

UNITED STATES PATENT OFFICE.

RUDOLPH F. FLINTERMANN, OF DETROIT, MICHIGAN.

MATERIAL FOR RESISTING OXIDATION AT HIGH TEMPERATURES.

No Drawing.

Application filed February 14, 1921. Serial No. 444,766.

To all whom it may concern:

Be it known that I, RUDOLPH F. FLINTERMANN, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Materials for Resisting Oxidation at High Temperatures, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to materials which have the property of resisting oxidation when subjected to high temperatures, and it is the object of the present invention; first, to obtain an alloy which is formed of relatively inexpensive metals; second, to avoid difficulties in the process of compounding the alloy; third, to obtain resistivity to oxidation; and fourth, to combine with said property of resistivity other desirable properties, such as closeness of grain, a small coefficient of expansion, malleability and ductility, etc. To this end the invention consists in the alloy as hereinafter set forth.

My improved alloy consists of nickel or cobalt from twenty to sixty per cent, silicon from three to nine per cent, not to exceed three per cent of some grain closing metal such as titanium, molybdenum, vanadium, tungsten, uranium or calcium, with the balance of the alloy composed of iron. It is understood that the term "iron" in the above specification refers not to chemically pure iron but to iron containing the elements carbon, manganese, sulphur and phosphorus in proportions usual in commercial iron or steel. The alloy is formed by melting in a refractory lined furnace having a suitable source of heat the proper proportions of nickel or cobalt and silicon and iron and one or more of the grain closing ingredients above mentioned preferably one of which is titanium.

The alloy above described is free from defects common to many oxidation resisting alloys such as:

(a) Lack of fluidity necessary for ease of handling in the foundry.

(b) Lack of strength during solidifying and cooling in mold resulting in production of cracked castings;

(c) Lack of ductility, both hot and cold.

(d) Lack of mechanical strength when cold;

(e) Tendency to crack upon sudden change in temperature;

(f) Inability to withstand quenching in water from elevated temperatures;

(g) Loss of ductility by water quenching.

In addition to being free from the above defects the alloy as described possesses a high degree of resistivity to oxidation. It is suitable either for casting to shape desired or for casting in billets to be forged, rolled, or drawn to shape desired.

One function performed by the nickel or cobalt of alloy is the reduction in the coefficient of expansion which lessens the danger of cracking on sudden changes in temperature.

What I claim as my invention is:

1. An alloy for resisting oxidation at high temperatures containing nickel or cobalt in an amount greater than 20% and less than 60%, silicon in an amount greater than 3% and less than 9% and the balance principally of iron.

2. An alloy for resisting oxidation at high temperatures containing more than 20% and less than 60% of nickel or cobalt, more than 3% and less than 9% of silicon, not to exceed 3% of titanium, or molybdenum, or vanadium or tungsten, or uranium, or calcium, the balance of the alloy being principally iron.

3. An alloy for resisting oxidation at high temperatures containing more than 20% and less than 60% of nickel or cobalt, more than 3% and less than 9% of silicon, and not to exceed 3% of titanium, the balance of the alloy being principally iron.

In testimony whereof I affix my signature.

RUDOLPH F. FLINTERMANN.