H. D. SINGER & H. V. D. PRATT.

THERMOSTAT.

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1,124,541. Patented Jan. 12, 1915.

Fig. 2

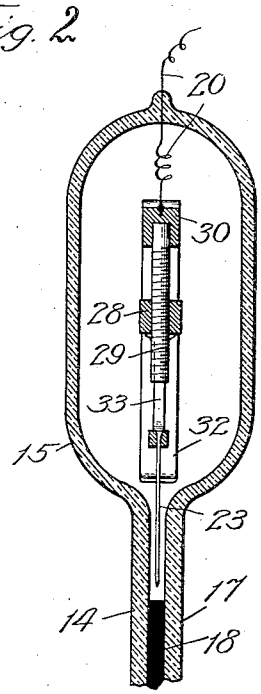
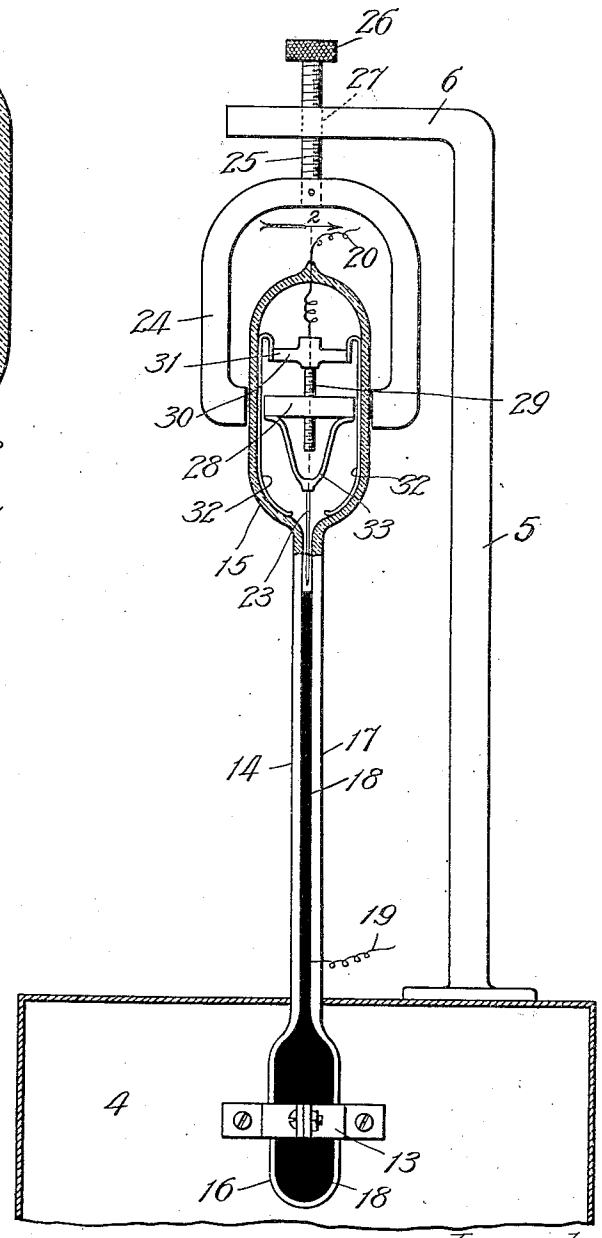


Fig. 1.



Witnesses:

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UNITED STATES PATENT OFFICE.

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THERMOSTAT.

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Application filed September 11, 1911. Serial No. 648,643.

To all whom it may concern:

Be it known that we, HAROLD D. SINGER and HOWARD V. D. PRATT, a subject of the King of Great Britain and a citizen of the United States, respectively, residing at Hospital, in the county of Kankakee and State of Illinois, have invented a new and useful Improvement in Thermostats, of which the following is a specification.

Our invention relates to improvements in thermostats of the type involving a thermometer-tube having one of the electric terminals connected with the mercury therein and the other of the electric terminals adjustable in the tube to make contact with the upper end of the column of mercury to close the circuit when the mercury rises in the tube to a predetermined point.

Our object is to provide a novel and simple construction of thermostat of the type above referred to, and to provide for the maintenance of the vacuum in the tube at all times regardless of the adjustment of the upper electric terminal therein.

Referring to the accompanying drawings: Figure 1 is a view in elevation of our improved thermostat shown extending into a tank illustrated in section, the contents of which are to be maintained at a predetermined temperature; and Fig. 2, an enlarged section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

In the drawings we have illustrated our improved thermostat as the medium for controlling the making and breaking of electric circuits between a source of electrical energy (not shown), and mechanism (not shown) for controlling the supply of a heating medium to the tank represented at 4, and into which our improved thermostat extends. Rising from the top of the tank is an upright 5 provided with an arm 6 through a threaded opening 7 in which a threaded rod 25 extends. The lower end of this rod is rigidly connected with a magnet 24, shown as a permanent magnet of horse-shoe form, though an electro-magnet may be substituted therefor if desired, the upper end of the rod 25 carrying a thumb-piece 26 by means of which the rod 25 and the magnet 24 may be rotated, the rod 25 and the magnet raising or lowering when the rod is turned, depending upon the direction in which it is rotated. The thermometer tube, which extends into the tank 4 and is secured thereto in any desirable manner, as by means of a clip 13 secured to a wall of the tank, is illustrated at 14, it being preferred that this tube be of the form shown, namely, with upper and lower expanded tubular sections 15 and 16, respectively, and a restricted intermediate capillary section 17, the mercury or other expansible fluid employed, and represented at 18, filling the tube-section 16 and extending upwardly into the section 17, a vacuum being provided in the tube above the mercury. An electric terminal wire 19 extends through a wall of the tube 14, in which it is sealed, into contact with the fluid 18 and the other electric terminal 20 extends through and is sealed in the top of the tube-section 15. The terminal 20 is connected with a member 30 confined in the tube-section 15, this member being formed of a cross-piece 31 and depending sections 32 of spring metal which latter press against the inner walls of the tube-section 15 and prevent the member 30 from turning when the device is operated, as hereinafter described. Depending from and rigidly secured in the cross-piece 31 is a threaded rod 29 which has screw-thread engagement with a member 28 of soft iron, forming an armature for the magnet 24. The armature 28 carries on its under side a depending yoke 33 which is electrically connected with the upper end of a depending contact wire 23, preferably of platinum, which extends downwardly into the upper end of the tube-section 17 and operates to make electrical contact with the mercury 18, when the latter rises into contact therewith.

The operation of the apparatus illustrated is as follows: When the temperature of the water in the tank 4 reaches a predetermined degree, depending upon the height at which the lower end of the contact 23 extends in the tube-section 14, the mercury 18, in ascending in the tube contacts with the lower end of the wire 23, thus establishing an electrical circuit between the terminal 20 and fluid 18 through the wire 23, yoke 33, armature 28, rod 29 and cross-piece 31, which, in practice, would operate to close a circuit for controlling the operation of mechanism (not shown) for shutting off the supply of heat medium to the tank 4. By turning the rod 25 the magnet 24 is rotated and caused to travel up or down, depending on the direction in which this rod is rotated, the magnetic force exerted by the magnet on the armature 28, causing the

latter to turn, with the magnet, on the threaded rod 29, the latter, by preference, having the same size thread as that on the rod 25, and thus adjusting the lower end of the wire contact 23 with relation to the top of the fluid 18. It will be understood that by rotating the magnet as described, the position occupied by the wire 23 relative to the top of the fluid 18 may be varied as desired, to cause the electrical contact to be made at any desired point on the thermometer tube.

By constructing a thermostat in accordance with our invention, the electric terminal may be sealed in the tube and thus the vacuum originally established thereby may be maintained.

It will be understood that while we have shown our improved thermostat in connection with a tank for containing water, the temperature of which is to be controlled, our improved device is not limited in its use to such apparatus, as it may be used in any situation where the employment of a thermostat of this general type is desirable.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a thermostat-device, the combination of a thermometer-tube containing an expansible fluid, a member in said tube provided with spring-arms bearing against the inner wall of the tube, a member of magnetizable material in said tube and having screw-threaded connection with said first-named member and movable up and down relative thereto, and electric-circuit terminals one of which is in contact with said fluid and the other of which is supported by said member of magnetizable material relative to the upper end of the fluid.

2. In a thermostat-device, the combination of a thermometer-tube containing an expansible fluid, spiral guiding-means in said tube, a rotatable member of magnetizable material engaging with said guiding-means, electric-circuit terminals one of which is in contact with said fluid and the other of which is supported by said member relative to the upper end of the fluid, a support, spiral guiding-means on said support, and a rotatable magnet external of the tube, coöperating with said member of magnetizable material and engaging with said last-named guiding-means, for the purpose set forth.

3. In a thermostat-device, the combination of a thermometer-tube containing an expansible fluid, spiral guiding-means in said tube, a rotatable member of magnetizable material engaging with said guiding-means, electric-circuit terminals one of which is in contact with said fluid and the other of which is supported by said member relative to the upper end of the fluid, a support, spiral guiding-means on said support having the same pitch as said first-named guiding-means, and a rotatable magnet external of the tube coöperating with said member of magnetizable material and engaging with said last-named guiding-means, for the purpose set forth.

4. In a thermostat-device, the combination of a thermometer-tube containing an expansible fluid, spiral guiding-means in said tube, a rotatable member of magnetizable material engaging with said guiding-means, electric-circuit terminals one of which is in contact with said fluid and the other of which is supported by said member relative to the upper end of the fluid, a support, and a rotatable magnet external of the tube, coöperating with said member of magnetizable material and provided with a stem having screw-threaded connection with said support, for the purpose set forth.

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In the presence of—
A. U. THORIEN,
R. A. SCHAEFFER.