

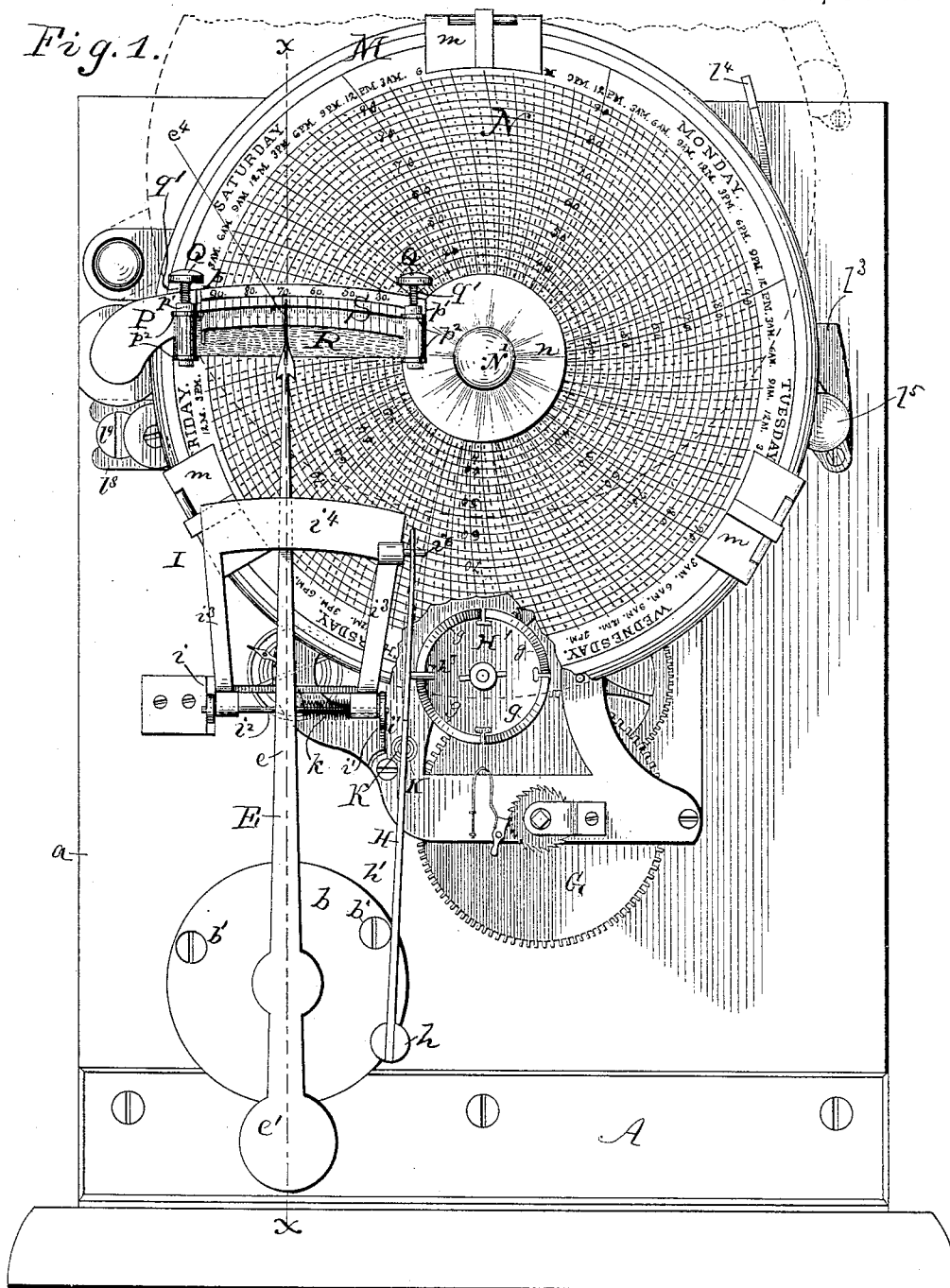
(No Model.)

3 Sheets—Sheet 1.

W. F. BREWSTER.
RECORDING THERMOMETER.

No. 392,310.

Patented Nov. 6, 1888.



Witnesses,

William Goebel.
O. O. Dietrich.

Inventor,

William F. Brewster

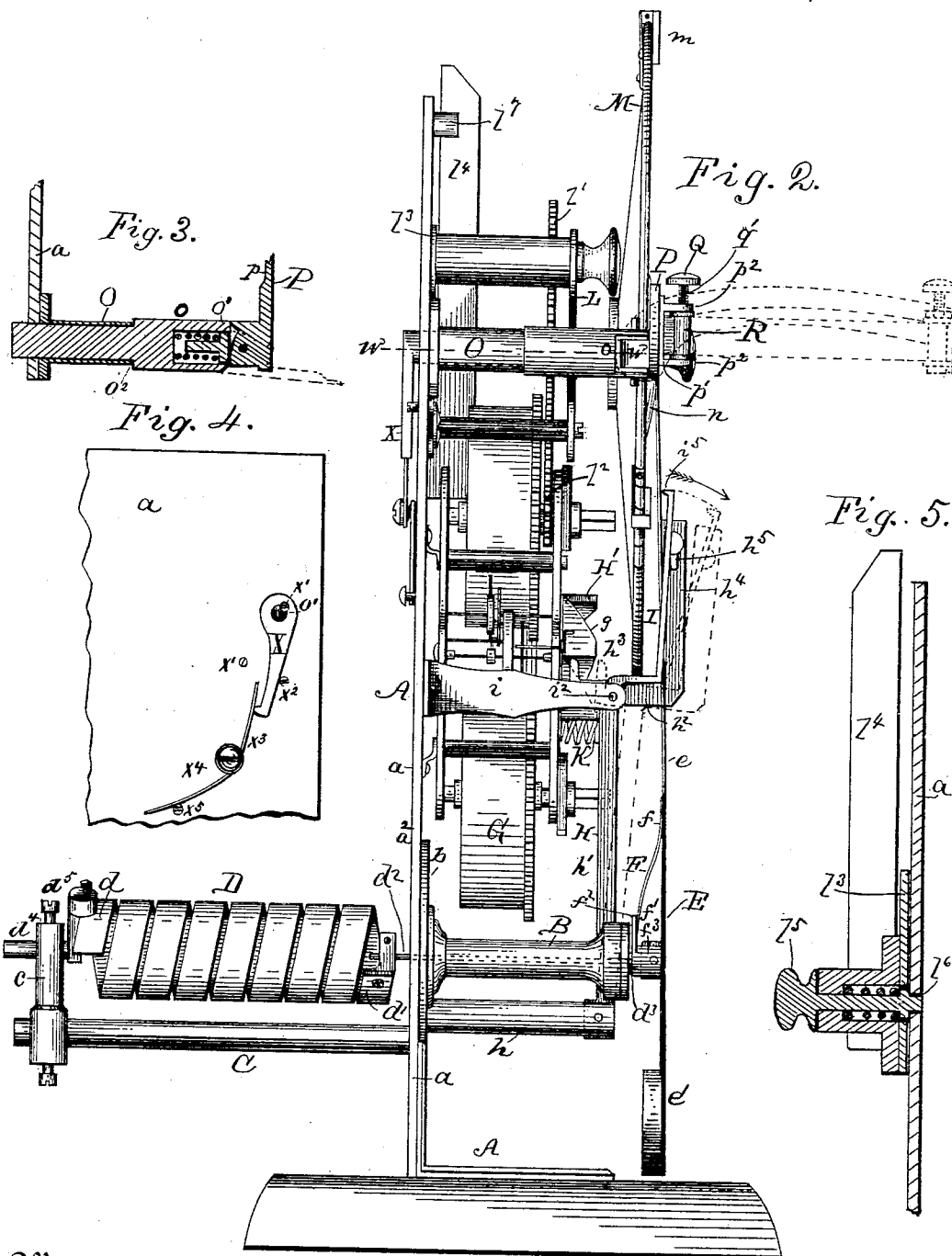
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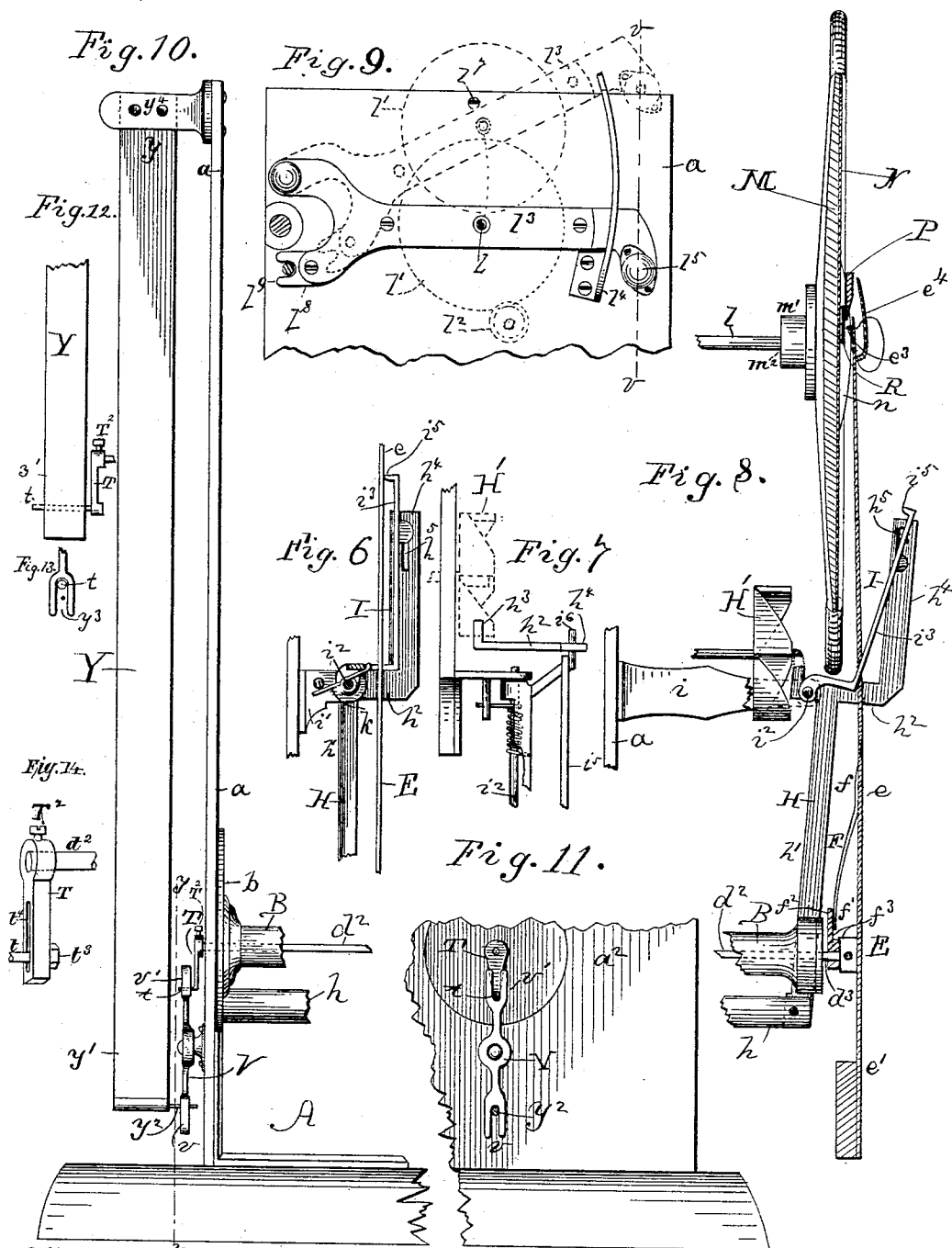
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3 Sheets—Sheet 3.

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RECORDING THERMOMETER.

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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. 392,310, dated November 6, 1888.

Application filed January 11, 1888. Serial No. 260,400. (No model.)

To all whom it may concern:

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

This invention relates to improvements in what are known as "recording-thermometers"—that is, thermometers which make on a sheet or tablet a record of the temperature during a given period of time, so that they can be adjusted, and during or at the end of any such period of time the temperature of any particular point of time in such period can be told at a glance upon the sheet or tablet, and, as usually constructed, such record can be preserved for future reference, if so desired.

The present improvements consist in certain details of construction whereby such thermometers are rendered more certain in operation, more convenient in use, defects are remedied, and advantages are obtained, and they relate more particularly to and consist more especially in, first, a holder carrying a marking medium—such as an inked or carbonized ribbon or sheet—said holder being so constructed and arranged that it is independent of and does not move with the recording-sheet when the latter is moved in making a record; second, a movable holder carrying a marking medium—such as an inked or carbonized ribbon or sheet—said holder being so constructed and arranged that it is independent of and does not move with the recording-sheet when the latter is making a record, and with the marking medium can be moved away from its position, so that the recording-sheet may be more readily changed or adjusted in position; third, a compound lever for causing the point or stylus (which is brought into contact with the marking medium and recording-sheet to produce a record) to move a greater distance in the same space of time, thus striking a quicker blow and lifting more quickly after the blow has been struck, and also enabling the point at which the lever is secured to the frame to be at greater distance from the cam which actuates said lever, and thus requiring less power for its operation; fourth, a spring-buffer for giving a quick rebound to the stylus-arm; fifth, the spring-connection of the stylus-arm to the free end of the bimetallic thermometers, so that the arm will move readily toward and away from the recording-sheet when making a record; sixth, a pivoted recording-sheet-supporting frame, whereby the frame can be swung up to allow access to the clock mechanism or when placing a new sheet thereon.

In the annexed drawings, Figure 1 is a front view with a portion of the recording-sheet broken away to give a better view of the connection between the hammer mechanism and clock-work which moves the recording-sheet. Fig. 2 is a side view; Fig. 3, a detail section on line *vv*, Fig. 2; Fig. 4, a detail rear view; Fig. 5, a section on line *vv*, Fig. 9. Fig. 6 is a side view, and Fig. 7 a top view, of the striker-springs; Fig. 8, a sectional and side view of a portion of the device; Fig. 9, a side view looking at the inside of the back wall; Figs. 10, 11, 12, 13, and 14, modifications.

The letter A represents a portion of the case which is to contain the various parts of the mechanism. The back wall, *a*, is preferably a metallic plate, upon which the various parts of the mechanism are fastened. In the wall *a* of the case is cut a hole, *a'*, in which is countersunk the flanged end *b* of a post, B, by means of screws *b'*, Fig. 1. Projecting rearwardly from this post B is the bracket C, having the vertical arm *c*. To this arm *c* is secured one end, *d*, of a bimetallic helical thermometer, D, the other end, *d'*, of which is connected to a shaft, *d''*, which passes through the post B and carries on its projecting end *d'''* the arm E, having the lower shorter weighted portion, *e'*, and the upper longer portion, *e*. To the top of this arm, on the under side, is secured a pin or stylus, *e''*, and to this top is also secured a finger, *e'*, which projects up beyond the end of the upper longer portion, *e*, and serves as a pointer or indicator; or the finger *e'* may be omitted.

In the drawings I have shown the arm E as being connected to the shaft *d''* at a right angle thereto, which I consider the preferred form; but it will be manifest to any mechanic that the arm might be connected to the shaft at an angle other than a right angle and yet have it serve its purpose.

To the rear side of the arm E there is rigidly secured the upper end, f , of a spring, F, the lower end, f' , of which bears loosely against a stud, f^2 , upon a sleeve, f^3 , which is 5 keyed to the shaft d^2 between the arm E and the post B.

Secured to the wall a back of the arm E is the recording mechanism, the clock portion G of which is of the ordinary construction, and 10 which carries the operative cam-wheel H'. This cam-wheel H' has the four cam-surfaces g , such surfaces being given a curvature which makes them quick cams, so as to quickly lift the lever H and form a crown-wheel with cam-teeth. Below the clock mechanism a post, h , 15 projecting from the wall a , has pivoted to it the lever H, which is one portion of the compound lever. This lever has the stem h' , the cross-bar h^2 , finger h^3 , and top arm, h^4 , provided with the vertical slot h^5 , the finger h^3 projecting across the face of the cam-wheel H' and in the path of the several cam surfaces or teeth.

Secured to the wall a is a bracket, i , and 25 to the frame of the clock mechanism another bracket, i' . To these brackets is secured a rod, i^2 , on which are hinged the arms i^3 i^4 , one at each end of the rod i^2 , and a cross-bar, i^4 , connecting the free ends of the arms, 30 forming the hammer or striker I. The lever H and the hammer or striker I form a compound lever. This cross-bar has a sharp edge, i^5 , and the hammer or striker is so arranged on the rod i^2 that the striker is on the side of 35 the arm and stylus away from the recording-sheet. A pin, i^6 , enters the slot h^5 . Surrounding the rod i^2 is a spiral spring, k , one end of which bears on the striker or hammer I and the other end against the bracket i' . 40 This spring is arranged so that its free resilient action will throw the striker I against the arm E. To the clock-frame there is secured a spiral or other buffer-spring, K, just back of the lever H.

To one side of the wall a there is secured a 45 stud or arbor, on which is pivoted a frame, L, which carries the recording-sheet support M and the gear-wheel l' , which drives it. This gear-wheel l' meshes with the geared pinion l^2 50 of the clock mechanism. This frame L has a portion, l^3 , which lies next to the plate a , which plate has a bar, l^4 , attached to it, so that the portion of the frame l^3 can move up and down between the plate a and bar l^4 . The end 55 of l^3 extends beyond l^4 and is provided with a spring-catch, l^5 , which engages with a hole, l^6 , or with the top of the wall a , as the frame is either up or down. A stud, l^7 , limits the upward movement of the frame L; also, to hold 60 the frame L more rigidly in place when the gear-wheel l' is connected with geared pinion l^2 , the slot l^8 fits closely around and under the head of stud-screw l^9 . The recording-sheet support M has the usual recording-sheet, N. 65 The support M has a smooth-bored hub, m , through which projects the end of arbor l , with

hub resting against a shoulder, m^2 , the outer end of arbor l also projecting through disk or binding-washer n and the extreme outer end of l screwing into thumb-nut N', Fig. 1. Hinged 70 to edge of support M are several spring-catches, m . The recording-sheet N is centered around the end of arbor l and snapped under spring-catches m . The binding-disk n is placed 75 over paper recording-sheet N, and the thumb-nut N', being screwed down, binds the paper recording-sheet N to its support M, and the pressure of thumb-nut N' firmly holds the support M and recording-sheet N from turning on 80 arbor l , because the hub m' is bound against shoulder of arbor m^2 .

Projecting at right angles from wall-plate a on the left-hand side of support M and nearly 85 opposite to its axis is the hollow bored post O, through which passes the shaft o from W to W, Fig. 2. The shaft o is shouldered on the post O at o^2 , and is on the extreme outer end keyed to the crank-lever X by a set-screw, x' . At the other inner end of the shaft o is 90 hinged a holder or bridge, P, by a knife-blade spring-joint, o' . This holder consists of a horizontal bar, p , with two vertical ends, p' p' , having ears p^2 p^2 . Through these ears p^2 p^2 pass the ribbon or sheet holding bobbins Q Q, 95 having the usual tension-springs, q' q' . On these bobbins is held the inked or carbon ribbon or sheet R, which is fed, as occasion requires, from one to the other, forming what I have termed a "marking medium." The 100 holder is so arranged that the marking medium R is held underneath the stylus e^2 of arm E and between the stylus e^3 and the recording-sheet N. This recording-sheet N is subdivided with radial lines denoting divisions of time and concentric lines denoting degrees of tempera- 105 ture.

To enable the face of the recording-sheet to be exposed, so that the stylus e^2 of arm E may be set at the proper hour, the holder P has a dual 110 movement—a motion parallel with the plane of the recording-sheet, which enables the ribbon or sheet R to move from under the stylus e^3 and clear of end of arm E, and a movement parallel to the axis of the recording-sheet, (on the knife-blade joint,) which throws the holder 115 P entirely clear of recording-sheet N, and leaves it parallel with the shaft o and post O. The movement parallel to the plane of the recording-sheet is obtained by the shaft o revolving in post O, and this movement is limited 120 to clearing the arm E by the crank-lever X striking against the stud screws x' x^2 , Fig. 4, the spring x^3 holding the holder P in place under stylus e^3 when the instrument is in operation. To remove holder P from contact 125 with recording-sheet N, first swing the right-hand end of holder P till it clears stylus e^3 or pointer e^4 of arm E, and then lift the end of the holder P until the knife-blade joint holds it parallel with shaft o and at right angles with 130 plane of recording-sheet N. To replace the holder P and marking medium R again in po-

sition, reverse the dual motion. When across the face of recording-sheet N, the knife-blade spring-joint o' will hold the holder in one position as the spring x^3 does in the other. On the holder P is a thermometric scale, S, the same being identical with that which is on the recording-sheet just underneath the scale.

The object of scale S is, first, to adjust the arm E so that it will indicate and register the proper temperature, and, second, being correctly adjusted, the temperature being at any time registered under the marking medium R by the stylus e^3 on recording-sheet N can be read by the degree indicated on the scale S by the finger or pointer e^4 .

In Figs. 10 and 11 is shown a modification of my recording-thermometers, in which a thermostatic strip is used instead of the helical thermometer. A thermostatic strip, Y, is secured at one end in the binding-post y^1 , Fig. 10, which post y^1 is secured to the back of wall-plate a . The free end of strip y^1 has a pin, y^2 , which enters slot v of the lever V, the other slotted arm, v' , in which enters a crank-pin, t , of the crank T, which is secured to the shaft d^2 by the set screw T^2 , Figs. 10 and 12. Both the pin y^2 and the crank-pin t (as to the width of the slots) accurately fit said slots in lever V. As the thermostatic strip Y is affected by the change in temperature, it moves to the right or left from a straight position, and the pin y^2 , through the lever V, causes the shaft d^2 to move the arm E across the face of the recording-sheet N in the same manner as by means of the helical thermometer.

The object of the slot is twofold: First, it provides for the shortening or lengthening of the thermostatic strip Y as it curls from or returns to a straight position, and, second, the crank-pin t being adjustable as to its distance from the axis of d^2 by the set-nut t^3 , the slot t^4 provides for this change in leverage of crank T, as the slot v provides for the change in the lengthening and shortening of strip Y. The change in the distance of the pin t from the axis of crank T is to provide a means of changing the range indicated on the scale S and recorded on the recording-sheet N, as is herein-after described.

In Figs. 12 and 13 is shown another modification. Here the compensating lever V is dispensed with, and the crank-pin t , instead of entering the slot in slotted arm v' of lever V, enters a slot made at the end of the strip Y at the point where the pin y^2 is placed in the modification illustrated in Figs. 10 and 11, the result (the turning of the crank T by means of the strip Y) being the same in both modifications.

In set screw d^3 in Fig. 2 and T^2 in Figs. 10 and 12 a means for setting the arm E is provided, so that the stylus e^3 may record on recording-sheet and finger e^4 may indicate on scale S the correct temperature.

The clock mechanism is wound up, and to wind the top spring the recording-sheet sup-

port M is thrown up out of the way, so as to give access to the upper winding-post. The holder P is placed across the recording-sheet, as heretofore described, and with the marking medium between the stylus and the recording-sheet, with the ribbon R properly inked or carbonized. The whole device is duly incased in a suitable case and put in place with the thermometer projecting within the space the temperature of which is to be recorded. As the thermometer varies in its expansion and contraction, so the arm E will be swung to the right or the left. Meanwhile the clock mechanism, unwinding, turns the cam-wheel G, so that the cam-surfaces g , bearing against the finger h^3 , move the striker or hammer I on the rod l^2 away from the arm, the slot h^2 allowing for the necessary play. This movement compresses the spring k . As soon as a given surface, g , passes the finger h^3 , the spring k quickly throws the striker or hammer against the arm E, causing the stylus e^3 to strike the marking medium, R, and mark the recording-sheet N. The shock upon the pointer is taken up by the spring F, and the stroke of the striker or hammer I and the lever H is taken up by the buffer-spring K. The cam-wheel making one revolution per hour and there being four cam-surfaces, the arm strikes the marking medium once every quarter of the hour and the recording-sheet only moves after each stroke a sufficient distance to allow of another stroke. Hence the points made upon the recording sheet appear as a continuous line.

To adjust the arm E so that when operated by the helical thermometer D it shall indicate and record the correct temperature, loosen set-screw d^3 in arm e , so that shaft d^2 is free to revolve; then, having moved the finger e^4 of arm E so that it points to same degree on scale S as shall be at the time indicated on a standardized thermometer by which the adjustment is made, while retaining the finger or pointer e^4 so it points to the correct degree of temperature, (as indicated on a standardized thermometer,) fasten the shaft d^2 in arm e by screwing down the set-screw d^3 .

To adjust the arm E when operated by the thermostatic strip Y, loosen the set-screw T^2 in the crank T until the shaft d^2 is free; then, having set the finger e^4 on arm E on scale by a standardized thermometer, hold the arm at the then correct temperature and fasten the crank T on shaft d^2 by screwing down the set-screw T^2 , being careful to let the position of the crank T on shaft d^2 be that which the free action of strip Y has given it.

To change the range of the arm so that the number of degrees indicated on the scale S and recording-sheet N may be greater or less, loosen the nut t^3 on lower end of crank-pin t , so that it will slide in crank-slot t^4 . To increase the range, move the pin t away from axis of d^2 , and the "range" can be decreased and the arm E made to move a greater dis-

tance or greater part of a circle to each degree of temperature by moving the pin *t* nearer to the axis of d^2 —that is, the radial lines in drawings represent one-twentieth of a circle and the range of the scale in drawings is 60° Fahrenheit.

I have herein shown and described my improvements as applied to a recording-thermometer of the preferred form or construction; but it is manifest that they could as readily be applied to other forms or constructions than the one here selected. It is also manifest to any mechanic that the form or construction of the holder *P* and marking medium *R*, as well as that of the compound lever *I*, could be somewhat changed and yet have the holder *P*, medium *R*, and compound lever *I* perform the same functions in the combination of parts hereinafter claimed as the special form or construction herein shown and described. Therefore I do not wish to limit myself to the exact form or construction herein shown and described; but

What I claim, and desire to secure by Letters Patent, is—

1. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a holder independent of the recording-sheet, a marking medium mounted on said holder and disposed between the recording-sheet and stylus, and a hammer connected with the mechanism for moving the recording-sheet, and arranged to strike the stylus against the marking medium and recording-sheet at stated intervals of time, whereby the recording-sheet will be caused to move and receive upon it marks made by the marking mechanism and stylus when the latter is forced against said sheet by the action of the hammer, and thus make a record of the temperature during a given period of time.

2. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer, a shaft connected with the free end of said thermometer and thereby rotated, an arm secured at an angle to said shaft and provided with a stylus, a holder independent of the recording-sheet, a marking medium mounted on said holder and disposed between the recording-sheet and the stylus, and a hammer connected with the mechanism for moving the recording-sheet, and arranged to strike the stylus against the marking medium and recording-sheet at stated intervals of time, whereby the recording-sheet will be caused to move and receive upon it marks made by the marking medium and stylus when the latter is forced against said sheet by the action of the hammer, and thus make a record of the temperature during a given period of time.

3. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a holder independent of the recording-sheet and carrying a marking medium, the medium being disposed between the recording-sheet and stylus, and a compound lever constructed substantially as described and connected to the mechanism for moving the recording-sheet, whereby the stylus will be forced against the marking medium and recording-sheet with a quick blow, and the stylus will be quickly relieved from the pressure of the hammer portion of said lever, and the stylus be left free to be moved by the bimetallic thermometer, and a clearer and more nearly correct record be made.

4. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a holder independent of the recording-sheet and carrying a marking medium, the medium being disposed between the recording-sheet and stylus, and a compound lever constructed substantially as described and connected to the mechanism for moving the recording-sheet, whereby the stylus will be forced against the marking medium and recording-sheet with a quick blow, and the stylus will be quickly relieved from the pressure of the hammer portion of said lever, and the stylus be left free to be moved by the bimetallic thermometer, and a clearer and more nearly correct record be made.

5. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a movable holder independent of the recording-sheet, said holder moving on a knife-blade spring-joint, a marking medium mounted on said holder and disposed between the recording-sheet and the stylus, and a hammer connected with the mechanism for moving the recording-sheet, and arranged to strike the stylus against the marking medium and recording-sheet at stated intervals of time, whereby the said holder can be moved from between the recording-sheet and stylus or away from said recording-sheet when it is to be changed, and also return to its position for making a record, and when so moved said holder will be held in either of two positions by the action of the knife-blade spring-joint.

6. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a support for such sheet, mechanism for moving the recording-sheet to make a record, and a movable connection between the recording-sheet support and the mechanism for moving the recording-sheet to make a record, whereby the recording-sheet, with its support, can be moved to connect or disconnect, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a movable holder independent of the recording-sheet, a marking medium mounted on said holder and disposed between the recording-sheet and the stylus, and a hammer connected with the mechanism for moving the recording-sheet, and arranged to strike the stylus against the marking medium and recording-sheet at stated intervals of time, whereby the said holder can be moved from between the recording-sheet and stylus or away from said recording-sheet when it is to be changed, and also return to its position for making a record, and when so moved said holder will be held in either of two positions by the action of the knife-blade spring-joint.

7. In a recording-thermometer, the combination, substantially as set forth, of a recording-sheet, a support for such sheet, mechanism for moving the recording-sheet to make a record, and a movable connection between the recording-sheet support and the mechanism for moving the recording-sheet to make a record, whereby the recording-sheet, with its support, can be moved to connect or disconnect, substantially as set forth, of a recording-sheet, a mechanism for moving the same, a bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a movable holder independent of the recording-sheet, a marking medium mounted on said holder and disposed between the recording-sheet and the stylus, and a hammer connected with the mechanism for moving the recording-sheet, and arranged to strike the stylus against the marking medium and recording-sheet at stated intervals of time, whereby the said holder can be moved from between the recording-sheet and stylus or away from said recording-sheet when it is to be changed, and also return to its position for making a record, and when so moved said holder will be held in either of two positions by the action of the knife-blade spring-joint.

nect the recording-sheet support to or from the mechanism for moving the recording-sheet.

7. In a recording-thermometer, the combination, substantially as set forth, of a recording sheet, a mechanism for moving the same, a
5 bimetallic thermometer with its free end connected to an arm, a stylus on said arm, a holder independent of the recording-sheet and carrying a marking medium, the medium being
10 disposed between the recording-sheet and stylus, a compound lever constructed substantially

as described and connected to the mechanism for moving the recording-sheet, and a buffer-spring, whereby the compound lever is more quickly moved away from the arm connected 15 to the bimetallic thermometer and a more perfect record is made.

WILLIAM F. BREWSTER.

Witnesses:

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