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METHOD OF PRODUCING HIGHLY PURE MANGANESE TITANIUM ALLOYS

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2 Claims. (Cl. 75—135)

This invention relates to the treatment of titanium dioxide, particularly methods of producing therefrom titanium and alloys of manganese and titanium.

In heretofore known art the production of titanium has been accomplished by reduction of dioxide with calcium hydride and subsequent decomposition of the titanium hydride by heating in vacuum. This process is necessarily expensive, since it involves many steps. Other processes of reducing titanium dioxide have presented difficulties due to incomplete reduction and the inability to separate the reduced titanium from the other products of the reaction.

My invention is based on the discovery that when titanium dioxide is dissolved in metallic manganese it may be readily reduced with aluminum, magnesium, or calcium.

The oxides so formed are not soluble in manganese and therefore separate from the alloy of titanium and manganese which is formed. Such an alloy of titanium and manganese finds many uses in the metallurgical arts. However, if it is desired to obtain pure titanium, this may be done by distilling off the manganese in vacuum.

The following is a specific example of the application of my invention: 100 lbs. of electrolytic manganese are melted and held at a temperature of 1320 degrees C. 10 lbs. of highly purified titanium dioxide are added to the melt. When the dioxide has been incorporated the stoichiometric equivalent of pure aluminum is added. Reduction takes place immediately with the evolution of heat. When the bath has resumed its original temperature the metal is poured away from the alumina which will have adhered to the crucible. An alundum crucible is satisfactory for carrying out the operation. The alloy so formed contains approximately 7% of metallic titanium. While a greater percentage of titanium may be introduced by adding a proportionately larger amount of titanium dioxide to the manganese, I have found it preferable to increase the titanium content of the alloy by stage addition. In this way the loss of titanium through the formation of titanium aluminate may be avoided. In general I have found it more efficient to make alloys containing less than 50% titanium by this method. Alloys containing more than 50% titanium and the pure metal itself are obtained by distilling manganese from the alloys containing less than 50% titanium.

The distillation of manganese from the titanium may be performed by methods known in the art either in vacuum or in an inert gas like helium. I have described my invention in detail as carried out by the use of metallic aluminum because this is the cheapest of the several metals which can be used and is likewise non-volatile at the temperature of molten manganese. If calcium or magnesium is used for reduction care must be taken to add them slowly to prevent loss by volatilization.

While alloys of titanium and manganese produced by this method are suitably employed as intermediate products adapted for further treatment in the production of substantially pure titanium, such alloys have properties and characteristics which may suit them for other uses in the arts.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. A method of producing highly pure manganese titanium alloys, substantially devoid of carbon, which consists in dissolving titanium dioxide in molten, electrolytic manganese, adding metallic aluminum to reduce the titanium dioxide, and separating at least a part of the electrolytic manganese from the titanium by distillation.

2. A method of producing highly pure manganese titanium alloys, substantially devoid of carbon, which consists in dissolving titanium dioxide in molten, electrolytic manganese, adding a reducing metal to reduce the titanium dioxide, and separating at least a part of the electrolytic manganese from the titanium by distillation.

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