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PALLADIUM NICKEL ALLOY

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This invention relates to alloys and more particularly relates to palladium alloys having physical characteristics comparable to white gold and/or platinum and suitable for jewelry, watch cases, optical frames, dentures and other articles of manufacture.

Palladium is a soft white noble metal of the platinum group. It is lighter in weight and lower in cost than platinum. The natural softness of palladium, like platinum, renders it unsuitable as a metal for articles of manufacture. Attempts have heretofore been made to harden palladium by alloying it with costly or rare metals such as ruthenium, rhodium, platinum, etc.

In accordance with my present invention, I provide a commercially hard palladium alloy by the addition of the base metal nickel to palladium. Nickel is comparatively very cheap and has substantially the same color as palladium. I have found that by proper proportioning of the nickel content, a hard palladium alloy is produced, having the white appearance of palladium, and being resistant to oxidation and discoloration.

The relatively high fusion point of the palladium-nickel alloy of my invention, together with the white appearance and workability of the metal, renders it widely useful. The elasticity and springiness of the alloy make it suitable for optical frames and other uses.

It is accordingly an object of my present invention to provide a novel alloy of palladium.

Another object of my present invention is to provide a novel palladium alloy of commercial hardness.

A further object of my present invention is to provide a novel palladium alloy hardened by the base metal nickel.

A still further object of my present invention is to provide a novel palladium nickel alloy having the appearance of palladium and being resistant to oxidation and tarnishing.

Other objects and advantages of my present invention will be evident from the following description.

I have discovered that by alloying palladium with four to six per cent of nickel produces the qualities in palladium hereinabove described. In practice, I have found that as the percentage of nickel content is increased up to sixteen per cent, the hardness rises rapidly.

At sixteen per cent nickel, the alloy has a tendency to crack and can be worked satisfactorily only when hot. Beyond this percentage of nickel, the alloy begins to present considerable difficulties. Sixteen per cent nickel may therefore be considered the upper limit of the palladium-nickel composition of this invention. Nickel, having a color similar to palladium, does not affect the color of the palladium alloy in the proportions used. The alloy is cold-rolled to suitable shape in a manner well known in the art and is annealed by heating to a temperature of 800° to 1000° C. and permitted to cool slowly under atmospheric conditions. In order to prevent the formation of oxide coatings on the palladium alloy, I water quench the alloy.

I have found that the addition of a small quantity of flux when the alloy is first prepared from its elementary constituents, prevents the formation of nickel oxide. This is important inasmuch as nickel oxide inclines the alloy to be brittle. After the nickel has been melted in the palladium, the standard technique as used in melting pure palladium can be followed for subsequent melting of the alloy.

Rockwell hardness measurements on pure palladium using the B scale range from —40 to —50. Similar hardness measurements on the palladium-four per cent nickel alloy of my present invention showed +30 to +35; measurements on the palladium-five per cent nickel composition yielding +53 to +55; six per cent yielding to +75.

The resultant palladium-nickel alloy has the white appearance of palladium and suitable commercial hardness for jewelry, watch-cases, rings and the like, serving as a good and economical substitute for white gold and/or platinum. This alloy is resistant to oxidation, acids, and discoloration.

The high fusing point of the palladium-nickel alloy of my present invention together with the malleability and workability of the alloy renders it, as stated, suitable for a wide variety of uses and produces a springiness or elasticity and malleability making it useful for jewelry generally.

I claim:

1. An alloy consisting of approximately ninety-five percent palladium and approximately five percent nickel.

2. An alloy constituted principally of palladium, ninety-seven to ninety-two percent having a corresponding nickel content of three to eight percent.

3. An alloy composed of palladium and nickel having from five to sixteen percent nickel content.

4. An alloy constituted principally of palladium of approximately ninety-five percent, hardened with nickel to a Rockwell hardness of the order of +55 when using the B scale, the nickel content being approximately five percent.

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