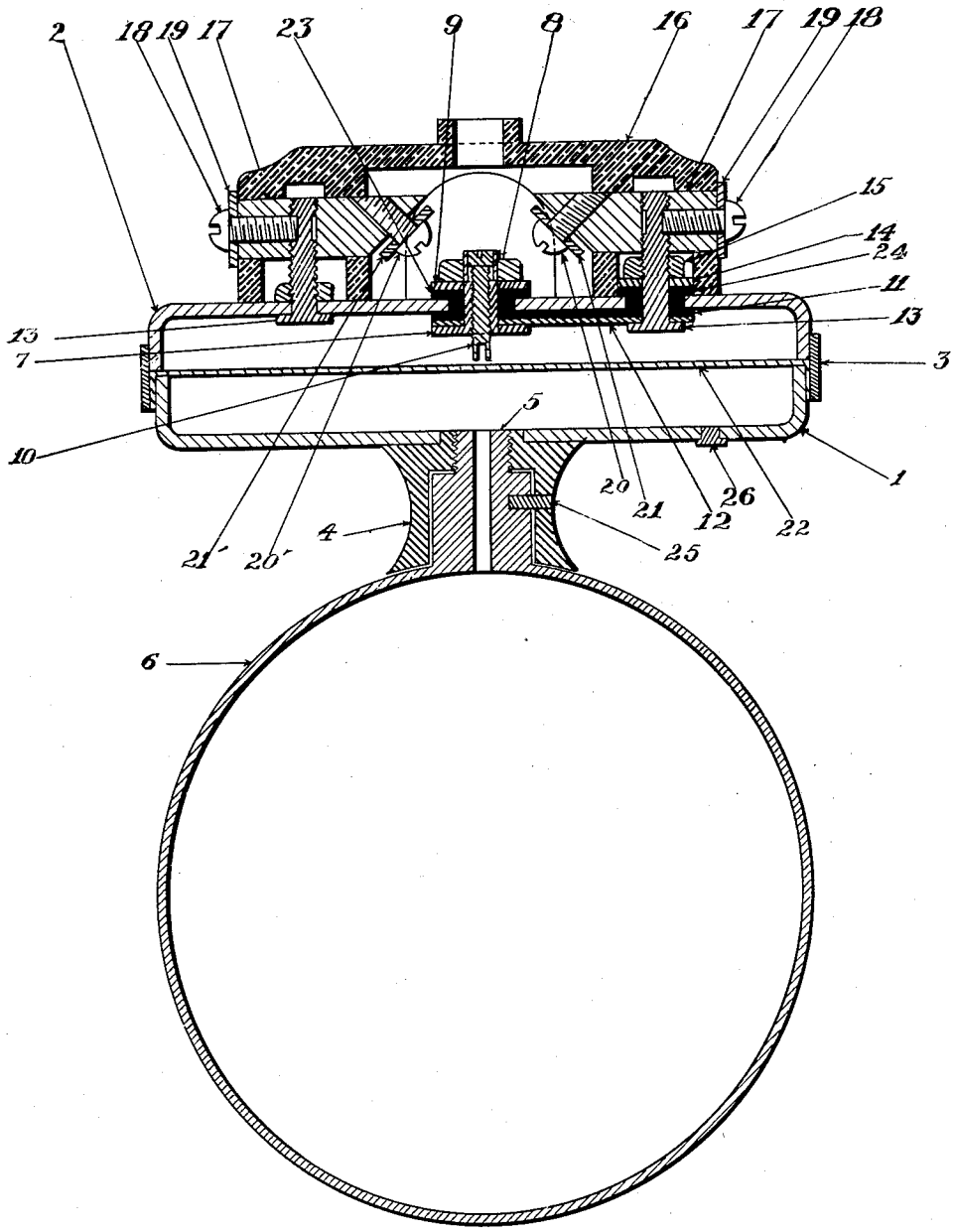
A. GOLDSTEIN.

ELECTRICAL THERMOSTAT.

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1,328,427.

Patented Jan. 20, 1920.



WITNESSES:

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ELECTRICAL THERMOSTAT.

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To all whom it may concern:

Be it known that I, ALBERT GOLDSTEIN, a citizen of the United States, residing at 2508 Broadway, in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Electrical Thermostats, of which the following is a full, clear, and exact description.

My invention relates to thermostatic devices of the type in which air expansion in a closed chamber actuates a diaphragm to close a circuit and transmit an alarm signal, and a method for adjusting the thermostat to operate at a predetermined rate of temperature rise.

The invention consists in the construction of a thermostat whereby the instrument is made highly sensitive to slight changes in the temperature of the surrounding atmosphere, said thermostat having a vent to equalize the internal with the external pressure when due to gradual and slow temperature changes but which provides a frictional impedance to the passage of the air out of the instrument when the increase of pressure and volume is due to a rapid temperature rise, this pressure equalization being accomplished by a leakage through a screw threaded joint, means being provided for securely locking the said joint in position and sealing the instrument when said position has been ascertained by test.

In the accompanying drawing, I have illustrated an embodiment of my present preferred form.

Referring to the drawing, the lower half 1 of the diaphragm case constitutes the upper part of the pressure chamber and is secured to the upper half of the diaphragm case 2 by the clamping ring 3 and constitutes the temperature responsive element of the device, at the same time affording a means of support for the remaining parts of the pressure chamber through the vent socket 4 by which by means of the vent screw 5, the air chamber 6 is held in place.

In the upper half 2 of the diaphragm case is placed the contact screw body 7 secured by the nut 8 and washer 9, and within which is placed the contact screw 10, all insulated from the diaphragm case 2 by the mica link 11 and the insulating bushing 23, and electrically connected by the metal link 12 to the connecting stud 13, which is also secured to the upper half 2 of the diaphragm case by the washer 14 and the nut 15 and insulated from it by the mica link 11 and the insulating bushing 24. The connecting stud 13′ is in mechanical and electrical connection with the upper half 2 of the diaphragm case, being secured thereto by a nut similar to 15, both connecting studs affording means for electrical connection through the medium of the metal blocks 17 and 17′ mounted in the insulating support 16. The connecting studs are provided with grooves around their bodies near their free extremities affording engagement for the extremity of the locking screws 18 and 18′. The circuit wires are held in secure electrical contact with the metal blocks 17 and 17′ by the binding screws 20 and 20′ and the washers 21 and 21′.

Between the upper half 2 of the diaphragm case and the lower half 1 of the case, is placed a diaphragm 22 of thin sheet copper or other suitable material, secured by the clamping ring 3 which also holds the two parts of the diaphragm case securely in place.

The following is the method of adjusting the air vent of the thermostat so that the air contained within the expansion or pressure chamber may be allowed to escape to the outer atmosphere through the tortuous passage formed by the space between the male and female elements of the supporting screw parts when the rate of increase in volume due to temperature rise below a certain predetermined number of degrees per minute is experienced.

The screw thread joint between the vent socket 4 and the vent screw 5 is made to standard screw thread sizes, affording sufficient space between the two elements of the screwed parts to permit the escape of air from within the pressure or expansion chamber when subjected to pressure. The pressure for adjusting purposes is applied at a small opening in the lower half 1 of the diaphragm case, shown as sealed with the plug 26.

The adjustment may be effected for a critical rate of temperature rise of three degrees F. per minute, for example, a more rapid rise deflecting the diaphragm and operating a circuit closer. This rate of rise

indicates that approximately six tenths of one per cent. of the total capacity of the expansion or pressure chamber must pass through the vent between the vent socket 4 and the vent screw 5 per minute. Since a rapidly adjustable temperature rise is not conveniently obtained, and since the pressure in the expansion chamber will vary with the absolute temperature, the rate of flow through the vent may be tested by means of a water gage and pressure chamber connected to the opening for a plug 26 (later sealed). In the case just assumed, with a room temperature of seventy degrees F., a rise of temperature of three degrees will cause an increase of pressure of approximately 2.2 inches of water. The rate of air flow through the vent may be adjusted by varying the length of the tortuous passage between the male thread on the vent screw 5 and the female thread in the vent socket 4 by advancing or withdrawing the vent screw 5 until the rate which will barely allow the pressure to remain at 2.2 inches without causing the deflection of the diaphragm is arrived at, after which the two parts of the vent—the vent socket 4 and the vent screw 5—are locked in position by a pin 25 driven into a drill hole and cut off flush with the surface of the vent socket 4.

The operation of the thermostat is as follows: The contact screw 10 is preferably adjusted so that its tip comes as close to the diaphragm 22 as possible without touching it; but it may be adjusted at any predetermined distance from said diaphragm dependent upon the conditions under which it is desired to work. The increase and decrease in the pressure of air within the chamber 6 and its related parts as affected by the changes of temperature are normally equalized with that of the surrounding atmosphere through the vent space between the vent socket 4 and the vent screw 5 so that there is no danger of the apparatus being set in operation from the effect of gradual changes of temperature. Should, however, a quick rise in temperature take place, as in the case of a fire, in which the increase in the temperature of the surrounding air would be greater than, for example, the three degrees F. per minute at which it is assumed that the instrument is adjusted to operate, the heat is rapidly conducted through the walls of the chamber 6 expanding the air therein more rapidly than the vent in the screw parts 4 and 5 will permit it to escape, and the increasing volume and pressure is communicated to the surface of the flexible diaphragm, distending it and causing it to make an electrical contact with the contact screw 10.

No electric circuit for the thermostat is herein shown or described, but a circuit which may be used is shown in my copending application filed Nov. 18, 1914, Serial No. 872,680, of which application this application is a division.

I claim:

1. An electrical thermostat comprising a case, a diaphragm in said case dividing the space therein into two chambers, a contact piece in proximity to the diaphragm in one of said chambers, the contained air in said chamber being freely open to the atmosphere, an expansion chamber connected to the other of said two chambers, and an adjustable vent, the adjustment of said vent being secured by the manipulation of a screw joint by means of which the expansion chamber is attached to said other chamber.

2. In a thermostatic device, a diaphragm case, an expansion chamber, and an adjustable vent, the adjustment of said vent being secured by the manipulation of a screw joint by means of which the expansion chamber is attached to the diaphragm case.

In testimony whereof I have affixed my signature in the presence of two witnesses.

ALBERT GOLDSTEIN.

Witnesses:
MINNIE NEWMAN,
BELLE HAMMER.