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HARD SUBSTANCE ALLOY

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Up to the present it was only possible to make very hard sintered metal alloys—so-called hard metals, consisting mainly of tungsten-carbide—with a slight addition, about 5–6%, of auxiliary metal, for instance of the iron group, preferably cobalt. If these hard metals contained more auxiliary metal their hardness was reduced to such an extent, that they no longer represented metal alloys fit for technical use. 20% of auxiliary metal was therefore taken as the maximum which should be added to the hard metal for sintering as far as hard metal alloys of tungsten-carbide and auxiliary metals of the iron group are concerned. Though a process for making sintered hard metal alloys, in which more than 20% of auxiliary metals were added, has become known, it entailed operating at a gauge-pressure of about 70 kgs./sq. cm. It was only possible to increase the content of auxiliary metal beyond this figure in the case of double carbides, for instance with tungsten-chromium-double carbide, and when the auxiliary metal was not a pure metal of the iron group but was itself a hard metal-alloy, with an addition of tungsten and chromium, for instance.

These disadvantages and difficulties are avoided and an extraordinarily hard, wear-resisting metal alloy with a high resistance and tenacity is surprisingly produced, if the hard-substance ingredient of the hard metal alloy is obtained by melting carbides, nitrides, silicides and borides of metals in the presence of atomic hydrogen and this hard substance produced under atomic hydrogen is sintered in a powdered state with the auxiliary metals or metal alloys, for instance of the iron group. It is possible in this case to work with much higher additions of auxiliary metals without reducing the hardness, resistance and tenacity of this sintered hard metal alloy to an extent which would impair its fitness for technical use. A metal alloy made of such components can be sintered without any special complicated equipments.

In case of the existence of various modifications of the metal carbides the use of the lower-carbon modification is advisable, thus, for instance, of the modification W_2C or of a lower carbon modification, in case of the use of tungsten-carbide melted in the presence of atomic hydrogen.

The carbides, silicides, nitrides or borides of tungsten, molybdenum, titanium, vanadium, zirconium, cerium, silicium, boron, aluminium, beryllium, chromium formed under atomic hydrogen have proved particularly suitable for the formation of the hard metal alloy, while particularly the metals of the iron group are used, either by themselves or as alloys, as the auxiliary metals of the alloy.

Example.—65% of a pulverized low-carbon tungsten carbide with a carbon-content of about 3,7%, melted in the presence of atomic hydrogen, and 35% of powdered cobalt as auxiliary metal are sintered together.

The tungsten carbide, melted in the presence of atomic hydrogen differs considerably in structure and tenacity from the carbides obtained under the usual conditions, so that the alloy sintered from same also has qualities, which are not present in the usual sintered hard-metal alloys.

I claim:

1. A sintered hard substance alloy of pulverized metal carbides, nitrides, silicides or borides and auxiliary metals, in the production of which a metal carbide, silicide, nitride, or boride melted or formed in the presence of atomic hydrogen is sintered together with powdered auxiliary metals or metal alloys in the usual way.

2. A sintered hard substance alloy according to claim 1, consisting of carbides, nitrides, silicides or borides of tungsten, molybdenum, titanium, vanadium, zirconium, cerium, silicium, boron, aluminium, beryllium or chromium, formed or melted in the presence of atomic hydrogen, and of metals of the iron group, either by themselves or alloyed with each other.

3. A hard substance alloy comprising a pulverized compound chosen from the group of the carbides, nitrides, silicides and borides of a metal which compound has been melted in the presence of atomic hydrogen, sintered together with an auxiliary metallic substance.

4. A hard substance alloy comprising a pulverized compound selected from the group consisting of the carbides, nitrides, silicides and borides of a metal chosen from the group consisting of tungsten, molybdenum, titanium, cerium, silicium, boron, aluminium, beryllium or chromium which compound has been melted in the presence of atomic hydrogen sintered with an auxiliary metal.

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