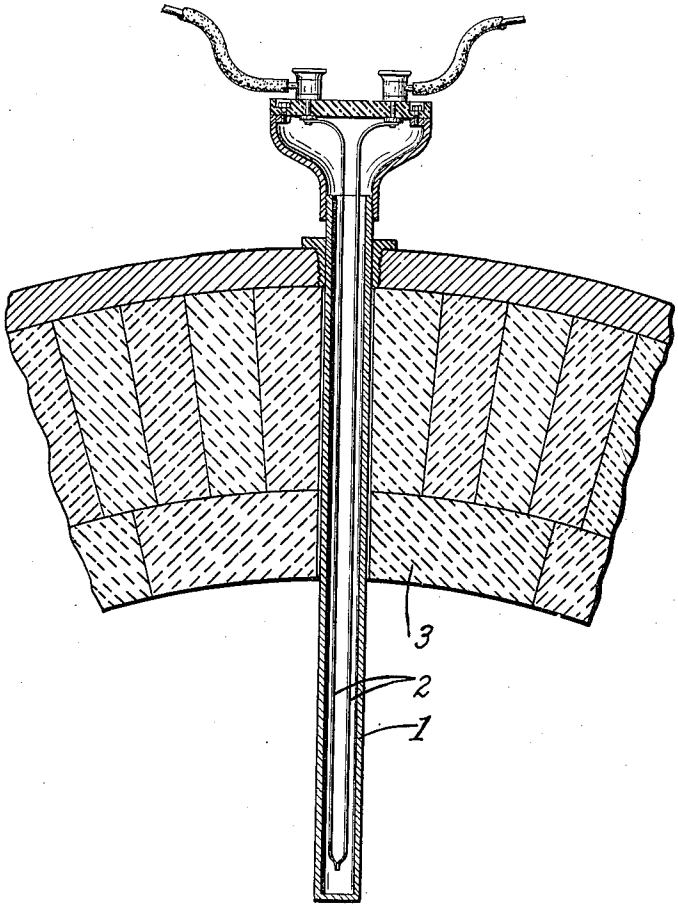
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PYROMETER TUBE

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PYROMETER TUBE

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3 Claims. (Cl. 136—4)

This invention relates to a tube for use at high temperatures. More particularly it relates to an improved pyrometer tube.

For metal as commonly heat-treated in a normalizing furnace which operates at relatively high temperatures, it is necessary that the temperature within the normalizing furnace be controlled within reasonable limits over a prolonged period of time. In order to determine the temperatures within the furnace at intervals, pyrometers are commonly used having pyrometer tubes which extend through the wall of the furnace into the chamber of the furnace and are exposed to the gases of the furnace. It has been found that pyrometers as commonly constructed when heated up to operating temperatures of the normalizing furnace such as, for example, 1800 degrees Fahrenheit, become inaccurate in their readings, and, for example, may register temperatures as much as a hundred degrees or more lower than actually exist within the furnace chamber. If the temperature within the furnace is elevated to make the pyrometer give the desired reading the material within the furnace is exposed to too high a temperature and may be injured accordingly. It is believed that this inaccuracy is due to the fact that the tube becomes pervious to the gases of the furnace and thus allows the gases to pass through the walls of the tube into contact with the thermocouple wires within the tube and either to form a chemical reaction with the material of the wires or to deposit material thereon thereby interfering with the efficiency of the same.

This invention, therefore, relates to the provision of a tube which will properly protect the thermocouple wires as enclosed within the tube and installed in furnaces operating at high temperatures. More specifically, it relates to an improved alloy pyrometer tube of such an analysis and so constructed that the thermocouple wires inclosed therein are protected against deterioration which in turn cause incorrect instrument readings. Furthermore, the composition or analysis of such a tube renders it capable of satisfactorily withstanding corrosion and oxidation from high furnace temperatures, such as continuous normalizing furnaces where the temperatures approach 1900 to 2100 degrees Fahrenheit or any other furnace wherein the temperatures exceed about 1800 degrees Fahrenheit.

The figure is a cross-sectional view of a pyrometer tube in use in a furnace.

In carrying out my invention I provide a protecting tube 1, completely enclosing the thermocouple wires 2, with the tube 1 extending through the furnace walls or roof 3 as indicated in the figure.

For furnaces operating at high temperatures as previously mentioned, it has been the general practice to use a nickel or a nickel-chrome protecting tube. These have been unsatisfactory, inasmuch as the intensive heat of the furnace together with the nature of the gas as introduced into the furnace as well as the gases of combustion in the furnace cause the tube to not only become porous and absorb these gases, but to permit sulphur fumes to attack the nickel and cause a precipitation of nickel sulphide and similar deposits on the enclosed couple wires, thus destroying the efficiency of the same. As a consequence, the pyrometer becomes inaccurate in its readings and, for example, may register lower temperatures than actually exist within the furnace chamber.

With a preferred embodiment in mind, but without desiring to limit the invention otherwise than as may be required by the prior art the invention comprises an elongated tube closed at one end and constituting a body portion, the walls of which are formed of steel containing from approximately twenty-five to thirty-five percent of chromium. Preferably this composition should be substantially free from added nickel but nickel may be used for certain purposes if it does not exceed about one percent. The metal constituting the walls is compact, dense and non-porous to such an extent that it is substantially impervious to gases at high temperatures, for example, at temperatures above approximately 1800 degrees Fahrenheit.

The tube may be formed by taking a bar of steel of the foregoing composition and subjecting the same to a compacting operation such as rolling or forging until the metal of the bar has become compacted sufficiently to render the same substantially non-porous, impervious to the furnace gases and to form a dense compact structure of the particles of the metal itself. Subsequently the metal bar is fashioned in any suitable way into an elongated tube having a closed end, with the closed end and side walls being of approximately equal thickness, preferably by drilling out the interior of the bar.

The tube manufactured as above described is substantially impervious to furnace gases and can be utilized as a pyrometer protecting tube wherein the thermocouple wires will accurately record the high temperatures of said furnace over a prolonged period of time. The tube will, when ex-

posed to these gases under high temperatures, resist their penetration through the walls and prevent deterioration of the couple.

While a preferred embodiment of the invention has been shown and described, it will be understood to those familiar with the art, that various modifications can be made within the scope of the appended claims.

What I claim is:

1. A pyrometer tube comprising a body portion formed of steel containing twenty-five to thirty-five percent chromium and less than about one percent of nickel and sufficiently dense and compact to exclude gases at temperatures above 1800 degrees Fahrenheit.

2. A pyrometer tube for temperatures above about 1800 degrees Fahrenheit comprising integral end and side walls, substantially impervious to gases, of approximately equal thickness and composed of steel containing between about twenty-five percent and about thirty-five percent of chromium and less than about one percent of nickel.

3. A pyrometer tube for temperatures above about 1800 degrees Fahrenheit comprising a hollow steel body having substantially gas-impervious integral end and side walls and containing from about twenty-five percent to about thirty-five percent of chromium and not more than about one percent of nickel.

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