PATENT SPECIFICATION

Application Date: March 19, 1937. No. 8104/37. **485,797**
" " March 22, 1937. No. 8331/37.
One Complete Specification Left: Feb. 2, 1938.
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PROVISIONAL SPECIFICATION
No 8104 A.D. 1937.

Improvements in and relating to the Treatment of Materials containing Tantalum and/or Niobium

I, WILLIAM WARREN TRIGGS, of the firm of Marks & Clerk, of 57 & 58, Lincoln's Inn Fields, London, W.C.2, a British subject, do hereby declare the nature of this invention (a communication to me from abroad by Societe Generale Metallurgique de Hoboken, a Belgian Limited Company, of Hoboken-lez-Anvers, Belgium,) to be as follows:—

This invention relates to the treatment of primary materials, such as ores or metallurgical by-products, containing tantalum and/or niobium.

The object of the invention is to extract the tantalum and/or niobium in a comparatively simple and economical way.

Another object of the invention is to obtain the tantalum and/or niobium in the form of a ferro-alloy which shall be free from carbon, or poor in carbon.

According to the invention, the primary material is subjected to a reducing operation in the presence of carbide of calcium.

The said reducing operation may be carried out in the presence of iron so as to obtain a ferro-alloy. The latter ferro-alloy may be refined with oxides of Ta and/or Nb.

The reducing operation may be carried out in any suitable metallurgical furnace. For instance, it may be carried out in an electric furnace in the presence of calcium carbide and of the usual fluxes which are considered necessary for obtaining a fluid slag.

Iron may be added either in metal form, or in oxide form, and the amount added is that required for obtaining a ferro-alloy of the desired composition. The addition of iron may be effected either before, or during or after the de-oxidation process.

By the present invention a ferro-tantalum and/or niobium alloy is obtained which contains carbon. This alloy may be refined in an electric furnace in the presence of oxides of Ta and/or Nb so as to obtain finally a ferro-tantalum and/or niobium free from carbon, or poor in carbon. The slag may also be treated separately for the recovery of various elements.

Dated this 19th day of March, 1937.

MARKS & CLERK.

PROVISIONAL SPECIFICATION
No. 8331 A.D. 1937.

Improvements in and relating to the Treatment of Materials containing Tantalum and Niobium

I, WILLIAM WARREN TRIGGS, of the firm of Marks & Clerk, of 57 & 58, Lincoln's Inn Fields, London, W.C.2, a British subject, do hereby declare the nature of this invention (a communication to me from abroad by Societe Generale Metallurgique de Hoboken, a Belgian Limited Company, of Hoboken-lez-Anvers, Belgium,) to be as follows:—

This invention relates to the treatment of materials, such as ores, metallurgical by-products or the like, containing tantalum and niobium.

The object of the invention is to obtain a product which shall be richer than the primary material in one of the two elements: niobium, relatively to the other element: tantalum.

The invention consists in subjecting the primary material to a reducing operation by means of an amount of calcium carbide insufficient for completely reducing the two elements niobium and tantalum, whereby an alloy is obtained in which the ratio Nb/Ta is higher than that of the primary material.

Iron may be added before, during or after the reducing operation, in metal or oxide form as required, so as to obtain a ferro-alloy of the required composition.

For instance, the primary material containing the tantalum and niobium and iron may be treated inside an electric furnace in the presence of such an amount of calcium carbide as to reduce the major part of the niobium and to obtain a ferro-niobium alloy containing also some tantalum, but in which the ratio Nb/Ta is higher than that of the primary material. By the same operation a slag rich in tantalum is obtained, containing also some niobium and in which the ratio Ta/Nb is higher than that of the primary material.

The slag rich in tantalum may be subjected to any known suitable treatment for the recovery of niobium and tantalum. The ferro-alloy obtained by the reducing operation may be refined in any suitable metallurgical apparatus e.g. in an electric furnace by oxides of niobium or even by oxides of niobium and tantalum, the former one being reduced prior to the latter.

This refining operation will give a ferro-niobium containing some tantalum in which the ratio Nb/Ta will be higher than the same in the primary material and a slag containing some tantalum and niobium to be treated by any known means in order to recover those elements, as is the case with the slag obtained by the original reducing operation.

Dated the 22nd day of March, 1937.
MARKS & CLERK.

COMPLETE SPECIFICATION

Improvements in and relating to the Treatment of Materials containing Tantalum and/or Niobium

I, WILLIAM WARREN TRIGGS, of the firm of Marks & Clerk, of 57 & 58, Lincoln's Inn Fields, London, W.C.2, a British subject, do hereby declare the nature of this invention (a communication to me from abroad by Societe Generale Metallurgique de Hoboken, a Belgian Limited Company, of Hoboken-lez-Anvers, Belgium) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the treatment of primary materials, such as ores or metallurgical by-products, containing tantalum and/or niobium.

One object of the invention is to extract the tantalum and/or niobium in a comparatively simple and economical way.

Another object of the invention is to obtain the tantalum and/or niobium in the form of a ferro-alloy in a simple and economical way.

According to the invention, the primary material is subjected to a reducing operation in the presence of carbide of calcium.

The said reducing operation may be carried out in the presence of iron so as to obtain a ferro-alloy. The latter ferro-alloy may be refined with oxides or oxide compounds of Ta and/or Nb.

The reducing operation may be carried out in any suitable metallurgical furnace. For instance, it may be carried out in an electric furnace in the presence of calcium carbide and of the usual fluxes which are considered necessary for obtaining a fluid slag.

Iron may be added either in metal form or in oxide form, and the amount added is that required for obtaining a ferro-alloy of the desired composition. The addition of iron may be effected either before, or during or after the reducing process.

A ferro-tantalum and/or niobium alloy is obtained which contains carbon. This alloy may be refined in an electric furnace in the presence of oxides of Ta and/or Nb. The slag may also be treated separately for the recovery of various elements.

According to another feature of the present invention the primary material is subjected to a reducing operation by means of an amount of calcium carbide insufficient for completely reducing the two elements niobium and tantalum, whereby an alloy is obtained in which the ratio Nb/Ta is higher than that of the primary material.

Iron may be added, before, during or after the reducing operation, in metal or oxide form as required, so as to obtain a ferro-alloy of the required composition.

For instance, the primary material containing the tantalum and niobium and iron may be treated inside an electric furnace in the presence of such an amount of calcium carbide as to reduce the major part of the niobium and to obtain a ferro-niobium alloy containing also some tantalum, but in which the ratio Nb/Ta is

higher than that of the primary material. By the same operation a slag rich in tantalum is obtained, containing also some niobium and in which the ratio Ta/Nb is higher than that of the primary material.

The slag thus obtained rich in tantalum, may be subjected to any known suitable treatment for the recovery of niobium and tantalum, whilst the ferro-alloy obtained by the first said reducing operation may be refined in any suitable metallurgical apparatus e.g. in an electric furnace by oxides of niobium or even by oxides of niobium and tantalum, the former one being reduced prior to the latter.

This refining operation will give a ferro-niobium containing some tantalum in which the ratio Nb/Ta will be higher than the same in the primary material and a slag containing some tantalum and niobium to be treated by any known means in order to recover those elements, as is the case with the slag obtained by the original reducing operation.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for the treatment of materials containing tantalum and/or niobium, characterized in that the primary material is subjected to a reducing operation in the presence of carbide of calcium.

2. A process as claimed in claim 1, characterized in that the primary material is subjected to a reducing operation by means of an amount of calcium carbide insufficient for completely reducing the two elements niobium and tantalum, whereby an alloy is obtained in which the ratio Nb/Ta is higher than that of the primary material.

3. A process as claimed in claim 1 or 2, characterized in that the reducing operation is carried out in the presence of iron so as to obtain a ferro-alloy.

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higher than that of the primary material. By the same operation a slag rich in tantalum is obtained, containing also some niobium and in which the ratio Ta/Nb is higher than that of the primary material.

The slag thus obtained rich in tantalum, may be subjected to any known suitable treatment for the recovery of niobium and tantalum, whilst the ferro-alloy obtained by the first said reducing operation may be refined in any suitable metallurgical apparatus e.g. in an electric furnace by oxides of niobium or even by oxides of niobium and tantalum, the former one being reduced prior to the latter.

This refining operation will give a ferro-niobium containing some tantalum in which the ratio Nb/Ta will be higher than the same in the primary material and a slag containing some tantalum and niobium to be treated by any known means in order to recover those elements, as is the case with the slag obtained by the original reducing operation.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for the treatment of materials containing tantalum and/or niobium, characterized in that the primary material is subjected to a reducing operation in the presence of carbide of calcium.

2. A process as claimed in claim 1, characterized in that the primary material is subjected to a reducing operation by means of an amount of calcium carbide insufficient for completely reducing the two elements niobium and tantalum, whereby an alloy is obtained in which the ratio Nb/Ta is higher than that of the primary material.

3. A process as claimed in claim 1 or 2, characterized in that the reducing operation is carried out in the presence of iron so as to obtain a ferro-alloy.

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