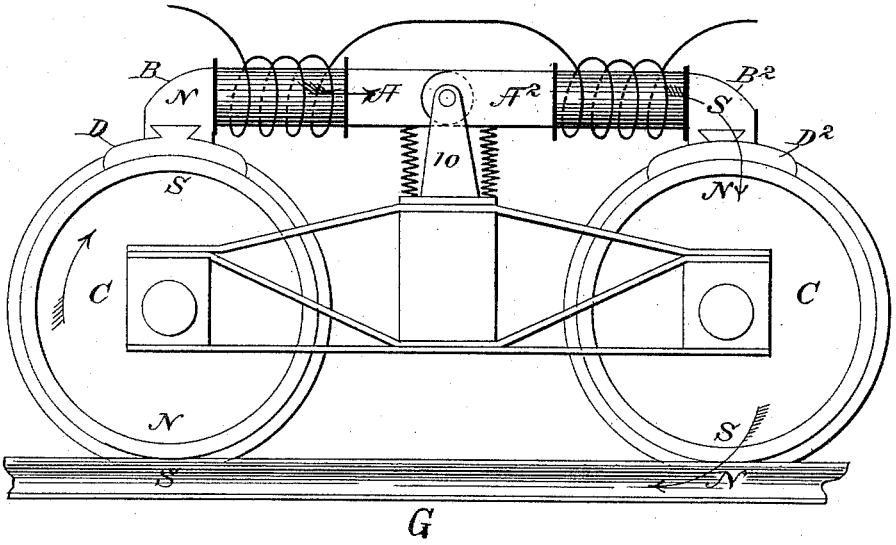
(No Model.)

# C. R. ARNOLD.

## ELECTRIC CAR BRAKE.

No. 457,067. Patented Aug. 4, 1891.




ATTEST:
J. H. Hindle
W. H. Mattson.

INVENTOR:
Craig R. Arnold
By H. L. Townsend
Attorney

# UNITED STATES PATENT OFFICE.

CRAIG RITCHIE ARNOLD, OF SHARON HILL, PENNSYLVANIA.

## ELECTRIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 457,067, dated August 4, 1891.

Application filed August 21, 1890. Serial No. 362,572. (No model.)

*To all whom it may concern:*

Be it known that I, CRAIG RITCHIE ARNOLD, a citizen of the United States, and a resident of Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Electric Car-Brake, of which the following is a specification.

My invention relates to that class of railway-car brakes in which the power of an electro-magnet is employed for drawing the brake-shoe against the wheel.

The object of my invention is to produce a brake of this character in which the power of the magnet shall be efficiently employed.

A further object of my invention is to simplify brakes of the general character in which the brake-shoe is drawn by the action of the magnet against the car-wheel.

My invention consists, essentially, in utilizing the car-wheels to form parts of a closed magnetic circuit from one pole to the other of the brake-magnet, so as to constitute a part of a closed magnetic circuit-armature for the magnet.

My invention consists, further, in a railway-car brake wherein the brake-magnet has its magnetic circuit completed exteriorly through two car-wheels and a section of railway-rail between them.

My invention consists, further, in other details of construction, and combinations of devices, more particularly hereinafter described, and then specified in the claims.

The accompanying drawings show in side elevation and diagrammatically an organization in which my invention is embodied.

C C indicate the wheels of a railway-car, and G the rail upon which they travel.

A $A^2$ indicate the brake-magnet, made either in one or two parts, but preferably in two parts, which are pivoted upon an upright 10, rising from the car-truck. The parts A $A^2$ are in such magnetic relation to one another that a practically continuous magnetic circuit exists from one part to the other. The electro-magnet A $A^2$ is wound with the usual coils of energizing-wire, (indicated in skeleton,) through which coils an electric current is caused to flow from any desired source when the brake is to be applied. The coils are wound so that the opposite terminals B $B^2$ of the magnet will have respectively a north and south polarity.

D $D^2$ indicate the brake-shoes, which form a part of or are attached to the poles of the electro-magnet in any desired manner, so as to become virtually the polar extremities of the electro-magnet. When the magnet is excited, the brake-shoes are drawn down upon the wheels C C. Any suitable means, as springs, may be employed for holding the brake-shoes normally off the wheels. When the magnet is excited and the brake-shoes are drawn down upon the wheels, the magnetic circuit is formed from one pole B of the electro-magnet to the other pole $B^2$, through the two wheels C and a section of rail G between them. The wheels C and the section of rail G form an armature for the electro-magnet, thus permitting it to act with full power in keeping the shoes D drawn against the wheel.

Magnetic polarities are formed in the magnetic circuit from one pole to the other at the points indicated by the letters N S. Thus, as indicated, two opposite poles N S will exist, respectively, in the wheel and in the part of the rail upon which said wheel rests. The effect of this is obviously to increase the friction between the wheel and the rail, so that a greater power may be applied to the brake without causing the wheel to slip.

I do not limit myself to any particular way of mounting the magnet, nor to the making of the same in any particular number of pieces. I prefer to construct it, however, in two parts hinged or jointed together, as shown, so that the magnet may be in part supported by the truck instead of wholly by the retracting devices.

By my invention it will be seen that the two car-wheels themselves being oppositely magnetized and being virtually the poles of a magnet constituted by the car-wheels and the iron cores or masses of iron connecting them at their top the section of rail between such wheels will be a true armature joining two opposite poles of a magnet. The adhesion between the car-wheels and the track is by this means so far increased that the car-wheels will be held down upon the track and be prevented from leaving the same. This is a valuable feature, inasmuch as when the

brakes are applied in an emergency the adhesion between the wheels and rails thus produced will tend not only to prevent the wheels from leaving the rails, but to prevent overturning of the truck and car. This feature of my invention, it will be observed, is of value independently of the braking action produced by the magnetized brake-shoes.

What I claim as my invention is—

1. In a railway-brake, a brake-magnet having brake-shoes constituting the opposite poles of such magnet and bearing, respectively, upon two car-wheels, said wheels with the section of rail between them forming a closed magnetic circuit from one pole to the other of the magnet.

2. In an electric railway-brake, an electro-magnet made in two parts, pivoted in magnetic connection and arranged parallel with the rail, in combination with brake-shoes carried by and in magnetic connection with the poles of such magnet and bearing, respectively, on different wheels running on the same rail.

3. In a railway-brake, the combination, substantially as described, of an electro-magnet made in two parts, pivoted on the car-truck and arranged to swing in a vertical plane, and brake-shoes attached to and forming a part of the pole ends of such magnet, which are of opposite polarity, respectively, and adapted to bear, respectively, on two car-wheels at the same side of the truck, so that the magnetic circuit for said electro-magnet will be completed through the car-wheels of opposite polarity and the section of track between them.

4. The combination, with two car-wheels running on the same rail, of an electro-magnet bridging the space between said wheels and having its opposite polar ends constituting brake-shoes arranged to polarize said wheels respectively, as described, so that said wheels with the section of track between them shall form a closed magnetic circuit or armature from one pole to the other of the magnet.

5. The combination, with the car-wheels running on the same rail, of an electro-magnet, the opposite polar ends of which polarize said wheels, as described, so that the wheels with the section of track between them shall form a closed magnetic circuit from one pole to the other of the magnet.

Signed at Chester, in the county of Delaware and State of Pennsylvania, this 4th day of August, A. D. 1890.

CRAIG RITCHIE ARNOLD.

Witnesses:
LETTIE D. ALLMOND,
JOS. H. HINKSON.