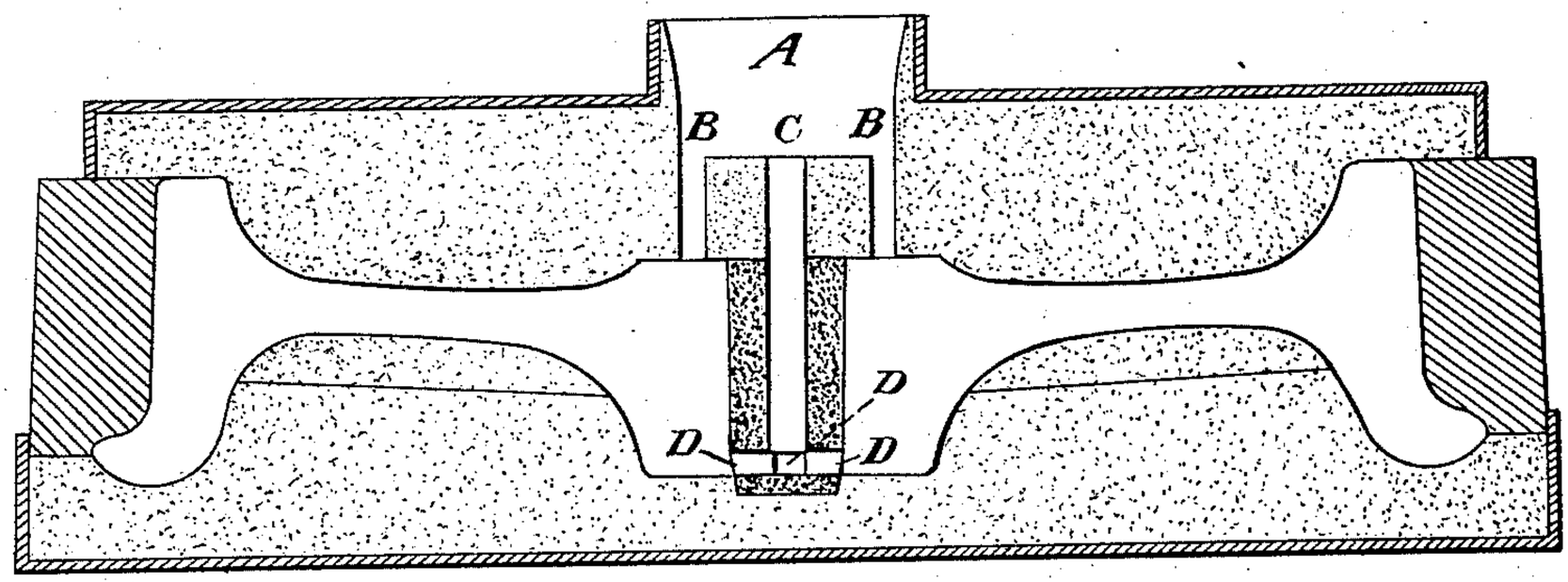
(No Model.)

# W. WILMINGTON.

## METHOD OF CASTING CAR WHEELS.

No. 363,444. Patented May 24, 1887.




Witnesses:
A. Ruppert.
C. B. Thompson.

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# UNITED STATES PATENT OFFICE.

WILLIAM WILMINGTON, OF TOLEDO, OHIO.

## METHOD OF CASTING CAR-WHEELS.

SPECIFICATION forming part of Letters Patent No. 363,444, dated May 24, 1887.

Application filed March 15, 1887. Serial No. 231,002. (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 certain new and useful Improvements in the Art of Casting Car-Wheels, of which the following is a specification, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

This invention is an improvement in the art of casting chilled-tread cast-iron car-wheels; and it consists in a novel process or method of combining with molten chill-hardening cast-iron during certain stages in the casting of the wheel the commercial metalloids of ferro-manganese (or its equivalent rich spiegeleisen) and rich ferro-silicon, (or its equivalent silicon-spiegel,) the same being introduced during the continuous inflow of molten iron into the mold.

The object of the invention is to restore or give to the molten iron during the different stages of casting the quantities required for the different parts of the wheel of carbon, silicon, and manganese, these elements having been more or less removed by previous meltings of the iron.

Heretofore different patents of the United States have been granted to me upon methods of casting iron car-wheels, the inventions of which consist in incorporating, in varying quantities, rich and finely-powered ferro-manganese of commerce with molten cast-iron composing the wheel by placing the same in the stream of iron flowing from the pouring-ladle or directly into the basin of the mold during the casting of the wheel; and an application (Serial No. 222,600) for a patent for an improvement in casting wheels has recently been allowed to me, which improvement consists in incorporating, in varying quantities, during the casting of the wheel, rich and finely-powdered ferro-silicon of commerce with molten chill-hardening cast-iron. These methods produce beneficial effects upon the iron composing certain parts of the car-wheel, but not to the requisite extent when the production of a cheap wheel from low-priced and partially-decarbonized high chill-hardening cast-iron is desired, from causes which may be stated as follows:

When, in accordance with my said patented methods, molten cast-iron very high in chill-hardening qualities first enters the mold of a wheel on filling the depression in the drag wherein is formed a part of the hub of the wheel, it loses its heat rapidly by coming in contact with the sides of the lower end of the cold central core and moist sand of the mold. It will be remembered that the ferro-manganese is added in comparatively greater quantities at the later stages of the pouring, and consequently, there not being a sufficient quantity of said substance in combination with the first inflow of iron to modify it to the proper degree on its contact with the central core, the chill-hardening properties of the iron leave the metal, when cold, around the axle-opening dense and hard, making it at times a difficult matter to bore the wheel correctly.

In the practice of my present invention I prefer to melt in a cupola in the common manner old or condemned cast-iron car-wheels or other low-priced partially-decarbonized chill-hardening cast-irons, which, by repeated meltings, have been more or less deprived of their carbon, silicon, and manganese, leaving the iron high in chill-hardening properties, which qualities produce the best results in carrying out my present method of casting wheels.

The object of my present improvement is therefore to obviate the difficulty arising from the employment of low-priced and partially-decarbonized cast-irons, the use of which is necessary to produce a cheap wheel. This iron being deficient in the proper proportions of carbon, silicon, and manganese, that must compose certain portions of the wheel to prevent undue hardness of the iron at the hub of the wheel, I incorporate the proper quantities of the elements contained in rich ferro-manganese and rich ferro-silicon (or their described equivalents) with the molten iron forming different parts of the wheel during the continuous pouring or casting of the same.

In the drawing is shown a cross-section of a mold for a single-plated car-wheel.

A represents the basin of the mold.

B B show two or more openings in the bottom of the basin leading directly into the mold.

C shows a vertical opening through the bottom of the basin and the central core of the mold.

D D represent four or more horizontal outlets leading outward from the vertical open-

ings in the central core into the hub part of the mold.

The molten iron being drawn into a reservoir-ladle, from this iron trial-pieces are cast. The brittleness of these pieces on fracture determines the quantities of ferro-manganese and ferro-silicon (or their equivalents) that will be required to produce the desired effects upon the iron composing the different parts of the wheel. The wheel is afterward cast in the ordinary manner by the continuous pouring of the molten iron, except that a distinctive method or process of operation is also employed, as follows: At the time or immediately after the molten iron enters the mold I place in the stream of molten metal flowing from the pouring-ladle, with a suitable sheet-metal scoop, rich and finely-powdered ferro-manganese and rich and finely-powdered ferro-silicon, using the same scoop for the two substances, which are at first not mixed or combined, the ferro-manganese being discharged first from the scoop gradually into the stream of molten iron or directly into the basin of the mold during about two-thirds of the filling of the mold. At this stage in the casting of the wheel a mixture of ferro-manganese and ferro-silicon is discharged from the scoop into the stream of molten iron passing from the ladle or directly into the basin of the mold, the same continuing until the mold is filled.

The effects produced by this method of casting car-wheels are as follows: The powdered ferro-manganese, coming in contact with the molten iron in the stream or in the basin, is quickly melted by the inherent heat of the iron, and combining with the iron adds strength to the same. The first of this iron thus mixed with ferro-manganese, entering the mold through the openings in the bottom of the basin, fills that part of the mold in which is formed the hub of the wheel, and then fills those parts of the mold in which are formed the arms, the plate, and the parts of the tread of the wheel most subject to wear. The iron, at this stage of casting the wheel, has but a small quantity of ferro-manganese mixed with it, which secures durability to a part of the tread of the wheel, the same being made dense and hard. A part of the continued inflow of the iron, having mixed with it the ferro-manganese, being discharged from the horizontal openings in the central core into the hub part of the mold, and imparting heat to the core and the sand of this part of the mold, the now inflowing iron, having in combination ferro-manganese and ferro-silicon, will displace from the central core the iron first poured, and coming in contact with the heated central core and the sand, the cooling of the molten iron will be prolonged, which will aid the ferro-silicon in preventing this iron from becoming dense and hard.

To produce a cheap, strong, and durable chilled-tread wheel from the qualities of iron described, I use about one pound of finely-powdered eighty per cent. ferro-manganese and about three pounds of finely powered nine per cent. ferro-silicon.

In the use of some varieties of irons I find it advantageous to increase the quantity of free carbon in the ferro-silicon by adding, in combination with the same, free or graphitic carbon of commerce in the desired quantities. The metalloids of ferro-manganese and ferro-silicon and their equivalents being articles of artificial production, their quality is not always correctly given in commerce. Therefore I do not confine myself to the use of the exact quantities of the same specified, but use such quantities as are found to produce the best effects upon the iron composing the different parts of the wheel; nor do I confine myself to any particular stage in the casting of the wheel before commencing the incorporation with the iron of the combined metalloids of ferro-silicon and ferro-manganese or their equivalents; but I commence the incorporation of these metalloids therewith at a stage in the filling of the mold shown by practice to produce the best results in the wheel being cast. I am thus enabled to produce a cheap and efficient cast-iron car-wheel having a hard and durable tread, while the hub and inner plate parts are soft and strong.

What I claim is—

The method of casting chilled-tread cast-iron car-wheels, which consists in first filling a portion of the mold with molten chill-hardening cast-iron, the same having combined with and disseminated through it in a melted state a quantity of ferro-manganese of commerce, then filling the remainder of the mold by the continuous inflow of the same quality of molten cast-iron having combined with and disseminated through it in a melted state a mixture of ferro-manganese and ferro-silicon of commerce in varying quantities, substantially as described, and for the purpose set forth.

In testimony whereof I have hereunto set my hand and seal this 17th day of February, 1887.

WILLIAM WILMINGTON. [L. S.]

Witnesses:

ALEXANDER WEBER,

LINCOLN HAYS.