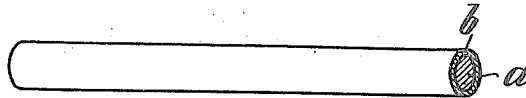


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HIGHLY REFRACTORY ARTICLE OF TANTALUM AND ITS ALLOYS.
APPLICATION FILED OCT. 17, 1912.

1,180,614.

Patented Apr. 25, 1916.



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UNITED STATES PATENT OFFICE.

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HIGHLY-REFRACTORY ARTICLE OF TANTALUM AND ITS ALLOYS.

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Specification of Letters Patent.

Patented Apr. 25, 1916.

Application filed October 17, 1912. Serial No. 726,257.

To all whom it may concern:

Be it known that I, OTTO ARCHIBALD SIMPSON, a citizen of the German Empire, and residing at Charlottenburg, near Berlin, Germany, have invented a certain new and useful Improved Highly-Refractory Article of Tantalum and Its Alloys, of which the following is a specification.

My invention relates to articles of tantalum or an alloy of tantalum rendered highly refractory by a cover of platinum.

Since tantalum has been produced in a metallically pure form and very inexpensive processes of manufacturing the same have been devised, the metal has become of great importance in the arts and has been widely used. This is owing to tantalum possessing a combination of excellent properties such as no other single metal can be said to possess even approximately. Tantalum not only has a very high resistance to breaking strain, higher even than that of iron, but, in addition, it is very elastic and can be very readily worked in the most various ways. For example, it can be drawn to form the finest wires. Also it can be hardened like the best steel. Further, tantalum has excellent chemical properties; at ordinary temperatures it is unaffected by the atmosphere and in this respect behaves like the noble metals. Likewise, at ordinary temperatures, it is not attacked by most acids. Its melting point is considerably higher than that of platinum. Again, tantalum forms alloys with other metals, tantalum-iron alloys being the best known, and the alloys can be subsequently welded with the metal employed to form the alloy. Another property of tantalum, and one which under some conditions is very important, is that it is almost or entirely non-magnetic. Finally, in spite of all these valuable properties, it has the advantage of being cheaper than metals whose properties will bear any comparison at all with its own. Heretofore, however, tantalum has had one drawback, viz. that when it is exposed to the atmosphere, it begins to oxidize at temperatures of only a few hundred degrees centigrade. When it is at temperatures higher than 600° to 800° C. it may not be exposed to the air. Therefore, in spite of its extended use, a very large field of ap-

plication remains closed, namely it cannot be used whenever high temperatures are involved. Very great endeavors have therefore been made to render tantalum usable in such cases also, but hitherto in vain.

A primary object of my invention is to obviate the above drawback, and to provide a new combination of metals which unites in itself all the above-mentioned desirable advantages and constitutes a very important addition to the arts. The production of such a metal has been successfully effected by covering tantalum with platinum.

In the accompanying drawing one illustrative embodiment of my invention is shown in perspective, wherein—

a designates a rod composed of tantalum pushed into an exactly fitting thin platinum tube *b*. The new article of manufacture made in this manner may, if necessary, be worked up further as desired by rolling or hammering.

It is, of course, well-known to plate various metals with platinum. In every case, however, this was done with the sole view of obtaining a cheap substitute for the expensive platinum. The problem in such cases was to find a new metal for certain purposes for which the known metals were largely or entirely unsuitable, for the one metal, platinum, was available and combined in itself all the desired properties, but was much too costly. In bimetals of this kind known heretofore the properties of the starting or plated metal are not the determining factors. Also, in all cases one of the plated metals employed heretofore, *e. g.* copper, can be replaced by another, *e. g.* aluminium, without affecting those properties of the bimetal which are most important. According to my invention, however, I provide a new combination of metals for purposes for which no metal or combination of metals known heretofore could be employed, a new combination of metals having properties such as are not even approximately possessed by any other known metal or bimetal.

Every field of application heretofore closed to tantalum is open to my new combination of metals. It can therefore be employed in all cases where use is made of high, and indeed the highest temperatures,

which only platinum could stand heretofore, and such cases are of course exceedingly numerous. I may mention, for example, the employment of the wire composed of metals according to my invention for heating apparatus and for smelting-furnaces heated electrically by resistances; the employment of the combination of metals for making pins for artificial teeth, for making crucibles for very high temperatures, and so on; almost any desired number of examples could be given. Moreover, as the new combination of metals can be welded very well with platinum, copper and a number of other metals, other fields of application, in which weldability is a necessity, are opened.

In addition, platinized tantalum is com-

paratively inexpensive, because the platinum coating required for the purpose may be exceedingly thin.

I claim:—

1. As a new article of manufacture, a body comprising tantalum covered with platinum.

2. As a new article of manufacture, a body composed of an alloy of tantalum covered with platinum.

In testimony whereof, I have signed my name to this specification in the presence of two witnesses.

OTTO ARCHIBALD SIMPSON.

Witnesses:

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