(No Model.) 4 Sheets—Sheet 1.

C. G. HOFFMANN.

TELE-THERMOMETER.

No. 397,548. Patented Feb. 12, 1889.

Fig. 1.

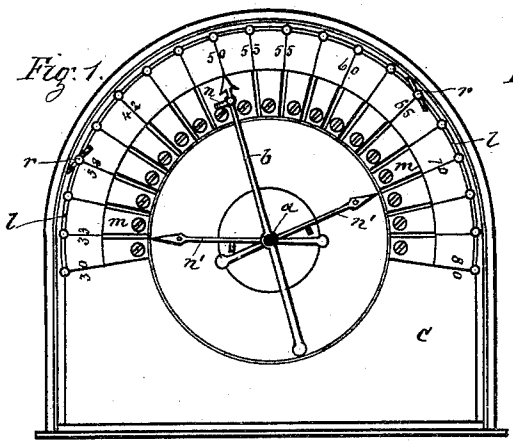


Fig. 2.

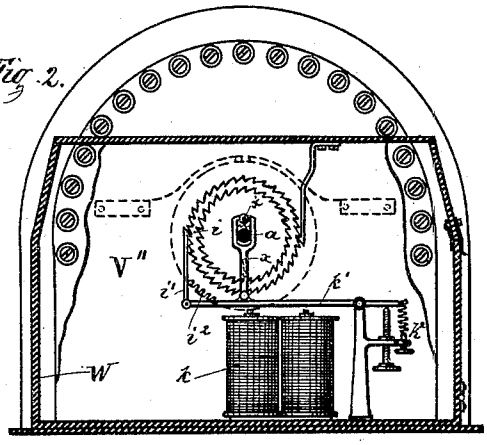
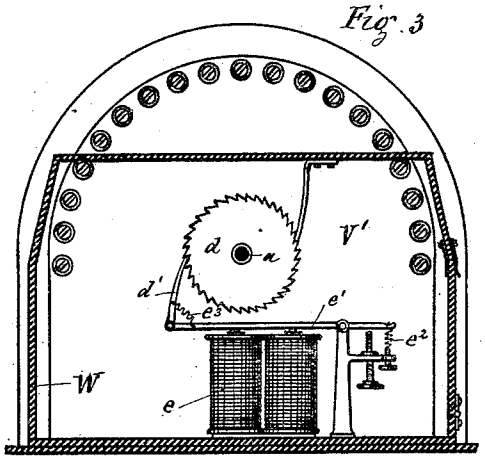


Fig. 3



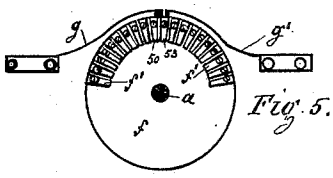


Fig. 5.

Witnesses.
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(No Model.) 4 Sheets—Sheet 2.

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Fig. 7.

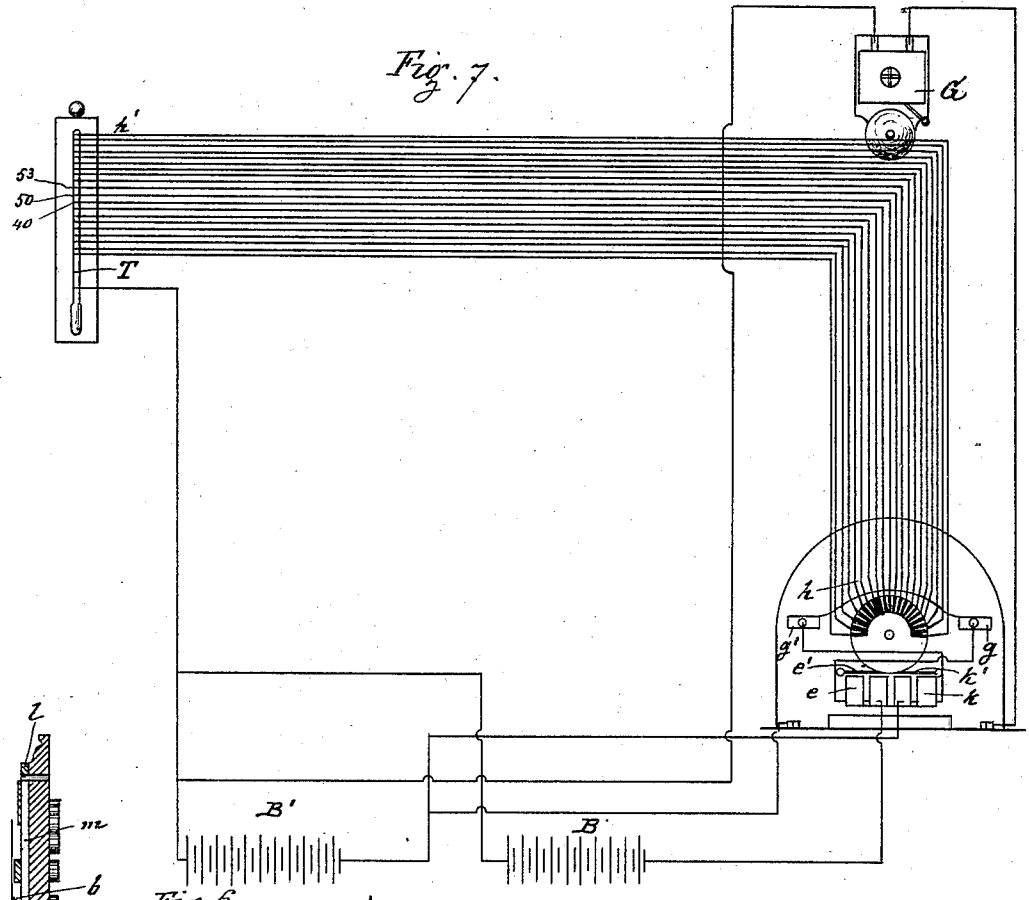


Fig. 6.

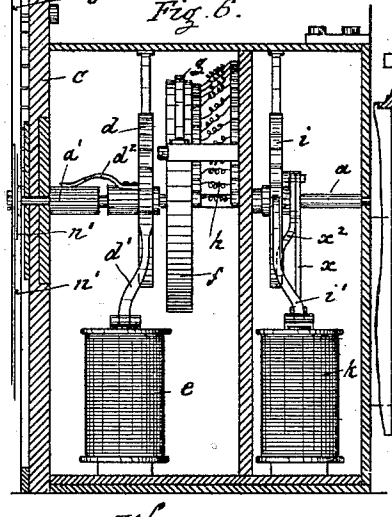
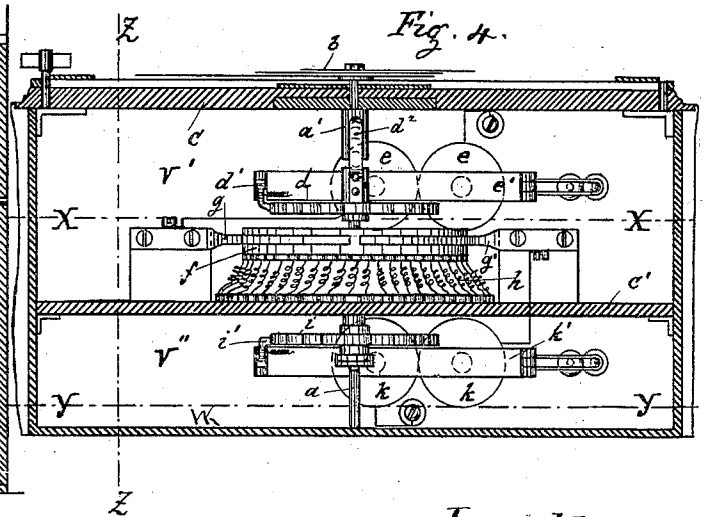


Fig. 4.



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(No Model.) 4 Sheets—Sheet 3.

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TELE-THERMOMETER.

No. 397,548. Patented Feb. 12, 1889.

Fig. 8.

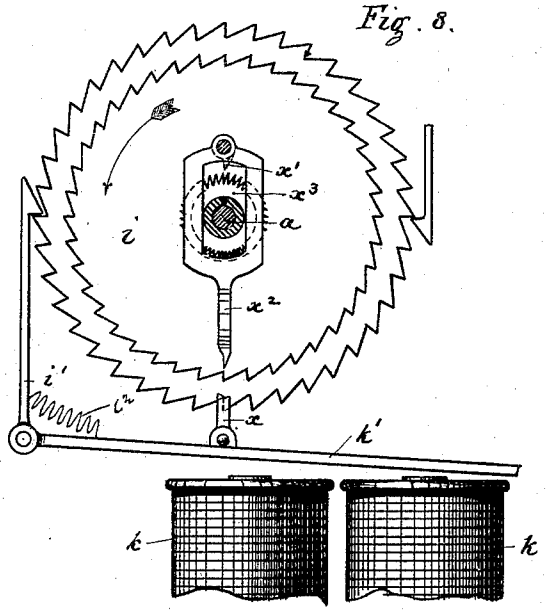


Fig. 9

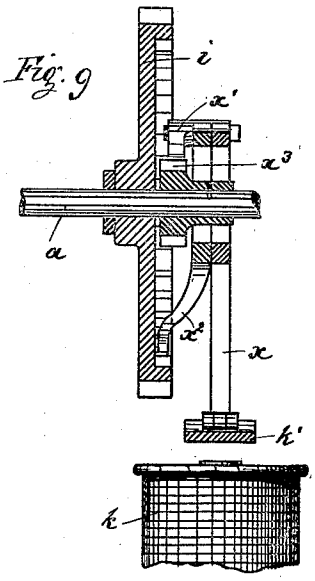


Fig. 10.

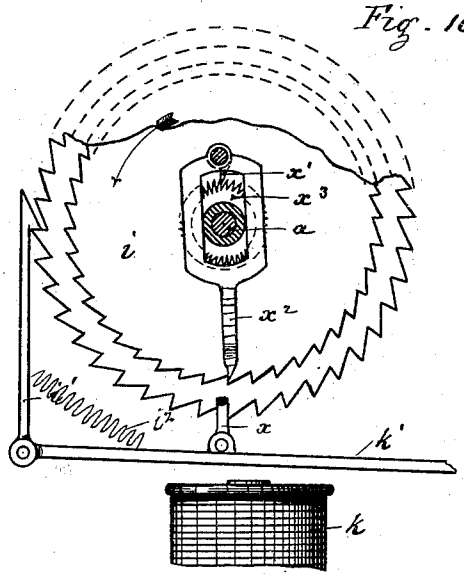
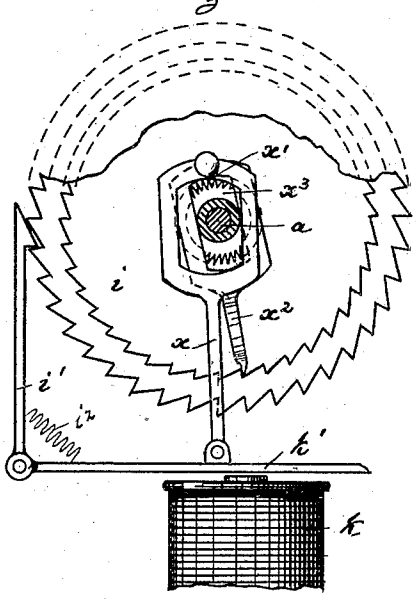


Fig. 11.



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TELE-THERMOMETER.

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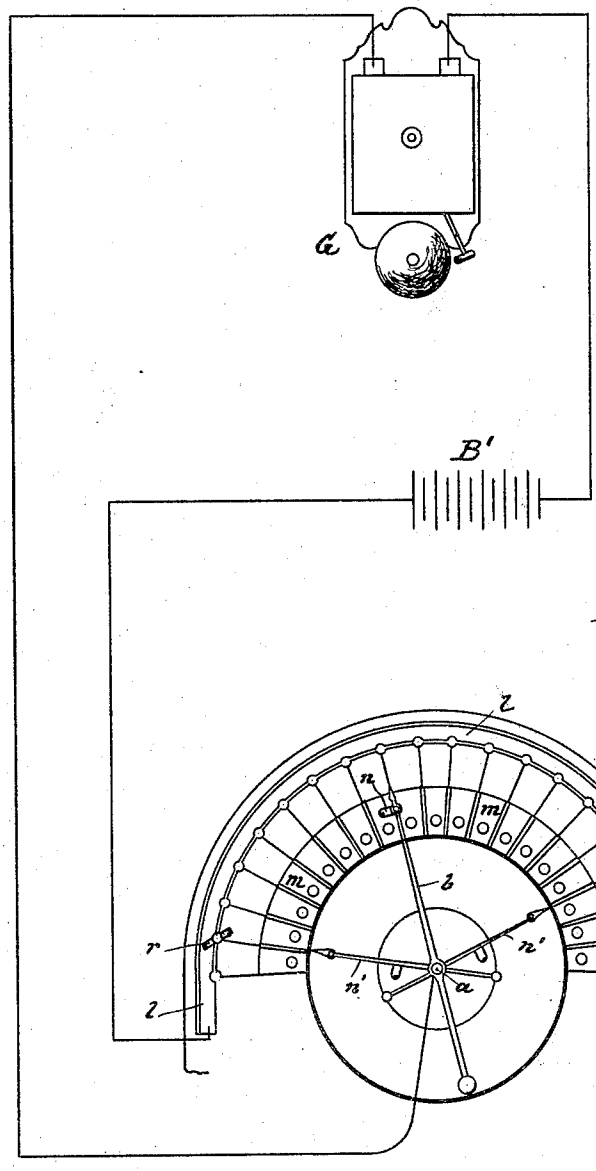


Fig. 12.

Witnesses.
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UNITED STATES PATENT OFFICE.

CARL GUSTAV HOFFMANN, OF LEIPSIC, SAXONY, GERMANY.

TELETHERMOMETER.

SPECIFICATION forming part of Letters Patent No. 397,548, dated February 12, 1889.

Application filed August 14, 1886. Serial No. 210,864. (No model.) Patented in Germany June 12, 1886, No. 39,259; in Belgium September 28, 1886, No. 74,660; in France September 29, 1886, No. 178,779; in England October 1, 1886, No. 12,489, and in Austria-Hungary December 2, 1887, No. 19,063 and No. 56,929.

To all whom it may concern:

Be it known that I, CARL GUSTAV HOFFMANN, of Leipsic, Saxony, Germany, have invented a new and Improved Thermometer-Indicator, (for which I have obtained the following patents: In Germany, No. 39,259, dated June 12, 1886; Belgium, No. 74,660, dated September 28, 1886; France, No. 178,779, dated September 29, 1886; England, No. 12,489, dated October 1, 1886; Austria, No. 19,063, dated December 2, 1887; Hungary, No. 56,929, dated December 2, 1887,) of which the following specification is a full, clear, and exact description.

This invention relates to an apparatus for indicating any change of temperature at a different place from the observer, and at the same time to give an alarm if a certain fixed minimum or maximum temperature is exceeded.

The invention consists of the various elements of improvement hereinafter described.

In the accompanying drawings, Figure 1 is an outside front view of the apparatus. Fig. 2 is a vertical section at line Y Y, Fig. 4. Fig. 3 is a vertical section at line X X, Fig. 4. Fig. 4 is a horizontal plan of the apparatus with the casing in section. Fig. 5 shows part of the mechanism referred to in the specification. Fig. 6 is a vertical cross-section at line Z Z, Fig. 4. Fig. 7 shows the general arrangement. Fig. 8 is an enlarged front view of the gearing shown in Fig. 2. Fig. 9 is a cross-section of the same. Figs. 10 and 11 represent the same as in Fig. 8, only in different positions. Fig. 12 represents a view showing the electrical connection with bell G.

In a suitable case, W, divided into two apartments, V′ V″, by the partition c', a shaft, a, is supported in suitable bearings, carrying the indicator-hand b at its outer end, moving over a marked face-plate attached to the outside wall, c, of the case.

In the apartment V′ of the case a ratchet-wheel, d, is placed loose upon the shaft a, arranged with a pawl-lever, d', hinged to the armature-lever e' of the electro-magnet e, and kept in the teeth of the ratchet-wheel d by means of spring e^3, attached to lever e' and pawl-lever d'. A constant current passes through the electro-magnet e, whereby the lever e' is continually attracted by the same. Upon the hub of the wheel d a spring-lever, d^2, is attached working with its free end upon a ribbed wheel, a', firmly attached to the shaft a in such a manner that any motion of the wheel d is communicated to the shaft a, as well as to a wheel, f, attached to said shaft a behind the wheel d. When the current of the electro-magnet is interrupted, the armature-lever e' will be moved away from the same by the action of a spring, e^2, arranged at the end of said lever e', in consequence of which the pawl-lever d' will be moved upward, so as to turn the ratchet-wheel d one tooth around toward the right, and this motion is communicated to the shaft a and to the hand b. In the apartment V″ of the case a similar mechanism is arranged—viz., an electro-magnet, k, armature-lever k', with spring k^2, and pawl-lever i', with spring i^2 acting upon a ratchet-wheel, i, but so arranged that the current does not pass continually through the electro-magnet, and when the circuit is completed the armature-lever k' will operate the pawl-lever i' so as to turn the wheel i, and consequently the shaft a, in the opposite direction, or toward the left. (See Fig. 2.) The wheel i is likewise loose upon the shaft a, and the motion of the wheel i is communicated to the shaft a, as follows:

To the armature-lever k' a lever, x, Figs. 8 and 9, is hinged, the upper end of which surrounds the shaft a. To this upper end a tooth or projection, x', is attached, placed above a small tooth-wheel, x^3, attached to the shaft a. As soon as the armature-lever k' is attracted by the electro-magnet k, and is consequently moved downward, this tooth x' engages with a tooth in the wheel x^3. At the same time a spring, x^2, attached to the lever x, engages a tooth in the inside of the wheel i, whereby the loose ratchet-wheel i will be firmly coupled with the shaft a, and any motion given to the wheel i will be communicated to this shaft a. At the same time the friction of the spring-lever d^2 upon the ribbed wheel a' will be overcome, so as to allow the shaft a to turn, together with the hand b, toward the left.

The wheel f is made of wood or other non-

conducting material, and is provided at its circumference with a series of metal plates, f', corresponding in number to the number of points or degrees on the thermometer or with the number of platina wires connected with the thermometer. (See Fig. 5.) From each metal plate f' a well-insulated wire, h, is conducted to the partition c' in the case W, each wire being of such a length as to allow a free motion of the wheel f toward the right or toward the left, as may be required. From this partition c' the wires are conducted to the thermometer T and connected to the several platina wires h' attached to the thermometer. (See Fig. 7.)

At the periphery of the wheel f spring-levers g g' are arranged, the end of the lever g being of sufficient width to be always in contact with two of the metal plates f', while the end of the lever g' is of such a width as to come in contact only with one of said metal plates f'.

As above mentioned, every platina wire of a certain degree on the thermometer is connected with a corresponding metal plate f' on the wheel f—as, for example, the wire from 48° on the thermometer with corresponding metal plate, 48, on wheel f, from 50° on the thermometer with plate 50 on wheel f, &c. When the thermometer indicates 50°, a current passes through the positive pole of battery B and electro-magnet e and from there to lever g to the metal plate 50 on wheel f, with which said lever g is in contact, then through its corresponding wire h to the platina wire h' in the thermometer corresponding with 50°, through the mercury column and back to the negative pole of battery B. The end of the lever g' is during this time in contact with the metal plates f' corresponding with and connected to wire of 53°. When the temperature rises to 53°, a current passes from the positive pole of battery B′ through electro-magnet k to the lever g', through the metal plate 53 on wheel f to the corresponding wire on the thermometer at 53°, and then through the mercury column and back to the negative pole of battery B′.

The electro-magnet k attracts then the armature-lever k', which by its downward motion produces a connection between shaft a and wheel i, as above described, and acts at the same time upon the wheel i so as to turn the same one tooth toward the left, moving thereby the hand b on the face-plate to indicate 53. At the same time the wheel f is turned with the shaft a the distance of one metal plate f' to the adjoining metal plate. The lever g' comes thereby in contact with plate f' corresponding with 55, and the lever g is in contact with the metal plates corresponding with 53 and 55. In consequence of the lever g being in contact with two metal plates the circuit of the electro-magnet e will not be disturbed by this turning to the left of the wheel f, and consequently no motion will be communicated to the wheel d. The current of the electro-magnet k is then interrupted, the spring k^2 raises the other end of the armature-lever k' and disconnects at the same time the tooth x' from the wheel x^3, and consequently disconnects the shaft a from the wheel i, lifting at the same time the pawl-lever i' to the next tooth in wheel i, ready for the next operation. When the temperature falls below 53°, the current of the electro-magnet e will be interrupted, (as there will be no circuit to plates f' corresponding with 53 or 55,) the armature-lever e' will be acted upon by spring e^2 so as to cause the pawl-lever d' to act upon the wheel d and turn the same one tooth toward the right. The spring-lever d^2 acts at the same time on the wheel a' to turn the shaft a and hand b in the same direction, so that the hand b will indicate again 50 on the index. At the same time the wheel f is turned a corresponding distance, so that the lever g comes in contact with metal plates f' corresponding to 50 and 53. The current still passing through plate f' corresponding with 50°, the electro-magnet e will act upon the armature-lever e' until the next falling or rising of temperature. This operation takes place at each change of temperature from one platina wire to the adjoining one.

On the face of the casing where the different degrees are indicated small metal plates m are inserted, over which a spring, n, attached to the handle b, slides. Each of these plates can be connected through a pin or bolt, r, with a metal bar, l, Fig. 1.

Suppose that connection is made between 38 and 65 and the bar l, then as soon as the spring n comes in contact with either of the corresponding metal plates, m, a current will pass from battery B′ through the bar l, plate m, hand b, and metal parts of the casing to the bell G, Fig. 7, and back to battery B′, in consequence of which the bell G will sound an alarm.

To indicate the highest and lowest degrees of temperature obtained during the day, small hands n' n' are placed upon the shaft a, capable of being moved by the hand b when the same turns toward the right or toward the left, but not turning with said hand b when the same recedes. By this arrangement the highest and lowest degrees of temperature during a certain time will be indicated. These hands n' n' must be moved close up to the hand b every day.

With this apparatus the variations of temperature at a distance can likewise be marked upon a sheet of paper having a regular and continuous motion from a clock-work communicated to the same by adding a friction-wheel to the shaft a, which operates a horizontal rod having at its end a pencil bearing upon this paper, and producing thereby a line which, when the paper is regularly divided, will indicate the variations.

I claim as my invention—

1. In combination with a thermometer, T,

connected through wires at various points with metal plates f', attached to a wheel, f, fast to a shaft, a, the loose wheels d i, with means of connecting the same with the shaft a, pawls d' i', armature-levers e' k', springs e^2 k^2, and electro-magnets e and k, and indicator-hand b, attached to shaft a, arranged to operate in combination with batteries B B', in the manner and for the purpose described.

2. In combination with wheel f, provided with metal plates f' around its circumference, connected through wires with a thermometer, the spring-levers g g', electro-magnets e k, and batteries B B', substantially as and for the purpose specified.

3. The combination of bar l and metal plates m on the face of the casing, the connecting pins or stops r, hand b, with spring n, in contact with said plates m, with an alarm, G, and battery B, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL GUSTAV HOFFMANN.

Witnesses:
EDMUND BACH,
MAX MATTHÄI.