(No Model.) 2 Sheets—Sheet 1.

M. A. AGELASTO.

ELECTRIC THERMOMETER.

No. 571,426. Patented Nov. 17, 1896.

FIG. 1.

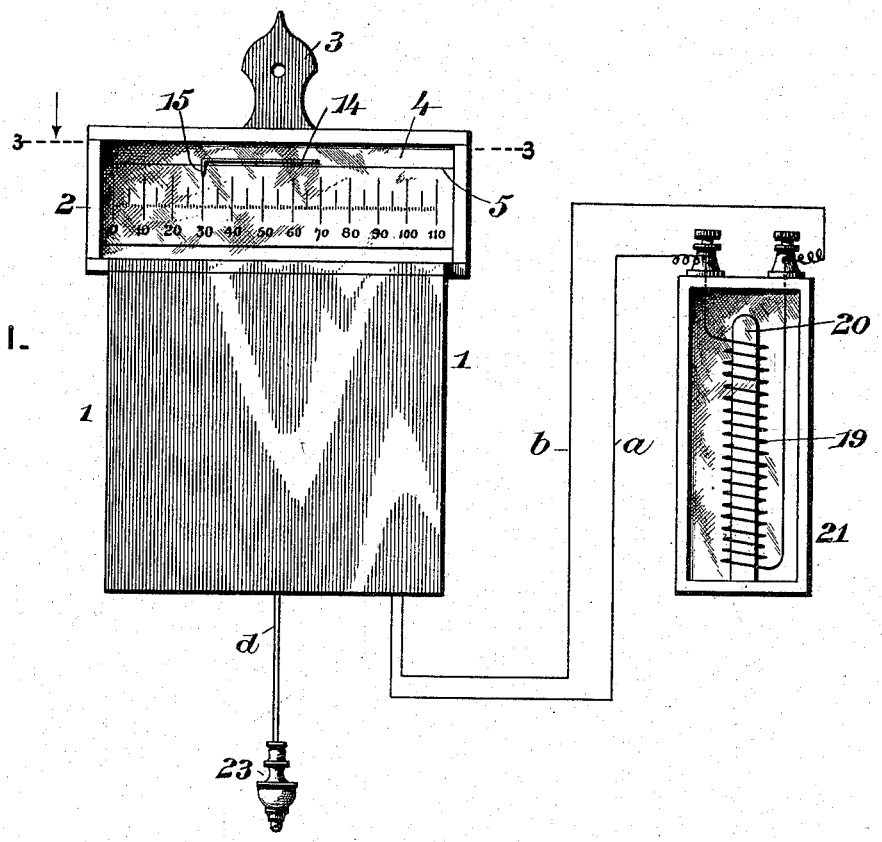
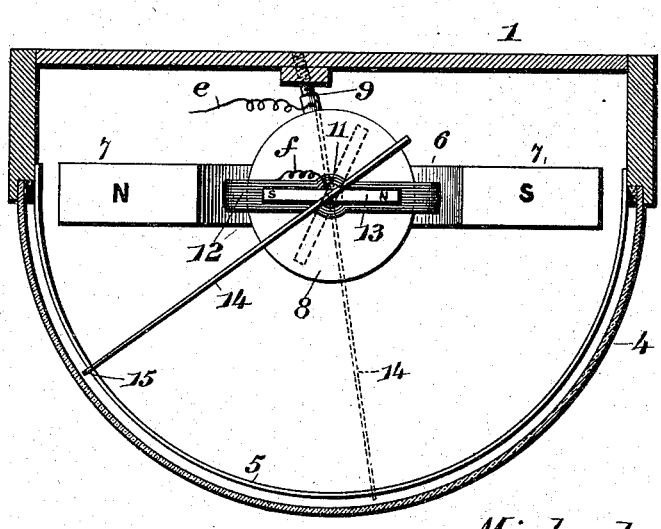


FIG. 3.



Witnesses
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(No Model.)

M. A. AGELASTO.

2 Sheets—Sheet 2.

ELECTRIC THERMOMETER.

No. 571,426.

Patented Nov. 17, 1896.

FIG. 2.

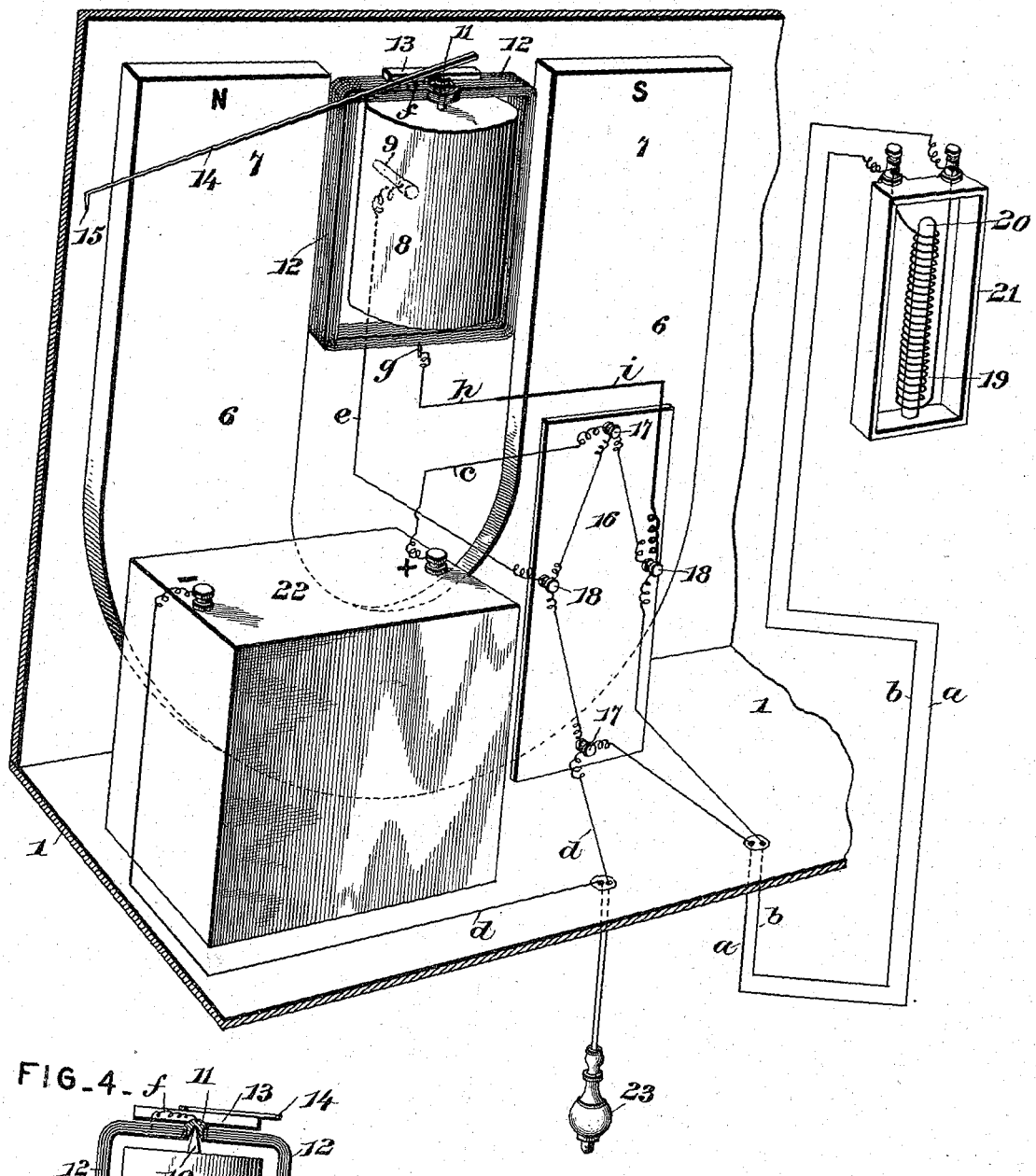

FIG. 4.

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UNITED STATES PATENT OFFICE.

MICHAEL ALEXANDER AGELASTO, OF NORFOLK, VIRGINIA.

ELECTRIC THERMOMETER.

SPECIFICATION forming part of Letters Patent No. 571,426, dated November 17, 1896.

Application filed May 8, 1896. Serial No. 590,722. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL ALEXANDER AGELASTO, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented a new and useful Electric Thermometer, of which the following is a specification.

This invention relates to electric thermometers or thermo-indicators, and it has for its object to provide a simple and practical instrument of this character especially designed for use in hospitals, private residences, hotels, cold-storage warehouses, and the like. To this end the main and primary object of the present invention is to provide a new and useful construction of electric thermometer for determining at any desired place the exact variation of temperature existing at another place or places, and this result is primarily accomplished by the direct influence of heat on the electrical resistance of a coil of fine wire and by the indicating or registering of the variation of current due to the variation of resistance in the thermostatic coil of the instrument by changes in temperature.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a front elevation of an electric thermometer constructed in accordance with this invention. Fig. 2 is an enlarged perspective view of the instrument, the casing being illustrated as broken away. Fig. 3 is a sectional view on the line 3 3 of Fig. 1. Fig. 4 is a detail sectional view illustrating the pivotal support of the movable dead-beat helix on top of the stationary metallic core.

Referring to the accompanying drawings, the numeral 1 designates a suitable case or box provided with an enlarged upper portion 2 and at the top with a bracket extension 3, which bracket extension provides a convenient support for the instrument, whereby the same can be readily hung on a wall or the like. The enlarged upper portion 2 of the case or box 1 is open at its front side and has fitted therein the curved glass front 4, in rear of which, within the box, is arranged the semicircular or curved scale-plate 5, having stamped on its front side, so as to be exposed through the glass front 4, a scale indicating the degrees of temperature which the instrument is capable of registering.

Suitably supported within the case 1 in an upright position is a permanent magnet 6, preferably of a horseshoe type and having the opposite poles 7 thereof disposed toward the top of the case and having arranged therebetween in a fixed position the stationary metallic core 8. The stationary metallic core 8 is preferably of a cylindrical shape and is made of iron, and the said stationary metallic core 8 is provided at one side with a supporting-screw 9, adapted to be fitted in the rear side of the case or box 1 to provide for properly supporting the core in a position between the two opposite poles of the permanent magnet 6.

The stationary metallic cylindrical core 8 has projected from the top side thereof a short pivot-pin 10, on which loosely turns a bearing cup or socket 11, fitted centrally in the upper side of the substantially rectangular movable dead-beat helix 12. The rectangular movable helix 12 comprises closely-bunched coils of wire and loosely encircles the core 8 lengthwise thereof, so as to be free to turn around the core and in the spaces between the core and the opposite poles of the permanent magnet, the pivotal support of the helix on top of the core providing for the delicate balancing thereof, so that the same will readily respond to the slightest fluctuation in the strength of the current passing through the wire of the helix.

The loose pivotally-suspended helix has fixedly secured on the upper side thereof a bar-magnet 13, disposed longitudinally of said upper side of the helix, with the ends thereof normally disposed in a line with the opposite poles of the magnet 6, the adjacent poles of the magnets 6 and 13 being of different polarity, whereby the attraction of the unlike poles of the two magnets will provide for maintaining the dead-beat helix in a proper normal position for holding the pointer 14 at the zero point on the indicating scale. The pointer 14 is secured fast on top of the upper side of the helix 12, so as to move therewith, and at its outer end the pointer is provided with an in-

dicating-finger 15, working over the top edge of the scale-plate 5 and in front of the degree-graduations thereon, so that the movement of the pointer will carry the finger thereof over the scale to indicate the correct temperature of the particular place or places in connection with which the instrument may happen to be employed.

In connection with the movable dead-beat helix 12 is employed a Wheatstone bridge 16, suitably arranged within the box or case 1 at any convenient point, and the said bridge 16 is of an ordinary construction, comprising four resistance-coils, three of which are made of material whose resistance changes very little with variation of temperature. These three resistances, shown in a diamond group, are embedded in material (not shown) which is a bad conductor of heat. The bridge has opposite end terminals 17, and the opposite side terminals 18, intermediate of the said end terminals 17, and the fourth of the resistance-coils of the Wheatstone bridge 16, designated by the numeral 19, forms the thermostatic coil of the instrument and is arranged at a point remote from the other three resistances of the bridge and indicating mechanism mounted within the case or box 1. The said thermostatic coil 19 is preferably supported on an upright core 20 within a tight casing 21, which serves to exclude moisture, dampness, or other foreign influences which would affect the coil 19 within the casing, and the said casing carrying the coil 19 is placed in any convenient position within the room or other place where the temperature is to be taken.

The thermostatic coil 19 of the instrument has its terminals connected with wire connections *a b*, leading, respectively, to one end and side terminal of the bridge 16, so as to complete the usual circuit connections of the bridge, and in the present invention the opposite end terminals 17 of the bridge have respectively connected therewith the battery-wires *c d*, leading to a battery 22, preferably arranged within the case or box 1, or to another suitable source of electrical energy.

One of the battery-wires, designated as *d*, includes in the circuit thereof an ordinary circuit-closer or push-button 23, which is conveniently suspended by the wire *d*, so as to hang below the bottom of the case or box 1 within convenient reach of the operator whenever it is desired for the instrument to indicate the temperature of the place or places where the thermostatic coil or coils of the bridge is located, as will be readily understood by those skilled in the art, it being noted that one instrument can be thrown into circuit by means of a switch with any number of thermostatic coils distributed at different places.

One of the side terminals of the bridge 16 has connected thereto one terminal of a circuit-wire *e*, the other terminal of which is connected with the supporting-screw 9 of the core 8, which is in metallic connection with the said screw. The current which passes through the circuit-wire *e* also passes through the core 8, the pivot-pin 10, and the bearing cup or socket 11, which bearing cup or socket 11 has connected therewith one of the wire terminals *f* of the helix 12, the other wire terminal *g* of which helix has a wire connection *h* with a heavier circuit-wire *i*, which connects with the side terminal 18 of the Wheatstone bridge opposite the terminal with which the circuit-wire *e* connects.

Under conditions during which, in graduation when the four resistances or arms of the Wheatstone bridge are balanced, the current from the minus or negative pole of the battery passes over the wire *d* to the circuit-closer or push-button 23 and thence to the lower end terminal 17 of the Wheatstone bridge. From this point the current then passes through the four resistances of the bridge to the upper end terminal 17 thereof and thence through the battery-wire *c* to the positive terminal of the battery. The conditions which balance the bridge are that the exposed resistance or arm shall be at some constant temperature, zero or below or above zero, depending on the range of temperature the instrument may be constructed for, while the three unexposed resistances or arms, whose resistance varies but little with variation of temperature and which are embedded in a bad conductor of heat, are at the average temperature of the place where the indicating instrument is to be used. As stated, this would be the course of the current when the bridge is balanced under the above conditions, but the exposed resistance-coil 19 of the bridge located at a point remote from the indicating instrument, when exposed to any temperature above or below the temperature at which the instrument was originally balanced, the resistance of said coil is varied and becomes unequal to the resistances of the other three coils of the bridge, thereby unbalancing the bridge and causing a portion of the current to pass through the indicator-circuit *e h i*. The indicator-circuit *e h i* includes the loosely-suspended helix, and in passing through the convolutions or coils of the helix the helix becomes as a magnet, following all the laws of a magnetized body, and the permanent magnet 6 will cause the helix to turn, thereby causing the finger of the pointer to move over the scale and indicate the precise degree of temperature of the place where the thermostatic coil 19 is located. It will of course be understood that the instrument is put in operation by closing the circuit manually at the circuit-closer or push-button 23, which is of an ordinary construction. When the helix is relieved of the current, the same is returned to a proper normal position by the magnet 13, the poles of which are attracted by the adjacent unlike poles of the permanent magnet 6.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described electric ther-

mometer will be readily apparent to those skilled in the art without further description, and it will be understood that various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent, is—

1. In an electric thermometer, a Wheatstone bridge included in a battery-circuit and having one of its resistance-coils isolated at a remote point to form a thermostatic coil, a suitably-arranged scale, a stationary permanent magnet having oppositely-arranged poles, a dead-beat helix or coil pivotally suspended from a fixed point of balance between the poles of the permanent magnet and having circuit-wire connections with the bridge, and a pointer moving over the scale and fitted directly to the dead-beat helix or coil, substantially as described.

2. In an electric thermometer, a Wheatstone bridge included in a battery-circuit and having one of its resistance-coils isolated at a remote point to form a thermostatic coil, a suitably-arranged scale, a stationary permanent magnet having oppositely-arranged poles, a stationary metallic core supported between the poles of the permanent magnet, a pivotally-suspended helix loosely encircling the core between the poles of the permanent magnet and carrying a pointer, and circuit-wire connections between said helix and the Wheatstone bridge, substantially as set forth.

3. In an electric thermometer, a Wheatstone bridge included in a battery-circuit and having one of its resistance-coils isolated at a remote point to form a thermostatic coil, a suitably-arranged scale, a stationary permanent magnet having oppositely-arranged poles, as tationary metallic core supported between the poles of the permanent magnet, a pivotally-suspended helix loosely encircling the core and carrying a pointer, circuit-wire connections between the helix and the bridge, and a readjusting-bar magnet fitted on the helix between the opposite poles of the permanent magnet, substantially as set forth.

4. In an electric thermometer, a case or box provided with an enlarged upper portion having a glass-covered open front side, a curved scale-plate fitted within the front side of the upper portion of the case, a Wheatstone bridge arranged in the case and included in a battery-circuit, one of the resistance-coils of the bridge being isolated at a remote point to form a thermostatic coil, and a magnetically-influenced movable body having circuit-wire connections with the bridge and carrying a pointer provided with a finger moving over the top edge of the scale-plate, substantially as set forth.

5. In an electric thermometer, a Wheatstone bridge included in a battery-circuit and having one of its resistance-coils isolated at a remote point to form a thermostatic coil, a suitably-arranged scale, a stationary permanent magnet having oppositely-arranged poles, a stationary metallic core supported between the poles of the magnet and provided at its upper end with a short pivot-pin, a movable dead-beat helix loosely encircling the stationary core between the poles of the permanent magnet and carrying centrally at its upper side a bearing cup or socket loosely turning on said short pivot-pin, circuit-wire connections between the two terminals of the helix and two opposite terminals of the bridge, a readjusting-bar magnet fitted on the upper side of the helix, and a pointer attached to the helix, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MICHAEL ALEXANDER AGELASTO.

Witnesses:
HENRY B. CONSTABLE,
GEO. W. NEVILLE.