W. J. FRYER, Jr., & W. FREEBORN.

Car Wheel.

No. 52,986. Patented Mar. 6, 1866.

Fig. 2.

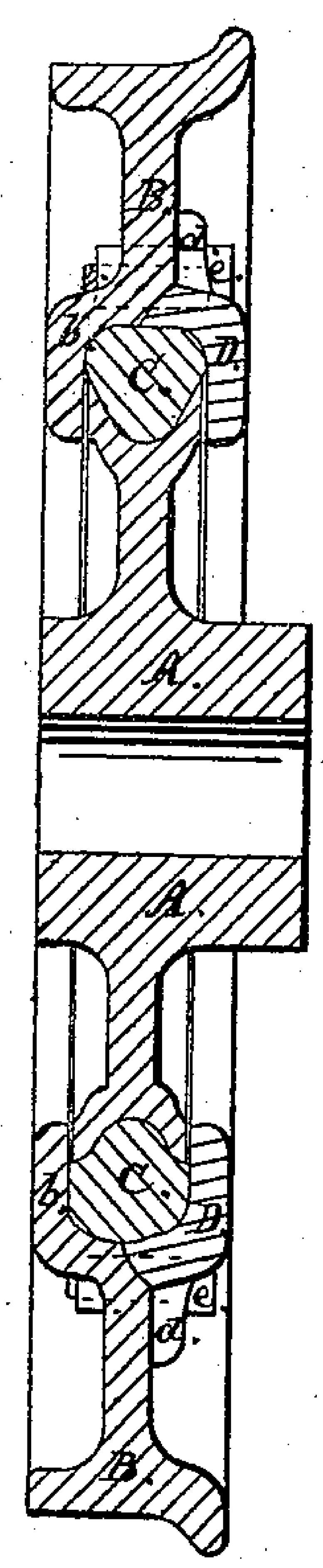
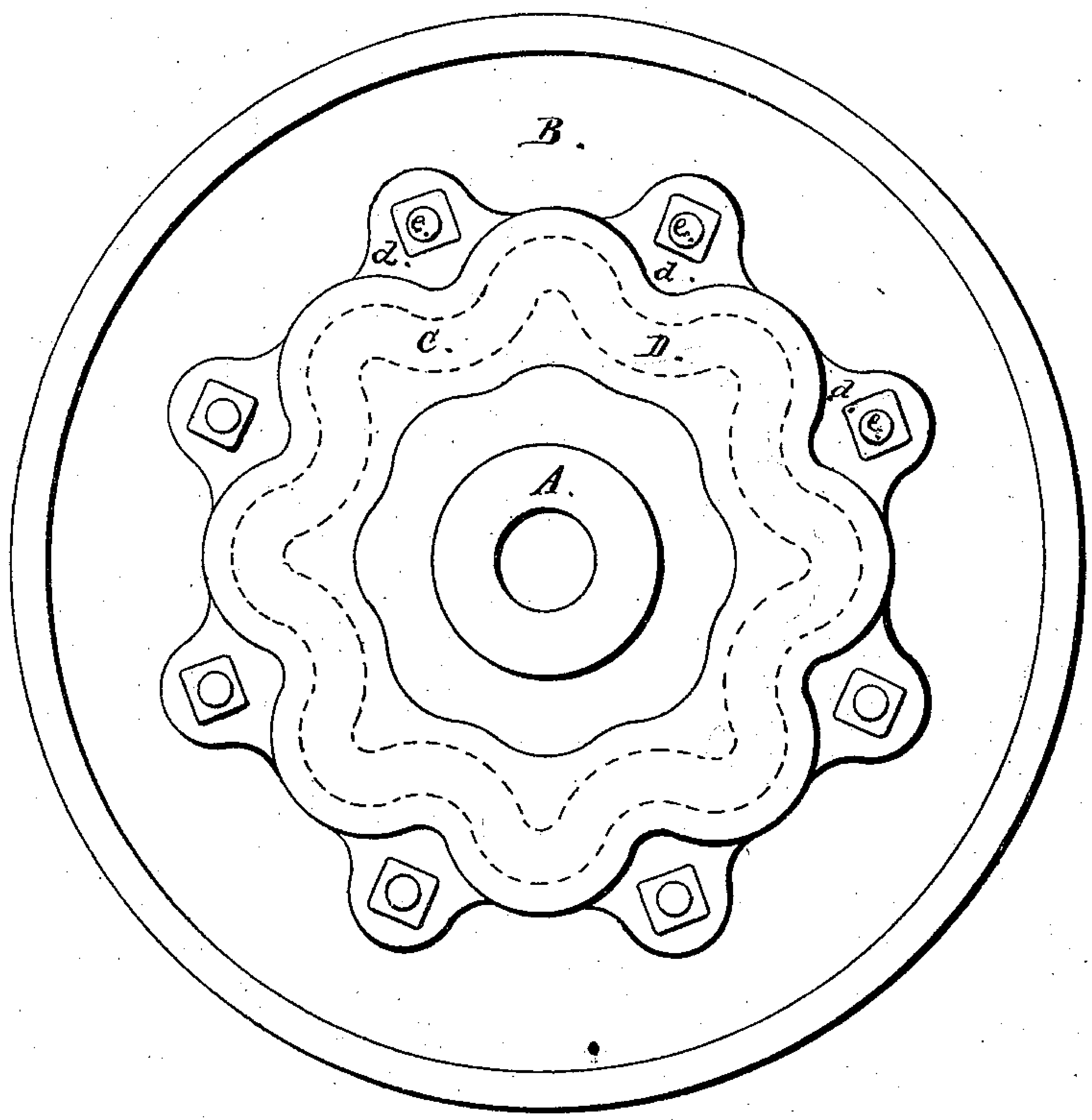


Fig. 1.



Witnesses:

Chas. G. Church

Jno. W. Brady

Inventor:

Wm. J. Fryer Jr.

Wm. Freeborn.

AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

WILLIAM J. FRYER, JR., AND WILLIAM FREEBORN, OF NEW YORK, N. Y.

IMPROVED RAILROAD-CAR WHEEL.

Specification forming part of Letters Patent No. 52,986, dated March 6, 1866.

To all whom it may concern:

Be it known that we, WILLIAM J. FRYER, Jr., and WILLIAM FREEBORN, both of the city, county, and State of New York, have invented certain new and useful Improvements in Railroad-Car Wheels; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 represents a side view. Fig. 2 represents a section.

Letter A is the inner wheel; letter B, the outer wheel; letter C, the elastic packing; letter D, the annular concavo-convex ring.

Similar letters of reference indicate similar parts.

The nature of our invention consists in constructing a railroad-car wheel of two concentric wheels, the inner wheel having a hollow concavo-convex periphery, and the outer wheel made with its inner surface and annular projecting flange forming a corresponding concavo-convex line, the two wheels being united together at a point about equidistant between the rim and the hub by a sinuous line of elastic packing, the latter being inserted in position through the agency of and kept in place by the annular concavo-convex ring bolted to the disk of the outer wheel. By this construction a compensation for irregular movements is provided, which results in saving the road-bed and the rolling-stock, lessening the noise, and economizing steam in the consequent reduction of friction, and securing comfort and safety to the traveler, all as will be more fully shown hereinafter.

To enable those skilled in the arts to make and use our invention, we will proceed to describe its construction and operation and the advantages it presents.

The inner wheel, A, is of cast-iron or homogeneous metal of the form shown in the drawings. The periphery of this wheel is made concavo-convex, with a hollow face. The outer wheel, B, is also made of cast-iron or homogeneous metal, the rim of the same being chilled by casting against an iron chill, the remaining portion being in the sand or other slow conductor of heat in the usual manner. The inner surface of this wheel is made concavo-convex, and has a side flange, *b*, following the same line, as illustrated in the drawings. A portion of the opposite flange may be cast on. The outer wheel, B, can be of a kind of iron best adapted to take a chill very hard, while the inner wheel, A, can be of a softer and tougher kind, each being particularly adapted to the labor they respectively perform. Either wheel or any parts of the same may, if desired, be made of wrought-iron.

Our construction of two wheels allows in each a uniform shrinkage in cooling when of cast metal, and thus avoids the danger of straining or cracking, as often happens in cases where one portion of a wheel becomes fixed and cooled before others. It is well known that when the rim of a wheel is chilled the metal suddenly contracts, and the disk, which cools slowly, causes a crack by the contraction of the latter, or at best leaves the metal in such a state of tension as to endanger breakage by the shocks to which railroad-wheels are constantly subject. By casting two small wheels, A B, to form a large one the metal is regularly and equally cooled and all strains avoided. Each wheel may afterward be annealed or not.

Between the two wheels A B an annular concavo-convex ring, of india-rubber, gutta-percha, wool, or other analogous non-vibrating elastic substance, is placed.

To bring the parts together the outer wheel, B, is laid down in a horizontal position, with its flange *b* toward the earth. The inner wheel, A, is then placed in its proper relation to the outer wheel, and the continuous elastic packing C, previously molded to the proper shape and state, but still in a plastic condition, is pressed in the space provided for it. The annular flange D is then placed in position and bolted fast to the disk of the outer wheel, B, by the bolts *e*. The wheel is now subjected to a heat sufficient to complete the vulcanization of the rubber by any of the well-known processes; or completely vulcanized rubber can be set in place and pressed downward by vertical hydraulic pressure applied to the flange D. The elastic packing C is thus confined in an internal cell or chamber, where it cannot be squeezed or worked out of place and where oil or other dissolving liquids or substances cannot reach it.

By placing the elastic packing in a sinuous or concavo-convex line we are enabled to get a greater number of cubic inches of non-vibrating substance, the thickness and width being equal, than if it lay in a true circumferential line. It also better accommodates itself to the irregular movement of the wheel in motion and more quickly and effectually provides for the down, the forward, and the side thrusts. It will be observed that the line of packing can be varied to accomplish the same object. It can be made to follow a line similar to toothed gearing or some other irregular course.

In the application of the packing to wheels for heavy freight-cars it may be found necessary to bed steel springs inside the rubber to better resist and sustain the vertical compression and weight. The thickness of the elastic packing will vary with the size of the wheel and the burden it is to carry.

The concave portion of one wheel fitting into the convex portion of the other, and vice versa, brings the two wheels together in the strongest possible relations to each other. The bolt-holes pass through the very strongest portion of the disk. Where the bolts pass through bosses are raised, thereby increasing the thickness of the iron to offset the weakness occasioned by the holes. The ordinary objections, however, to bolts in connection with car-wheels find no lodgment here, as the interposition of the elastic packing prevents all concussion, and consequently the bolts will have no cause to shake or wear loose.

The flange D is usually made of the same metal as the wheel B. If, by any unforseen accident, this flange should get broken off, either in part or in whole, the form of the rubber would still hold the two wheels together properly and enable each to perform its allotted task without hinderance.

A portion of the flange D may be made part of the outer wheel, B.

In fastening the annular ring D to the wheel B the bolts may be dispensed with and keys used in their stead. A variety of efficient modes readily suggest themselves to any mechanical mind. Any simple device will answer to fasten the two together.

In order to fully and comprehensively understand the peculiar features of our invention, we will proceed to state some self-evident propositions, or what may here properly be called our "argument."

The rails are professedly straight; but practically they are a series of small curves, each rail being on a different plane—one higher, another lower—on which the wheels sledge and jump and get destroyed. Repairs of roads and rolling-stock, that form so large an item in railway expenses, are rendered principally necessary by the rapid transit of trains operating upon every inequality of the line with all the injurious effect of a steam-hammer.

Friction is destruction, and as the load is increased the evil increases. The theoretical resistance is from eight to ten pounds per ton to the level. The player on a violin extracts music from friction. If the strings were greased the music ceases. Now, if the friction between the wheels and the rails could be greased the noise would be stopped, the passengers delighted, but the engineer would not be pleased. The wheels would revolve without advancing.

If we watch the foot of a horse or other animal walking on an uneven road, we find that, by means of the pastern or ankle-joint, the tread of the foot is made to accommodate itself to the slope of the ground in every direction, and the artist in body patch-work provides his artificial legs with steel springs for the same purpose. If, therefore, the tread of the car-wheel is to fit the practically uneven road, there must be provided for it an elasticity which will serve a similar purpose—a compensating-spring placed in the same relative position—so that the body of the car, like that of the horse and of the man, will preserve its equilibrium, and the wheel, like the foot, provide for the inaccuracy of the track.

The noise and rumbling occasioned by the concussion of two hard surfaces—the wheel and the track—are transmitted in an intensified degree to the body of the car above in the same manner as the sounding-board of a piano transmits sound.

A harsh iron wheel with little or no elasticity has a great tendency to rupture when frost is present and the iron is in a shrunken condition.

Our car-wheel presents the following advantages:

First, resistance to draft-power is lessened.

Second, the friction is reduced, and the noise consequently lessened. The bite remains effectively the same. The wheel treads fairly on the rail.

Third, it economizes steam by the reduction of friction. It accomplishes a greater rate of speed with a given amount of steam.

Fourth, the torsion on the axle is greatly reduced. All shock or jar to the same during the running of the train is prevented.

Fifth, it prevents vertical blows, secures contact between the wheel and the rail without jumping, and, by rocking laterally, the elasticity prevents the grinding of the flanges.

Sixth, as wear on the wheel and rail is about equal, the rail is saved in the same proportion as the wheel.

Seventh, it prevents an unequal wear on the periphery of the wheel.

Eighth, it preserves the rail ends from destruction.

Ninth, it preserves the level of the road-bed, and, by preventing the racking of the cars, thereby exerts a powerful saving influence on the rolling-stock.

Tenth, it enables a train to be started with more ease—*i. e.*, when a pulling force is applied the inner wheel, to which the axle is attached, becomes eccentric to the outer wheel, and the weight is moved from its center of gravity. The ease with which a train may be started applies to a wet and slippery track as well as to where a superabundance of friction exists. The brakes can be applied with the greatest effectiveness in consequence of the eccentricity the axle assumes when the stopping force is applied.

Eleventh, the radial distance of the wheel being one-half reduced, the liability to rupture by frost is very greatly lessened. It saves the brittle rail as well as the brittle wheel.

Twelfth, it secures comfort and safety to the traveler.

Thirteenth, it resists without injury to itself the straining, racking, and twisting to which railroad-wheels are subjected.

Fourteenth, it in effect dispenses with all the disagreeable results of necessary connection between the axle of the car and the track without losing the advantages of fixed bearings.

Fifteenth, it is simple in construction, efficient in operation; its vital point protected from the weather, requiring no attention, and can be run at any rate of speed. It is applicable to horse as well as to steam railway cars.

All the advantages of the ordinary car-wheel in its present accepted form are retained in this, with the addition of the foregoing-enumerated advantages.

This invention is not a problem requiring mathematical calculation, but a definite and practical fact capable of demonstration by the process of comparative breakage or of revolution in fixed bearings against rough surfaces, showing the power of movement under conditions that would absolutely arrest the movement of ordinary wheels. It carries out the universal mechanism of nature by providing a compensation for irregular movements.

What we claim as our invention, and desire to secure by Letters Patent, is—

A railroad-car wheel constructed substantially as herein described—that is to say, formed of two concentric wheels, the inner wheel, A, made with a hollow concavo-convex periphery, and the outer wheel, B, made with its inner surface and annular side flange, *b*, to form a corresponding concavo-convex line, the two wheels being united together at a point about equidistant between the rim and hub by a sinuous line of packing, C, together with the annular concavo-convex ring D, bolted to the disk of the outer wheel, B, the separate parts united forming a complete whole, in the manner and for the purposes specified.

WM. J. FRYER, Jr.
WM. FREEBORN.

Witnesses:
Chas. G. Clinch,
John A. Brady.