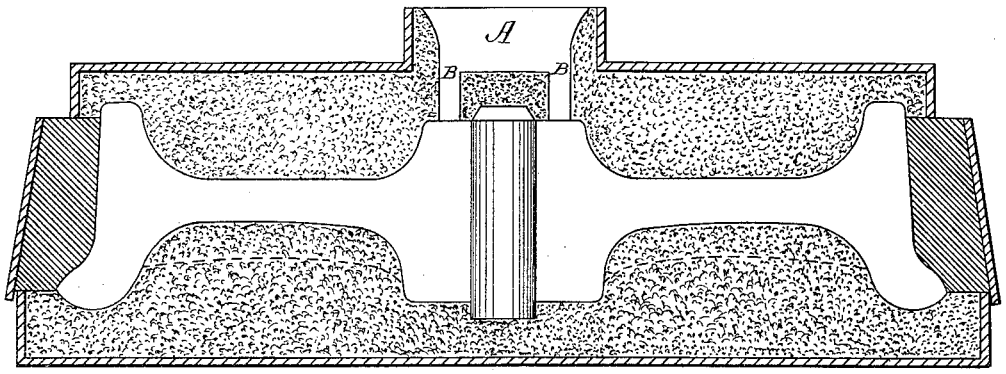
(No Model.)

W. WILMINGTON.

PROCESS OF CASTING CAR WHEELS.

No. 344,300. Patented June 22, 1886.



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WILLIAM WILMINGTON, OF TOLEDO, OHIO.

PROCESS OF CASTING CAR-WHEELS.

SPECIFICATION forming part of Letters Patent No. 344,300, dated June 22, 1886.

Application filed April 27, 1886. Serial No. 200,385. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WILMINGTON, of Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Improvement in Methods of Casting Car-Wheels, of which the following is a specification.

This invention is an improvement upon a method of casting car-wheels upon which Letters Patent of the United States No. 309,120 were granted me December 9, 1884. That method consists in placing gradually rich ferro-manganese in the current of molten iron from the pouring-ladle or into the basin of the mold during the casting of the wheel. This method of modifying the chill-hardening properties of the iron composing the different parts of the wheel in varying degrees secures a strong and durable car-wheel; but at times difficulties arise from the carelessness of operatives, who sometimes allow the molten iron in the basin to run down low at the latter stage of filling the mold, at which times small portions of the ferro-manganese in an unsettled condition are carried into the mold by the rapid inflow of molten iron, which is objectionable.

The object of my improvement is to secure with certainty the melting of ferro-manganese or spiegeleisen before the same has entered the mold of a car-wheel, thereby securing with greater certainty the gradual modification of the chill-hardening properties of the molten cast-iron in varying degrees in the different parts of the wheel.

In the method of incorporating ferro-manganese or its equivalent in varying quantities with the molten iron composing the wheel during the casting of the same by incorporating less of the ferro-manganese in the iron forming the tread than in the iron forming the hub and inner plate parts of the wheel, and the use of old or condemned car-wheels, I am enabled to produce a cheap, strong, and durable wheel by restoring to the molten product derived from the old car-wheels certain elements, more particularly carbon and manganese, which by repeated meltings of the old car-wheel have been more or less decarburized.

Before further describing my improvement, I will state some facts in relation to cast-irons used for casting car-wheels. While a proper proportion of manganese imparts strength to these irons, it will also, when in excess in the iron forming the tread of a car-wheel, affect injuriously the same. Therefore I limit the quantity of the ferro-manganese admitted to the molten iron entering the mold of the car-wheel in the early stages of casting the wheel, and during the latter periods of casting the wheel I incorporate a greater quantity of manganese with the molten iron entering the mold.

In practicing my improvement I melt in a cupola in the ordinary manner the desired quantities of old or condemned car-wheels, with or without the addition of suitable hard cast-iron, and I may add to these metals to be melted with the same steel in such quantities as may be desirable. The molten product derived from these metals, being deprived of its carbon and manganese to a great extent, is extremely high in chill-hardening properties, which quality is necessary to obtain the best results by my method. The combination of metals after melting is drawn into a reservoir-ladle, and from the same trial-pieces are cast. From these is determined the quantity of ferro manganese to produce the desired effects upon the iron forming the wheel to be cast. I then proceed to cast a car-wheel by the following method: I take into a ladle about five hundred pounds of suitable molten chill-hardening cast-iron in its normal state. In another ladle I take about one hundred pounds (more or less) of the same quality of molten iron or other suitable cast-irons. I place with the molten iron in this ladle the determined quantity of ferro-manganese, the same being powdered or reduced to that degree of fineness that the same will quickly melt by the inherent heat in the molten metal in the ladle, waiting a few seconds until the ferro-manganese has become homogeneous with the molten iron in the ladle. I then commence to cast the wheel by filling the basin of the mold preferably with the molten iron in its normal state, the same being poured continuously until the mold is filled. After the basin is properly filled I commence also to pour the molten metals from

the ladle holding the ferro-manganese, and the metals then run from both ladles simultaneously, the alloyed molten iron being poured gradually into the flowing stream of molten iron in its normal state from the other ladle, or directly into the basin of the mold. I gradually increase the flow of the alloyed molten iron until the mold of the car-wheel is filled by the molten metals from both ladles. The effect of incorporating small and increasing quantities of ferro-manganese, the same diffusing with the molten iron already in the mold of the car-wheel, lessens the intensity or affinity for combination by diffusion which exists between the quality of the iron already in the mold and the quality of the incoming iron during the latter stages of filling the mold. Consequently the iron at and near the surface of the tread of the wheel, having less manganese in its composition, will not be injuriously affected by the latter inflow of molten iron having greater quantities of ferro-manganese, which forms the hub and inner plate of the car-wheel, the iron forming these portions of the wheel being greatly modified in its chill-hardening properties, which is very desirable. I prefer to use rich ferro-manganese, which may be stated to be from seventy-five to ninety per cent. of manganese; but I do not confine myself to any particular quality or quantity of ferro-manganese or its equivalent, (spiegeleisen,) but I use such qualities and quantities of each as the different characters of car-wheels to be cast require and as practice shows to produce the best results by my method.

For the benefit of others, I will state that by the use of one and one-half pound of eighty per cent. ferro-manganese a five-hundred-and-fifty-pound car-wheel can be produced by my method having the desirable qualities of cheapness, strength, and durability.

Letters Patent of the United States have been granted me at different times upon different methods of casting car-wheels from two qualities of molten iron poured separately into the mold of a wheel from different ladles. The general practice of these methods was to fill the mold of a car-wheel about half full of molten chill-hardening cast-iron, then by a second pouring of a softer iron from another ladle to fill the mold. These different methods of casting car-wheels have all been abandoned from various causes.

My improvement in the art of casting chill-tread cast-iron car-wheels is distinct from all other methods of casting car-wheels from two qualities of molten cast-iron poured separately into a mold of a car-wheel from different ladles, in that the practice in these methods is to largely fill the mold with molten chill-hardening cast-iron having the proper quantities of carbon and manganese in natural combination. My method is different from all others from the fact that the molten metal necessary to produce the best results, if poured separately into the mold of a car-wheel to form the tread of the wheel, would be worthless, because the tread-flange and brackets of the wheel would be nearly white, having but little strength, while the tread of a car-wheel composed of the alloyed molten iron would have but little durability; but when the different qualities of molten iron in the different ladles have become homogeneous in the basin of the mold before entering the mold of the wheel the mass becomes a single and variable quality of molten iron. It is this gradual change in the qualities of the molten iron during the casting of the wheel that lessens the tendency of diffusion, which enables me to secure with greater certainty the modification of the chill-hardening properties of the molten iron forming different parts of the car-wheel in varying degrees.

The accompanying drawing represents a central cross-section of a mold for a car-wheel, in which A is the basin, and B openings leading into the mold.

I broadly disclaim as my invention all methods, processes, or means of modifying or alloying the properties of cast or wrought irons and steel by an admixture of ferro-manganese or spiegeleisen in a solid condition or in a molten state, for the use of these metalloids has been long known and practiced in the manufacture of cast and wrought irons and steel.

What I claim as my invention is—

The method herein described of casting chilled-tread cast-iron car-wheels, which consists in pouring molten cast-iron from two ladles, one containing suitable molten chill-hardening cast-iron in its normal state, the other containing suitable molten cast-iron having mixed in a molten homogeneous state a quantity of ferro-manganese, or its described equivalent, the same being powdered or reduced to a degree of fineness that permits it to be melted by the inherent heat in the molten iron in the ladle, and to become homogeneous with the molten iron in the ladle, the pouring being conducted in the following manner, to wit: filling the basin of the mold with the molten iron in its normal state, the same being poured continuously until the mold is filled, and, after the basin is properly filled and while the first-named metal is running, pouring the metal from the ladle holding the alloyed molten iron gradually into the flowing stream of iron in its normal state, or into the basin of the mold, and gradually increasing the flow of the alloyed iron until the car-wheel is cast, substantially as described, and for the purpose set forth.

WILLIAM WILMINGTON.

Witnesses:
LINCOLN HAYS,
ALEXANDER WEBER.