

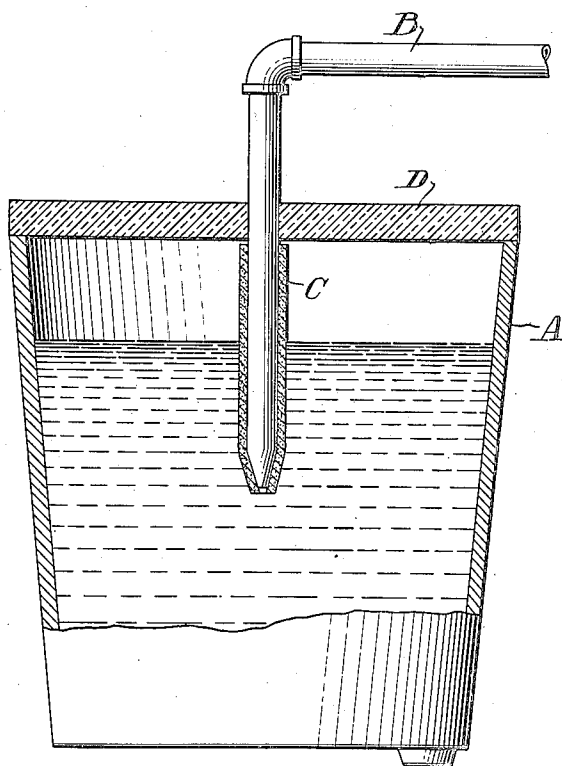
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J. R. BILLINGS

PROCESS OF TREATING MOLTEN CAST IRON OR STEEL

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Inventor:

James R. Billings
by *Reynolds Townsend & Brinkenstein*
Attorneys.

UNITED STATES PATENT OFFICE.

JAMES R. BILLINGS, OF CHICAGO, ILLINOIS, ASSIGNOR TO J. R. BILLINGS IRON AND STEEL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

PROCESS OF TREATING MOLTEN CAST IRON OR STEEL.

Application filed May 12, 1922. Serial No. 560,446.

To all whom it may concern:

Be it known that I, JAMES R. BILLINGS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Treating Molten Cast Iron or Steel, of which the following is a specification.

My invention relates to an improvement in making castings of iron or steel. My process is applicable to the improvement of molten cast iron, as obtained from blast furnaces or from cupolas, for use in making castings and particularly malleable iron castings, as well as to the production of sound ingots from open hearth or Bessemer steel, whether or not it has been recarburized.

My preferred method consists in injecting into the molten cast iron or steel, contained in a suitable receptacle such as a ladle or furnace, a current of air for a short period of time, say two or three minutes.

The time of injection cannot be more definitely stated than that it must be carried to a point at which the appearance of the molten metal indicates a glowing white condition. If carried beyond this point, injurious oxidation of the iron will result. When the operation is conducted within the proper limits, which will readily be ascertained by experience, I find that the quality of the cast iron or steel is improved in the following particulars:

Cast-iron, so treated, will have its fluidity so greatly increased that it will make sound castings without blow holes. Ingots of steel, likewise, will, when so treated, be found to have very few blow holes and the steel produced from such ingots will have increased strength over untreated steel from the same mold.

Any suitable apparatus may be employed. In the accompanying drawing I have shown a ladle A for containing the molten metal. Air from a suitable blower or compressor is introduced through pipe B, the portion extending into the metal being provided with a suitable refractory covering C. A cover D may be used, if required.

In operation the molten cast iron or steel, either before or after it has been recarburized, is poured into the ladle and air under sufficient pressure which need be only enough to prevent metal from entering the pipe B is forced through pipe B, whose lower end preferably extends well down into the molten metal. The air injection is continued for a relatively short time, until the appearance of the metal indicates a distinct rise in its temperature. The hot metal is then forthwith cast into molds or ingots, in accordance with the usual practice.

The reasons for the improvement in the quality of the molten metal produced by this simple procedure are not quite clear. In my opinion the result is due to the oxidation, by the oxygen of the introduced air, of carbon monoxide, or hydrogen or hydrocarbons present in the molten metal, to carbon dioxide, with concomitant generation of heat sufficient to increase the temperature of the molten metal, but without oxidation of the iron itself, or substantial reduction of the total carbon content. The process is particularly applicable to the treatment of coke and hot blast smelted iron in which I believe there exists carbon monoxide gas, as such, and it is largely by oxidation of this gas to carbon dioxide that the additional heat is produced.

The treatment above specified has the further beneficial effects of eliminating or permitting the elimination of objectionable gases and oxids.

When properly conducted, this process will produce molten iron or steel from which may be obtained particularly sound castings in grey iron, malleable iron and steel, as well as ingot metal for rolling purposes.

While I have specified air as the oxidizing agent, oxygen gas or oxygen producing compounds may be introduced into the molten metal.

I claim:

1. The process of treating molten cast iron or steel which consists in introducing air into the molten metal for a sufficient time to cause, without oxidation of the iron itself or substantial decrease of carbon content, a

substantial rise in temperature, and then casting the metal into molds or ingots.

2. The process of treating molten cast iron or steel which consists in introducing an oxidizing agent into the molten metal for a sufficient time to cause, without oxidation of the iron itself or substantial decrease of

carbon content, a substantial rise in temperature, and then casting the metal into molds or ingots.

In testimony whereof, I affix my signature.

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JAMES R. BILLINGS.