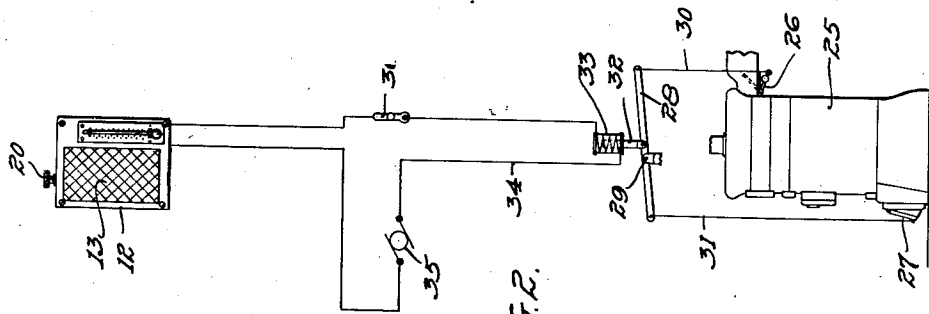
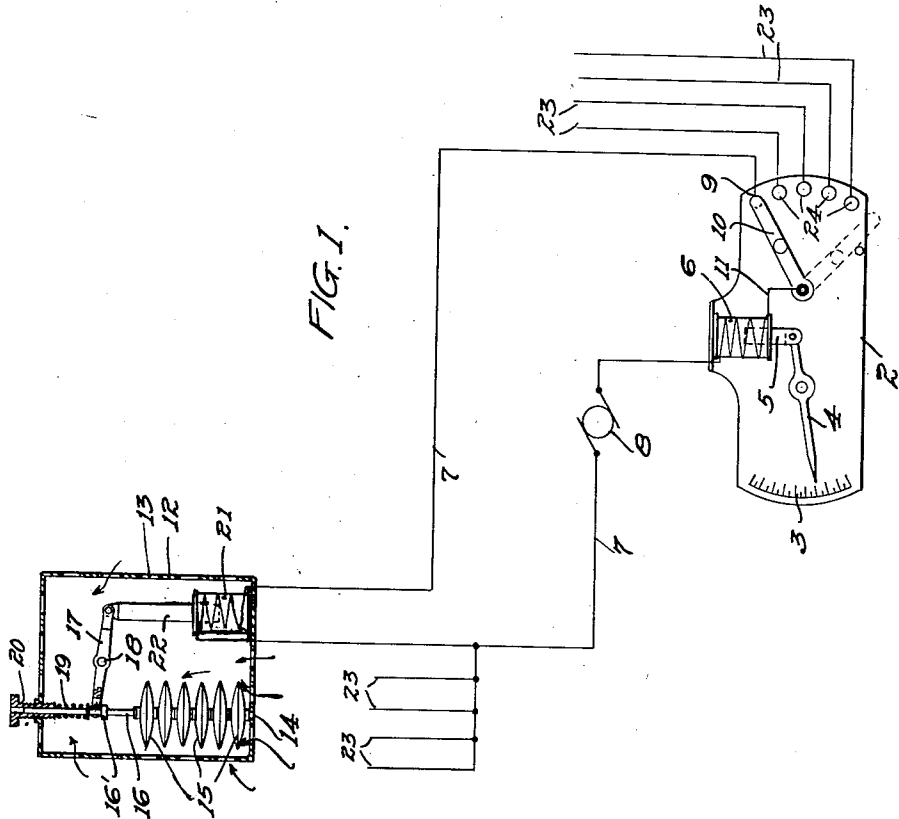


L. H. HARLOW.
HEAT REGULATOR.
APPLICATION FILED DEC. 20, 1916.

1,355,041.

Patented Oct. 5, 1920.



WITNESSES
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UNITED STATES PATENT OFFICE.

LEE H. HARLOW, OF GALESBURG, ILLINOIS, ASSIGNOR TO MINNEAPOLIS HEAT REGULATOR COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION.

HEAT-REGULATOR.

1,355,041.

Specification of Letters Patent.

Patented Oct. 5, 1920.

Application filed December 20, 1916. Serial No. 138,134.

To all whom it may concern:

Be it known that I, LEE H. HARLOW, a citizen of the United States, residing at Galesburg, county of Knox, State of Illinois, have invented certain new and useful Improvements in Heat-Regulators, of which the following is a specification.

The object of my invention is to provide an apparatus equipped for constant regulation upon a change of a degree of heat without the use of sliding or other type of contacts, batteries, springs or weights.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claim.

In the accompanying drawings forming part of this specification,

Figure 1 illustrates the invention used in connection with an indicator by means of which a person stationed, for instance, in the basement of a building can easily ascertain the temperature of any room in the building.

Fig. 2 is a diagrammatic view, illustrating my invention applied to a heating apparatus.

In the drawing, 2 represents a plate placed in the basement or any other suitable place remote from the thermostat and provided with graduations 3 and an indicator hand 4 movable over said graduations, said hand being pivoted at a point intermediate to its ends and provided at one end with an armature 5 for the solenoid 6. An electric circuit 7 is connected to the solenoid coil 6 and to a source of electrical energy, such as a dynamo 8 for generating alternating current, and is also connected to a contact 9 on the plate 2 and through this contact with a switch 10 mounted on the base 2 and connected by a conductor 11 with the coil 6. By means of this switch the circuit may be open or closed through the coil 6.

At some remote point, as in a distant room of the building, the thermostatic device is located, consisting preferably of a casing 12 having perforations 13 therein and provided with bearings for a series of hollow disks arranged one above the other therein. These disks are filled with alcohol or some other volatile fluid which will expand and contract under changes of temperature. A rod 16 is attached to the upper disk and an arm 17 is pivoted at 18 and has one end arranged

to bear on a collar 16', being held in contact therewith by a spring 19, the tension of which is increased or decreased through the adjustment of a thumb nut 20 on said rod. A reactance coil 21 is provided within the casing in the circuit 7 and has an armature 22 that is connected with the arm 17 so that the rocking of said arm will raise or lower the armature and withdraw it from the coil 21 or allow it to enter the coil 21 a greater distance. This movement of the armature will result from expansion or contraction of the walls of the disks 15 through action of the volatile fluid therein, an increase in temperature causing the disks to expand against the tension of the spring 19 and rocking the arm 17 to lower the armature 22 and increase the voltage of the current passing to the solenoid coil 6 and thereupon effect a corresponding movement of the armature 5, causing the indicator 4 to rock on its pivot and indicate on the graduations a higher degree of temperature. That is, if the temperature of the room or place where the thermostat is located rises and correspondingly expands the thermostatic disks, then the indicator hand at a distance from the thermostat will point to a higher graduation and the engineer or other person in charge of the building will at once know how much the temperature of the room has risen without making an actual examination of the thermometer in the room.

In case it is desired to connect a number of rooms with the said indicator, a series of circuits 23 are provided, connected with the circuit 7 and with contact points 24 on the plate 2 in position to engage with the switch 10 and allow the person in charge to operate the switch and determine the temperature of any room with which the device may be connected. By means of the adjusting nut 20 the tension of the spring 19 can be increased or decreased to vary the degree of resistance to the expansion of the thermostatic disks.

The device may be connected for indicating the temperature of water tanks, bake ovens, and for various purposes where indication of temperature is desired at a point remote from the thermostat.

In Fig. 2 I have adapted this same device to the regulation of a heating plant without the use of batteries, sliding contacts, springs or weights. 25 represents a heating plant

of ordinary construction, having dampers 26 and 27. A bar 28 is pivoted at 29 and has connections 30 and 31 with the dampers and is also connected with an armature 32 of a coil 33. This coil has an electric circuit 34 connected with a generator 35 and provided with a switch 36 for opening and closing the circuit. The thermostat corresponds to the one described with reference to Fig. 1 and I will indicate the casing and the adjusting nut by the same reference numerals. The expansion and contraction of the thermostatic disks will vary the current and open or close the dampers as the temperature of the room varies.

The devices shown in Figs. 1 and 2 of the drawing are both used in connection with an alternating current, varying usually from 110 to 115 volts, the coil 21 in Fig. 1 having the function of a reactance coil in connection with its armature for varying the voltage and effecting the operation of the remote thermostat indicator or a damper through such variation.

I claim as my invention:

A heat regulator comprising an indicating device having a solenoid coil and an indicator hand connected with the armature thereof, an alternating electric circuit for said coil, a series of branch circuits and a switch therefor, thermostats for said circuits, each having a reactance coil and an armature therefor, and a thermostatic device connected with the armature of each thermostat reactance coil for changing the position thereof and regulating the voltage of the alternating current and causing a corresponding movement of the armature of said indicating device solenoid coil, whereby a person at the indicator by adjusting said switch can determine the temperature of any room or place where the thermostat in the circuit closed by said switch is located.

In witness whereof I have hereunto set my hand this 18th day of October, 1916.

LEE H. HARLOW.

Witness:

H. A. ANDERSON.