

(No Model.)

W. R. PATTERSON.
THERMOMETRIC INDICATOR.

No. 402,347.

Patented Apr. 30, 1889.

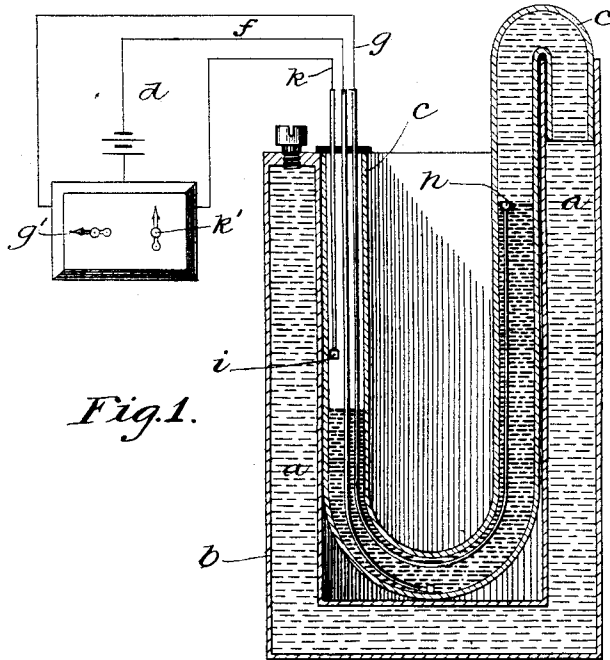


Fig. 1.

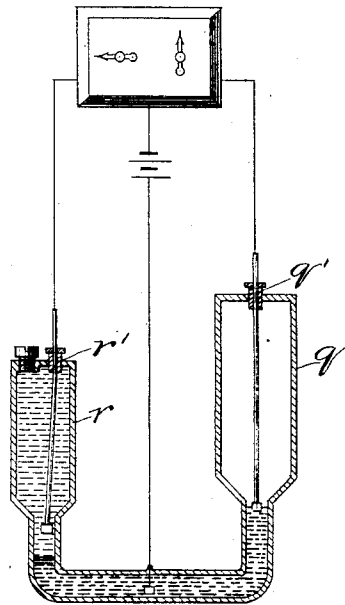


Fig. 3.

Fig. 2.

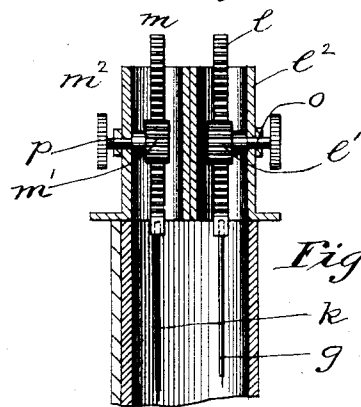
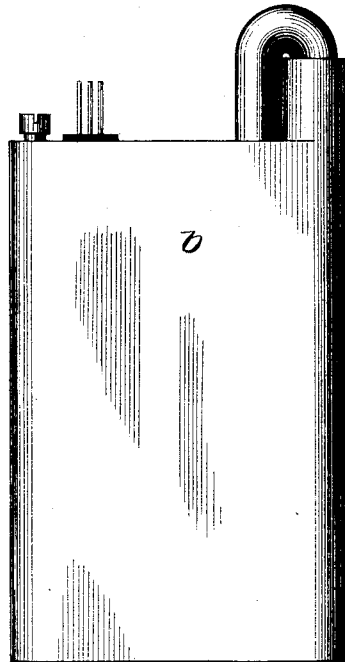


Fig. 4.

Witnesses.

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WILLIAM R. PATTERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE
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THERMOMETRIC INDICATOR.

SPECIFICATION forming part of Letters Patent No. 402,347, dated April 30, 1889.

Application filed October 1, 1888. Serial No. 286,835. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. PATTERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Temperature-Regulators, (Case 58,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to apparatus for automatically indicating changes in temperature. By its use one is enabled to keep the temperature of a room or building within certain limits.

My apparatus is so arranged that when the temperature rises above a certain point an electrical signal will be given, and in like manner when the temperature falls below a certain point the fact will be electrically indicated.

My invention consists of a thermostat in which mercury is moved by the expansion and contraction of oil or other non-conducting liquid, preferably paraffine-oil.

My invention also consists in the combination of parts hereinafter described and claimed.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of a thermostat embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is a modified form of the thermostat. Fig. 4 is a view, partially in section, of a rack-and-pinion device for regulating the wires in the thermostat.

Referring now to Fig. 1, the oil *a* is contained in the closed vessel *b*, the space containing the oil being annular, as shown, so that a large surface may be exposed. The vessel should be of metal or other good conductor of heat. The bent tube *c* is connected with the reservoir containing the oil, as shown. This tube is preferably of glass, and is conveniently placed within the opening in the vessel containing the oil, as shown. The end of the tube not connected with the oil-chamber may be left open, if desired. Enough mercury should be placed in the

tube to insure its presence in both branches while the oil is at a temperature between the desired limits. I find it best in practice to place enough mercury in the tube to extend into both branches at any temperature to which the apparatus may be subjected. One pole of the battery *d* is connected permanently with the mercury by wire *f*. The wires *g g* are branched from the other pole of the battery through suitable signaling apparatus or annunciators, *g' k'*, and so arranged that when the temperature falls below the desired limit one of the circuits will be closed. The other branch is so connected that when the temperature rises above the desired limit the mercury will come in contact with said other branch, thus closing the circuit of the battery through the other signaling-instrument. As long as the temperature does not fall below or rise above these maximum and minimum points the circuit of the battery will remain open. Thus in Fig. 1 it will be seen that the mercury is in contact with wire *g* at *h*. If now the temperature should be increased, the oil *a* will expand, thus forcing the mercury *d* down from the point *h* and up toward point *i* until on reaching point *i* contact will be made between the mercury and wire *k* at said point *i*. As long as the mercury remains between the points *h* and *i* it is evident that both branches of the circuit will remain open. The wires *g* and *k* are insulated, except at the ends *h* and *i*, as indicated.

After determining within what limits the temperature is to be regulated, the position of the naked contacts *h* and *i* of the wires with respect to the mercury and each other may be accordingly regulated in any suitable manner, the oil being heated or cooled artificially, as required.

The different branches of the wires *g k* may, if desired, be connected with the racks *l m*, as shown in Fig. 4. By turning the pinions *l' m'* the position of the wires may be changed, so as to bring the bare portion at the points required.

The tubes *l' m'*, holding the racks and pinions, are preferably of hard rubber, and serve as guides for the racks. Connection with the

battery may be made through the spindles *o* and *p*, which carry the pinions, respectively.

In Fig. 3 I have shown a modification of my apparatus. Instead of having the end of the tube containing the mercury open, I provide a closed chamber, *q*, containing air, at one end of the tube containing the mercury. The oil is placed in the closed reservoir *r* at the opposite end of the tube. The expansion of the oil by heating forces the mercury toward the air-reservoir, the air being compressed. I preferably mix metallic filings with the oil, in order that the oil may be more sensitive to changes of temperature, especially when the reservoir containing the oil has only a small surface exposed.

The circuits shown in Fig. 3 and the operation of the device are the same as heretofore described. The branch wires I preferably run through stuffing-boxes *r'* *q'*, in order that they may be adjusted without opening the oil-chamber or air-chamber.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the mercury, of a non-conducting liquid placed in the bent tube containing said mercury and electrical connections—one on each side of said mercury—with which the mercury is adapted to make electrical connections alternately as the temperature rises and falls, substantially as and for the purpose specified.

2. The combination, with a tube containing mercury, of closed chambers—one at each end of the said tube—one of said chambers containing an insulating-liquid and the other containing air, and an electric circuit permanently connected with said mercury and extending through a battery to two signal-instruments

and from said signal-instruments in two branches to points *h* and *i* on opposite sides of the mercury, whereby the circuit is closed through one signal-instrument or the other as the oil expands or contracts to move the mercury into contact with one or the other of said points.

3. The combination, with the mercury, of oil contained in the same tube therewith and branch electric circuits and contact-points on different sides of the said mercury in said tube, whereby one circuit or the other will be closed as the temperature rises or falls below the point to which the apparatus is adjusted.

4. The combination, with the annular reservoir *b*, containing an insulating-liquid, *a*, of the bent tube *c*, containing mercury, placed within the opening in the reservoir, said mercury being in both branches of said tube, said tube being closed at one end of the reservoir *b*, and the other end of said tube, above the mercury, containing air, the battery *d*, one pole of which is connected permanently with the mercury, while the other pole is extended by the branches *g* *k* to points *h* and *i*, to which points the mercury is adapted to be alternately forced by changes in the temperature of the oil, and the signal-instruments *k'* *g'*—one in each of said branches—whereby changes of temperature within certain limits will be indicated by the signal-instruments, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 28th day of September, A. D. 1888.

WILLIAM R. PATTERSON.

Witnesses:

GEORGE P. BARTON,
ELLA EDLER.