(No Model.) 2 Sheets—Sheet 1.

E. C. MERRILL.

THERMOSTATIC REGULATOR.

No. 486,727. Patented Nov. 22, 1892.

FIG. I.

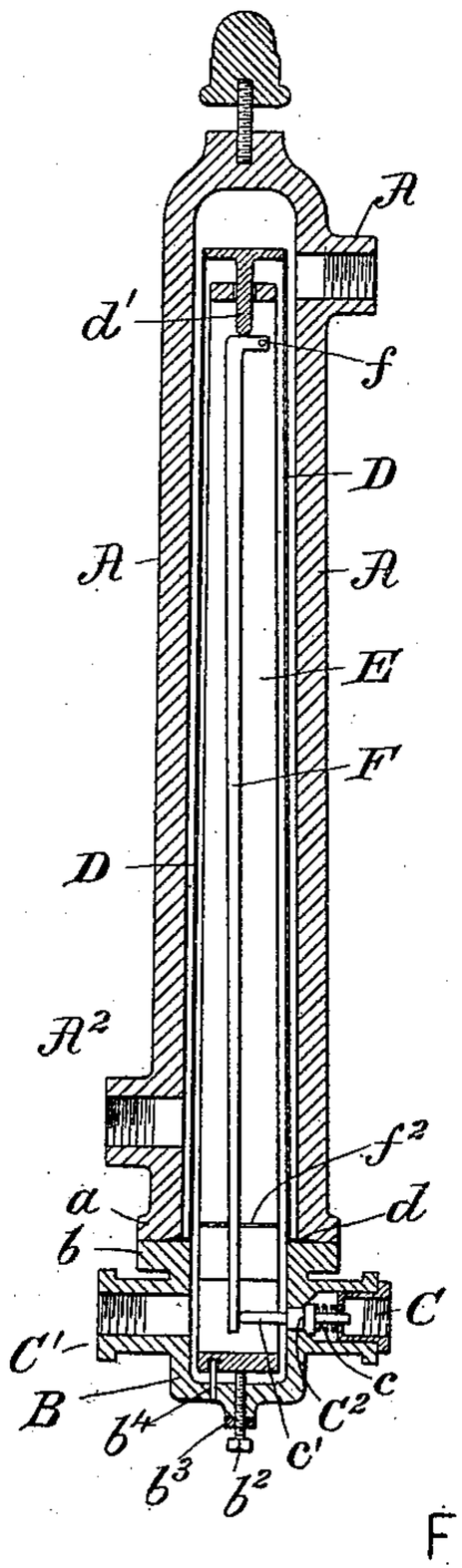


FIG. II.

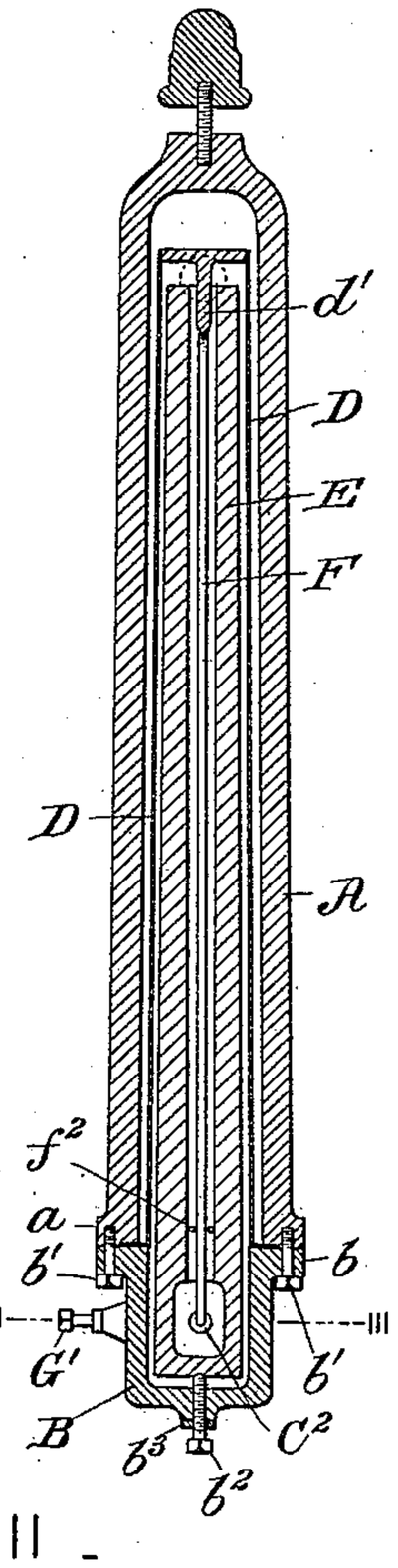
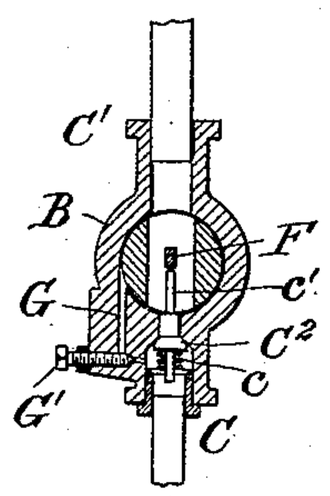


FIG. III.



Attest:

Geo. T. Smallwood.

Geo. Lewis.

Inventor:

Edwin C. Merrill

by Poole & Mauro

his attorneys.

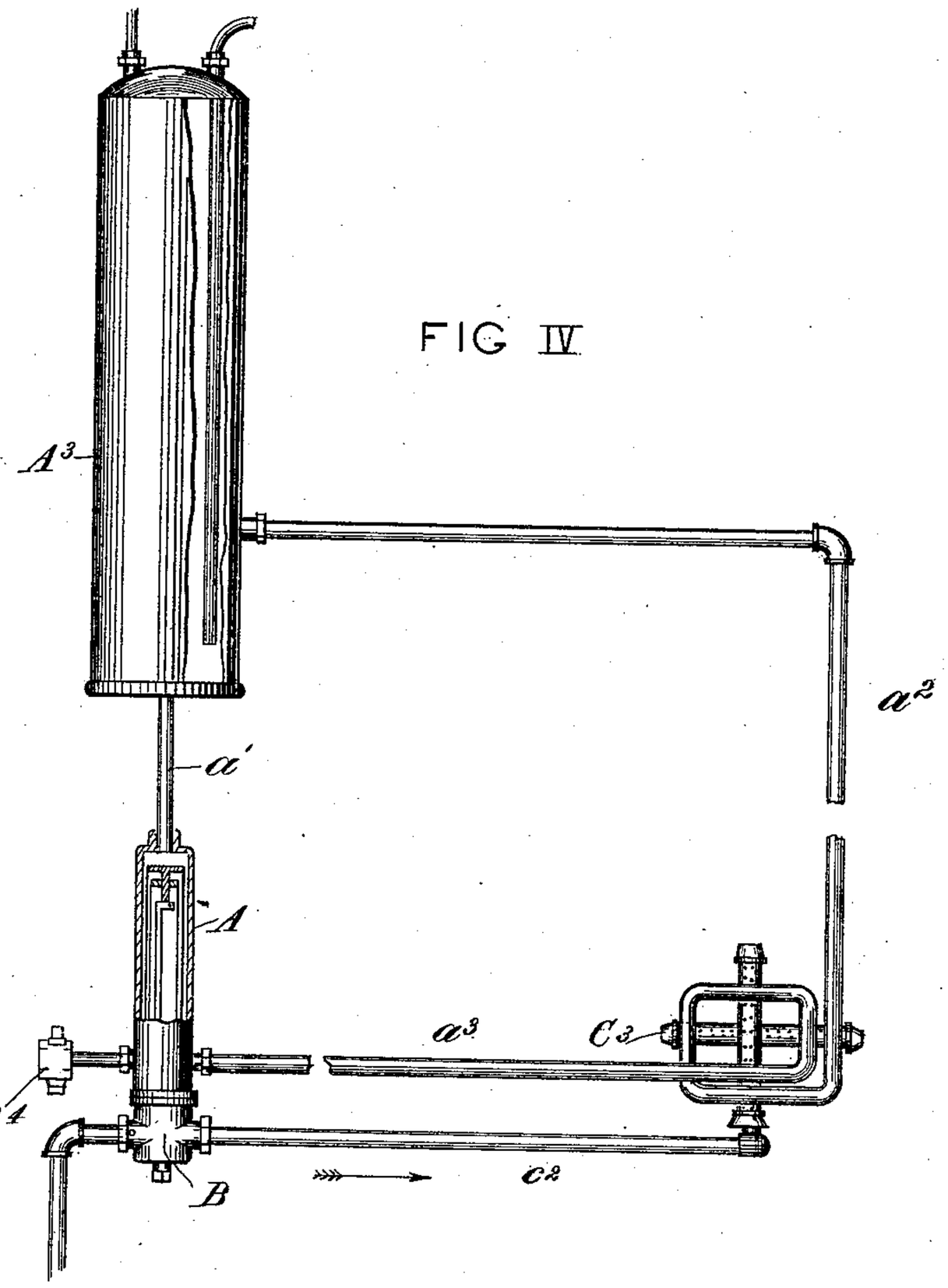
(No Model.) 2 Sheets—Sheet 2.

E. C. MERRILL.

THERMOSTATIC REGULATOR.

No. 486,727. Patented Nov. 22, 1892.

FIG IV



Attest.
Arthur A. Ekt.
Rowe Lewis.

Inventor:
Edwin C. Merrill
by Record Mann
his attorneys.

UNITED STATES PATENT OFFICE.

EDWIN C. MERRILL, OF ALLEGHENY, PENNSYLVANIA.

THERMOSTATIC REGULATOR.

SPECIFICATION forming part of Letters Patent No. 486,727, dated November 22, 1892.

Application filed March 9, 1892. Serial No. 424,316. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. MERRILL, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Thermostatic Regulators, which improvement is fully set forth in the following specification.

This invention relates to an improvement in thermostatic regulators and is designed particularly for use in connection with hot-water heaters, though it will be evident that the invention or parts thereof may be applied to other analogous uses. The apparatus is more especially adapted for use in combination with the circulating-pipe of a hot-water heater, in which the circulating medium is heated by live steam or gaseous fuel, the supply-pipe for which is provided with a regulating-valve operated by the thermostat.

In gas-ranges constructed for household use the water-back is usually heated by a separate burner, and if this burner be kept constantly ignited and burning at its full capacity (as is necessary at times) the water in the boiler becomes too hot, causing steam to generate and, moreover, entailing a waste of fuel. The generation of steam in domestic boilers and in the water-back is very objectionable. The presence of steam in the water-back displaces the water and impairs or destroys the circulation. Moreover, the ebullition of water in the boiler stirs up sediment that otherwise would be deposited and makes the water impure. The apparatus herein described is designed to obviate these difficulties by automatically operating a regulating-valve in the supply-pipe, so as to keep the water in the boiler and pipes at a certain predetermined temperature. Said apparatus comprises, among other features, an expansible member in the form of a tube, around which the hot water is allowed to circulate, said tube inclosing the lever or connection whereby its movements are transmitted to the regulating-valve. This construction not only has the advantages of compactness and great sensitiveness to changes of temperature in the surrounding body of water, but it does away with stuffing-boxes, with their attendant objections of friction and liability to leakage.

In the accompanying drawings, which form part of this specification, Figure I is a vertical central section. Fig. II is a similar view taken at right angles to Fig. I. Fig. III is a horizontal section on line III, Fig. II; and Fig. IV is a diagrammatic view showing the device in operative connection with a burner and heating system.

A represents the casing of the thermostat, provided with inlet and outlet openings A' A^2 for the circulating water or other liquid, the openings A' and A^2 being, respectively, connected with the boiler A^3 by pipes a' and a^2, the latter passing above burner C^3, at which point it is preferably formed into a coil. A^4 is a drain-cock for removing the water from the boiler and circulating system, when desired. This casing is preferably cylindrical and made of cast-iron and is formed with an outwardly-extending flange a at its lower end.

B is the valve-casing, provided at its upper end with a flange b, corresponding to the flange a, to which it is secured by bolts b', and having an inlet-opening C and outlet-opening C' for the gaseous fuel or heating medium. The inlet-opening contains a valve C^2, provided with a spring c, tending to close the valve and having its stem c' extended into the casing, and the inlet-opening is connected with burner C^3 by a pipe c^2.

D is a tube closed at its upper end and having an outwardly-extending annular flange d around its lower end, which flange is clamped between the flanges a and b of the thermostat-casing A and valve-casing B, respectively, forming a water-tight joint. Depending from the top of the tube D is a pin d'. The tube D is made of thin brass, zinc, or other metal having a greater coefficient of expansion than iron, and its movements control the regulating-valve, as hereinafter shown. Within the tube D is a cast-iron bar E, which constitutes the adjustable support for the valve-actuating lever F, which lies in a slot extending lengthwise of the bar E, and is pivoted thereto at f. The lower end of the lever is held out of contact with the walls of its containing-slot by means of guides f^2.

The pin d' on the expansible tube D passes loosely through a hole in the upper end of bar E, and bears against the bent lever F. The lower end of the latter is in contact with the

end of valve-stem c' of the regulating-valve, so that the contraction of the tube D due to the fall of temperature below that determined upon will cause the valve to open proportionately to the extent of the movement of contraction, while in case of a rise of temperature in the liquid surrounding tube D the latter will proportionately expand, permitting spring c to close the valve so as to diminish the supply of fuel.

The lever-support E rests at its lower end upon adjusting-screw b^2, provided with a locknut b^3. By means of this screw the support E may be adjusted relatively to the expansible tube D, and in this way the water circulating through the casing may be maintained at any desired temperature within certain limits. The support E is guided below by a pin b^4 entering a hole in the end thereof and above by the pin d' projecting from the end of tube D.

In Fig. III is shown a by-pass G, connecting the inlet and outlet openings in casing B around the valve C^2, which may be closed by set-bolt G'. This by-pass is provided for the purpose of maintaining a light at the burner, so that in case the valve C^2 were allowed to close by the actuating-lever the light would not be put out when the valve is again opened by a fall of temperature of the circulating medium.

In the drawings I have shown what is regarded as the best embodiment of the principle of the invention; but it will be obvious that the details of construction, the forms of various parts, and the materials used in their construction are susceptible of modification without departing from the spirit of the invention.

Having now fully described my said invention and the manner in which the same is or may be carried into effect, what I claim is—

1. The combination, with the regulating-valve, of a chamber through which the heating medium circulates, an expanding tube inclosed by said chamber closed at its inner end and connected at the other end with the wall of the chamber by a tight joint and around which the heating medium circulates, and a lever in said tube operated by the contraction and expansion thereof to open and close the regulating-valve, substantially as described.

2. The combination, with the valve, of a chamber adapted to contain water, an expansible tube inclosed thereby, closed at its inner end and at the other end connected with said chamber by a water-tight joint, and a connection from the free end of said tube and inclosed thereby for actuating said valve by the expansion and contraction of said tube, substantially as described.

3. The combination, with the regulating-valve, of a thermostatic controlling device therefor, comprising an expansible tube in a casing provided with inlet and outlet for water, said tube being closed at its inner end and at its other end connected with said chamber by a water-tight joint, a bar or support within said tube, and a valve-actuating lever in the tube pivoted to said support and adapted to transmit the motion of said tube to said valve, substantially as described.

4. The combination of the regulating-valve, the expansible tube in a casing or chamber adapted for the circulation of water around said tube, a support inclosed by said tube, a valve-actuating lever fulcrumed in said support, and means for adjusting the support and lever with respect to said tube, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWIN C. MERRILL.

Witnesses:
WM. K. GRAY,
S. C. EDWARDS.