(No Model.)

L. B. STONE.

THERMOSTAT.

No. 351,719. Patented Oct. 26, 1886.

Fig. 1.

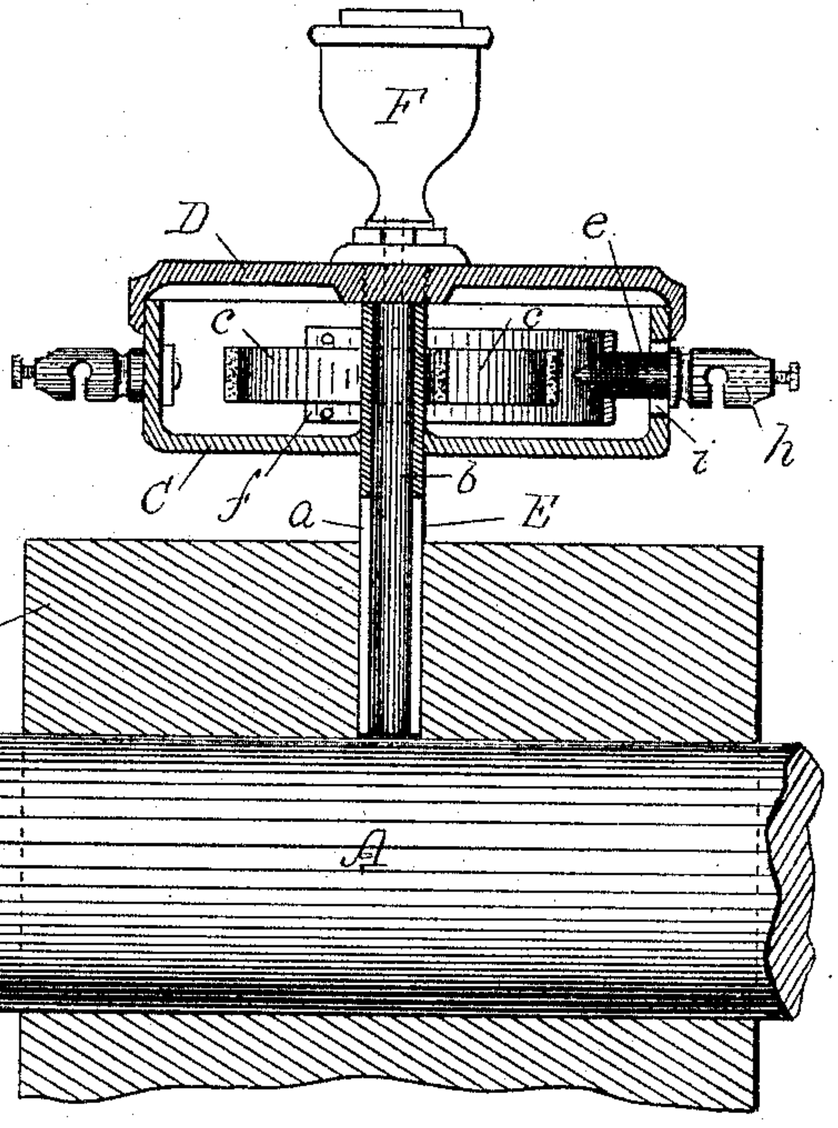


Fig. 2.

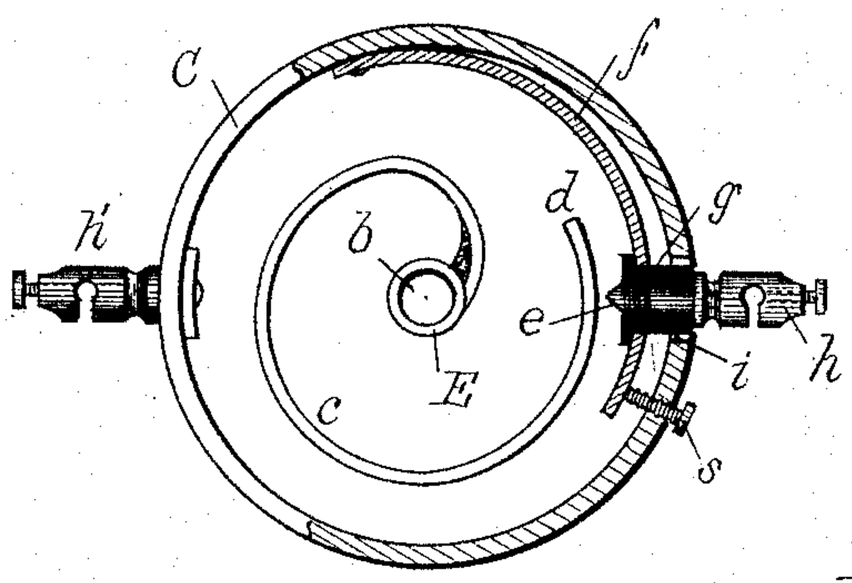
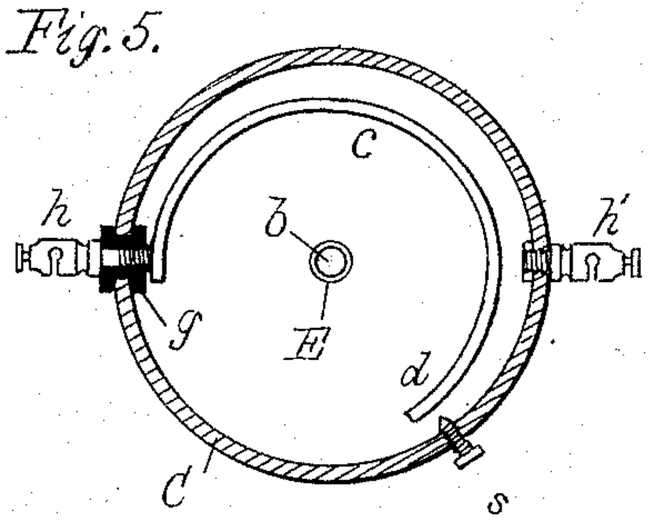


Fig. 5.



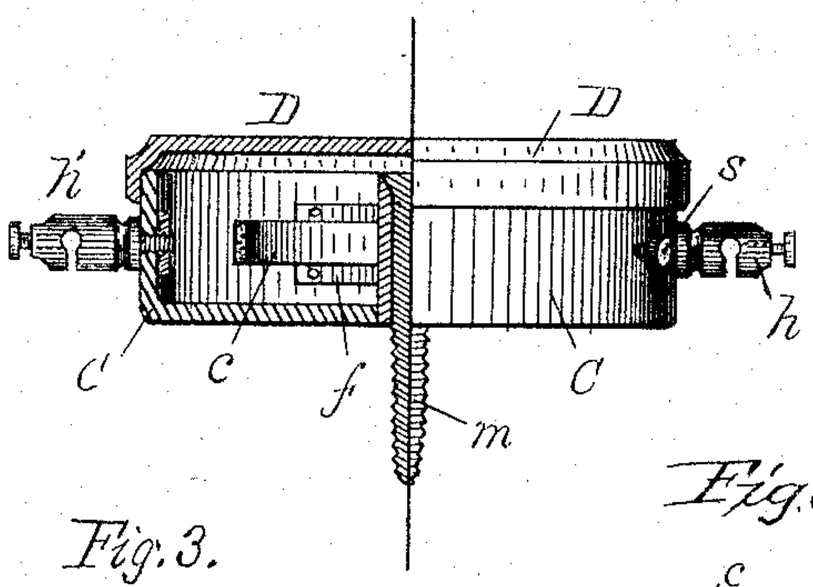


Fig. 3.

Fig. 4.

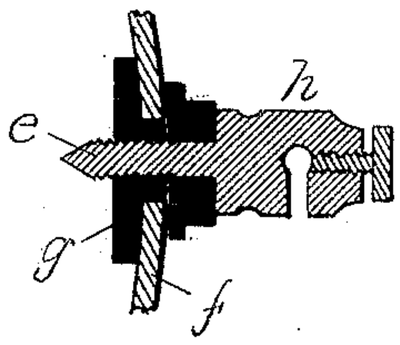
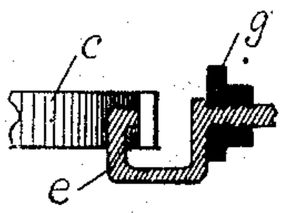


Fig. 6.



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UNITED STATES PATENT OFFICE.

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THERMOSTAT.

SPECIFICATION forming part of Letters Patent No. 351,719, dated October 26, 1886.

Application filed April 19, 1886. Serial No. 199,311. (No model.)

To all whom it may concern:

Be it known that I, LAWSON B. STONE, a citizen of the United States, residing at Marblehead, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Thermostats; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to thermostats which employ a spring as the thermostatic agent; and it consists, chiefly, in the combination of such a spring and the electric circuit, of which it forms one terminal, with another spring, the other terminal of said circuit attached to said spring, and an adjusting-screw bearing against one of said springs to regulate the distance between said terminals, as hereinafter set forth and claimed.

The said invention also relates to certain additional features of construction and combination, also hereinafter set forth and claimed.

The drawings accompanying this specification represent, in Figure 1, a vertical central section, and Fig. 2 a sectional plan, of a journal-thermostat embodying my invention. Fig. 3 is an enlarged view showing the manner of mounting the adjustable terminal, while Fig. 4 is a sectional elevation showing a modification. Fig. 5 is a horizontal section, wherein the Bourdon spring is insulated as a terminal. Fig. 6 represents a sectional detail view of a modified form of terminal arranged so that the expansion of the Bourdon spring will open the circuit instead of closing it.

In said drawings, A represents a piece of shafting suitably mounted in the bearing B. Upon the latter is affixed the journal-thermostat, which consists, primarily, of a hollow circular metallic box or case, C, surmounted by and covered with the cap D. Centrally located thereof and secured to said box is a hollow post or tube, E, which extends outwardly, and is of a length to suit requirements or the location of the thermostat. In the present instance this tube is fitted into the journal-box and approaches very closely the periphery of the shaft. In order to make a close metallic connection, the more readily and efficiently to convey to the thermostat the heat from said shaft and bearing should it at any time become excessive, I have longitudinally kerf-cut or split said tube at *a*, and hence when it is thrust into its proper position in the bearing the sides of the tube are compressed, and thus brought into close contact with the surrounding metallic surface.

By the use of a hollow post the thermostat can readily embody in its construction an oil-cup, since the lubricant supplied from the cup F, which is secured to and surmounts the cap D of the thermostat, is conveyed downward through the bore *b* of the tube E, and thence to the journal-bearing and its shaft. Thus while the thermostat supplies the oil, it is in readiness to announce at any time whether the bearing is properly lubricated or not.

The portions of this apparatus operated thermally consist of a Bourdon spring, *c*, (the construction and operation of which is well known among those skilled in the art,) one end of which is firmly soldered to the upper part of the hollow post E. Directly opposite the free end or extremity *d* of this Bourdon spring is disposed the adjustable terminal *e*, in an electric circuit. This terminal is mounted upon a plate-spring, *f*, which is secured to the case B exteriorly of the Bourdon spring, and bent to conform somewhat to the curve of the box within which it is contained. The free end of this plate-spring *f* is bored to admit a hollow sleeve, *g*, securely fastened thereto. Said sleeve is made of any suitable insulating material interiorly screw-threaded, to receive and hold the metallic terminal, pointed interiorly, and which terminates exteriorly in a binding-post, *h*. Furthermore, the inclosing box or case C is bored at *i* to permit unimpeded movement of the terminal *e* and its insulating-sleeve *g*, while arranged diametrically opposite and in metallic connection with said case C is affixed a second binding-post, *h'*, the terminal of which is the free end *d* of the Bourdon spring. Thus the wires (not shown) connecting with the posts *h h'* may extend to any suitable or convenient place or room in which the alarm is to be given, and are constantly in

place to be electrically induced, so that when the two terminals *d* and *e* are united by the movement of the Bourdon spring, due to increase in the temperature which actuates it, the circuit is closed and the thermostatic alarm apparatus performs its office.

Hitherto in the arrangement of thermostats of the class before premised the activity or range of movement in said Bourdon spring or the thermal temperature at which the circuit will be operated has been dependent upon the coefficient of expansion of the contents of the spring or on the strength of the material composing said spring. In some instances the free end of the spring has been encumbered, in order to overcome the tension of a spring terminal, which acts to oppose its movement. To overcome these defects and enable the Bourdon spring to be made of material of any desired strength, and not necessarily fill it with certain easily-expansible gas or fluid, or a combination of the two in order to regulate its action, I have adjustably mounted one of the terminals upon a spring, which, by means of the screw *s*, engaged in the case C, can be caused to retreat or advance, and thus carry the terminal from or toward the Bourdon spring. Consequently it is evident that greater extremes of movement is permitted the latter, and it will be compelled to advance a greater or less distance to operate the circuit, either of which movements must be attendant upon or caused by a greater or less degree of heat.

In lieu of insulating the spring-mounted terminal, as shown, a very practicable modification is that represented in Fig. 5, in which the plate-spring is omitted and the Bourdon spring insulated. By this alteration the same adjustment in the thermal temperature at which the thermostat becomes active is obtained. This variation in the active thermal temperature is secured by means of the screw *s*, engaging in the thermostat case, and which is also in metallic connection with the post *h'*, the Bourdon spring, on the other hand, being insulated, together with the post *h*, with which it is electrically connected. By either construction in the expansion of the gas within the Bourdon spring and the straightening of the latter sliding metallic contact is effected between the terminals to operate an electric circuit. Again, by locating this adjustable terminal opposite the free extremity of the Bourdon spring, where its action or movement is the greatest, any extreme is easily and readily obtained, if desired, while the action of said spring is unimpeded, and yet can be accurately adjusted. This thermostat in the present drawings is shown as constructed to be on an open circuit; but the alternative construction to operate a closed circuit is equally as practicable, since by extending the terminal *s* or *e* with an offset or bend to place the contact-point upon the concave surface of the Bourdon spring, the two normally in contact, any expansion or movement of said spring due to increase in the thermal temperature will open the circuit and cause an alarm.

In the present instance I have shown my thermostat as embodying an oil-cup; but I desire not to be limited to this precise arrangement, since the supporting-rod or conductor E may be solid and the oil-cup omitted. Again, the hollow post or rod E may be replaced by an ordinary screw, *m*, and the thermostat affixed elsewhere.

As before premised, this device may be caused to operate either an open or closed electric system, and therefore applicable as a thermostat to other locations and positions, and especially alarm-circuits.

In Fig. 6 the terminal *e* is hook-shaped, so that it may come within the curve of the Bourdon spring *c*, and be normally in contact with the inner face of the free end of said spring. The expansion of the latter opens the circuit.

I claim—

1. The combination of a thermostatic spring and the circuit of which it forms one terminal with another spring, the other terminal of said circuit attached to said spring, and an adjusting-screw bearing against one of said springs and regulating the distance of said terminals from each other.

2. In combination with post E and case C, the Bourdon spring *c*, attached to said post, a spring, *f*, attached to said case, a contact, *e*, carried by the latter spring, and an adjusting-screw, *s*, acting against spring *f*, substantially as set forth.

3. A Bourdon spring, *c*, an adjustable terminal, *e*, opposed thereto, an insulating-sleeve surrounding said terminal, a spring to which said sleeve is attached, and an adjusting-screw acting against the latter spring to adjust the terminal, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

LAWSON B. STONE.

Witnesses:

H. E. LODGE,

F. CURTIS.