam-boiler, with the fire-box, and the water-space extending to opposite sides of the fire-box, of water-tubes within the fire-box and opening into the water-spaces on opposite sides of the latter, and feed-water pipes extending through said side water-space and into the circulating-tubes, substantially as shown and described.

6. The combination of a steam-boiler, water-spaces on the sides of the fire-box, water-circulating tubes within the box and communicating with said spaces, and feed-water pipes having elongated return-bends positioned in said tubes, the pipes entering the tubes through the water-spaces and discharging therein, substantially as shown and described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES W. COX.

Witnesses:
R. L. MOORE,
C. C. MARSH.