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CROSS REFERENCE SEARCH ROOM
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Sept. 24, 1963 J. A. DUKE 3,105,150

COATED RADIANT ENERGY SIGHT GUIDE FOR TEMPERATURE MEASUREMENT

Filed Nov. 18, 1959

FIG. 1

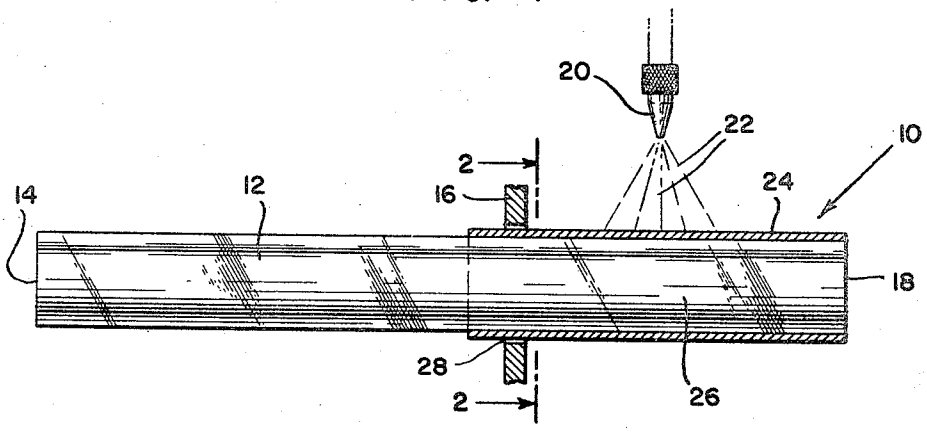
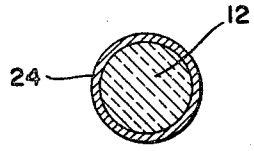


FIG. 2



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United States Patent Office 3,105,150 Patented Sept. 24, 1963

3,105,150

COATED RADIANT ENERGY SIGHT GUIDE FOR TEMPERATURE MEASUREMENT

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Filed Nov. 18, 1959, Ser. No. 853,812
5 Claims. (Cl. 250—83)

This application generally relates to a radiation transmission guide used in measuring for example the temperature of furnaces wherein energy is transmitted from a hot end of the guide located in a furnace, which is proportional to the temperature of the furnace, through the wall of the furnace to a cool end of the guide.

When guides of this type are employed to measure the temperature of furnaces in the aforementioned manner it has been found that inaccurate temperature measurements ofttimes result particularly between room temperature and 3000° F. Experimentation has shown that these inaccuracies are caused when small particles such as dirt, carbon, molten glass, slag or other similar particles are deposited on the peripheral and/or end portions of the rod particularly the cool peripheral end portion of the guide. When this happens a loss in transmission efficiency of the guide occurs.

It is one of the primary objects of the present invention to provide a coating for such a radiation transmission guide wich will greatly reduce the loss in the transmission efficiency of the radiant energy transmitting guide.

It is another more specific object of the invention to provide a coating of the aforementioned type for a radiant transmission guide which is made of aluminum oxide cement and which when applied to an outer peripheral surface of the guide will effectively protect the radiant energy transmitting characteristics of the guide over wide ambient temperature ranges particularly between room temperature and 3000° F.

In the drawing:

FIGURE 1 shows a coated radiant energy transmission guide, and

FIGURE 2 shows a cross section of the guide and coating taken along the section line 2—2 of FIGURE 1.

FIGURE 1 of the drawing shows an apparatus that is useful in measuring the heat given off from an object such as a part of the interior of a furnace or an object being heated by this furnace.

This apparatus is generally designated in the drawing as reference numeral **10** and has a radiant energy transmission guide **12**. Although the guide **12** is preferably of a rod shaped configuration and made of a transparent material such as sapphire or synthetic sapphire it should be understood that guides which are made of quartz, Pyrex or of acrlyn resin or methyl methacrylate plastics materials of the thermo-plastic type such as for example commercial Plexiglas or Lucite may also be used depending on the temperature range under which the temperature measurement is taking place.

This guide is shown having a left heated end **14** which protrudes into and through the right side of a furnace wall **16**. The arrangement of the guide is such that this end can readily be sighted on an exposed furnace wall or object mounted therein not shown. The right or cool end **18** of the guide **12** is shown located exterior and to the right of the right side of the furnace wall **16**.

FIGURE 1 also shows a spray nozzle **20** through which a refractory material in the form of, for example, aluminum oxide cement **22** can be sprayed on the outer peripheral surface of the guide **12** to form a protective coating **24** thereon. This coating is placed on the guide by either one or the other of the following two methods,

the first of which is the preferred form as shown in the drawing.

In the first or preferred method the portion **26** of the guide **12** is cleaned by a suitable cleaning fluid on which the aluminum oxide is to be applied and a coating of hot aluminum oxide cement **22** is then uniformly applied to the outer peripheral surface of the guide **12**. The coating is then allowed to dry out and to be hardened on the portion **26** of the rod **12**.

In the second or alternative method the portion **26** of the guide **12** is cleaned by means of a suitable cleaning fluid then temperate rather than hot aluminum oxide cement in paste form is applied to the exterior surface of the guide portion **26**. The paste is then heated to substantially 2200° F. to dry out any moisture in the aluminum oxide cement and to cause the aluminum oxide to adhere to the guide.

When an aluminum oxide coating **24** is placed on the guide by either of the aforementioned techniques, laboratory experimentations have shown that should any radiant energy then seep through the aperture **28** in the furnace wall which surrounds the guide **12** this undesired energy will not be permitted to enter the coated portion **24** surrounding the guide portion **26** to cause the efficient transmission characteristics of the guide **12** to be upset.

Experimentation has further shown that an aluminum oxide coating **24** can be applied which will effectively protect transmitting efficiency of the guide against ambient temperatures caused by the aforementioned undesired radiant energy which temperatures may be as high as 3000° F.

Experimentation has also shown that another advantage of the aluminum oxide coating **24** is its ability to prevent small atmospheric particles of carbon for example in the form of smoke or lamp black, molten glass or slag from being brought into contact with the surface **26** of the guide **12**. Powdered carbon and molten glass are ofttimes produced by furnaces for example when an improper combustion of the fuel oil or gas being used by the furnace occurs due to insufficient amount of air being fed to the furnace.

The slag particles are brought about by impurities in the ore that is placed in a furnace, for example, the impurities calcium carbonate and silica.

By preventing the aforementioned particles for example carbon from coming into contact with a hot guide portion **26** it is possible with the coated transmission guide disclosed herein to prevent transmission inefficiencies from occurring in the radiation energy transmitting guide.

From the aforementioned description of the heat measuring apparatus it can be seen that a coating of refractory material such as aluminum oxide has been employed about a radiant energy guide to prevent transmission inefficiencies from occurring in the radiant energy guide particularly under the conditions when the ambient temperature surrounding the guide is raised to an abnormally high level and/or deposits of carbon, slag or glass particles are present in the atmosphere immediately surrounding the guide.

What is claimed is:

1. A radiant energy transmitting sight guide adapted to effect the efficient transmission of radiant energy proportional to the temperature of an object located within the confines of a wall of a heat emitting furnace from a hot end of the guide when positioned within the confines of the wall to an opposite end of the guide positioned outside the wall, comprising a protective coating of material entirely surrounding a peripheral portion of said guide that is spaced from said hot end and extends through an opening in the wall to the opposite end, and said material having refractory characteristics to prevent molten particles emitted in heating the object in the furance from

being brought into contact with the peripheral portion of said guide.

2. The transmitting sight guide as specified in claim 1 wherein said refractory material is comprised of a dried coating of aluminum oxide cement.

3. The transmitting sight guide as specified in claim 1 wherein said coating is effective in protecting the radiant energy transmission efficiency of said rod in atmospheres up to 3000° F.

4. The transmitting sight guide as specified in claim 1 wherein said guide is made of a synethetic sapphire material.

5. A radiant energy transmitting guide adapted to effect the efficient transmission of radiant energy proportional to the internal temperature of a carbon fuel burning furnace from a hot end of the guide when positioned within an inner wall of the furnace to an opposite end of said guide positioned outside the wall, comprising a protective coating of material entirely surrounding a peripheral portion of said guide spaced from said hot end and extends through an opening in the wall to the opposite end and said material having refractory characteristics to prevent

molten carbon particles emitted by the fuel being burned in the furnace being brought into contact with the peripheral portion of said guide.

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