

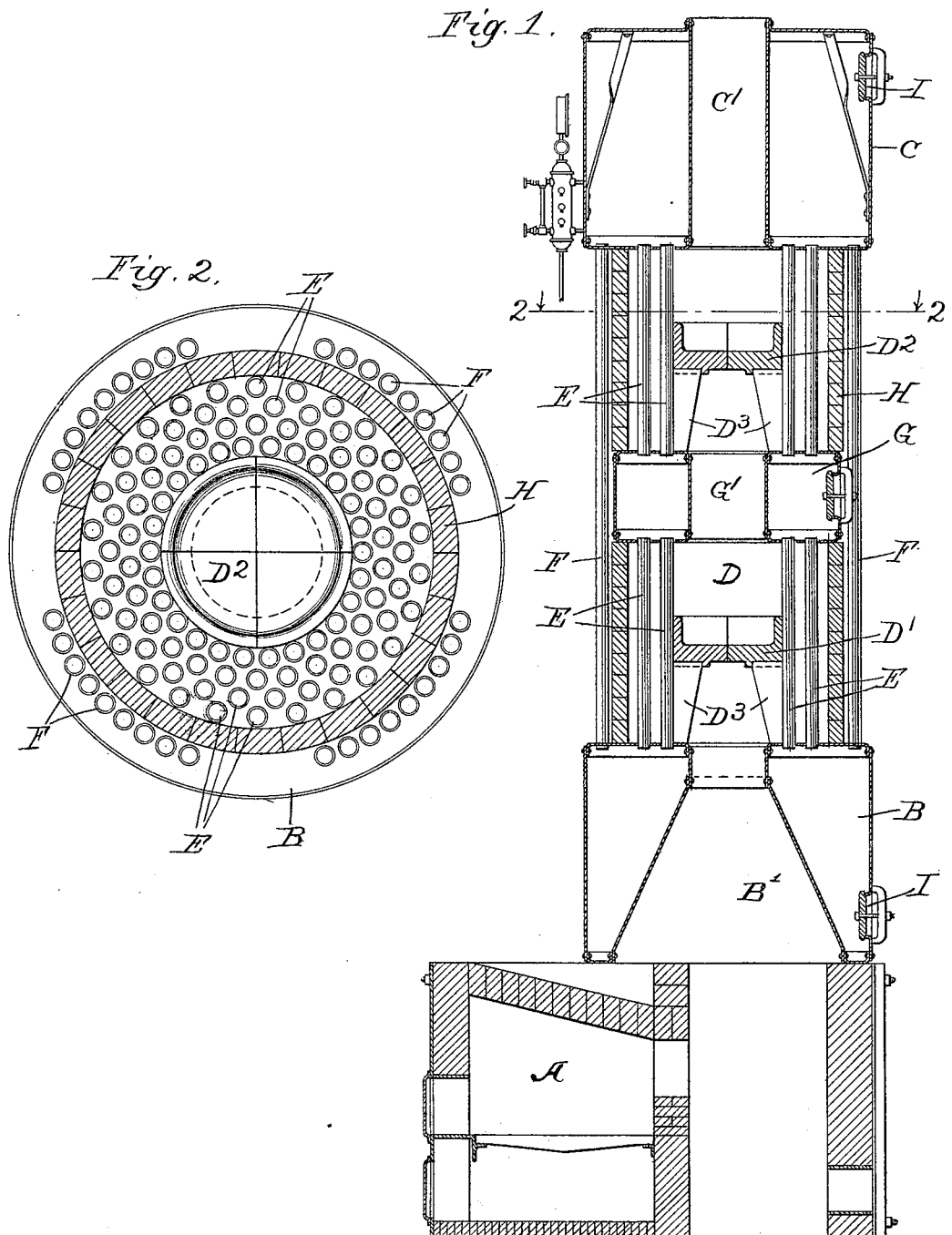
No. 645,935.

Patented Mar. 27, 1900.

R. BOHNEN.
BOILER.

(Application filed Nov. 6, 1899.)

(No Model.)



Witnesses.

Edward T. Wray,
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Inventor.

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UNITED STATES PATENT OFFICE.

RICHARD BOHNEN, OF CHICAGO, ILLINOIS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 645,935, dated March 27, 1900.

Application filed November 6, 1899. Serial No. 735,891. (No model.)

To all whom it may concern:

Be it known that I, RICHARD BOHNEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Boilers, of which the following is a specification.

My invention relates to boilers, and has for its object to provide a new and improved boiler, of which the following is a description, reference being had to the accompanying drawings, wherein—

Figure 1 is a longitudinal sectional view of a boiler embodying my invention. Fig. 2 is a section on line 2 2, Fig. 1.

Like letters refer to like parts throughout both figures.

Referring now to the drawings, I have shown my invention as embodied in a vertical boiler. This boiler is mounted upon a suitable support, and a combustion-chamber A is associated therewith. Two chambers B and C are provided, said chambers having suitable passage-ways B' C', extending there-through and being connected by a series of tubes disposed so as to form a central opening or passage-way D for the gases coming from the combustion-chamber. These tubes are preferably divided into two sets, the inner tubes E forming the upflow-tubes and the outer tubes F forming the downflow-tubes. I provide an intermediate water-chamber G between the chambers B and C, dividing the tubes E into two sets, the upper tubes communicating with the chamber C and the chamber G and the lower tubes communicating with the chamber B and the chamber G. This intermediate chamber is provided with a central opening G' for the gases coming from the combustion-chamber. The outer or downflow tubes F are not connected with the central chamber, but communicate at one end with the chamber B and at the other end with the chamber C. This chamber may be termed a "steam-chamber," as the steam generated by the boiler is contained therein. A wall H is interposed between the tubes E and the tubes F. This wall may be of any desired material which will not be injured by the heat from the hot gases flowing through the passage-ways and between the tubes. The passage-way D is provided with

two deflectors D' and D², placed one on each side of the central chamber. These deflectors are supported by the pedestals or supports D³, mounted, respectively, upon the chamber B and the chamber G. By using the two deflectors and the intermediate chamber I deflect the heated gases in such a way as to abstract the greatest amount of heat therefrom, and thereby greatly increase the efficiency of the boiler. These heated gases coming from the combustion-chamber pass through the passage-way B' until they strike the deflector D'. The heated gases are then deflected at substantially right angles to the tubes E, so as to strike said tubes. The gases then pass up until they strike the bottom of the intermediate chamber G, when they are again deflected at substantially right angles to the tubes E, and then pass through the opening G'. They then strike the deflector D² and are again deflected at right angles against the tubes E. The gases then pass along the tubes until they reach the bottom of the chamber C, where they are again deflected inwardly and pass out through the passage-way C'. By placing the tubes F outside of the wall H these outer or downflow tubes are not subjected to the extreme heat, and hence will always be at a much lower temperature than the inner tubes. This insures a much more rapid circulation of the water, and hence a much greater efficiency is obtained. I prefer to arrange the chambers B and C so that they will be somewhat longer than the tubes E. By this means if it is necessary to remove any of the tubes E they can be passed into the chamber C or B and removed through the manholes I. If no intermediate chamber were provided and the tubes E extended from the chamber B to the chamber C, it would be necessary to provide some special arrangement for removing the tubes and inserting new tubes—such, for example, as making holes in the roof—so that the tubes could be removed through them. My construction avoids all these difficulties and permits the tubes to be easily changed. It will thus be seen that I have here a construction which has numerous advantages in the matter of efficiency and adaptability and convenience.

I have shown the downflow-tubes and the

upflow-tubes as bearing a certain relation; but it is of course evident that this relation may be changed or varied to meet the conditions presented.

5 I have described in detail one construction embodying my invention; but it is of course evident that the construction may be varied in many particulars without departing from the spirit of my invention, and I therefore do
10 not limit myself to the construction shown.

When the intermediate chamber is omitted, it is also necessary to provide the upper chamber C with a series of hand-holes opposite the tubes, so that the tubes may be passed there-
15 through in order to remove or replace them. This construction, of course, is unnecessary when my boiler is used.

I claim—

1. A vertical water-tube boiler, comprising
20 an upper and a lower chamber, each provided with a passage-way for the heating-gases, a series of upflow-tubes connecting said chambers and disposed about a central passage-way, a series of downflow-tubes connecting
25 said chambers and a wall of heat-resisting material interposed between the two sets of tubes.

2. A vertical water-tube boiler, comprising an upper steam-chamber and a lower chamber,
30 an intermediate chamber, all of said chambers provided with passage-ways for the heating-gases, a series of upflow-tubes connecting the upper and lower chambers with the intermediate chamber, said tubes arranged so as
35 to form a passage-way for the heating-gases, and a series of outer downflow-tubes connecting the upper and lower chambers.

3. A vertical water-tube boiler, comprising an upper and a lower chamber, an intermediate
40 water-chamber, all of said chambers provided with passage-ways for the heating-gases, a series of upflow-tubes connecting the

upper and lower chambers with the intermediate water-chamber, said tubes arranged so as to form a passage-way for the heating-
45 gases, two heat-deflectors located in the passage-way formed by said upflow-tubes, one located on each side of the intermediate chamber, and a series of outer downflow-tubes connecting the upper and lower chambers.
50

4. A vertical water-tube boiler, comprising an upper and a lower chamber, an intermediate water-chamber, all of said chambers provided with passage-ways for the heating-
55 gases, a series of upflow-tubes connecting the upper and lower chambers with the intermediate water-chamber, said tubes arranged so as to form a passage-way for the heating-gases, two heat-deflectors located in the passage-
60 way formed by said upflow-tubes, one located on each side of the intermediate chamber, a series of outer downflow-tubes connecting the upper and lower chambers, and a wall interposed between the two sets of tubes so as to protect the downflow-tubes from the heating-
65 gases.

5. A vertical water-tube boiler, comprising an upper steam-chamber, a lower chamber and an intermediate chamber, the three chambers being separate from each other and provided with passage-ways for the heating-
70 gases, a series of upflow-tubes connecting the upper and lower chambers with the intermediate chamber, the tubes above the intermediate chamber being substantially equal in
75 length to the height of the steam-chamber, and a series of outer downflow-tubes; by means of which the upper and lower chambers are connected.

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Witnesses:

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