

UNITED STATES PATENT OFFICE

2,458,502

STRUCTURAL ELEMENT FOR HIGH TEMPERATURE SERVICE USE

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This invention relates in general to alloys, but has reference more particularly to alloys which are especially adapted for hard facing purposes as well as for use in the form of castings.

In my United States Letters Patent No. 2,396,552, granted March 12, 1946, I have described an alloy which is especially useful for the hard facing of valves and valve seats, due principally to its resistance to the attack of lead oxide and other lead compounds found in or resulting from the combustion of so-called leaded gasoline. The alloy in that case consisted principally of nickel, chromium, tungsten and cobalt with the nickel present in amounts of 35% to 55%, the chromium in amounts of 25% to 40%, the tungsten in amounts of 10% to 20% and the cobalt in amounts up to 12%.

I have discovered that the cost of such an alloy can be considerably reduced, while maintaining, and in some instances, improving the resistance of the alloy to the attack of lead oxide, by increasing the nickel content of the alloy to a range of from 55% to 75%, lowering the chromium range to 10% to 30%, utilizing a tungsten range of 10% to 13.5%, and eliminating cobalt as a constituent of the alloy.

An alloy, in accordance with the invention, may contain the following constituents or elements in the stated ranges:

	Percent
Nickel	55 to 75
Chromium	10 to 30
Tungsten	10 to 13.5
Carbon	Up to 3.5
Iron	Balance but not more than 10

The carbon may be replaced in whole, or in part by boron, for the purpose of controlling primarily the alloy's melting point which is reduced by increasingly larger amounts of boron, the practical limit being of the order of 3%. In most cases, however, a carbon content of from about 1.75% to 2.75% is preferred.

A preferred alloy within the range stated above has the following approximate analysis:

	Percent
Nickel	65
Chromium	20
Tungsten	11.5
Carbon	2.0
Iron	1.5
	100.0

Alloys made in accordance with the invention are particularly resistant to the attack of lead oxide and other lead compounds found in or resulting from the combustion of the so-called leaded gasolines, and for this reason are especially adapted for the hard facing of valves and valve seats in internal combustion engines which utilize such fuels.

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While the utility of the alloy for hard facing purposes has been emphasized, it is to be understood that the alloy may also be utilized for making castings.

Having thus described my invention, I claim:

1. A structural element having at least a part which in use is subjected to abrasion and wear at elevated temperatures, and which is capable of resisting the corrosive action of lead oxide at those temperatures, said part comprising an alloy containing from about 55% to about 75% nickel, from about 10% to about 30% chromium, from about 10% to about 13.5% tungsten, and from about 1.75% to about 3.5% carbon, the balance of the alloy being substantially all iron, but the iron being not in excess of 10%.
2. A structural element, as defined in claim 1, in which the carbon is within the range of from about 1.75% to about 2.75%.
3. A structural element, as defined in claim 1, said element being a valve.
4. A structural element having at least a part which in use is subjected to abrasion and wear at elevated temperatures, and which is capable of resisting the corrosive action of lead oxide at those temperatures, said part comprising an alloy containing about 65% nickel, about 20% chromium, about 11.5% tungsten and about 2% carbon, the balance of the alloy being iron.
5. A structural element, as defined in claim 4, said element being a valve.

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