UNITED STATES PATENT OFFICE.

ALEXANDER JUST, OF BUDAPEST, AUSTRIA-HUNGARY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

METHOD OF PRODUCING MALLEABLE AND DUCTILE BODIES OF TUNGSTEN OR TUNGSTEN ALLOYS.

1,179,009. Specification of Letters Patent. Patented Apr. 11, 1916.

No Drawing. Application filed August 5, 1915. Serial No. 43,780.

To all whom it may concern:

Be it known that I, ALEXANDER JUST, a subject of the Emperor of Austria-Hungary, residing at Budapest, Austria-Hungary, have invented certain new and useful Improvements in Methods of Producing Malleable and Ductile Bodies of Tungsten or Tungsten Alloys, of which the following is a specification.

It is known that tungsten when melted and solidified, that is, when in the form of a regulus, is not malleable and ductile, so that such products of fusion cannot be worked or drawn into shaped articles, particularly wire. Most tungsten alloys which contain only a comparatively small percentage of an auxiliary metal are like tungsten in this respect. On the other hand, it is desirable to produce malleable tungsten and tungsten alloys in larger pieces or in different form from that which is possible by the existing process of sintering a short and comparatively slender bar.

According to the present invention, a regulus is formed by melting tungsten or a tungsten alloy admixed with a small quantity of boron or boron compounds such as boron nitrid (borstickstoff). If boron nitrid is used, the amount is preferably less than 2 per cent.; the regulus thus obtained is perfectly malleable and ductile, and may be worked further in any mechanical manner desired. The causes of this peculiar action of boron or boron compounds such as boron nitrid are not yet explained, but it may be surmised that at the fusing temperature of the tungsten, tungsten borid is formed, and this, either independently or in the form of a fixed solution formed with the tungsten, prevents the formation of large crystals, which, as is known, make the metal especially brittle. This assumption appears the more probable because it has been found that the desired result may be attained not only with boron nitrid, but also with boron and other boron compounds.

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

1. The process which consists in mixing metallic tungsten and a small proportion of boron material reacting with tungsten at the fusing temperature of tungsten and materially less than is necessary to convert said metallic tungsten into tungsten borid, and fusing said mixture until a ductile and malleable regulus has been produced.

2. The process which consists in subjecting to a fusion a mass comprising metallic tungsten and not more than two per cent. of boron material chemically reactive with respect to tungsten and thereby forming a regulus of ductile tungsten.

3. The process of rendering non-ductile and non-malleable tungsten both ductile and malleable which consists in melting said metal admixed with not more than two per cent. of boron nitrid until a regulus of ductile and malleable metal is formed.

In witness whereof, I have hereunto set my hand this third day of July 1915.

ALEXANDER JUST.