

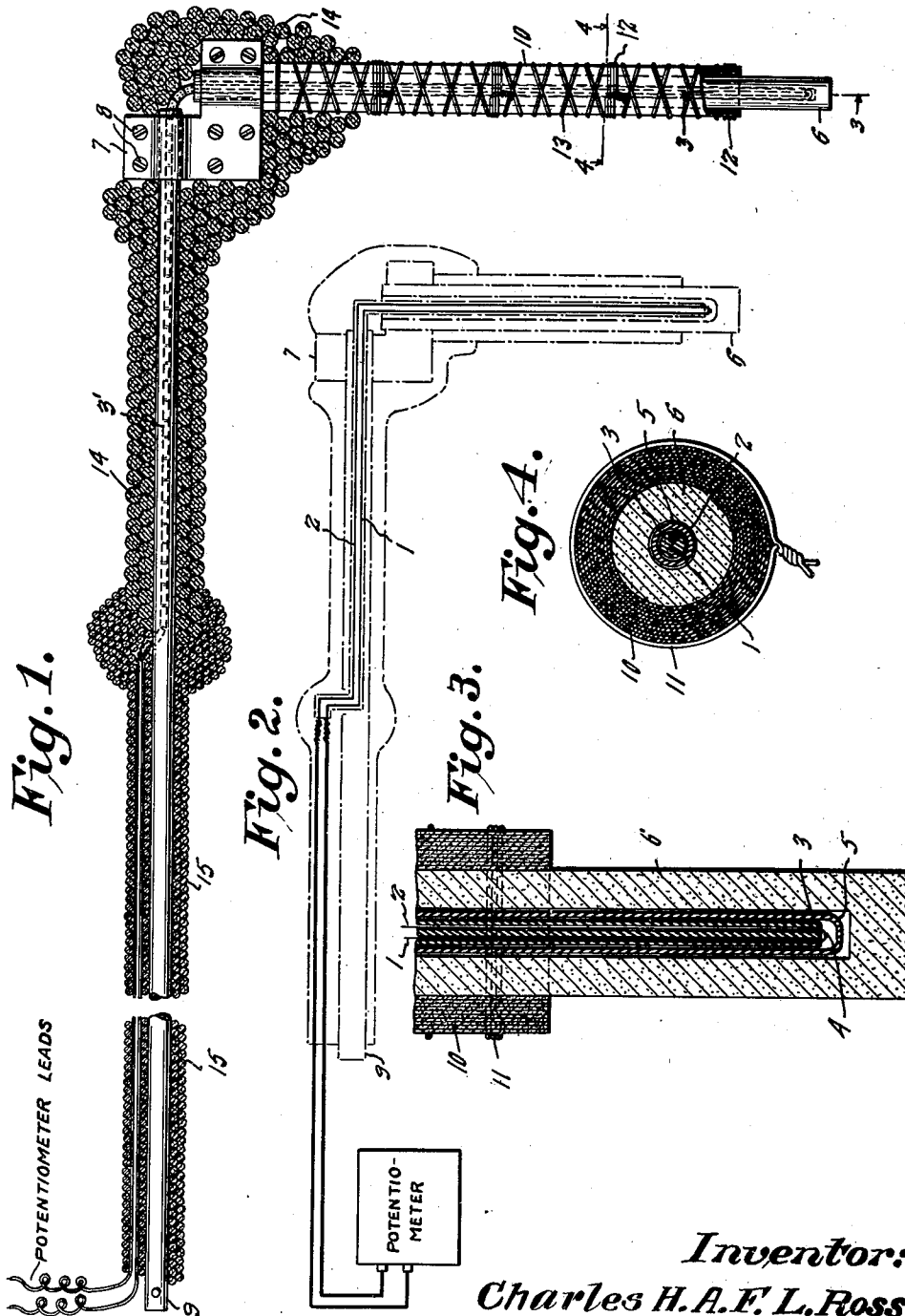
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PYROMETER

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PYROMETER

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8 Claims. (Cl. 136—4)

This invention relates generally to pyrometers or instruments for the measurement of high temperatures. More specifically, it relates to such a device of the thermo-couple type, and of particular use in the measurement of the temperature of a bath of molten metal.

A major object of the present invention is the provision of a novel type of thermo-couple.

A further object of the invention is the provision of novel protective material of particular utility in conjunction with thermo-couples.

A still further object of the invention is the arrangement of such protective material on the thermo-couple so as to give maximum protection with minimum interference with the heat transfer to the thermo-couple junction.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement without departing from the spirit of the invention and the scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing, means for carrying the same into practical effect without limiting the improvements in their useful applications to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In the drawing:

Figure 1 is a view, partially in section, of a thermo-couple embodying the invention.

Figure 2 is a somewhat diagrammatic view showing the electrical connections of the thermo-couple.

Figure 3 is a longitudinal sectional view of the end of the thermo-couple and taken on line 3—3 of Figure 1.

Figure 4 is a transverse sectional view of the end of the thermo-couple taken on line 4—4 of Figure 1.

The thermo-couple, per se, consists of two wires of dissimilar metals which are shown most clearly in Figure 3. These consist of a wire 1, of pure platinum, and a wire, 2, of 90% platinum and 10% rhodium. The wires lie in the parallel bores of a porcelain protection tube, 3, and are joined at their lower extremities to form a thermo-junction, 4. The porcelain tube 3, in turn, lies within the sheath, 5, of protective material. This sheath, finally, lies in the bore of a hollow carbon rod, 6.

The upper end of the hollow carbon rod 6 is

clamped between two L-shaped members, 7, which are held together by suitable bolts, 8. Also clamped between such members 7, as shown in Figure 1, is a rod, 9. This rod, as indicated, is hollow for a portion of its length, and the wires 1 and 2, protected by short segments of tubing, 3', similar to tube 3, are led through this hollow portion after leaving the top of the hollow carbon rod 6. After passing about half way along the rod, the wires are brought out at the top of the rod and the short protective segments are discontinued.

To protect the carbon rod 6 from the action of the furnace, it is surrounded with laminated asbestos, 10, which has been saturated with a thick solution of sodium silicate. In practice, the asbestos sheet is thoroughly impregnated with the solution, wrapped about the carbon rod 6 while it is still moist and allowed to dry in its final position. The laminated asbestos is securely held in position by being bound by nichrome wire, 11.

It will be noticed that this binding consists of groups of coils, 12, spaced at intervals over which a more open lattice of wire, 13, is wound. The groups of coils, 12, strongly bind the laminated material to the rod 6, while the more open lattices 13 prevent the detachment of portions of the material.

It will be noted that the laminated asbestos coating is not extended to the very end of the carbon rod 6, but that this lower extremity, which is to be inserted in the molten metal, is left uncovered. It has been found that it is not the molten metal which destroys the rod, but the action of the furnace. Accordingly, by having the portion of the rod which is inserted in the metal uncovered, a material advantage is obtained since the heat penetrates more easily to the thermo-junction, and none of the protective features are lost.

The remaining portions of the thermo-couple are protected by a wrapping of asbestos rope, which has been impregnated with a thick solution of sodium silicate. It will be noted that a fairly large rope, 14, has been used to cover the thermo-couple from the part of rod 9 where the wires emerge down to the upper part of the laminated asbestos, which it overlaps. The outer end of the rod 9 is covered with wrappings of a smaller rope, 15, which also acts as a protective covering for the wires 1 and 2 which lie above the rod at that part thereof.

The wires 1 and 2 are suitably connected to a potentiometer, as indicated in Figure 2, and the

temperature at the thermo-junction is ascertained thereby in the usual well-known manner.

While I prefer the impregnated asbestos in laminated and rope form, hereinabove described, 5 as a protective coating for my thermo-couple, under certain conditions I find it advantageous to use in its place a mixture of French sand and sodium silicate, applied in a moist condition as a protective coating. If desired, a part of the pro- 10 tective coating may be of asbestos impregnated with sodium silicate, and the remaining part, of French sand and sodium silicate.

While I have shown and described the preferred embodiment of my invention, I wish it to be under- 15 stood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention or exceeding the scope of the ap- 20 pended claims.

I claim:

1. A protective casing for a thermo-couple com- 25 prising a hollow carbon member adapted to be inserted in molten metal, and a protective coating thereon in the zone of hot gases existing above the surface of the molten metal to prevent oxidation of such member, said coating terminating short of the extremity of the member that is im- 30 mersed in the molten metal.

2. A protective casing for a thermo-couple com- 35 prising a hollow carbon member adapted to be partially immersed in molten metal, and a protective covering thereon for such part of the surface of the carbon member as is not to be immersed, said

coating terminating short of the extremity of the portion of the member that is immersed in the molten metal.

3. A protective casing for a thermo-couple com- 5 prising a hollow carbon member and a covering therefor of laminated asbestos impregnated with sodium silicate.

4. A protective casing for a thermo-couple com- 10 prising a hollow carbon member adapted to be partially immersed in molten metal, and a protective covering of laminated asbestos impregnated with sodium silicate for such part of the member as is not to be immersed.

5. A protective casing for a thermo-couple com- 15 prising a hollow carbon member, a covering therefor of laminated asbestos impregnated with sodium silicate, and a wire binding of nichrome to maintain the covering on the member.

6. A protective casing for a thermo-couple com- 20 prising a hollow carbon member and a covering therefor of a non-inflammable porous material impregnated with sodium silicate.

7. A protective casing for a thermo-couple com- 25 prising a hollow carbon member, a covering therefor of asbestos impregnated with sodium silicate, and means to maintain the covering on the member.

8. A protective casing for a thermo-couple com- 30 prising a hollow carbon member adapted to be partially immersed in molten metal, and a protective covering of asbestos impregnated with sodium silicate for such part of the member as is not to be immersed.

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