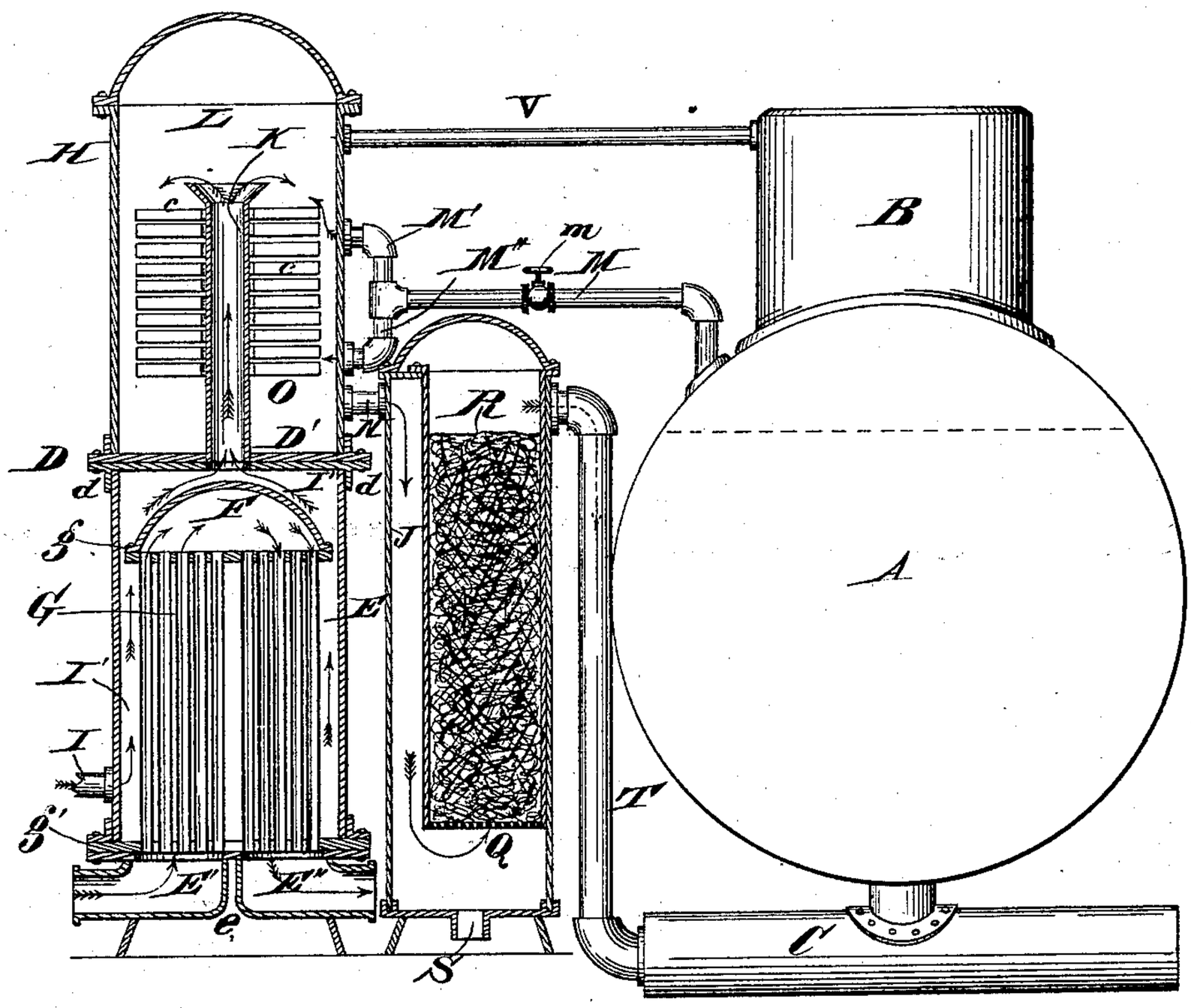
(No Model.)

E. R. STILWELL.

FEED WATER HEATER.

No. 278,196 Patented May 22, 1883.



Attest.

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UNITED STATES PATENT OFFICE.

EDWIN R. STILWELL, OF DAYTON, OHIO.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 278,196, dated May 22, 1883.

Application filed February 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWIN R. STILWELL, a citizen of the United States, and a resident of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention relates to an improvement in feed-water heaters and purifiers.

One object of my invention is to provide a device which will utilize at the same time the escape-steam and employ live steam for further heating the feed-water for purification and supplying the boiler with purified hot feed-water.

Another object of my invention is to so connect the parts with the boiler and engine that either the live or escape steam may be used alone, if desired.

In the annexed drawing and description thereof I have shown and described the preferred form of constructing the heater and purifier; but various modifications may be made therein—as, for instance, the filtering-purifier may be made horizontal in place of vertical.

Another object of my invention is to combine a tubular heater with a lime-extractor or water-purifier, the tubular portion of the heater utilizing exhaust-steam and the heater purifying-chamber employing live steam. It will also be obvious that the exhaust-steam could be utilized in the purifying-chamber and the live steam employed in a tubular portion of the heater; but the former is the preferred plan of operation. In some classes of water the filtering or mud-depositing vessel or compartment is not essential.

The figure in the annexed drawing represents a central vertical section of my improvement attached to the boiler.

A represents an ordinary boiler; B, a steam-dome, and C a mud-drum.

D represents a compound tubular and lime-extracting heater.

D′ represents a diaphragm separating the tubular from the purifying-heater.

E represents the tubular heater, which is preferably made of a cylindrical shell, having flanges *d*, by which it is joined to similar flanges of the purifying-heater shell H.

G represents a series of tubes rigidly connected to heads *g g′*.

E′ represents a steam-chamber underneath the tubular heater, and is divided into two compartments by partition *e*.

F represents a dome or space above the tubes G.

I represents a cold-water-supply pipe.

The operation of this portion of my device is as follows: The feed-water is admitted by pipe I into the chamber I′ and occupies the space around and between the tubes G. Steam is admitted into chamber E′, passing up through one half of the series of tubes G into dome F, thence down the other portion of the series of tubes G, and exhausting out through the chamber E″. It is not essential that the tubes G be equally divided into two sections, as in practice chamber E′ and the tubes opening into it may be greater than the exhaust portion of the tubular heater.

H represents the sediment-depositing portion of my heater; *c*, a series of shelves or other suitable depositing-surfaces.

K represents the water-supply pipe, leading from chamber I′ to overflow-space L, above shelves *c*; M M′ M″, the preferred form of employing live-steam heating-pipes. The pipe M is provided with a cock, *m*, for cutting off communication between the boiler and purifier when it is desired to use the waste steam from the engine only as a heating medium.

J represents a filter-chamber, which is connected by pipe N to space O, under pan *c*, and is provided with a vertical passage to the bottom of the chamber Q, from whence it flows upward through filtering material R, thence through pipe T into the boiler.

V represents a pipe for conducting gases from space L into the dome of the boiler, and is claimed in a former patent granted me, and it is not a feature of my claims herein. Other forms of filter-chamber may be employed; but the upward filter is the best, as the mud may be readily expelled through blow-off S. The pipe T may be connected to the boiler direct instead of to the mud-drum C, which is not essential with my heater and purifier.

The operation of the upper portion of my heater is as follows: The water is forced from chamber I′ through pipe K into overflow-space L, thence over the series of shelves *c*, where it receives additional heat from steam

supplied by pipes M′ M″, passing into space O, below the shelves, and then through the filter into the boiler. The overflow-pipe K might be placed on the outside to connect chamber I′ to space L; but there would be a loss of heat from radiation. It would be observed that heaters E and H are distinct but successive in their operation, the latter being an auxiliary to the former, and more perfectly accomplishes the work of heating and purifying the feed-water than could be done by either alone. At the same time, in case of accident to one the other could still be used.

I claim—

1. In a feed-water heater for boilers, the combination of the heater E, containing the tubes G, and chamber I′, surrounding the tubes, for receiving the feed-water, said heater being adapted to receive exhaust-steam at its bottom, with the purifier H, connected with the boiler and containing the sediment-depositing surfaces *c*, said purifier being in communication with the heater to receive the feed-water therefrom, substantially as described.

2. The tubular heater E and purifying-heater H, separated by diaphragm D′, and pipe K, connecting the chamber I′ with the space L above the shelves *c*, substantially as herein set forth.

3. In a feed-water heater for boilers, the heater E, composed of the separated bottom chambers, E′ E″, the tubes G, and the chamber I′, having a pipe, I, for receiving the feed-water, in combination with the purifier H, connected with the boiler and the heater E, and containing the sediment-depositing surfaces *c*, and a filter connected with the purifier by a pipe, N, substantially as described.

4. In a feed-water heater, the combination of the feed-water heater E, composed of tubes G, and receiving exhaust-steam, and the auxiliary heater and purifier H, in communication with the boiler and the heater E, and containing the sediment-depositing surfaces *c*, with a filter, J, located between the heaters and the boiler and connected with the heater and purifier H by a pipe, N, substantially as described.

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

EDWIN R. STILWELL.

Witnesses:

O. M. GOTTSCHALL,

FRANK S. BREENE.