

No. 651,000.

Patented June 5, 1900.

W. WEBSTER.

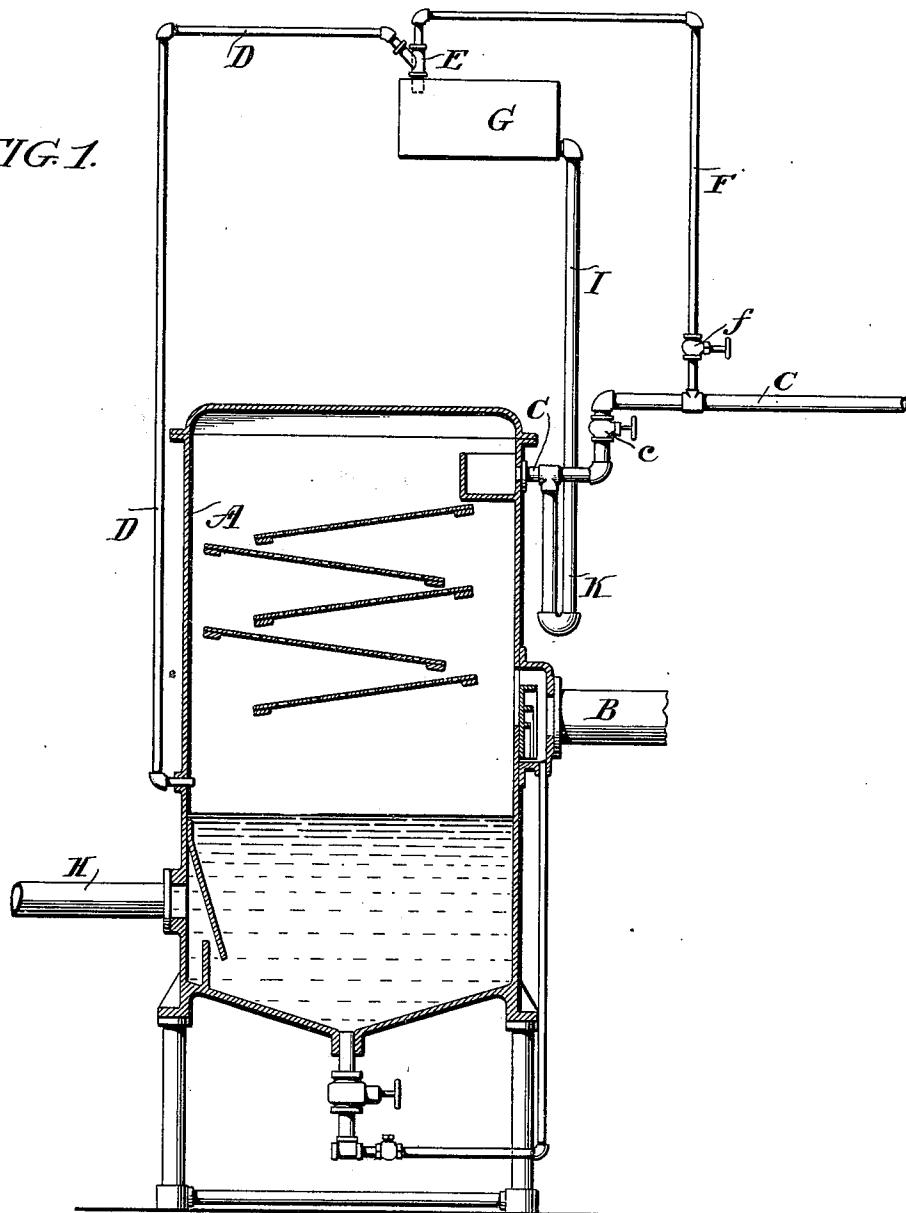
FEED WATER HEATER.

(Application filed Mar. 8, 1900.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.



Witnesses:

*George D. Smith
R. M. Kelly*

Inventor:

*Warren Webster,
By his attorney,*
Frank M. Webster

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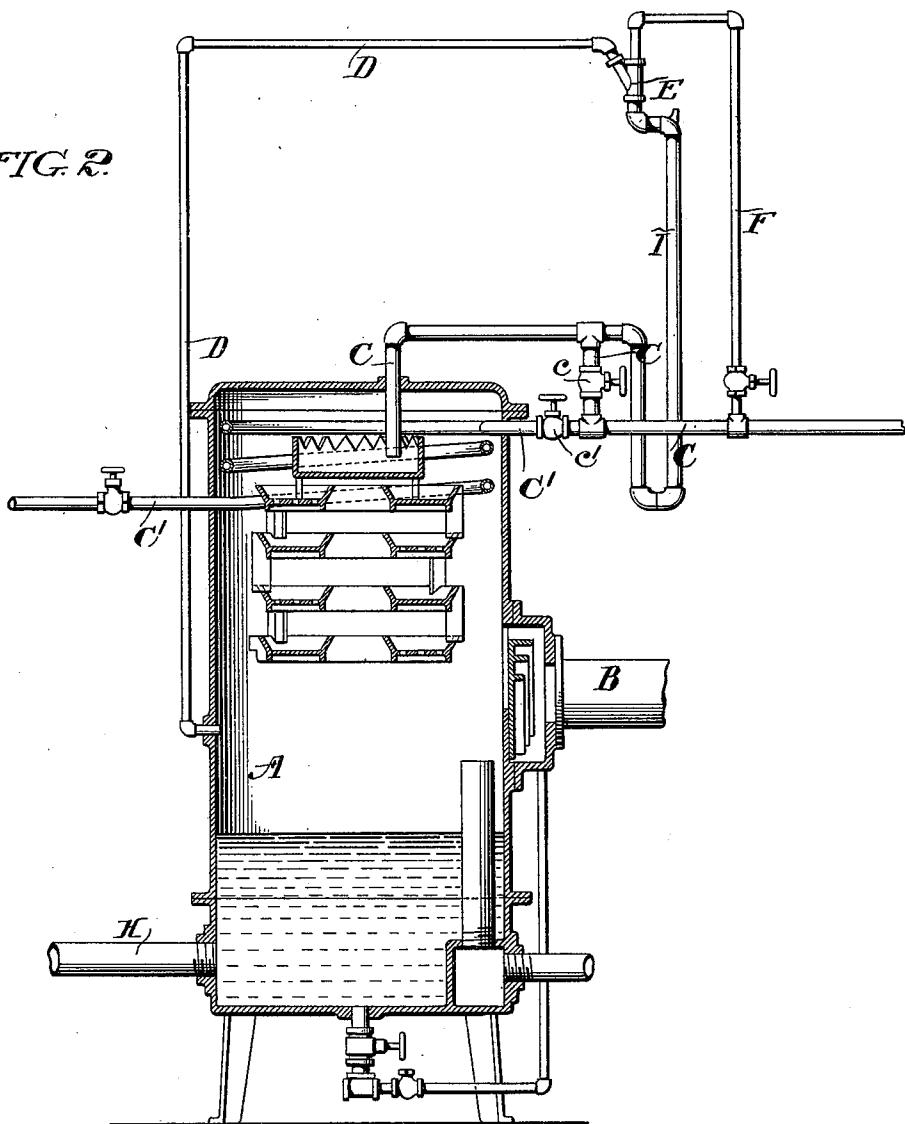
FEED WATER HEATER.

(Application filed Mar. 3, 1900.)

(No Model.)

2 Sheets—Sheet 2.

FIG. 2.



Witnesses:

George Dury
R.M. Kelly.

Inventor:

Walter Webster
By his attorney
Mark M. Mulligan

UNITED STATES PATENT OFFICE.

WARREN WEBSTER, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO THE
WARREN WEBSTER & COMPANY, OF NEW JERSEY.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 651,000, dated June 5, 1900.

Application filed March 8, 1900. Serial No. 7,192. (No model.)

To all whom it may concern:

Be it known that I, WARREN WEBSTER, of Merchantville, county of Camden, and State of New Jersey, have invented an Improvement in Feed-Water Heaters, of which the following is a specification.

My invention relates to feed-water heaters; and it consists of certain improvements, which are fully set forth in the following specification and are shown in the accompanying drawings.

In feed-water heaters of that type in which steam and water are brought into contact, either direct or indirect, within a closed outer casing or body, and the water is heated and purified by the condensation of the steam, gases and uncondensed vapors are liberated. As the best results both in the raising of the temperature of the water and in its purification, as well as in the general operation of the heater and its effect upon the sources from which it receives its supply of steam, are obtained when a partial vacuum or lower pressure is maintained in the heater, it is necessary that the air, gases, and uncondensed vapors liberated by the steam should not be permitted to accumulate. To accomplish this result, I have heretofore employed suction devices connected with the heater-body and acting to draw out the air, gases, and vapors as they were liberated and to maintain the desired low pressure or partial vacuum; but such devices have heretofore been operated by additional or independent means, entailing extra cost and labor of installation and maintenance.

The present invention is an improvement upon these devices, in which the water to be heated is utilized as the means of creating the suction to draw the air, gases, and vapors from the heater.

In carrying out my invention I employ a vapor-pipe leading from the heater to a vacuum creating or exhausting device, such as an ejector, and connect the ejector by a branch with the water-supply pipe, so that the water which is supplied to the heater may be used as the means of operating the ejector to produce the desired suction in the vapor-pipe. The water from the ejector may be fed directly to the supply-pipe or heater or may be

discharged into a tank, from which it may be fed to the heater by hydrostatic pressure.

In the drawings, Figure 1 is a vertical sectional view of a feed-water heater embodying my invention, and Fig. 2 is a similar view illustrating a modification.

The particular construction of the internal parts of the heater is not material to the invention. For purposes of illustration I have shown two different types of "Webster" heaters in Figs. 1 and 2; but it is to be understood that my invention may be applied to heaters of any other suitable form and internal construction in which the air, gases, or vapors are to be drawn out from the interior and whether they be of the "open" type, in which the water is introduced in the form of a jet, spray, or sheet, or of the "closed" type, in which it circulates through heating coils, pipes, or vessels.

A is the outer casing or the body of the heater, into which steam is introduced by any suitable steam-supply pipe B from any convenient source or sources.

C is the supply-pipe, by which the water is introduced into the heater either directly or through a coil C', Fig. 1. In Fig. 2 I have shown both constructions, the supply-pipe C being provided with a valve branch C', forming the coil.

H is the discharge-pipe for the hot water.

D is a vapor-pipe leading from the heater to an ejector E, to which cold water is supplied by a branch pipe F from the main supply-pipe C and from which the water may be supplied to the pipe C or heater by a pipe I, which may be formed with a water seal K.

The pipes F, C, and C' are provided with suitable valves f, c, and c', respectively.

In the construction shown in Fig. 1, instead of connecting the ejector directly with pipe C or heater by the pipe I, I employ an elevated tank G, into which the ejector discharges and from which the pipe I leads to the pipe C or heater.

The operation of the apparatus is as follows: The column of water passing through the pipe F into the ejector acting on the well-known principle condenses the vapors entering through the pipe D and produces a suction by which the air, gases, and vapors

produced by the condensation of the steam are drawn out of the heater and a constant suction is maintained therein. In the construction shown in Fig. 2 the water flows into the heater under the hydrostatic pressure from the elevated tank G. The uncondensed air and gases that have been drawn out of the heater A are liberated in the ejector or in the tank G when it is employed, so that a low pressure or partial vacuum may be maintained in the heater, which renders the purification and heating of the water more effective and draws the steam into the heater from the supply-pipes, thus maintaining the supply of steam without the necessity of pressure. By properly regulating the valves f and c in the pipes F and C all the water may be supplied directly to the heater when desired without passing through the ejector E. In the construction shown in Fig. 1, with the coil C', the water may be supplied through the coil either directly or from the ejector by a proper regulation of the valves f, c, and c'. The condensation of the uncondensed vapors in the ejector E by the incoming water and the mingling of that water with the hot gases and air acts to raise the temperature of the water passing through the ejector to the heater and enables the heat units of the discharged air, gases, and vapors to be utilized.

The details of construction shown may be varied without departing from the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

- 35 1. In a feed-water heater, the combination with a closed heater-body having a steam-inlet and a hot-water outlet, of a vapor-pipe leading from said heater-body, an ejector connected with said vapor-pipe, a water-pipe connected with said ejector, and a water-supply pipe communicating with said ejector and leading to the heater-body for the purpose of supplying water thereto, said ejector being operated by the water supplied to it by said water-pipe to create a suction in the vapor-pipe.
- 40 2. In a feed-water heater, the combination with a closed heater-body having a steam-inlet and a hot-water outlet, of a vapor-pipe leading from said heater-body, an ejector connected with said vapor-pipe, a water-pipe connected with said ejector, a receptacle to receive the water from said ejector, and a water-supply pipe leading from said receptacle to the heater-body, for the purpose of supplying the water thereto, said ejector being operated by the water supplied to it by said water-pipe to create a suction in the vapor-pipe.
- 45 3. In a feed-water heater, the combination with a closed heater-body having a steam-inlet and a hot-water outlet, of a vapor-pipe leading from said heater-body, an ejector connected with said vapor-pipe, a water-pipe connected with said ejector, a receptacle to receive the water from said ejector, and a water-supply pipe leading from said receptacle to the heater-body, for the purpose of supplying the water thereto, said ejector being operated by the water supplied to it by said water-pipe to create a suction in the vapor-pipe.
- 50 4. In a feed-water heater, the combination with a closed heater-body having a steam-inlet and a hot-water outlet, of a vapor-pipe leading from said heater-body, means controlled by a water-supply pipe for creating a suction in said vapor-pipe, a water-supply pipe leading to said heater, and a branch leading from said water-supply pipe to the means for creating a suction in the vapor-pipe for the purpose of operating it.

In testimony of which invention I have hereunto set my hand.

WARREN WEBSTER.

Witnesses:

A. SPENCER WEBSTER,
DAVID W. GARRIGUES.