(No Model.)

W. A. CONNELLY.

ELECTRIC HEAT REGULATING APPARATUS.

No. 370,007. Patented Sept. 13, 1887.

FIG. 2.

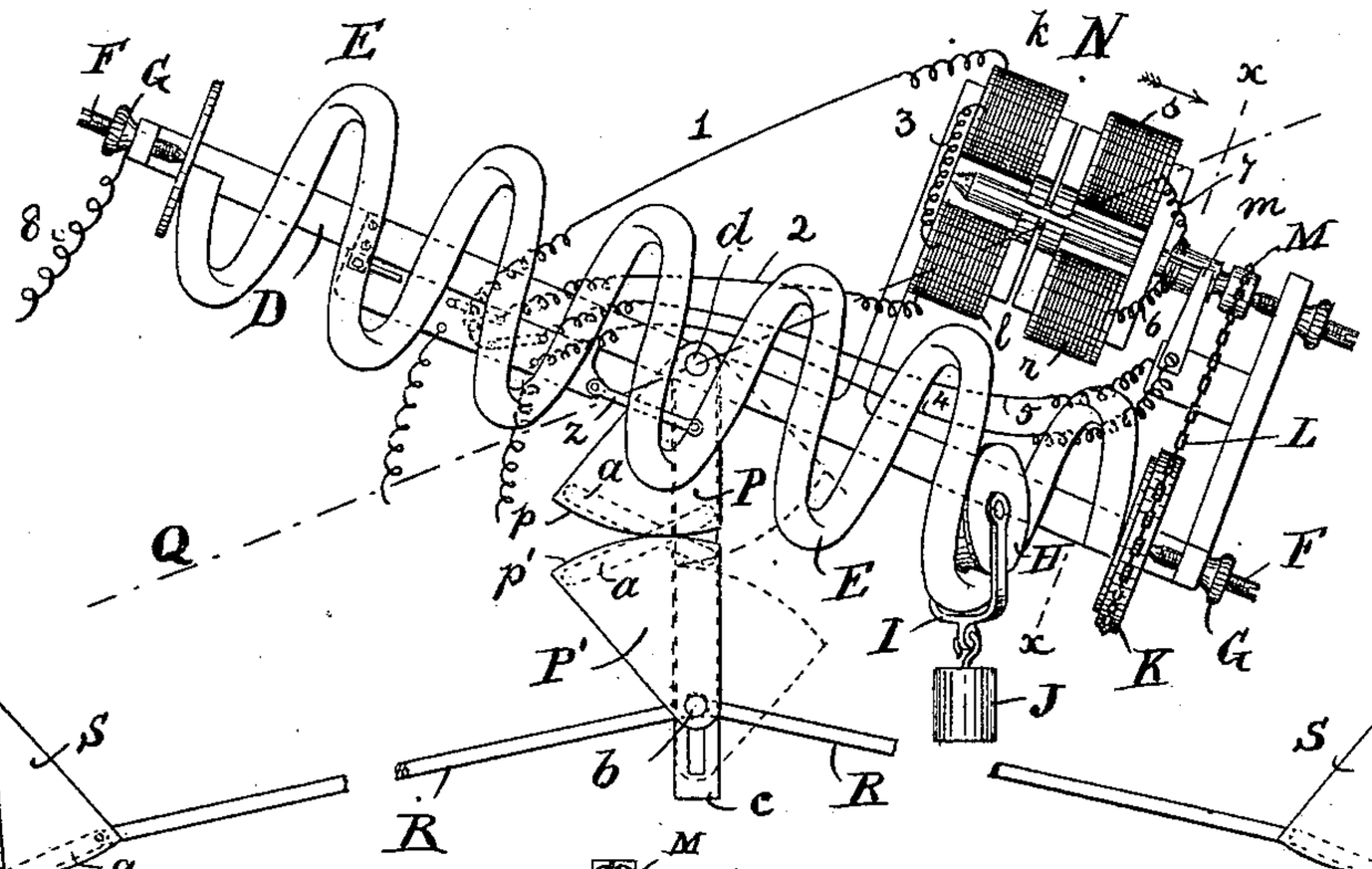


FIG. 4.

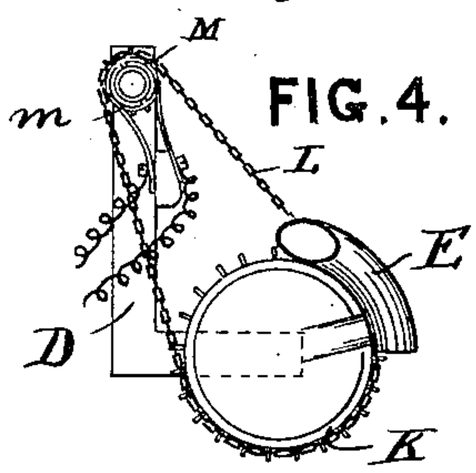


FIG. 5.

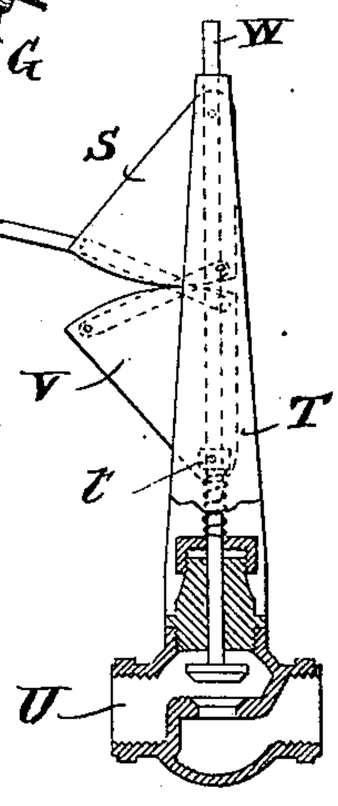
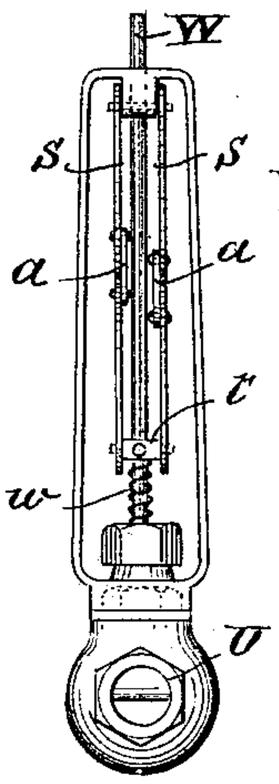


FIG. 3.



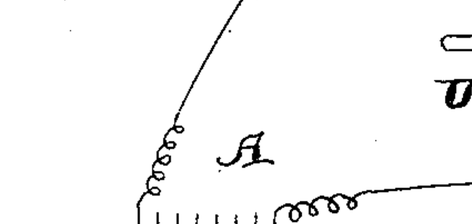


FIG. 6.

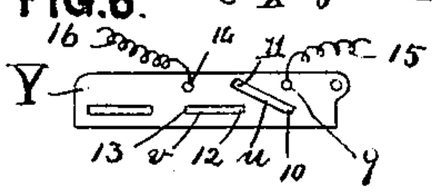


FIG. 7.

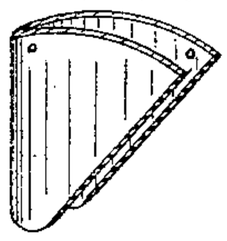


FIG. 8.

FIG. 1.

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ELECTRIC HEAT-REGULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 370,007, dated September 13, 1887.

Application filed November 19, 1886. Serial No. 219,429. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. CONNELLY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Heat-Regulating Apparatus, of which the following is a specification.

The object of my invention is to produce a device for automatically regulating the valves of a radiator employed for heating a room or other place, so as to maintain an even temperature, or for the regulation of dampers or ventilators; and the invention consists of certain details of construction, hereinafter fully set forth, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a radiator with a device embodying my invention applied thereto. Fig. 2 is a side view of my regulating device, showing the method of operating the valves. Fig. 3 is an end view of one of the valves and its attachments. Fig. 4 is a section taken on line *x x* of Fig. 2. Fig. 5 is a view of the switch-plate. Fig. 6 is a view of the rear of the switch. Fig. 7 is a perspective view of one of the eccentric quadrants, and Fig. 8 is a top view of the same.

In Fig. 1, A represents a battery, B a thermostat, and C a radiator with my regulating device applied thereto.

D is a frame fulcrumed on a shaft, *d*, secured to a plate attached to the tubes of the radiator C.

E is a worm, or it might be a screw, pivoted to the frame D by means of set-screws F, which, when adjusted, are held by check-nuts G. On the worm E is mounted a wheel, H, free to travel from end to end of the worm, and connected to the axle of the wheel H is a U-shaped frame, I, that carries a weight, J. At one end of the worm E is secured a sprocket-wheel, K, which, by chain L, is connected to a smaller sprocket-wheel, M, that is driven by an electric motor, N.

P is an eccentric quadrant-shaped piece of metal firmly secured to the shaft *d*, and P′ is a similar-shaped piece of metal. These quadrants are double or U-shaped, (see Figs. 7 and 8,) and the faces *p p′* gradually increase in radius from their fulcrum, and the faces of the two are held in contact with each other by bars *a a*, one end of each being secured to the quadrant P and the other ends to the quadrant P′, as shown, so that, although the quadrants are free to make a part of a revolution, the faces will be held in close contact with each other, and one quadrant cannot move without imparting motion to the other. Thus, if the frame D is tilted to the inclination of the dotted line Q, the quadrant P will be turned to the position shown in dotted lines and will carry with it the quadrant P′, thereby forcing its fulcrum *b* down, as shown. The pin *b* slides in a slot in a plate, *c*, secured to the tubes of the radiator C. Therefore it is guided in a straight line. To the pin *b* are secured rods or bars R R, the outer ends of which are connected to eccentric quadrants S S, fulcrumed to frames T T, secured to valves U U. The eccentric quadrants S S are connected to other eccentric quadrants, V V, by bars, as described with reference to quadrants P P′, and the quadrants V V are fulcrumed to a block, *t*, secured to the valve-stem W, a spiral spring, *w*, being placed between the valve U and block *t* to assist in raising the valve-stem.

To the frame D is secured a switch-plate, X, (see Fig. 5,) provided with four points of contact, *e f g h*, and two points, *i j*, are in contact with the frame D. The points *e f* are connected by wires 1 and 2 to the fixed magnets *k l* of the electric motor N, the magnets being connected by wire 3, and the points *g h* are connected by wires 4 and 5 to the brush *m*, which, by wires 6 and 7, connect with the rotating magnets *r* and *s*. The two points *i* and *i* connect with the negative pole of the battery through frame D and wire 8.

In front of the switch-plate is secured so as to slide freely the switch Y, (see Fig. 6,) provided with six points of contact, 9 10 11 12 13 14, the points 10 and 11 being connected together by a strip of metal, *u*, and the points 12 13 by a strip of metal, *v*. The points are by wires 15 and 16 connected with two points of contact, 17 and 18, on the thermostat, which latter is connected by wire 19 to the positive pole of the battery A.

The switch Y is connected to the plate *c* by a rod, Z, so that as the frame D is tilted and the quadrant P moved, the switch will slide upon the face of the switch-plate X.

The operation is as follows: Suppose the ap-

paratus to be in the position shown—that is, with the valves U U open—and the temperature rises too high. Then the tongue *y* of the thermostat will be thrown into contact with point 17, (see Fig. 1,) and the electric current passes from the battery A through wire 19 to the thermostat, and thence through tongue *y* to the point 17 and through wire 15 to point 9 of the switch, which is now in contact with point *g* of the switch-plate, then through wire 4 to the brush *m* and through the revolving magnets *r s* and return from the brush *m* through wire 5 to point *h*, which is in contact with point 10 of the switch, through strip *u* to point 11, which is now in contact with point *e*, and thence by wire 1 through the fixed magnets *k l* and back by wire 2 to point *f*, that is now in contact with point 12 of the switch, and thence through strip *v* to point 13, which is in contact with point *j* on the frame D, and thence through frame D and wire 8 to the battery A. The electric current thus passing through the apparatus causes the magnets *r s* to revolve, and with them the sprocket-wheel M, which, by chain L, transmits motion to sprocket-wheel K and worm E, and as the worm E revolves the wheel H travels up the same until it passes the center of gravity, when the whole frame D tilts to the inclination of dotted line Q. The quadrants P P′, being pushed back, lowers the fulcrum *b*, thereby pressing on the rods R R, which force back the quadrants S T, thereby closing the valves U U, thus shutting off the steam, and at the same time shifting the switch-board, thereby breaking the current between the points *j* and *f* and *e* and *h* and making connection between points *f* and *h* and *g* and *i*, the wire 15 being switched off and the wire 16 switched into contact, so that when the temperature falls below the desired point and the tongue *y* of the thermostat is thrown into contact with the point 18 the electric current will pass through the apparatus so as to revolve the motor N in the opposite direction, thereby tilting the frame D back to its first position, and thereby open the valves U U.

Although I have described and shown the apparatus as applied to a radiator, it can be applied to any system of valves or dampers to regulate the temperature of a room or other place.

What I claim as my invention is—

1. In a heat-regulating apparatus, the combination of a tilting frame provided with a weight capable of being moved from end to end of the frame, and an electric motor for operating the same, substantially as shown, and for the purposes described.

2. In a heat-regulating apparatus, a tilting frame provided with a worm carrying a weight, and an electric motor for imparting a rotary motion to the worm, substantially as shown, and for the purposes described.

3. The tilting frame D, in which is mounted the worm E. carrying wheel H, and weight J, in combination with the electric motor N, switch-plate X, and switch Y, substantially as shown, and for the purposes described.

4. The tilting frame D, worm E, weight J, electric motor N, switch-plate X, and switch Y, in combination with the eccentric quadrants P P′ and rods R R, connected to the stems of the valves in such manner as to open and close the valves as the frame D is tilted one way or the other, substantially as shown and described.

5. The switch Y, in combination with the tilting frame D, switch-plate X, and rod Z, attached at one end to the switch and to a fixed point at the other end, so that as the frame is tilted one way or the other the switch will be shifted, substantially as shown and described.

6. The eccentric quadrants S V, frame T, valve U, and stem W, in combination with rod R, eccentric quadrants P P′, and tilting frame D, for operating the valve, substantially as shown and described.

7. A tilting frame provided with an electric motor, movable weight, and suitable mechanism for operating the valves, in combination with a thermostat and electric battery, substantially as shown and set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM A. CONNELLY.

Witnesses:
E. PLANTA,
J. GEORGE SELTZER.