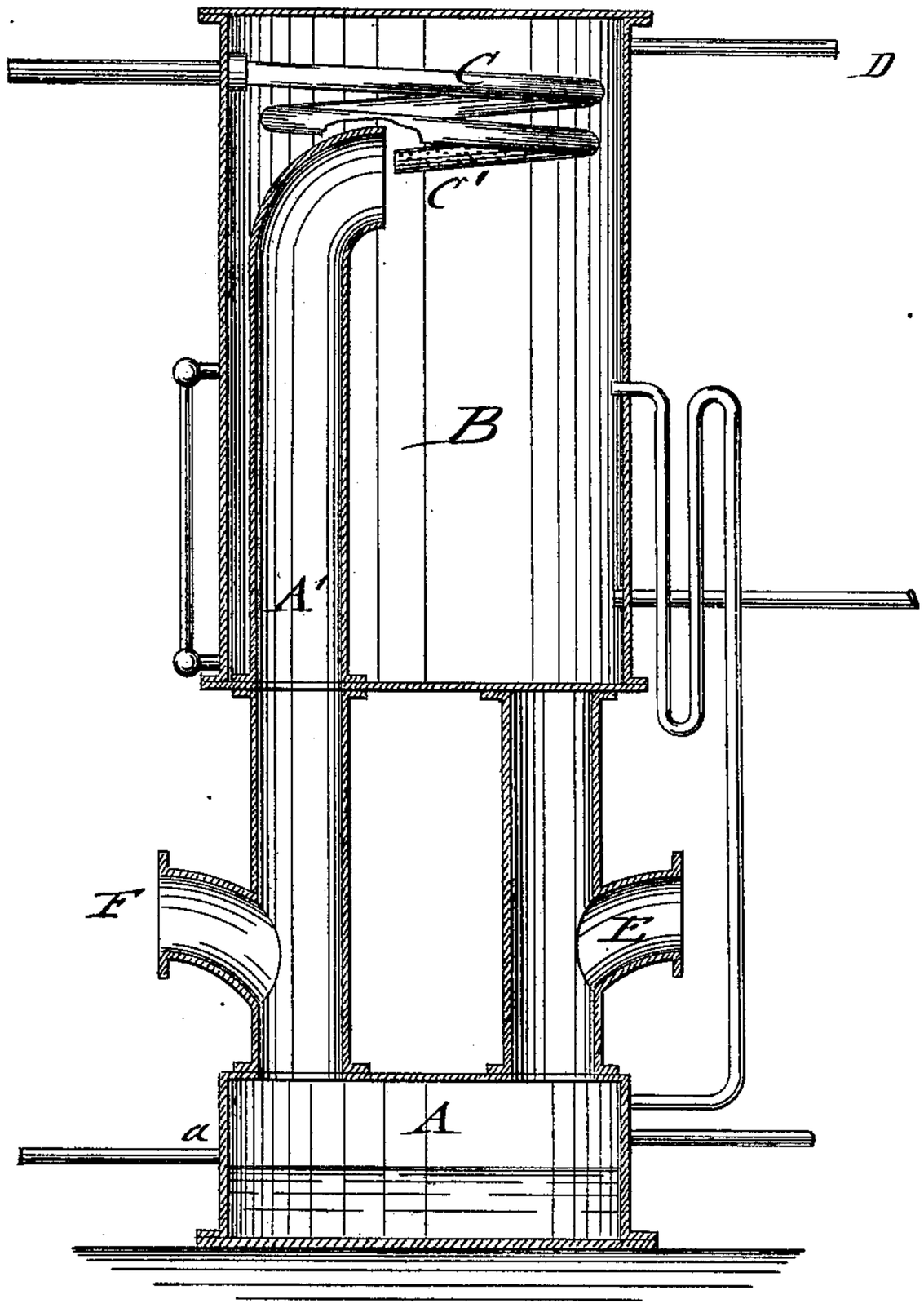
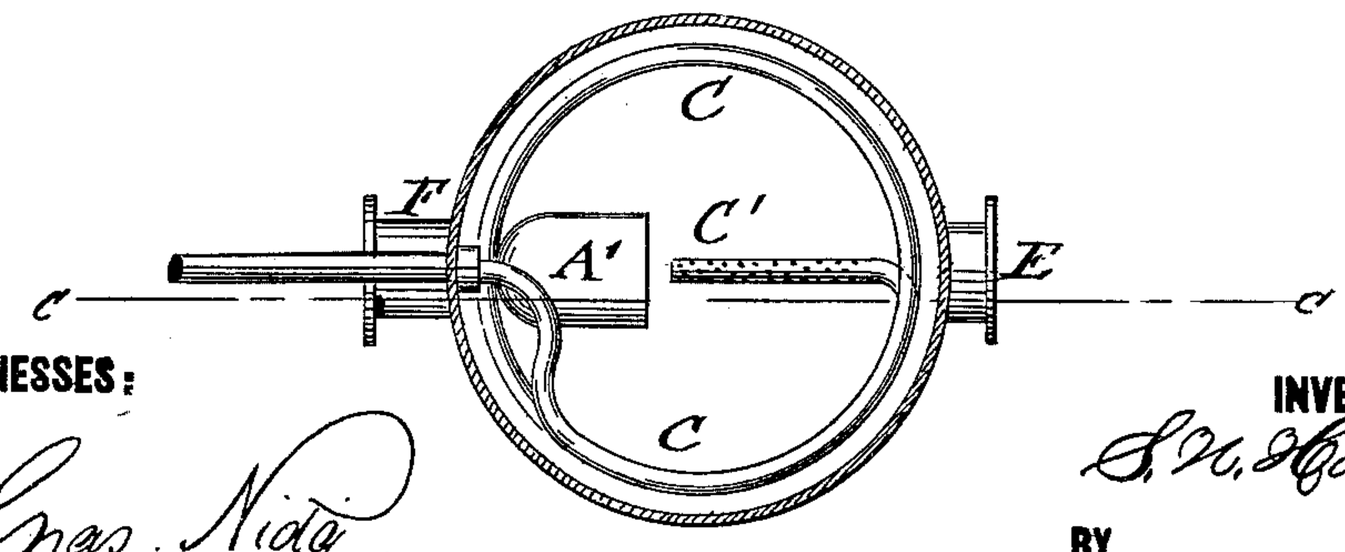
S. N. HARTWELL.

FEED WATER HEATER.

No. 176,223. Patented April 18. 1876.





WITNESSES:

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SAMUEL N. HARTWELL, OF WOLLASTON HEIGHTS, MASSACHUSETTS.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **176,223**, dated April 18, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, SAMUEL N. HARTWELL, of Wollaston Heights, in the county of Norfolk and State of Massachusetts, have invented a new and Improved Feed-Water Heater, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a vertical central section of my improved feed-water heater, on the line *c c*, Fig. 2; and Fig. 2 is a top view of the same with top plate detached.

Similar letters of reference indicate corresponding parts.

The invention relates to improvements in that class of feed-water heaters in which the water is heated by mingling with the exhaust steam, so that the oil or grease carried along by the exhaust steam is entirely separated from the steam, and the heater be made more efficient in heating and more economical in the use of steam.

The open heaters have well nigh been abandoned, on account of the oil or grease with which the engine is lubricated finding its way into the boiler, where it unites with the other impurities of the water and forms a dangerous and annoying deposit. In some cases it forms a scum, which, as the water is blown off to empty the boiler, settles upon the flues and shell, and, adhering thereto, does not again float when the boiler is filled, producing finally a deposit that effectually keeps the water from the iron, so as to overheat and crack or weaken the same. With mud the grease or oil forms even a more objectionable deposit. My invention is intended to remedy this objectionable feature and utilize the heating capacity of the exhaust steam to best advantage in the heater. It consists mainly in the combination of a feed-water heater with a grease-condenser, through which the exhaust steam is passed, the steam being then drawn to the heating-chamber, to which the feed-water is conducted in a spray through a coiled pipe with perforated end. The air which accumulates in the heating-chamber is drawn off by an air-pipe leading to a flue.

In the drawing, A represents the grease-condenser for the exhaust steam, which is placed below the heating-chamber B, the exhaust steam being conducted into the condenser by a pipe, E, and passed out through an exit-pipe, F. The condenser is partially filled with water or other fluid, upon the surface of which the steam charged with the oil or grease is so directed as to cause the minute globules of grease or oil, by reason of their greater density and consequent momentum to penetrate the fluid to some extent, and thus be arrested and condensed, while the steam moves toward the steam-outlet at the other side or end of the condenser, giving the floating grease a motion in the same direction toward a proper overflow-opening, *a*, which is so located as to height that a retarded motion of the steam within the chamber is induced, time being given for any grease that may have escaped at the first impact with the fluid to settle upon the surface of the same.

In connection with water or other fluid, mechanical filtering devices may also be employed in the condensing-chamber, to purify the exhaust steam completely, or such fluids be used that lessen the condensation of steam in the condenser. The condenser may also be applied in connection with other devices in which exhaust steam is utilized for different purposes.

The purified exhaust steam passes from the condensing-chamber A in upward direction through the communicating pipe A′ into the heating-chamber B. Only such a quantity of steam as is required for the heating of the feed-water passes through pipe A′, the surplus not needed for heating being conducted off through the exit-pipe F. The necessary quantity of steam is drawn into the feed-chamber by the tendency of the exhaust steam to form a partial vacuum therein, by condensation caused by the contact with the supply-water, which enters through a coiled pipe, C, with perforated end section C′, which throws the water in fine jets or spray after having been partly heated in the convolutions of the pipe. As the water has a regular flow and the steam an intermittent flow some water would fall in the intermissions, and would not come in contact with the steam when supplied in the usual manner through a short pipe, so that some portions of the same would pass

down in nearly as cold a state as in the supply-tank or city-main, and thereby materially reduce the temperature of the feed-water, which is but slightly affected by the steam above its surface. This is avoided by heating up the water in the coiled pipe before issuing and causing the action of the steam on minute particles of water, which secures a higher temperature of feed-water and thereby a better utilization of the exhaust steam.

To prevent the collection of air from the entering water in the heating-chamber, so that the same will not be filled after a time and allow but little steam to reach the water, an air-pipe, D, is applied at the upper part of the heating-chamber, which pipe leads to some convenient flue or chimney, where the air-pressure is less than in the surrounding atmosphere, so that the accumulated air is readily drawn off and a regular circulation of steam in the heating-chamber obtained.

Settling-shelves may be used in the heating-chamber to precipitate impurities of the feed-water in case it should be required by the same. The water is drawn off by a pipe at the lower part of the heating-chamber, to convey the heated water, free of oil or grease, to the pump and boiler.

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

The combination of a feed-water heater with an oil or grease condensing chamber, for purifying the exhaust steam before entering the heating-chamber, in the manner and for the purpose substantially as described.

SAMUEL N. HARTWELL.

Witnesses:
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