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COMPOSITION OF MATTER FOR ALLOYS.

No Drawing. Original application filed November 15, 1924, Serial No. 750,132. Divided and this application filed May 25, 1925. Serial No. 32,832.

The alloy herein set forth is a division of the composition set forth in the patent application filed under date of November 15, 1924, bearing the United States Series Number 750,132, of which a division is required therein.

Our invention relates to a composition of elements for forming an alloy suitable for making non-oxidizable castings, and possessing high heat resisting properties.

The object is to produce an alloy that will fuse quickly to steel parts as may be set in the mold for casing therein, and yet solidify rapidly before melting or changing the inclosed steel section.

A further object is to produce an alloy that is non-oxidizable and cannot be changed in hardness even when subjected to a highly oxidizing flame or extreme heat temperatures.

It is common practice in manufacturing valves which are to be used in high speed gas engines, to use a turned steel valve stem and cast an alloy head thereon by placing the steel stem within the mold before pouring the molten alloy therein, thereby making a one piece valve which is turned and machined into a perfect mechanical part. The grade of alloy, having the desired properties may be predetermined by a slight variation of the proportions of the elements comprising the composition of the alloy. In high speed engines, especially in aero-plane engines, where the valves are subject to extremely high heat temperatures, both valve cap and a portion of the valve stem are subjected to highly oxidizing conditions, and which result in many cases in scaling, pitting and warping of the exposed parts of the valve, or annealing and softening the metal, allowing it to jam against the engine valve seat and destroy the valve. An alloy suitable for this purpose requires high heat resisting properties, and such that the molecular properties of the metal cannot be changed nor affected by the heat, and is immune from oxidization under all conditions. Our alloy is especially adapted for meeting these conditions, and possess properties requisite to the effective manufacturing and operating of high speed gas engine valves. This alloy being similar in character and properties to the alloy set forth in the original patent heretofore referred to, although comprising a different combination of elements. Like the former patent, it possesses non-oxidizing and non-molecular changing properties, and is capable of being rolled into sheets, or drawn into bars without effecting the metal in any manner.

In preparing our alloy we use the following elements: nickel, manganese, iron, silicon, tungsten and copper, properly proportioned and fused together under a high temperature. The preferred proportions of the elements used for producing an alloy of the highest heat and oxidizing resisting properties, are as follows given in percentage by weight:

	Per cent.
Nickel	64
Manganese	7
Iron	14
Silicon	2
Tungsten	1
Copper	12

This alloy has a fusing point between 3000 and 4000 degrees Fahrenheit, being of sufficiently high temperature to instantly melt and fuse with the surface of any steel part that may be placed within the mold for casting-in, yet solidify almost instantly before destroying or changing the steel section inclosed, even in the case of thin small rods as valve stems, making the steel stem a component part of the casting.

While the foregoing show the preferred proportions of elements used in our alloy, it is obvious that various modifications of the proportions of elements therein may be made for producing various grades of alloy, without departing from our invention. Very efficient results have been obtained in resulting alloys by varying the proportion of any of the elements between the following limits:

	Per cent.
Nickel from	60 to 70
Manganese from	4 to 10
Iron from	5 to 15
Silicon from	½ to 3
Tungsten from	½ to 2
Copper from	5 to 15

In varying the proportions of any one or

more of the elements, the resisting properties of the resulting alloy will be changed and varied accordingly, and may be regulated and controlled for producing any desired grade of alloy as best suited for the special purpose for which it is used.

The base of this alloy being nickel, the same as used in the original patent, and this metal being similar to and closely associated with the metal cobalt, the resulting property of the alloy, when one metal is substituted for the other therein, is practically the same, we, therefore claim the right to substitute cobalt for nickel throughout this patent without departing from our invention (but all references to metals of the nickel group are to include nickel and cobalt only).

Very good results for commercial castings where high heat resisting and non-oxidizing properties are not required, as for valves to be used in low powered engines, or castings under similar conditions, have been obtained by us, by substituting aluminum in the place of the tungsten in the above formula, and which we also claim the right of substitution.

Having fully described our alloy, what we claim as our invention and desire to secure by Letters Patent is:

1. A non-oxidizable alloy comprising nickel 64 percent, manganese 7 percent, iron 14 percent, silicon 2 percent, tungsten 1 percent, copper 12 percent.

2. A non-oxidizable alloy adapted for making castings which will readily fuse with the surface of inclosed steel parts, comprising a metal in the nickel group 64 percent, manganese 7 percent, iron 14 percent, silicon 2 percent, tungsten 1 percent, and copper 12 percent.

3. A non-oxidizable alloy adapted for making castings or rolled into sheets or bars, comprising of from 60 to 70 percent nickel, from 4 to 10 percent manganese, from 5 to 15 percent iron, from ½ to 3 percent silicon, from ½ to 2 percent tungsten, and from 5 to 15 percent copper.

4. A non-oxidizable alloy adapted for resisting high heat temperatures, comprising nickel 64 percent, manganese and silicon 9 percent, iron 14 percent, tungsten 1 percent, copper 12 percent.

5. An alloy adapted for making non-oxidizable and heat resisting castings, comprising nickel 73 percent, manganese and silicon 10 percent, iron 16 percent, tungsten 1 percent.

In witness whereof we sign this specification.

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