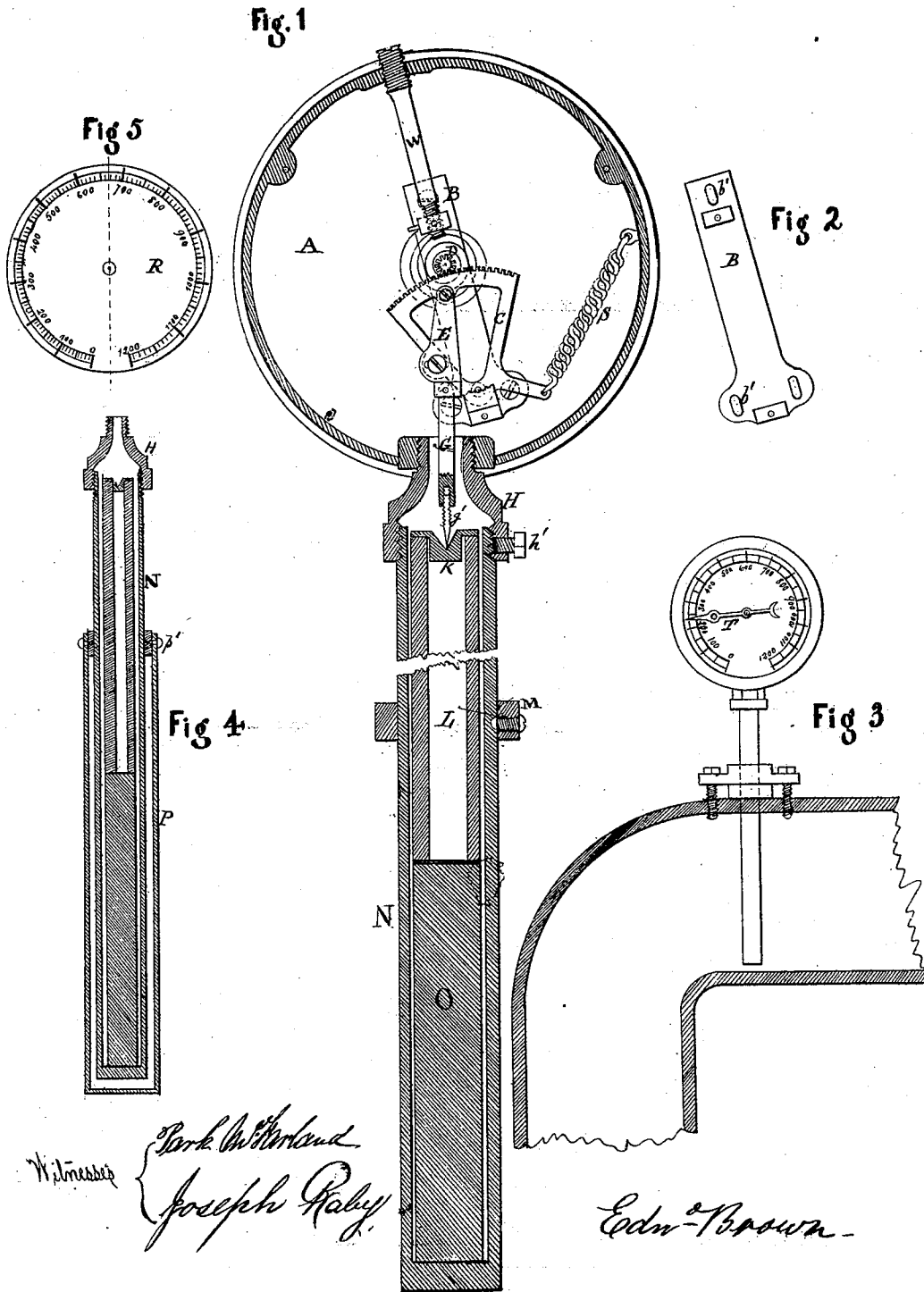


E. BROWN.  
Pyrometer.

No. 102,654.

Patented May 3, 1870.



Witness  
*Joseph Raley*

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# United States Patent Office.

EDWARD BROWN, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 102,654, dated May 3, 1870.

## IMPROVEMENT IN PYROMETERS.

The Schedule referred to in these Letters Patent and making part of the same

I, EDWARD BROWN, of Philadelphia, and State of Pennsylvania, have invented certain "Improvements in Pyrometers," of which the following is a specification.

The nature of my invention consists in the mode of adjusting the pointer to compensate for inaccuracy, and also in the combination and arrangement of the expansion tube with certain interior bars of highly-refractory and small expansive qualities.

The details of its construction I will now describe.

Figure 1 is a section through the instrument.

Figure 2 is a plan of the frame, showing elongated screw holes.

Figure 3 shows the pyrometer in position in the hot-blast pipe.

Figure 4 shows the stem, with the protecting tube attached.

The case containing the movements is shown at A. It contains a frame, B, carrying segment C, and pinion D, to which the pointer is attached.

An arm, E, is adjusted by means of a set-screw to the exact leverage corresponding with the expansion of the stem. To this arm is jointed the rod G, passing downward into the stem N. Its length may be varied slightly by the pointed screw *g*.

W is an adjusting screw. One end is screwed into the case by a coarse screw; the other into the frame B by a thread half as coarse.

The frame B is screwed to the case A, not rigidly, but so as to permit of a motion endwise. The screw-holes are slotted to suit, as shown at *b*, fig. 2.

The head A is attached to the iron stem N by the coupling H, the upper thread being of a finer pitch than the lower one. A set-screw, *h*, may be inserted to secure the coupling from turning.

The tube N is welded flat across at its lower end. It is from twenty inches to three feet long in practice, and has a collar, M, secured by a set-screw about nine inches from the top, to regulate the depth to insert the stem in the hot blast.

Within the stem, and resting on the bottom, is a bar of black lead similar to that used for black-lead crucibles, a good proportion of which is three-fourths plumbago and one-fourth Stourbridge clay. Resting upon this is a bar or tube of porcelain, made out of the best fire-clay. The ends are ground square, and the upper end is capped with brass, into which passes the point *g*.

The bars are kept in contact, and all the lost motion in the joints is taken up by the spring S.

It is obvious that the porcelain tube may be dispensed with, and the cap K rest directly on the black-lead bar O.

In fig. 4, P is an exterior protecting tube, screwed to the collar M by a screw, *p*. It is welded solid at

the bottom, and entirely protects the stem from injury by deleterious gas or acid.

The operation of the instrument I will now describe.

The tube N is inserted and secured in the hot blast up to the collar M. Within the tube, and resting on the bottom, is a bar of black-lead ware, O. This material is very refractory, and permits of a pyrometer for high temperatures being made with a very short stem. I make no claim to the use of black-lead ware of itself, as that was used for scientific experiments many years ago, but has never been so arranged and combined as to be practically useful in the arts. The expansion of the metal stem N gives motion to the pointer of the dial through the gearing previously described.

It has been maintained by metallurgists that the metal stem permanently elongates under a continuous temperature of 700° or 800°. Such has been found to be the case with ordinary pyrometers, constructed with brass and iron combined stems. One of the features of my invention is to neutralize this, by constructing the interior bar or bars of about equal lengths of black lead and fire-clay, whereby the instrument maintains greater accuracy than when constructed of either alone. I have had one of these instruments in melted zinc at 850° for three months, and on taking it out the pointer returned to exactly the atmospheric temperature—a result heretofore unattainable.

No pyrometers at present in use have any means of adjustment of the pointer other than that of screwing the head upon the stem—a very inconvenient plan, as the dial is thus turned out of sight, and can only be remedied by breaking the cemented joint of the stem, involving more trouble and expense, in some cases, than the instrument is worth.

To provide against any inaccuracy which may occur from long use, I have designed an easy method of adjustment by the screw W. By simply turning it upon the exterior of the case by a screw-driver, the frame B, with the segment and pinion, is moved bodily across the back of the case, while the point of the spring pin *g* remains stationary within the stem N. In this way the pointer is adjusted at any required point. Thus, should the porcelain tube be fractured by the heat, the pointer may be adjusted, and still the instrument be of service. Even inferior instruments of brass and iron, with this device, may be from time to time adjusted by means of my detachable instruments, patented June 1, 1869, and prove useful. The instrument may be adjusted by the screws upon the coupling H, but that is very inconvenient. Other means of moving the frame B relatively to the case A will easily suggest themselves to a machinist, as an eccentric working through the back of the case.

When the instrument is used in situations where the action of the gas or acid will eat up a stem one-quarter of an inch thick in three or four months, I protect it with a tight case, P, screwed to the collar M. As soon as this tube is eaten through, I replace it by another, and the pyrometer stem thus maintains its original perfection.

These improvements render an instrument practically useful which has heretofore been so shortlived at temperatures above 700° as to be regarded with distrust by iron-masters.

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

1. The arrangement of the black-lead bar O within the metal-expansion and protecting tube N, and op-

erating the pointer of the dial through the spring pin G, substantially as herein described and shown.

2. The combination of the black-lead bar O, porcelain tube L, the metal tube N, and spring pin G, arranged to operate substantially as and for the purpose herein described.

3. The arrangement of the screw W, or its equivalent, operating the frame B, as described, in combination with the pinion D, segment C, and spring pin G, for adjusting the pointer substantially as herein set forth.

EDWD. BROWN.

Witnesses:

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