

UNITED STATES PATENT OFFICE.

ELWOOD HAYNES, OF KOKOMO, INDIANA.

METAL ALLOY.

No. 878,745.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed April 23, 1907; Serial No. 369,870.

To all whom it may concern:

Be it known that I, ELWOOD HAYNES, a citizen of the United States, and a resident of Kokomo, in the county of Howard and State of Indiana, have invented certain new and useful Improvements in Metal Alloy; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel metal alloy designed for use in the manufacture of articles requiring a high and durable luster, and possessing a degree of hardness adapting it to be substituted for mild tempered steel in the manufacture of edge tools, as table and pocket cutlery, physicians' and dentists' instruments, or standards of weight, measures, etc., etc.

Among the objects of my invention is to produce a commercially practical metal alloy having the properties above set forth and which is capable of being forged, hammered or otherwise worked into various forms of instruments and articles, and which is highly adapted, among other uses, as a substitute for steel and other metals which have been heretofore plated in order to provide a suitable luster and resist the oxidizing and corrosive action of the atmosphere and fumes commonly occurring in the atmosphere; and also to provide an alloy that is capable of being substituted in many cases for the rare and highly expensive metals comprising the so called polyxene group, including platinum, rhodium, irridium, palladium and osmium.

An alloy made in accordance with my invention is composed of chromium or other metal of the chromium group having properties like chromium, when considered with respect to the peculiar properties of my novel alloy, combined with cobalt in the proportions substantially as hereinafter specified. The metals included in the chromium group to which reference has been made embraces, in addition to chromium, tungsten, molybdenum and uranium. While I may employ other metals of the chromium group than chromium, my experiments up to the present time have led me to prefer the latter metal as possessing the most desirable qualities of a constituent of my alloy for the purposes and uses intended, though it may be

found for different uses other metals of the chromium group may be used as a constituent of the alloy.

I have discovered that an alloy may be produced by fusing together chromium and cobalt, in the proportions substantially as hereinafter specified, having such properties as will enable it to receive an extremely lustrous polish, rivaling silver in this respect, and which is capable of resisting oxidation and all form of corrosive fumes commonly occurring in the atmosphere, and showing no tendency to tarnish when exposed to the atmosphere of a chemical laboratory for a long period of time, and even retaining its brilliantly polished surface when subjecting it to boiling nitric acid. By reason of these and other properties of the alloy it may be substituted for many of the metals of what is termed the polyxene group hereinbefore referred to. For example my alloy may be used in the manufacture of standards of weight and measures and analogous purposes which have heretofore been made of platinum and irridium, with the result of possessing all the practical advantages of those metals at an immensely reduced cost to produce the same. I have also discovered, as an additional valuable property of this alloy, that it possesses a degree of hardness and elasticity which is fully equal to that of mild tempered steel and may be formed into edge tools having cutting qualities closely comparable to tools made of tempered steel. I have found that the alloy may be best worked into forms of utility when raised to the temperature of red heat.

In order that the alloy shall most advantageously possess the qualities above described, it is necessary that the constituent metals be substantially pure and especially that they shall be free from carbon, sulfur and like substances which seriously interfere with the non-tarnishing properties of the alloy. An alloy of chromium and cobalt which I have found to possess the aforesaid properties in varying degrees contains from ten to sixty per cent. of chromium, together with a corresponding variation of cobalt. For instance, I have found that an alloy consisting of substantially ten per cent. of chromium and ninety per cent. cobalt is capable of taking in a satisfactory cutting edge, is hard while not brittle, but is not so resistive to corrosion as an alloy containing from twenty-five to thirty per cent. of chromium, while an alloy

including the latter and somewhat higher proportions of chromium are better suited to edged tools and like implements. I have found that pure carbonless chromium is very difficult to fuse, and the methods hereinafter referred to are the only ones of which I am aware that may be successfully practiced in the production of alloys containing more than twenty per cent. of chromium and ranging from that proportion to sixty per cent. Chromium containing a substantial percentage of carbon may be fused under lower temperatures, but the presence of the carbon is highly objectionable inasmuch as it does not take the high luster of the pure chromium alloy and is more readily tarnished. I desire it to be understood, however, that I may combine small quantities of other substances with the alloy described such as will not objectionably effect the nature of the binary alloy for the purposes stated.

I have produced the alloy of chromium and cobalt by three different methods or processes. One method or process consists in placing the pure metals, chromium and cobalt, in a magnesia crucible, which crucible is placed in a furnace lined with magnesia and the crucible heated by an oxyhydrogen flame. The metals may be fused in a crucible of similar character and construction heated by an electric arc. The third method of fusing the metals to alloy the same consists in mixing the oxid of chromium with the required proportion of oxid of cobalt and

thereafter mixing these two oxids intimately with metallic aluminium preferably in the form of powder. Thereafter this mixture is introduced into a crucible lined with magnesia or alumina, and the mixture is either heated until decomposition takes place or is ignited cold and the metals are reduced to the metallic state and at the same time fused to a regulus by the extremely high temperature thus produced.

I claim as my invention:—

1. A metal alloy composed of a metal of the chromium group and cobalt.

2. A metal alloy composed of cobalt and more than ten per cent. of a metal of the chromium group.

3. A metal alloy composed of chromium and cobalt in the proportions of more than ten per cent. of the chromium.

4. A binary metal alloy composed of chromium and cobalt.

5. A metal alloy composed of chromium and cobalt in the proportions of more than ten per cent. and less than sixty per cent. of the chromium, the remainder of the alloy being cobalt.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 9th day of April A. D. 1907.

ELWOOD HAYNES.

Witnesses:

DON WATSON,

FRANK J. FANNING.