



C. W. SMART.  
STEAM BOILER OR HOT WATER HEATER.

No. 552,974.

Patented Jan. 14, 1896.

Fig. 3

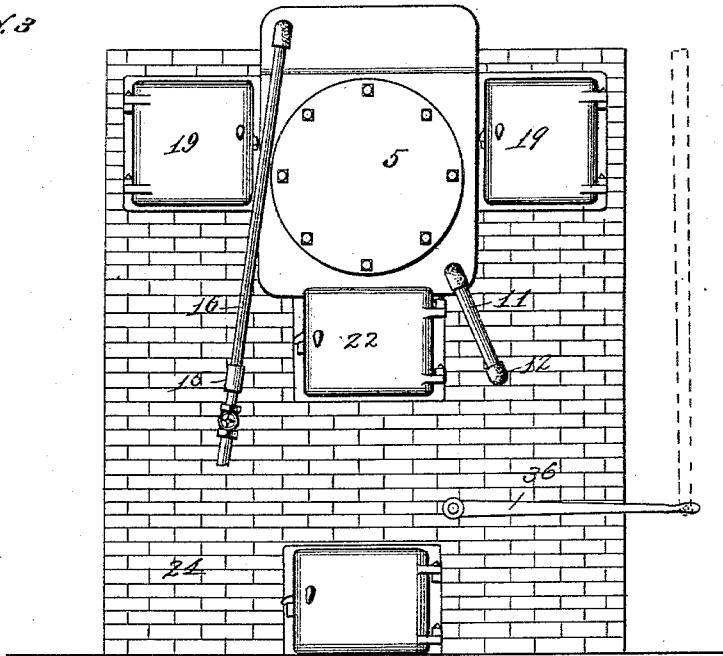


Fig. 4

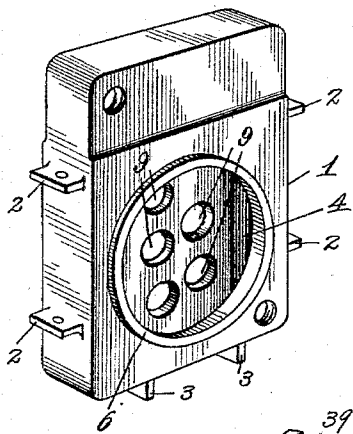


Fig. 5

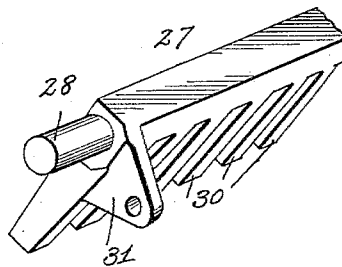
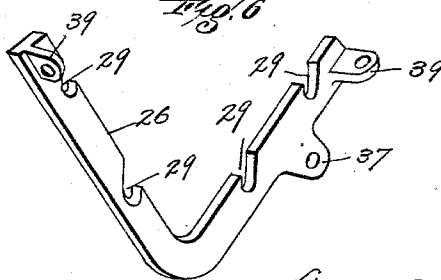


Fig. 6



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# UNITED STATES PATENT OFFICE.

CHARLES W. SMART, OF CARBONDALE, ILLINOIS.

## STEAM-BOILER OR HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 552,974, dated January 14, 1896.

Application filed May 13, 1895. Serial No. 549,123. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. SMART, of the city of Carbondale, Jackson county, State of Illinois, have invented certain new and useful Improvements in Steam-Boilers or Hot-Water Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to a steam-boiler or hot-water heater; and it consists in the novel construction, combination and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of my boiler. Fig. 2 is a cross-section taken approximately on the indicated line 2 2 of Fig. 1 and looking in the direction indicated by the arrow A. Fig. 3 is a front elevation of the same. Fig. 4 is a view in perspective of one of the cast-iron headers which I employ in the construction of my boiler. Fig. 5 is a view in perspective of the forward end of one of the grates which I employ. Fig. 6 is a view in perspective of one of the brackets which I employ to support the grate.

Referring by numerals to the accompanying drawings, 1 1 indicate headers approximately rectangular in form and provided with lugs 2 2 on their vertical edges, and with similar projecting lugs 3 3 on their lower edges. Formed in the front faces of these headers are circular openings 4, which are closed or covered by heads 5. For the purpose of making the joint between the heads 5 and headers 1 steam-tight, I employ a raised edge 6 on the headers 1, which fits snugly in a corresponding circumferential groove 7 in the heads 5, thereby forming a perfect joint without the necessity of using packing of any description.

In the construction of my boiler I employ two headers of the form shown in Fig. 4 and join them by a number of tubes 8, which are expanded into openings 9 in the headers on the face opposite to that in which the openings 4 are formed. The upper portion of the headers 1 forming the steam-domes of the boiler are connected by a pipe 10 for the purpose of equalizing the pressure in the steam-spaces of the boiler. From one of the lower ends of the forward header a pipe or tube 11 extends downwardly a slight distance, and at

its lower end is provided with a common elbow 12, to which is connected a horizontal pipe 13, which extends rearwardly as far as the bridge-wall 14, crosses to the opposite side of the boiler and extends forwardly to the front of the boiler, where it is provided with an elbow 15 to which is attached the pipe 16, which is connected to the steam-space of the forward header. The pipe thus arranged forms supports on either side of the boiler for vertical walls of tiling 17, which confine the heat of the fire to the tubes 8, and also form the inner walls of the coal-magazine.

Attached to the lugs 2 are frames 18 which support the doors 19 opening into the coal-magazines 20.

Attached to the lugs 3 is a frame 21 which supports a fire-door 22. Side walls 23 and end walls 24 and 25 completely inclose the boiler.

The inner sides of the side walls 23 form the outer sides of the coal-magazines 20.

Fixed in the forward face of the bridge-wall 14 and to the rear face of the front wall 24 are V-shaped brackets 26, which support the grates 27. These grates 27 are provided at their opposite ends with journals 28, which rest in depressions 29 in the brackets 26. Each of the grates 27 is formed with a series of fingers 30, and to the forward one of said fingers is attached a lug 31. When the grates are in position under the boiler, as shown in section in Fig. 2, I connect the lugs 31 of each grate by means of a bent bar 32. It will be evident that any motion communicated to the bar 32 will by means of the several lugs on the grates 27 be transmitted to each individual bar, and thereby very efficiently shake or stir the fire upon said bars. A horizontally-extending rod 33 provided near its outer end with a crank 34 and link 35, said link being connected to the bar 32, provides means for operating or shaking the grates when it is found necessary or thought desirable. The forward end of this rod 33 extends a slight distance beyond the front face of the front wall 24, and attached to this extending end is a lever 36, which forms convenient means for oscillating the rod 33 and shaking the grates. The rearward end of this rod 33 is journaled in a lug 37 formed on the rear supporting-bracket 26.

At the lower ends of the coal-magazines 20 are inclined plates 38, which are fixed to lugs

39 formed on the brackets 26. These plates 38 form inclines, down which the coal is fed by gravity whenever the grates 27 are shaken.

At the rearward end of the boiler is formed a pocket 40 for the purpose of catching the accumulations of soot, &c. If it is found desirable, a cold-air check may be connected to this pocket, and the pressure of the steam in the boiler may be automatically regulated.

The operation is as follows: The boiler being filled with water to the level indicated in Fig. 1 and a fire started on the grates, heat will be communicated to the water and the water will be rapidly circulated. For the purpose of assisting the circulation, I prefer to set the rear end of the boiler slightly higher than is the front end, although this is not essential. The pipe 10, as before stated, equalizes the pressure between the headers at the opposite end of the boiler, and also forms a convenient means of attaching the boiler to a series of radiators or to a steam-engine, for the purpose of producing power. By supporting the tiling 17 upon pipes connected to the water-space of the boiler, said pipes are kept comparatively cool, and the danger of the support for the tiling burning away is entirely obviated.

A boiler of my improved construction may be very cheaply assembled, and by removing the heads 5 access to the interior of the boiler is obtained, for the purpose of inspection or repairs.

The entire boiler being covered by brick, contraction or expansion is obviated and injury to the boiler is thereby prevented. It is not necessary that the entire headers should be formed of cast-iron, as that portion of the header to which the tubes are attached may be made of sheet steel or iron and riveted to the header.

By placing the grates in an inclined position the coal will feed down by gravity and very little attention is required to keep the boiler in operation.

If it is found desirable a rod may be extended vertically from the lever 36 to the floor above, and so avoid the necessity of leaving the room for the purpose of shaking the grates.

It is not necessary that tiling be employed

to form the inner wall of the magazine 20, but I may make the inner wall in the form of a water-leg extending downwardly to a plane below that of the tubes and connected by suitable connections to the headers at either end.

What I claim is—

1. The improved steam-boiler, constructed with two opposite vertical-headers 1, 1, having water-spaces in their lower-portions, a series of horizontal-tubes 8 connecting the water-spaces of said headers; each header having but a single opening of sufficient area to extend opposite the adjacent ends of all said tubes, a cover for said opening, a steam-space in each header projecting free in a plane above the water line of the boiler, and a separate steam-pipe 10 located in a plane above said tubes and connecting the steam-space of said two headers, substantially as herein specified.

2. In a steam boiler, two opposite hollow headers, suitable tubular connections between said headers, one of said headers having on each of its vertical edges perforated lugs, and door-frames secured to said lugs, substantially as specified.

3. In a steam boiler, two opposite hollow headers, suitable tubular connections between said headers, one of said headers having on each of its vertical edges and on its lower edge perforated lugs, and door-frames secured to said lugs, substantially as specified.

4. In a steam boiler, two opposite hollow headers, suitable tubes connecting said headers, each of said headers having a steam space in a plane above said tubes, a pipe leading from said steam space downwardly and rearwardly, a pipe leading from the water space of said header, downwardly and rearwardly, a pipe connecting the rearwardly extending ends of said horizontal rearwardly extending pipes, and tiling supported on said horizontal rearwardly extending pipes, substantially as herein specified.

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

CHARLES W. SMART.

Witnesses:

EDWARD EVERETT LONGAN,  
JOHN L. TUNISON.