

# UNITED STATES PATENT OFFICE.

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## CAST-IRON CAR WHEEL.

No Drawing.

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*To all whom it may concern:*

Be it known that I, JULE M. KELLER, residing at St. Louis, Missouri, and being a citizen of the United States, have invented certain new and useful Improvements in Cast-Iron Car Wheels, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, though it is to be understood that the invention is not limited to the exact details of construction described, as it is obvious that various modifications thereof within the scope of the claims will occur to persons skilled in the art.

This invention relates to articles of cast iron having chilled wearing surfaces and particularly to cast iron car wheels having chilled treads and it is an object of this invention to provide an improved cast iron car wheel or other article having a chilled tread or wearing surface in which copper is mixed with the 3% to 4% of combined carbon, iron and other elements which constitute the chilled portion of a cast iron car wheel or other article.

The chilled treads of car wheels are subjected to the grinding action of the brake shoes and to the heating which results from the friction of the tread against the brake shoes. This heating raises the temperature of the tread above the temperature of the body of the wheel causing stresses to be set up in the wheel which result in cracks or checks in the tread surface of the wheel. These cracks deepen as the result of the stresses of service and the repeated heating and cooling due to the brake applications until a portion of the wheel tread is loosened and drops out rendering the wheel unfit for further service. In accordance with this invention, to the mixture used for casting the wheels, copper is added until the percentage of copper is between .6% and 3.5%, it having been found by test that less than the smaller amount of copper has no effect and copper in excess of the larger amount is left in the casting in the uncombined state. The copper may be added to the molten iron in the pouring ladle just prior to pouring the contents of the ladle into the mold. There is thus formed a mixture with the copper distribut-

ed throughout so that when the wheel is cast the copper is distributed throughout the casting and is present in the chilled portion of the wheel at the tread along with the combined carbon, silicon, manganese, phosphorous, sulphur and iron which go to make up a cast wheel.

Tests by the sclerescope and by the Brinell test indicate that the presence of the copper in the chilled portion of the wheel does not reduce the hardness below that of the chilled portion of a casting made without the copper and the presence of the copper prevents the checking or cracking of the wheel tread caused by the heat from the application of the brake shoes and the resulting dropping out of portions of the tread as in the present cast iron wheels. The results of service confirm the results of thermal tests of the wheel treads made by subjecting the wheel treads to the heat of molten iron poured into a mold formed about the tread of the wheel. In all thermal tests the threads of wheels containing copper show few, if any, cracks or checks in the chilled wear tread while the chilled wear treads of the wheels not containing copper are cracked and checked.

Applicant is unaware of the exact metallurgical effect of the added copper but tests have shown that the chilled wear treads of cast iron wheels made in accordance with this invention are of substantially the same hardness as the chilled wear treads of cast iron wheels made in the usual manner and are substantially free from the cracking or checking of the chilled wear tread in service to which cast iron wheels are ordinarily subject.

While this invention has been described in connection with cast iron wheels, it is to be understood that it is equally applicable to any cast iron article having a chilled wear surface that is subjected to alternate heatings and coolings in service due to friction thereon or to other conditions of service.

What is claimed is:

1. As a new article of manufacture, a chilled cast iron having from 3% to 4% of combined carbon and from .6% to 3.5% of copper.

2. An article of cast iron having a chilled portion containing from 3% to 4% of com-

bined carbon and from .6% to 3.5% of copper.

3. A cast iron article having a chilled portion forming a wear surface, said chilled  
5 portion containing from 3% to 4% of combined carbon and from .6% to 3.5% of copper.

4. A cast iron car wheel having a chilled tread portion containing from 3% to 4% of combined carbon and from .6% to 3.5% 10 of copper.

In witness whereof I have hereunto set my hand.

JULE M. KELLER.