No. 742,684. PATENTED OCT. 27, 1903.

J. P. S. LAWRANCE.

CAST STEEL WHEEL.

APPLICATION FILED APR. 10, 1901.

NO MODEL.

fig. 1.

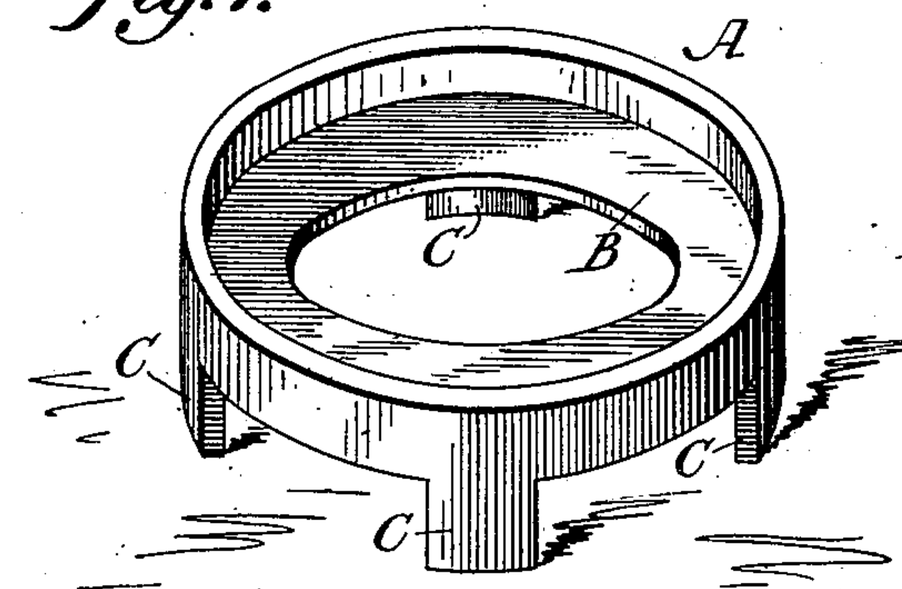


fig. 2.

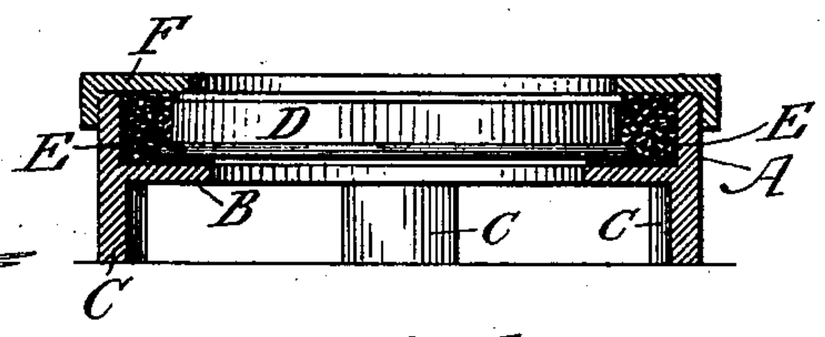
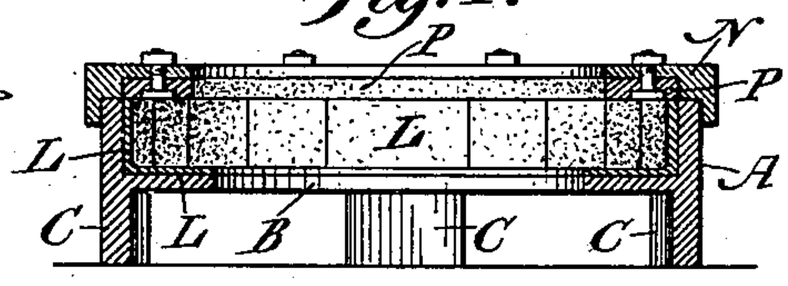


fig. 4.



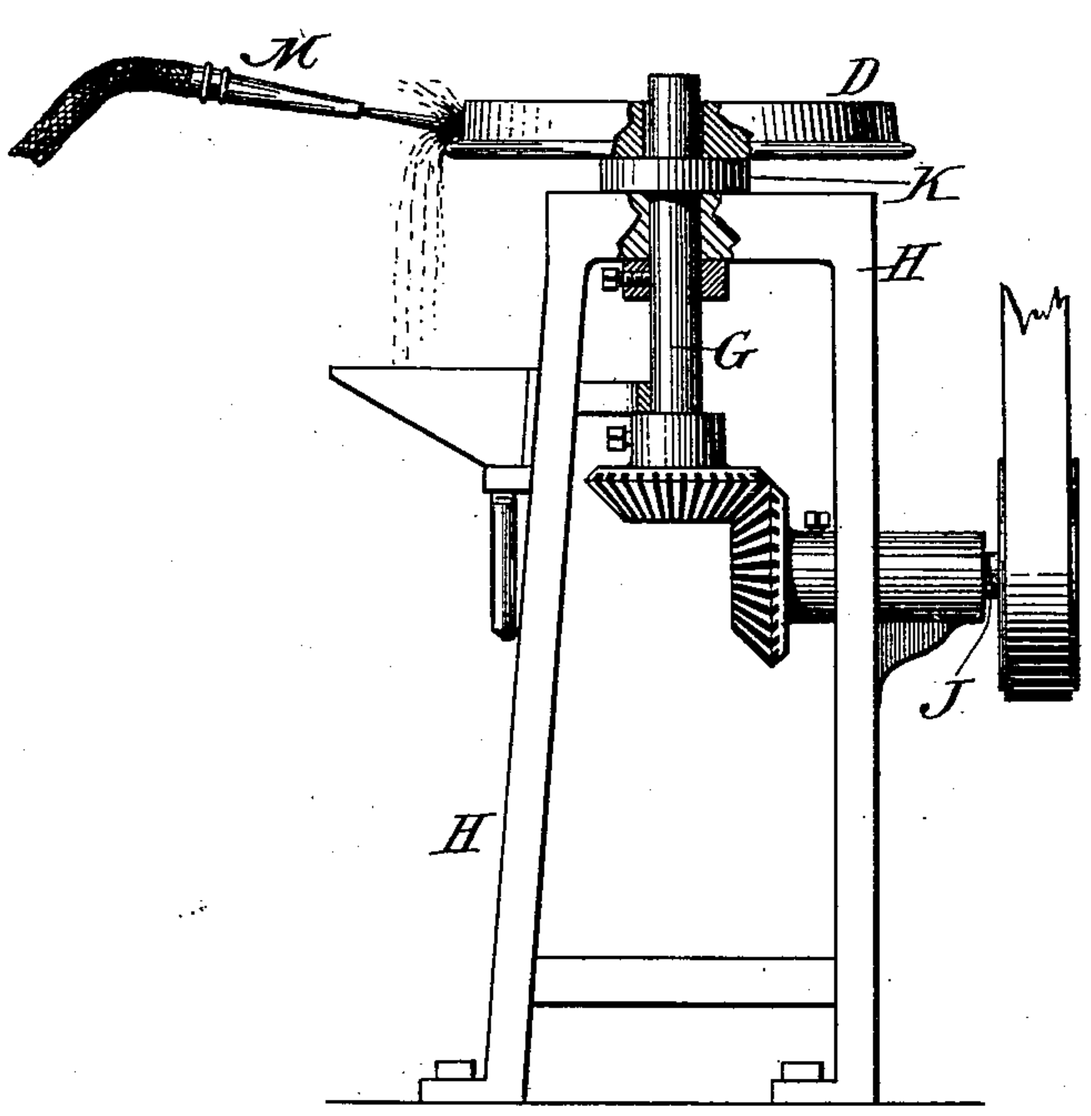


fig. 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES P. S. LAWRANCE, OF THE UNITED STATES NAVY, ASSIGNOR OF ONE-HALF TO THOMAS BURD ZELL, OF READING, PENNSYLVANIA.

CAST-STEEL WHEEL.

SPECIFICATION forming part of Letters Patent No. 742,684, dated October 27, 1903.

Application filed April 10, 1901. Serial No. 55,128. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. S. LAWRANCE, a citizen of the United States, of the United States Navy, have invented a new and useful Improvement in Cast-Steel Wheels, of which the following is a specification.

My invention has for its object the production of a solid cast-steel wheel having a hardened peripheral portion, as will be hereinafter fully described and claimed.

Figure 1 represents a perspective view of a flask. Fig. 2 represents a central vertical section of the flask with gear-wheel therein. Fig. 3 represents a side elevation of an apparatus for rotating the wheel. Fig. 4 represents a central vertical section of a flask provided with a refractory lining, such as fire-brick or the like.

The novelty I claim for the cast-steel wheel embodying my invention is that the peripheral portion is hardened as compared with the remaining portion—that is to say, the said remaining portion is softer or possesses greater ductility than the peripheral portion. To accomplish this, the percentage of carbon in the peripheral portion is increased as compared with the remaining portion, this percentage being greater than would be desirable for the latter.

To illustrate my invention, I have selected an integral cast-steel car-wheel; but it is understood that other cast-steel wheels may be treated thereby to harden the peripheral portion thereof without correspondingly hardening the remaining portion. In treating cast-steel car-wheels only the tread and flange are hardened—that is to say, only the portions that receive the greatest wear and tear.

In carrying out my process in the production of an integral or solid cast-steel car-wheel embodying my invention I first increase the percentage of the carbon contained in the tread and flange of the wheel by subjecting the wheel to heat with the tread and flange in the presence of carbon, such as charcoal or the like. As soon as this step is completed the car-wheel is subjected to the second step in the process, which consists in rapidly cooling the tread and flange, while the remaining portions of the car-wheel are allowed to cool gradually. By the use of this process I find that the tread and flange of the car-wheel absorb more carbon than would be desirable for the wheel center to absorb, and thereby all portions of the wheel are in the most approved desired condition—that is to say, the wheel center possesses the requisite ductility and the tread and flange their requisite hardness.

In said drawings, Figure 1 shows the flask with which this process can be carried out, the same being circular and designated by A and provided interiorly with the annular flange or bottom B, suitable feet C being provided upon which it rests.

In Fig. 2 I show a car-wheel in place within the flask in the position the parts assume during the first step of my process, the car-wheel D being supported by the annular flange B and resting on a layer of and being surrounded by carbonaceous material E, such as charcoal and the like. The annular cover F is also placed upon the flask. The flask is then placed in a suitable furnace and subjected to heat, whereupon the tread and flange of the wheel absorb the carbon. At the conclusion of this step the wheel is removed from the flask and placed upon the rotatable spindle G of the apparatus shown in Fig. 3, said spindle being mounted in suitable bearings in the frame H and being geared to a driving-shaft J. The wheel D rests upon a table K upon said spindle, and as the wheel is rotated thereby a suitable cooling fluid, a liquid or gas, is thrown in contact with the flange and tread thereof to rapidly cool the same, while the remainder of the wheel is allowed to cool gradually.

In said drawings I have shown a nozzle M, by which the cooling fluid is directed upon the tread and flange; but it will be understood that a plurality of these nozzles may be employed and that, further, in accordance with my process I contemplate either the rotation of the wheel or of the nozzles to direct the cooling medium evenly over the entire surface of the tread and flange—that is to say, there is a relative progressive movement between the tread and flange and the cooling medium.

The flask can be made of any suitable ma-

terial, and when made of metal it may be desirable to line the same with refractory material, and in Fig. 4 I have shown a flask A that is provided with a refractory lining L upon the inner face of the side walls thereof and upon the upper face of the flange B. The cover N is also provided with a refractory lining P. Thus I am enabled to further increase the percentage of the carbon absorbed by the flange and tread of the car-wheel, since such refractory linings prevent the metallic flask from absorbing the carbon.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A cast-steel car-wheel having the center, flange and tread formed integral, the wheel center being formed of a relatively low carbon-steel, and the tread being formed of relatively high carbon-steel.

2. The herein-described new article of manufacture, the same consisting of a cast-steel wheel having the wheel center, rim and tread formed integral, the metal of the tread being of relatively high carbon-steel, and the metal composing the wheel center and the remaining portion of the rim being of relatively low carbon-steel.

3. The herein-described new article of manufacture, the same consisting of a cast-steel car-wheel having a wheel center and rim cast integral of relatively low carbon-steel, the tread of said rim of relatively low carbon-steel being converted into relatively high carbon-steel.

4. The herein-described new article of manufacture, the same consisting of a cast-steel wheel having the rim and wheel center cast integral in one heat and of the same quality of steel throughout, the rim of said wheel being case-hardened after cooling, whereby the steel of the rim is made harder than the steel of the wheel center.

5. A railway-car wheel cast in one piece and having a center of low carbon-steel, and a tread with a higher percentage of carbon, substantially as specified.

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Witnesses:
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