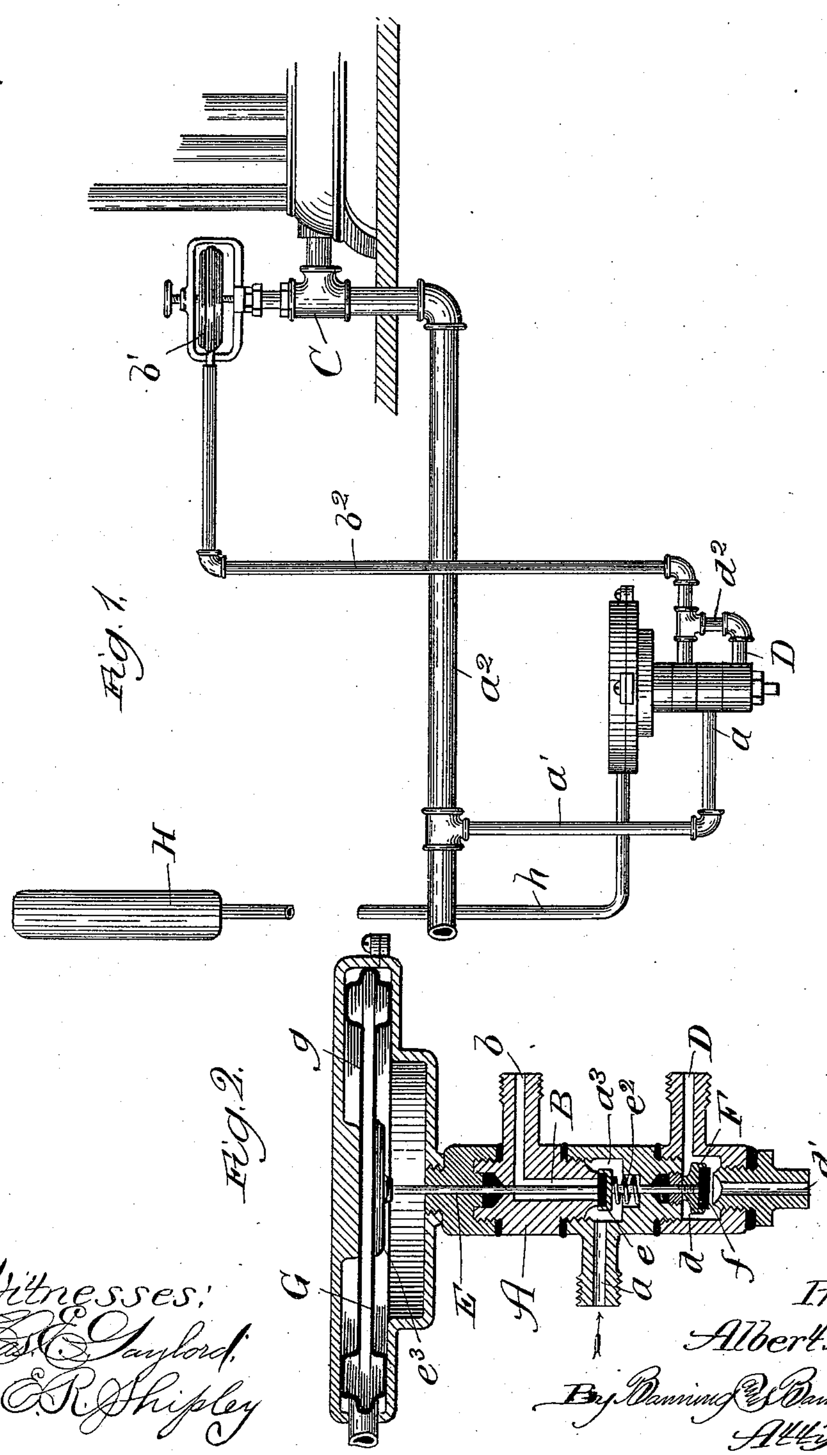
(No Model.)

# A. M. BUTZ.

## THERMOSTATIC VALVE.

No. 525,330. Patented Sept. 4, 1894.

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# UNITED STATES PATENT OFFICE.

ALBERT M. BUTZ, OF OAK PARK, ILLINOIS.

## THERMOSTATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 525,330, dated September 4, 1894.

Application filed May 1, 1893. Serial No. 472,513. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT M. BUTZ, of Oak Park, Illinois, have invented certain new and useful Improvements in Thermostatic Valves, of which the following is a specification.

My invention relates particularly to that class of valves which are connected with a heat radiating system, and are operated by the expansion or contraction of a fluid due to the variations in temperature, and for the purpose of regulating the supply of heat; and it consists in the features, details and combinations hereinafter described and claimed.

In the drawings, Figure 1 represents a diagrammatic view showing my improved valve in connection with a heat radiating system; and Fig. 2 is an enlarged sectional view of my improved valve.

The object of my invention is to provide a multiple valve in connection with a radiating system which has an inlet valve that is operated by the pressure of steam in its diaphragm chamber to close the same, and a spring, or high pressure of steam, to open the same when the pressure is removed from the diaphragm chamber; and it consists in providing the multiple valve with two chambers and valves affixed to a single valve rod, so that both are operated simultaneously. The opening of one valve furnishes an uninterrupted channel to the diaphragm chamber of the inlet valve—so that steam pressure acting directly in the same will close the inlet valve—and when such valve is closed, the other is simultaneously opened, whereby the supply of steam to the diaphragm chamber of the inlet valve is shut off, and a channel opened so that the pressure can escape into the outer air, thus allowing the spring or high pressure of steam to open the inlet valve and furnish a supply of steam to circulate through the radiating system. It consists further in providing the multiple valve stem with a contacting diaphragm constructed in such manner as to form an inclosing chamber, which is connected to a cylinder that may be located at any desired position, and the expansion of a fluid in this cylinder, due to variations of temperature, will cause a like expansion in the diaphragm chamber, which, expanding the diaphragm, will operate the valve stem and likewise its valves.

In constructing my improved multiple valve, I provide a valve body or what I term a casing, A,—preferably made in several parts for convenience in manufacture—and provide it with an inlet pipe $a$, which is connected by the pipe $a'$ to the main steam pipe $a^2$. The inlet, $a$, communicates with an inlet chamber $a^3$, and communicating with this chamber through the valve is an outlet channel B, having an outlet $b$, which is connected to the diaphragm chamber, $b'$, on the inlet valve by means of a pipe $b^2$, so that when this channel is uninterrupted, a supply of steam will pass around from the main supply pipe, through the multiple valve, and enter the diaphragm chamber on the inlet valve, expanding the diaphragm and closing the inlet valve, thus preventing a steam supply from entering the radiating system. Located preferably near the lower end of the multiple valve is an inlet D, which communicates with an outlet chamber $d$, which has an opening $d'$ connecting it with the outer air. A branch pipe, $d^2$, connects the inlet pipe, D, with the pipe $b^2$, so that when the channel B in the multiple valve is closed against the supply of steam to the diaphragm chamber in the inlet valve, the outlet chamber is opened to the air, allowing the pressure in the diaphragm chamber of the inlet valve to pass back through the branch pipe, $b^2$, and through the outlet chamber to the open air, permitting the inlet valve to be opened by the pressure of the steam—from the main pipe, or a spring located in the valve—and furnish a fresh supply of steam to the radiator.

To open and close the chamber in the multiple valve, I provide a valve rod, E, extending longitudinally through the valve, and secure to it in any suitable manner a valve, $e$, in the inlet chamber, which is held normally against its seat by means of a spring $e^2$, thus forming a valve to close this chamber against the passage of steam through it from the main supply pipe to the diaphragm chamber of the inlet valve. Secured preferably to the lower end of the valve rod is a second valve, F, which is held normally out of contact from its seat $f$, which forms a second valve, so that its chamber may be opened to the air by means of the outlet $d'$, in such manner that the pressure in the diaphragm chamber of the inlet valve may be permitted to escape. Secured preferably to the upper end of the valve stem is a disk $e^3$, which normally contacts a diaphragm G, which is provided with a diaphragm chamber, $g$, formed by the shape of diaphragm. The diaphragm chamber is connected with a cylinder, H, located in any desired position in a building or apartment by means of the pipe $h$, so that the expansion or contraction of a fluid in the cylinder is likewise expanded or contracted in the diaphragm chamber. The outlet port, $b$, of the inlet chamber is thus in direct communication with the diaphragm chamber, $b'$, and with the outlet chamber in the valve body, the inlet chamber never being in direct communication with the outer air. It will also be observed that the port, D, is always an induct, and that the only communication between the two chambers in the valve body is out through the port, $b$, and in through the port, D.

In using my improved thermostatic valve, as shown in Fig. 1, when the temperature, in the room that the cylinder is located in, rises above a certain point, the fluid in the cylinder is expanded into the diaphragm chamber, and the diaphragm expanded in such manner that the valve rod is moved downward, thereby opening the valve in the inlet chamber, so that a supply of steam may pass from the main pipe through the valve into the diaphragm chamber of the inlet valve, thereby closing the inlet valve and preventing a further supply of steam to the radiator, or it will open the valve in the inlet chamber of the multiple valve a proportionate amount to the rise in temperature, and allow a small supply of steam to pass through it into the diaphragm chamber of the inlet valve, and closing the inlet valve proportionately. The supply of steam or heat being thus shut off from the radiator, the temperature of the room gradually becomes cooler, and the fluid in the cylinder likewise. When it has cooled below a desired point, the fluid in the cylinder is contracted, and, the pressure in the diaphragm chamber of the multiple valve relaxing, the spring $e^2$ in the multiple valve closes the valve in the inlet chamber, and, by the upward movement of the valve rod, opens the valve in the chamber $d$, so that there is a channel now open between the diaphragm chamber of the inlet valve and the outer air by which the pressure in the same may escape; when steam pressure or a spring in the inlet valve will cause that valve to be opened and a new supply of steam to be furnished to the radiator. These operations will repeat themselves automatically as many times as there are variations in the temperature of the room, and can be regulated to change proportionately to the variations in temperature.

I claim—

1. In a heat regulating system, a radiator, a pipe supplying a heating medium thereto, a valve governing the flow of the heating medium, a motor operating said valve, a branch pipe leading from the supply pipe to the valve motor, a compound valve placed in the branch pipe having an inlet chamber and an outlet chamber and an inlet port and an outlet port for each chamber, a valve in the inlet chamber for controlling the flow of the pressure fluid to the valve motor, a valve in the outlet chamber for controlling the escape of the operating fluid from the valve motor, a valve rod on which these two valves are mounted, a diaphragm chamber mounted above the compound valve chamber, a diaphragm therein contacting the valve rod and controlling the motion thereof, a thermostat so situated as to be affected by the radiation of heat from the radiator and arranged to communicate motion to the diaphragm through changes in its temperature, and means for establishing communication between the radiator valve motor and the inlet port of the outlet chamber of the compound valve, substantially as described.

2. In a heat regulating system, a radiator, a pipe supplying the heating medium thereto, a valve governing the flow of the heating medium, a motor operating said valve, a branch pipe leading from the supply pipe to the valve motor, a compound valve placed in the branch pipe having an inlet chamber and an outlet chamber and an inlet port and an outlet port for each chamber, a valve in the inlet chamber for controlling the flow of pressure fluid to the valve motor, a valve in the outlet chamber for controlling the escape of the operating fluid from the valve motor, a valve rod on which these two valves are mounted, a diaphragm chamber mounted above the compound valve chamber, a diaphragm therein contacting the valve rod and controlling the motion thereof, a thermostat so situated as to be affected by the radiation of heat from the radiator and arranged to communicate motion to the diaphragm through changes in its temperature, and a pipe connecting the radiator valve motor with the inlet port of the outlet chamber of the compound valve, substantially as described.

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