

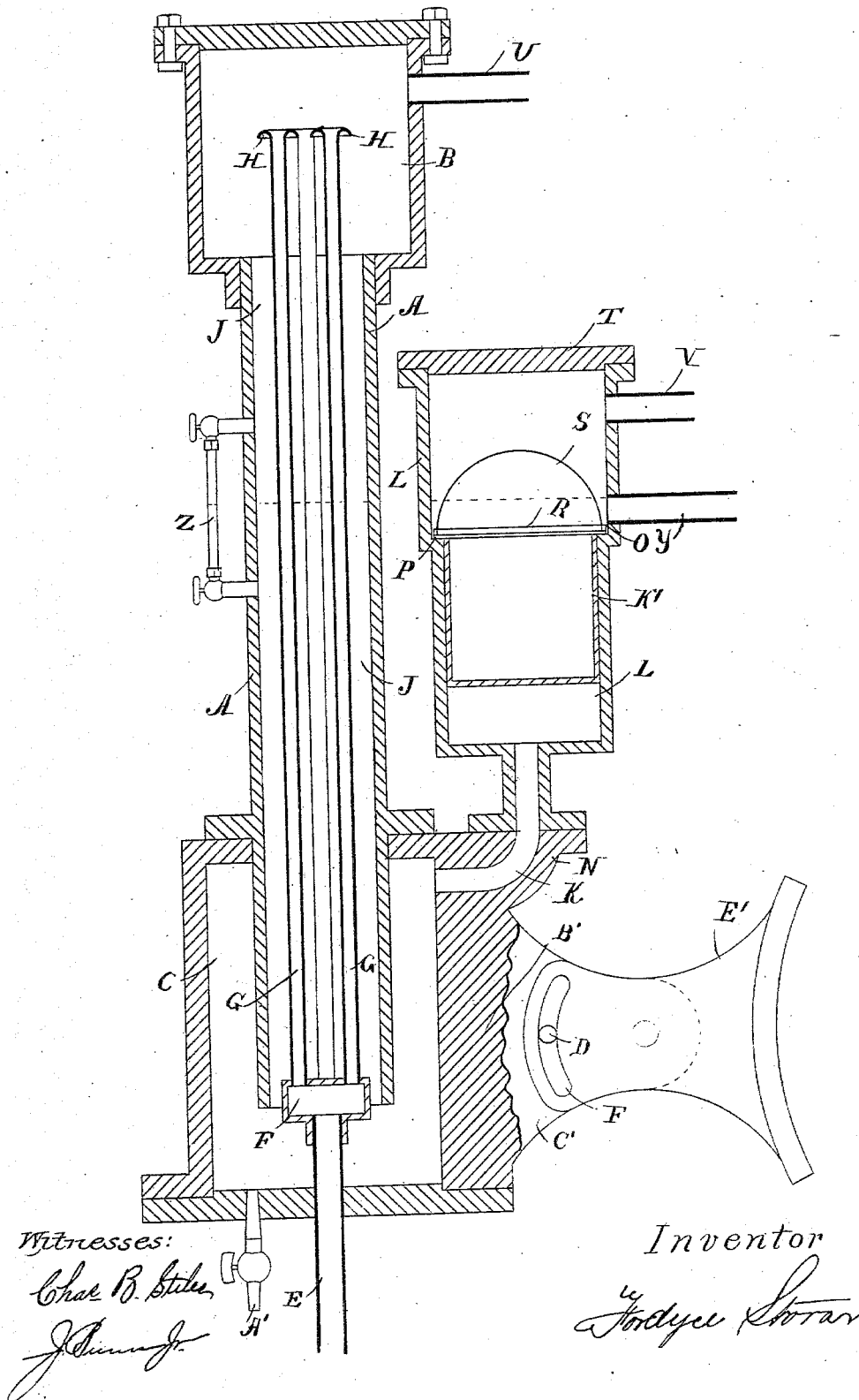
(No Model.)

F. STORAR.

FEED WATER HEATER AND PURIFIER.

No. 302,955.

Patented Aug. 5, 1884.



UNITED STATES PATENT OFFICE.

FORDYCE STORAR, OF SPRINGFIELD, ILLINOIS.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 302,955, dated August 5, 1884.

Application filed February 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, FORDYCE STORAR, a subject of the English Government, (but have declared my intention to become a citizen of the United States,) residing at Springfield, in the county of Sangamon, State of Illinois, have invented a new and useful Feed-Water Heater and Purifier for Steam-Boilers, of which the following is a specification, and that according to my knowledge and belief the same has not been in public use or on sale in the United States.

My invention relates to an improvement in feed-water heaters and purifiers, the object of the same being to provide a device of this character in which the water-filter will be adapted to operate in conjunction with water supplied from a suitable pump; and, further, to provide means by which the water will be immediately heated to high temperature by means of steam supplied from the boiler, and by the action of which the impurities of the water are precipitated before the water passes into the boiler. A further object is to provide a portable device of this character which may be readily and conveniently attached to boiler of ordinary construction; a further object being to provide a device of this character with a swinging or regulable bracket, by means of which the same may be attached to a boiler either below or above the center-line of the boiler, and yet permit the same to occupy a perpendicular position. A further object is to provide a device of this character which shall be simple and economical in construction, and durable and efficient in use; and with these ends in view my invention consists in certain details of construction and combinations of parts, as will be more fully described, and pointed out in the claims.

In the accompanying drawing, the figure shown is a vertical sectional view of my improvement.

A represents a cylindrical casing connecting the upper and lower chambers, B and C, which are secured thereto in any desired manner. The lower chamber is centrally provided on its lower end with a screw-threaded opening, through which passes the feed-pipe E,

which is secured therein. The feed-pipe E is provided with a screw-threaded upper end, to which is secured the cylindrical box or casing F, which is provided with screw-threaded openings, into which are secured the tubes G, which are screw-threaded upon their lower ends. The said tubes G may be of any desired number and size, according to the amount of work desired. The upper ends of the tubes are provided with the downwardly-curved flanges H, as shown, for the purpose of allowing the water to flow therefrom in thin and varied streams. The upper ends of the said tubes G open into the steam space or chamber B. The said chamber B is provided with the top I, which is secured thereto in any suitable manner. The spaces J are formed between the tubes G and the casing A, and open into the chambers B and C, the said space extending within a short distance of the bottom of the lower chamber, C, as shown. The lower chamber, C, is provided near its upper end with the water-passage K, which connects with the chamber L. To the chamber L is movably secured the filter K', which in this instance is provided with a suitable flange, O, which rests upon the shoulder P of the chamber L. The filter K' is made of strong wire-cloth of sufficient elasticity to fit closely around the inside of the chamber L. The filter is supplied with a coating of sponge upon its inner walls, the whole being re-enforced by a quantity of charcoal, and secured in position by means of a perforated metallic cover, R. If desired, the filter may be supplied with a handle, S, for convenience in removing it when it is desired to clean or renew its contents. This may be accomplished by removing the cover T, which is secured over the chamber L in any desired manner. The chambers B and L are provided with screw-threaded openings, into which are secured the ends of the steam-induction pipes U and V. These pipes are provided at any part of their length with suitable stop-cocks, for the purpose of regulating the flow of steam into the apparatus. The chamber L is provided above the shoulder P with a screw-threaded opening, into which is secured the water-eduction pipe Y,

which is inclined downwardly and connects with the boiler, and by means of which the same is supplied with water.

A suitable water-gage, Z, is secured in the position shown connecting with the spaces J for the purpose of determining at successive strokes of the pump whether or not the water is passing freely to the boiler. The lower chamber, C, is provided with the blow-off pipe and cock A'.

For the purpose of providing an adjusting device to connect the feed-heater to the boiler, I provide the side frame, B', of the chamber C with an arm, C', which is formed integral therewith or secured thereto in any desired manner. The arm is provided with a hole through which passes the thumb-screw D'. To the arm is pivotally secured an adjustable bracket, E', formed, as shown, and provided with the elongated slot F', by means of which the bracket may be caused to assume any desired position.

Having described the construction of my apparatus, its operation is as follows: The steam-pipes U and V are opened and the steam issues from the boiler and immediately fills all available space in the apparatus. The water is then forced into the tubes G, through the feed-pipe E, and, coming into contact with the live steam, is heated to a high temperature. The water ascends upward through the tubes, and, overflowing the same, runs over and into the spaces J, and, descending the same, runs out at the lower ends into the chamber C, and filling which, it flows into the water-passage K, and through the chamber L into the filter K', and from thence into the induction-pipe Y, which leads to the boiler. The continuous action of the steam upon the water precipitates the matter, sediments, and other impurities, which fall through the spaces J into the chamber C, from whence it may be removed at any time by opening the cock A'. By the above means the boiler is supplied with water possessing an equal temperature to that already in the boiler, thus overcoming the danger of sudden contraction and expansion of the plates, and other probable dangers likely to result from the sudden introduction of cold or partially-heated water into the boiler.

It is evident that slight changes in the construction and relative arrangement of the several parts of my invention might be resorted to without departing from the spirit of my invention, and hence I would have it understood that I do not confine myself to the exact construction shown and described, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

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

1. The combination, with an upper and lower chamber, of a cylinder or barrel connecting the chambers, tubes secured in the cylinder, and means for forcing water and steam through the chambers, cylinder, and tubes and into the boiler, substantially as set forth.

2. The combination, with an upper and lower chamber, of a cylinder connecting the chambers, tubes secured in the cylinder, means for forcing water and steam through the chambers, cylinder, and tubes and into the boiler, and means for purifying the water in its passage to the boiler, substantially as set forth.

3. The combination of an upper and lower chamber, tubes secured in the lower end of the cylinder and terminating in the upper chamber, a feed-water pipe leading into the tubes, feed steam-pipes connecting the chambers with the boiler, and a water-education pipe leading into the boiler, substantially as set forth.

4. The combination, with an upper and lower chamber, of a cylinder connecting the chambers, tubes secured in a box located in the lower end of the cylinder, said tubes terminating in the upper chamber, a feed-water pipe secured in the lower side of said box and holding the latter in position, induction steam-pipes leading from the boiler into the chambers, and an eduction water-pipe leading from the lower chamber into the boiler, substantially as set forth.

5. The combination, with an upper and lower chamber, of a cylinder connecting the chambers, tubes located in the cylinder and terminating in the upper chamber, a feed-water pipe leading into the tubes, a side chamber connected by a pipe to the lower chamber and provided with a filter, and means for forcing water and steam through the chambers and tubes, and through the filter into the boiler, substantially as set forth.

6. The combination, with an upper and lower chamber, of a cylinder connecting the chambers, tubes located in the cylinder, a feed-water pipe leading into the tubes, a side chamber connected with the lower chamber and provided with a filter, steam-pipes leading from the boiler into the upper and side chambers, and a water-pipe leading from the side chamber into the boiler, substantially as set forth.

7. The combination, with an upper and lower chamber connected by a barrel or cylinder, of tubes located in the cylinder, the upper ends terminating in the upper chamber and having their edges bent down and their lower ends secured in a box located in the lower end of the cylinder, a feed-water pipe secured to the box and holding the latter in place, a side chamber connected to the lower chamber and provided with a removable filter, steam-pipes leading from the boiler into the upper

and side chambers, and a water-pipe leading from the side chamber into the boiler, substantially as set forth.

5 8. The combination, with the chambers B and C and the cylinder A, provided with a gage, Z, of tubes G, box F, pipe E, side chamber, L, provided with a filter, K', steam-pipes U V, and water-pipe Y, all of the above parts combined and adapted to operate substantially
10 as set forth.

9. The combination, with a steam-boiler, of a feed-water heater adjustably attached to said boiler, substantially as set forth.

FORDYCE STORAR.

Witnesses:

CHARLES B. STILES,
JACOB BUNN, Jr.