Patented May 30, 1950 2,509,800

UNITED STATES PATENT OFFICE

2,509,800

NICKEL-COBALT HEAT-RESISTING ALLOY

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No Drawing. Application November 20, 1946, Serial No. 711,197. In Canada December 19, 1945

3 Claims. (Cl. 75—171)

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This invention relates generally to alloys having a high degree of resistance to the combined and continued action of intense heat and stress, and particularly relates to alloys which are used in the construction of gas turbine parts.

The gas turbine type of engine consists mainly of a shaft having mounted thereon an air compressor and a hot gas turbine, the rotation being imparted to the engine by the action of the hot gases upon the gas turbine during expansion. The heat of the flaming gases, acting upon the blades and buckets, causes the corrosion and rupture of the metal used in their manufacture in a comparatively short time. It may, therefore, be safely stated that the development of the gas turbine depends upon the development of proper alloys to withstand the intense heat involved in its operation.

It is therefore the object of this invention to provide an alloy which will withstand intense heat and stress for a long period of time.

A more specific object of this invention is to provide an alloy which will withstand high mechanical stress at a temperature of 1500° F. or more for a comparatively long period of operation.

With these objects in view the present invention consists in an alloy comprising cobalt, chromium, nickel, copper, molybdenum, boron and iron.

These metals may be melted together in the usual manner to form the improved alloy.

In the course of the research done in connection with the improved alloy, a large number of combinations in various proportions were made, outstanding among these and exemplary of them are the following two combinations:

		Per cent
1.	Co	50
	Cr	20
	Ni	10
	Cu	5
	Mo	5
	B	.25
	Fe	9.75

		Per cent
2.	Co	40
	Cr	20
	Ni	20
	Cu	6
	Mo	4
	B	.25
	Fe	9.75

Preliminary tests on the alloy within the range of the above compositions show the following:

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Stress, p. s. i.	Rupture Time, hrs.	Elongation, per cent in 2"	Reduction of area, per cent
25,000	100	12.5	18.3
23,000	206	13.00	23.9
21,000	508.5	12.5	18.3
17,500	[1] 1,230		

[1] Graph of Time-Rupture line indicates that it would continue to 2600 hours.

The above tests have been carried out under a temperature of 1500° F.

Other alloys, having the same properties as those described above, but having a chromium content varying from 15% to 25% have also shown good results; these alloys also containing from 40 to 50% of cobalt, 10 to 20% of nickel, 5 to 6% of copper, 4 to 5% of molybdenum, 9.75% of iron, and 0.25% of boron.

The foregoing description is given by way of example only and without intention to limit the invention to the proportions stated.

What I claim is:

1. A castable alloy adapted for use in the construction of gas engine parts and characterized by high heat and stress resistance consisting of the following metals in the proportions by weight of cobalt 40 to 50%, nickel 10 to 20%, chromium 15 to 25%, copper 5 to 6%, molybdenum 4 to 5%, iron 9.75% and boron 0.25%.

2. A castable alloy adapted for use in the construction of gas engine parts and characterized by high heat and stress resistance consisting substantially of the following metals in the proportions by weight of cobalt 50%, chromium 20%, nickel 10%, iron 9.75%, copper 5%, molybdenum 5% and boron 0.25%.

3. A castable alloy adapted for use in the construction of gas engine parts and characterized by high heat and stress resistance consisting substantially of the following metals in the proportions by weight of cobalt 40%, chromium 20%, nickel 20%, iron 9.75%, copper 6%, molybdenum 4% and boron 0.25%.

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