

No. 727,103.

PATENTED MAY 5, 1903.

J. C. DAVIS.
METHOD OF MAKING CASTINGS.
APPLICATION FILED JAN. 10, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

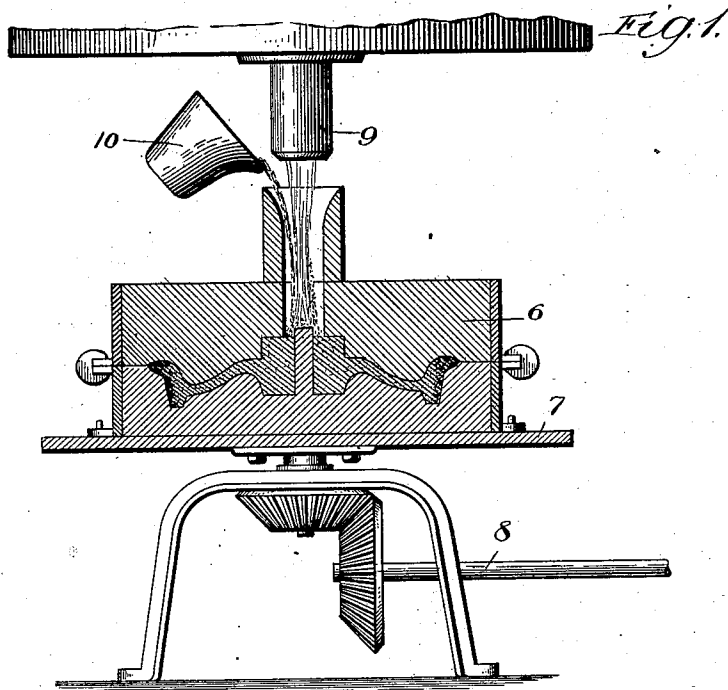
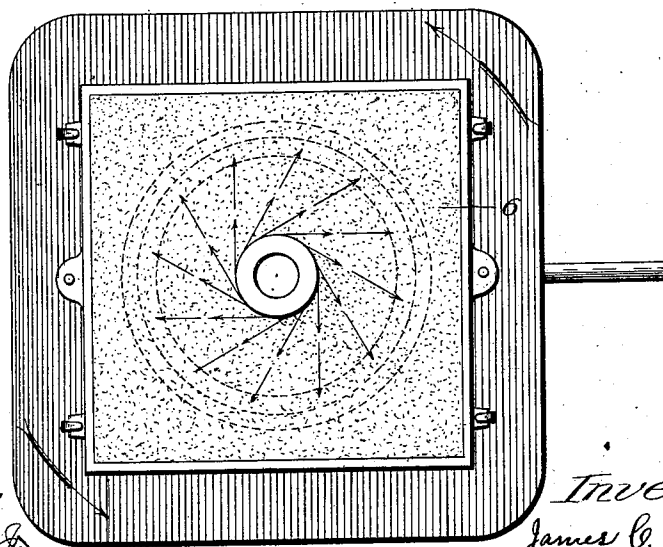


Fig. 2.



Witnesses:

John Enders Jr.
Geo. C. Brown.

Inventor,

James C. Davis

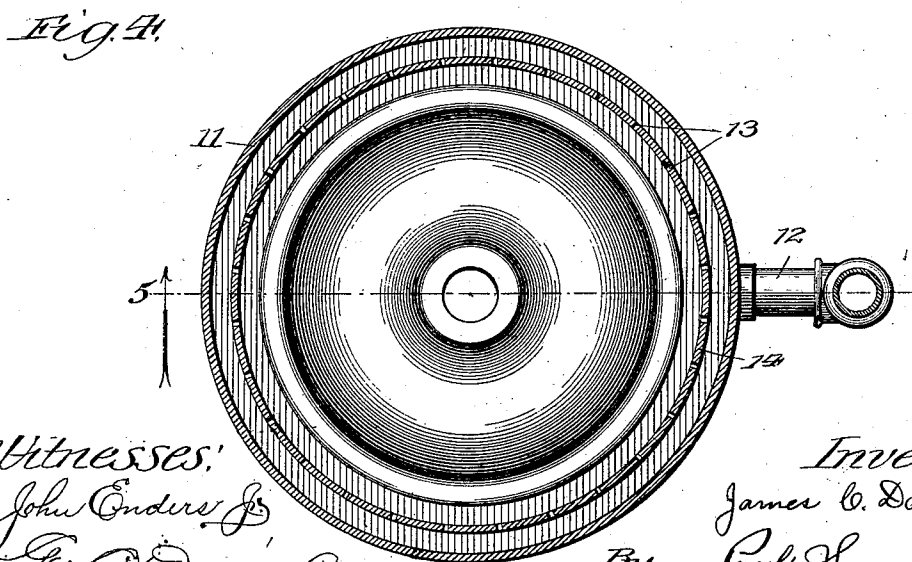
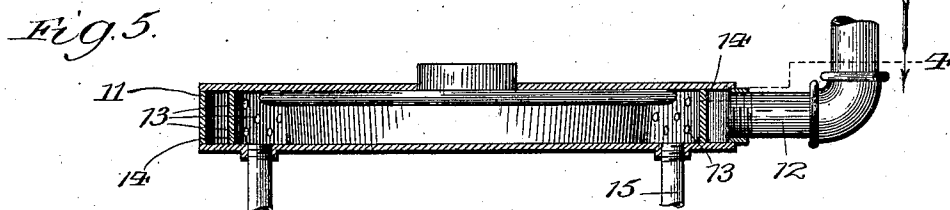
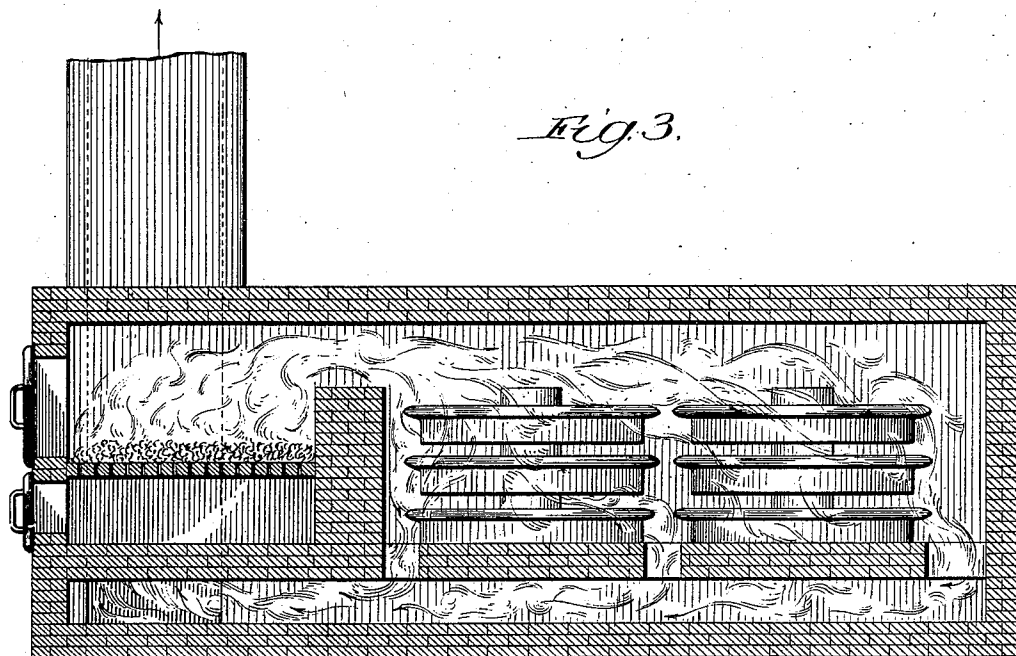
By Paul Symmestvedt
Att'y

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2 SHEETS—SHEET 2.



Witnesses:
John Enders &
Geo. C. Dawson.

Inventor:
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UNITED STATES PATENT OFFICE.

JAMES C. DAVIS, OF ST. LOUIS, MISSOURI.

METHOD OF MAKING CASTINGS.

SPECIFICATION forming part of Letters Patent No. 727,103, dated May 5, 1903.

Application filed January 10, 1902. Serial No. 89,104. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. DAVIS, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Methods of Making Castings, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention has reference to an improved method of making castings which shall be of varying degrees of hardness, thus one made of steel which shall be of a hard temperable quality around the outside and relatively more soft, and consequently tough and ductile, near the center.

Other objects of my invention are to produce wheels of a certain predetermined and unvarying quality of metal, and especially wheels in which the outer rim is composed of a perfectly homogeneous quality of metal which shall be alike in any number of wheels.

My invention is particularly designed for use in the formation of steel car-wheels, and it is in connection with this that I will now proceed to describe it.

Referring to the accompanying drawings, it will be seen that in Figure 1 I have illustrated a rotatable mold provided with means for mounting the same, within which a car-wheel is being cast in accordance with my improved method. In Fig. 2 I have shown a plan view of this mold and rotating table. In Fig. 3 I have shown a sectional view of the interior of a heating-furnace designed to be used for raising the temperature of the wheels after casting. In Fig. 4 I have shown a plan sectional view of a chilling ring or casing which I employ; and in Fig. 5 a sectional view, taken on the line 5 of Fig. 4, showing more clearly the details of construction of said chilling-ring.

In carrying out my invention I first take a mold, as the car-wheel mold 6, and place the same upon a table 7, constructed to rotate by means of the driving mechanism 8 at a speed of, say, two hundred revolutions per minute while the metal is being cast. The metal is then poured into the mold, as shown in Fig. 1, from some suitable ladle, as indicated at 9, and at the same time the mold is rotated, by means of the rotating mechanism 8, at the proper speed, and coincidently with such

pouring and such rotation there is introduced into the metal as it is being poured into the mold some hardening element of a high specific gravity relative to the metal being cast—such, for example, as finely-divided manganese—this being introduced by suitable means, as the small ladle 10. (Shown in Fig. 1.) The finely-divided manganese or other hardening element being of high specific gravity passes down into the mold, together with the metal, and as the mold is rapidly rotating is driven by the centrifugal action to the outside thereof, the heaviest portion of the contents of the mold naturally gravitating toward the periphery of the casting, which is where I desire to have the greatest degree of hardness. The metal first introduced into the mold is of course the first to reach the outside circumference thereof, and it is into this particularly that I desire to introduce the hardening element of the character described. The amount of hardening element added may be gradually reduced as the casting progresses until toward the end thereof there may be little or none added. This will leave the central portion of the casting ductile and soft relative to the balance thereof, although there will be no sharp dividing-line between them. The castings having been formed are placed in a heating-furnace, as shown in Fig. 3, wherein they are raised to a high temperature preparatory to the hardening process, which is accomplished by means of the chilling ring or casing, (shown in Figs. 4 and 5,) the wheels being placed in such ring, which I have marked 11, within the center thereof, as shown in Fig. 5, and water or other cooling agent introduced through the pipe 12 and by means of the radial openings 13 in the partition 14 distributed or caused to act upon the several portions of the tread-surface of the wheel, passing off through the outlet tubes or drains 15, of which there may be as many as desired. The casting having been thus suitably hardened is then removed from the chilling-ring and ready for use.

By employing a predetermined and fixed quality and quantity of the hardening material and attending to the speed of revolution of the mold and the rate at which the hardening material is introduced any number of wheels may be made of a known and uniform

composition and structure, and the tread of the wheel will be of a quality which can be tempered and treated as ordinary tool-steel, but is much superior to ordinary cast-steel.

- 5 It has all the qualities of a steel-tired wheel, while the center of the wheel remains ductile and workable and thoroughly tough to stand the strain.

The advantages of my invention will be
10 still more apparent when it is considered that the increasing weight of cars gradually coming into use is making the requirements on the wheels more and more severe until the limit for cast-iron wheels of the usual construction has nearly if not quite been reached.
15 Unless a superior wheel is found to those now in use the carrying capacity of cars cannot be much further increased so long at least as the present style of track construction continues to be followed.
20

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

- 25 1. The herein-described method of making castings, which consists in pouring into a revolving mold a mixture of fluid metal and a hardening element, substantially as described.

2. The herein-described method of making
30 castings, which consists in pouring metal into a revolving mold, and during the act of pouring adding to the molten metal as it passes into the mold, a finely-divided hardening element, substantially as described.

- 35 3. The described method of making castings, which consists in pouring into a revolving mold a mixture of molten metal and a

hardening element, and gradually diminishing the amount of the hardening element as the mold is filled, substantially as described. 40

4. The method of making car-wheels which consists in providing a revolving mold therefor, pouring metal into the same and simultaneously introducing a hardening element in a finely-divided state, afterward heating 45 the wheel, and then suddenly cooling the outer rim of the same.

5. The method of making car-wheels which consists in pouring the molten metal into a revolving mold, introducing at the same time 50 a hardening material and gradually diminishing the quantity of the latter as the mold is filled and afterward heating the wheel and suddenly cooling the rim thereof, whereby the rim is hardened and the metal is left 55 more and more malleable toward the center of the wheel.

6. The process of making cast car-wheels by providing a revolving mold therefor, pouring molten steel thereinto and at the same 60 time introducing finely-divided manganese, diminishing the amount of manganese as the mold is filled, then heating the finished wheel and suddenly cooling the outer rim thereof whereby the wheel is tempered and the hard- 65 ness varies with the distance from the center, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES C. DAVIS.

Witnesses:

GEO. G. FLOYD,
WM. E. HOBLITZELLE.