

(No Model.)

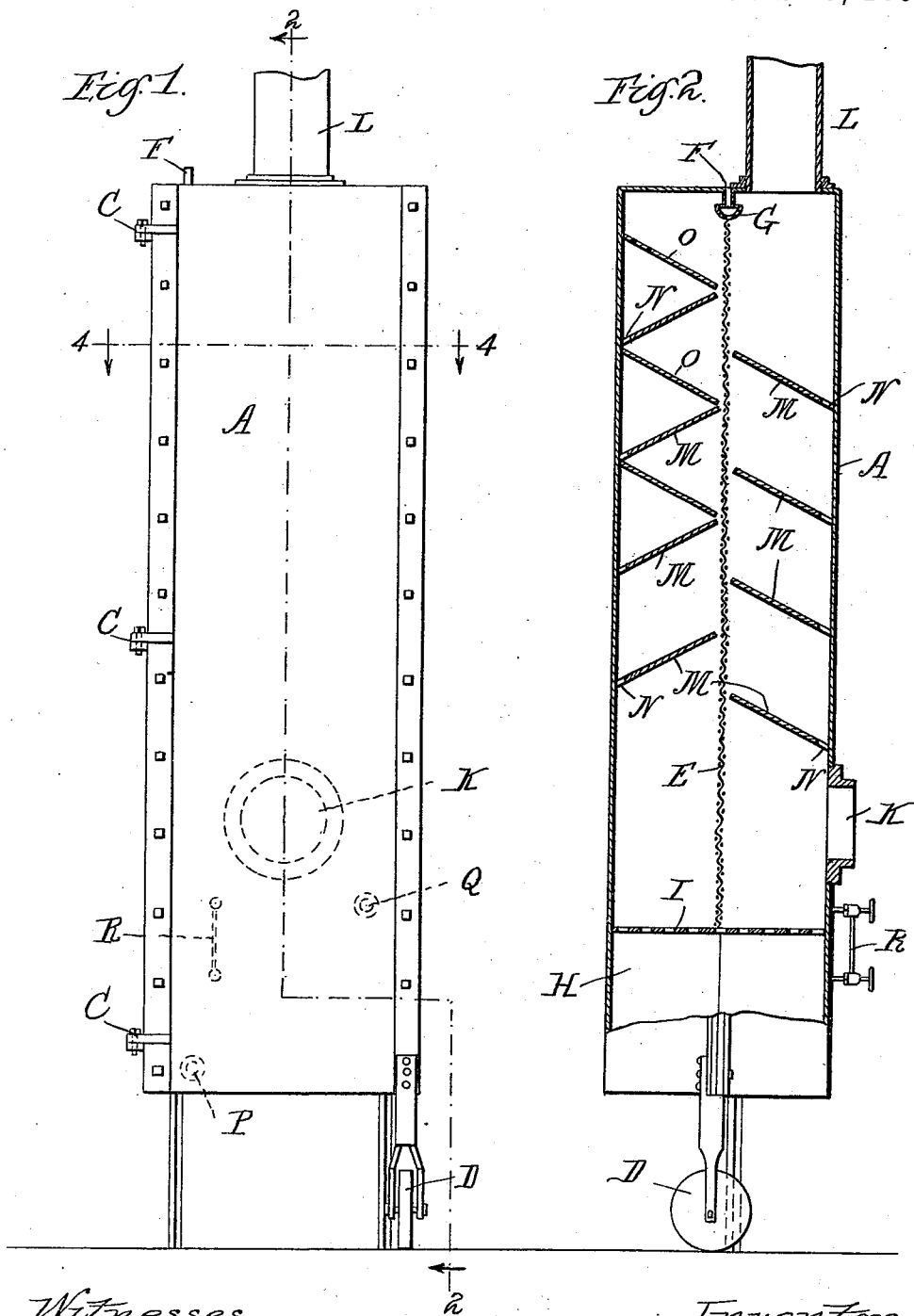
2 Sheets—Sheet 1.

J. E. SMITH.

COMBINED FEED WATER HEATER AND PURIFIER.

No. 553,694.

Patented Jan. 28, 1896.



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Inventor.
Julian E. Smith
by Howard Darby atty.

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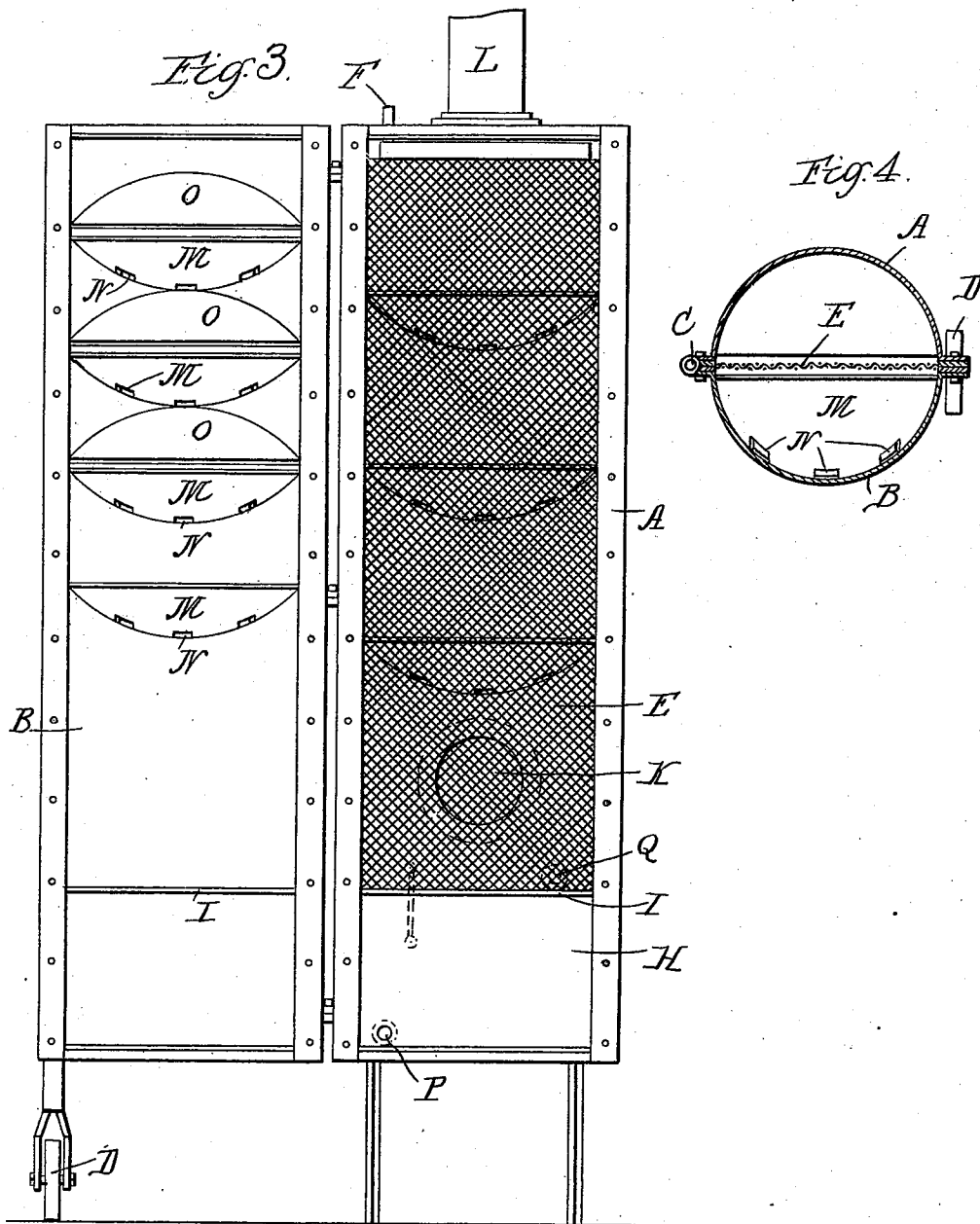
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UNITED STATES PATENT OFFICE.

JULIAN E. SMITH, OF CHICAGO, ILLINOIS.

COMBINED FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 553,694, dated January 28, 1896.

Application filed June 24, 1895. Serial No. 553,908. (No model.)

To all whom it may concern:

Be it known that I, JULIAN E. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Combined Feed-Water Heater and Purifier, of which the following is a specification.

This invention relates to a combined feed-water heater and purifier.

10 The object of the invention is to provide a construction wherein is created a galvanic action, to which the feed-water of the boiler is subjected, thereby neutralizing the affinity of the scale-making properties for each other
15 which is contained in the feed-water, and hence preventing the formation of scale or incrustation in the boilers.

20 A further object of the invention is to heat the feed-water before it is introduced into the boiler.

A further object of the invention is to provide a construction which is simple, economical, easily accessible, understood and operated.

25 Other objects of the invention will more fully hereinafter appear.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, as shown in the
30 accompanying drawings and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in elevation of a combined feed-water heater and purifier embodying the principles of my invention. Fig. 2 is a view in central longitudinal section of the same, taken on the line
35 2 2, looking in the direction of the arrows. Fig. 3 is a view similar to Fig. 1, with the hinged part shown in open position. Fig. 4 is a transverse sectional view taken on the line 4 4, Fig. 1, looking in the direction of the arrows.

40 The same reference-sign is employed throughout the several views to designate the same part wherever it occurs.

In carrying out my invention I provide a suitable chamber or receptacle A of any suitable construction and arrangement, but preferably provided with a hinged door or section

B hinged, as at C, and provided with suitable means by which said hinged section may be closed water-tight to form the receptacle A. A suitable caster or support D may be provided to support the hinged section B in opening or closing the same. Suitably mounted within receptacle A is a screen or lattice-work E, as fully shown in section in Figs. 2 and 4, and in side elevation in Fig. 3, and
55 comprising strips of copper, zinc, aluminium or other suitable material, possessing, when brought into conjunction with each other under suitable conditions, galvanic properties. These strips of zinc and copper or other suitable metal or material may be of any desirable or preferred form in cross-section, and this lattice-work or screen may be arranged in any suitable position within receptacle A and suitably supported therein in any suitable manner.
60 65 70

The feed-water to be purified or heated is introduced to receptacle A through suitable connection, as at F, and the arrangement being such that the feed-water is arranged to flow down the lattice-work or screen E. In order to secure this result I arrange a suitable trough G to receive the feed-water from connection F, and arrange the same directly over and in line with the lattice-work or screen
75 80 and provide the same with suitable slots or perforations to enable the water to be distributed through the width of said lattice-work or screen at the top end thereof, or, if desired, the water may be permitted to overflow said trough and thereby flow down the lattice-work.
85

At the lower end of the receptacle A, I provide a receiving-chamber H, separated from the main body of the receptacle A by means of a screen or grating I, thereby retaining within receptacle A any sediment or other extraneous matter which might not be able to pass through the valves of the pump employed to deliver the feed-water from the receiving-chamber H to the boiler.
90 95

In order to heat the feed-water and at the same time to increase the galvanic action of the electropositive and electronegative metals employed therefor by subjecting the same to heat I provide a suitable steam-inlet K, which may communicate with any source of steam,
100

either live steam or exhaust, but preferably and more economically with the exhaust-steam of the engine, and I also provide said receptacle A with an exhaust or exit L for the same. By arranging the steam-inlets K and L at opposite ends of the receptacle A, and preferably by arranging the inlet K at the opposite end of said receptacle with respect to the connection F for the feed-water, the steam and the feed-water flow in opposite directions through said receptacle A, thereby subjecting the incoming feed-water to the action of the outgoing steam, and hence effecting a heating of the feed-water.

In order that the steam may be deflected against the screen or lattice-work down which the feed-water flows during the passage of such steam through receptacle A, suitably-arranged deflectors or baffle-plates M may be provided, and in order to provide for any condensation that may take place I provide suitable openings N to enable the condensed water to be drawn off of said deflectors or baffle-plates; or, if desired, said deflecting-plates may be suitably perforated.

If desired, plates O may be employed for use in conjunction with plates M, and said plates O and M may be constructed of copper and zinc in order to increase the galvanic action within the receptacle A.

The heated water contained in the receiving-chamber H may be drawn off for use in the boiler through any suitable opening, as P, and receptacle A may be provided at Q with an overflow-opening through which excess of water may pass.

If desired, a sight-glass R may be provided to indicate the height of level of the water in the receiving-chamber H.

If desired, instead of the receptacle A any feed-water heater may be provided with a combination of the electropositive and the electronegative elements arranged in any suitable manner.

It is a well-known fact that the elements of feed-water which combine with each other to form deposits or incrustations upon the parts of the boiler exposed thereto possess a very strong chemical affinity for each other, and it is on account of such affinity that scale is produced. By subjecting the feed-water to galvanic action before introducing the same to the boiler, as above described, this chemical affinity of the scale-forming properties of the feed-water is disrupted, broken up, or neutralized, thereby avoiding or preventing the formation of scale deposits or incrustation within the boiler. It will also be observed that the neutralizing effect of the galvanic action is increased and intensified by reason of the presence of heat due to the passage of the steam through the heater and purifier, acting upon the galvanic materials.

Many variations in the construction and arrangement of parts would readily suggest themselves to persons skilled in the art and

still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the exact details shown and described; but,

Having explained the object and nature of my invention and its purposes and a form of apparatus embodying the same, and having explained the principle and mode of operation thereof, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a feed-water heater or purifier a receptacle, a screen or lattice work composed of electro-positive and electro-negative elements arranged within said receptacle, means for admitting the feed water to be purified to said receptacle and to deliver the same upon said screen or lattice work, and means for delivering steam upon said elements to heat the same during the passage thereof of the feed water, whereby said feed water is heated and subjected to galvanic action; as and for the purpose set forth.

2. In a feed water heater and purifier, a receptacle, a screen or lattice-work arranged therein composed of electro-positive and electro-negative elements, means for admitting feed water to said receptacle, and for causing the same to flow along said screen or lattice work, and means for subjecting said lattice work or screen to the action of heat during the passage thereover of said feed water; as and for the purpose set forth.

3. In a feed water heater and purifier, a receptacle, a trough, a pipe communicating therewith, and adapted to deliver the feed water therein, a screen or lattice work composed of electro-positive and electro-negative elements arranged within said receptacle in position for the feed water to flow thereover from said trough, and means for heating the same; as and for the purpose set forth.

4. In an apparatus of the class described, a receptacle, a trough arranged therein, a pipe for delivering feed water into said trough, a screen or lattice work, composed of copper and zinc or other suitable electro-positive and electro-negative elements, and relatively arranged with respect to said trough for the feed water to trickle over said lattice work or screen from said trough, whereby said feed water is subjected to galvanic action, and a connection leading from said receptacle to the boiler; as and for the purpose set forth.

5. In a feed-water heater and purifier, a receptacle, a screen or lattice work arranged therein and composed of electro-positive and electro-negative elements, means for causing the feed water to flow along said screen or lattice-work in one direction, and means for admitting a heat medium to said receptacle at the opposite end of said screen or lattice work, whereby the same flows in a direction opposite to that in which the feed water flows, and in contact with said screen or lattice work and feed water whereby the feed water

is heated and is simultaneously therewith subjected to an intensified galvanic action; as and for the purpose set forth.

6. In a feed water heater and purifier a receptacle, a screen or lattice work arranged therein, means for admitting feed water to one end of said receptacle, whereby said feed-water flows along said screen or lattice work in one direction, means for admitting steam to said receptacle at the opposite end thereof, and means for deflecting said steam against said screen or lattice work; as and for the purpose set forth.

7. In a feed water heater and purifier, a receptacle, a screen or lattice work arranged within said receptacle and composed of electro positive and electro negative elements, means for delivering the feed water thereon at one end thereof, whereby said feed water travels thereover, means for admitting steam to said receptacle at the opposite end thereof, and baffle plates arranged within said receptacle to deflect the steam upon said screen or lattice work, thereby intensifying the galvanic action thereof, and simultaneously therewith heating said feed water; as and for the purpose set forth.

8. In a feed water heater and purifier, a receptacle, a strainer arranged therein to divide the same into two compartments, electro-positive and electro-negative elements arranged in one of said compartments, means for causing the feed water to flow over and in contact with said elements, means for simultaneously therewith delivering steam upon said elements, and means for delivering the purified feed water from the other of said compartments to the boiler; as and for the purpose set forth.

9. In a feed water heater and purifier, a receptacle, a screen or lattice work arranged therein, and composed of electro-positive and electro-negative elements adapted to sustain an electric current, means for admitting feed

water and steam to said receptacle to pass over and in contact with said screen or lattice work; as and for the purpose set forth.

10. In a feed water heater and purifier, a receptacle, a screen or lattice work, composed of electro-positive and electro-negative material, and means for causing feed water and steam to traverse said screen or lattice work in opposite directions; as and for the purpose set forth.

11. In a feed water heater and purifier, a receptacle, electro-positive and electro-negative elements arranged therein, and means for causing feed water and steam to traverse said receptacle and in contact with said elements in opposite directions; as and for the purpose set forth.

12. A feed-water heater and purifier, made in sections, said sections being hinged or pivoted together, one of said pivoted or hinged sections carrying electro-positive and electro-negative elements, and means for admitting the feed water and for heating the same; as and for the purpose set forth.

13. A feed water heater made in sections hinged together, in combination with electro-positive and electro-negative elements mounted upon one of said sections; as and for the purpose set forth.

14. In a feed water heater and purifier, a screen or lattice work, composed of zinc and copper, means for causing the feed water to flow along said screen, means for passing steam along said lattice-work or screen in a direction opposite to that in which the feed water flows, and baffle plates arranged to deflect said steam upon said lattice work or screen said baffle plates provided with openings for the escape of the condensed vapor; as and for the purpose set forth.

JULIAN E. SMITH.

Attest:

C. S. SMITH,

FRANK T. BROWN.