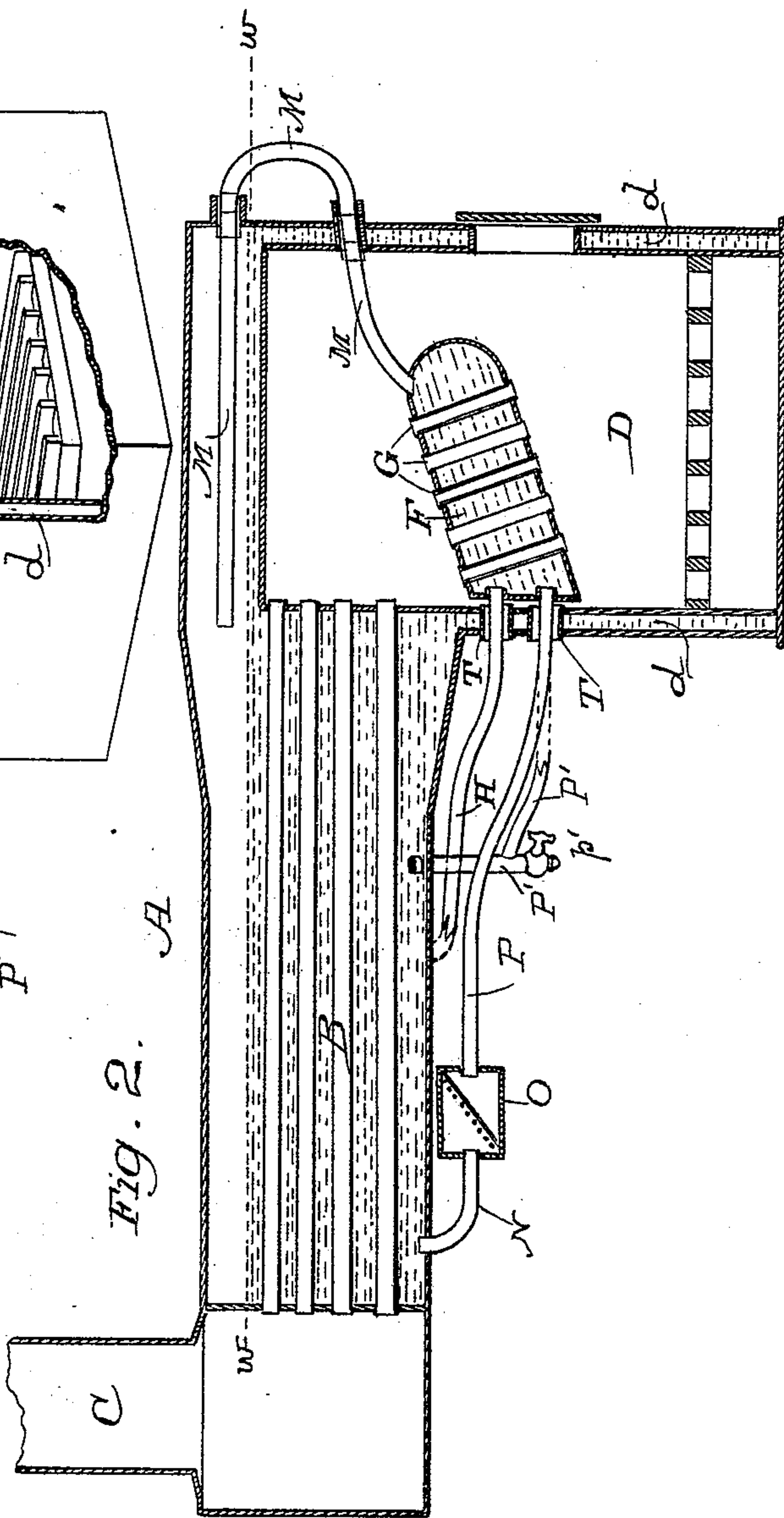
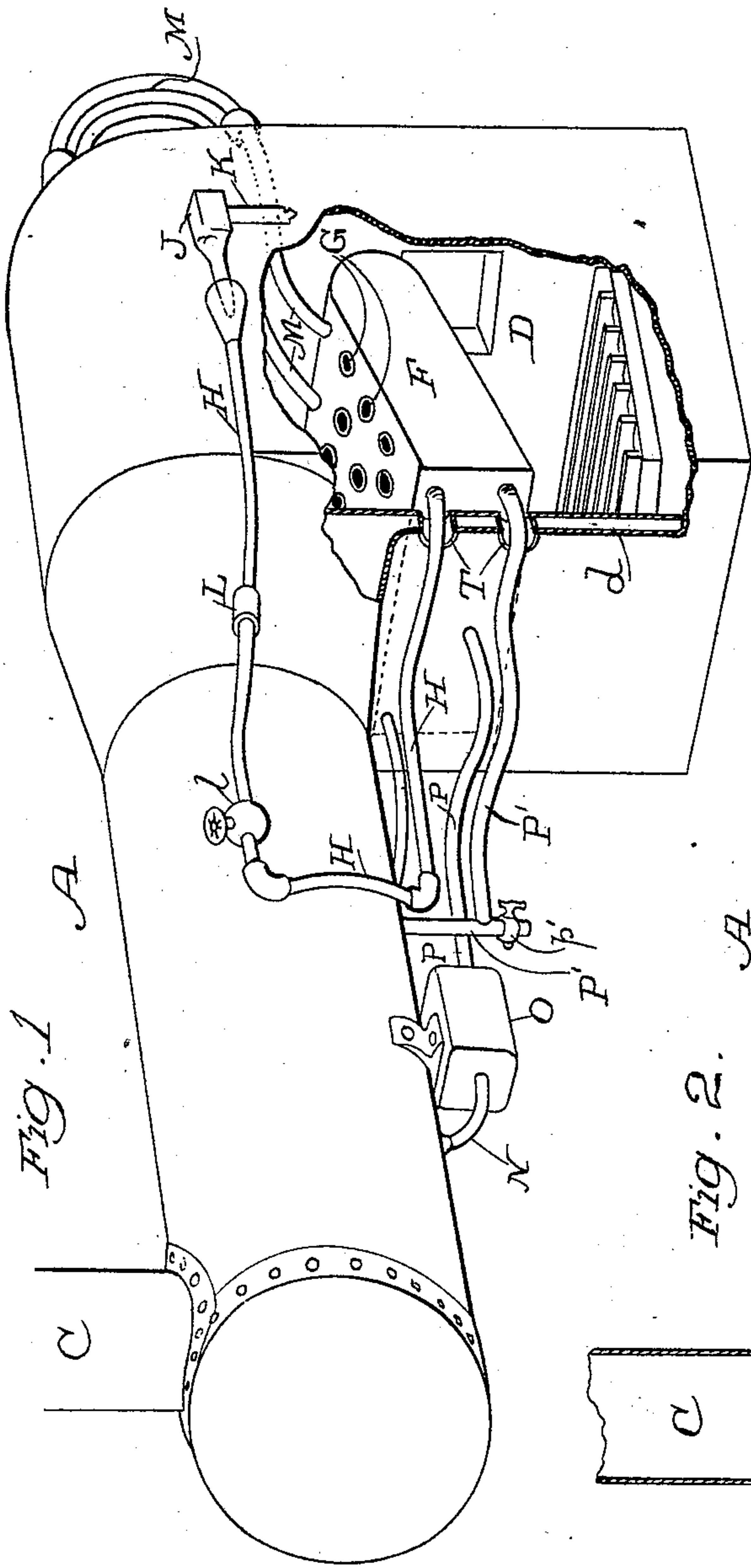


(No Model.)

E. L. MARTIN.
CIRCULATING TUBULAR BOILER.

No. 525,958.

Patented Sept. 11, 1894.



Witnesses,
J. H. House
J. A. Bayless

Inventor,
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UNITED STATES PATENT OFFICE.

EDWIN L. MARTIN, OF KERN, ASSIGNOR TO THE LOCOMOTIVE FEED WATER HEATER COMPANY, OF BAKERSFIELD, CALIFORNIA.

CIRCULATING TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 525,958, dated September 11, 1894.

Application filed January 18, 1894. Serial No. 497,288. (No model.)

To all whom it may concern:

Be it known that I, EDWIN L. MARTIN, a citizen of the United States, residing at Kern, Kern county, State of California, have invented an Improvement in Circulating Tubular Boilers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of locomotive or circulating tubular boilers, in which a supplemental heater located in the fire-box is connected with the injector from the cold water tank and with the boiler.

My invention consists in details of arrangement, construction and combination which I shall hereinafter fully describe and specifically claim.

The several improvements are especially applicable to that boiler, heretofore patented by me, No. 498,441, dated May 30, 1893.

The object of the supplementary pipe into the bottom of the supplemental heater are, first, to provide for the continuance of the circulation if the main circulating or filter pipe be clogged up; and, second, to provide a means for blowing off the supplemental heater when necessary.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of a locomotive boiler with a portion of the fire-box broken away, showing my invention. Fig. 2 is a vertical longitudinal section of the same.

A represents a boiler of the ordinary locomotive type, provided with a series of tubes B, smoke-stack C and fire-box D. Within this fire-box is properly supported at an inclination, the supplemental heater F, constructed of suitable material and provided with a series of tubes G extending vertically through it.

On the exterior of the boiler, one on each side, is an injector J for forcing water from the cold water tank, said water entering the injector through the pipe K. The injector communicates with a pipe H which has in it a check valve L where the injector works against the boiler pressure, and beyond this check valve is a globe valve *l* by the closing

of which it will be possible to remove the check valve for grinding and reseating without letting the steam off the boiler.

The pipes H are conducted through a suitable course exterior of the boiler, and finally communicate at the other end with the supplemental heater F, and by means of these pipes the cold water from the tank is conducted directly into the supplemental heater without passing into the boiler.

Leading out from the supplemental heater, preferably at its upper or higher portion, are the pipes M which are conducted through a suitable course and enter the boiler and open out therein above the water line *w—w*. The course of these pipes is not essential, though the preferable way is to carry them outwardly through the walls of the fire-box and inwardly again above the fire-box, as is shown, thereby providing, by means of suitable unions, for the disconnection of their sections and the removal of the supplemental heater whenever required.

Issuing from the bottom of the boiler is the pipe N connected with the filter or strainer box O, said filter or box being connected by a pipe P with the lower portion of the supplemental heater F.

An auxiliary pipe P' leads from the bottom of the boiler and communicates with a corresponding portion of the supplemental heater F. In its lower portion is a valve *p'*.

The walls of the fire-box are doubled or spaced, as is shown at *d*, and, as in this case, there are three different degrees of heat to be considered in the connection of the pipes with the supplemental heater, I have found it necessary to provide for the expansion and contraction of the joints at this point.

It will readily be seen that the supplemental heater within the fire-box has the highest degree of heat, the inner wall of the fire-box the next highest, and the outer wall the lowest, and if the several pipes were seated fixedly in these three thicknesses of plate, namely, the outer wall, the inner wall and the wall of the supplemental heater, they would be subjected to unequal degrees of expansion and contraction and would make a leaky joint.

To remedy this I pass through the two walls of the fire-box, a sleeve T, and through this sleeve I loosely pass the pipe, and thread the inner end of it in the wall or plate of the supplemental heater. Thus it will be subjected to but one degree of expansion and will not leak. All the pipes that pass through the double walls of the fire-box are thus provided for.

10 It will be seen, from the foregoing description, that the pipes M entering the boiler, as they do, above the water line, conduct the circulation of water and steam in the most simple manner and wholly avoid undue pressure in
15 the supplemental heater, which would be the case if they opened out into the boiler below the water line, as heretofore. By having the auxiliary pipe P', the circulation of the water continues even though the filter or screen
20 pipe becomes clogged, and moreover said auxiliary pipe provides a means for blowing off the supplemental heater through the valve p' in the lower portion of the auxiliary pipe when opened.

25 The circulation in this boiler is from the supplemental heater, through pipes M, into

the boiler, and back through pipes N and P, to the supplemental heater.

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

In a circulating tubular boiler, the combination of the supplemental heater located in the fire-box and having means for supplying it with cold water, a pipe leading from the supplemental heater above and entering the boiler, a pipe leading from the lower portion of the boiler and entering the lower portion of the supplemental heater, a filter or strainer in said pipe and a second or auxiliary pipe leading from the lower portion of the boiler and entering the lower portion of the supplemental heater, said auxiliary pipe having a valve in its lower portion substantially as herein described.

In witness whereof I have hereunto set my hand.

EDWIN L. MARTIN.

Witnesses:

S. H. NOURSE,
GEO. H. STRONG.