

# UNITED STATES PATENT OFFICE

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## PROCESS FOR ADDING MAGNESIUM TO CAST IRON

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2 Claims. (Cl. 75—130)

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My invention relates to metallurgy wherein magnesium is alloyed with cast iron to produce nodular graphite cast iron.

This is a continuation-in-part of my copending application, Serial No. 123,087, filed on October 22, 1949, now abandoned.

The production of nodular iron involves, first, the addition of sufficient magnesium to a molten cast iron to desulphurize said iron to yield a molten iron containing from 0.05 to 0.15% mag-  
nesium. The magnesium-bearing iron is then inoculated with about 0.75% silicon.

During the course of experiments concerning the use of magnesium carbide for introducing magnesium into molten cast iron quietly, I discovered that nodular iron produced with the addition agent, magnesium carbide, was superior to nodular iron produced with other magnesium addition agents—the magnesium-nickel alloys and the magnesium-silicon alloys, for example. Furthermore, I found that the use of magnesium carbide as an addition agent yielded unexpected good results when it was combined with the conventional amount of silicon inoculating agent.

In a test that I made with an iron containing 3.33% carbon, 2.33% silicon, 0.45% manganese, 0.065% phosphorus, and 0.020% sulphur, I introduced 0.20% magnesium carbide into the molten metal. The resulting castings were a good grade of nodular iron; this, in spite of the fact that no inoculating agent was introduced into the metal—that is, no ferro-silicon. In this case, the magnesium carbide not only provided the required magnesium, but also acted as its own inoculating agent.

In another test that I made, I divided a batch of molten iron into two portions, said molten iron being composed of: 3.42% carbon, 1.99% silicon, 0.23% manganese, 0.045% phosphorus, and 0.015% sulphur. To one portion I added enough magnesium-nickel to bring the residual magnesium content of the metal up to 0.11% magnesium, and then I added 0.75% silicon. To the second portion I added enough magnesium carbide to bring the residual magnesium content of the metal up to 0.12% magnesium, and then I added 0.75% silicon. A microscopic examination of the resulting metals showed that, while the magnesium-nickel treated metal was a normal nodular iron, the magnesium carbide treated metal was an exceptionally good specimen of nodular iron; that is, for example, the magnesium carbide treatment yielded a nodular iron with an unusually high percentage of graphitic carbon and ferrite in the as-cast condition.

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Generally speaking, nodular iron solidifies to form a product wherein a portion of the carbon content of the metal has formed graphite nodules surrounded by ferrite in a matrix of pearlite. With the magnesium carbide treated metal, the ferrite islands were much larger, indicating that the use of magnesium carbide yielded a molten metal which more readily transformed into graphite nodules and ferrite than molten iron treated with conventional magnesium addition agents; furthermore, I found that this advantage of magnesium carbide over magnesium-nickel also applied to such addition agents as magnesium-copper and magnesium-silicon.

Experiments in heat treating the carbide treated metal showed that such a metal could be completely ferritized in but a fraction of the heating time that it takes to break down the structure of a normal nodular iron.

Having now described my invention, I wish it to be understood that my invention is not to be limited to the specific forms or arrangement of steps hereinbefore described, except insofar as such limitations are specified in the appended claims.

I claim as my invention:

1. In the process wherein magnesium is alloyed with molten cast iron in the production of nodular graphite cast iron castings, the steps, which comprise: adding substantially all of said magnesium to said molten cast iron by adding magnesium carbide to said molten cast iron; and casting the molten magnesium-bearing cast iron.

2. In the process wherein magnesium is alloyed with molten cast iron in the production of nodular graphite cast iron castings, the steps, which comprise: adding substantially all of said magnesium to said molten cast iron by adding magnesium carbide to said molten cast iron; inoculating the molten magnesium-bearing cast iron with silicon; and casting the molten magnesium-bearing and inoculated cast iron.

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### REFERENCES CITED

The following references are of record in the file of this patent:

### UNITED STATES PATENTS

Number	Name	Date
2,485,760	Millis et al.	Oct. 25, 1949