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UNITED STATES PATENT OFFICE

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ACID-PROOF ALLOYS

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Alloys composed of iron and silicon having a silicon content of from 7 to 20% and which strongly resist the effect of acids and other corrosive media are generally known. These alloys are fairly strong when their silicon content lies between 7 and 12%, but their resistance to acids is smaller than that of alloys with a higher silicon content. If the content of silicon increases above 12% these alloys become chemically more resistant, but at the cost of their strength and alloys with more than 16% silicon are so brittle that the production of comparatively simple castings becomes very difficult. The process hitherto employed for their production consists in melting down a high percentage ferro-silicon with iron and in remelting—and this is the disadvantage of this process—the resulting product in order to obtain a homogeneous material suitable for casting.

The object of the present invention is to improve both the quality and the casting properties of the acid-proof alloys. The improvement of the mentioned properties is attained by alloying titanium with the usual acid-proof alloys composed of iron and silicon. Titanium may replace the silicon in the acid-proof alloys used in practice either partly or completely. A real improvement both in the mechanical and in the casting properties as compared with the usual acid-proof alloys is established with the group of alloys in which titanium partly replaces the silicon, namely, in those alloys which contain 0.01 to 10% of titanium together with 7 to 20% of silicon. Alloys obtained in this manner are distinguished by their complete homogeneity and are free from gases and impurities. It is to be emphasized that no remelting is necessary in their production and that already on the first melting down a material is obtained of uniform, fine-grained structure without oxidizing or other liquidations, and possessing an increased resistance to corrosion, an increased tenacity and of definitely decreased brittleness. Further the suitability for casting of these alloys is improved by the influence of the titanium. The titanium effects an increase of the number of the crystal centres and prevents the formation of trans-crystallization zones when the wall strengths are large and in the transitions. It influences the uniformity of the crystallized structure and diminishes the tendency to form cracks in the castings.

The melting of the acid-proof alloys which form the subject of the present invention is carried out in the usual melting apparatus, that is in the cupola furnace or—as is especially advantageous for these alloys—in the flame furnace and chiefly in the electric furnace.

I claim:

Acid-proof alloys consisting of from 0.01 to 10% of titanium, from 7 to 20% of silicon and the balance iron.

In testimony whereof I affix my signature.

EMANUEL VALENTA.