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NONFERROUS ALLOY.

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The present invention relates to alloys comprising cobalt, one or more metals of the chromium group, and boron, the latter in the proportion of at least 0.40% by weight. Alloys of the type comprising cobalt and a metal or metals of the chromium group, are disclosed in U. S. patents to Haynes 873,745, 1,057,423 and 1,057,828, and boron has heretofore been introduced in very small proportion into such alloys. I have now discovered that the introduction of boron in larger proportion, as above indicated, exerts a highly favorable influence in the properties of the alloy, especially for lathe tool purposes.

Alloys which I have found to possess cutting qualities, when used for lathe tools and the like, far superior to those of the heretofore known alloys of the cobalt-chromium-tungsten type, have been prepared within the range set forth in the following table:

	Per cent.
Tungsten	20 to 30
Chromium	20 to 30
Carbon	0.75 to 2.40
Boron	0.40 to 2.00
Iron	0.0 to 5.00
Silicon	0.0 to 1.00
Cobalt	Balance.

It is to be understood that iron and silicon are present substantially as impurities and are not necessary elements in the composition.

It is further considered to be within the scope of my invention to add amounts of boron greater than 0.40%, not only to alloys such as those covered by the range specified in the above table but also to any alloy of the cobalt-chromium-tungsten type, with or without other components.

Alloys which have shown exceptionally good cutting qualities when tested on semi-steel have been made with a tungsten content of substantially 25%, chromium substantially 25%, boron 0.40% to 0.60%, carbon 0.75% to 2.40%, the balance principally cobalt.

It has also been found that when the boron content is raised to between 0.80% and 1.80% and the carbon is held between .75% and 2.40%, the properties of the metal change, the metal becoming slightly weaker but exhibiting improved cutting qualities on both steel and semi-steel. From these investigations it would appear that the best results on steel are obtained when the carbon content is not more than 0.50% above the boron content, although good tools may be made throughout the range indicated. When the boron and carbon are both close to the upper limit the metal is somewhat brittle. Tools of comparatively high strength may be made within the range boron .80% and 1.10%, carbon 1.30% and 2.00%.

An alloy containing 1.20% boron and 1.15% carbon has shown particularly good properties when cutting steel and semi-steel, while an alloy containing .54% boron and 1.38% carbon has shown exceptionally good qualities when used on semi-steel.

Obviously some modifications of my invention as herein described may be made without departing from the spirit thereof and I do not wish to be limited to the exact composition in all of its details as herein described.

All the alloys comprised within the invention are suitable for tools for the high-speed cutting of cast iron, steel, and semi-steel, though they are also useful for other purposes. The term "high-speed" is here used in the same sense as in the common expression "high-speed steel," and imports conditions of such severity that ordinary carbon steels subjected to them would be softened by the heat generated in the cutting and thus become useless.

Having thus described my invention, what I claim is:

1. A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains at least 15% of chromium, at least 10% of another metal of the chromium group and at least 0.40% of boron, with the balance principally cobalt.

2. A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains at least 15% of chromium, at least 10% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

3. A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains at least 15% of chromium, at least 10% of tungsten, at least 0.75% of carbon and at least 0.40% of boron, with the balance principally cobalt.

4. A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains at least 15% of chromium,

20% to 30% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

5. A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains 20% to 30% of chromium, 20% to 30% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

6. An alloy composed of 20% to 30% chromium, 20% to 30% tungsten, 0.40% to 2.00% boron, 0.75% to 2.40% carbon, with the balance principally cobalt.

7. An alloy composed of 20% to 30% chromium, 20% to 30% of another metal of the chromium group, 0.40% to 2.00% boron, and 0.75% to 2.40% carbon, with the balance principally cobalt.

8. A machine cutting tool composed of a self-hardening non-ferrous alloy containing at least 15% of chromium, at least 10% of another metal of the chromium group and at least 0.40% of boron, with the balance principally cobalt.

9. A machine cutting tool composed of a self-hardening non-ferrous alloy containing at least 15% of chromium, at least 10% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

10. A machine cutting tool composed of a self-hardening non-ferrous alloy containing at least 15% of chromium, at least 10% of tungsten, at least 0.75% of carbon and at least 0.40% of boron, with the balance principally cobalt.

11. A machine cutting tool composed of a self-hardening non-ferrous alloy containing at least 15% of chromium, 20% to 30% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

12. A machine cutting tool composed of a self-hardening non-ferrous alloy containing 20% to 30% of chromium, 20% to 30% of tungsten and at least 0.40% of boron, with the balance principally cobalt.

In testimony whereof, I affix my signature.

WILLIAM A. WISSLER.