(No Model.) 2 Sheets—Sheet 1.

J. S. G. CARNACHAN.

THERMOMETRIC VALVE CONTROLLER.

No. 369,162. Patented Aug. 30, 1887.

Fig. 1.

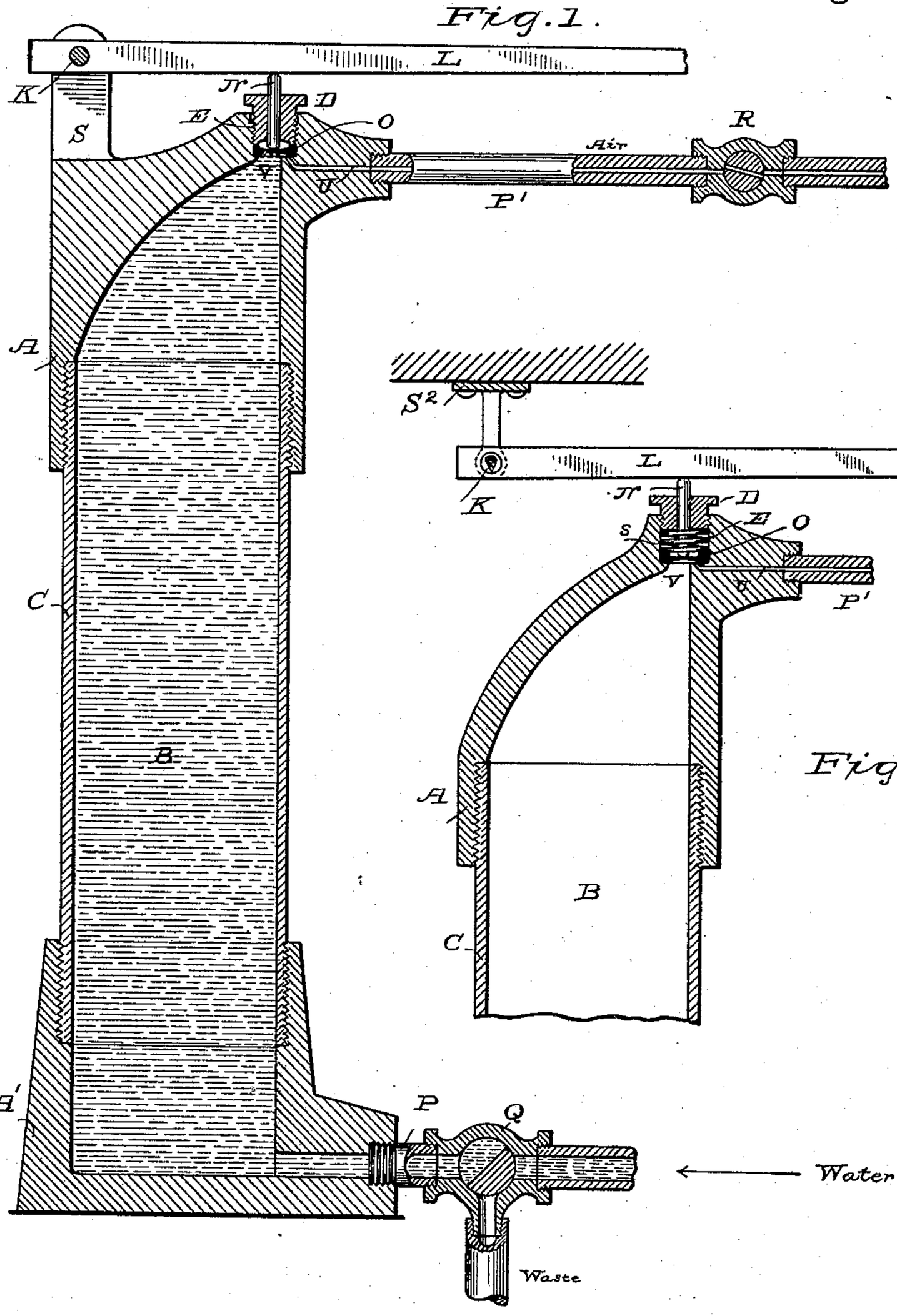

Fig. 1x.

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(No Model.) 2 Sheets—Sheet 2.

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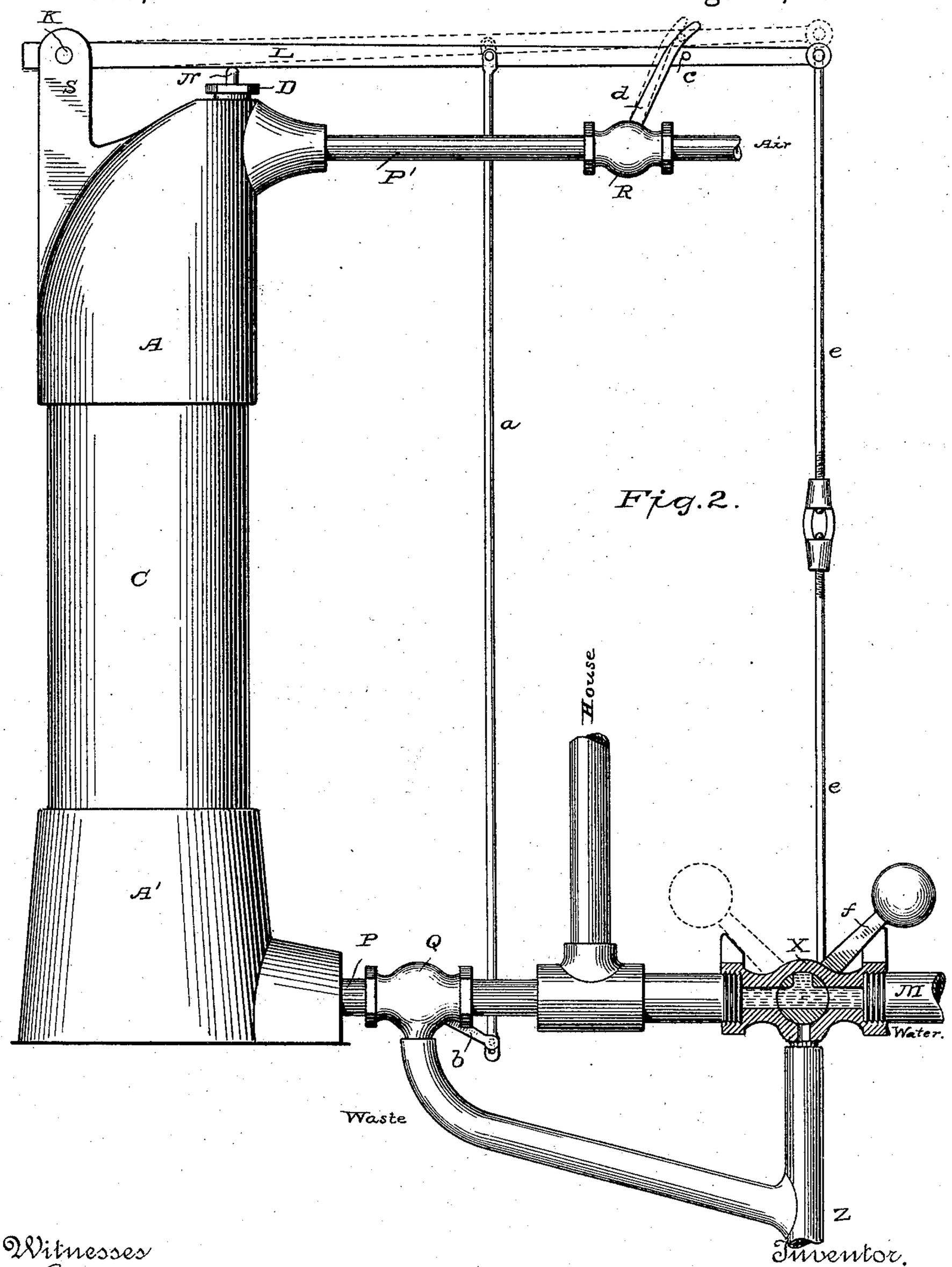

Fig. 2.

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UNITED STATES PATENT OFFICE.

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THERMOMETRIC VALVE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 369,162, dated August 30, 1887.

Application filed March 8, 1887. Serial No. 230,130. (No model.)

To all whom it may concern:

Be it known that I, JAMES STUART GORDON CARNACHAN, a citizen of the United States, residing at Louisville, in the State of Kentucky, have invented a new and useful Improvement in Hydraulic Mechanism, of which the following is a specification.

This invention relates to "automatic" thermotic devices for cutting off the flow of water and opening escape-cocks when the temperature falls below the freezing-point; and it consists in an improved "hydraulic cut-off thermometer" and certain novel combinations of parts therein, as hereinafter set forth and claimed.

Two sheets of drawings accompany this specification as part thereof.

Figure 1 of the drawings represents a vertical axial section of the main apparatus with some of the parts near the plane of section in elevation. Fig. 1× is a like view of the upper part of a modified mechanism, illustrating certain modifications hereinafter set forth. Fig. 2 represents a general elevation, partly in section, of the mechanism represented by Fig. 1, illustrating the operation as a whole.

Like letters of reference indicate corresponding parts in the several figures.

C represents a hollow metallic cylinder or tube, preferably of copper or block-tin, but which may be of any metal or other substance of sufficient strength subject to contraction by a reduction of the temperature to which it is exposed.

A and A′ represent, respectively, top and bottom caps, of brass or other metal, which are recessed, as shown, and firmly attached to the cylinder C. They may be so attached either by ordinary screw-joints, as shown, or by other joints which will make a sufficiently strong and tight connection of the parts.

The chamber B, within the cylinder C and caps A A′, is filled with water from a main supply-pipe, M, through a pipe, P, which is preferably coupled to the bottom cap, A′, as shown, and is provided with a stop-cock, Q. Said chamber B is cylindrical within the bottom cap, A′, and cylinder C. Above the latter, within the top cap, A, it gradually and smoothly tapers upward to an opening, V, in line with one side of the cylinder.

D represents a screw stuffing-box formed vertically in line with said opening V. The box proper is a recess, E, with which the cap A is provided at its apex. A rod-shaped piston, N, works in the bore of the gland of said stuffing-box D. Said piston is preferably of glass, so as to be practically free from thermotic elongation and contraction. It rests upon a diaphragm, O, which is preferably of elastic rubber within a metallic rim, but may be of any approved construction. This diaphragm is seated as a valve on the bottom of said recess E, above which bottom it forms a shallow central recess, with which said opening V communicates at all times, as does also a duct, U, leading to an air-pipe, P′, which is coupled laterally to the cap A and provided with a stop-cock, R. Diametrically opposite said stuffing-box D the cap A (represented in Figs. 1 and 2) is further provided on top with a pivot-support, S, which is provided with a horizontal pivot, K, forming the fulcrum of a lever, L, which extends across said stuffing-box D and rests upon said piston N, so as to be moved by the latter and to multiply its motion to any required extent. Said lever L may be connected in any approved way with the plugs of said stop-cocks Q R, so as to open them and so that the former shall be opened at the end of its limit of effective movement, (represented by dotted lines in Fig. 2,) also with the supply and waste cocks or a combined supply and waste cock, X, Fig. 2, in the main service-pipe M of the system which the mechanism controls.

By way of illustration, I have shown in Fig. 2 a slotted link, *a*, connecting the lever L with a lever-arm, *b*, on the plug of said stop-cock Q, a pin and cam-lever connection, *c d*, between said lever L and the plug of said stop-cock R, and an adjustable connecting-rod, *e*, and a self-tilting weighted lever, *f*, as means for transmitting motion from said lever L to the plug of said main cock X. I do not, however, limit myself as to these details, as they admit of numerous modifications within the province of architects and skilled mechanics.

The operation of the device, as illustrated

by Figs. 1 and 2, is as follows: The chamber B being full of water in a static condition and the water stop-cock Q and the air stop-cock R both closed, the metal of the cylinder C and caps A A′ will begin to contract several degrees above the freezing-point, (32° Fahrenheit,) and the confined water will at the same time expand, owing to the well-known thermotic laws. The water is thus forced through the opening V, Fig. 1, against the diaphragm O, and lifts the latter with well-nigh resistless force. The diaphragm lifts the piston N, and the latter lifts the lever L, which in turn, through said illustrative connections, Fig. 2, or their mechanical equivalents or known substitutes, reverses said water stop-cocks Q and X, so as to connect the guarded water-pipes and said chamber B with a waste-outlet, Z, and finally to open the air stop-cock R, so as to admit air above the water in said chamber B. The latter, as well as the guarded pipes, is thus quickly emptied.

As illustrated by Fig. 1×, the diaphragm O may, for example, be rigid, as of cast metal, and slide within the stuffing-box recess E, being held down by a spring, *s*, compressed between the same and the gland of the stuffing-box D. The pivot K of the lever L may have a fixed support, S^2, above and distinct from the top cap, A, and said lever or any of the parts moved thereby may be adjustably weighted, as represented, by a sliding weight, *w*, on said lever in the figure, to provide for regulating the mechanism, so that the water will be shut off at one degree or another within the range of expansion of water by cold, as may be preferred. Other like modifications will suggest themselves to those skilled in the art.

Having thus described my said improvement in hydraulic mechanism, I claim as my invention and desire to patent under this specification—

1. A hydraulic cut-off thermometer having a tightly-closed chamber filled with a fluid, as water, which is expanded by cold, and provided with a motion-transmitting piston acted on by said fluid, substantially as herein specified.

2. In a thermotic device for actuating water-cocks, the combination, substantially as herein specified, of a hollow vertical cylinder provided with a tight cap at each end, and having a water-passage through its bottom cap and an air-passage through its top cap, a water stop-cock and an air stop-cock, which normally close said passages, and a piston working through said top cap and acted on by the water confined within said cylinder and caps, for the purpose set forth.

3. In a thermotic device for actuating water-cocks, the combination, with a vertical fluid-containing cylinder, of a top cap having an upwardly-tapering interior, an opening at its apex, a diaphragm above said opening, and a vertical piston projected upward by the fluid-pressure against said diaphragm, substantially as herein specified.

4. In a thermotic device for actuating water-cocks, the combination, with a vertical fluid-containing cylinder, of a top cap having an upwardly-tapering interior, with apex in line with one side of said cylinder, an opening at said apex, a diaphragm above said opening, a vertical piston above said diaphragm, a pivot-support on said cap diametrically opposite said piston, and a motion-multiplying lever fulcrumed in said pivot-support and acted on by said piston, substantially as herein specified.

5. In a thermotic device for actuating water-cocks, the combination, with a vertical fluid-containing cylinder, of a top cap having an upwardly-tapering interior, with apex in line with one side of said cylinder, an opening at said apex, a diaphragm above said opening, a vertical motion-transmitting piston above said diaphragm, and an air-passage communicating with the fluid-chamber through the diaphragm-recess, substantially as herein specified.

6. In a thermotic device for actuating water-cocks, the combination, substantially as herein specified, of a cylinder contracted by cold and filled with a fluid, as water, which is expanded by cold, a diaphragm acted on by said fluid, and a motion-transmitting piston acted on by said diaphragm, for the purpose set forth.

7. In a thermotic device for actuating water-cocks, the combination of a cylinder contracted by cold and filled with a fluid, as water, which is expanded by cold, a diaphragm acted on by said fluid, and a motion-transmitting piston of a material, as glass, which is not materially expanded or contracted by cold, substantially as herein specified.

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