

(No Model.)

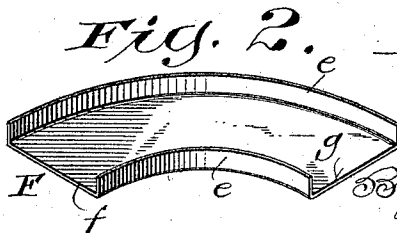
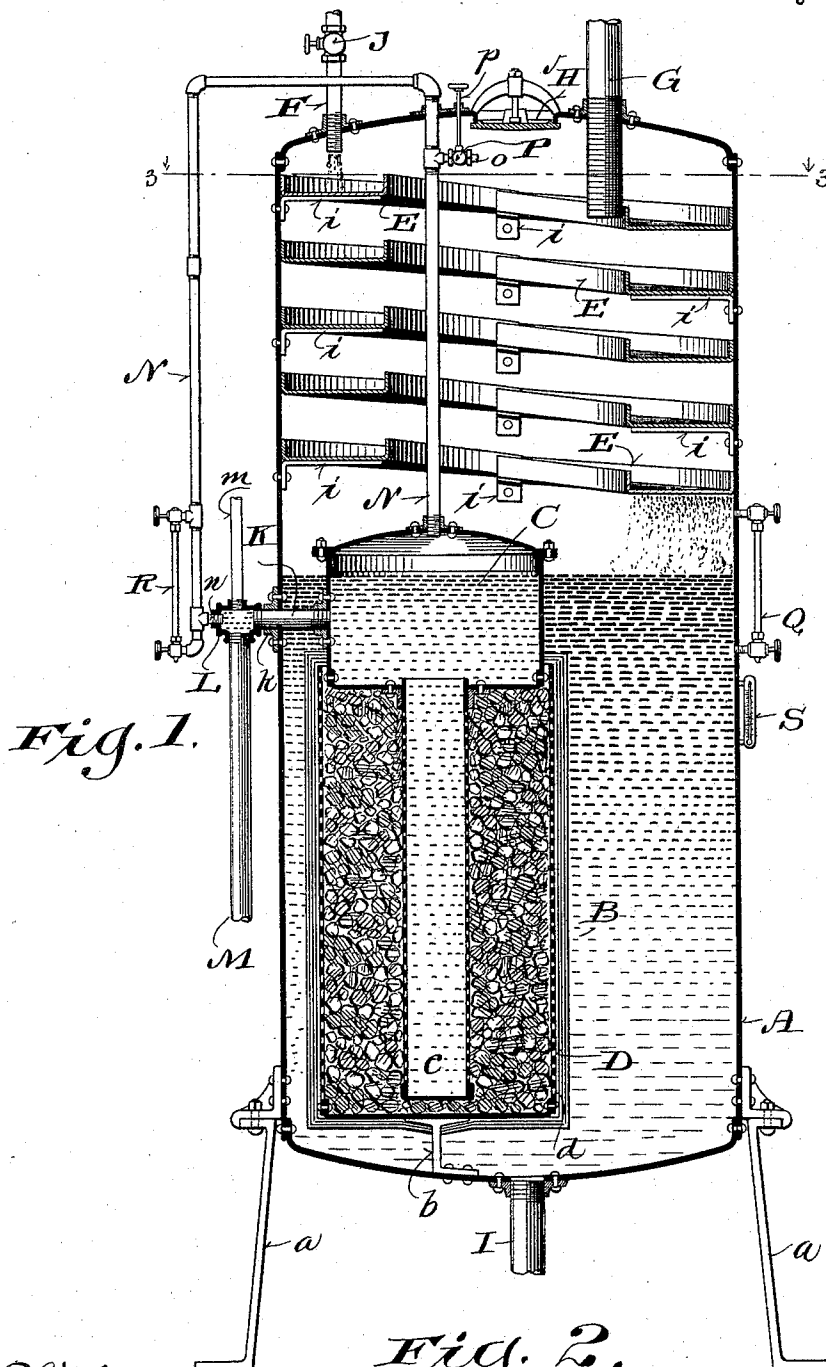
2 Sheets—Sheet 1.

J. E. CRAWLEY.

FEED WATER HEATER AND PURIFIER.

No. 585,928.

Patented July 6, 1897.



Witnesses:

Geo W Young.

Henry Bankert.

Inventor:

James E. Crawley

By H. G. Underwood
Attorney

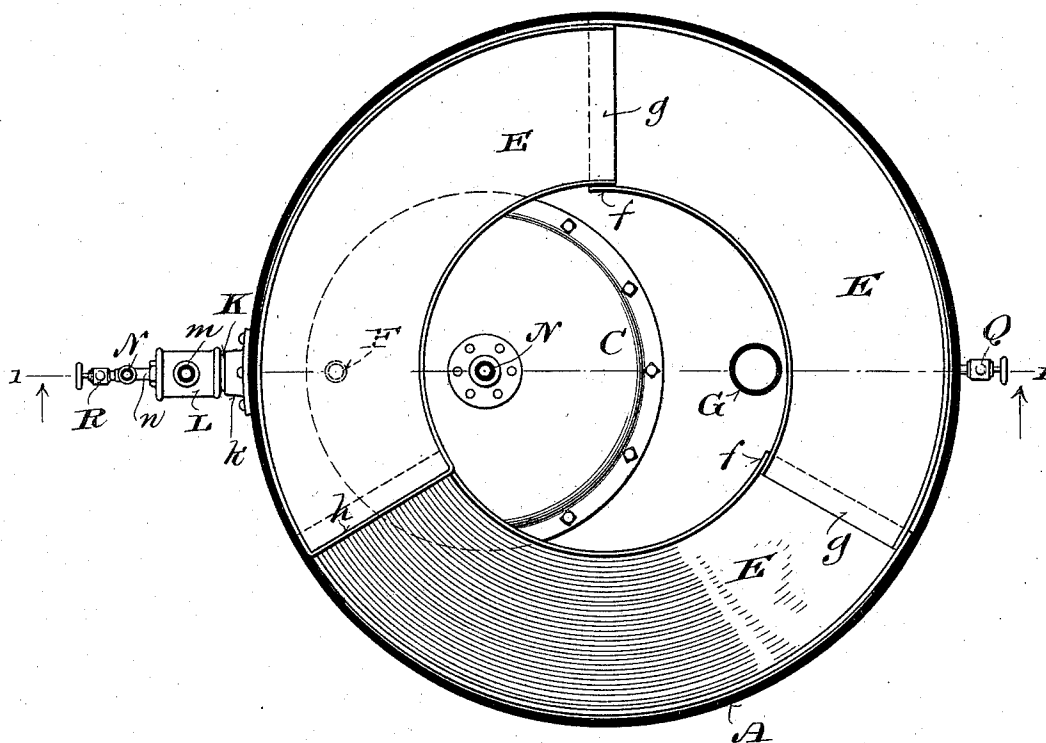
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Fig. 3.



Witnesses:
Geo. W. Louny,
Henry Bankert.

Inventor:
James E. Crawley
By H. G. Underwood
Attorneys

UNITED STATES PATENT OFFICE.

JAMES E. CRAWLEY, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF
TO THOMAS L. MCGREGOR, OF SAME PLACE.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 585,928, dated July 6, 1897.

Application filed June 20, 1895. Serial No. 553,401. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. CRAWLEY, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to devices for heating and purifying feed-water; and it consists in certain peculiarities of construction and combination of parts, as will be fully set forth hereinafter and subsequently claimed.

In the drawings, Figure 1 is a central vertical sectional view of my improved device. Fig. 2 is a perspective detail view of a pan-section forming a portion thereof. Fig. 3 is a horizontal sectional view on the line 3 3 of Fig. 1.

Referring to the drawings, A represents a vertical tank, preferably supported on legs, as shown at *a a*. Supported within this tank, as by post or standard *b*, is a filtering device B, which is preferably of substantially the same construction as that shown in my prior patent, No. 537,020, granted April 9, 1895, having a perforated vertical central pipe *c*, communicating at top with a receiver C for the purified water, said perforated pipe being surrounded by a perforated tube *d* and the space between this tube and the central pipe *c* being filled with any suitable filtering material, such as coke, and the exterior of the tube *d* being wrapped with any suitable coarse textile material D, such as burlaps.

In the upper part of the tank A there is located a continuous sectional spiral trough formed of a series of flat-bottom curved pans E, one of which is shown best in Fig. 2, wherein one of the intermediate pan-sections is illustrated, the same having inner and outer vertical edge flanges *e e*, but open at each end. These pans are somewhat wider at one end *f* than at the other end *g*, so that when the pan-sections are put together in forming the said continuous spiral trough the narrow end *g* of one pan will fit snugly within the wide end *f* of the next succeeding pan, and so on. The first or uppermost pan-section of said trough is preferably formed with an up-

per end flange *h*, as shown in Fig. 3, but all the other pan-sections are formed with both ends open. These pan-sections are supported upon series of brackets or arms *i i i*, bolted or riveted to the vertical wall of the tank A, as shown.

F is the feed-water pipe, formed with suitable cock *j* and projecting vertically through the top of the tank A just above the uppermost pan-section E of the spiral trough.

G is a pipe similarly projecting through the tank-top for conveying live steam from the boiler (not shown) for heating the feed-water. H is a manhole, with suitable cover for allowing access to the interior of the tank through its top.

I is a washout-pipe in the bottom of the tank, which is of course provided with a suitable shut-off cock. (Not shown.)

K is a pipe for the purified feed-water, leading from the receiver C out through the wall of the tank (through a suitable stuffing-box *k*) and communicating with a four-way coupling L, from the lower branch of which a pipe M leads to the boiler, the upper branch of this coupling receiving a live-steam pipe *m* for blowing out the filter when necessary, as afterward explained.

N is a pipe communicating by short pipe *n* with the remaining branch of the coupling L, the other end of the pipe N, after passing through the top of the tank A, entering the top of the receiver C.

All of the hereinbefore-named pipes are provided with suitable valves or cocks, which I have not deemed it necessary to illustrate in the drawings.

The pipe N within the tank is provided with an open-ended short transverse pipe O, provided with an equalizing-valve P, controlled by a hand-rod *p*, passing up and out through the tank-top, there being of course suitable stuffing-boxes at all points where the described pipes and said rod pass through the said tank-top.

Q is a water-gage to show the height of the feed-water supply within the tank, and R is a like gage to show the height of the purified feed-water within the receiver C.

S is a thermometer to indicate the temperature of the water within the tank.

The operation of my device will be readily understood from the foregoing description of its construction, taken in connection with the accompanying drawings.

5 The feed-water admitted through pipe F falls upon the upper pan-section of the continuous spiral trough and flows down in a thin shallow stream around through the same to the lowermost section thereof, from whence
10 it falls into the tank, being heated in its passage by the live steam admitted through pipe G, and passes through the described vertical filter into the receiver C and out through pipes K and M to the boiler. If at any time the
15 gages Q R indicate a greater height of water in the receiver C over the level in the tank A, this can be remedied by opening the equalizing-valve P in the pipe O by means of the hand-rod *p*, so that the steam within the tank
20 A may enter the pipe N and receiver C to equalize the pressure and reduce the water in said receiver to a common level with that in the tank, and, further, if the said gages indicate a greater height of the water in the tank
25 over the level in the said receiver this shows that the filter has become clogged, and to remedy this the washout-pipe I is opened and the pipes F, G, and M and valve P are closed and live steam admitted through the pipe *m*,
30 by means of which the filter can be blown out and all impurities adhering to the burlaps quickly removed in a very few minutes.

It is important that my described sectional spiral trough should be absolutely continuous
35 from end to end, so that there may be no interruption to the continuous forward and downward flow of the described thin shallow stream of water, and this is accomplished by snugly fitting the lower open end of one pan-
40 section within the upper open end of the next

succeeding pan-section, as described, and this construction is of the very essence of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters 45 Patent, is—

In a feed-water heater and purifier, the vertical tank A, rested on legs, and containing a filter B, supported by a standard secured within the tank; said filter consisting of a 50 perforated central pipe *c*, surrounded by a perforated tube *b*, and having the intermediate space filled with suitable filtering material, and its exterior coated with textile material; in combination with a receiver C, at 55 top; a continuous spiral trough E, formed of a series of unobstructed, flat-bottomed, curved pans, provided with inner and outer vertical edge flanges, the sections of said continuous trough being supported by brackets bolted to 60 the tank-wall, and the lower end of one pan-section fitting snugly within the upper end of the next pan-section, so as to form a continuous spiral trough, and cause a continuous shallow flow of water; and said spiral trough 65 extending from a point below the feed-water inlet to a point above the water-level line in the tank; the steam-pipe G; the feed-water inlet F, the pipe N, with its connections; and the outlet-pipe K, all combined, arranged, 70 and operating as hereinbefore shown and described.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wis- 75consin, in the presence of two witnesses.

JAMES E. CRAWLEY.

Witnesses:

H. G. UNDERWOOD,
HENRY DANKERT.