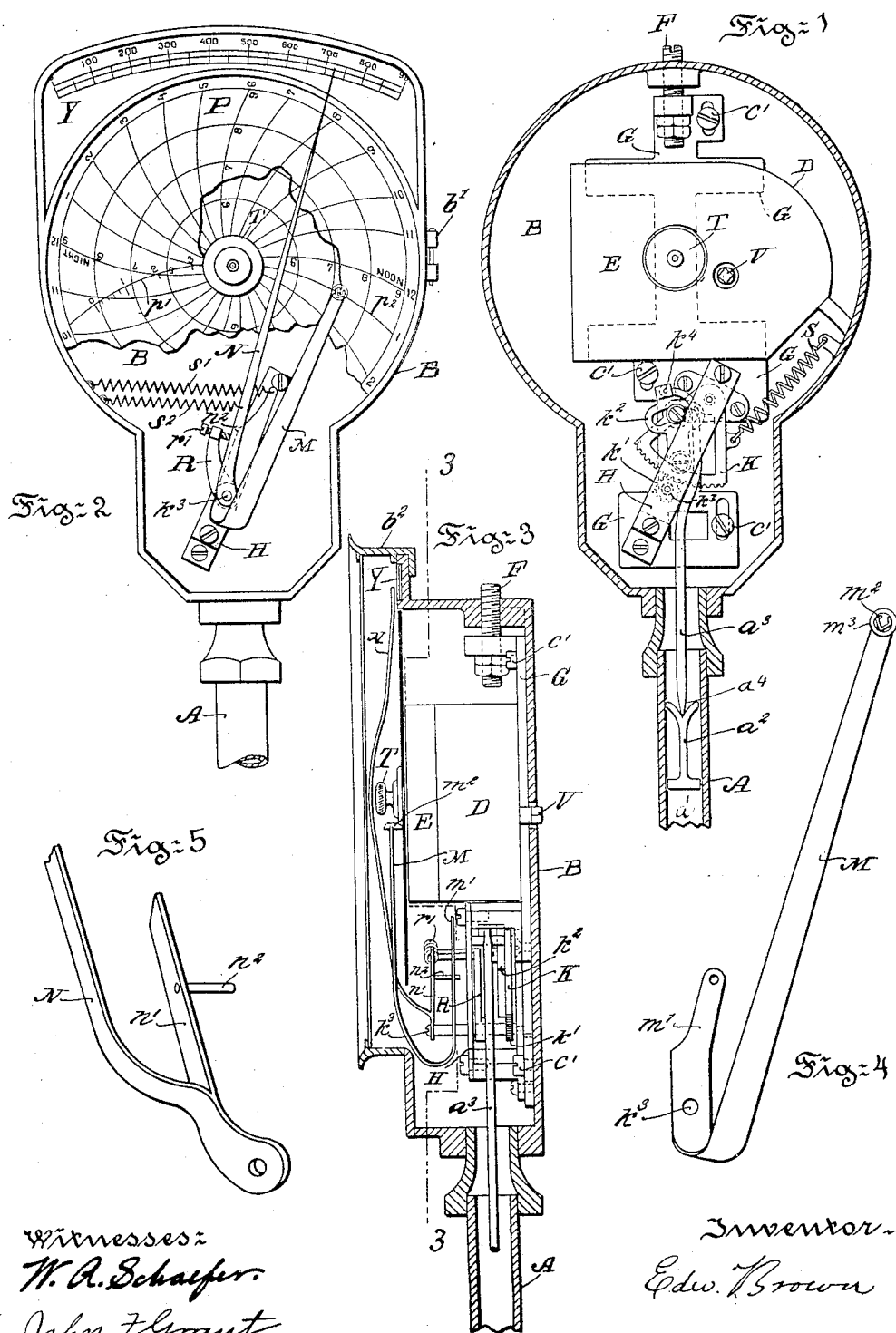


(No Model.)

E. BROWN.
RECORDING PYROMETER.

No. 571,334.

Patented Nov. 17, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD BROWN, OF PHILADELPHIA, PENNSYLVANIA.

RECORDING-PYROMETER.

SPECIFICATION forming part of Letters Patent No. 571,334, dated November 17, 1896.

Application filed May 22, 1896. Serial No. 592,610. (No model.)

To all whom it may concern:

Be it known that I, EDWARD BROWN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Recording-Pyrometer, of which the following is a specification.

My invention relates to the construction of a recording device for preserving a record of the fluctuations of the pointer of a pyrometer, a part of which invention is applicable to other recorders.

In my pyrometer, where the head containing the indicating mechanism is attached direct upon a stem which projects into the heated gas or other medium to be indicated, whether the instrument be a fixture or carried about by hand from one furnace to another, it is important that the head be reduced to a small and portable size. The circular paper dial or chart turns upon its central pivot, as is customary in recording steam-gages, but instead of the pencil-arm recording all the fluctuations within the limit of the pyrometer it may be made to record only that portion most desirable—as, for instance, the degrees from the center to circumference may run from 500° to 900° out of a limit of 0° to 900°, or the complete scale from 0° to 900° may be indicated with the use of smaller degrees. These features are fully described in my patent of March 24, 1896, No. 556,841.

One feature of the improvements now described is the placing of an indicating-pointer so as to traverse across the surface of the recording-dial, and indicate the degrees upon an arc-shaped dial beyond the periphery of the recording-dial, by which I have a recorder and an indicator on the same side condensed into a very small compass.

Another improvement is mounting the recording pen and clock upon a sliding plate, by which the adjustment of the pen upon the exact degree may be made without disturbing the distance of the dial center from the pivot of the recording-pen. Thus the arc of the pen will always correspond with the arc of the paper dial.

Other minor improvements consist in the mode of actuating the recording arm and pointer, the adjustment of the same to correspond with the degrees on the dial, the utilization of the clock-case lid as a backing to sup-

port the recording dial, and the marking of the cardboard dial with some of the degrees on each side of the center for the purpose of the adjustment of the instrument when unusually large degrees are required to be recorded.

Figure 1 is a view of the interior mechanism, the pointers and card dial being removed. Fig. 2 is a front view to show the two dials and the operation of the recording pen and pointer. Fig. 3 is a cross-section through the recording-head on line 3 3. Fig. 4 is a perspective of the pivoted end of the recording-pen. Fig. 5 is a perspective of the pivoted end of the indicating-pointer.

G is a sliding plate held to the case B by screws *c'*. It is moved by the screw F, which passes through the case. The clock is inclosed in a case D, and both are bolted to the sliding plate.

T is the central thumb-screw upon the clock-arbor, and V the winding-stem of the clock.

E is the lid of the clock-case, in which are openings for the central arbor; also, openings for winding and regulating the clock. This lid is just flush with the under side of the card dial P. Thus the clock-case lid serves as a support for the flexible card dial, without any intervening disk, as heretofore employed. This flexible dial is pressed in close contact with the lid, and access of dust to the clock-movement through the holes in the lid is prevented, which is a matter of considerable importance when a dial is removed every day.

A is the pyrometer-stem, the expansion of which operates the recording-arm M.

a' is a graphite rod upon which is a metal rod *a*², countersunk at its upper end.

To the sliding plate G is also bolted the frame H, which carries the multiplying mechanism. This consists of a pivoted rack K operating the pinion *k'*. The shaft *k*³ of pinion *k'* serves as the pivot of the recording-pen. *k*³ is the adjusting-arm. It is secured to the rack K. The movement of the stem is communicated to the rack K through the connecting-link *a*³ and pin *k*⁴. All the joints are held in contact with the stem by the tension of a strong spring S acting upon the rack K.

To the pinion-shaft *k*³ is rigidly soldered the arm R, carrying the small screw *n'*. The recording-arm M and pointer N both turn easily upon the shaft *k*³, and both have shanks *m'* *n'*. By the forward motion of the arm R the screw

r' presses upward the pointer N, which has a pin n^2 upon its shank which comes in contact with the shank of the recording-arm and both are carried forward in unison, the recording-pen indicating 600° on the card and the pointer 600° on the dial Y. By turning the screw r' the pointer may be made to correspond with the exact degree, and after the front of the case is all closed up the adjustment from the outside, which is necessary on account of the elongation of the stem, is provided for by the screw F. Two small springs s' s^2 hold the arms M and N in contact so that they move together, according to the rise and fall of the arm R.

The operation is thus: Supposing the recording-arm to register only from 500° to 900° instead of 0° to 900° ; the instrument being cold the pointer N will indicate about 50° . As the temperature rises the stem A expands, the connecting-link a^3 falls, the screw r' moves the pointer N up to 500° , at which point the pin n^2 comes in contact with the recording-arm, carrying it along with it to 900° . In Fig. 3 we see that the pointer N is bent, so as to pass over the screw-button T on the clock, which holds the card dial. This pointer extends beyond the center of the card dial and indicates the degrees on an enlarged scale upon the segmental scale Y. By this novel construction I can indicate and record the degrees upon an enlarged scale, and at the same time restrict the instrument to a very compact and portable form. When the heat is increased above 900° , the pen m^2 comes in contact with the edge of the case, and the connecting-link a^3 breaks contact at a^4 with the interior parts of the stem. Upon cooling off the stem the rod or connecting-link a^3 will soon touch the rod a^2 , the recording-pen will fall by the pull of spring s' to 500° , where it is stopped by the thumb-screw T. The pin n^2 then ceases to control the recording-pen, and the pointer N continues to fall to the atmosphere by the pull of spring s^2 . I do not confine myself to this particular way of operating the pointer or pointers from the arm R. It will readily occur to a mechanic that the pointer may be soldered to some part of the recording-arm M or shaft k^3 and both move rigidly with the shaft k^3 ; but with this plan more strain is put upon the pointer and arm when changing dials. With the plan first described either pen or pointer can be freely moved by the fingers in either direction, and access easily obtained to manipulate the central screw-button T.

When the recording-pen is made to record only the upper part of the scale, so as to make larger degrees, should the pointer N be omitted or cut off, then some difficulty will be experienced in ascertaining the accuracy of the pyrometer when in use, in consequence of the permanent elongation or set of the stem when used at a red heat.

On the left-hand side of the dial P, I mark a curved line p' , the same being a continua-

tion of the line or scale p^2 , struck from the same center, and with the lower degrees accurately marked below 100° . The instrument can then be adjusted thus: Allow it to cool off, and raise the recording-pen so that it will pass over the button T, and then by the screw F set the pointer accurately to the temperature of the atmosphere by a thermometer.

The instrument is usually placed upright. It may sometimes work horizontal or upside down, in which position the pen would not retain ink. I make the pen m^2 to turn in a circular socket m^3 at the end of the arm M.

I claim—

1. In a recording-gage, the combination of a clock carrying a recording-dial, and a recording-pen which traverses the dial, both being mounted upon the same adjustable sliding plate.

2. The combination in a recording-gage of a case B, a clock carrying a recording-dial, a pivoted arm carrying a recording-pen, a sliding plate G upon which the clock and pen are mounted, and the adjusting-screw F.

3. In a recording-gage the rotating circular recording-chart P having thereon a curved scale p' p^2 extending on each side of the center of the chart, struck from one center upon which are cut lower degrees on one side of the center, and the higher degrees on the opposite side, and a recording-pen traversing the said scale, by which device the accuracy of the instrument may be tested.

4. In a recording and indicating gage the combination of a pivoted arm carrying a recording-pen m^2 , a recording-chart rotated by a clock, and a pointer N which traverses above the surface of the chart and indicates the degrees on a separate dial, both the pointer and pen moving in unison from the same pivot.

5. In a recording-gage the combination of a recording-dial rotated by a clock, an indicating-pointer N, and a recording-pen m^2 both oscillating upon the same pivot operated by the arm R secured to the multiplying mechanism, and springs s' s^2 .

6. In a recording-gage the combination of a rotating recording-dial P, an arm R, secured to the multiplying mechanism of the gage, an adjusting-screw r' upon the arm, by which the recording-pen upon the pivoted arm M may be brought into position with the degrees upon the dial.

7. In a recording-pyrometer, the combination of an expansion-stem the motion of which is to be recorded, the connecting-link a^3 , adjusting-arm k^2 , the pivoted rack K, a spring S to hold the mechanism and stem in contact, a recording-pen m^2 oscillating with the pinion-shaft k^3 , and a recording-dial P driven by a clock.

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