

931,594.

F. GELSTHARP.
FLAME INDICATOR FOR FURNACES.
APPLICATION FILED DEC. 26, 1908.

Patented Aug. 17, 1909.

Fig. 1.

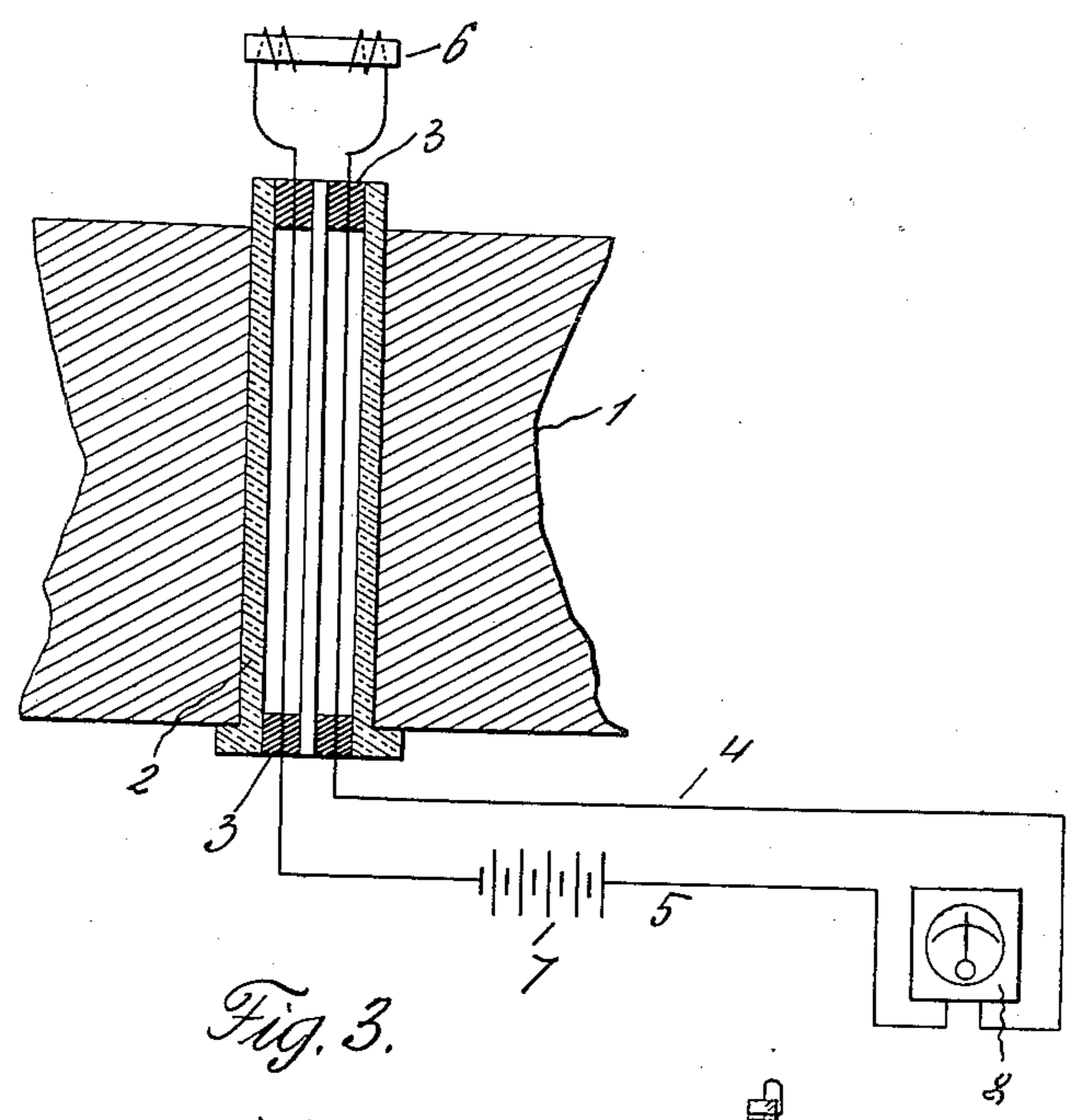


Fig. 2.

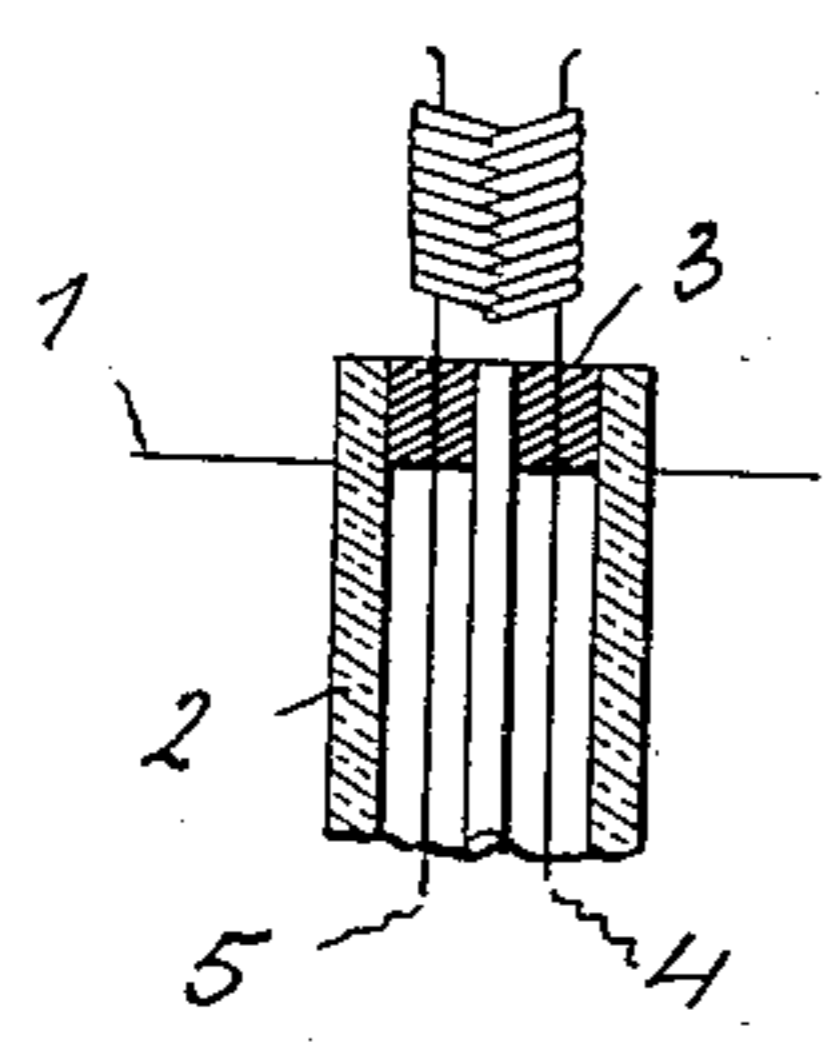


Fig. 3.

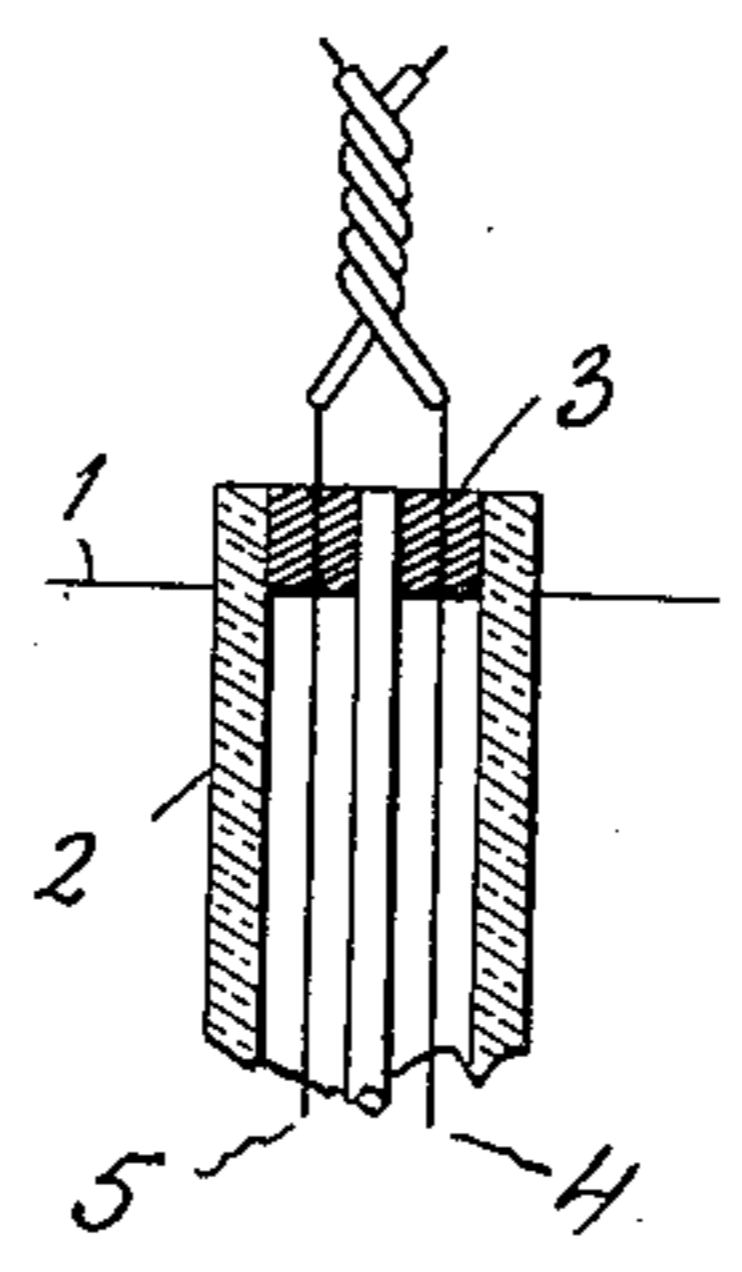
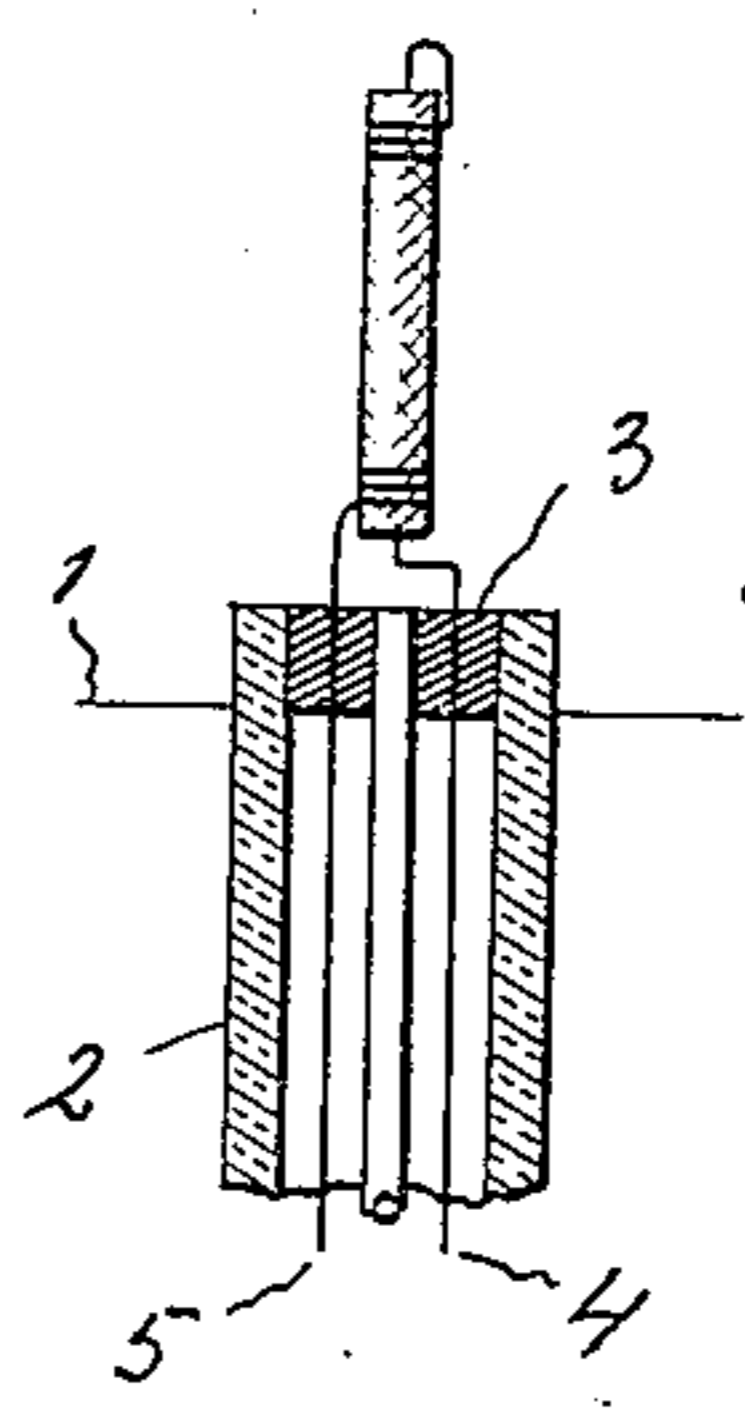


Fig. 4.



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UNITED STATES PATENT OFFICE.

FREDERICK GELSTHARP, OF FORD CITY, PENNSYLVANIA.

FLAME-INDICATOR FOR FURNACES.

No. 931,594.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed December 26, 1908. Serial No. 469,282.

To all whom it may concern:

Be it known that I, FREDERICK GELSTHARP, a subject of the King of Great Britain, residing at Ford City, in the county of Armstrong and State of Pennsylvania, have invented certain new and useful Improvements in Flame-Indicators for Furnaces, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a flame indicator for furnaces, and the object of my invention is to provide a novel instrument for determining whether the furnace is operating with an oxidizing or reducing flame. Such an object is an important matter in connection with metallurgical furnaces, where it is essential to determine the action of the flame within the furnace.

My invention aims to provide an electrical instrument in connection with certain metals, which will give a continuous record of the good or faulty working of a furnace, showing the periods during which the furnace was working with an oxidizing or reducing flame. In this connection, my instrument is of value when used with metallurgical furnaces and even with steam boilers, as a possible waste due to the burning of metal and the over consumption of fuel can be prevented or regulated and the best results obtained in working the furnace.

The principle of my invention depends on the fact that metals are good conductors of electricity, while their oxids are comparatively non-conductors, and it is the gases in the furnace acting upon the non-conductors that is adapted to complete an electrical circuit through the instrument and indicate when a current is passing through the electrical circuit.

The invention will be hereinafter more fully described and then specifically pointed out in the appended claims, and reference will now be had to the drawings, wherein I have illustrated the preferred embodiments of my invention, but I would have it understood that the elements can be changed, particularly in the manner of assemblage, without departing from the spirit of the invention.

In the drawings:—Figure 1 is a diagrammatic view of a flame indicator, and Figs. 2 to 4 inclusive are detail views illustrating modifications of the invention.

In the accompanying drawings, 1 designates the wall of a furnace, preferably that

of a flue leading to the chimney and in this wall is located a porcelain or fused quartz tube 2. In the ends of the tube are located plugs 3 of insulation, and extending longitudinally through the tube and insulated from one another by the plugs 3 are two leading wires 4 and 5 of a permanent metal, as platinum, gold, nickel or suitable alloy. The ends of the leading wires 4 and 5 within the furnace are connected to a non-fusible material 6 as asbestos, bone ash, clay, porcelain, or any incombustible material which is a non-conductor of electricity. This material is saturated or coated, with the oxid of metal or a mixture of metals, which are chosen for the active material. Any metallic oxid or mixtures of oxid that can be easily reduced to metal and re-oxidized at a temperature near 1000 degrees Fahr. can be used, for instance, the oxid of iron FeO or Fe_2O_3 , or copper oxid CuO .

The opposite ends of the leading wires 4 and 5 are placed in circuit with a suitable source of electrical energy 7 of low voltage, as a thermo battery, and a galvanometer 8 which will indicate when a current is passing through the circuit.

Since the active material 6 is introduced in the flue leading to the chimney of the furnace, at a point which is usually at a temperature about 1000 degrees Fahr., the action of the flame upon the oxid or mixture of oxids coated upon the non-combustible material will readily determine the flow of a current through the leading wires 4 and 5, consequently the galvanometer will indicate, somewhat similar to a pyrometer, (which determines the action of a furnace by the temperature and proper working of a furnace).

In Figs. 2 and 3 of the drawings, I have illustrated the inner ends of the leading wires 4 and 5, as connected by an asbestos core, while in Fig. 4 of the drawings, the leading wires have been connected to the asbestos tube or to an incombustible non-conductor. These incombustible elements can be easily coated with an active element that will insure a positive operation of my indicator.

Having now described my invention what I claim as new, is:—

1. In a means for indicating a reducing or an oxidizing atmosphere in a furnace, a galvanometer in circuit with a source of electrical energy, conductors insulated from

each other, connected with said galvanometer and to the source of electrical energy, said conductors each having an end extending in the furnace, a strip of non-conducting material connecting the ends of the conductors which are arranged in the furnace, and a metallic oxidized coating upon said strip and constituting a non-conductor when exposed to an oxidizing atmosphere and further constituting a conductor when exposed to a reducing atmosphere to complete the circuit.

2. In a means for indicating a reducing or an oxidizing flame within a furnace, a pair of conducting wires each having one end extending within the furnace, a source of electrical energy interposed in one of said wires, a strip of non-conducting material connecting the ends of the wires within the furnace, a galvanometer connected to the ends of the wires exteriorly of the furnace, and a metallic oxidized coating upon said strip constituting a non-conductor when exposed to an oxidizing atmosphere, and further constituting a conductor when exposed to a reducing atmosphere to complete the circuit.

3. In a means for indicating a reducing or an oxidizing flame within a furnace, a pair of conductors each having one end positioned within the furnace, a source of electrical energy of low voltage interposed in one of said conductors, an incombustible and non-conducting strip connecting the ends of the conductors within the furnace together, a galvanometer connected with the conductors for indicating when the current is passing through the circuit, and a metallic oxidized coating for said strip constituting

a non-conductor when exposed to an oxidizing atmosphere and further constituting a conductor when exposed to a reducing atmosphere to complete the circuit.

4. In a means for indicating a reducing or an oxidizing atmosphere within a furnace, a pair of conductors extending within the furnace and in circuit with a source of electrical energy of low voltage, means arranged within the furnace and connected to the conductors for maintaining the circuit broken during an oxidizing atmosphere and for making the circuit during a reducing atmosphere, and means connected to the conductors for indicating when a current is passing through the circuit to indicate a reducing atmosphere within the furnace.

5. In a means for indicating a reducing or an oxidizing flame within a furnace, a pair of conductors extending in the furnace and connected together by an incombustible non-conducting means, a source of electrical energy of low voltage attached to one of said conductors, a metallic oxidized coating for said strips constituting a non-conductor when exposed to an oxidizing atmosphere and further constituting a conductor when exposed to a reducing atmosphere to complete an electrical circuit, and means connected to the conductors for indicating when a current is passing through the circuit to indicate a reducing atmosphere within the furnace.

In testimony whereof I affix my signature in the presence of two witnesses.

FREDERICK GELSTHARP.

Witnesses:

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