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HEAT RESISTANT ALLOYS

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2 Claims. (Cl. 75—124)

It is known that iron-chromium-aluminium alloys, for example alloys in which the main constituent is iron and which also contain about 20–35% of chromium and about 1–10% of aluminium, are very resistant to high temperatures, i. e. to the effect of the oxygen of the air at high temperatures.

It has now been found that the resistance to heat of such alloys can be considerably further increased by adding a proportion of metallic thorium to them. The advantageous effect of the thorium is already apparent with the addition of very small amounts, for example an amount of 0.001% or less.

The amounts employed in practice will generally be between 0.001 and 5%. In some cases, however, a higher proportion of thorium may be added. The amount of thorium to be added depends on the degree of increase of resistance to the effect of oxygen at high temperatures which is to be obtained, on the mechanical properties desired in the alloy and finally on considerations of economy.

For the purpose of varying the mechanical properties of the alloys, for example their capability of being worked, small proportions of other metals, for example manganese, silicon, magnesium and the like may also be incorporated. The amount of such additional metals which is added may be for example from 0.01 to 2%.

The alloys manufactured in accordance with the invention represent a particularly valuable material for making articles which have to resist heat, such as for example resistance materials, and particularly heating wires for electrically heated appliances and furnaces and the like.

Comparative experiments have proved that the life at a temperature of 1250° C. of resistance wires, for electrically heated appliances and the like, made of an alloy of 65% iron, 30% chromium and 5% aluminium became 2½ times as long with the addition of 0.05% thorium, 3½ times with the addition of 0.1% thorium and 7 times with the addition of 0.5% thorium.

The iron-chromium-aluminium alloys manufactured in accordance with the invention with the addition of thorium have the further great advantage that the variation in their resistance is less. Thus, for example, the resistance of an electric resistance wire made of an iron-chromium-aluminium alloy of the aforesaid composition when heated to 1250° C. increased in its life of about eight hours by 60% as compared with its resistance at the start. The increase in resistance of an alloy of a similar composition but with a content of 1% of thorium on the other hand was only 27% after being heated for 56 hours at a temperature of 1250° C.

We claim:

1. A heat resistant alloy which consists of about 1–10% of aluminum, about 20–35% of chromium, about .001–5% of thorium and the remainder substantially of iron.

2. An electric resistance element comprising an alloy consisting of about 1–10% of aluminum, about 20–35% of chromium, about .001–5% of thorium and the remainder substantially of iron.

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