Patented Aug. 10, 1926. 1,595,218

UNITED STATES PATENT OFFICE.

ALADAR PACZ, OF CLEVELAND, OHIO, ASSIGNOR TO ALUMINUM COMPANY OF AMERICA, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ALUMINUM-SILICON ALLOY.

No Drawing. Application filed February 27, 1922. Serial No. 539,740.

My invention relates to alloys containing principally aluminum and silicon. In my application, Serial No. 323,350, filed September 12, 1919, is disclosed an alloy of silicon and aluminum containing upwards of 2 1/2% of silicon, and, more specifically, such an alloy containing aluminum, silicon and copper. In my Patent No. 1,387,900, issued August 16, 1921, I have disclosed the use of alkali fluorine compounds to enhance the properties of alloys of aluminum and silicon. My present invention consists of the addition of manganese in small amounts to aluminum silicon alloys and is efficacious even where the alkali fluorine compound is not utilized. This is particularly apparent in the case of die-castings or castings made in permanent molds. However, my invention may also be used to great advantage in connection with metal treated with alkali fluorine compound or having other constituents.

Although in the case of sand castings, the best results are secured when the alkali fluorine compound is used, sand castings having superior physical properties such as tensile strength, elongation and workability, may be obtained by the addition of the manganese to the aluminum silicon alloy without utilizing the grain refining agent. It seems that when manganese is employed, the injurious effect of any iron impurities which may be present in the alloy is diminished. It may be that the beneficial effect of the manganese is due to this neutralization of the injurious effects of the iron and other impurities, but I do not confine myself in any way to such theory. The effect of the manganese on the aluminum silicon alloy is probably to produce a better dissemination of the silicon in the alloy. At any rate, the finer grained structure which is produced through the use of manganese is evidence of its beneficial function. The advantages arising from the addition of manganese are apparent even where the manganese comprises only 1/10 of one per cent of the alloy. The amount of manganese may be increased, depending upon the use to which the product is to be put. and also depending upon the percentages of other elements, such as the silicon, and also depending upon the amount of impurities, such as iron.

In one instance where I applied my invention to die casting, I employed 8/10 of one per cent manganese in an alloy containing 8 per cent silicon and the rest aluminum. In another instance of die casting, I utilized 5/10 of one per cent manganese in an alloy containing 13 per cent silicon and the rest aluminum. In both of these cases the resulting alloy had a very fine grained structure, high ductility and tensile strength. The results showed that the advantages of the invention may be secured even without utilizing the alkali fluorine compound referred to in my Patent No. 1,387,900. This should be true also of castings made in permanent molds where there is a chilling action similar to that given the metal in die casting.

My invention is applicable not only to aluminum alloys containing the higher percentages of silicon such as 5 per cent and above, but may be used to advantage in any aluminum silicon alloy containing a substantial amount of silicon. The addition of the manganese in all cases produces superior physical properties.

The manganese may be incorporated with the aluminum silicon alloy by any of the well-known methods. It may be added by itself or as an alloy with the aluminum, or with aluminum silicon, or with any other constituent which it is desired to incorporate in the alloy. One method which I have practiced successfully is to briquette, for example, 75 grams of manganese powder with 56 grams sodium silico fluoride and 11 grams of aluminum powder. This is in accordance with the practice set forth in application Serial Nos. 366,967 and 366,968. This may be added to sufficient aluminum silicon alloy to produce an alloy which will be high in manganese, for instance as high as 33%, and this alloy may be added in the requisite proportions to the actual casting alloy. Another practice would be to add the briquettes directly to the actual casting alloy.

The alloys produced according to my invention may be utilized for any kind of casting, and such castings may be worked as by rolling, extruding, forging, drawing, etc.

What I claim and desire to secure by Letters Patent is:

1. An alloy consisting predominantly of

aluminum and containing a small percentage of manganese and between about 2 1/2% and about 15% of silicon.

2. An alloy consisting predominantly of aluminum and containing manganese and between about 2 1/2% and about 15% of silicon, the manganese constituting a small percentage of but not less than about 0.1% of the alloy.

3. An aluminum base alloy containing from about 3 to 15 per cent of silicon and from 0.1 to 0.8 per cent of manganese.

4. An aluminum base alloy containing from 8% to 13% of silicon and a small percentage of but not less than about 0.1% of manganese.

5. A chill casting formed of an aluminum base alloy containing from about 3 to 15 per cent of silicon and from about 0.1 to 0.8 per cent of manganese.

6. An article formed from an aluminum base alloy containing from about 3% to about 15% of silicon and from about 0.1% to about 0.8% of manganese and having refined grain and improved physical properties characteristic of the treatment with an alkali fluorine compound of an aluminum alloy containing from about 3 to 15% of silicon.

In witness whereof, I have hereunto set my hand this 24th day of February, 1922.

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DISCLAIMER

1,595,218.—*Aladar Pacz*, Cleveland, Ohio. ALUMINUM-SILICON ALLOY. Patent dated August 10, 1926. Disclaimer filed November 9, 1937, by the assignee, *Aluminum Company of America*.

Hereby disclaims the claims numbered 1 and 2 of said Letters Patent.

[*Official Gazette November 30, 1937.*]

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