J. L. Mott,

Casting Car Wheels.

No. 5,636. Patented June 13, 1848.

Fig: 2.

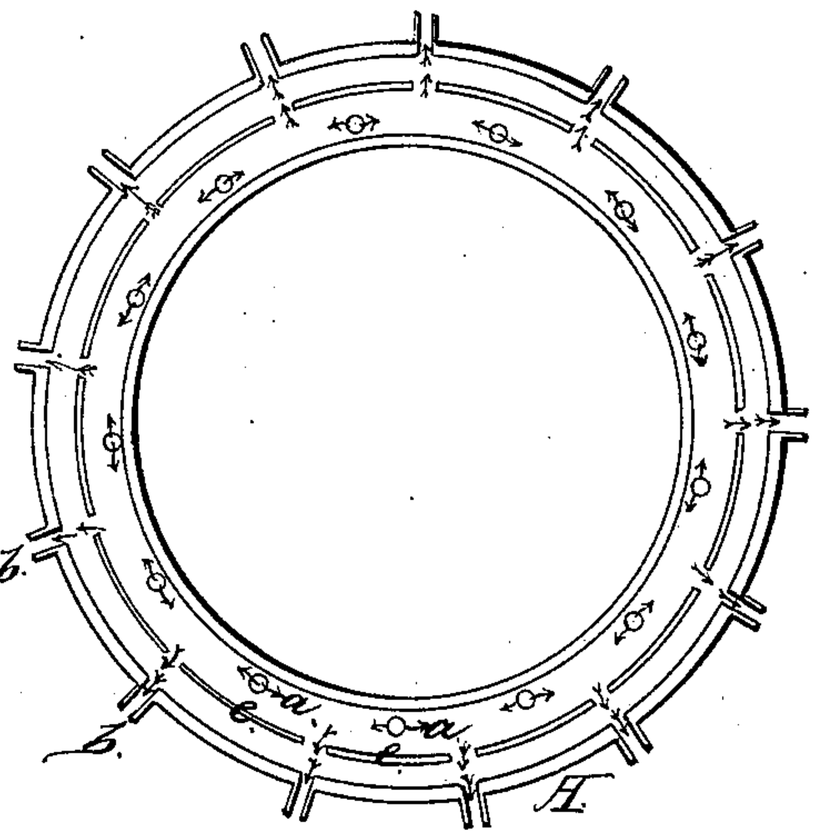


Fig: 1.

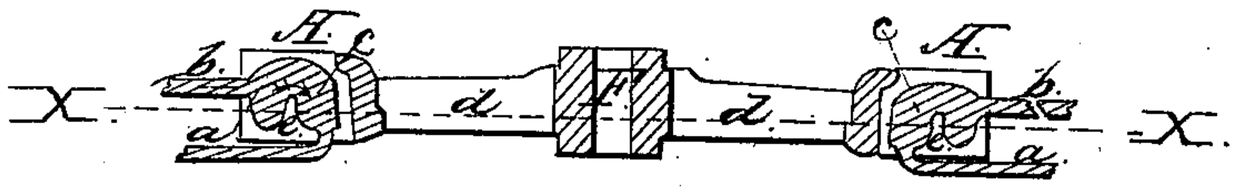
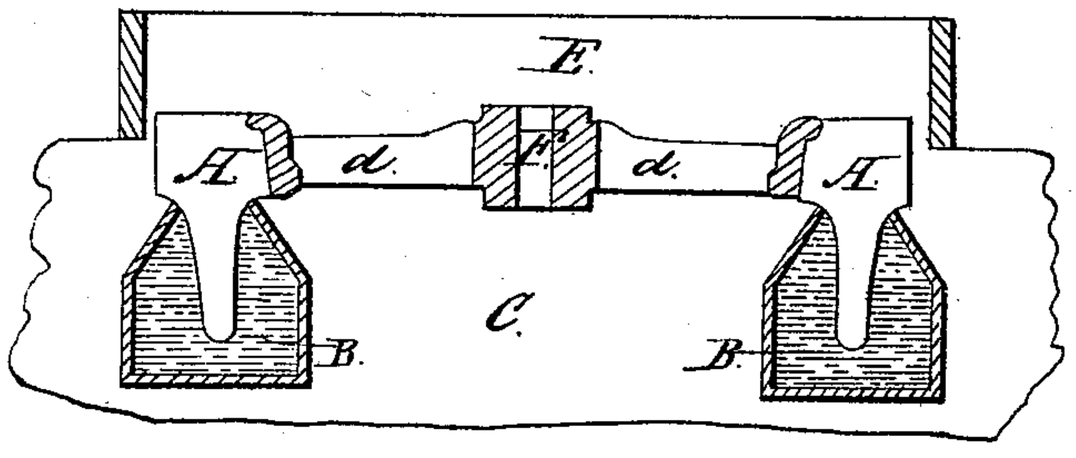


Fig: 3.



UNITED STATES PATENT OFFICE.

JORDAN L. MOTT, OF NEW YORK, N. Y.

IMPROVEMENT IN THE PROCESS OF CHILLING CASTINGS.

Specification forming part of Letters Patent No. **5,636**, dated June 13, 1848.

To all whom it may concern:

Be it known that I, JORDAN L. MOTT, of New York city, in the county of New York and State of New York, have invented new and useful Improvements in a Hydraulic Chill for Hardening or Chilling the Tread or Rim of Car-Wheels or other Cast-Metal Articles; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section of a car-wheel laid in a metal chill on my improved plan; Fig. 2, a horizontal section of the same, taken at the line *x x* of Fig. 1; and Fig. 3, a vertical section of a modification of my improved hydraulic chill.

The same letters indicate like parts in all the figures.

It is a well-established fact that when iron is cast in a metal mold the heat from the molten metal in contact with it is conducted so rapidly as to harden the surface of the casting and produce what is called a "chill," the sudden exposure of iron to the cold having the effect of hardening it; and it is equally well known that after the metal has thus been hardened it may be softened by what is known as the "annealing process"—viz., by keeping it for some time exposed to a moderate temperature.

In casting car-wheels it is deemed necessary, nay, indispensable, to chill or harden the tread and flange—that is, the parts which act on the rails—to render them more durable and at the same time to make the inner parts soft, that they may have more tenacity and be less liable to break. For this purpose the inner part of the wheel is molded in sand surrounded by an iron mold called the "chill," which forms the tread and flange, so that the molten iron, when poured in, is chilled by the conducting qualities of the iron part of the mold to form the tread and flange of the wheel and to harden it, while the other parts are suffered to set and cool gradually in the sand mold, which is a bad conductor. When the molten iron first comes in contact with the chill, it is suddenly cooled and set; but the heat of the mass within, which is prevented from cooling down rapidly by the non-conducting properties of the sand mold, is gradually transmitted to the chilled tread and flange and the chill or iron part of the mold, which latter, being necessarily massive, becomes heated to a temperature which has the effect, in a great measure, to anneal the part previously chilled or hardened, and therefore to produce wheels with a tread and flange softer than would really be due to the chilling process independent of the after annealing effect. It has been essayed to avoid this difficulty by so making the mold that the chill can be removed so soon as the rim of the wheel is set and chilled; but this is ineffectual, for the internal heat is transmitted to the chilled part faster than the surrounding atmosphere will absorb it, and in this way the annealing effect is produced; and, besides, the removal of the chill at that time is accompanied with difficulty and labor.

The invention which I have made is believed to be an effectual remedy for the evil pointed out above; and it consists in subjecting the metal chill to the cooling effects of a current or currents of water, or to a body of water so large as to prevent the chill from reaching a temperature sufficiently high to produce an annealing effect on the rim of the wheel, the heat from the internal mass, as it passes through the chilled part to the chill, being absorbed or carried off by the water.

In the accompanying drawings, A represents the iron chill for chilling the tread and flange of the railroad-wheel F. This chill is made hollow all around, as at *c c*, with pipes *a* leading from some reservoir through the bottom, and near the inner periphery of the hollow part other pipes, *b*, leading out from the upper part of the discharge of the water into any other reservoir. A series of flanges, *e*, project upward from the bottom of the hollow part, the spaces between them corresponding with the discharge-pipes *b*, so that as the water enters through the pipes *a* in the bottom it is by reason of the flanges *e* made to pass in opposite directions in contact with the inner periphery of the chill to the spaces leading to and thence out through the discharge-pipes *b*. In this way constant currents of wa-

ter are made to pass against the inner face of that part of the chill which forms the tread and flange of the wheel, and thus to carry off the heat from the chill and chilled part of the rim as fast as it is given out by the internal mass, and therefore prevents annealing.

In molding the wheel F the arms or spokes *d* should be so placed that if lines were projected from them they would intersect the pipes *a*, through which the cooling-water enters the chill, so that the heat which is conducted from the internal mass along the arms or spokes may be carried off more rapidly by the water from these than other parts, and this arrangement for the introduction and discharge of the water must of course be varied to correspond with the form of the wheel intended to be cast—as, for instance, if the rim and hub of the wheel are to be united by a single disk, the water should be made to enter the chill in a sheet, so that the current will pass mainly against that part of the chill which is nearest that part of the rim which is connected with the disk, and so of the double disk wheel. In short, the current or currents of water should be made to correspond with the form and mass of the article to be cast, whether car-wheels or any other article which is to be cast, with a part of its surface chilled.

Instead of passing a current or currents of water through the hollow part of the chill, I propose in some cases to make the chill A solid, as represented in Fig. 3, where the car-wheel is represented in the sand-mold C E, with a flange projecting down from the bottom into a vessel, B, through which a current of water is made to pass, or which may be made of such capacity as to hold a sufficient quantity of water to prevent the chill from being overheated.

It will be obvious from the foregoing that this method of preventing chilled castings from being annealed is applicable to other articles as well as to car-wheels.

I am aware that water has been used in various branches of the arts for preventing tools from overheating, and that water has been poured onto castings, or on part of them, for the purpose of cooling the whole or part of the mass, and therefore I do not claim as my invention the mere use of water for the purpose of preventing tools from overheating, or for the purpose of cooling castings; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The method, substantially as herein described, of preventing chilled castings from being annealed by passing a current or currents of water through or around, or by immersing the chill in water, as described, whereby the heat of the internal mass is permitted to pass off without heating the chilled surface and chill to a temperature sufficiently high to produce an annealing effect, as described.

JORDAN L. MOTT.

Witnesses:

M. D. VAN DOREN,

EDWARD LEWIS.