UNITED STATES PATENT OFFICE.

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METAL ALLOY.

1,334,089. Specification of Letters Patent. Patented Mar. 16, 1920.

No Drawing. Application filed July 16, 1917. Serial No. 180,866.

To all whom it may concern:

Be it known that I, JAMES B. GRENAGLE, a citizen of the United States, residing at Catonsville, in the county of Baltimore and State of Maryland, have invented a new and useful Metal Alloy, of which the following is a specification.

My invention has relation to a new metal alloy possessing many valuable properties. This novel metal alloy is obtained from the oxids of zirconium, columbium and tantalum, and is characterized in part by the following properties:

It is extremely inert to chemical reagents. It is not attacked by hydrochloric, nitric or sulfuric acids, either hot or cold, or by aqua regia; and cold hydrofluoric acid has no appreciable effect on it. It is also non-sensitive to alkaline solutions. It can be heated to a white incandescence in the open air without oxidizing or vaporizing. It is substantially unaffected by either nascent chlorin or by nascent oxygen in wet solution. Its melting point is above 2000° C. It shows no affinity for either oxygen or hydrogen at high temperatures, but combines with carbon, and forms carbids and metallic combinations. These, as at present known, have a metallic appearance and are quite hard and brittle. The metal, or metal alloy, somewhat resembles platinum, but has a slight yellowish tinge. It is readily workable and can be hammered out into thin sheet form. It can also be rolled and drawn into very thin wires. In many of these respects it differs widely from the metals zirconium, columbium and tantalum, which separately do not possess these properties.

One method of making the metal alloy is by mixing the oxid of zirconium with about one-half its weight of the oxids of tantalum and columbium (niobium), and then heating the mixture in an electric furnace. The oxids appear to react on one another and at a temperature above a white heat the mass fuses. When cooled the fused mass is found to contain beads of the described metal or metal alloy. These beads are then collected and fused together, preferably in an atmosphere which is free from carbon, or carbon vapor or gases. The mass thus obtained can be rolled into sheets, foil, or wire, or can be otherwise worked.

A typical analysis of an alloy produced in this manner is the following:

Zirconium	6.8
Columbium	53.5
Tantalum (by difference)	39.7

However, I do not wish to limit myself to an alloy having this particular analysis.

I do not limit myself to this particular method of making the new metal or metal alloy, nor do I limit myself to the proportions of oxids described, since other proportions will produce a metal having the described properties.

I claim:

1. A metal alloy containing substantially 6.8 of zirconium, 53.5 of columbium and 39.7 of tantalum.

2. A metal alloy containing zirconium, columbium and tantalum—the proportions of each of the columbium and tantalum being greatly in excess of that of the zirconium, substantially as described.

In testimony whereof, I have hereunto set my hand.

JAMES B. GRENAGLE.