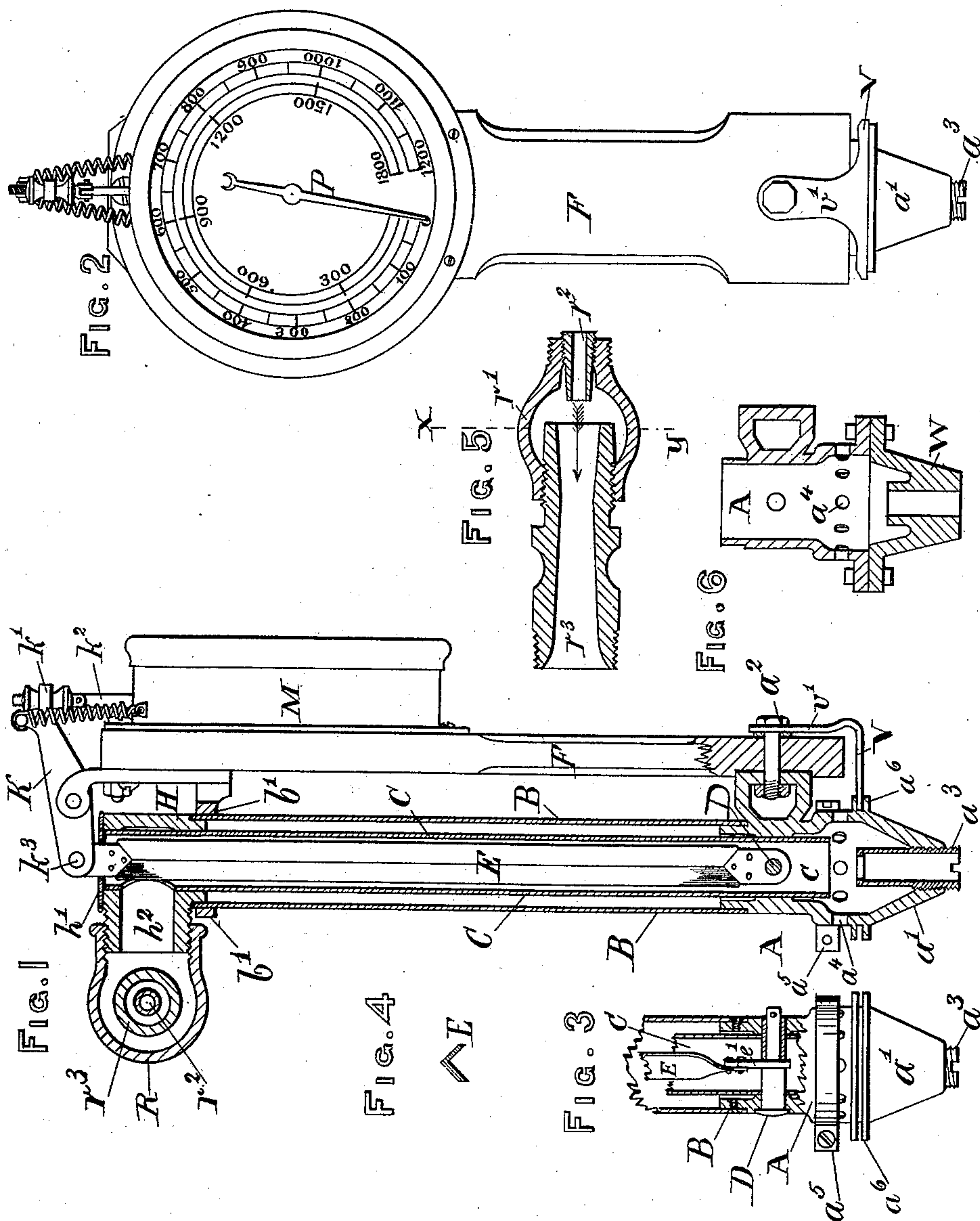


(No Model.)

E. BROWN.
PYROMETER.

No. 393,963.

Patented Dec. 4, 1888.



Witnesses,

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EDWARD BROWN, OF PHILADELPHIA, PENNSYLVANIA.

PYROMETER.

SPECIFICATION forming part of Letters Patent No. 393,963, dated December 4, 1888.

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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 Pyrometer, of which the following is a specification.

My invention relates to pyrometers in which a heated current of hot air under pressure is permitted to escape through the instrument. The heated air passes through an injector-nozzle and draws along with it a percentage of cold air at atmospheric temperature. The temperature of this mixed hot and cold air is then ascertained by some ordinary indicating mechanism or thermometer, and by an additional scale attached thereto the actual heat of the hot blast and relative heat are shown. A description of this pyrometer may be found in my patent, No. 247,157, September 20, 1881.

The object of my invention is to make the instrument available for indicating the temperature of heated air under ordinary natural draft-pressure as it is in an annealing-furnace, and to construct the expansion-bar upon which the heat impinges of such thin material that the indication may be taken in the shortest possible time before the instrument is injured by the great heat.

Figure 1 is a vertical section through my pyrometer. Fig. 2 is a front view of it. Fig. 3 is a vertical section at right angles to Fig. 1 to show the end of the expansion-bar. Fig. 4 is a horizontal section through the middle of the expansion-bar. Fig. 5 is a longitudinal section through the air-exhausting apparatus. Fig. 6 is a vertical section showing a fire-brick nozzle, which is used for temperatures above white heat.

Similar letters in each figure refer to similar parts.

The casting A is made conical at its lower end, a' , to fit an opening in the shell of the chamber which contains the heated air the temperature of which is to be indicated. The other end is fitted to a brass tube, B, and within the tube B is the inner tube, C, through which the heated air is conducted. A pin, D, passes through the casting A, the conductor C, and the expansion-bar E. The casting A is bolted to the mahogany bar F by bolt a^2 . The top end of the tube B slides in the guide

b' , which is screwed to the mahogany bar F. An injector-nozzle, a^3 , of smaller size than the tube C, is screwed into the cone a' . As the heated current passes into the conductor C, it draws along with it through the holes a^4 a fixed percentage of cold air, the amount of air being regulated by the sliding ring a^5 . When this ring completely covers the holes, the full temperature of the heated medium impinges upon the expansion-bar, and the outside circle is used. The top end of the conductor-tube C is closed by a casting, H, and a plate, h' . This casting H, which has on one side a screwed branch pipe, h^2 , by which it is connected to an air-exhausting device, might be cast with the plate h' , but for convenience is better separate. The expansion-bar E passes through a close-fitting slot in the plate h' , and is connected by an eyebolt, k^3 , to a lever, K. This lever is hinged to the mahogany bar F, and at the opposite end, k' , it communicates by link k^2 with the indicating mechanism within the gage-head M. This mechanism is the same as is usually found in steam-gages and pyrometers, and consists of a toothed quadrant gearing into a pinion, which carries the pointer P.

Upon the dial is shown two circular indexes. The outer circle for lower temperatures is used when the valve-ring a^5 is over the holes and heated air only is passing through the conductor. When mixed hot and cold air is passing through, the inner circle for higher temperatures is used. I can thus indicate a temperature of eighteen hundred degrees with a temperature of twelve hundred degrees only on the expansion-bar—that is to say, the eighteen hundred degrees of heated air is cooled down to twelve hundred degrees.

The expansion-bar E, I make of thin sheet-iron bent into an angle, as shown in section, Fig. 4. Each end of the expansion-bar is flattened (see Fig. 3) and riveted to a flat and thicker end piece, e' , to resist the pull upon the bolt D when the eye of the expansion-bar is red hot. I thus secure an expansion-bar free from lateral vibration and from elongation at the bolt-holes, and one which becomes heated a few seconds to the temperature of the current of hot air before any damage is done to the case and mahogany bar.

The pyrometer when open to the air at the

top of the conductor-tube C can only be used for a hot blast under pressure.

To indicate hot air not under pressure, or under natural draft only, as it is in a heating-furnace or a muffle, I close the top of the conductor-tube C by the casting H, previously described. This casting H has an outlet or branch, h^2 , upon which is screwed the air-exhausting apparatus R, commonly known as an "injector." It consists of a hollow globe casting, r^1 , into which is screwed at one end the small injector-tube r^2 , and at the other end is inserted the larger tube, r^3 . When the tube r^2 is connected to a steam-pipe and a small head of steam turned on, a partial vacuum is produced and air is drawn through the conductor C. With this arrangement I am able to bring the heated air of a heating-furnace at once upon the expansion-bar or mixed hot and cold air, as described. When cold air is drawn in by the hot-blast itself, the air-holes a^1 require to be much larger than when the cold air and heated air are drawn in by the injector R.

I do not restrict myself to the air-exhausting device R above described, as a rotary fan or blower will produce the desired suction through the instrument. When the heat to be indicated approaches to white heat, I use the fire-brick cone W, (shown in Fig. 6,) which is bolted to the casting A. To protect the mahogany bar from the hot blast which escapes around the cone a' , I attach the sheet-brass shield V to the flange a^6 of the cone a' and bend at right angles the shank r' , which is secured to the mahogany bar by the bolt a^2 . I thus protect the lower end of the mahogany bar from fire by the shield V, which surrounds it without touching it.

A six-hundred-degree thermometer may be inserted through the plate h' and used instead of my expansion-bar and indicating mechanism. It is, however, easily broken, and with a mixture of equal parts of hot and cold air only indicates up to twelve hundred degrees,

whereas my metal expansion-bar, which is better with equal volumes of hot and cold air, will indicate up to two thousand four hundred degrees.

I claim—

1. In pyrometers, the combination of the casting A, for the introduction of hot and cold air, the conductor C, closed at the top, cap H h' , an air-exhausting apparatus attached to the cap H, and an indicating mechanism by which the temperature of the mixed hot and cold air is ascertained.

2. In pyrometers, the combination of the casting A with openings a^1 , for the mixing of hot and cold air, the conductor C, closed at the top and open only to the air-exhausting apparatus R, lever K, and a metal expansion-bar, E, communicating its motion by said lever K to indicating mechanism within the gage M.

3. In pyrometers, the expansion-bar E, formed of thin sheet angle-iron riveted to stouter eye-pieces e' , the conducting-tube C, the bolt D, and pin k^3 , by which the expansion of the bar E is conveyed to indicating mechanism outside of the tube C.

4. In pyrometers for temporarily testing high temperatures, the air-conductor C, connected at its lower end to the heated-air chamber the temperature of which is to be indicated, in combination with an air-exhausting device at the opposite end of the conductor, and a thermometric apparatus for indicating the temperature of the induced current of hot air.

5. In pyrometers, the combination of the casting A, the grooved ring a^6 upon the said casting, the wooden bar F, the shield V, having the shank r' , secured to casting A, and also to the bar F by means of the right-angled shank r' , as described.

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Witnesses:

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