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RESISTANCE OR FUSE WIRE

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This invention relates to wires suitable as electrical resistances particularly in the ignition of explosives, such as resistance wires or bridge wires in blasting caps, detonators and the like.

Heretofore such resistance wires for igniting or setting off explosives usually consisted of an alloy of platinum-iridium containing from 10% to 20% iridium, the alloy of 80% platinum and 20% iridium generally being preferred. Such alloys of platinum-iridium are, however, very expensive. In a co-pending application Serial No. 288,572, filed August 5, 1939, I have described electrical resistance wires of alloys of platinum with palladium and ruthenium containing from 10% to 80% platinum, from 12% to 90% palladium, and from 1% to 15% ruthenium, which alloys have been found to be highly satisfactory.

It is one object of my invention to produce an electrical resistance wire which shall consist substantially of precious metals only and shall have low specific gravity, high electrical resistance and satisfactory breaking loads or tensile strength to take the place of fuse wire of platinum-iridium alloys heretofore in general use in setting off explosives, and which while having characteristics similar to those of such platinum-iridium alloys shall be of considerably lower cost.

It is another object of my invention to produce such wires for such purposes as resistances in Wheatstone bridges, resistance coils and resistance wires for use in igniting explosives, as in blasting caps, detonators or the like. A still further object of my present invention is to provide such resistance wires which shall be cheaper than the resistance wires described in my co-pending application above referred to and yet of equal quality or even superior quality.

This application is a continuation in part of my application No. 378,376, filed February 11, 1941.

The electrical resistance wire of my present invention consists of an alloy of palladium with at least one metal taken from the group consisting of rhodium and ruthenium in the proportion of not less than about 80% palladium and not more than about 95% palladium alloyed with 5% to 20% of such metal of the group rhodium and ruthenium. In no case should the alloy contain less than 5% of rhodium or ruthenium or of rhodium and ruthenium. If the electrical resistance wire is constructed of a substantially binary alloy, the alloy should contain, therefore, at least 5% rhodium or 5% ruthenium; if the electrical resistance wire is, however, constructed of a substantially ternary alloy, the alloy should, therefore, contain at least 5% rhodium and ruthenium such, for instance, as 2.5% rhodium and 2.5%

ruthenium, with a corresponding maximum amount of 17.5% for each of the rhodium and ruthenium constituents. Such alloys have excellent corrosion resistance and their melting points are in excess of the ignition point of detonating charges. As such alloys have, further, high electrical resistance and great strength they are admirably suited for such purposes as resistance wires or bridge wires in blasting caps, detonators and the like.

I have found particularly satisfactory electrical resistance wires of such specific alloys as 95% palladium-5% ruthenium, 90% palladium-5% ruthenium-5% rhodium, and 95% palladium-5% rhodium, i. e. alloys of 90% to 95% palladium and 5% to 10% of metal taken from the group rhodium and ruthenium. The alloys have a high melting point and low specific gravity. I may provide, for instance, 7500 feet of 0.0015" electrical resistance wire from 1 ounce of alloy of 95% palladium-5% ruthenium, an alloy which has a specific gravity of 12.1 and a melting point of 1600° C. The particular feature of the electrical resistance wire according to the present invention is that it is completely satisfactory without the presence of any platinum, whereby it is possible to take full advantage of the extremely low price and low specific gravity of palladium, although of course the alloys may contain some platinum; likewise, the specific gravity of rhodium as well as ruthenium is extremely low.

What I claim is:

1. An electrical resistance wire consisting of the alloy of 80% to 95% palladium and 5% to 20% of metal taken from the group consisting of ruthenium and rhodium.

2. An electrical resistance wire consisting of an alloy of 80% to 95% palladium, 2.5% to 17.5% ruthenium, and 2.5% to 17.5% rhodium, wherein the combined content of ruthenium and rhodium does not exceed 20%.

3. An electrical resistance wire consisting of an alloy of 90% to 95% palladium, and 5% to 10% of metal taken from the group consisting of ruthenium and rhodium.

4. An electrical resistance wire consisting of an alloy of 90% to 95% palladium, 2.5% to 7.5% ruthenium, 2.5% to 7.5% rhodium, wherein the combined content of ruthenium and rhodium does not exceed 10%.

5. An electrical resistance wire consisting of an alloy of about 95% palladium and about 5% ruthenium.

6. An electrical resistance wire consisting of an alloy of about 90% palladium, about 5% ruthenium, and about 5% rhodium.

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