

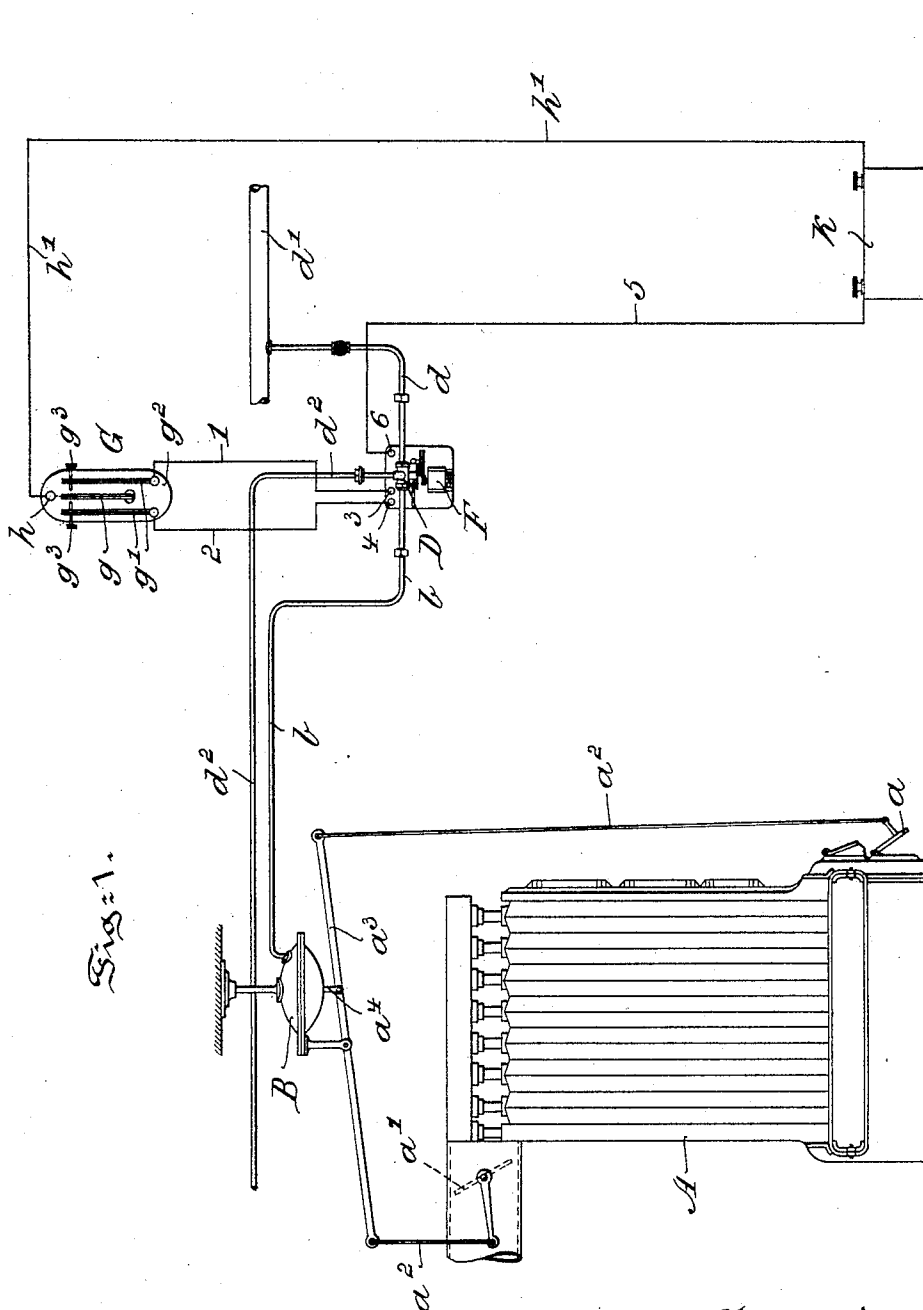
(No Model.)

2 Sheets—Sheet 1.

W. J. ROBINSON.
HEAT REGULATOR.

No. 578,026.

Patented Mar. 2, 1897.



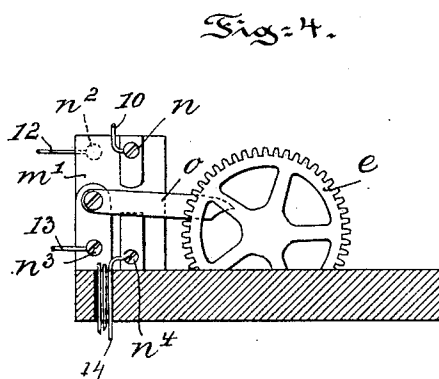
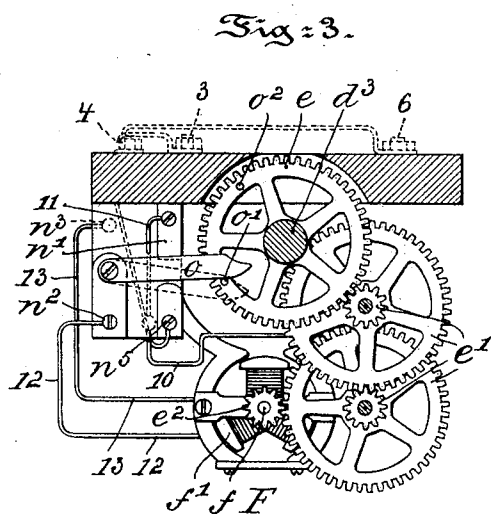
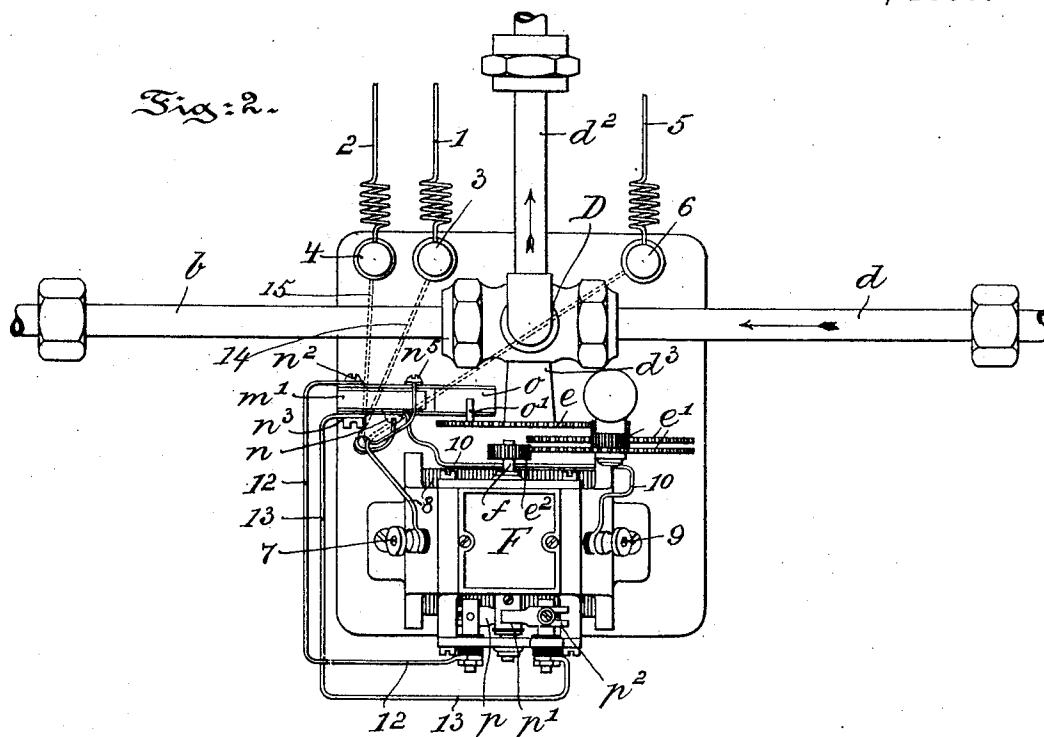
Witnesses:
Thomas M. Smith,
Richard C. Maxwell.

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM J. ROBINSON, OF PHILADELPHIA, PENNSYLVANIA.

HEAT-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 578,026, dated March 2, 1897.

Application filed April 16, 1896. Serial No. 587,798. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. ROBINSON, a citizen of the United States, residing at Philadelphia, (Germantown,) in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Heat-Regulators, of which the following is a specification.

My invention has relation to a device adapted to regulate the temperature of a building by automatically controlling the drafts of a heater or similar source of heat, and in such connection it relates particularly to the construction and arrangement of such a device.

The principal object of my invention is to provide a simple, efficient, and comparatively inexpensive apparatus whereby the drafts of a heater may be automatically controlled through variations in temperature operating upon a thermostat.

My invention, stated in general terms, consists of an apparatus adapted to automatically regulate the temperature of a building, constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a diagrammatic view of a heating system to which a regulator embodying features of my invention is applied. Fig. 2 is a side elevational view of a three-way valve and a motor controlling the same. Fig. 3 is a horizontal sectional view, looking from the top, of the motor; and Fig. 4 is a similar view reversed, looking from the bottom, and illustrating in detail the construction and arrangement of the switch for the motor.

Referring to the drawings, A represents a heater of any well-known type, preferably what is known as a "sectional" water-heater. The heater A is provided with the usual under-grate door *a* and a damper *a'*. The door *a* and damper *a'* are each connected by a chain or cord *a²* with a lever-arm *a³*, adapted to be actuated by an arm *a⁴*, secured to and controlled by an ordinary diaphragm B. The diaphragm B is connected with a pipe *b*, which is provided with a three-way valve D of well-known construction. This valve D is con-

nected by a pipe *d* with a water main or pipe *d'* and by a pipe *d²*, at right angles with the pipe *d*, with a sewer or other receptacle for the overflow or waste from the diaphragm B.

The spindle *d³* is operated by the following preferred mechanism: The spindle *d³* carries a gear-wheel *e*, which meshes with a train of gears *e'* and *e²*, operated by a spindle *f* of an armature *f'* of an electromotor F. This motor F is controlled by a thermostat G of the ordinary construction, having a central compound metal strip *g* and two outer compound metal strips *g'*. The center metal strip is fastened at one end to the frame *g²* of the thermostat and is free to move at the other end. The other strips are fastened in a similar manner, so that under any increase or decrease of temperature the free end of either outside strip will approach the free end of the middle strip. Each outside strip carries at its free end a set-screw *g³*, forming a contact-point adapted to touch the center strip under variations of temperature.

The center strip *g* is connected through a binding-post *h* and wire *h'* with one pole of a battery *k*. The other strips are connected, respectively, by wires 1 and 2 with binding-posts 3 and 4 of the electromotor F. A wire 5 leads from the other pole of the battery *k* to a binding-post 6 of the motor F. The circuits through the motor are illustrated in Figs. 2, 3, and 4, and are as follows: from the binding-post 6 to one pole 7 of the field-magnet by the wire 8, through the field-magnet to the pole 9, then by the wire 10 to a contact-point *n*. Pivoted in a suitable bracket *m'* of the motor F is a double-armed switch or shunt *o*, adapted to be shifted by means of two pins *o'* and *o²*, carried by the gear-wheel *e*, and separated from each other a distance of approximately ninety degrees. The switch *o* is double, that is to say, it consists of an upper and lower arm, each pivoted at one end to the bracket *m'* as follows: The upper arm is pivoted to an upper front contact-piece *n²* of the bracket, while the lower arm is pivoted to a lower rear contact-piece *n³* of said bracket. The arms are insulated from each other and the pieces *n²* and *n³* similarly insulated by the bracket *m'*, which is formed of insulating material. On the upper face of the bracket *m'* is also located an upper front contact *n⁵*

and an upper rear contact n' , and on the lower face of the bracket is also located a lower rear contact n^4 and a lower front contact n . When now the switch o is moved by the pin o' , its arms engage at their free ends respectively the upper rear contact n' and the lower rear contact n^4 , whereupon a circuit is established from the field-magnet, as follows: from the lower front contact n , by the wire 11, to the upper rear contact n' , thence through the upper switch-arm to the upper front contact n^2 , and thence by the wire 12 to one brush p of the armature p' , thence through the armature to the other brush p^2 , then by the wire 13 to the lower rear contact n^3 , thence through the lower arm of the switch and lower rear contact n^4 and wire 14 to the binding-post 3, thence by the wire 1 to the strip g' of the thermostat. When, however, the switch o is moved by the pin o^2 , the circuit is reversed, for the arms of the switch engage at their free ends respectively the upper front contact n^5 and the lower front contact n . The circuit is then completed from the wire 10 of the field-magnet F through the contact n , thence through the lower arm of the switch to the lower rear contact n^3 , thence by wire 13 to the brush p^2 of the armature, through the armature to the brush p , thence by the wire 12 to the upper front contact n^2 , thence through the upper arm of the switch to the upper front contact n^5 , thence by the wire 15 to the binding-post 4, and by the wire 2 to the other strip g' of the thermostat.

As before explained, the field-magnet is constantly in circuit and is connected with the middle strip g of the thermostat, and from the above description of the circuits and connections controlled by the position of the switch it is apparent that the current will pass either from the positive pole of the armature through the armature and to the negative pole thereof, or vice versa, according to the position of said switch. The movement of the armature is thereby reversed by the switch and the position of the switch is controlled by the rotation of the armature. The armature through its connections reverses the movement of the valve D . As before explained, the gear e , which operates the valve D , also carries the pins o' and o^2 , which operate the shunt or switch o , so that when the gear has been rotated a quarter of a revolution by the armature through the train of gears e' and e^2 a pin will shift the switch, so that the circuit previously established is broken and the second or reversing circuit is established, that is, supposing the temperature of the room increases above that which is desired and that the right-hand strip g' of the thermostat makes contact with the center strip g , there will then

be established a circuit which will energize the motor F and through the gear e and train of gears e' and e^2 will turn the cock of the three-way valve until water freely passes from the pipe d' , through the pipes d and b , to the diaphragm, which will thereby be depressed to close both the damper and the door of the heater.

It may be here remarked that the gear e while turning will reverse the circuit through the armature by shifting the switch and will break the circuit first established. Hence the gear e will not operate the valve farther than a quarter of a revolution, and will not again rotate until the temperature of the room falls below the normal, when the left-hand strip of the thermostat makes contact with the center strip and sends a current in a reverse direction through the armature and the gear e is rotated reversely to shut the valve. The elasticity of the diaphragm is sufficient when the supply of water is shut off to elevate the lever-arm a^3 and open both damper and door. The water from the main d' passes through the valve D and through the pipe d^2 to the sewer.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a heat-regulating apparatus, an electric motor having a stationary field-magnet, a thermostat in circuit with said motor, a rotating armature for the motor, a shaft operated by said armature, a gear-wheel operated by said shaft, pins carried by said gear-wheel, a bracket, a double-armed switch pivoted in said bracket and adapted to be raised and lowered by said pins, the contacts n' and n^5 , located on one side of said bracket and traversed by one arm of said switch, the contacts n and n^4 , located upon the other side of the bracket and traversed by the other arm of said switch, the contact-pieces n^2 and n^3 to which the respective arms of the switch are pivoted, an electric connection between the contacts n^2 and n^3 and the respective brushes of the rotating armature, and electric connections between the other contact-strips and the thermostat, all arranged so that in one position of the switch the circuit is completed in one direction through the armature and in the other position of the switch the circuit is reversed through said armature, substantially as described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

WM. J. ROBINSON.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.