

UNITED STATES PATENT OFFICE.

WALTER FRIEDRICH, OF NIEDERSCHONEWEIDE, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PROCESS OF REFINING ALLOYS.

No Drawing.

Application filed April 12, 1924. Serial No. 706,192.

To all whom it may concern:

Be it known that I, WALTER FRIEDRICH, a citizen of Germany, residing at Niederschoneweide, Germany, have invented certain new and useful Improvements in the Processes of Refining Alloys, of which the following is a specification.

The present invention comprises a process of producing an improved aluminum bronze, that is an alloy consisting largely of copper and containing aluminum. It is the object of my invention to refine the grain or texture of this alloy and thereby to improve its physical properties.

My improved process consists in treating the alloy while molten with a compound of an alkali metal, in particular with halide, as for example, sodium fluoride or sodium chloride.

The refining process constituting my invention will be described with reference to an alloy of iron-aluminum and copper and in particular in connection with the refining of an alloy consisting of about 3 to 6 parts of iron; 8 to 15 parts of aluminum and the remainder of copper. The refining material which may consist of equal parts of a sodium chloride and sodium fluoride is added to the liquid metal and distributed by stirring. The metal thereupon may be cast. The quantity of the refining mixture advantageously may consist of about 0.5 to 3% by weight of the quantity of the metal to be treated. Other alkali compounds can be used in a similar manner, but especial favorable action is obtained with the above mixture.

Test pieces of both the refined and non-refined alloy show the chemical combination of aluminum and iron which is indicated by the formula Al_3Fe , but the non-refined test pieces show this chemical combination in the form of very fine globules, whereas in the case of the refined metal, the globules are coarser. In an etched section of the non-refined metal, a microscopic examination reveals a strongly radiated texture while the refined metal is shown to be crystallized in normal grains.

Mechanical tests show that the tensile strength of the refined alloy over the non-refined is increased from 62.5 kilograms per sq. mm. to 72 kilograms per sq. mm.—an increase of 15%. In cast pieces the hardness is increased by refining from 171 kilograms per sq. mm. to 198 per sq. mm. In rolling mill material the extensibility or elongation is increased to the extent of about 4 to 5%; for example from 184 kg. per sq. mm. to 199 kg. per sq. mm. The alloys refined by the new process are furthermore found to be corrosion proof against water and saline solutions and in a measure to acids. They can be readily worked while hot.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The process of refining alloys of copper and aluminum which consists in treating said alloys in a fluid state with an alkali compound.

2. The process of refining an alloy of copper aluminum and iron which consists in treating the same while molten with an alkali halide.

3. The process of refining an alloy of copper aluminum and iron which consist in treating the same while molten with a mixture of a chloride and a fluoride of an alkali metal.

4. The process of refining an alloy of copper aluminum and iron which consists in treating the same while molten with substantially equal parts of a chloride and a fluoride of an alkali metal.

5. The process of refining an alloy of copper aluminum and iron which consists in stirring into the alloy while molten substantially equal parts of a chloride and a fluoride of sodium in an amount sufficient to refine the grain and improve the physical properties of the alloy.

6. The process of refining an alloy consisting largely of copper and containing aluminum and iron which consists in mixing with said alloy while molten a halide of alkali metal to the amount of no more than about three per cent by weight of said alloy.

WALTER FRIEDRICH.