(No Model.) 2 Sheets—Sheet 1.

W. F. BREWSTER.

RECORDING THERMOMETER.

No. 373,719. Patented Nov. 22, 1887.

Fig. 1.

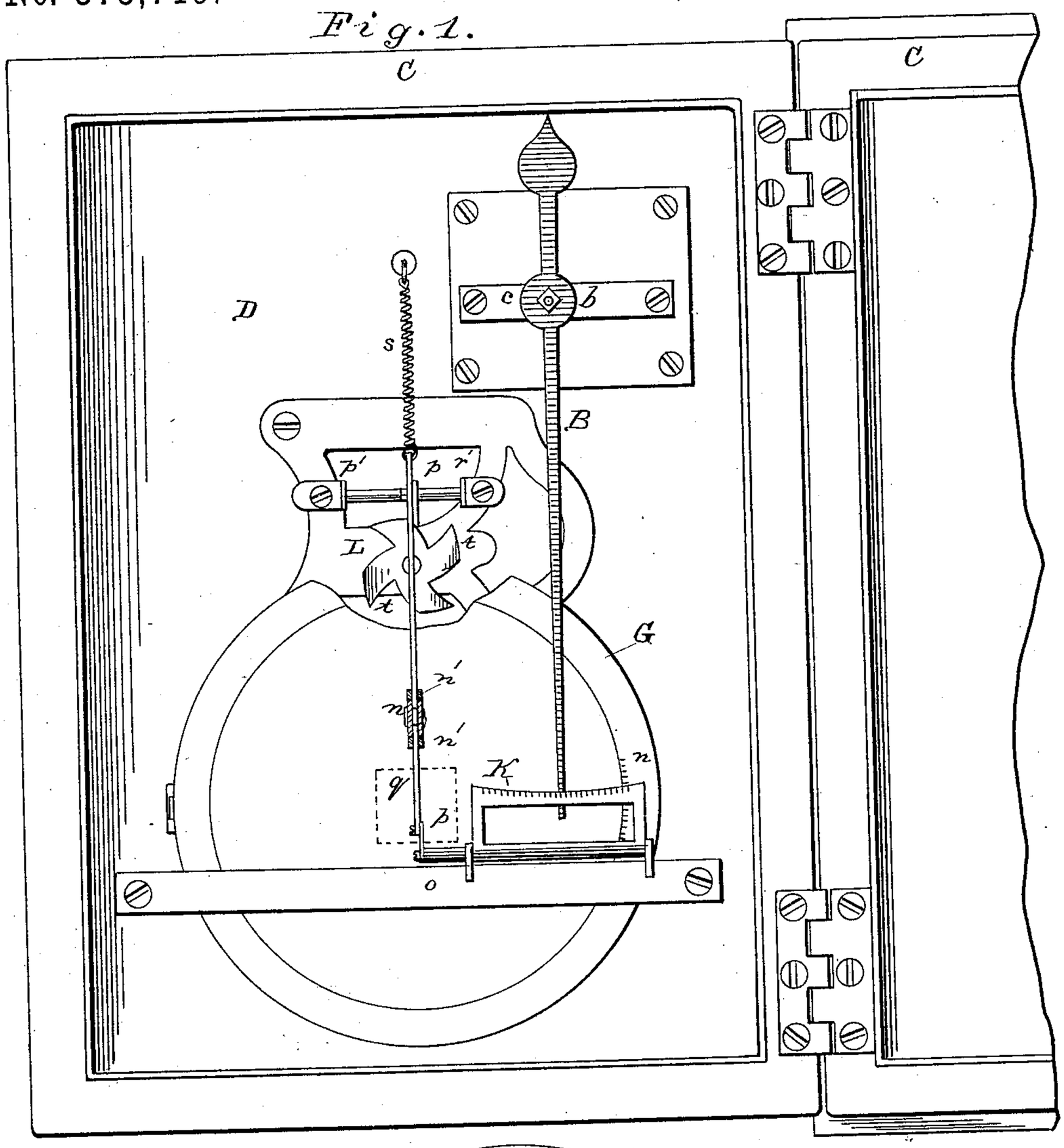
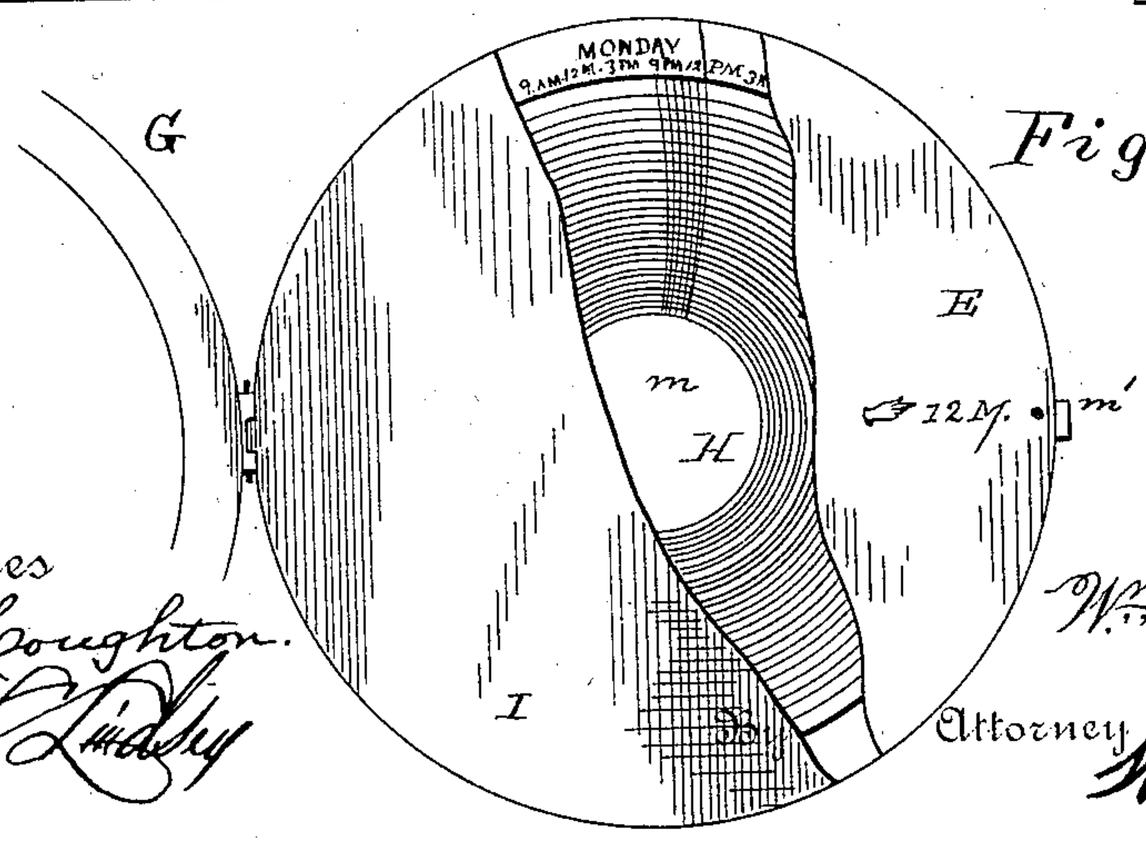


Fig. 2.



Witnesses
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A. J. Lindsley

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(No Model.)

2 Sheets—Sheet 2.

W. F. BREWSTER.

RECORDING THERMOMETER.

No. 373,719. Patented Nov. 22, 1887.

Fig. 3.

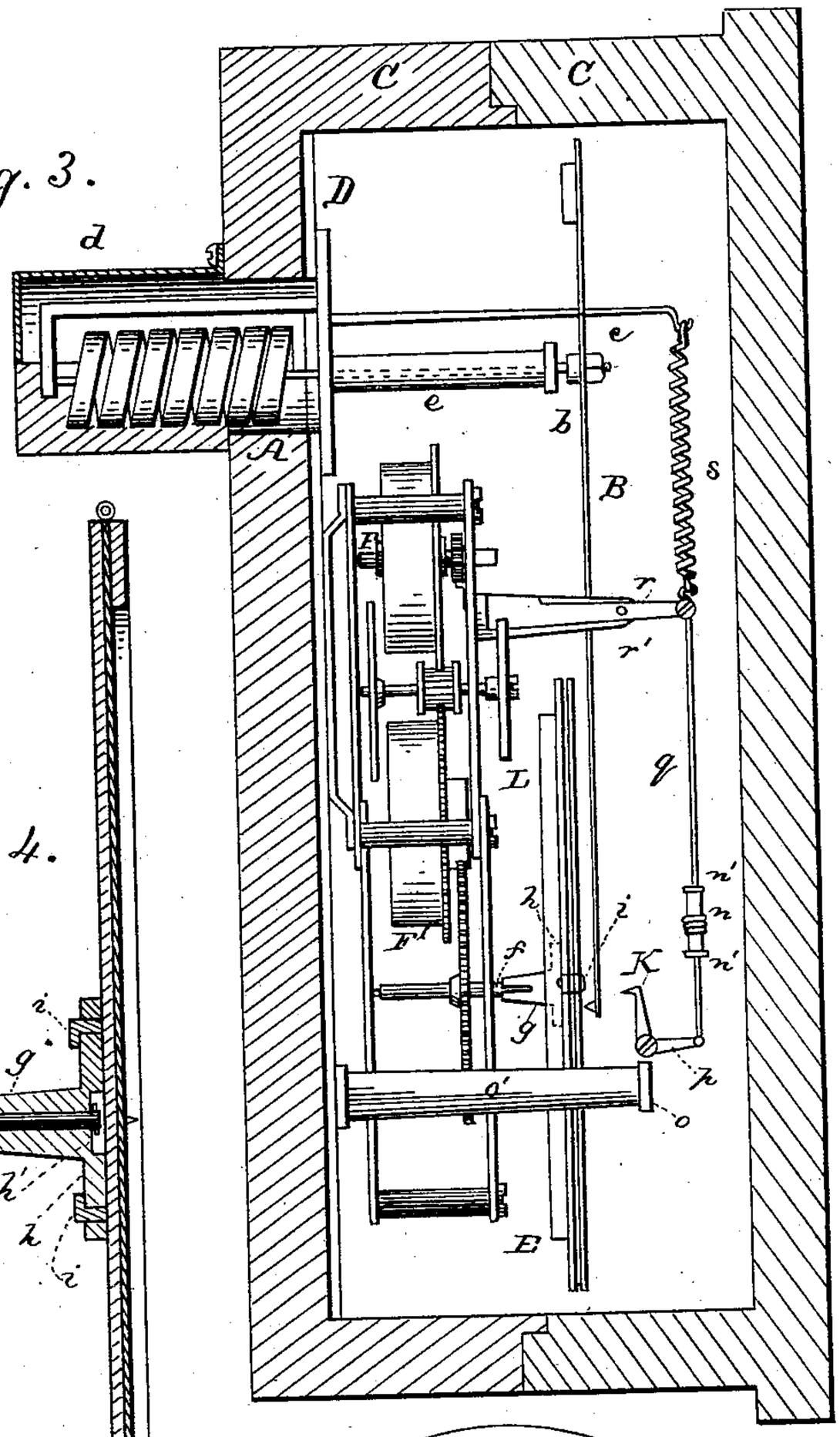

Fig. 4.

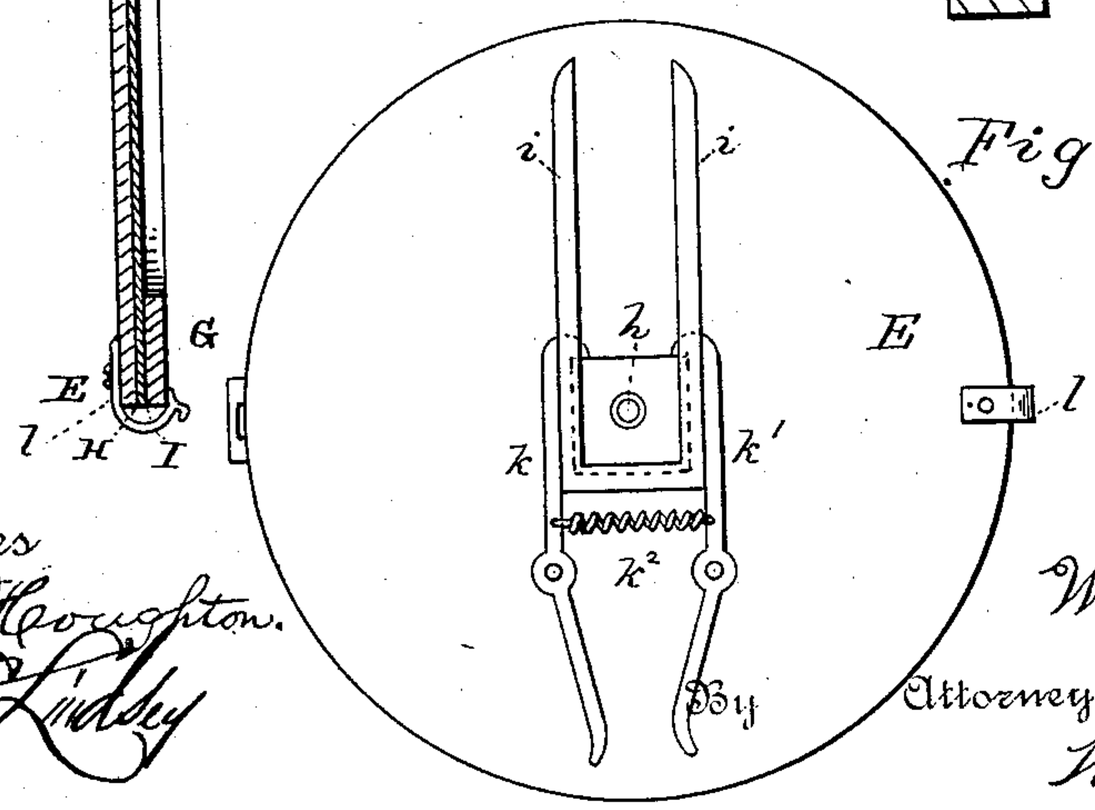

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM F. BREWSTER, OF EAST ORANGE, NEW JERSEY.

RECORDING-THERMOMETER.

SPECIFICATION forming part of Letters Patent No. 373,719, dated November 22, 1887.

Application filed December 8, 1886. Serial No. 220,050. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. BREWSTER, of East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Recording-Thermometers, of which the following is a specification.

The object I have in view is to produce a practically-operative recording-thermometer which will be sensitive and accurate in its action, will produce a clear record, and will be capable of proper adjustment.

In carrying out my invention I provide a recording-dial revolved by clock-work with an exceedingly slow movement, and making one complete revolution in any desired interval of time—say, for example, in one week—for which length of time the clock-work will run with one winding. A style travels across the face of this dial from its center to its periphery, and is carried directly by a shaft from the free end of a bimetallic helical thermometer, which gives the necessary amplitude of movement by its direct action. The point of the style does not touch the recording-surface of the dial; but at short intervals it is depressed by the action of the driving clock-work and perforates or indents the recording-surface or marks it if the point of the style is a pencil or pen. I cover the recording surface with a sheet of carbon paper, such as is used for duplicating written matter. The pressure of the style upon the carbon paper marks the recording-surface beneath. The depression of the style is accomplished at such short intervals relatively to the speed of the dial—say once every fifteen minutes—that the record is practically a continuous line. The dial-plate is arranged for removal from its driving-stud, so that the recording-surface and carbon paper can be conveniently replaced, and this dial-plate is also adapted to be readily adjusted or turned by hand on its driving-stud independent of the clock-work, in order that the dial may be properly set at starting the instrument. To permit the proper adjustment of the dial-plate it is provided with a point marked for some hour—say 12 m.—by which the recording-sheet will be placed upon it, the same hour on the recording-sheet of the day on which the instrument is started being made to register with the point marked on the dial-plate. This sheet is then covered by the carbon paper and a hinged clamping-ring closed upon it, which ring is provided with a time-scale having a central mark corresponding with the mark on the dial and hour-marks for half a day on each side of this central mark, so that, although the recording-surface is hidden by the carbon paper, the dial can be set by a watch to the correct hour at starting. The style is attached adjustably to the thermometer-shaft by a nut or otherwise, and a thermometric scale on the hammer which depresses the point of the style furnishes the guide by which the style can be set with reference to a standard thermometer, and also shows the temperature at any time while the instrument is working without removing the carbon paper from the recording-sheet. The hammer for depressing the point of the style is a pivoted flap, which is thrown forward by a spring and strikes the style at or near its point a sudden blow, which causes the point of the style to strike the carbon paper and then to rebound therefrom, clearing the surface so as not to retard the clock-work. The hammer is lifted through levers by a cam driven by the clock-work, and clears the style almost immediately, or at least a sufficient time before it completes its upward movement, to permit the thermometer to freely vary the position of the style before the hammer again strikes it. A means for finely adjusting the length of a link connecting the hammer with the operating-cam is provided, so that inaccuracies in fitting may be compensated for and the hammer brought into proper relation with the style.

In the accompanying drawings, forming a part hereof, Figure 1 is a front view of the recording-thermometer, with the case open and the dial broken away to show the lifting-cam; Fig. 2, a face view of the dial-plate, with the recording-sheet and carbon paper broken partly away; Fig. 3, a side view of the thermometer mechanism, the case being in section; Fig. 4, a section through the dial-plate, its covering-sheets, and supporting-sleeve; and Fig. 5, a back view of the dial-plate.

A is a bimetallic helical thermometer held stationary at its outer end by a post, *a*, and connected at its inner free end directly with a shaft, *b*, which carries on its other end the style

B. The shaft *b* is in line with the axis of the helical thermometer, while the style B extends at right angles to said shaft, the style being moved by the direct action of the helical thermometer. The style is adjustably secured to the end of the shaft by a nut, *c*, or other device.

The inclosing-case C of the thermometer is made to open. Within it is secured the base-plate D, upon which the parts of the thermometer mechanism are mounted. The helical thermometer A projects outwardly from the back of the plate D (from which the post *a* is supported) through the case, and is protected by a shield, *d*, made partly or wholly of wire-gauze. The thermometer-shaft *b* projects through a guiding-post, *e*, extending inwardly from the base-plate D, and the style is mounted on this shaft, where it projects beyond such guiding-post.

E is the dial-plate, which is driven by the clock-work F, also mounted on the base-plate D. The driving-stud *f* of the clock-work passes through a split friction-sleeve, *g*, which is held from pulling off of the stud by a pin, *h'*. The friction-sleeve *g* carries a slide-plate, *h*, which slides in dovetail ways *i* on the back of the dial-plate, being held by spring-catch levers *k k'*, which snap back when the dial-plate is pushed on the slide-plate *h*, but can only be released by pressing their outer ends together against the strain of the spring k^2. To the dial-plate is hinged a clamping-ring, G, held by a snap, *l*. The dial-plate has a central pin, *m*, and a pin, *m'*, at its periphery for securing the marked recording-sheet H. The pin *m'* is marked on the dial as representing a certain hour—say 12 m. The hinged clamping-ring has a time-scale, *n*, on its edge above the pin *m'*, with a central line corresponding with the pin *m'*, and hour-marks on opposite sides of the central mark. The recording-sheet H has its surface printed in the way well understood, with curved radial lines and with concentric circles, the curved radial lines representing divisions of time and the concentric circles divisions of temperature. The periphery of the sheet is printed with the days of the week and with the hours of each day.

I is the sheet of carbon paper, which is placed over the recording-sheet before the clamping-ring is closed upon the dial-plate.

K is the hammer. This is a flap pivoted to a bridge-piece, *o*, extending across the dial-plate and supported by posts *o'* from the base-plate D. The hammer extends over a sufficient surface of the dial to cover the point of the style at all times. On the outer face of the hammer is a thermometric scale, which serves as a guide whereby the style can be set with reference to a standard thermometer, and also shows the temperature at any time while the instrument is working without removing the carbon paper from the recording-sheet. A crank-arm, *p*, projecting outwardly from the hammer, is connected by a link, *q*, (extending parallel with the base-plate D,) with a lever, *r*, arranged perpendicular to the base-plate. This lever *r* is pivoted between posts *r'*, and is retracted by a spiral spring, *s*. A cam-wheel, L, having cam-teeth *t* and driven by the clock-work, engages with the inner end of the lever *r* and acts to move it against the tension of the spring *s*, and in doing so to lift the hammer K. When the point of one of the teeth *t* passes the lever *r*, the spring *s* throws this lever forward into the next notch of the cam-wheel, and the hammer strikes the style near its point, with the result before explained.

The link *q* is made in two parts, as shown, connected by a sleeve, *u*, having right and left hand screw-threads engaging with similar screw-threads on the adjoining ends of the two parts of the link. By turning the sleeve *u* the length of the link *q* can be adjusted. Jam-nuts *u'* may be employed to lock the sleeve *u*.

What I claim is—

1. The combination, with a circular dial-plate, mechanism for revolving the same, and a recording-sheet on said plate, of a helical bimetallic thermometer, a shaft secured directly to the free end of said thermometer and thereby rotated, a style secured at right angles to said shaft, and a marking-point at the end of said style, the extremity of the style carrying said point being disposed and vibrating in front of said dial-plate, and the said point being turned toward said dial-plate and adapted to bear upon said recording-sheet, substantially as described.

2. The combination, with a circular dial-plate, mechanism for revolving the same, and a recording-sheet on said plate, of a helical bimetallic thermometer, a shaft secured directly to the free end of said thermometer and thereby rotated, a style secured at right angles to said shaft and disposed in front of said dial-plate, a marking-point at the end of said style, turned toward said dial-plate, and a hammer, the end of said style carrying said point being interposed between said hammer and said dial-plate, and the hammer being mechanically connected to said dial-revolving mechanism, and thereby caused intermittently to strike said style and move said marking-point into contact with said recording-sheet, substantially as described.

3. The combination, with the circular dial-plate E, clock-work mechanism L, recording-sheet on said plate, and a carbon or transfer sheet, I, covering said recording-sheet, of the helical bimetallic thermometer A, shaft *b*, style B, rigidly connected at right angles to said shaft, marking-point at the extremity of said style, hammer K, and mechanism between said hammer and clock-work mechanism, whereby motion from said clock-work is communicated to said hammer, to cause it intermittently to strike said bar and thereby to press said point into momentary contact with said carbon sheet, substantially as described.

4. In a thermometric recording mechanism, the combination, with a thermometer, a style

moved thereby, a clock-work mechanism, and a time-dial, of a pivoted hammer striking the style at intervals, a cam driven by the clock-work and connected by levers and a link with such hammer, and means for adjusting the length of said link, substantially as set forth.

5. The combination of the thermometer A, style B, clock-work mechanism L, dial E, actuated thereby, and an independently-supported thermometer-scale, the said style being interposed and vibrating between said scale and said dial, substantially as described.

6. The combination of the thermometer A, style B, clock-work mechanism L, dial E, actuated thereby, bridge-piece *o*, and hammer K, supported upon said bridge-piece and having on its outer face a thermometric scale, the said style being interposed and vibrating between said hammer and said dial, substantially as described.

7. The combination of the thermometer A, style B, clock-work mechanism F, dial E, and cam L, actuated by said clock-work, and hammer K, link-rod *q*, lever *r*, and spring *s*, substantially as described.

8. The combination of the thermometer A, style B, clock-work mechanism F, dial E, and cam L, actuated by said clock-work, and link-rod *q*, lever *r*, spring *s*, and hammer K, the said hammer being provided with a thermometric scale on its outer face, substantially as described.

9. The combination of the thermometer A, style B, clock-work mechanism F, dial E, and cam L, actuated by said clock-work, and link-rod *q*, lever *r*, spring *s*, bridge-bar *o*, and hammer K, supported in bearings on said bridge-bar, substantially as described.

10. The combination of the dial-plate E, clock-work mechanism F, clamping-ring G, pins *m m'*, and time-scale *n* on the said clamping-ring, substantially as described.

This specification signed and witnessed this 7th day of December, 1886.

WILLIAM F. BREWSTER.

Witnesses:
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E. C. ROWLAND.