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ALLOYS

Werner Hessenbruch, Hanau-on-the-Main, Germany, assignor to Heraeus-Vacuumschmelze, A. G., Hanau-on-the-Main, Germany

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1 Claim. (Cl. 75-171)

This invention is concerned with alloys of improved characteristics, which alloys are especially suitable for the cutting edges of tools for lathes.

Recently there have been some sintered alloys introduced for machining hard materials and ordinary steels. While these alloys represent an improvement over some of the former materials employed in high-speed tools, as well as an improvement over heretofore known alloys similar to the so-called stellite (built up on a cobalt-chromium basis), still these prior sintered alloys have been subject to a number of disadvantages. For example, the prior alloys have been very brittle. Other types of alloys employed for cutting tools heretofore, for example, stellites, have been open to the objection that their hardness, especially at higher temperatures, was not sufficient.

The prior stellite type of alloy (cobalt-chromium basis) also incorporated one or more of additional ingredients such, for example, as tungsten and molybdenum, and sometimes nickel. These prior alloys, furthermore, had an average content of carbon from about 2% to about 4%, and they were ordinarily cast and were not capable of being improved by heat treatment.

The present invention is concerned with alloys of the cobalt-chromium type, which alloys are capable of heat treatment and have materially improved properties, such as cutting efficiency, strength and toughness, although they are not brittle.

An important factor in producing the improvement is the addition of metals such as beryllium or titanium or both. I prefer also to melt and pour my improved alloys in vacuo.

More specifically, the present invention contemplates an alloy containing from about 30% to about 60.0% cobalt and from about 20% to about 40% chromium. While some improvement may be effected by the beryllium or titanium even when substantial amounts of carbon are present, I prefer to reduce or even eliminate the carbon, and I have further found that the properties may very readily be appreciably improved by heat treatment. For example, the alloys are desirably quenched in oil or some equivalent quenching medium, from a high temperature, and then

subsequently annealed at a temperature of from about 500 to 900° C. The brittleness of stellites and similar cutting alloys heretofore employed is at least in large part produced by the content of carbon, and the invention contemplates the addition of titanium or beryllium and elimination of or at least reduction in the carbon content, in instances where it is desired to materially diminish the brittleness. The total amount of titanium or beryllium or both should be in the neighborhood of from about .3% to about 4%.

In addition to the cobalt, chromium and beryllium or titanium, I also contemplate the use of tungsten, molybdenum or tantalum either individually or in combinations. The total content of this constituent should be less than 25% of the alloy, and it is preferable where only molybdenum and/or tantalum are employed, to keep the total below about 15%.

Nickel may also be added to the alloy, although preferably not in excess of about 10%.

The preferred range of beryllium or titanium (or both combined) is from about 1% to about 2%.

As a specific example of an alloy of the type contemplated by this invention, which alloy is tough, hard, and strong, even when heated to high temperature, I mention one containing the following ingredients in about the proportions indicated:

	Per cent
Cobalt.....	40
Chromium.....	25
Tungsten.....	18
Nickel.....	10
Molybdenum.....	5
Beryllium from 1% to.....	2

I claim:—

A cutting tool composed of an alloy consisting of from about .3% to about 4% beryllium, molybdenum up to about 15%, and the balance a basic ingredient composed of cobalt and chromium, the former of which comprises from about 30% to about 60% of the entire alloy and the latter of which comprises from about 20% to about 40% of the entire alloy.

WERNER HESSENBRUCH.