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COMPOSITE TITANIUM BORIDE BARS

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ABSTRACT OF THE DISCLOSURE

The disclosed invention pertains to a metallized coated titanium diboride bar by means of an intermediate alloy of titanium and molybdenum or tungsten. The outer metallized coating is secured to the diboride base by melting the alloy.

My invention relates to alloys and methods for attaching conductors to titanium diboride vaporizer bars, and more specifically to alloys and methods which will form a sound, strong, electrically conducting bond between titanium diboride vaporizer bars and electrical conductors, whereby the conductors may be attached directly to the vaporizer bars without the need for mechanical attachments heretofore required to be used.

Titanium diboride vaporizer bars have been commonly used for the vapor deposition of various metallic and nonmetallic materials in thin coatings for the production of ornamental plastic parts, reflectors, television tubes, mirrors and many other products. In such vapor deposition, the vaporizer bar is placed in a vacuum spaced from the particular product or products to be coated, the particular coating material placed on the vaporizer bar, and the vaporizer bar resistance heated by the passing of electrical energy therethrough, which results in the coating material being vaporized and condensing on the surface of the cooler product to be coated, thereby providing the desired coating.

To my knowledge, prior to my present invention, it has always been necessary to attach the electrical conductors to the ends of the titanium diboride vaporizer bars in order to pass electrical energy therethrough by means of various mechanical fasteners and clamps. One of the major problems presented with this form of clamping is that these mechanical fasteners and clamps loosen during heating and cooling and the electrical contact between the conductors and vaporizer bars is diminished, if not totally destroyed.

It is, therefore, a general object of the present invention to solve the foregoing major problem with the prior constructions.

It is a primary object of the present invention to provide alloys and methods for attaching conductors to titanium diboride vaporizer bars wherein a secure physical permanent attachment will be formed, not subject to loosening from repeated use of the vaporizer bar.

It is a further object of the present invention to provide alloys and methods for attaching conductors to titanium diboride vaporizer bars with which the conductor may be positioned on the vaporizer bar and the alloy melted thereover, resulting in a strong bond between the vaporizer bar and the alloy, and between the alloy and the conductor.

Finally, it is an object of the present invention to provide alloys and methods for attaching conductors to titanium diboride vaporizer bars which satisfy the foregoing objects in a simple and efficient manner and at a minimum of cost.

These and other objects are accomplished by the alloys, products, methods and procedures comprising the present invention, preferred embodiments of which—illustrative of the best mode in which applicant has contemplated applying the principles—are set forth in the following description and which are particularly and distinctly pointed out and set forth in the appended claims forming a part hereof.

In general terms, the improvement of the present invention may be stated as including alloys for attaching conductors to titanium diboride vaporizer bars, titanium diboride vaporizer bar products incorporating such alloys, and new methods for attaching conductors to titanium diboride vaporizer bars using such alloys and/or special procedures.

According to the present invention, my new alloys are formed by mix melting 2 parts of titanium with from a minute quantity to 5 parts of one of molybdenum and tungsten in an inert atmosphere. This may be accomplished by using conventional arc welding apparatus having an inert gas shield, such as argon or helium, and it is preferred to form the alloy into a bar-like shape for ease in later use.

In forming the final attachment to the titanium diboride vaporizer bar, conductors of titanium, molybdenum or tungsten, or alloys of any one of these three metals, are positioned on the vaporizer bar and the same welding equipment used with the inert gas shield to melt the particular alloy over the conductor and against the vaporizer bar, which, upon hardening, will form a strong, sound bond to the vaporizer bar. It is important in this alloy depositing operation that the arc be established between the electrode and alloy, and not directly on the titanium diboride vaporizer bar, since the arc will destroy the vaporizer bar by causing it to break away and apparently melt, thereby completely destroying the usefulness thereof.

The purpose of adding the molybdenum or tungsten to the titanium in the alloy is to give the resulting alloy higher temperature characteristics to prevent the alloy from cracking off of the vaporizer bar during the resistance heating thereof in the vapor deposition use. Thus, the amount of molybdenum or tungsten necessary in the alloy is dependent on the temperature of vaporization of the material to be vapor deposited by the vaporizer bar. For this reason, the higher the temperature of vaporization of the material, the greater amount of molybdenum or tungsten required within the specified quantity limits.

It has been found that if appreciably more than 5 parts of molybdenum or tungsten to 2 parts of titanium is used in the alloy, cracking off of the alloy from the titanium diboride vaporizer bar will occur and a sound bond will not be accomplished. Further, it has been found that if titanium is eliminated from the alloys, there will be no wetting of the alloy on the vaporizer bar when it is attempted to melt deposit the same.

It has also been found that titanium alone may be used for attaching titanium, molybdenum or tungsten conductors to the titanium diboride vaporizer bars as long as the same procedure is used maintaining the arc between the electrode and attaching titanium and not on the titanium diboride vaporizer bar. The use of titanium alone as the attaching metal, however, is of extremely limited application in view of the low temperature characteristics of titanium without the addition of either molybdenum or tungsten.

After the titanium, molybdenum or tungsten conductors have been attached in the foregoing manner to the titanium diboride vaporizer bars, conventional electrically conducting wires may be attached to the conductors by any usual method, such as by spot welding copper or silver wires. This connection is not critical or troublesome.

Thus, using the specified alloys and following the foregoing procedures, a strong, sound bond may be provided between a conductor and a titanium diboride vaporizer bar which will withstand the heating of the vaporizer bar encountered during use in vapor deposition.

In the foregoing description, certain terms have been used for brevity, clearness and understanding but no unnecessary limitations are to be implied therefrom, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the alloys, products, methods and procedures described herein are by way of example and the scope of the present invention is not limited, except where specifically set forth, to exact details of construction and procedure described.

Having now described the invention, and the advantageous new and useful results obtained thereby, the new and useful alloys, products, methods and procedures, and reasonable mechanical equivalents thereof obvious to those skilled in the art are set forth in the appended claims.

I claim:

1. The product including a titanium diboride vaporizer bar, a conductor consisting essentially of at least one metal of the group of titanium and molybdenum and tungsten, and an alloy positioned forming a bond between the vaporizer bar and conductor substantially consisting of 2 parts of titanium and from a minute quantity to 5 parts of one of molybdenum and tungsten.

2. The product including a titanium diboride vaporizer bar, a conductor consisting essentially of at least one metal of the group of titanium and molybdenum and tungsten, and an alloy positioned forming a bond between the vaporizer bar and conductor substantially consisting of 2 parts of titanium and from a minute quantity to 5 parts of molybdenum.

3. The product including a titanium diboride vaporizer bar, a conductor consisting essentially of at least one metal of the group of titanium and molybdenum and tungsten, and an alloy positioned forming a bond between the vaporizer bar and conductor substantially consisting of 2 parts of titanium and from a minute quantity to 5 parts of tungsten.

4. The product including a titanium diboride vaporizer bar, a conductor consisting essentially of at least one metal of the group of titanium and molybdenum and tungsten, and a metal positioned forming a bond between the vaporizer bar and conductor substantially consisting of at least titanium.

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