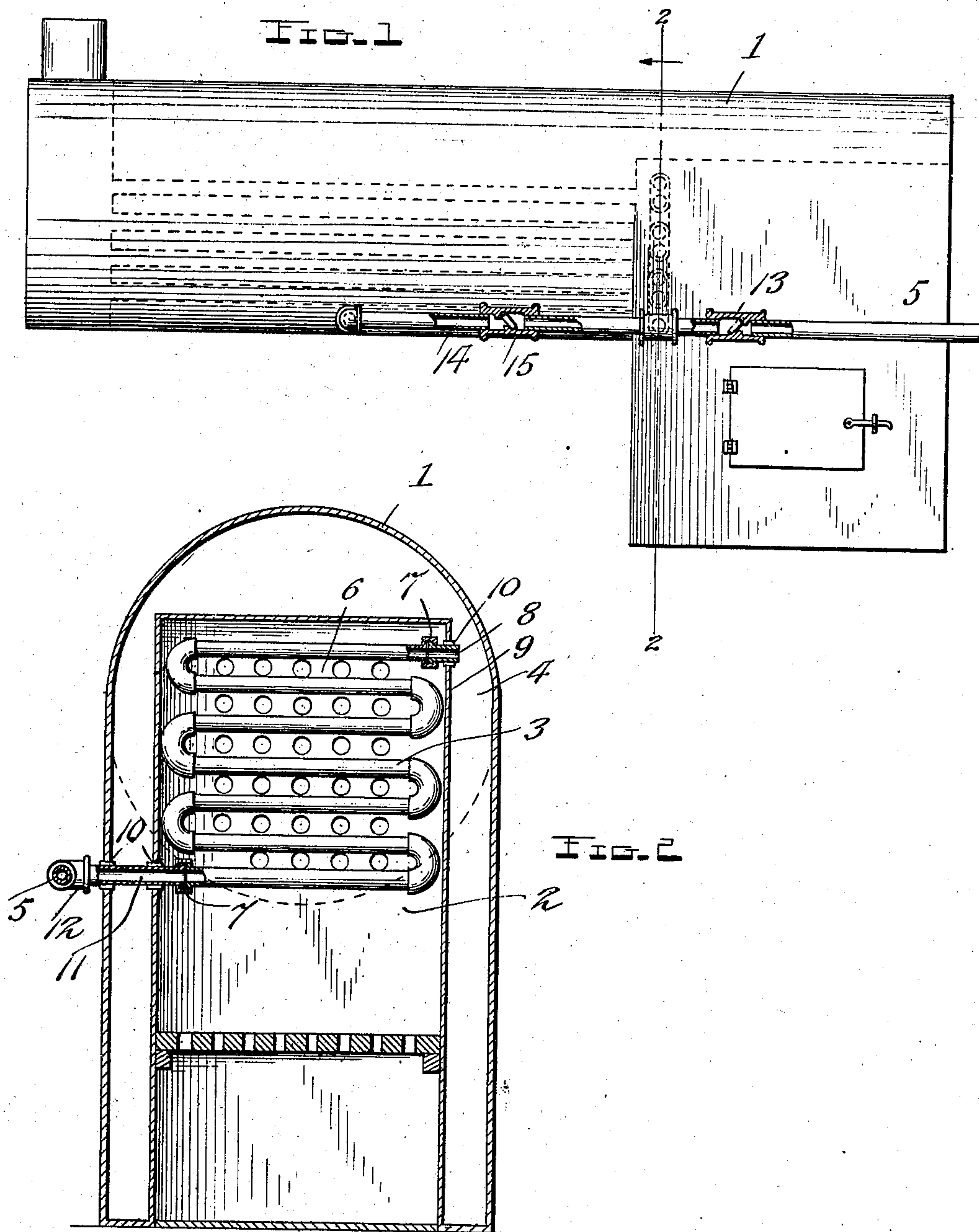


No. 894,598.

PATENTED JULY 28, 1908.

R. C. CASPERSON.  
FEED WATER HEATER.

APPLICATION FILED MAR. 21, 1907.



Inventor

Rasmus C. Casperson.

Witnesses

Chas. R. Griesbauer.  
6 Broadway

By Victor J. Evans.

Attorney



# UNITED STATES PATENT OFFICE.

RASMUS C. CASPERSON, OF LAKE BENTON, MINNESOTA.

## FEED-WATER HEATER.

No. 894,598.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed March 21, 1907. Serial No. 363,688.

*To all whom it may concern:*

Be it known that I, RASMUS C. CASPERSON, a citizen of the United States, residing at Lake Benton, in the county of Lincoln and State of Minnesota, have invented new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention relates to feed water heaters and it consists in the construction and arrangement of parts, as will be hereinafter described and particularly pointed out in the claim.

In the accompanying drawing, which illustrates one of the embodiments of the invention, Figure 1 is a side elevation of a locomotive boiler showing portions of the feed water heating system in section. Fig. 2 is a vertical transverse section on line 2—2, Fig. 1.

Similar reference characters are employed to designate similar parts in the figures.

Referring to the drawing, 1 designates a steam generator of the locomotive type which is of ordinary construction and provided with a firebox or combustion chamber 2. Located in the firebox is a feed water heating coil 3 constructed in any approved manner and preferably comprising a conduit bent back and forth a number of times with its upper end discharging into the water space 4 of the boiler and its lower end connected with the water supply pipe 5 receiving water from a pump or injector in the usual manner. The coil 3 is disposed in a vertical plane and slightly spaced from the tube sheet 6 of the boiler so as to permit of the unobstructed entrance of the fire gases into the boiler tubes. The feed water heating coil is thus located in the direct path of the fire gases and at the hottest point so that the feed water is brought up to a high temperature in passage through the coil. The upper end of the coil is connected by a suitable coupling 7 with a short piece of pipe 8 that passes through the firebox sheet 9 and discharges into the water space 4, there being a brass bushing 10 around the short pipe 8 so as to prevent leaking. The inlet end of the coil is similarly attached to a short pipe 11 that extends from the firebox to a point exterior to the boiler where it is connected by a T-coupling 12 with the supply pipe 5. In the pipe 5 is a check valve 13 that opens toward the heating coil and closes toward the source of supply, thus preventing leakage when the pump or injector is not operating.

Since the heating coil is subject to a very

high temperature, it is necessary to provide means for maintaining it filled with water; otherwise, the water therein would soon turn to steam after the feed water is cut off and result in the coil quickly burning out. For this purpose, a safety device is employed which comprises a pipe 14 connected at one end with the bottom or water space of the boiler and at the other end with the T 12, there being included in the pipe a check valve 15 that opens toward the T and closes toward the water space of the boiler. This pipe constitutes a by-pass whereby water can flow into the heating coil to take the place of the water that is generated into steam in the coil. In other words, as long as the water level in the boiler is maintained above a predetermined limit, the coil 3 will always be filled with water.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains.

In practice, the supply of water through the pipe 5 to the boiler is opened when the water level reaches a predetermined low limit and water passes through the valve 13 and coil 3 in which it is highly heated and then discharges into the boiler. Since the pipe 14 is equipped with a check valve, it is impossible for the water to be supplied directly to the boiler. After the supply is cut off, the check valve 13 automatically closes under the pressure in the boiler and as the pressure in the water coil tends to vary, due to the generation of steam therein, this pressure is equalized through the pipe 14. It will thus be seen that the water can freely flow from the boiler into the coil 3 and through the latter back into the boiler.

The water heating device is of simple and inexpensive construction and highly efficient in operation.

Having thus described the invention, what I claim is:—

A feed water heater comprising a boiler with a fire box therein having a surrounding water space therebetween, a coiled conduit having one end connected to the upper portion of one of the side walls of the fire box, and its other end connected midway of the opposite side wall thereof, and also connected to the wall of the boiler, said connected ends of the coiled conduit serving to



support the coils approximately near the top of the fire box, and disposed in a vertical plane and slightly spaced from the tube sheet of the boiler, the openings of said tube sheet being arranged so as to point between the longitudinal spaces of the coils, said spaced portion between the tube sheet and the coiled conduit serving to permit of an unobstructed passage of the fire gases into said boiler, a tee connected with the lower extremity of said coiled conduit; a feed pipe connected with one branch of said tee; a

check-valve in said feed-pipe opening toward said conduit; a pipe connected with the other branch of said tee and with the water-space of the boiler, and a check valve in said pipe opening away from the boiler. 15

In testimony whereof, I affix my signature in presence of two witnesses.

RASMUS C. CASPERSON.

Witnesses:

CHAS. E. LAVESSON,  
F. E. TUCKER.