

No. 794,871.

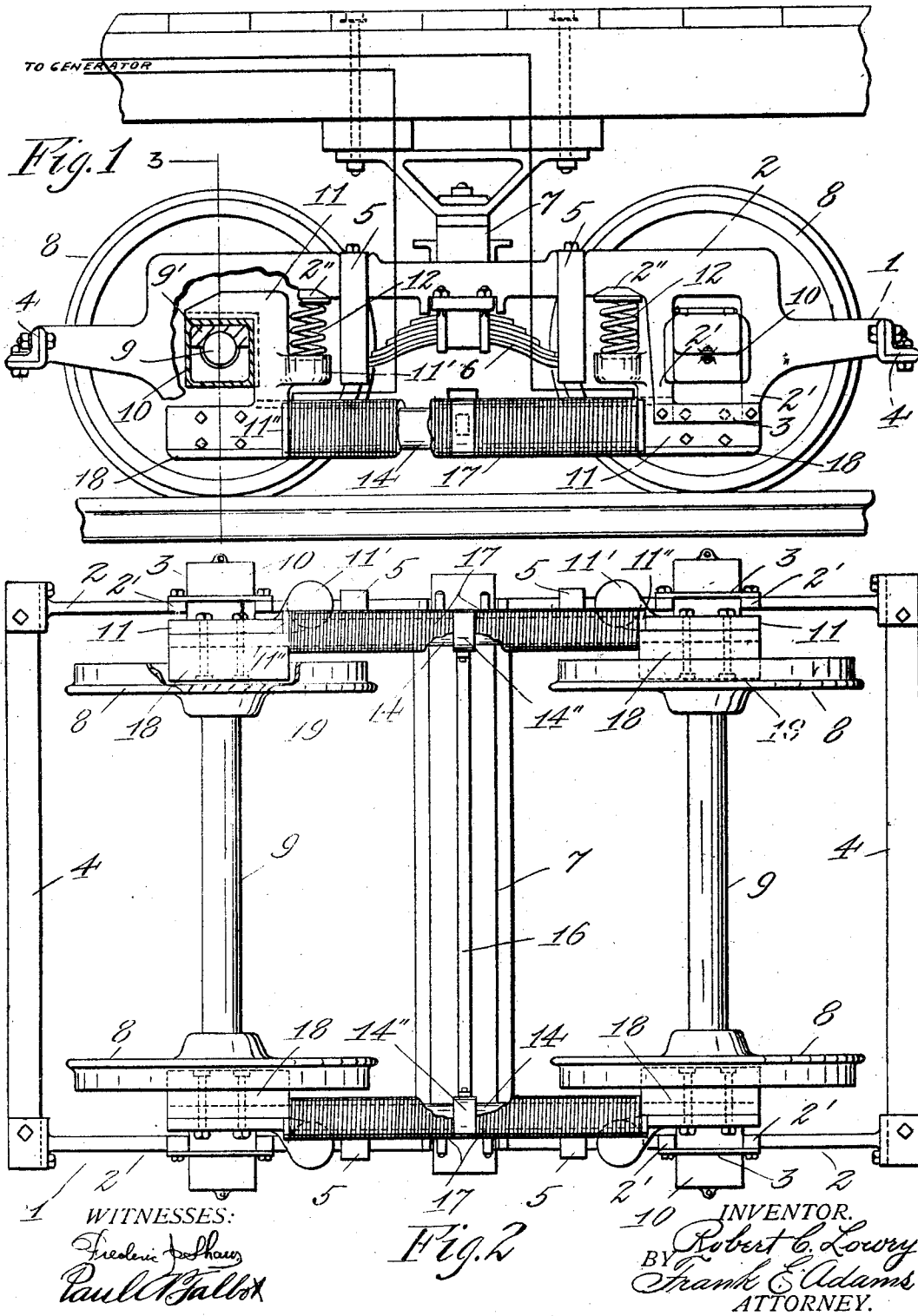
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APPLICATION FILED OCT. 19, 1904.

2 SHEETS—SHEET 1.



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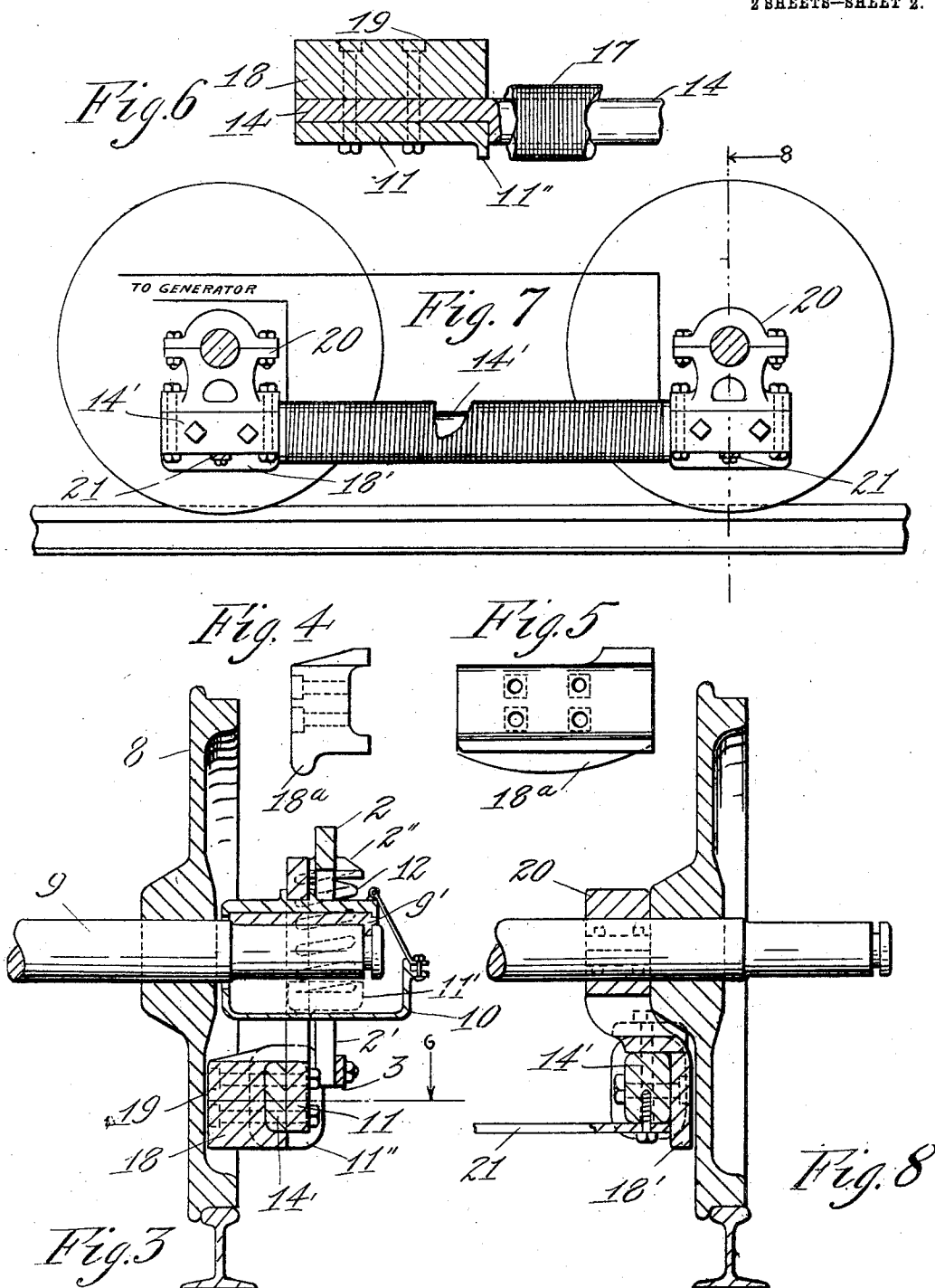
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DEVICE FOR INCREASING THE ADHESION BETWEEN WHEELS AND RAILS.

SPECIFICATION forming part of Letters Patent No. 794,871, dated July 18, 1905.

Application filed October 19, 1904. Serial No. 229,195.

To all whom it may concern:

Be it known that I, ROBERT C. LOWRY, a subject of the King of Great Britain, and a resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Devices for Increasing the Adhesion Between Wheels and Rails, of which the following is a specification.

My invention relates to improvements in devices for magnetically increasing the adhesion between truck-wheels and the rails upon which they roll.

The object of my invention is to improve and simplify such devices.

My invention comprises the parts and combinations thereof which are particularly set forth in the claims terminating this specification.

The drawings forming a part of this specification illustrate my invention in forms which are now preferred by me.

With reference to the accompanying drawings, in which like reference characters designate corresponding parts throughout, Figure 1 is a side elevation of a truck with my invention disposed at the outer sides of the truck-wheels. Fig. 2 is a plan view of the truck inverted. Fig. 3 is a sectional elevation on line 3 of Fig. 1. Figs. 4 and 5 are detail views showing a pole-piece of modified form. Fig. 6 is a fragmentary section on line 6 of Fig. 3. Fig. 7 is a sectional elevation showing two wheels of a truck on the same rail with my invention in modified form and disposed at the inner sides of the wheels, and Fig. 8 is a sectional elevation on line 8 of Fig. 7.

I will first describe my invention as shown in Figs. 1, 2, and 3. In this form it is shown applied to a four-wheeled truck embracing a frame 1, formed with opposite side pieces 2 of ordinary construction and each having, as usual, a pair of depending guide-bars 2' adjacent each end, which are connected at their lower extremities by brace 3. These side pieces are connected by cross-pieces 4 and are each provided with the usual stirrups 5 for the elliptical springs 6, which support

the bolster 7, upon which the body of the car rests. The wheels 8, which are of magnetizable metal, are secured to axles 9, preferably of non-magnetizable metal. These axles, as shown, project from the outer side surfaces of the wheels to support the journal-boxes 10, which are provided with the usual bearing-brasses 9' and are slidably embraced by guide-bars 2 of frame 1. Related to frame 1 are supporting members, as hangers 11, preferably of non-magnetizable metal and which depend from the journal-boxes 10 and carry horizontal brackets 11', upon which are seated the spiral springs 12, bearing against suitable bosses on the frame 1 and serving to yieldingly support the latter, thus applying the weight of the frame, car-body, and their attachments to the hangers and conveying it thereby through the brasses 9' to the axles 9. Each hanger 11 comprises an upper and a lower horizontal portion and a vertical portion, the said upper portion resting upon the journal-box and the lower portion lying beneath said box, as clearly shown on the left in Fig. 1. The journal-boxes are secured against movement longitudinally of the axles in the usual manner, as shown in Fig. 3, each box being provided with opposite shoulders which embrace the brass endwise and the brass having a flange engaging in a peripheral groove formed in the bearing-surface of the axle, and the vertical portions of the hangers 11 are engaged in suitable vertical grooves provided on the said boxes, whereby said hangers are rigidly held from being moved laterally to or from the adjacent wheels 8.

Reference character 14 (see Fig. 2) indicates magnet-cores, which are identical in construction and application, excepting that they are disposed at opposite sides of the truck. Consequently a description of one of said cores and its attendant parts will be sufficient for a clear understanding of the application and purposes of both. Each core is composed of suitable magnetizable metal and preferably consists of a bar of the required length to extend between the hangers 11 at the same side of the truck and also along the inner side faces of the lower portions of said hangers.

In the end portions of the core rabbets are preferably formed to receive the lower portions of the hangers, and a collar 14" may be provided on the core, as shown in Figs. 1 and 2, to which collar a rigid strut, as 16, is secured and which extends to and is secured to the collar on the opposite core. On each core is a coil or helix, as 17, of properly insulated electric wire, which is confined between projections 11", provided on the hangers 11, and is conveniently formed in two sections, so as to leave a space for the collar 14', both of said sections being wound in the same direction and being electrically connected with each other at said collar. The coils or helices on the cores at opposite sides of the truck are electrically connected with a suitable electric generator, and they are so wound or they are connected in such a manner with said generator that the electric current traverses them in the same direction, so that poles adjacent opposite wheels 8 are of like magnetic polarity when said coils or helices are energized. Each core is provided at its extremity with a pole-piece, as 18, of magnetizable metal, which extends toward but does not touch the adjacent wheel 8 and is of suitable form to present to said wheel a face, as 19, of large area relatively to the cross-sectional area of the core, the said face conforming to the opposing wheel-surface and lying close thereto, but not contacting at any point therewith. These pole-pieces are preferably detachable from the core and are suitably attached thereto by means of bolts, as shown in Figs. 1, 2, 3, and 6, which are also adapted to rigidly fasten the core to the hangers, whereby the pole-pieces are positively held from being moved into contact with the adjacent wheels 8 by magnetic attraction. When an electric current from any convenient source is caused to pass along the wire of the coil 17, a magnetic current traverses the core 14, passes into corresponding pole-piece 18, thence across the narrow air-gap from the face of the pole-piece into the wheel 8, then down the wheel to the rail at the tread of the wheel, then along the rail to the tread of the other wheel, and by way of it and its proximate pole-piece 18 into core 14, thus completing the circuit, the effect being to cause an attraction between the wheels and the rail at the treads or points of contact, and thus increase the adhesion between wheels and rail at these points.

It will be observed that the combination of hangers 11 and core 14 (shown in Figs. 1, 2, and 3) constitutes an "equalizing-bar"—such, for instance, as is found on trucks of the type known as the "Master Car-Builders'" pattern. By this expedient the core is in addition a part of the truck structure and the chance of magnetic leakage is reduced, as parts of the truck-frame in the position of said equalizing-bar may be largely responsible

for leakage, and the essential weight of the device is diminished.

The wheels, as shown in drawings, have straight centers or webs; but these may be of any desired shape, the adjacent faces of pole-pieces being shaped correspondingly to effect clearance.

In Figs. 7 and 8 another and modified form of construction is shown. In this the relation of the parts of the electromagnet and the wheels is essentially the same as previously described. The magnet-core is, however, carried directly by suspension members 20, of non-magnetizable metal, and which are journaled directly upon the axle. These suspension members are also given a bearing against surfaces upon the inner side of the wheels, and the bar or core 14' is secured to two of the suspension members carried by two of the truck-axles. To prevent movement of the suspension members and the bar 14', with its pole-pieces 18', away from the wheels, the bars or cores 14' on opposite sides of the truck are connected, as by bars 21, which are preferably of non-magnetizable metal.

In Figs. 4 and 5 I have shown two views of a pole-piece of a slightly-modified construction, the feature of which is a depending flange 18^a, curved to correspond to the curvature of the inner surface of the wheel-rim. This tends to bring the pole-pieces nearer to the point of contact between wheel and rail, reduces the length of the circuit, and encourages the passage of the magnetic flux through the rim of the wheel, as well as through its web.

Whatever construction is used it is desirable that the wheels and pole-pieces be held close together, but not in actual contact, so that the magnetic lines of force induced by the passages of the electric current through the coil may meet with the least possible reluctance in completing the magnetic circuit. By maintaining a slight air-gap I prevent the friction which would be produced by actual contact between pole-piece and wheel. I am thus enabled to secure efficiency and simplicity in the device and avoid constructions which are liable to get out of order.

For the efficient use of my invention a magnetizable axle is unnecessary, as the axle does not form a part of the magnetic circuit, and I aim at preventing the magnetic flux from reaching the axle, and thereby being dissipated to any extent, and, further, I endeavor to pass the magnetic flux into the wheel as near as practicable to the tread of the latter, and thus insure its entry to the rail at the point of contact of the latter with the wheel. In my invention the magnet-core does not embrace the axle at any point, and thus I altogether avoid the disadvantage due to cutting action of malleable iron or steel moving in contact with similar metal.

It is evident that my invention may be embodied in forms quite different from those herein shown and described. The latter forms have been given only as illustrative of what now seems to me to be preferable. I do not, therefore, wish to be understood as limiting my invention to the forms herein shown or described, but as claiming any construction which falls within the terms of the following claims when broadly construed.

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

1. In a device for increasing the adhesion between wheels and rails, in combination, truck-wheels adapted to bear upon a common rail, members supported from the axles of said wheels, and an electromagnet having a core supported from said members with its poles adjacent said wheels.

2. In a device for increasing the adhesion of truck-wheels to a track, in combination, truck-wheels adapted to bear upon a common rail, a magnetizable bar forming a part of the truck structure and having its poles adjacent the respective truck-wheels, and an electric coil surrounding said bar.

3. In a device for increasing the adhesion of truck-wheels to a track, comprising truck-wheels adapted to bear upon a common rail, a magnetizable bar extending between said wheels and forming a part of the truck structure, and an electric coil surrounding said bar, said bar and coil constituting an electromagnet and being disposed to use the rail and wheels as an armature.

4. In a device for increasing the adhesion between wheels and a rail, in combination, truck-wheels adapted to run upon a common rail, a magnet-core extending between and having its poles closely adjacent two of said wheels, an electric coil mounted on said core, and non-magnetizable supports for said bar.

5. In a device for increasing the adhesion between wheels and their supporting-rail, in combination, load-supporting wheels adapted to run upon a common rail, a magnetizable bar, an electric coil mounted on said bar, the bar being disposed alongside of the wheels and between the wheel-axes and the rail and adapted when magnetized to use the rail and wheels as an armature.

6. In a device for increasing the adhesion between track and wheels thereon, in combination, a track-rail, truck-wheels adapted to run upon said rail, hangers supported from the wheel-axes, a bar and its coil constituting an electromagnet and supported from the hangers of different axles with a pole adjacent each its respective wheel.

7. In a device for increasing the adhesion between a track and wheels thereon, in combination, the truck-wheels adapted to run upon a common rail, hangers supported from

the wheel-axes, a magnetizable bar, and an electric coil about said bar, the ends of said bar being fixed respectively to the hangers of different axles.

8. In a device for increasing the adhesion between a track and wheels thereon, in combination, truck-wheels adapted to bear upon a common rail, journal-boxes for the axles of said wheels, hangers carried by said boxes, a magnetizable bar the ends of which are carried by said hangers, and an electric coil mounted on said bar.

9. In a device for increasing the adhesion between a track and wheels running thereon, in combination, truck-wheels adapted to run upon a common rail, a magnetizable bar having pole-pieces upon its ends, said pole-pieces being placed respectively opposite to faces of said wheels, an electric coil mounted on said bar, and means for maintaining a fixed relative between said pole-pieces and their respective wheels.

10. In a device for increasing the adhesion between a track and wheels running thereon, in combination, a truck having a plurality of wheels adapted to run upon a common rail, a magnetizable bar fixedly supported and extending between said wheels and having pole-pieces upon its ends related to said wheels, said bar being disposed with its pole-pieces each opposite its respective wheel adjacent the point of contact thereof with the rail, and an electric coil mounted on said bar.

11. In a device for increasing the adhesion between a track and wheels running thereon, in combination, a truck having a plurality of wheels adapted to run upon a common rail, a magnetizable bar having pole-pieces at its ends adapted to be placed each opposite its respective wheel, an electric coil for said bar, and means for supporting said bar with its pole-pieces closely adjacent to but not in contact with side surfaces of said wheels.

12. In a device for increasing the adhesion between a track and wheels running thereon, in combination, a truck having a plurality of wheels running upon a common rail, a magnetizable bar having pole-pieces and adapted to be placed with said pole-pieces each opposite its respective wheel and constantly separated therefrom, and an electric coil mounted on said bar.

13. In a device for increasing the adhesion between wheels and their supporting-rail, in combination, wheels adapted to run upon a common rail, an electromagnet extending between said wheels and having pole-pieces disposed adjacent the sides of respective wheels between the axles and peripheries thereof and means to support said magnet with an air-gap constantly maintained between each pole-piece and its relative wheel.

14. In a device for increasing the adhesion between wheels and rails, the combination of

wheels adapted to bear on a common rail, an
electromagnet extending between said wheels
and having pole-pieces disposed adjacent to
but not touching said wheels, and means to
5 support said magnet with its pole-pieces con-
stantly in said relations to the respective
wheels.

15 15. In a device for increasing the adhesion
between wheels and rails, the combination of
10 wheels, and an electromagnet extending there-
between and having pole-pieces disposed ad-
jacent to but not touching said wheels and be-
ing related thereto in a constantly-open mag-
netic field when said magnet is energized.

15 16. In a device for increasing the adhesion

between wheels and rails, the combination of
wheels, and an electromagnet including a core
extending between said wheels and having
pole-pieces formed with faces opposed to sur-
faces of respective wheels, said faces being of 20
large area relatively to the cross-sectional area
of the core of said magnet and being related
to said wheels in a constantly-open magnetic
field when said magnet is energized.

Signed at Seattle, Washington, this 12th day 25
of October, 1904.

ROBERT C. LOWRY.

Witnesses:

H. E. SNOOK,

FENLEY BRYAN.