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RUTHENIUM ALLOY PEN POINT

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This invention relates to a pen point composed essentially of ruthenium alloy.

Pen points are subjected to very serious corrosion and erosion influences and as a result must be hard, wear resistant, and extremely resistant to chemical corrosion.

The platinum group of metals is known for the high melting points of the members and for their chemical inertness. As a result all of the metals of this group have been tried for pen point purposes. Up to the present time, however, osmium has been the platinum metal almost universally employed, although it has been used in combination with many others of the group.

Ruthenium has hitherto not been successfully employed as a major constituent of a pen point material, nor has it been employed in a binary alloy even in minor proportions. The reason for this apparently has been that ruthenium, when used in pen point alloys, produced an extremely brittle metal which could not be worked in the manner required of pen point materials.

It has now been discovered that a very satisfactory pen point may be produced by the use of ruthenium, provided the proportion of ruthenium in the alloy is extremely high and particularly if the presence of a substantial proportion of matrix metal is avoided.

In the alloy of the present invention ruthenium is employed in an amount of at least approximately 85% of the total, and may be utilized to as high a proportion as approximately 98%.

A further advantage of the present invention lies in the fact that ruthenium may be employed in a binary alloy in the proportions stated.

A preferred alloy comprises from 85% to 98% by weight of ruthenium and from 2% to 15% of platinum metal. The platinum metal forms a matrix binding together the ruthenium. It has been found important that the alloy be prepared under such conditions that the matrix will not greatly exceed 15% of the total. For example, if an alloy is prepared using 85% ruthenium and 15% platinum, and the individual constituents are alloyed by fusion, a considerable proportion of ruthenium will dissolve in the platinum, thereby increasing to a great extent the amount of matrix material, and the resulting alloy will be brittle and unsatisfactory for pen point purposes. The same thing is true of an alloy comprising 90% ruthenium and 10% platinum. If the proportion of platinum is made low enough, however, and fusion is carried on with great care, it is possible to produce a satisfactory alloy by fusion. However, under commercial conditions fusion has not been found to be a suitable method of producing the alloy.

The alloys of the present invention are, therefore, preferably produced by powder metallurgy processes in which the constituents are ground to a fine state of division, thoroughly intermingled, compressed under extremely high pressures, and are then sintered in an inert atmosphere at a high temperature.

For example, an alloy containing 85% ruthenium and 15% platinum was prepared by mixing the two metals in finely divided form in the proportions stated, compressing them into a block under high pressure, and then sintering the material in an inert atmosphere at a temperature of approximately 2950–3000° F. for one hour.

The treating time and temperature may be considerably altered, but care should be taken not to produce a temperature so high that excessive amounts of matrix will be formed. If the alloy becomes excessively brittle, the treating time or temperature, or both, should be reduced.

An alloy of 90% ruthenium and 10% platinum is suitably produced in the same manner, in this case the sintering being for one hour at 2950° F.

An alloy of 95% ruthenium and 5% platinum may satisfactorily be produced by the same method, employing two hours of sintering at 2950° F.

The platinum may be replaced in part by other metals which do not modify the characteristics of the alloy, and the term "platinum metal" has been used to indicate a platinum which may be so modified.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom.

What I claim as new, and desire to secure by Letters Patent, is:

1. A pen point consisting essentially of a non-brittle ruthenium alloy including at least substantially 85% ruthenium, said alloy containing at least approximately 2% of other platinum group metal, said alloy being characterized by substantial freedom of the matrix thereof from ruthenium.

2. A pen point as set forth in claim 1, in which the alloy includes a substantial proportion of platinum.

3. A pen point consisting essentially of a non-

brittle alloy including from 85% to 98% of ruthenium, and 2% to 15% of platinum, the matrix metal in said alloy being substantially free from ruthenium.

4. A ruthenium alloy including substantially 85% to 98% ruthenium, and 2% to 15% platinum metal, the matrix metal in said alloy being substantially free from ruthenium.

5. An alloy consisting essentially of 85% to 98% ruthenium and 2% to 15% of platinum, the matrix metal in said alloy being substantially free from ruthenium.

6. An alloy consisting essentially of 85% ruthenium and 15% platinum, the matrix metal in said alloy being substantially free from ruthenium.

7. An alloy consisting essentially of 90% ruthenium and 10% platinum, the matrix metal in said alloy being substantially free from ruthenium.

8. An alloy consisting essentially of 95% ruthenium and 5% platinum, the matrix metal in said alloy being substantially free from ruthenium.

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