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SINTERED HARD METALLIC ALLOY

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4 Claims. (Cl. 75—1)

This invention relates to sintered hard metallic alloys for implements and tools which consist of a tungsten carbide with a carbon content of about 3 to 7% and an added metallic element of lower melting point, such as iron, cobalt or nickel, in quantities up to 20%. The invention aims at imparting to such alloys a fine grained structure which increases the capacity for maintaining the shearing resistance of the implements and tools. The invention is particularly applicable to alloys for the manufacture of fine drawing dies. The desired object is attained, according to the invention, by the inclusion in the alloy of from about 0.01 to 30% of vanadium carbide, niobium carbide, or tantalum carbide, alone or mixed, that is to say of the carbides of the metals of high melting point of the fifth group of the periodic system.

Fused carbide alloys containing tantalum, vanadium or niobium are already known as also are sintered carbide alloys containing tantalum or vanadium but without additional metals. These alloys are, however, relatively brittle and the alloys made according to the invention are much tougher.

In order to prepare the alloys according to the invention powdered vanadium carbide, niobium carbide, or tantalum carbide may be added to a powder mixture which consists of tungsten carbide, preferably tungsten mono-carbide, with up to 20% of a metal of lower melting point, preferably cobalt, after which the whole mixture is pressed and sintered in the usual manner. Mixtures of 94% tungsten mono-carbide, 4% cobalt and 2% vanadium carbide or 95% tungsten carbide, 2% cobalt and 3% vanadium carbide for example, have been found to be especially advantageous.

The amount of the vanadium carbide, niobium carbide or tantalum carbide added may as aforesaid amount to either less than 1% or may rise to about 30% according to the use to which the implement or tool is to be put. Although it is preferable to add prepared vanadium, niobium or tantalum carbide to a mixture of tungsten carbide and an additional metallic element such as iron, nickel, cobalt, manganese or silicon, the elements vanadium, niobium or tantalum may instead be added to a starting powder consisting of tungsten carbide and an additional metal or of tungsten, carbon and an additional metal. In such cases the vanadium, niobium or tantalum carbide is formed during the final sintering process.

It is not, of course, necessary for the alloy to contain only one of the three additional carbides; it may contain two or even all three of the carbides at the same time.

What we claim is:—

1. A sintered hard metallic alloy consisting of a tungsten carbide containing from about 3 to 7% carbon, an appreciable amount not over 20% of an auxiliary metal of lower melting point such as iron, cobalt, nickel, and from about 0.01 to 30% of vanadium carbide.

2. A sintered hard metallic alloy consisting of 94% tungsten mono-carbide, 4% cobalt and 2% vanadium carbide.

3. A sintered hard metallic alloy consisting of about 94 to 95% of tungsten carbide, 4 to 2% of cobalt, and 2 to 3% of vanadium carbide.

4. A sintered hard metallic alloy consisting of 95% tungsten carbide, 2% cobalt and 3% vanadium carbide.

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