(No Model.)

3 Sheets—Sheet 1.

L. L. ROWE.

AUTOMATIC THERMOSTATIC VALVE.

No. 580,585. Patented Apr. 13, 1897.

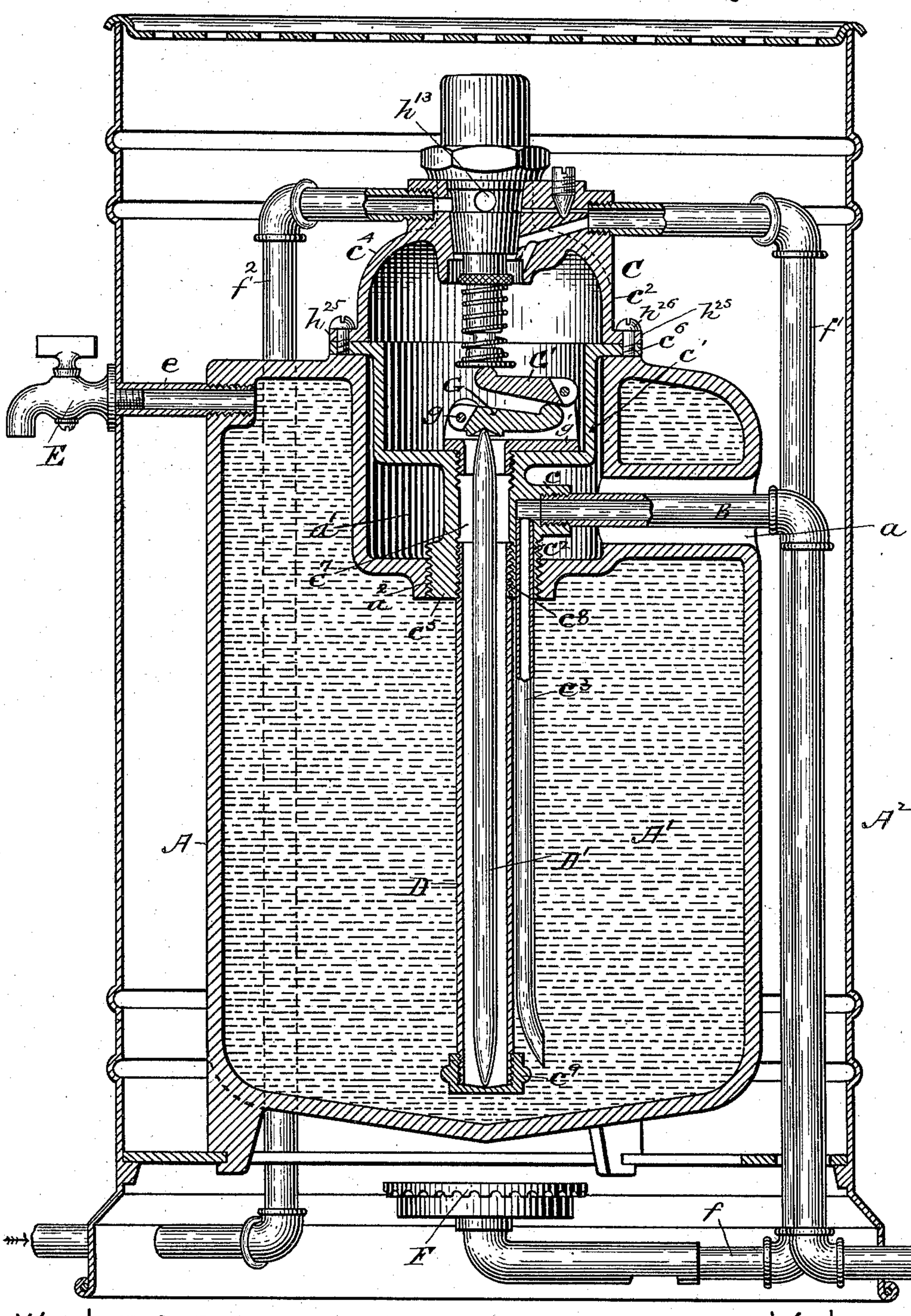

Fig. 1.

WITNESSES

F. F. Raymond

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(No Model.)

3 Sheets—Sheet 2.

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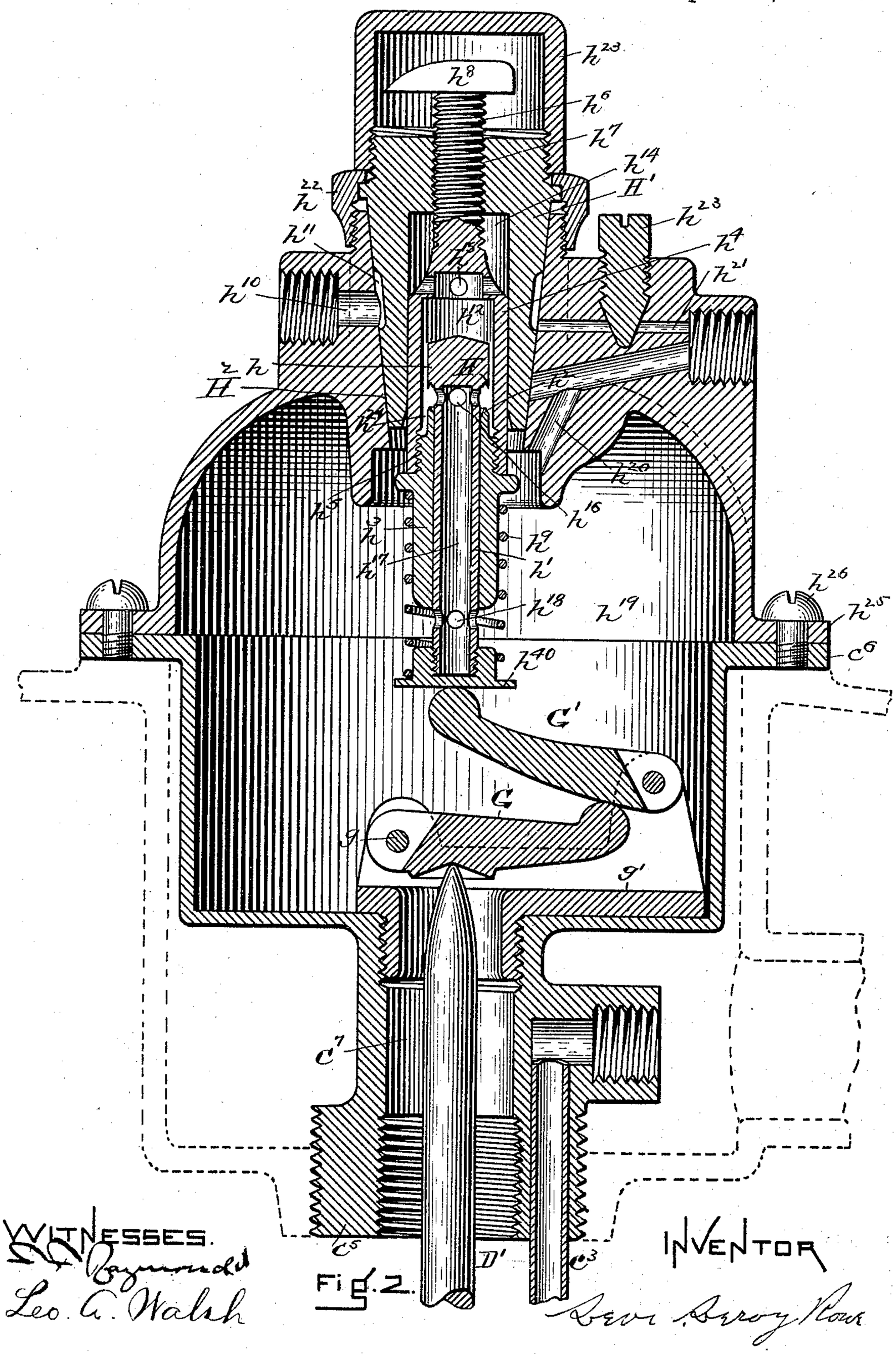

Fig. 2.

WITNESSES.

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(No Model.) 3 Sheets—Sheet 3.

L. L. ROWE.

AUTOMATIC THERMOSTATIC VALVE.

No. 580,585. Patented Apr. 13, 1897.

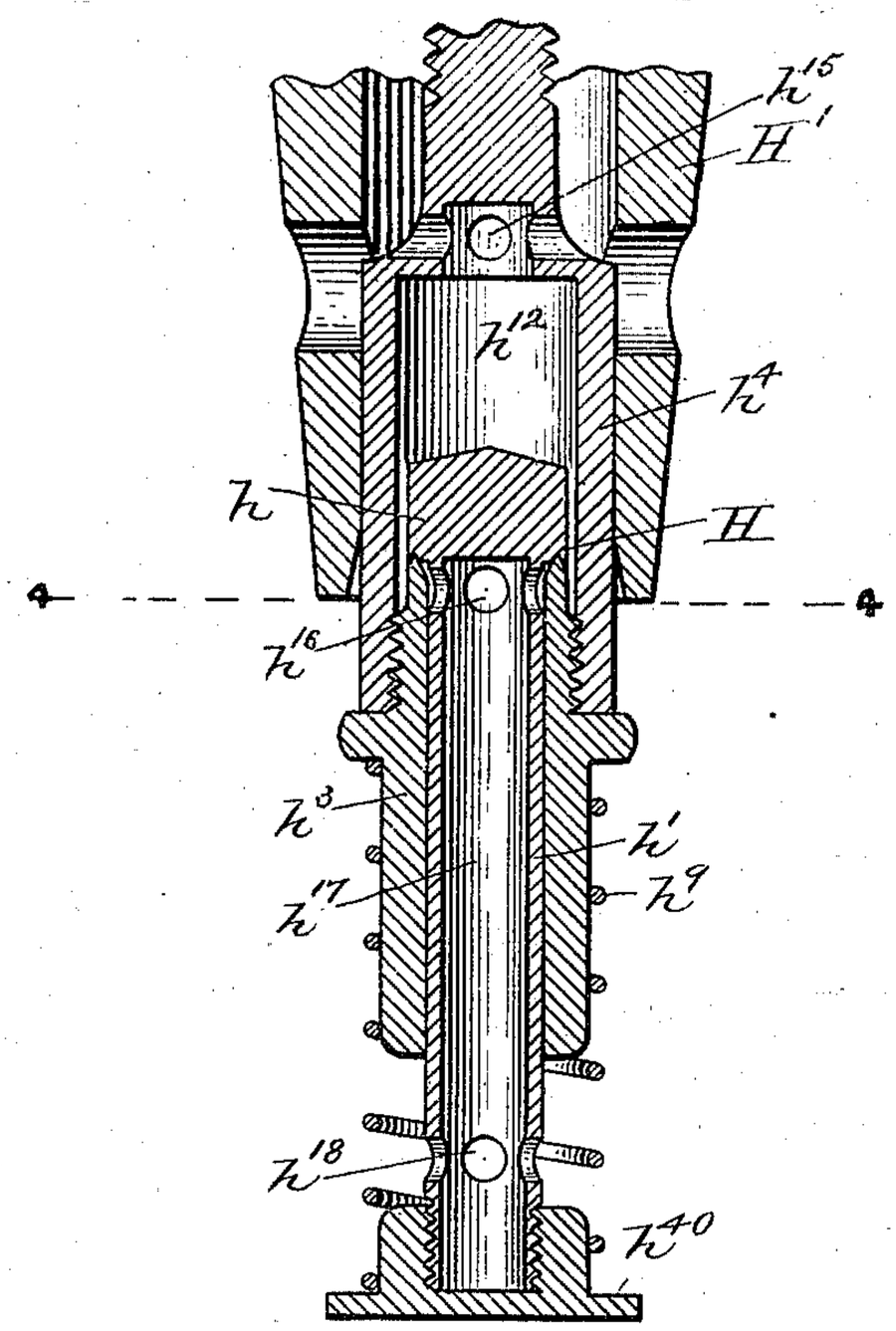

Fig. 3.

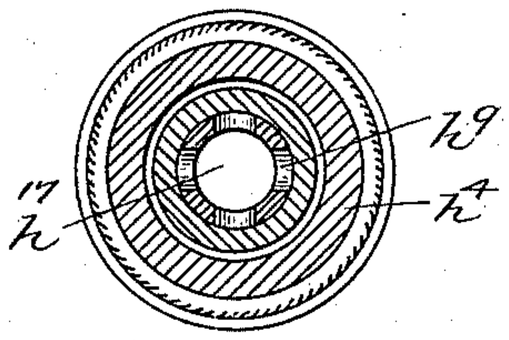

Fig. 4.

Fig. 5.

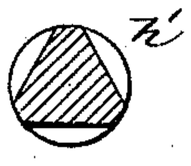

Fig. 6.

WITNESSES

T. F. Raymond

Leo. A. Walsh

INVENTOR

Levi Berry Rowe

UNITED STATES PATENT OFFICE.

LEVI LEROY ROWE, OF BOSTON, MASSACHUSETTS.

AUTOMATIC THERMOSTATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 580,585, dated April 13, 1897.

Application filed January 18, 1897. Serial No. 619,578. (No model.)

To all whom it may concern:

Be it known that I, LEVI LEROY ROWE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Automatic Thermostatic Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates especially to an automatic valve for regulating the supply of gas operated and controlled by variations in temperature of any medium, preferably, however, the medium adapted to be heated by the burning of said gas.

In the drawings I have represented the invention as applied to a liquid-heater of my invention.

Figure 1 is a view in vertical section thereof. Fig. 2 is a much-enlarged view of the valve in vertical section alone. Fig. 3 is a detail view in vertical section of a portion of the valve, to which reference is hereinafter made. Fig. 4 is a view in horizontal section upon the dotted line 4 4 of Fig. 3. Figs. 5 and 6 are detail views in horizontal section, to which reference will be hereinafter made.

A is the shell of the liquid-heater, forming a reservoir A′ for the liquid, which is admitted thereto through the passage in the feed or supply pipe B, the said pipe extending through the horizontal hole *a* in said casing A, and joining at its inner end a boss *c*, extending laterally from a section *c′* of the valve-casing. This boss *c* has a passage in continuation of the passage of the supply-pipe, which opens into a vertical passage c^2, in which is the upper end of the pipe or tube c^3. This tube extends downwardly into the reservoir A′ and is parallel with and close to the extensible pipe D, to which reference will hereinafter be made.

The heated liquid is drawn from the reservoir through the outlet *e*, controlled by a suitable cock E.

Beneath the casing A is the gas-burner F, which is supplied with gas by means of a passage in the gas-supply pipe *f*. This pipe is in two sections—namely, the section *f′*, which extends from the valve-casing C to the burner, and the section f^2, which connects the main with the said casing. The casing A, the burner, pipes, and valve are inclosed by a shell A^2. (See Fig. 1.)

The valve-casing has two principal parts—namely, the section *c′*, already referred to, and the section c^4, the two comprising the valve-case C. The section *c′* is contained in the chamber *a′*, extending downward from the top of the casing A, and the lateral hole *a* connects with it. In the bottom of this chamber there is the threaded hole a^2, into which the threaded neck c^5 of the section *c′* of the valve-casing screws, until the flange c^6 thereof rests upon the upper surface of the casing A about the chamber. The neck c^5 has a hole c^7 and an interior screw-thread c^8, and the extensible pipe D is connected with the said neck at its upper end by its threaded section which engages the said threaded section c^8 of the neck. The lower end of this tube is tightly closed by a cap c^9, which also acts as a rest or support for the inextensible rod D′, contained in the cavity of the tube and extending beyond its upper end into and slightly above the hole c^7. The liquid does not enter the cavity of the said tube D.

The extensible tube D and the inextensible rod D′ form means by which the valve is operated, variations in the temperature of the liquid causing the tube D to extend in relation to the neck c^5, and this movement is communicated at the lower end of the tube to the inextensible rod D′, which is thereby moved in one direction or the other, and communicates said movement to the lever G, pivoted at *g* to a piece or support *g′*, which is united to the valve-case section *c′* by a hollow screw-boss which screws into the upper threaded section of the neck c^5. This support not only carries the lever G, but also a second lever G′, with which the end of the first lever is engaged in a way to multiply its movement, and the end of the second lever is connected directly with the valve, its movement of course being much greater than that of the movement of the inextensible rod.

H (see Fig. 2) is the valve. It is in the form of an inverted V in the under side of the head *h*, formed upon or attached to the upper end of a movable sleeve or spindle *h′*. This sleeve or spindle communicates the movement of the outer end of the lever G′ to the valve

and causes the position of the valve to be automatically varied in respect to the stationary valve-seat h^2, which has two inclined surfaces which meet to form a sharp edge and which fit the inclined V-seat H of the valve. This seat is formed at the upper end of a sleeve h^3, which is united to a holder h^4 by its threaded section h^5, which screws into a threaded section of the holder. This holder therefore supports the valve-seat and valve and affords means by which both may be vertically adjusted together in the plug H', the said holder having a threaded end h^6, which extends through a threaded hole h^7 in the plug and has at its upper end a cross-piece h^8, by means of which it is turned. This turning of the holder and stem raises and lowers the holder and raises and lowers the valve and valve-seat and adjusts the relation of the valve or valve-seat to the movement of the outer end of the lever G'. As the valve stem or spindle h' simply rests upon the end of the lever G' and in view of the provision made for the inlet-ports it is not necessary to connect or disconnect any parts to adjust the valve or valve-seat, and these may be left in any position. The spring h^9, surrounding the sleeve h^3, bears against a shoulder or flange h^{40} at the lower end of the sleeve or spindle h' and holds the end of the spindle or sleeve in contact with the lever G', the spring serving to move the valve toward its valve-seat and to close it.

The gas enters the valve-case through the inlet h^{10}, which connects with the passage h^{11}, formed by a circumferential groove or recess around the plug H', and this passage h^{11} is connected with the small chamber h^{12} above the valve and in the valve-holder by means of radial passages h^{13} (see Fig. 1) through the plug, connecting the passage h^{11} with the chamber h^{14} and by means of the radial passages h^{15} in the valve-holder h^4, which connect the said chamber h^{14} with the chamber h^{12}. The gas is always present in these passages and free to escape from the chamber h^{12} past the valve H when the valve is lifted from the seat h^2, the chamber h^{12} extending downwardly around the head h and the gas then passing through the holes h^{16} within the valve-seat and passage h^{17}, formed within the sleeve h^3 by the spindle h^{17} or valve-stem, to the outlet h^{18}, the gas thus entering into the large chamber h^{19} within the valve-casing, filling it and the cavity of the tube D, and it leaves said chamber by means of the passage h^{20}, which extends to the section f' of the gas-supply pipe. There extends from the passage h^{11} directly to the passage of this section f' of the gas-supply pipe a hole h^{21}, (see Fig. 2,) adapted to be entirely closed or partly closed by a plug-valve h^{23}. This passage is small and provides for a very limited feed of gas to the burner in order that a sufficient quantity of gas may be continuously supplied it to keep it alight when the main supply has been entirely closed by the valve H. The upper section of the valve-casing has a conical seat H^2 for the plug H', and the plug is held in place by the coupling h^{22}. A cap h^{23} screws onto the plug and covers the end of the spindle and its turning and indicating end h^8.

It will be noticed that all the parts of the valve are attached to the plug H' and that by releasing the coupling h^{22} the plug and valve are removed together from the valve-casing and all parts of the valve thus rendered accessible.

It will further be seen that the stationary valve-seat h^2 has below it a cavity h^{24}, and this cavity is adapted to receive and hold any foreign substance which may lodge upon either of the valve-seats. The valve is provided with the inverted-V seat, and the stationary valve-seat is shaped as described and provided with a chamber below its edge in order that the action of the valve may not be impeded by any tendency of the valve to become inoperative because of a clogging due to the presence of any gas product about the seats, the seats being formed to shed such products, and the receptacle being formed to receive them, but in case the valve should become inoperative or lazy in its action because of such clogging or partial clogging then it may be very easily removed from the valve-case, cleansed, and returned. Moreover, the valve and valve-seat are easily and immediately removable from the valve-holder, which permits the plug H' to be removed to permit of the removal of the valve and to be immediately replaced while the valve is being cleansed, its replacement immediately closing the hole, through which gas would otherwise escape.

The upper section of the valve-casing has a flange h^{25}, which bears upon the flange c^6 of the lower section and is united thereto by the screw h^{26}.

The valve-casing itself is attached to the case A by the neck c^5 only, said neck making a screw connection with the threaded hole in the bottom of the chamber h^4, as above specified.

It will be seen that the valve may be removed or replaced without disturbing any of the connections of the valve-casing with the gas-supply pipes. In lieu of the sleeve h^{17} for holding and guiding the valve-head h there may be used a spindle provided with holes or channels in or on its outer surface and these holes extending from the valve-seat to below the lower edge of the sleeve h^3. The horizontal sections of these spindles are shown in Figs. 5 and 6.

I would not be understood as limiting the invention to its use in connection with the regulation of gas in a liquid-heater, but may use it for other purposes to which it may be applicable.

While I prefer the construction of reservoir-shell and valve-casing shown, yet I do not intend to confine the invention to this

form of construction, as the reservoir may have a continuous or unbroken top and the valve-casing located on it.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a regulating-valve of the character specified, the combination of the valve-case having an inlet and an outlet with a plug H′ having a chamber connected with said inlet and outlet and a valve and valve-seat carried by said plug, as and for the purposes described.

2. In a regulating-valve of the character specified, the combination of the valve-casing having inlet and outlet passages, a plug H′ contained in a conical cavity therein, having a chamber connected with the inlet and outlet, a valve-seat carried by said plug and means for varying the position of said valve and valve-seat lengthwise said plug.

3. The combination in a valve of the character specified of a valve-casing having an inlet and an outlet, a valve-holder bodily removable from said casing, and having a chamber connected with the inlet and outlet passages and a valve-seat and movable valve-holder supported by said holder and removable therewith and means actuated by changes in temperature for moving said valve automatically, as and for the purposes described.

4. The combination in a valve of the character specified of the movable valve-head h having the inverted-V-shaped seat H with the stationary valve-seat h^2 having the inclined sides and a chamber h^{24} around and below the said stationary valve-seat.

5. The combination of the valve-casing having the inlet h^{10}, the chamber h^{19} and an outlet therefrom, the conical seat H^2, the conical plug H′ having a seat to fit said conical seat H^2 and detachably secured to the valve-case, a valve adjuster and holder h^4 attached to the said plug and adjustable lengthwise it by means extending through the same, the chamber h^{12} therein connected with the inlet h^{10}, the sleeve h^3 attached to the holder h^4, having the stationary valve-seat h^2, the valve-head h having the valve-seat H, the stem h^{17} having a passage from the valve-seat to the chamber h^{19}, the spring h^9 and the lever G′, as and for the purposes described.

6. The combination of the casing A of the liquid-heater, its chamber a' having a bottom provided with the threaded hole a^2, the lateral hole a extending from the chamber to the exterior of the casing and the valve-casing C comprising the sections c, c' united together, the said valve-casing being secured to the casing A by the threaded neck c^5 which screws into the threaded hole a^2, and the liquid-supply pipe connected with the valve-casing by a pipe extending through the hole a and the gas-feed pipes being connected with the valve-casing, as and for the purposes set forth.

7. The combination in a liquid-heater of the shell A of the liquid-heater, the valve-casing C united to said shell by the threaded neck c^5 entering a threaded hole therein, the liquid-supply pipe B connected directly with the valve-casing, the gas-feeding pipes attached to said casing, devices contained in the valve-chamber for multiplying the movement of the inextensible rod D′, the said inextensible rod and its extensible tube D, the tube being attached to the said neck c^5 and a removable valve-holder H detachably secured to said casing, having a chamber connected with the inlet h^{10} and the outlet h^{20}, and a vertically-adjustable valve attached to said holder to be removable therewith and to be supported thereby when in operative position, and with its lower end in operative relation to the said device for multiplying the motion of the said valve D′.

8. The combination in a regulating-valve of the character described of the removable plug or holder H′, the valve-holder h^4 and a sleeve h^3 having a valve-seat detachable from the said holder and a valve H carried by said sleeve h^3, its stem h^{17} and spring h^9, the said valve stem and spring being removable with the said sleeve h^3 from the holder.

LEVI LEROY ROWE.

Witnesses:
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J. M. DOLAN.