(No Model.)

E. F. ROBERTS.

ELECTRIC VALVE CONTROLLER.

No. 482,139. Patented Sept. 6, 1892.

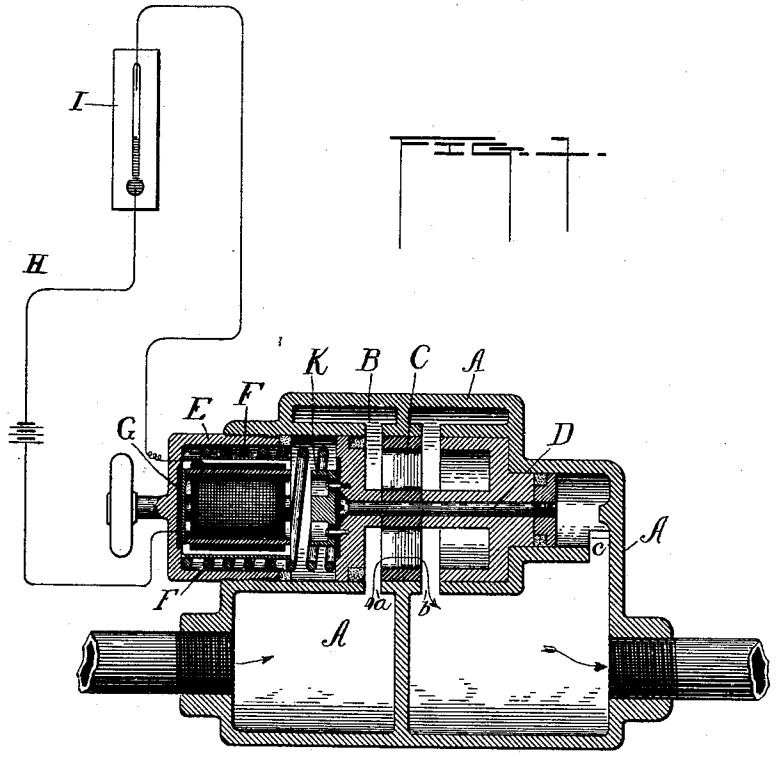


FIG. 1.

FIG. 2.

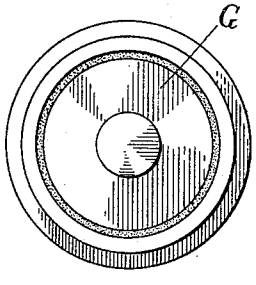
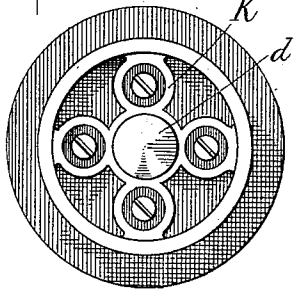


FIG. 3.



Witnesses
T. A. Connolly Jr.
D. K. Brown

Inventor
Edward F. Roberts, by
Butterworth Hall & Brown
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD F. ROBERTS, OF COLUMBUS, OHIO.

ELECTRIC VALVE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 482,139, dated September 6, 1892.

Application filed August 26, 1890. Renewed February 11, 1892. Serial No. 421,094. (No model.)

To all whom it may concern:

Be it known that I, EDWARD F. ROBERTS, a citizen of Great Britain, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Temperature-Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an apparatus designed particularly to be used in connection with heating systems; and its object is to automatically regulate the pressure and the temperature in such a system.

It consists in the construction herein described and claimed.

Like reference-letters refer to similar parts in the several figures of the drawings, in which—

Figure 1 is a longitudinal and horizontal section of the main apparatus with a circuit and longitudinal and horizontal section. Fig. 2 is an end view of the magnet which I prefer to employ; and Fig. 3 is a front view of the armature, showing its connection to the insulating-plate upon the piston.

The heating system has interposed therein suitable chambers—such as A—preferably divided into smaller chambers by transverse and longitudinal partitions, so as to provide an entrance and exit chamber for the heating-fluid, and the working chamber for the apparatus employed to control the flow of such fluid.

The working chamber, which I designate by the letter B, is preferably formed with a transverse flange with a circular opening adapted to fit the valve disks hereinafter to be described, and also the horizontal flanges, which have bores also corresponding to the valve-disks and pistons of the controlling-valve. I also prefer to contract the bore of the chamber formed by the horizontal flange at the exit end adapted to a piston of smaller diameter than the piston at the entrance side of the chamber. The horizontal flange which separates the main chamber from the operating-chamber has ports *a b c* formed therein, *a* being the entrance-port, *b* the exit-port, and *c* the back-pressure port. The operating-valve may be conveniently constructed in the following manner: A central shaft D carries three disks, the two outer of which constitute pistons as well as valves, and the intermediate disk is in the form of a gridiron or is perforated and has a solid periphery, and this also acts as a valve and permits the fluid to pass therethrough. The pistons formed by the outside disks are preferably of different diameters, so that a differential pressure will be exerted upon the same. The chamber B is provided with a removable cap E, and this latter is arranged to contain the spiral spring F and a suitable magnet or magnets G. For the sake of compactness and convenience I may arrange the magnets, as is shown in the drawings, one inclosed by the other and suitably insulated therefrom, the coil of the outer magnet constituting a cylindrical casing for the coil of the inner magnet. It is manifest that a single magnet or two or more laterally disposed may be employed. In any event the one or more magnets are arranged in electric circuit, as H, which contains a suitable thermostat, in this instance in the shape of a mercury-bulb I, with the wires of the circuit projecting therein.

In Figs. 1 and 3 I have shown a convenient form of arrangement of armature. The larger piston of the operating-valve may have secured to its outer face an insulated plate, and fastened with this latter is an annular armature K, having a central portion *d*, which affords a convenient opposing armature for the interior magnet.

The operation of this invention is as follows: The heating-fluid enters the main chamber by a suitable inlet-pipe and flows through the ports into the smaller chamber B and through the perforated valve-disk into the exit-pipe. This operation is continuous so long as the pressure and temperature of the fluid are uniform. When the pressure becomes too great, the excess thereof will operate upon the smaller piston and force the valves into the closed position against the tension of the springs, which tend to open the same. The valve will remain closed until the pressure is properly reduced. Again, when the temperature is too high a thermostat will be caused to close the electric circuit, energize the magnets, which latter will attract their armatures,

and the valves which are connected therewith, and thus cut off the supply of heating fluid and retain the valve closed until the temperature falls to the desired point. In this manner the pressure and temperature are kept uniform automatically and by a compact and simple apparatus.

It is obvious that many variations might be made in the construction and arrangement of the several features of my invention without departing from the principle thereof, and I do not wish to be understood as confining myself to the exact form and arrangement shown.

What I claim as new, and desire to protect by Letters Patent, is—

1. In a heating system, the combination of a valve for controlling the heating fluid, provided with pistons upon the opposite sides thereof, one of which is operated by excess of pressure and the other by an electro-magnet included in an electric circuit which also includes a thermostatic circuit-closer, substantially as and for the purpose set forth.

2. In a heating system, the combination of a valve for controlling the heating fluid, provided with differential pistons on the opposite sides thereof, the one open to and adapted to be operated by excess of pressure and the other by an electro-magnet included in an electric circuit which also includes a thermostatic device controlled by a variation of temperature, substantially as and for the purpose set forth.

3. In a heating system, the combination of a valve for controlling the heating fluid, provided at one of its sides with a piston open to and operated by excess of pressure and at its other side with an armature in connection with a magnet for operating the same, and a thermostat in the circuit of the magnet, substantially as and for the purpose set forth.

4. In a heating system, the combination of a valve having differential pistons secured to its opposite sides, the smaller piston open to and operated by excess of back-pressure and the larger having an armature in connection with one or more magnets arranged in the same chamber, and a thermostat arranged in the circuit of the magnets, substantially as and for the purpose set forth.

5. In a heating system, the valve for controlling the heating fluid, provided at one of its sides with a piston open to and operated by excess of pressure and at its other side with an armature, in combination with an electro-magnet contained within the valve-casing, an electric circuit including such magnet, and a thermostatic circuit-closer, substantially as and for the purpose set forth.

6. In a heating system, a valve for controlling the heating fluid, an electro-magnet for operating said valve, the same being inclosed within the valve-casing and being composed of two sets of coils, and appropriate cores, the one set within the other, and an electric circuit including such magnet, and a thermostatic circuit-closer, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD F. ROBERTS.

Witnesses:
EDWARD HUGHES,
WM. S. CREIGHTON.