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R. P. BROWN

VENTILATED THERMOCOUPLE

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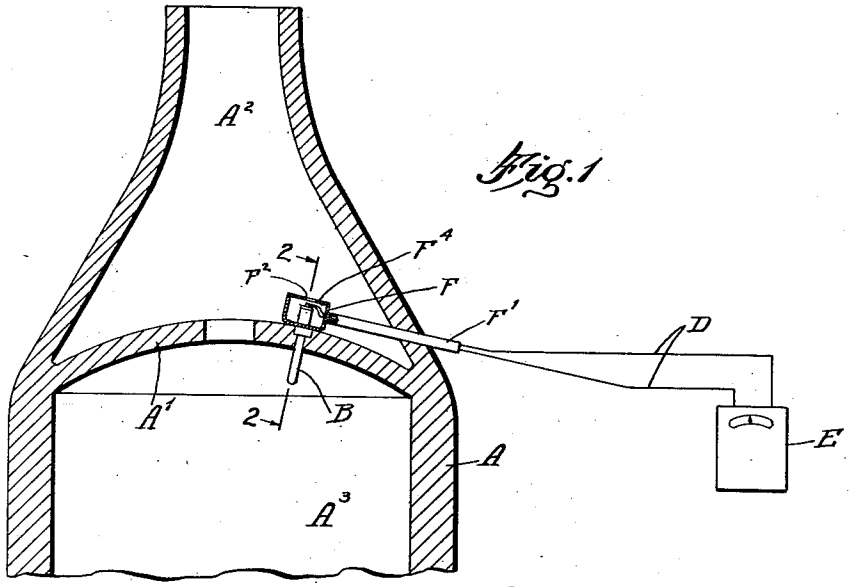


Fig. 1

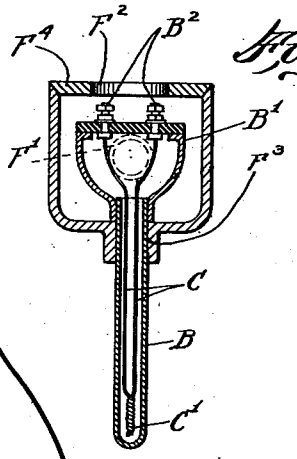


Fig. 2

Fig. 3

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VENTILATED THERMOCOUPLE.

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The general object of the present invention is to provide simple and effective means for protecting the conducting leads or terminal portions of a thermo-couple against overheating. More specifically, the object of the invention is to provide a thermo-couple for measuring relatively high furnace or kiln temperatures with simple and effective means for air cooling the thermo-couple connecting leads, and the portions of the thermo-couple which do not need to be exposed to, and would be injured by exposure to high temperatures.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of my invention.

Of the drawings:

Fig. 1 is a sectional elevation of a kiln;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is an elevation of a kiln partly in section illustrating a modified thermo-couple mounting.

In the drawings, and referring first to Figs. 1 and 2, A represents a so-called bottle kiln having a thermo-couple B inserted in the kiln chamber proper through the crown or arched roof A′ separating the kiln chamber A^3 from the kiln stack chamber A^2. The thermo-couple B may be, and, as shown, is of conventional type comprising a metallic casing in the form of a tube closed at its furnace end, and enlarged at the opposite end to provide a terminal head B′ having provisions B^2 for connecting the ends of the thermo-couple wires C to the leads D running to a pyrometer instrument E.

In accordance with the present invention, the portions of the leads D adjacent the thermo-couple and the head B′ of the latter are enclosed in a casing, shown as comprising a box-like chamber F receiving the head of the thermo-couple and a tubular extension F′ leading from the box F through the side wall of the stack portion of the kiln. The box F is provided with an outlet opening F^2 to the stack chamber A^2, and in normal operation air is drawn from the external atmosphere through the tubular extension F′ and box F and out of the latter through the outlet F^2 by the stack suction in the chamber A^2. The box F may well be made of cast iron, and, as shown, is formed with an opening F^3 in its bottom wall snugly receiving the tubular body of the thermo-couple casing. The box F is also provided with a cover portion F^4 removable to permit access to, and the insertion or removal of the thermo-couple, the port F^2 being formed in the cover F^4.

With the arrangement shown in Figs. 1 and 2, and properly proportioned, the stack suction insures a flow of air through the tube F′ and box F ample to maintain the leads D and the terminal head of the thermo-couple at temperatures much below those in the kiln chamber A^3, or in the stack chamber A^2. This prolongs the life of the thermo-couple and its leads, and permits of the use of less expensive thermo-couple lead and terminal portion parts than would otherwise be required. The cooling of the leads D and the terminal head thermo-couple thus provided for is obviously without significant effect upon the temperature of the thermo-couple hot junction C′. Provided the tubular portion of the casing part B is long enough to prevent the cooling of the outer end of this casing from significantly affecting the temperature of the closed inner end of the casing.

When, as is sometimes desirable, the thermo-couple B extends into a kiln or furnace chamber A^3 through the floor A^4 of the latter, as shown in Fig. 3, I advantageously encase the thermo-couple C and leads D in a box FA and pipe F^{10}, the latter being open at its outer end to the atmosphere, and also connect the casing FA to a suitable stack suction source as by means of a second pipe F^{12}. The latter may be connected to the stack of the kiln or furnace with which the thermo-couple is used, or, as shown in Fig. 3, may open at F^{13} into the stack G of some other and conveniently adjacent furnace or kiln. In the operation of the apparatus shown in Fig. 3, cooling air is drawn into the pipe F^{10} through its open end F^{11}, and from the pipe F^{10} into the casing box FA, and from the latter through the pipe F^{12} by the suction of the stack G.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Claims:—

1. The combination with a thermo-couple hot junction and conductors leading away from said hot junction, of a casing for said thermo-couple formed with a channel for conductor cooling air having an inlet and outlet at greater and less distances, respectively, from said hot junction.

2. The combination with a thermo-couple hot junction and conductors leading away from said hot junction, of a casing for said thermo-couple formed with a channel for conductor cooling air having an inlet and outlet at greater and less distances, respectively, from said hot junction, and adapted to be extended into a furnace structure with the inlet of said channel open to the external atmosphere and with its outlet open to a portion of the chamber in which the atmospheric gas pressure is less than the pressure of the external atmosphere.

3. The combination with a furnace, of a thermo-couple having its hot junction exposed to the temperature in one heated portion of the furnace, and having conductor portions adjacent said hot junction located in another heated portion of the furnace structure and a casing surrounding said conductor portions formed with a conductor cooling air channel communicated at a point relatively remote from said hot junction with the external atmosphere, and communicating at a point less remote from the thermo-couple hot junction with a source of draft suction.

4. The combination of a tubular casing closed at one end and having a terminal head at its opposite end, of conductors located within said casing and each connected at one end of said terminal head, and each connected at its opposite end to the other to form a thermo-couple hot junction located adjacent the closed end of said casing, thermo-couple leads connected to said terminal head and a second tubular casing surrounding said leads and having one end enlarged to surround said terminal head, and providing a channel for conductor cooling air with an outlet adjacent said enlarged end and an inlet adjacent the other end of said second casing.

5. The combination with a bottle kiln, comprising a heating chamber and a heating gas outlet chamber and a wall between said chambers, of a thermo-couple casing extending through said wall and having a thermo-couple terminal head at its end located in said outlet chamber, of a second casing surrounding said terminal head and comprising a tubular portion extending through the outer wall of said outlet chamber and open to the external atmosphere at its outer end, said second casing being formed with an outlet to said outlet chamber adjacent said terminal head.

Signed at Philadelphia, in the county of Philadelphia, and State of Pennsylvania, this 31 day of August, A. D. 1925.

RICHARD P. BROWN.