(No Model.)

H. W. HARDINGE.

ELECTRIC TELE-THERMOSCOPE.

No. 382,976. Patented May 15, 1888.

Fig. 1.

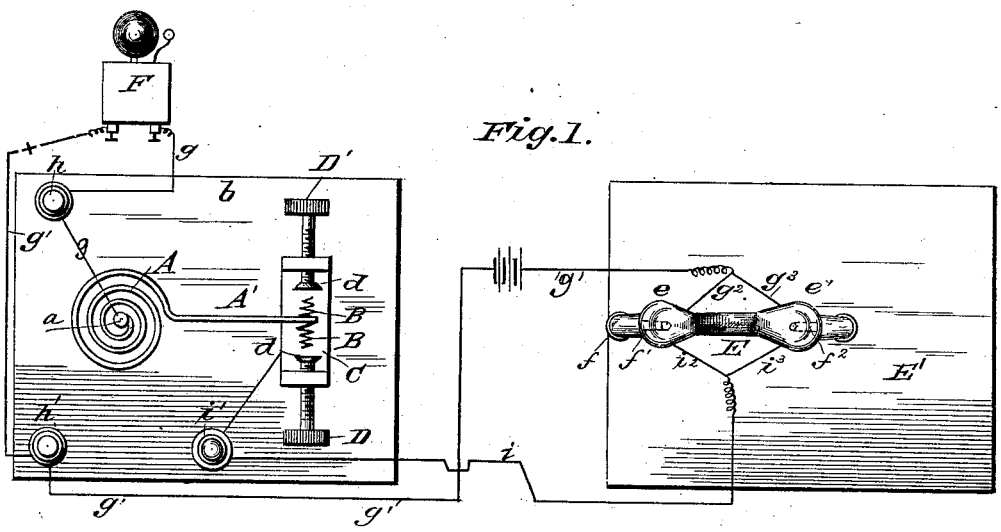


Fig. 2.

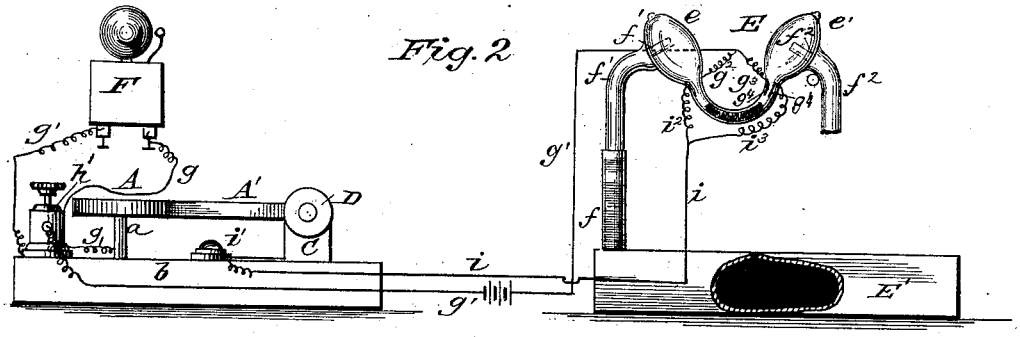
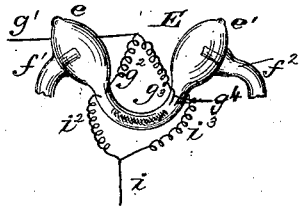


Fig. 3.



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ELECTRIC TELE-THERMOSCOPE.

SPECIFICATION forming part of Letters Patent No. 382,976, dated May 15, 1888.

Application filed August 27, 1887. Serial No. 248,091. (No model.)

To all whom it may concern:

Be it known that I, HARRY WILLIAMS HARDINGE, of Leadville, in the county of Lake and State of Colorado, have invented certain new and useful Improvements in Electric Tele-Thermoscopes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and in which—

Figure 1 is a front view of my invention. Fig. 2 is a side view of the same. Fig. 3 is a detached view of the pulsator, with its connecting-wires shown broken away.

This invention has for its object, primarily, to indicate electrically certain changes in the temperature, as also a rising and falling temperature, while it may also be adapted or utilized for other purposes; and to these ends the invention consists of the combination of parts, including their construction, substantially as hereinafter set forth, and pointed out in the claims.

In the embodiment of my invention I employ a thermostatic spring, A, which is of the coiled type, having its inner end secured to a post or projection, *a*, projecting from a base or support, *b*, suitably secured to a bracket or other elevated point. The other end of this spring is formed into an extension or arm, A′, radiating from its coiled portion, and provided at its extreme outer end with two supplementary or contact springs, B, one applied to each side of said arm. Also secured to said support *b* is a casting or bracket, C, which supports in its outwardly-projecting portions or arms regulating or adjusting screws D D′, which are disposed in alignment with the supplementary or contact springs B B, and which are preferably provided with plates or disks *d d* on their inner ends, to provide broad contact-surfaces therefor with said springs.

E is a pulsator, and E′ is an air-chamber, both of which are supported upon or suspended from the support or base *b* in any suitable way.

The pulsator E consists of a curved glass or other tube which contains a quantity of mercury, and which is provided with two bulbs, *e e′*—one at each end—one of which bulbs, *e*, is connected with the chamber E′ by a tube, *f*, secured to said chamber, and by a second tube, *f′*, having its one end coupled, it may be by an elastic sleeve, to the tube *f*, while its other end extends well into said bulb. The bulb *e′* at the opposite end of the tube or pulsator E connects with the external air by means of a tube, f^2, one end of which (like the tube *f′*) projects or extends well into said bulb. With the inner or connecting ends of the tubes f' f^2 thus projecting or extending into the bulbs *e e′* of the tube or pulsator E, the mercury will be prevented from accidentally escaping therefrom, as would otherwise be likely to occur.

In order to include the thermostatic spring A, the adjusting or regulating screws D D′, and the pulsator E, including the annunciator, presently referred to, in an electric circuit, I employ a wire, *g*, connecting with the post *h* and the annunciator F; a second wire, *g′*, connecting with the said annunciator and with the post *h′* and forked into branches g^2 g^3, connecting with the pulsator, as more fully explained hereinafter, which wire is also designed to be connected with a battery, and a third wire, *i*, connecting with the set-screw support or bracket C and with a post, *i′*, which wire is also forked into branches i^2 i^3, connecting with the pulsator or tube E, as also presently more fully set forth.

The branch wires connect with the tube or pulsator E just at the points of conjunction of the bulbs *e e′* therewith, the ends of the same penetrating the glass or material of the pulsator and adapted to have contact with the mercury contained therein. The free ends of the wires g^3 i^3 are extended downwardly a short distance, as at g^4 g^4, within the tubular portion of the pulsator E, the purpose of which will be brought out in the description of the operation of the invention.

The supplementary or contact springs B prevent the throwing out of adjustment of the thermostatic spring A, as would otherwise occur in case of a continuous rise or increase of temperature above the set or predetermined degree of heat. This is due to the fact that were the thermostatic spring A permitted to come directly into contact with a rigid stop—as, for instance, with either of the screws D D′—the spring would be liable to sustain a mechanical strain or bend and would not be able to fully recover its normal condition upon the removal of the cause of its first movement;

but with the interposed light springs B the strain is relieved, although the contacting action continues.

The operation is as follows: The adjusting or regulating screws D D′ having been adjusted, one, D, for rising temperature and for contact with one spring, B—say at a temperature of 110°—the arm A′ of the thermostatic spring A at such temperature being deflected by the action of the heat toward said spring, and the other screw, D′, for falling temperature, it will be seen that as the said set or predetermined temperature is reached, connection will be effected between the screw D, the adjacent spring B, and the thermostatic spring A. Also at this juncture the mercury in the pulsator or tube E, by the expansion of the air in the chamber E′, ascends the former toward and passes into the bulb e', and accordingly comes into contact with the ends of the wires g^3 i^3, thus bringing the aforesaid parts, exclusive of the screw D′ and that one of the springs B next to it, into the electric circuit. At that instant the annunciator will be sounded, after which, by reason of the escape of a portion of the confined air, the mercury will be permitted to return, again making contact with said wires and giving a second signal; but by reason of the extensions g^4 g^4 of the wires g^3 i^3, along which the mercury travels, a prolonged sounding of the second signal will take place. The fact of the rise of temperature to or above the set or predetermined degree will thus be announced by two signals. Of course as the heat continues to increase additional signals will similarly be given or announced.

If, instead of the temperature rising, it should fall, the mercury will ascend the tube toward its other bulb, e, and its entrance into the latter and return to the lower part thereof will accordingly cause it to have contact with the ends of the wires g^2 i^2, successively making and breaking the circuit, and thus make known that fact upon the annunciator by two quickly-sounded signals.

It will be seen that for rising temperature a prolonged sounding of the annunciator can be had, in consequence of the longer contact of the mercury with the wires, in which case a vibrating bell is preferably used, and thus readily distinguish between rising and falling temperature. It will, however, be understood that I do not restrict the connection of the wires to the particular points shown, as the connection may be effected at any point intermediately of the bulbs without departing from the spirit of my invention.

It will be noticed that during the rise of temperature which caused the deflection of the arm A′ of the thermostatic spring A to effect the connection between it and the screw D, the confined air of the chamber E′ will simultaneously expand by the action of the heat and a portion thereof be expelled into the tubular connection between said chamber and pulsator, from which said expelled air will enter the bulb e of the latter and act upon the mercury carrying it up the outer arm of the pulsator, along and past the extensions g^4 g^4 of the wires g^3 i^3, at about the same instant the connection is effected between the said arm of the thermostatic spring and the said spring effecting the connection between the thermostatic spring and one of the screws at the same time connection is made between the circuit-wires and the mercury in the pulsator.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The pulsator consisting of the curved tube provided with bulbs, one at each end, and additional tubes extending short distances into said bulbs, substantially as and for the purpose set forth.

2. The pulsator consisting of the curved tube provided with bulbs, one at each end, and additional tubes extending short distances into said bulbs, in combination with the air-chamber connected with one of said additional tubes, substantially as and for the purpose set forth.

3. The combination, with the pulsator comprising a curved tube having bulbs, one at each end, and connected to an air-chamber, of the thermostatic spring, and the regulating or adjusting screws which are adapted to have connection separately with an arm of said spring, the same being arranged in an electric circuit, substantially as and for the purpose set forth.

4. The combination, with the pulsator, of the thermostatic spring provided with an arm to which near its free or outer end are applied supplementary or contact springs, and the adjusting or regulating screws, the same being included in an electric circuit, substantially as and for the purpose set forth.

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Witnesses:
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