

No. 774,992.

PATENTED NOV. 15, 1904.

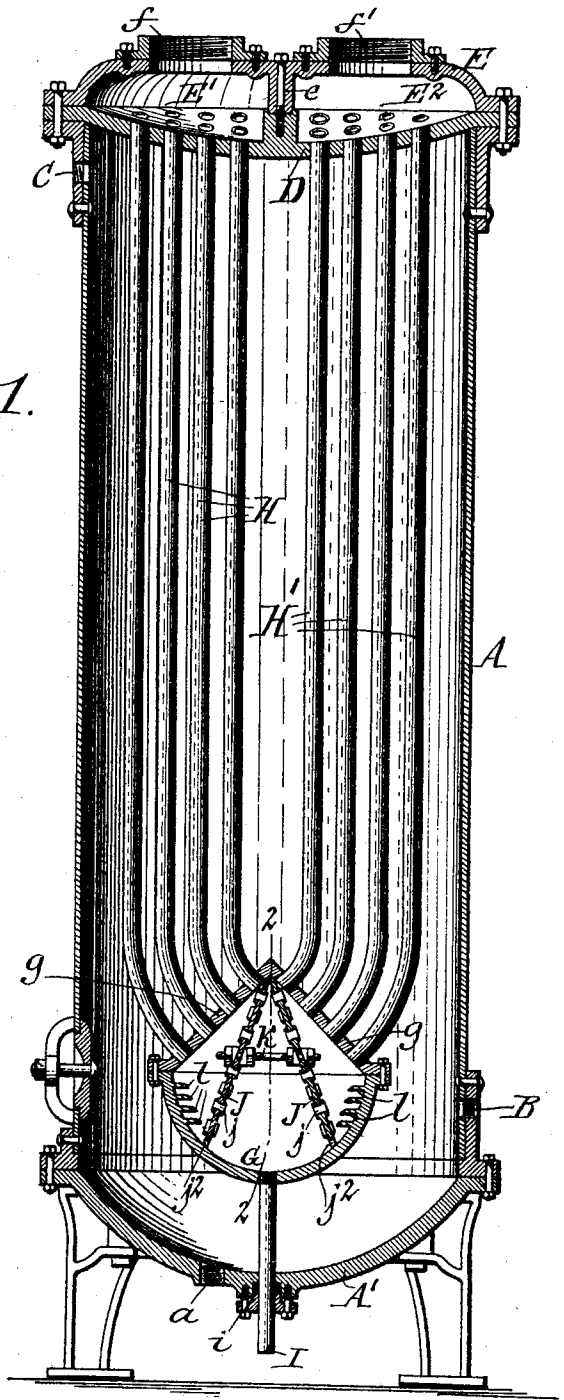
G. A. OTIS.
FEED WATER HEATER.

APPLICATION FILED JUNE 29, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Robert Weithrecht
Louis W. Graft

George A. Otis, Inventor
By Geyer & Popp
Attorneys

G. A. OTIS.
FEED WATER HEATER.

APPLICATION FILED JUNE 29, 1904.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.

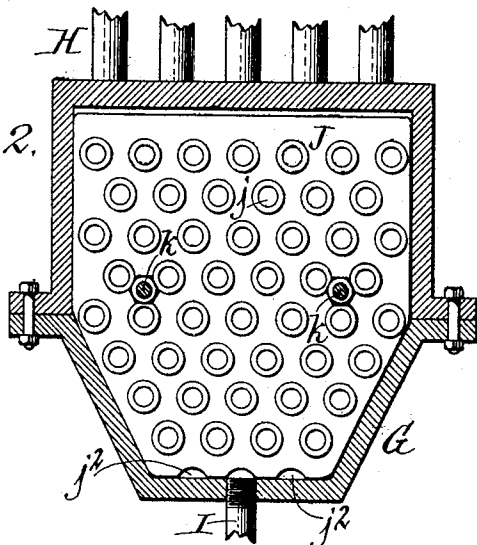


Fig. 3.

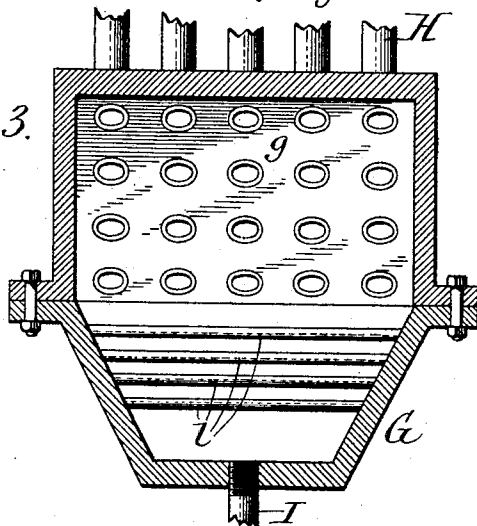
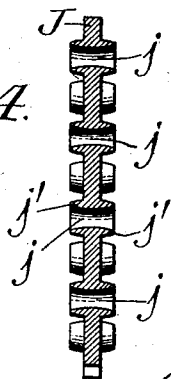


Fig. 4.



Witnesses:
Robert Weithnecht
Louis W. Gault

George A. Otis,
Inventor
by Geyer & Popp
Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE A. OTIS, OF BUFFALO, NEW YORK.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 774,992, dated November 15, 1904.

Application filed June 29, 1904. Serial No. 214,676. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. OTIS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

This invention relates more particularly to that class of feed-water heaters which comprise a shell, a series of tubes through which the exhaust-steam passes and which are surrounded by the water to be heated, and a water-chamber connected with the lower ends of the tubes for collecting and carrying off the water of condensation. A feed-water heater of this type is shown and described in Letters Patent of the United States No. 362,395, granted to me May 3, 1887.

The object of my present invention is to combine an oil separator or extractor with the feed-water heater in such a manner as to save the cost of a separate appliance for this purpose and so that the cold water supplied to the heater promotes the separation of the oil from the exhaust-steam.

In the accompanying drawings, consisting of two sheets, Figure 1 is a sectional elevation of a feed-water heater embodying my invention. Fig. 2 is an enlarged vertical section of the oil-separator and water-chamber in line 2 2, Fig. 1. Fig. 3 is a similar section with the baffle-plates omitted. Fig. 4 is a fragmentary transverse section, on an enlarged scale, of one of the baffle-plates.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates the upright cylindrical shell of the heater, having the usual concave or conical bottom A', provided with the mud blow-off *a*.

B is the inlet for the cold water, arranged near the bottom of the shell, and C the outlet for the heated water, arranged near the top of the shell.

D is the upper flue-sheet, and E the steam-chamber surmounting the same and divided by the central partition *e* into the inlet-com-

partment E' and the outlet-compartment E², these compartments having the steam-inlet *f* and outlet *f'*, respectively.

G indicates the water-chamber, arranged in the lower portion of the shell opposite the cold-water inlet, and H H' are the two groups of steam-tubes, connected at their upper ends with the inlet and outlet compartments E' E², respectively, and at their lower ends with the top of said chamber. This chamber may be of any suitable form; but its bottom and sides are preferably semicylindrical and its ends straight and converged downwardly, as shown in the drawings, while its top is composed of two flue-sheets *g g*, which incline outwardly from a central ridge and in which the lower ends of the two groups of steam-tubes H H' are secured.

I is a waste or drain pipe for the oil and water of condensation, which is connected with the bottom of the chamber G and passes through a stuffing-box *i* in the bottom of the shell A.

J J indicate a pair of perforated baffle-plates or partitions arranged in the chamber G and extending from end to end and from top to bottom thereof, so that the exhaust-steam entering said chamber through one set of the tubes H H' is compelled to pass through the openings *j* of the plates before escaping through the other set. The baffle-plates are provided with openings practically over their entire area, and each opening is bounded by a guard rim, flange, or nipple *j'*, which preferably projects beyond both sides of the baffle-plate, as best shown in Fig. 4. In the preferred construction shown in the drawings two of such baffle-plates are employed, and the same are inclined outwardly and rest at their separated lower ends upon the bottom of the chamber G, while their meeting upper ends are arranged in the apex of the angle formed by the inclined flue-sheets *g*. The plates are provided in their lower edges with notches or recesses *j²* to permit the passage of the oil and water from the portion of the chamber G on the outer sides of the plates to

the central portion thereof between the plates. The plates may be held in their proper relative positions by tie-bolts l passing through the same or by any other suitable means.

5 l represents a series of horizontal baffle ribs or flanges projecting inwardly from the inner sides of the chamber G and extending throughout the length of the latter. These ribs prevent the steam which enters said chamber
10 from carrying the oil and water of condensation through the ascending series of flues H'.

In the use of the apparatus the exhaust-steam entering the inlet-compartment E' descends through the tubes H into the oil and
15 water chamber G, passes through the openings of the baffle-plates J, and ascends thence through the tubes H' into the outlet-compartment E'', from which the uncondensed residue of the exhaust-steam escapes through the outlet f'. Any oil carried over from the engine-
20 cylinder with the exhaust-steam flows down the faces of the baffle-plates and collects in the lower portion of the chamber G, whence it is discharged through the waste-pipe I, the
25 oil deposited upon the baffle-plates being prevented from running through their openings by the guard-flanges j' thereof. To facilitate the dripping of the oil from these flanges, they are tapered toward their outer ends, as
30 shown in Fig. 4.

The chamber G forms a casing for the oil-separator, as well as a water collecting or condensation chamber. As this chamber is located in the lower portion of the shell or op-
35 posite the cold-water inlet, where its contents are coolest, the chamber and the baffle-plates J remain comparatively cool, and the oil contained in the steam is therefore chilled or reduced in temperature upon entering the cham-
40 ber, thus greatly promoting its separation from the steam. By thus combining the oil-separator with the cooled condensation-chamber the oil is extracted so thoroughly that the uncondensed residue of the exhaust-steam can
45 be used for other heating purposes.

By arranging the guard-flanges j' of the openings j' on both sides of the baffle-plates the latter will intercept the oil from either
50 side of the chamber G, thus permitting the pipe connections to the steam-inlet f and outlet f' to be reversed, if desired, without affecting the oil-separating capacity of the apparatus.

To prevent back pressure, the aggregate area
55 of the perforations of each baffle-plate exceeds the area of the steam-inlet f'.

I claim as my invention—

1. In a feed-water heater, the combination
60 with a shell having a cold-water inlet and a hot-water outlet, of a chamber arranged in the shell adjacent to said cold-water inlet, where-
by the chamber is exposed to the coolest por-

tion of the water in the shell, descending and ascending steam-tubes connected with said
65 chamber, respectively, and a baffle-plate arranged in said chamber between the steam-tubes and having perforations which are bounded by projecting rims or flanges, substantially as set forth.

2. In a feed-water heater, the combination
70 with a shell having a cold-water inlet and a hot-water outlet, of a chamber arranged in the shell adjacent to said cold-water inlet, where-
by the chamber is exposed to the coolest por-
75 tion of the water in the shell, descending and ascending steam-tubes connected with said chamber, respectively, and a perforated baffle-plate arranged in said chamber between the
80 steam-tubes and having its openings bounded by raised rims or flanges which project beyond both sides of the plate, substantially as set forth.

3. In a feed-water heater, the combination
85 with a shell having a cold-water inlet and a hot-water outlet, of a chamber arranged in the shell adjacent to said cold-water inlet, descending and ascending steam-tubes connected with
90 said chamber, respectively, and a pair of oppositely-inclined baffle-plates arranged in said chamber between the steam-tubes and each having perforations bounded by raised rims or flanges, substantially as set forth.

4. In a feed-water heater, the combination
95 with a shell having a cold-water inlet and a hot-water outlet, of a chamber arranged in the shell adjacent to said cold-water inlet and having a top composed of two flue-sheets inclined
outwardly in opposite directions, two groups of steam-tubes having their lower ends connected with said flue-sheets, respectively, and
100 a pair of perforated upwardly-converging baffle-plates arranged in said chamber between the groups of tubes and having their meeting upper ends located in the apex of the angle
105 formed by said flue-sheets, substantially as set forth.

5. In a feed-water heater, the combination
with a shell having a cold-water inlet and a
110 hot-water outlet, of a chamber arranged in the shell adjacent to said cold-water inlet and having a top composed of two flue-sheets inclined
outwardly in opposite directions, two groups of steam-tubes having their lower ends connected with said flue-sheets, respectively, a
115 pair of upwardly-converging baffle-plates arranged in said chamber and resting upon the bottom thereof and having their meeting upper ends located in the apex of the angle
120 formed by said flue-sheets, said plates having openings bounded by raised rims or flanges, and means for holding said plates in position, substantially as set forth.

6. In a feed-water heater, the combination
with a shell having a cold-water inlet and a

hot-water outlet, of a chamber arranged in the
shell adjacent to said cold-water inlet and pro-
vided on its inner side with horizontal baffle-
ribs and having a top composed of two flue-
5 sheets inclined outwardly in opposite direc-
tions, two groups of steam-tubes having their
lower ends connected with said flue-sheets, re-
spectively, and a pair of upwardly-converging
baffle-plates arranged in said chamber between

said steam-tubes and having perforations to
be bounded by projecting rims or flanges, sub-
stantially as set forth.

Witness my hand this 9th day of June, 1904.

GEORGE A. OTIS.

Witnesses:

C. F. GEYER,

E. M. GRAHAM.