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TUNGSTEN ALLOY.

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This invention refers to tungsten alloys and in particular to alloys of tungsten with lead and it is intended to facilitate the manufacture of such alloys and to increase the adaptability thereof. The preparation of such alloys is very difficult on account of the fact that tungsten in view of its high melting point and for other reasons does not readily unite into an alloy with lead and other rather readily melting and oxidizable metals. Attempts have been made to overcome these difficulties by the addition of a certain amount of iron, but the results were not entirely satisfactory. Now, it is the object of my invention to produce a perfectly homogeneous and nonseparating alloy of tungsten, particularly with lead, zinc and the like which is particularly adaptable for journal bearings and as a material for ammunition, such as infantry balls, shot and the like.

The invention is based on the fact that the tungsten metal is incorporated with a comparative excess of a readily melting metal which though oxidizable at high temperature, possesses great resistibility under ordinary conditions; and of these lead and zinc have been found to be specially suitable for the purposes of this invention. In order to manufacture a tungsten alloy according to this invention, one may proceed as follows:—

I. 50% of metallic tungsten-powder is fused in a crucible with 49.5% of an alloy of lead and antimony consisting of 20 parts antimony and 80 parts lead with the addition of 0.5% of iron or less.

This mixture may be further diluted by fusing it with additional quantities of the same lead-antimony alloy, and preferably at such proportions that for each 7½ kilogrs. of the alloy of tungsten-lead-antimony-and-iron 2½ kilogrs. of the lead-antimony-alloy are employed. If this dilution should not be sufficient, further quantities of the diluent may be added.

II. The thus diluted alloy is then fused with 13% tin and 18% antimony, 1.8% copper and 67.2% lead. By this means the entire amount of the tungsten becomes united with the lead, so as to form a perfectly homogeneous alloy.

III. Instead of the alloying with a mixture of tin, antimony, copper, lead and iron, as set forth under I and II, a mixture of zinc, lead and iron may be used for the alloying process, such mixture consisting approximately of 0.5 to 5 parts iron, 3.5 parts lead and 91 to 96 parts zinc. Small quantities of aluminium and of copper may also be added in this Case III.

It should, of course, be understood that the percentages of the several metals need not be strictly adhered to, but they may vary within certain limits. The final alloys obtained may comprise the following ingredients and proportions of constituents:—

I and II

Tungsten	0.02	to	3
Lead	47	to	80
Antimony	15.5	to	25
Copper	0.7	to	10
Tin	0.5	to	25

I and III

Tungsten	0.02	to	3
Iron	1	to	5
Copper	1	to	2
Aluminium	1	to	3
Zinc	86	to	96
Lead	2	to	5

Variations and modifications of these percentages and constituents are admissible to a certain extent within the scope and spirit of the invention, as defined by the appended claims.

I claim:—

1. The method of producing a tungsten alloy, which consists in melting metallic tungsten with approximately an equal amount of an alloy of lead and antimony in the presence of small amounts of iron, diluting the mixture by the addition of further amounts of lead-antimony-alloy and fusing the resulting mixture with a mixture of metals containing lead and a metal of a higher melting point than lead.

2. The method of producing a tungsten alloy, which consists in melting metallic tungsten with approximately an equal amount of an alloy of lead and antimony in the presence of small amounts of iron, diluting the mixture by the addition of further amounts of lead-antimony-alloy and fusing the resulting mixture with an alloy containing lead in excess, tin and antimony and small quantities of copper.

3. The method of producing a tungsten alloy, which consists in melting metallic tungsten with approximately an equal amount of an alloy of lead and antimony in

the presence of small amounts of iron, diluting the mixture by further addition of lead-antimony-alloy and fusing the resulting mixture with a compound containing lead, zinc and iron.

4. The method of producing a tungsten alloy, which consists in melting metallic tungsten with approximately an equal amount of an alloy of about eighty percent of lead and about twenty percent of antimony in the presence of small amounts of iron, treating the mixture with further addition of lead-antimony-alloy and fusing the resulting mixture with a compound containing large amounts of an excess of zinc with smaller quantities of iron and lead.

5. The method of producing a tungsten alloy, which consists in melting metallic tungsten with approximately an equal amount of a mixture of lead and antimony in the presence of small amounts of iron, then treating the mixture with further additions of lead-antimony-mixture and fusing the resulting product with a compound containing lead, zinc and small quantities of copper and aluminium.

6. The method of producing a tungsten-containing alloy, which consists in treating and melting a tungsten-lead-antimony-alloy with further quantities of lead and antimony, thereby greatly reducing the amount of tungsten in the resulting product, and then combining said product with a metallic base, containing lead and iron and a large excess of zinc.

7. A metallic alloy, comprising a metallic base which contains mainly lead and zinc with small additions of iron and copper, each averaging from a minimum of about one percent up to a maximum of about five percent, and from about two hundredths of one percent up to about three percent of metallic tungsten.

8. As a new product an alloy, containing from about two hundredths of one percent up to about three percent of tungsten, the bulk of the balance being composed of from about 86 to about 96 percent of zinc, with small quantities of about 2 to 5 percent of lead, about 1 to 5 percent of iron, from about 1 to 2 percent of copper, 1 to about 3 percent of aluminium, and about two hundredths to about 3 percent of antimony.

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