No. 766,856. PATENTED AUG. 9, 1904.

C. A. WELLS.

ELECTROMAGNETIC TRACTION DEVICE AND BRAKE.

APPLICATION FILED DEC. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

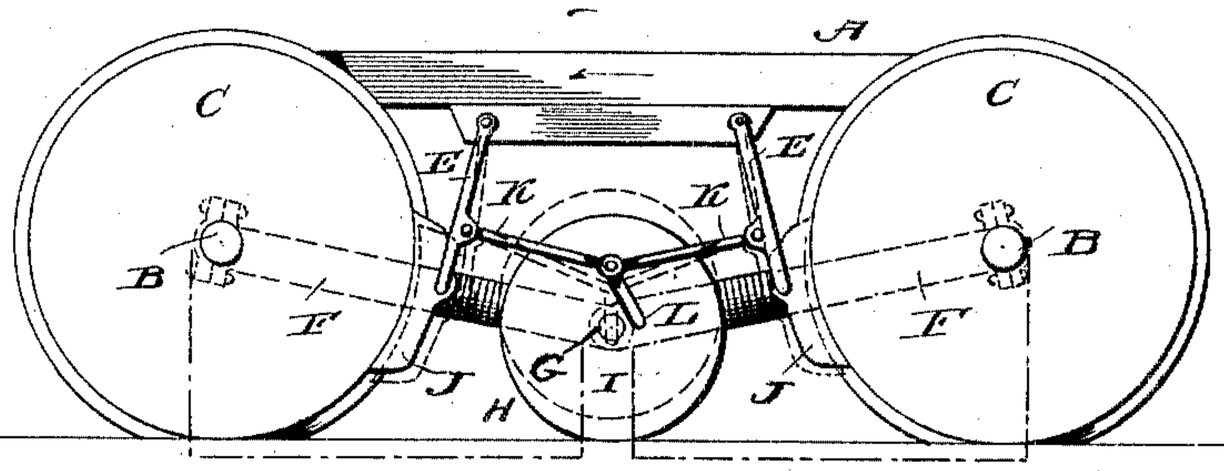


Fig. 2.

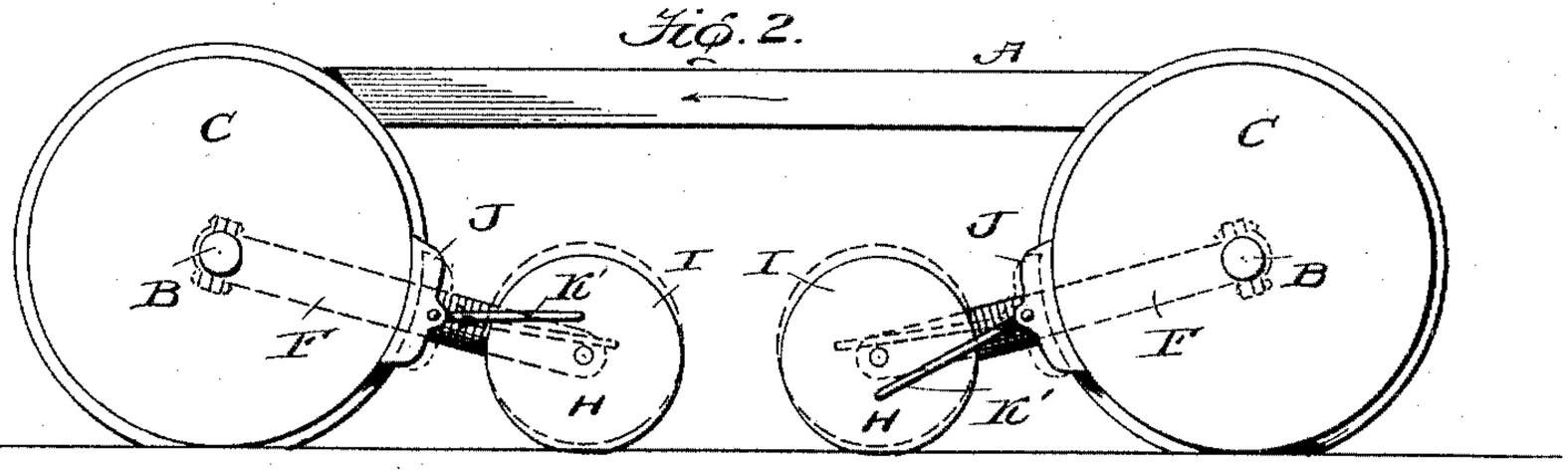


Fig. 3.

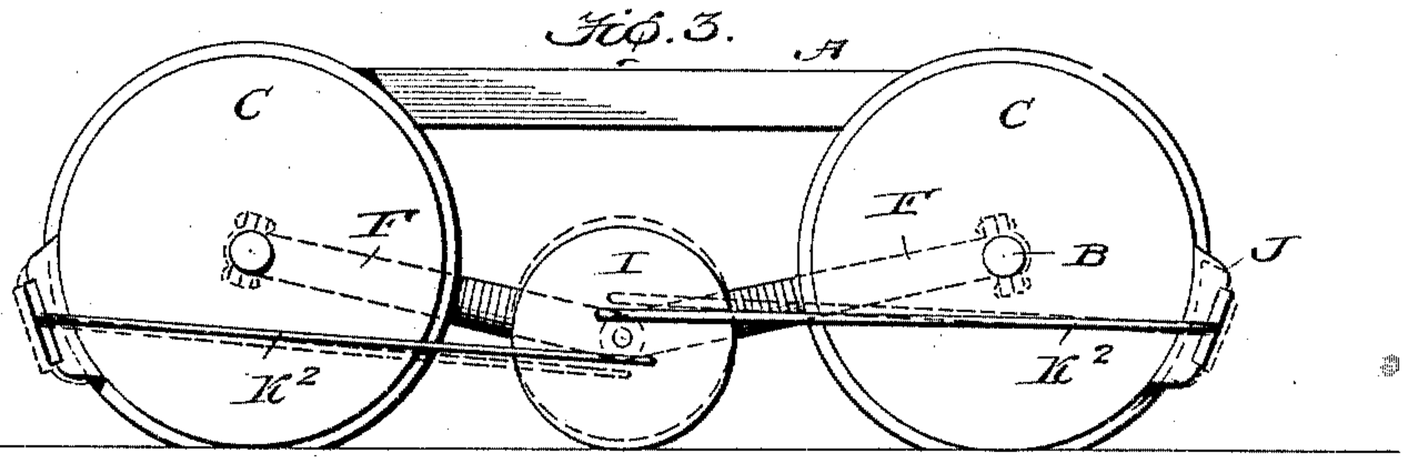


Fig. 4.

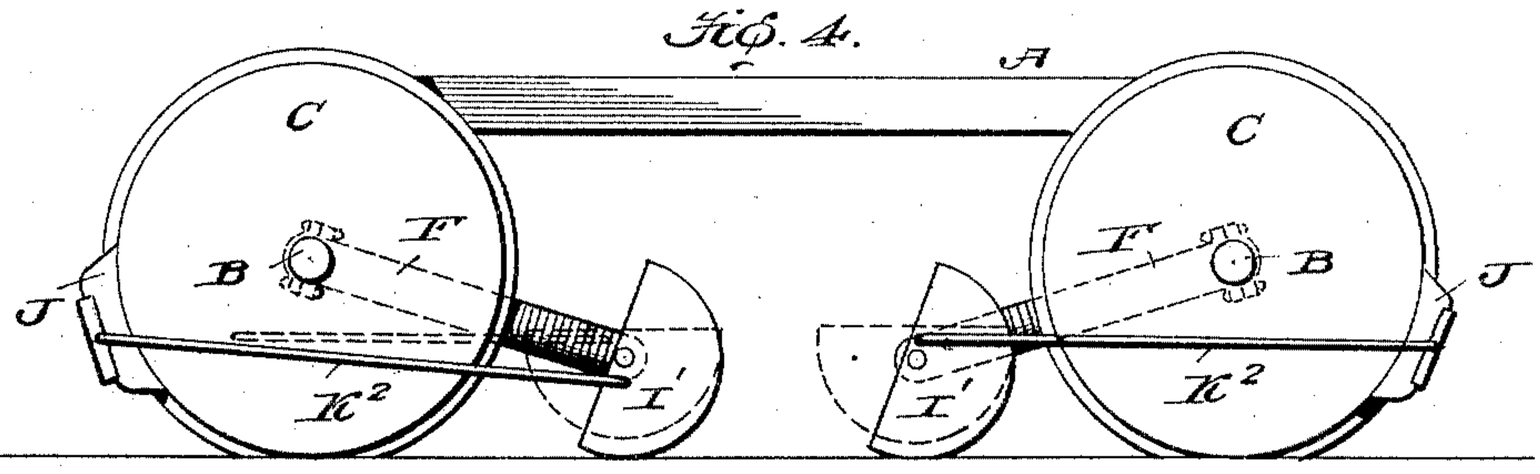
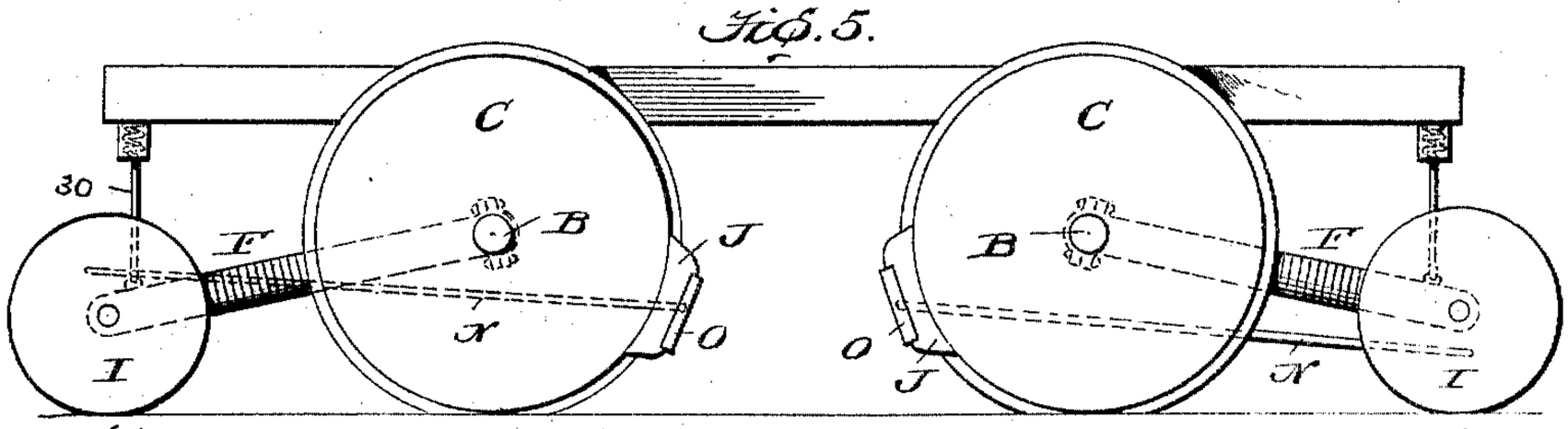


Fig. 5.



Witnesses.

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No. 766,856. PATENTED AUG. 9, 1904.

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ELECTROMAGNETIC TRACTION DEVICE AND BRAKE.

APPLICATION FILED DEC. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

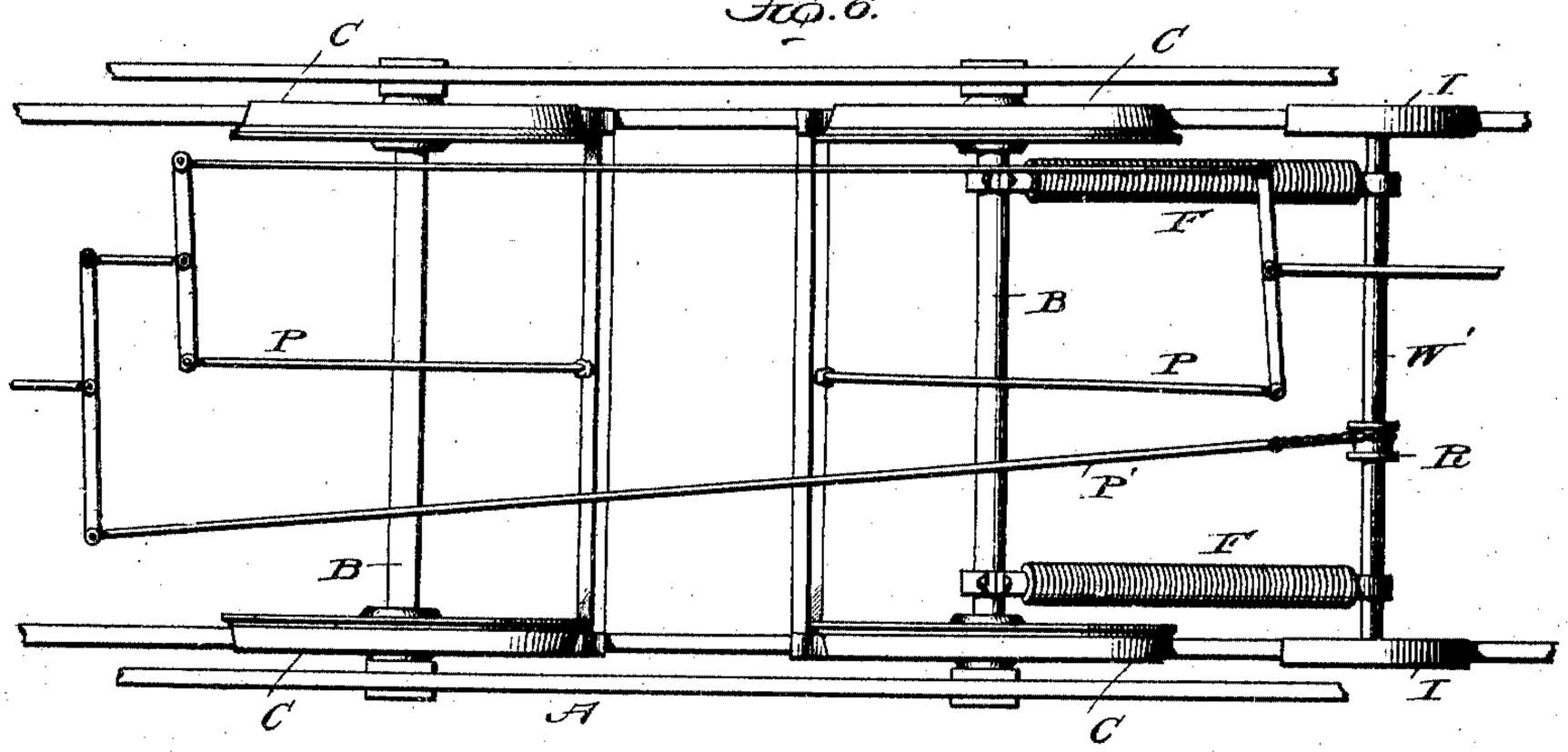


Fig. 8.

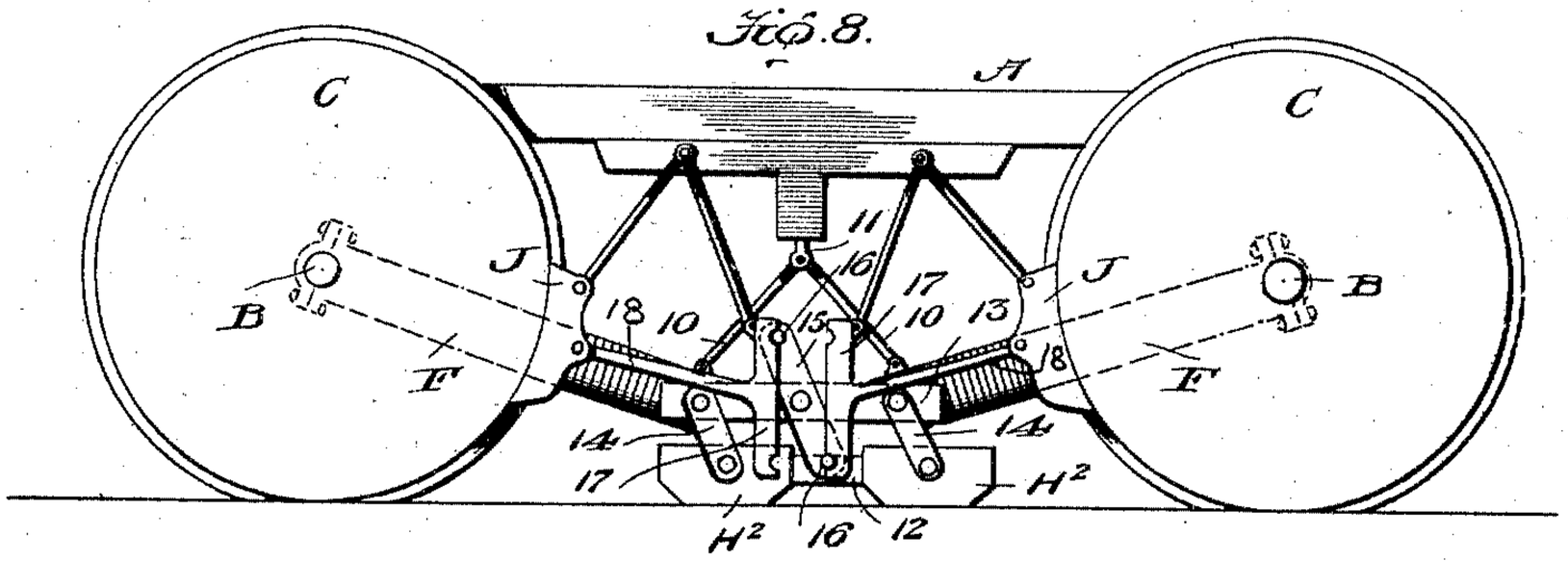


Fig. 9.

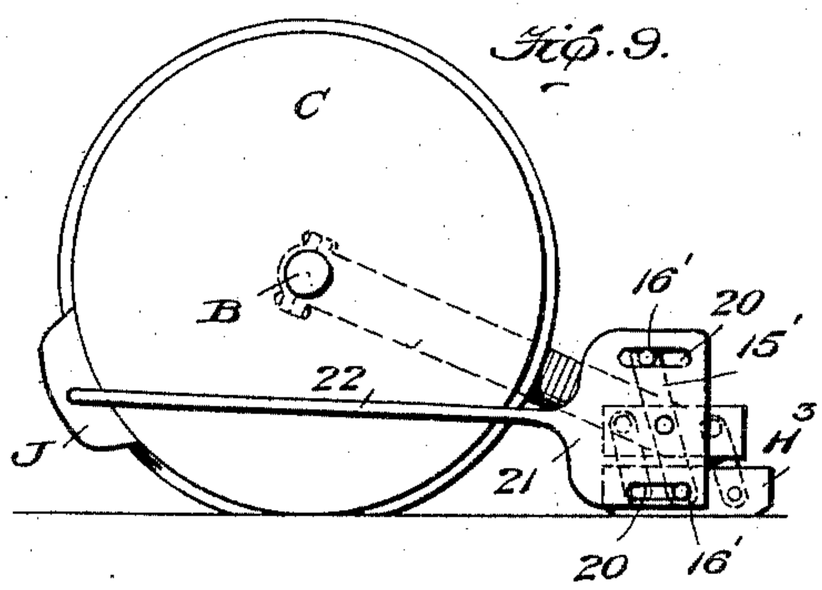


Fig. 7.

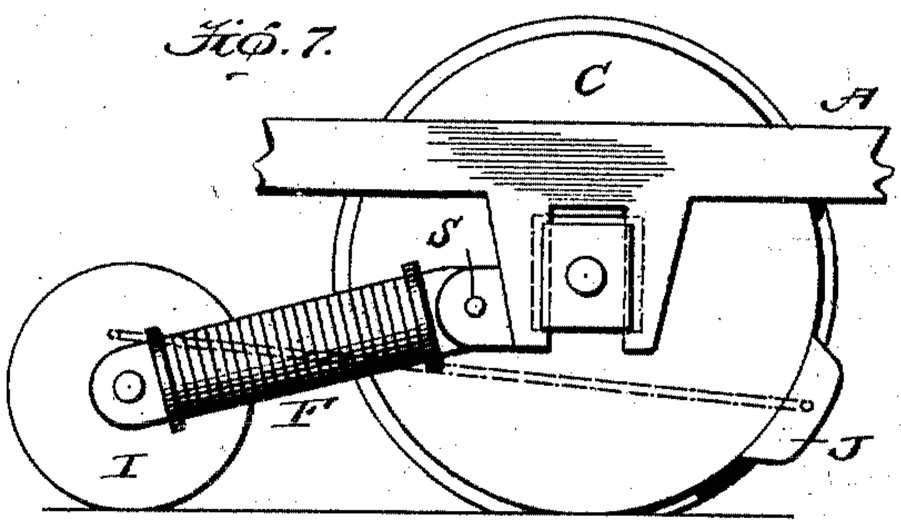


Fig. 10.

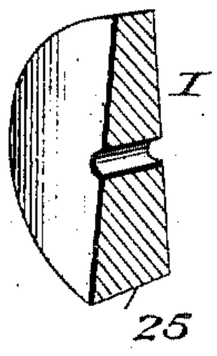
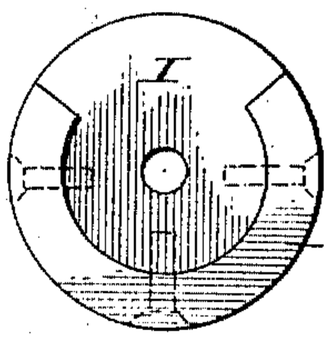


Fig. 11.



Witnesses.

Chapman N. Fowler

Inventor.

Charles A. Wells

By J. Walter Fowler

Its Atty.

No. 766,856. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

CHARLES A. WELLS, OF CHICAGO, ILLINOIS.

ELECTROMAGNETIC TRACTION DEVICE AND BRAKE.

SPECIFICATION forming part of Letters Patent No. 766,856, dated August 9, 1904.

Application filed December 10, 1903. Serial No. 184,542. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. WELLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Electromagnetic Traction Devices and Brakes, of which the following is a specification.

My invention relates to certain new and useful improvements in electromagnetic traction-increasing devices and brake for systems of railway; and it has for its object the increase of the traction power of the bearing or driving wheels of the locomotive or other motor-vehicle by means of an electric current which magnetizes the wheels and causes them to tend to pull the locomotive or vehicle down toward the rails, somewhat like the addition of a great weight to it, and thus increase the friction between the wheels and the rails to prevent the wheels sliding or slipping on the rails.

A further object is to employ in connection with an electric traction-increasing mechanism, as above, an emergency-brake, the shoe of which is also capable of being magnetized to further increase the bearing effectiveness of the wheels and to check the movement of the locomotive when desired.

My invention consists of the parts and the constructions and combinations of parts, which I will hereinafter describe and claim.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate like parts throughout the several views, Figure 1 represents a side elevation of a car-truck embodying the salient features of my invention and showing the brake in operative contact with the rails, the dotted lines showing the position of the parts when the brake is lifted from contact with the rails. Fig. 2 is a modification showing an independent brake for each wheel and showing a slightly-different method of connecting the brake with the ordinary wheel brake-shoe of the car. Figs. 3, 4, 5, 6, 7, 8, and 9 illustrate other modified forms of brake mechanism, as I will hereinafter fully explain. Figs. 10 and 11 illustrate different forms of shoes.

Referring now to Fig. 1, A represents a car-truck, which may be of any of the standard or approved forms and made of any desired material. In the truck-frame the main axles B are appropriately mounted, said axles carrying the usual bearing or traction wheels C, and which wheels are to be peripherally engaged by the wheel brake-shoes J, appropriately suspended by links or rods E from the truck-body. Securely hung upon the axles B and extending therefrom toward each other in downwardly-converging planes are appropriate electromagnets, which consist of a magnetizable bar F with the usual helical winding of wire surrounding the bar, and which bar is to be energized in an electrically-propelled car by the same current which supplies the driving-motor. In the case of cars propelled by other forms of motors any of the methods usually employed for supplying an electric current may be adapted for magnetizing the bar. For instance, if an electric headlight is used or if electricity is used for lighting the cars the current so employed may be used for energizing the magnets. The magnets are wound in the same direction, thereby in all cases making the bearing-wheels always the same polarity, while the track brake-shoes are always the opposite pole, thus completing the magnetic path between the magnets and shoes and the intermediate section of track. The magnets are preferably suspended from the axles just over the rails, and their lower or inner ends are connected by a transverse shaft G, carrying track brake-shoes H, one for each rail, which may be in the form of a wheel I, as shown in Figs. 1, 2, 3, 5, 6, and 7, or which may be a segment of a wheel, as shown at I′ in Fig. 4, and which when lowered into contact with the rails by means of any of the well-known and suitable suspending devices and the magnets energized by sending the electric current through them constitute, with the bearing-wheels of the car, a powerful magnet of the horseshoe type, one pole of which is represented by the bearing-wheels, while the opposite pole is represented by the track brake-shoe, the section of track or rail between these poles completing the magnetic circuit.

In the normal position of the parts the

track brake-shoes I I′ are held slightly above and out of contact with the rails, and when energized the magnets are strongly attracted to the rails, thereby increasing their traction efficiency, and as the track brake-shoes are suspended proximate to the rails when the magnets are energized the track brake-shoes are also magnetized and are attracted toward the rails, (but are held out of actual contact therewith by their suspending devices,) which attraction tends to pull the car down toward the rails like the addition of a great weight to it, and thus the effect in turn tends to increase the friction between the bearing-wheels and the rails.

When the track brake-shoes are to be used as an emergency or other brake, their suspending devices are operated to allow the shoes to drop into actual contact with the rails, and when the parts are magnetized, as before explained, these shoes serve as a powerful track-brake by further increasing the traction effect between the rails and wheels and shoes.

The track brake-shoes are connected with and actuate the usual and well-known wheel brake-shoes J to increase the efficiency of the latter, and the connections between these parts may be varied and any of the well-known systems of lever or link connections may be employed for my purpose. In Fig. 1 I show the wheel brake-shoes suspended from the car-truck by the links E, and above the point of pivotal connection of the links with the shoes I pivotally connect one end of the rods or bars K, whose inner ends are pivotally connected with a crank or wrist pin L on the track brake-shoe on that side. The rods or bars K form a sort of toggle connection, and when the track brake-shoes are allowed to drop into contact with the rails said shoes are caused to turn about their pivotal centers relative the rails, and their cranks or wrist pins cause the toggle connection to straighten out, thereby forcing the wheel brake-shoes tightly against the peripheries of the wheels and mechanically augmenting the effect of the electromagnetic traction-increasing devices. Thus the track brake-shoes not only serve to increase the electromagnetic traction effect, but by their slight rotation they set the wheel-brakes and instantly check the momentum of the car when an emergency requires the application of the wheel-brakes simultaneously with the energizing of the magnets to increase the traction effect on the rails.

In Fig. 2 substantially the same devices are used although there is disclosed a slight variation in the arrangement of the parts. In said Fig. 2 two sets of track brake-shoes are used, one for each wheel, and the crank or wrist pin of the shoe is connected with a link or bar K′, which is pivotally connected to the wheel brake-shoe, so that assuming the car to be traveling in the direction of the arrow when the track brake-shoes are lowered to the rails they first partake of a rotary movement relative to the rails, which causes their crank or wrist pin to force the rods outwardly, and thereby apply the wheel-brakes with great power.

In Fig. 3 the wheel brake-shoes are shown as bearing upon the outside of the wheels, and rods or connections K^2 extending therefrom connect with the track brake-shoe, one upon each side of the pivotal center of said track-shoe, whereby a partial rotation of the latter pulls upon the rods K^2 in opposite directions and sets the wheel-brakes.

In Fig. 4 the track brake-shoes I′ are in the form of segments; otherwise their construction and mode of operation are substantially the same as described.

In Fig. 5 the track brake-shoes are shown as having one set in advance of the front bearing-wheels of the car and another set is shown following the rear bearing-wheels, these brake-shoes connecting with brake-rods N, extending to the brake-beams O of the wheel brake-shoes, which latter are shown as adapted to engage the bearing-wheels from the inside.

In Fig. 6 one set of track brake-shoes is shown in connection with a well-known system of brake-levers P and connections, one member, P′, of which is attached to a drum or pulley R on the shaft or axle W, upon which the track brake-shoes are carried, whereby when the brake-shoes are lowered to the track and rotated said connection P′ is wound up and the desired force is generated to apply the wheel-brakes. The electromagnets may also be hung from the car-truck frame or from the journal-boxes, either inside or outside, by means of a jointed connection, as at S in Fig. 7, instead of suspending them directly from the main axles.

In Fig. 8 I illustrate another form of my invention wherein the track-shoes H^2 have a sliding movement relative to the rails as distinguished from a rotary movement. In this case the electromagnets on each side are suspended by means of rods 10, connected with a rod 11, which may be operated by any well-known method to raise and lower the magnets and the track-shoes carried thereby. The track-shoes in this instance are connected in pairs by a bar 12 and are attached to a second bar 13 by means of the inclined links 14, thereby forming a sort of parallel-ruler connection, said second bar having pivotally secured to it a centrally-pivoted lever 15, having pins or equivalent devices 16 on opposite ends, adapted to operate between the inner faces of the enlarged beads 17, which are made on the inner ends of the suspended levers 18, to which the wheel brake-shoes are connected. In this form when the track-shoes are lowered to the rails the link-bar connections turn about their pivotal centers, and the opposite ends of the lever 15 are caused to move in opposite direc-

tions, thereby spreading the levers 18 and setting the wheel-brakes in substantially the manner before described.

Instead of the double arrangement of track-shoes of Fig. 8 a single shoe H^3 and pivoted link-bar connections may be employed, as shown in Fig. 9, in which case the pins or lugs 16′ of the centrally-pivoted lever 15′ operate in slots 20 in the enlarged head 21 of the brake-rod 22, leading from the wheel brake-shoe.

When using the wheel for the track brake-shoe, it may be desirable to counterweight the same on the lower side, as at 25 in Fig. 10, so that it will when raised from the track turn about its pivotal center, and thereby automatically release the wheel-brakes, and, if desired, these track brake-shoes may be provided with removable sections 26, which can be replaced when worn.

From the foregoing description it will be apparent that the pole-pieces of the magnets extend over and in substantially close proximity to the rails on which the locomotive or cars travel and are to be connected up with some suitable battery, dynamo, or other well-known form of electric generator, and the circuit employed to magnetize the parts to produce the described results may be closed or opened by any suitable and well-known form of switch (not shown) operated from the cab or other part of the locomotive or car. The location of the magnets on the locomotive or car is a matter of choice as well as the number of them, so long as they will when energized attract the rails and tend to draw down the bearing-wheels and hold them to the rails, thereby increasing the friction between the wheels and rails and preventing the wheels slipping on the rails. This increase of traction-power will enable the locomotive, car, or train to more readily ascend steep grades, while the motion of the vehicle or train may be checked in descending grades, and the liability of the wheels slipping on wet tracks is reduced to a minimum, and the use of sand on the tracks is obviated. In addition to this increase of adhesiveness between the wheels and rails I utilize the magnetic force of the traction-increasing devices to set the wheel-brakes through the medium of the track-brakes and connections.

I have not shown any particular means for raising and lowering the track brake-shoes, as these are of any well-known type, and when the track-shoe is raised and an electric current sent through the magnet a strong magnet of the horseshoe type is made with the bearing-wheel as one pole thereof and the track brake-shoe as the opposite pole, said shoe being attracted strongly toward the rails, although not in actual contact therewith, to give increased weight to the wheels, thereby increasing the adhesion and enabling the locomotive or car to start quicker, haul a heavier load, and ascend steeper grades.

If occasion requires the use of an emergency-brake, the track brake-shoes are lowered into contact with the rails and the current sent through the magnets, when the wheel-brakes are set and any degree of braking power can be obtained, for as the current is turned on to increase the brake it also increases the adhesion of the bearing-wheels on the rails, so that the wheels can take the extra brake-pressure without slipping.

That my invention is readily applied to the brake systems now in use is apparent from the drawings, wherein I show such application. In using my invention on a car where it is wanted for a brake only a simple method is to support the magnets by a spring-pressed rod 30, Fig. 5, so that when the current is turned on to energize the magnet the track-brake will be drawn down against the pressure of the spring, and the amount of braking power will be regulated by the amount of current used.

When the wheel brake-shoes are located between bearing-wheels and the track brake-shoes, as in Figs. 1 and 2, they should be formed of suitable non-magnetizable material, especially if the mechanism is used to obtain increased traction in other ways than as a brake, as the brake-shoe will be attracted to the main wheel; but if the wheel brake-shoe is on the opposite side of the bearing-wheel, as in Figs. 3 and 4, there need be no change of the material usually employed, as the shoe is then outside of the magnetic field.

The brake-rods and the supporting connections should also be of non-magnetizable material.

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

1. The combination with bearing-wheels, of an electromagnetic traction-increasing device including a magnetizable member supported in proximity to the rails and provided with a shoe which forms one of the poles of the magnet, said shoe normally supported out of direct contact with and movable toward and from said rails, and a wheel-brake mechanism connected with and actuated by said shoe when the latter is attracted to the rails.

2. The combination with traction-wheels, of an electromagnetic traction-increasing mechanism including a suspended helically-wound magnetizable member and a shoe carried thereby proximate to but normally out of direct contact with the rails, and forming one of the poles of the magnet, said shoe adapted to be moved into contact with the rail and to have a movement thereon relative thereto, and a wheel-brake mechanism connected with and actuated by the movement of the shoe relative to the rail.

3. The combination with traction-wheels and a wheel-brake mechanism, of an electromagnetic traction-increasing mechanism including a suspended, helically-wound magnetizable member provided with a magnetizable shoe normally proximate to but out of direct contact with the rail, and forming one of the poles of the magnet, said wheel-brake mechanism connected to said shoe and said shoe capable of a movement relative to the rail when moved into contact therewith, whereby the wheel-brakes may be applied substantially simultaneously with the energizing of the magnet to increase the traction between the bearing-wheels and rails.

4. The combination with traction-wheels and a wheel-brake mechanism, of a means for increasing the traction between the wheels and rails and including a suspended magnetizable member and a helix surrounding the same and magnetizing it and the wheels, a shoe carried by the said member and normally suspended proximate to but out of direct contact with the rails and forming one of the poles of the magnet said shoe adapted when magnetized to be attracted to the rails and to have a limited movement relative thereto, and means connecting the shoe with the wheel-brake mechanism whereby the wheel-brakes are applied by the movement of the magnetized shoe on and relative to the rail.

5. The combination with traction-wheels and wheel brake-shoes, of electromagnetic traction-increasing devices including a suspended magnetizable member and a helix surrounding the same and magnetizing it and the wheels, a magnetizable shoe on the member and forming one of the poles of the magnet and normally proximate to but out of direct contact with the rails, and capable of being attracted to the latter, said shoe having a limited movement relative to the rails when attracted thereto, and connections between the shoe and the wheel brake-shoes whereby the wheel-brakes are set substantially simultaneously with the energizing of the magnet to increase the adhesion between the wheels and rails.

6. The combination with bearing-wheels and electromagnetic means for increasing the adhesion between the same and the rails, of a wheel-brake mechanism including a magnetizable shoe forming a pole of the electromagnet and movable toward and from the rails, said shoe, when attracted to the rails, having a limited movement on the latter to actuate the wheel-brake mechanism.

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

CHARLES A. WELLS.

Witnesses:
PETER J. HOLMBERG,
C. E. BURRELL.