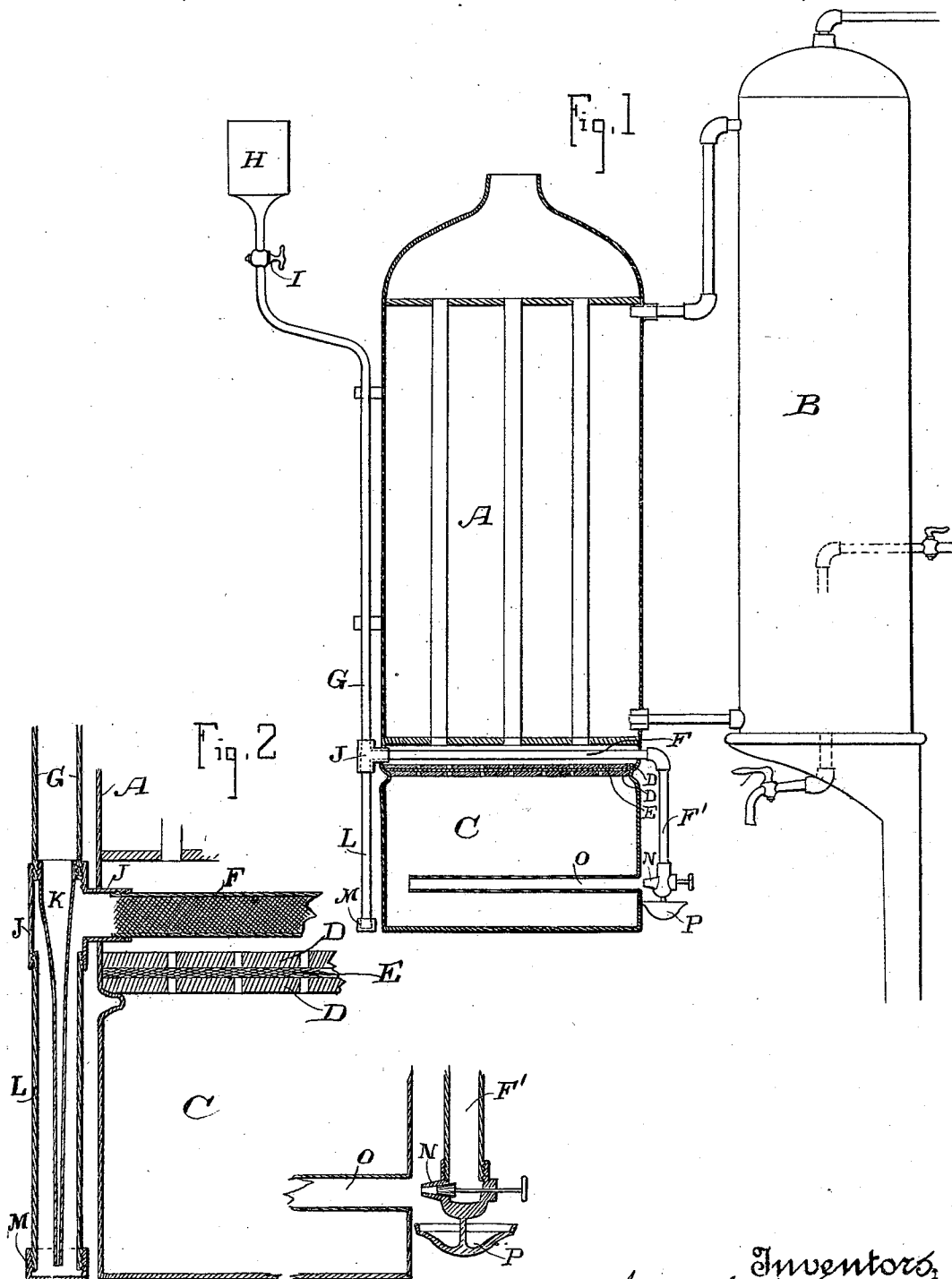


(No Model.)

J. N. STURM & H. FROELICH.
WATER HEATER.

No. 554,745.

Patented Feb. 18, 1896.



Witnesses,
J. A. Bayless

Inventors,
Joseph N. Sturm
Henry Froelich
By Deneys & Co attys

UNITED STATES PATENT OFFICE.

JOSEPH N. STURM AND HENRY FROELICH, OF SAN JOSÉ, CALIFORNIA.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 554,745, dated February 18, 1896.

Application filed August 3, 1895. Serial No. 553,667. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH N. STURM and HENRY FROELICH, citizens of the United States, residing in San José, Santa Clara county, State of California, have invented an Improvement in Water-Heaters; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to a device which is especially designed for heating water for family uses.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of my apparatus. Fig. 2 is an enlarged section of the lower part, showing the construction.

A is a boiler, which may be of any suitable or desired construction. In the present case we have shown it in the form of a vertical tubular boiler having circulating connections at the top and bottom with the hot-water-containing tank B. Beneath the boiler is a mixing-chamber C, the upper part of which has a burner consisting of plates D D, situated one above the other and having an intermediate filling of wire-gauze E, the meshes of which are so fine that flame cannot pass through it. Above this plate and between it and the lower part of the boiler A is a generator F, which consists of a suitably-constructed pipe or passage, having a filling of wire-gauze, which may be rolled and introduced into the pipe or otherwise suitably arranged. This generator is supplied with a suitable hydrocarbon liquid through a pipe G, which receives a supply of liquid from a containing-tank H, situated at a suitable distance and elevation, so that the liquid will flow by gravitation. I is a cock in this pipe, by which the flow of the liquid is controlled or cut off at will. The generator F is connected with the pipe G by a T-coupling J. The lower end of the pipe G is screwed into the upper end of this coupling, and the inside of the pipe G is also screw-threaded to receive the upper end of a small tapering pipe K.

From the lower end of the T-coupling a pipe L extends downward, and its bottom is closed by a cap, as shown at M. The smaller pipe K extends down to near the bottom within the

pipe L, and the hydrocarbon liquid from the pipe G passes down through the pipe K, thence rising up outside of the pipe K to the elevation of the generator F, which extends transversely across beneath the boiler and above the burner, and flowing through the generator it is exposed to the heat from the burner-plate, which thus constantly vaporizes the hydrocarbon liquid as it passes through it.

The pipe K, extending down into the exterior pipe L, which is constantly filled with liquid, serves as a trap to prevent the vapor thus generated from being forced back into the feed-pipe G.

The pipe F, extending across as described, passes to the outside of the chamber C and thence is connected by a pipe F' with a nozzle N. This nozzle discharges horizontally into a pipe O within the chamber C and is so arranged with relation to the opening of that pipe that the current of vapor passing into the pipe also draws in a supply of air, which mixes with the vapor, and the two are discharged against the side of the chamber C, after which they spread out and are thoroughly mixed within the chamber before passing through the burner-plates D D, previously described. The mixed air and vapor passing out through these plates and the intermediate gauze will be ignited upon the upper surface, and the heat and products of combustion pass thence through the tubes of the boiler and also serve to heat the generator F, so as to continue the supply of inflammable vapor.

In order to produce a supply of vapor to start the apparatus when cold, we have shown a cup P, arranged below the nozzle N, and this may be filled with any inflammable liquid and ignited, and when the nozzle has become slightly heated a small portion of the hydrocarbon liquid in the pipes will be allowed to run into it and be vaporized, being discharged thence through the pipe O and delivered to the burner, as previously described, until the generator F has become sufficiently heated to continue the supply. This apparatus is especially valuable for heating water for family purposes and can be set in operation in a very short time and continued as long as the need for the water continues.

Having thus described our invention, what

we claim as new, and desire to secure by Letters Patent, is—

1. The combination, of a boiler, a tank or receiver and circulating-pipes, a closed chamber situated below the boiler, perforated burner-plates and an intermediate filling of flame-arresting fine-wire gauze forming the top of said chamber, a generator extending transversely between the burner-plate and the bottom of the boiler, a supply-pipe through which a hydrocarbon liquid is delivered to the generator, a pipe extending across the lower part of the heating-chamber, and a nozzle discharging into said pipe and connecting with the generator, said nozzle being adapted to deliver vapor and air into the chamber, where it is mixed before passing out through the burner-plates.

2. The combination, of a boiler, a mixing-chamber situated just below the boiler, a burner-plate forming the top of the chamber and separating said chamber from the bottom of the boiler proper, and consisting of two perforated plates with an intermediate filling of flame-arresting fine-wire gauze, a generator placed between the burner and bottom of the boiler, means for supplying hydrocarbon fluid to said generator, a pipe entering the mixing-chamber and a nozzle connecting with the generator and discharging into the pipe entering the mixing-chamber.

3. The combination, of a boiler, a mixing-chamber below and separated from the bottom thereof, a burner forming the top of the chamber, a generator passing through the space between the burner and the bottom of the boiler, a connection from the generator having a nozzle and a pipe entering the mixing-chamber and receiving the discharge of the nozzle, a feed-pipe for hydrocarbon coupled to the generator and having an extension provided with a closed bottom, said extension adapted to constantly contain hy-

drocarbon, and a tapering pipe in said extension having its contracted end entering the liquid in the extension and forming a trap to prevent the vapor being forced back into the feed-pipe.

4. The combination, of a boiler, having a chamber at its lower portion and separated from the bottom of the boiler proper, a burner forming the top of said chamber, a generator passing through the space between the plate and bottom of the boiler proper, a connection from one end of the generator, having a nozzle, a pipe entering the mixing-chamber and receiving the discharge of said nozzle, a feed-pipe connected with the opposite end of the generator, a pipe in communication with the feed-pipe and extended below the generator, and adapted to be constantly filled with the hydrocarbon liquid, and a tapering pipe fitted to the lower end of the feed-pipe and dipping into the liquid in the extension thereof to form a trap to prevent the vapor being forced back into the feed-pipe.

5. The combination, of a boiler, a mixing-chamber, a burner, a generator passing between the bottom of the boiler and the burner, and consisting of a pipe having a filling of fine-wire gauze, a pipe entering the mixing-chamber and a connection from one end of the generator discharging vapor into said pipe, a feed-pipe connecting with the opposite end of the generator and means whereby a trap is formed below the level of the generator to prevent the vapor being forced back into the feed-pipe.

In witness whereof we have hereunto set our hands.

JOSEPH N. STURM.
HENRY FROELICH.

Witnesses:

C. M. LORIGAN,
S. F. LEIB.