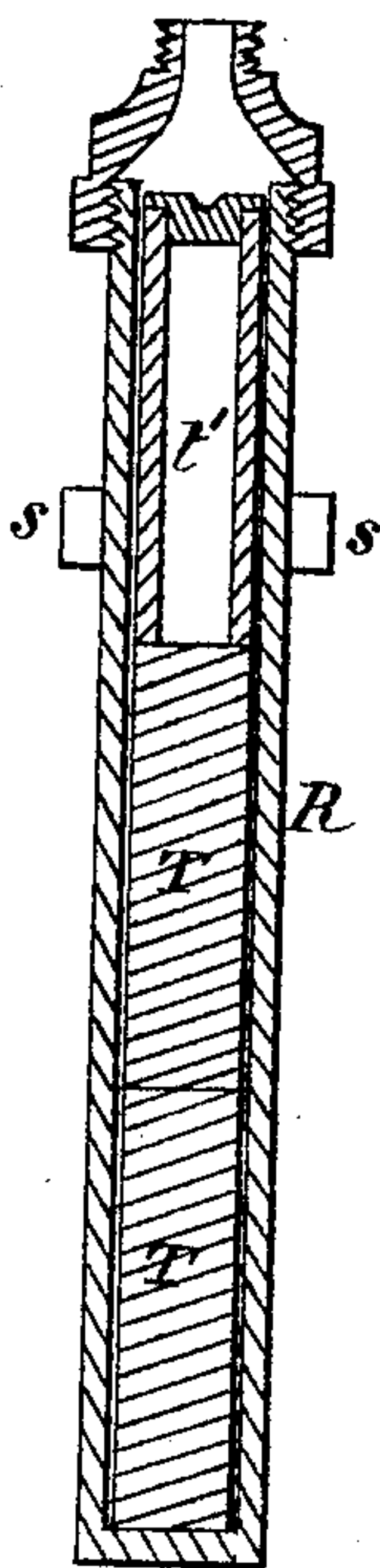


E. BROWN.

Improvement in Pyrometers.

No. 130,895.

Patented Aug. 27, 1872.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

EDWARD BROWN, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN PYROMETERS.

Specification forming part of Letters Patent No. 130,895, dated August 27, 1872.

*To all whom it may concern:*

Be it known that I, EDWARD BROWN, of 311 Walnut street, Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Pyrometers, of which the following is a specification:

My invention is applicable to all kinds of pyrometers, but as it relates more especially to such as are used in liquid baths I will describe the same more particularly as applied to such. A great difficulty with pyrometers used in liquid baths has been the incorrectness of their indication, arising from the variations of the level of the liquid in the baths, whereby a larger or a smaller surface of the metal stem is exposed to the heat of the liquid, and consequently a varying amount of the metal expanded, which, of course, results in a like variation in the indication; for if a larger surface or amount of the metal is exposed to the heat it will, of course, expand more in length than will a smaller surface or amount of the metal with the same degree of heat. My improvement is designed to overcome this difficulty; and to this end my said invention consists in making the upper portion of the interior expanding material of a pyrometer—which is surrounded by and held in a metal stem—of the same material as the said stem, or a material having nearly equal expansion, in order that the interior indicating and outer surrounding stem will expand equally above a given point, which may be the lowest level of a liquid bath, so that, if the level of the liquid rises above the point where this equality of material of the inner and outer stem commences, the equal expansion of both will insure the correctness of the indication.

The accompanying drawing represents a vertical section of a pyrometer-stem having my improvement applied thereto.

Within the hollow iron-stem R short bars, T, of porcelain or plumbago, are placed, which extend only to within a certain distance below a given point—for instance, the ring s, below which the level of the bath never falls, but above which it varies. On the bars T I place a tube or bar, *t'*, of the same material or a material of nearly equal expansion as the stem R, so that any heat ex-

erted on the stem above the bars T will expand the inner bar or tube *t'* equally with the stem R. If, therefore, the stem is inserted in a liquid bath the level of which rises above the ring s, the difference of expansion between the bars T and the stem R alone will be indicated, as the expansion of the bar or tube *t'* is always equal to that of the stem R.

It will be readily understood that the amount of expansion of the differently expanding materials makes no difference in the correct indication of the heat, provided there is no variation in the relative amount of expansion of the two materials; and this I effect by making the expansion of the inner bar and of the outer stem perfectly even above a given point—for instance, the lowest level of the liquid—or, in other words, by neutralizing the expansion of one by the equal expansion of the other above a given point, thus merely indicating the difference of expansion between a certain amount of one material and a certain amount of another. This improvement is of the utmost value in pyrometers, as it gives certainty and reliability to indications of high degrees of heat, which heretofore were only approximately correct, and in many cases absolutely wrong and unreliable; and this improvement is not merely applicable to pyrometers used for indicating the temperature of liquids of varying level, but it is applicable and highly advantageous to all pyrometers, whether having an iron stem or one of highly refractory material, so long as the inner and outer stem, above a certain and given point—to be determined by circumstances in different uses—are both made of the same material, or of materials of nearly the same expansive quality.

From the foregoing it will be observed that the inner bar of the stem is formed part of plumbago and part of iron or other similar metal to the outer tube as regards expansibility, so that the upper part of the stem, composed of tube and rod of the same expansibility, will not indicate any effect of heat applied above where the plumbago terminates, and thus effect a new combination, which entirely avoids the difficulty heretofore existing in pyrometers of the varying level of fluids,



&c., being heated, giving varying and uncertain indications by reason of there being greater expansive matter exposed to the same degree of heat at some times than at others.

Having described my invention, I claim—

The construction of pyrometer-stems with the top section of the inner bars made of the same material, or of material of nearly the same expansive quality as the outer tube, so that the inner bar and outer tube of the stem expand equally under heat above a given point

on the stem, which point is designed to be within the influence of the heated fluid or space to be tested to attain the advantages herein described, viz., the correct indication of the temperature of the matter to be indicated.

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Witnesses:

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