

# UNITED STATES PATENT OFFICE.

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CAST IRON AND METHOD OF MAKING SAME.

No Drawing.

Application filed August 27, 1927. Serial No. 215,997.

The present invention relates to the treatment of molten metal in the manufacture of castings, and has as an object the production of iron castings of superior tensile and transverse strength.

Heretofore, when deemed essential, it has been the practice in the manufacture of gray iron castings to add to the molten metal a suitable agent, in order to obtain the carbon in the desired forms.

In the breaking down of the iron carbide in the metal during solidification, ferro-silicon generally has been used as a graphitizing agent in order to provide the desired ratio of combined and graphitic carbon in the casting, and in the treatment of molten iron, such as would, upon solidification, produce a metal white in fracture, into metal for castings the fraction of which would be gray, the use of a silicide substantially free from iron is suggested in my Patent No. 1,499,068, granted June 24, 1924.

I have ascertained that the advantageous qualities of cast iron may be improved, and, more particularly, that the amount of carbon in graphitic form may be regulated by adding metallic calcium to the molten iron. The metallic calcium serves not merely to increase the strength of the casting, but to control the graphitization of the carbon. The metallic calcium should be added in an amount beyond what may be neutralized by such acidic or other elements as tend to combine with it, in order to leave available or free metallic calcium for graphitizing action. Where reference is made in the specification or claims to the addition of calcium, I mean an amount of calcium is used in excess of an amount that may be satisfied or react with and consequently be used up by any element in the charge. In other words, when the word "calcium" is used "available calcium" is meant as it is the available calcium only that acts to graphitize. Since the percentage of these acidic elements may vary the amount of calcium needed in particular instances will be governed accordingly. It has been found, however, that in some instances one-fourth of one percent of calcium will suffice, although it may be used in greater or less amounts under conditions above set forth, the calcium preferably being used in just sufficient amounts to produce the desired graphitizing effect.

The metallic calcium may be added to the

molten iron in the ladle, or to the bath within the furnace; or in any other suitable manner. It may be added to molten white iron for its general betterment as well as affecting a certain amount of graphitization if need be from which iron castings can be made, or to molten gray iron for its improvement as such, or for affecting additional graphitization, from which iron castings can be made. Obviously, it may be added to molten iron of any composition or description; for example, molten iron for the production of various iron alloys.

It has also been found that in addition to the calcium, it may be desirable at times to use another agent, such as is adapted to cause graphitization. For instance, another alkaline earth metal in metallic form, such as metallic magnesium produces very satisfactory results. For certain purposes, the metallic magnesium and metallic calcium may be used in proportions of one-half to one-eighth part of magnesium to one part of calcium, and the metallic magnesium may, if desired, be added as ferro-magnesium.

This application is a continuation in part of my pending application, Serial No. 69,501, cast iron and the art of making same, filed November 16, 1925.

I claim:—

1. That improvement in the art of making cast iron which consists in adding to molten iron, which if cast would contain more than 2% of combined carbon metallic calcium in proportion to the amount of graphitization desired.

2. That improvement in the art of making cast iron which consists in adding to molten iron, which if cast would contain more than 2% of combined carbon sufficient metallic calcium to cause a desired amount of graphitization, and an agent other than calcium, said other agent being such as to cause additional graphitization.

3. That improvement in the art of making cast iron which consists in adding to molten iron, which if cast would contain more than 2% of combined carbon sufficient metallic calcium to cause a desired amount of graphitization, and another alkaline earth metal in metallic form.

4. That improvement in the art of making cast iron which consists in adding to molten iron, which if cast would contain more than

2% of combined carbon sufficient metallic calcium to cause graphitization, and metallic magnesium.

5 5. That improvement in the art of making cast iron which consists in adding to molten iron containing more than 2% of combined carbon sufficient metallic calcium to be available or free and thereby cause a desired amount of graphitization.

6. That improvement in the art of making 10 cast iron which consists in adding to molten iron containing more than 2% of combined carbon sufficient metallic calcium to cause a desired amount of graphitization, and another alkaline earth metal in metallic form. 15

In testimony whereof I have hereunto set my hand.

AUGUSTUS F. MEEHAN.