Z. H. MANN.

Car Wheel.

No. 10,073. Patented Oct. 4, 1853.

Fig. 2.

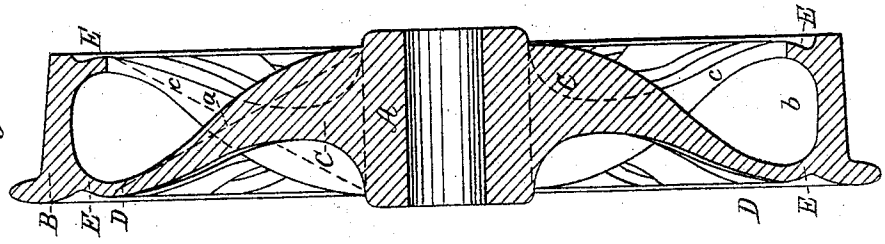
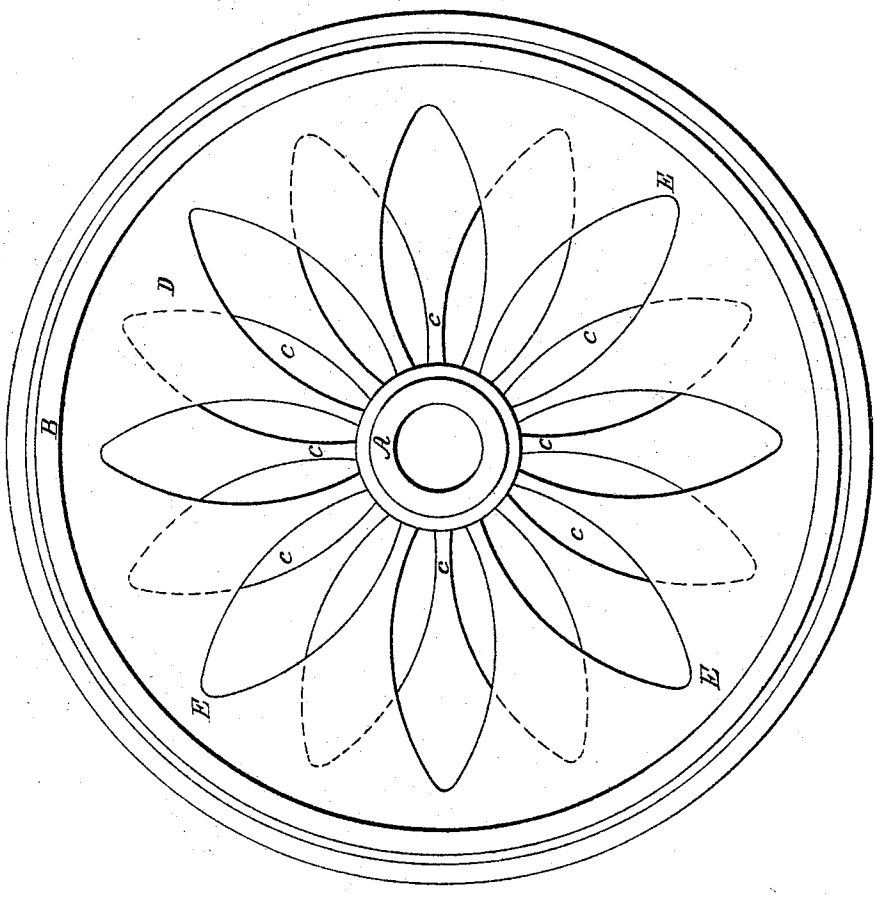


Fig. 1.



UNITED STATES PATENT OFFICE.

ZADOK H. MANN, OF NEWPORT, KENTUCKY.

CAR-WHEEL.

Specification of Letters Patent No. 10,073, dated October 4, 1853.

To all whom it may concern:

Be it known that I, ZADOK H. MANN, of Newport, Campbell county, Kentucky, have invented a new and Improved Construction for Cast-Iron Car and Locomotive Wheels; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, making part of this specification.

My aim in these improvements, is the construction of a cast iron car wheel that shall combine and embody as much as possible the following advantages. An equal rate of cooling and contraction in all parts, by a judicious distribution and ventilation of the metal. Sufficient provision for unequal shrinkage or strain. Adequate continuous support of the rim. Transverse or lateral stability effected by width of bearing of the connecting portion on the hub and by the brace and counter brace character of the said portion. Avoidance of liability to separate, either athwart the hub, or between the latter and the connecting portion, or across the rim, or in other parts now subject to fracture. The attainment of the requisite strength with the least possible weight of metal.

The numerous plans for wheels brought forward during the last five years, appear as far as known to me to be deficient in one or more of the above cited desiderata. All of these plans may be ranged mainly under one of two heads,—namely,—those in which the hub and rim are connected by spokes or those in which they are connected by plates; and some combine to some extent the advantages of both systems but none that I know of unites so fully as the plan proposed by me all the desiderata above recited; especially those of brace and counter-brace, continuous support of the rim and lateral stability together with adequate provision for the strain arising from shrinkage. The spoke wheels generally, are very subject to transverse fracture of the rim, and also to the severance of the latter from the spokes near the place of junction.

The disk wheels on the other hand, although at present extensively adopted are not free from radical defects. The want of an adequate lateral brace and the divergent action of the disk in setting, tend to strain the two ends of the hub apart, and cause it frequently to fracture at right-angles to the axis, during the process of boring, or, afterward when in use. Another difficulty attending the disk wheels, arises from the practical impossibility of perfectly centering the cores, and the consequent inequality of thickness of the plates, so that they have to be run very heavy, amounting to several thousand pounds superfluous weight in a single train.

Another practical objection in casting the disk wheels arises from the difficulty of providing a sufficient vent for any moisture remaining in or about the core, and as a consequence, a more or less porous formation of the disks, making them treacherous objects of dependence. They are also liable from the much longer retention of heat about the center, than at the outside, to be undergoing contraction at the center, while the parts toward the outside are expanding by crystallization; and the consequence is, a weakness and liability to part either by a radial fracture across the hub, or by a concentric crack in the plate, near the hub; and I will here observe, that there is with my wheel, not only a very uniform ventilation of the casting, but the slight necessary moistening of the sand which forms the interstices of the plates at the hub, occasions a beneficial cooling of the central portion.

It is my aim in the present improvement to combine the advantages of both classes of wheels, and to avoid their defects.

In the accompanying drawings, Figure 1 is a front view and Fig. 2 a transverse section.

(A) is the hub, and (B) the rim of a railroad car-wheel. The web or connecting portion of the wheel radiates from the hub in the form of a number of spokes or plates (C) whose depth or dimension parallel with the axis, is the full length of the hub,—or nearly so,—so as to give abundant lateral stiffness to the wheel. From the hub, each plate projects nearly at right-angles from the hub surface, whence diverging alternately to the front and back of the wheel in an easy curve, it becomes rapidly thinner in the direction parallel with the axle, and thicker in the plane of the wheel; until a little before it reaches the rim it has expanded into a plate, (D) which joining with that of the next alternate spoke on each side, becomes one of a pair of continuous flanges (E)—one at each verge of the concavity of the wheel, thus forming two flanges, and presenting the main substance

in the direction of revolution, which is where the strength is here wanted.

The curved form given to the web as represented, enables the parts to accommodate themselves to any unequal shrinkage without the danger of fracture, while at the same time the peculiar form of the web, operates both as a brace and counterbrace as is evident on inspection of the sectional view, where the dotted lines (*a*) indicate the direct and oblique strains which are thus guarded against. The form of the curve is also such as to present the connecting plates vertically—or nearly so—both to the hub and to the rim, which is the form best adapted to communicate the strain direct to the plate.

The wheel although at first sight it might seem otherwise is very easily molded, the hollow space (*b*) between the flanges, being formed by a single dry core in the shape of a ring, which is readily supported without the necessity for anchoring, and the uncertainty attending the molding of the disk wheels; and this annular core is—with exception of the usual one for the axle—the only one required. There is also abundant ventilation for the core.

It should also be observed that the openings (*c*) in one flange, come opposite the solid portions in the other one, so that any fracture would have either to pass through the wide part of one of the flanges, or to run obliquely across the tread of the wheel.

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

The construction—as described—of a cast-iron rail road car and locomotive wheel; whose web or portion connecting the hub and rim, consists at the hub, of broad radiating plates in the plane of the axis, whence turning alternately to the right and to the left, they contract in the direction parallel with the axis, and expand proportionally in the direction of revolution; those of each alternate set uniting as they approach their respective margins of the rim-concave, so as to form flanges having openings left for each intermediate plate on the other side, forming a braced and counter-braced wheel possessing the requisite lateral stability and continued support at the rim, together with adequate provision for the strain arising from shrinkage &c. and this I claim, whether the said web be formed in a *cyma reversa* curve as described—or in any way substantially equivalent.

In testimony whereof, I have hereunto set my hand before two subscribing witnesses.

Z. H. MANN.

Witnesses:
GEO. H. KNIGHT,
F. H. GETZENDONNER.