(No Model.)

C. F. DE REDON.

ELECTROMAGNETIC RAILWAY CAR BRAKE.

No. 597,433. Patented Jan. 18, 1898.

Fig. 1.

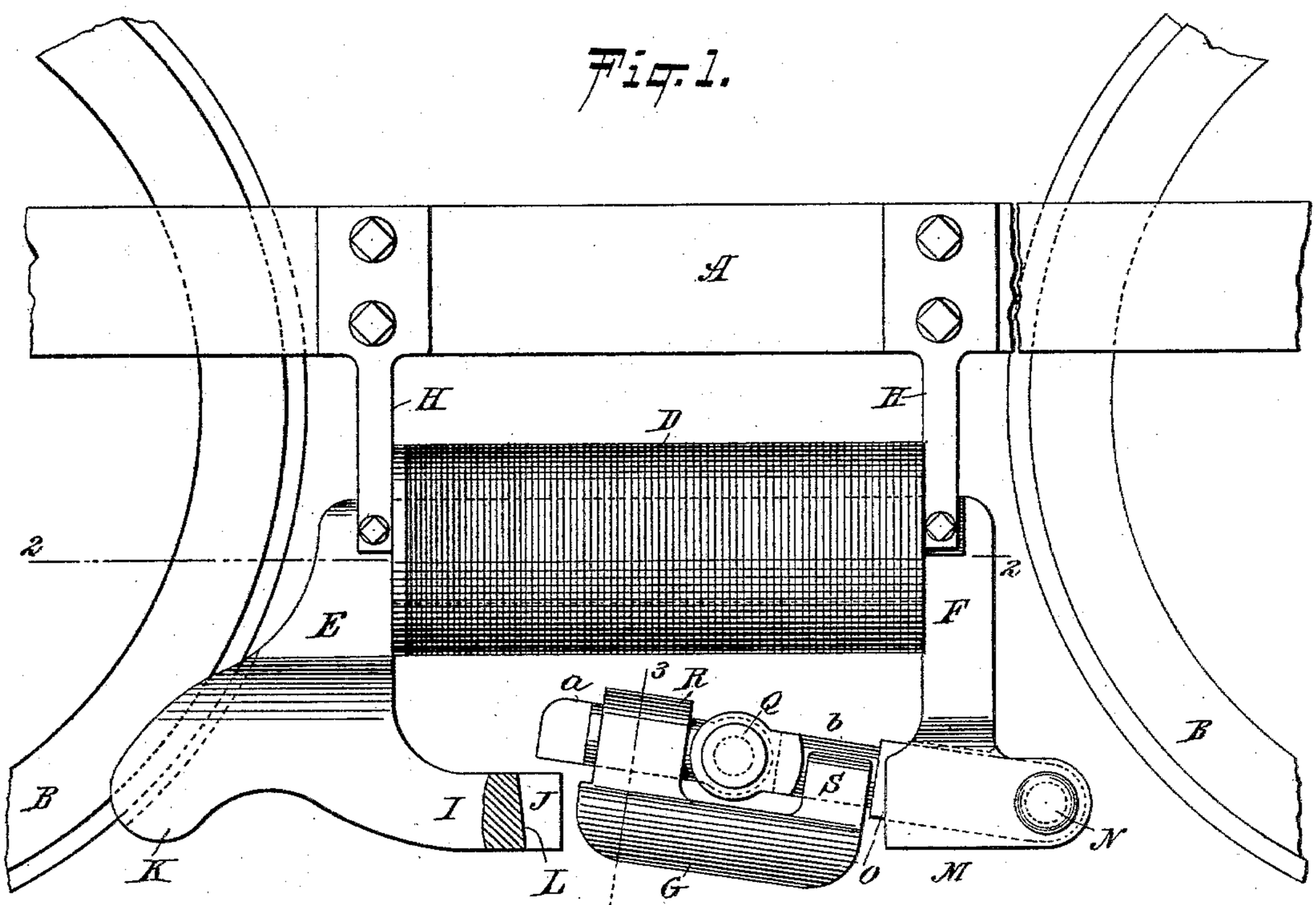


Fig. 2.

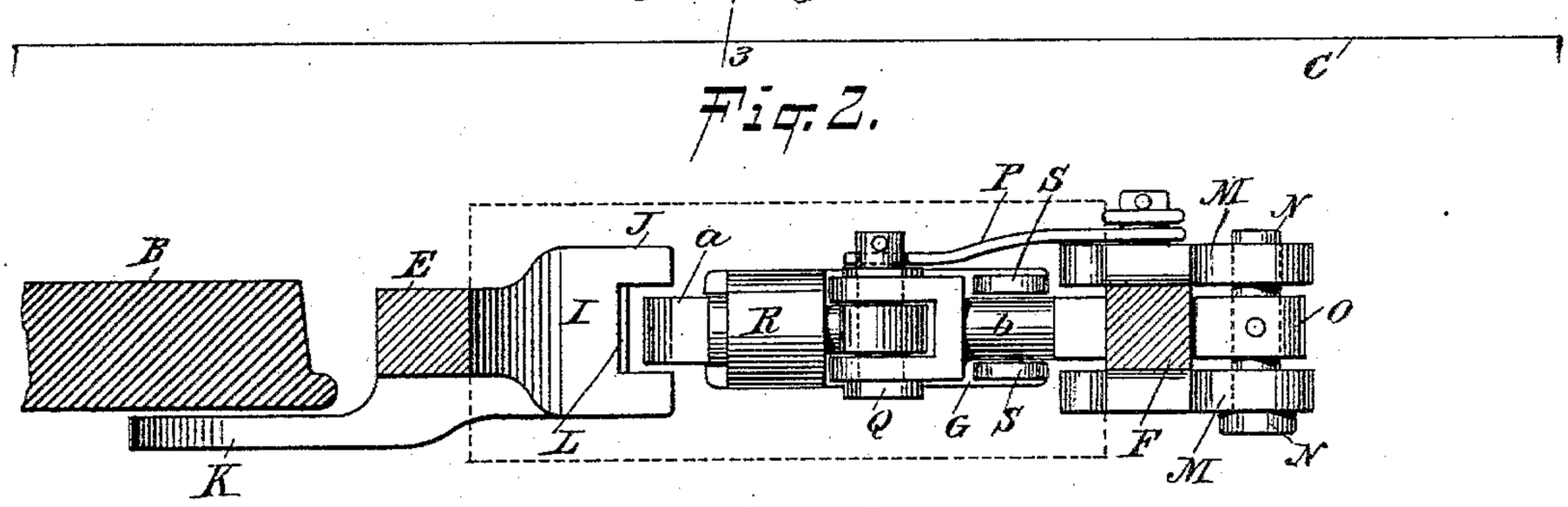
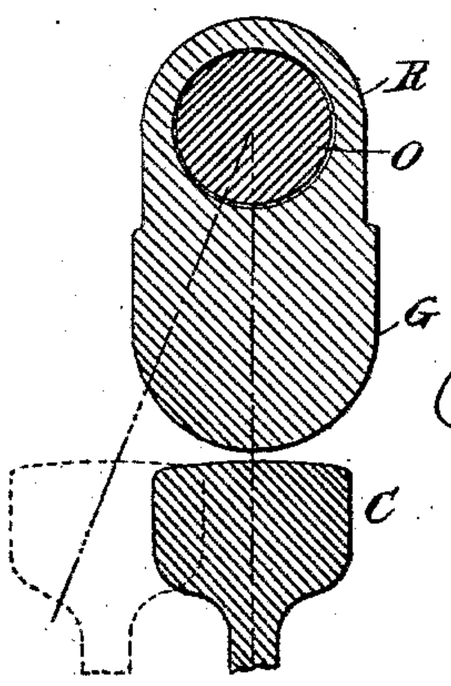


Fig. 3.



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ELECTROMAGNETIC RAILWAY-CAR BRAKE.

SPECIFICATION forming part of Letters Patent No. 597,433, dated January 18, 1898.

Application filed April 22, 1897. Serial No. 633,228. (No model.)

To all whom it may concern:

Be it known that I, CONSTANT F. DE REDON, a citizen of France, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electromagnetic Railway-Car Brakes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The invention relates to improvements in railway-car brakes, and particularly to electromagnetic brakes in which by magnetic force the brake-shoes are caused to bind against the track-rails.

The object of my invention is to greatly improve and increase the efficiency of this class of brakes and to produce a brake of great power, durability, and reliability and capable of being conveniently applied to the cars.

In the accompanying drawings and following description I present a brake embracing the features of my invention, and from said description it will be found that distinct novel advantages are derived from the various parts, separately and combined, of the brake mechanism.

Referring to the accompanying drawings, Figure 1 is a side elevation of a portion of a car-truck equipped with brake mechanism embodying my invention, said mechanism being partly in section. Fig. 2 is a horizontal section of same on the dotted line 2 2 of Fig. 1, the dotted lines of Fig. 2 denoting the outline of the electromagnet; and Fig. 3 is a vertical section of same on the dotted line 3 3 of Fig. 1, the dotted lines in Fig. 3 indicating diagrammatically the lateral swing of the brake-shoe to reach the track-rail at curves in the road.

In the drawings, A designates any usual or suitable car-truck frame, preferably of metal, B the wheels therefor, and C the usual track-rails.

The brake mechanism is in duplicate, one set of the mechanism being at each side of and connected to the car-frame.

The brake mechanism at each side of the car-frame comprises the electromagnet D, having the usual core, the arms lettered E F, respectively connected with said magnet and constituting the poles, and the brake-shoe G, pivotally secured to the arm or pole F and adapted for contact with the track-rail C.

The electromagnet D may be connected with the car-frame in any suitable manner, and in the present instance I illustrate the magnet as suspended from the truck-frame A by means of the hangers H, whose lower ends are connected with the arms or pole-pieces E F, as indicated in Fig. 1. The lower end of the hanger H, connected with the pole-piece F, will be insulated from said pole-piece. The insulation is not required between the lower end of the left-hand hanger and the pole-piece E.

The pole-pieces E F are of novel form and the means supporting the brake-shoe G from the pole-piece or arm F is also novel. The pole-piece E extends downward from the end of the electromagnet D, and one of its members I extends inward below said magnet and at its end is formed with the bifurcation or fork J, while the other member K of the arm or pole-piece E is in the form of a plate extending outward in line with the vertical surface of the car-wheel, as clearly shown in Fig. 2. The plate K is in conveniently close relation to the side of the wheel B, but does not contact therewith. The electromagnet D is in alinement with the car-wheels, as indicated by the dotted lines in Fig. 2, and hence the main portion of the pole-piece or arm E extends downward in line with the periphery of the car-wheel, while the member or plate K thereof turns laterally and thence longitudinally along the surface of the car-wheel. The forked end J of the pole-piece or arm E is directly below the electromagnet D, and the wall L of the said end of the pole-piece E is, as illustrated in Figs. 1 and 2, inclined downward and inward, for the purpose hereinafter explained.

The arm or pole-piece F extends downward from the end of the magnet D and at its lower end is provided with the horizontal plates M M, which extend downward below the main body of the arm or pole-piece F, forming an open frame whose members are connected at

their upper edges by the main body of the arm or pole-piece F. The ends of the plates M M extend inward as close as possible to the shoe G and outward as far as possible beyond the vertical outer plane of the arm or pole-piece F, and parallel with and between the plates M M upon the pin or shaft N is pivotally secured one end of the arm O, carrying the brake-shoe G, and which extends inward to a point in near relation to the member I of the arm or pole-piece E, the inner edge of said arm O being adapted to enter the fork J of said member I, which fork serves to retain the arm O in line with the track-rail C. The shaft or pivot N is located at the greatest convenient distance from the magnet D, and the vertical sides of the arm O, carrying the shoe, while being parallel with and properly near, are distinctly separated from the surfaces of the plates M at the lower end of the pole-piece F, the purpose of the arrangement and construction of the parts being to avoid as far as possible the heat generated by the friction of the shoe G on the track-rail C from passing to the coil or magnet D and to provide the maximum surfaces for the action of the magnetic influence from the pole-piece F.

In the construction presented it will be observed that the heat generated by the friction of the brake-shoe on the track-rail would have to pass to the very end of the arm O before it could be communicated to the pole-piece F and that the connection of the outer end of the arm O with the pole-piece F is at the farthest convenient point from the magnet, and hence the heat generated by the friction would become dissipated and lost prior to reaching the magnet. The separation of the sides of the arm O from the inner vertical sides of the plates M M, while preventing the heat generated by the friction from passing to the magnet D, is not sufficient to break the lines of magnetic force between said plates and arm O.

The arm O is adapted to have a rocking motion on or with the pin or shaft N and is normally held in its upward position clear of the track-rail by means of the spring P, flexed against said arm O and retaining the same in its upward position at all times, except when by the energizing of the electromagnets D the magnetic circuit is established, and the shoes G are forcibly drawn to and held upon the track-rails. The arm O and shoe G are of novel construction, and, as illustrated in Fig. 1, the arm O is jointed at Q, this joint dividing the arm O into the members *a b* and being preferably near the center of the brake-shoe G, which is suspended from said arm O by means of the sleeve R, formed on said shoe and engaging the member *a* of the said arm O. The shoe G at its lower surface is adapted to contact with the track-rail, and at the lower portions of its ends said shoe is rounded, as indicated in Fig. 1, to enable the shoe to more readily ride over any obstructions which might be found upon the track-rails. The upper surface of the shoe G is provided at one end with the aforesaid sleeve R and at the other end with the arms S S, constituting a fork adapted to pass upon the member *b* of said arm O. Those portions of the members *a b* of the arm O within the sleeve R and fork S are cylindrical in cross-section and conform in outline to the interior surfaces of the said sleeve R and fork S, thus enabling the shoe G to have a lateral swinging motion when necessary upon the arm O. This lateral swinging motion of the shoe G is to enable the shoe to reach the track-rail at curves, sidings, and other places in which the rail may diverge from a straight line, and in Fig. 3 the alinement of the shoe G with the straight track-rail C is indicated by full lines, while the dotted rail denotes the line of divergence at curves, and the radial dotted line indicates the direction of the swinging movement of the shoe G caused by the magnetic attraction between the rail at curves and said shoe. When the car is upon the straight through-rails, the shoe G will remain directly over the same, but should the coils D become energized while the cars are passing around a curve in the rails the swinging action permitted in the shoe G would enable the latter to turn laterally under the magnetic force in order to reach the rails. The relation of the upper surface of the shoe G to the articulation Q is such as to prevent the shoe G from having any undue lateral movement. Any other convenient means or stop, however, for preventing undue movement in the shoe G may be employed. The joint or articulation Q in the arm O is of special importance in that when the shoe is upon the track-rail the rocking or jarring motion of the car-body is prevented from affecting to any material extent the shoe G or its relation to the track-rail by reason of the fact that the member *b* of the arm O may move upward and downward on the pivotal connections at both its outer and inner ends, and thus yield with the jarring action of the car without disturbing the brake-shoe G. In order to permit of the vertical motion of the member *b* of the arm O, the fork S, open at its upper end, is provided, and in the absence of the articulation Q a sleeve such as that lettered R, instead of the open fork S, would be made use of. The sleeve R and fork S, being rigid with the shoe G and at opposite sides of the joint Q, will materially strengthen the arm O and aid the latter in resisting all lateral strains. The inner end of the arm O is adapted to pass between the arms of the fork J at the inner end of the pole-piece E, and the said end of the arm O is adapted to come into proper relation to the inclined wall L of the pole-piece E to be attracted thereby, and while preserving this result I shall prefer to have the wall L and arm O as far apart as possible. The inclination of the wall L is at a tangent to the arc on which the inner end of the arm O has its movement, and hence the inner end of said arm O more closely ap-

proaches the wall L the farther downward it moves, and this is a feature of importance in the class of brakes to which the present invention pertains, since it permits of the shoe G having a varying downward movement corresponding with the wear which may take place upon the lower surface of the said shoe. For instance, when there has been no wear upon the shoe G the arm O will have a fixed downward movement, but as wear takes place upon the lower surface of the shoe G the inner end of the arm O should be capable of being moved farther downward in order that the worn surfaces of the shoe G shall reach the rail and be capable of firmly binding thereon. The inclination of the wall L of the pole-piece E exerts a magnetic attraction to constantly draw the inner end of the arm O downward to its fullest extent, and hence as the surface of the shoe G is worn off the arm O will be pulled downward to a correspondingly further degree and preserve the contact of the shoe with the track-rail. To illustrate this part of the invention more clearly, it may be assumed that the inclined wall L does not exist and that the arm O might reach its horizontal position between the pole-pieces without the then worn surface of the shoe G reaching the rail, and under these circumstances the lines of magnetic force being directly between the vertical ends of the pole-piece E and arm O the latter would have a tendency to be held in its horizontal position and the shoe thus retained above the track-rail, whereas with the inclined surface L there is a downward-pulling action on the end of the arm O, and this action increases the nearer the end surface of the arm O approaches the wall L, and hence two results are accomplished by the inclined wall L, the first being that the shoe will be drawn to the track-rail at all times without regard to any reasonable wear thereof, and the second that the more nearly the end of the arm O approaches the lower portion of the wall L the stronger will be the magnetic action binding the shoe upon the rail.

It is not necessary that the wall L should be inclined on a straight line in all instances, since said wall constitutes simply the end surface of the pole-piece E, facing the end of the arm O, carrying the brake-shoe, and it is immaterial whether said wall or end surface L be inclined on a straight line or curved, the main consideration being that the end of the arm O shall more closely approach the wall L the nearer the brake-shoe approaches the track-rail, and this same result would follow if the wall L were simply curved on a line eccentric to or diverging upward from the arc described by the end of the arm O during its movement.

Upon the energizing of the coils D the magnetic circuit will be established through the truck-frame, axles, wheels, and rails, and the shoe G at each side of the truck will become attracted to and bind upon the rails C. The shoe G or the arm O, carrying the same, is first attracted by the pole E and then by the track-rail. The poles E are connected with the frame A and form with the frame, axles, wheels, and rails a complete magnetic field. The purpose of the plate or extension K of the pole E is to bring a part of the pole E into close relation with the face of the car-wheel, so as to produce a more intense magnetic influence intermediate the car-truck and track-rail, and this effect is facilitated by reason of the nearness of the main body of the pole E with the periphery of the car-wheel.

The invention is not wholly confined to the special forms, locations, and arrangements of parts illustrated in the drawings, nor in all instances to the use of the pole-piece E, and the form and location of the various parts of the brake mechanism will be varied as may be desired within the spirit of the invention.

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

1. In a railway-car brake, the electromagnet at each side of the car, and the arm or pole-piece extending downward from one end of said magnet, combined with the brake-arm pivoted to the lower end of said pole-piece and extending at substantially right angles therefrom, and the shoe carried by and being substantially in alinement with said brake-arm, said brake-arm having intermediate its ends the joint to prevent the jarring motion of the car from affecting the relation of the brake-shoe to the rail; substantially as set forth.

2. In a railway-car brake, the magnet at each side of the car, and the arm or pole-piece extending downward from one end of said magnet, combined with the brake-arm pivoted to the lower end of said pole-piece and extending at substantially right angles therefrom and parallel with the track-rail, and the shoe carried by and being substantially in alinement with said brake-arm; substantially as set forth.

3. In a railway-car brake, the electromagnet at each side of the car, the arm or pole-piece extending from one end of said magnet, and the brake-arm pivoted to said pole-piece, combined with the brake-shoe carried by said arm, the said brake-arm being separated from the pole-piece except at the point of its pivotal connection thereto to prevent the heating of the coil from the friction generated by the brake-shoe on the rail; substantially as set forth.

4. In a railway-car brake, the electromagnet at each side of the car, and the arm or pole-piece extending downward from said magnet and having at its lower end the elongated parallel plates extending beyond the vertical plane of said arm, combined with the brake-arm pivotally secured to and at the outer end of said plates, and the brake-shoe carried by said brake-arm, said brake-arm having its movement between but separated by an air-space from said plates; substantially as set forth.

5. In a railway-car brake, the electromag-

net at each side of the car, and the pole-piece extending from the end of said magnet, combined with the brake-arm pivoted thereto, and the brake-shoe for contact with the track-rails, said shoe being capable of lateral motion in addition to its vertical motion; substantially as set forth.

6. In a railway-car brake, the electromagnet at each side of the car, and the pole-piece extending from the end of said magnet, combined with the brake-arm pivoted to said pole-piece, and the brake-shoe carried by said arm, said shoe having the sleeve freely encompassing the said brake-arm; substantially as set forth.

7. In a railway-car brake, the electromagnet at each side of the car, and the pole-piece extending from one end of said magnet, combined with the brake-arm pivotally secured to said pole-piece, and the brake-shoe carried by said arm, said brake-arm being jointed and said brake-shoe having the sleeve and fork to engage the members of said brake-arm; substantially as set forth.

8. In a railway-car brake, the electromagnet at each side of the car, the pole-piece extending from one end thereof, and the brake-arm pivotally secured to said pole-piece, combined with the brake-shoe carried by said brake-arm, and the pole-piece extending from the other end of said magnet toward said brake-arm; substantially as set forth.

9. In a railway-car brake, the electromagnet at each side of the car, the pole-piece extending downward from one end of said magnet, the brake-arm pivotally secured to said pole-piece, and the brake-shoe carried by said arm, combined with the pole-piece extending from the other end of said magnet and toward said brake-arm, the end of said latter pole-piece facing the end of said brake-arm being on a line diverging from the arc through which the end of the brake-arm travels; substantially as set forth.

10. In a railway-car brake, the magnet at each side of the car, the pole-piece at one end of the magnet, and the brake-arm pivoted to said pole-piece, combined with the brake-shoe carried by said arm, and the pole-piece at the other end of said magnet and having the extension in close relation to the car-wheel; substantially as set forth.

11. In a railway-car brake, the magnet at each side of the car, the pole-piece extending from one end of said magnet, and the brake-arm pivotally secured to said pole-piece, combined with the brake-shoe carried by said arm, and the pole-piece at the opposite end of said magnet and extending toward said brake-arm with its end bifurcated to receive the end of said brake-arm; substantially as set forth.

12. In a railway-car brake, the electromagnet at each side of the car, the pole-piece extending from one end of the magnet, and the brake-arm pivotally secured to said pole-piece, combined with the brake-shoe carried by said arm, and the pole-piece at the opposite end of said magnet and having one of its members extended toward the brake-arm and another member extended in close relation to the car-wheel; substantially as set forth.

13. In a railway-car brake, the electromagnet at each side of the car, and the arm or pole-piece extending from the end of the magnet, combined with the brake-arm pivoted to said pole-piece, the shoe carried by said brake-arm, and means substantially as described for increasing the magnetic action drawing the shoe to operative position the more nearly the shoe reaches such position by the gradual approach toward one another of diverging surfaces connected with the magnet; substantially as set forth.

14. In a railway-car brake, the electromagnet at the side of the car, the arm or pole-piece at one end of the magnet and connected by conducting material with the truck and being adjacent to the wheel of the car, and the arm or pole-piece at the other end of the magnet, combined with the brake-arm pivoted to the last-named pole-piece, and the brake-shoe carried by the brake-arm; substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CONSTANT F. DE REDON.

Witnesses:
CHARLES C. GILL,
E. JOS. BELKNAP.