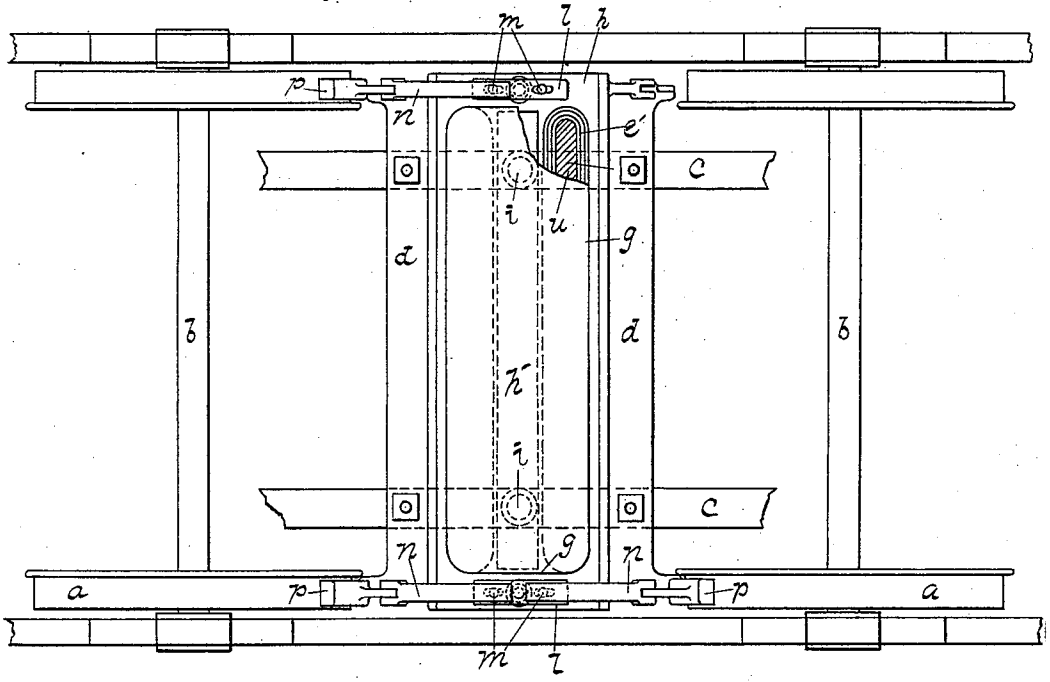
(No Model.)

B. F. CARD.

EMERGENCY ELECTRIC BRAKE.

No. 562,118. Patented June 16, 1896.

Fig. 1.



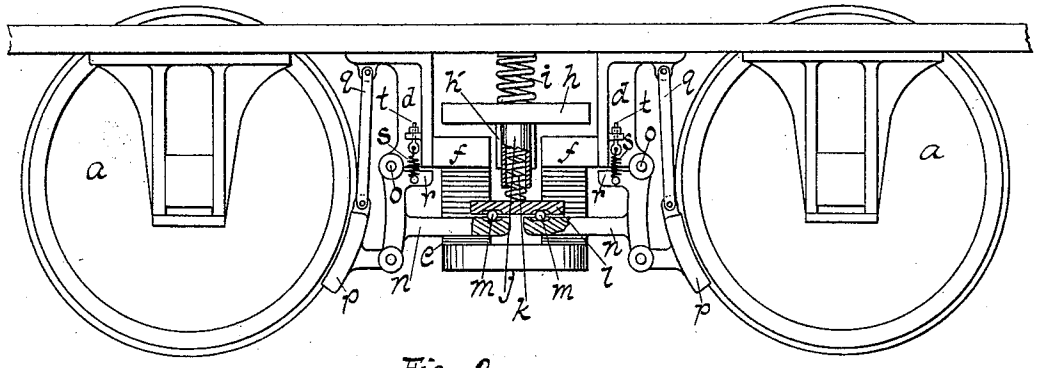


Fig. 2.

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EMERGENCY ELECTRIC BRAKE.

SPECIFICATION forming part of Letters Patent No. 562,118, dated June 16, 1896.

Application filed February 6, 1896. Serial No. 578,252. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. CARD, a citizen of the United States, and a resident of Brooklyn, county of Kings, and State of New York, have invented new and useful Improvements in Emergency Electric Brakes, of which the following is a specification.

My present invention relates to an emergency-brake for electric cars, especially those which are fed by a current from an overhead or conduit system, and that are adapted to draw upon an exceedingly large amount of electrical energy.

The necessity of an emergency-brake is apparent when it is considered that so many people are injured or killed by electric cars, the main trouble in each case being that the motorman is not able to stop the car sufficiently rapidly. There should be such a great power that the car is brought to a dead-stop within about a half car's length from the maximum speed, say, of ten to fifteen miles an hour. Provided the stopping is uniformly gradual as well as quick, the passengers will experience no jar because it will be the same as if the car were run into an exceedingly strong but true elastic cushion.

I have so constructed an electric brake that I am able to accomplish the rapid and gradual stopping alluded to.

In order to describe all the details of the invention intelligibly, the accompanying drawings are referred to.

Figure 1 is an inverted plan of so much of a car and of my brake as is necessary to set forth the elements of the invention, some of the parts being broken away and some omitted in order to better indicate the construction. Fig 2 is a side elevation of that which is shown in Fig. 1.

Referring to the figures of the drawings, the car may be sufficiently identified by the wheels *a*, whose axles are *b*. A part of the supporting-truck is indicated by the beams *c*. The main support for suspending the electric brake apparatus from the beams *c* is composed of the two angle-irons *d*, which are bolted to the beams *c*. The main element of the brake apparatus is the unusually large magnet *e*, whose pole-pieces are *f*, and yoke *g*. This magnet is represented so large that it reaches practically from one side of the car to the other, and it is retained upon the truck by having its pole-pieces *f* secured to the angle-irons *d* in a rigid manner. This magnet is so large that the winding is adapted to take several times the amount of electrical energy that is required to propel the car. It should be noticed that this brake, although it uses so much current, has not a very undesirable running expense, because the large amount of current is only employed for a matter of a very few seconds now and then, that is, in those cases where the motorman is doubtful about being able to stop the car by the hand-brakes within the distance desired. This is the reason that I call it an "emergency-brake," the same to be used generally only when there is an impending accident.

The armature of the magnet is formed of two parts, the horizontal plate *h* or armature proper, and the downwardly-projecting mass *h'*, which may be called the "core" part, which extends downwardly from the armature portion *h* between the poles *f*. In order to retain it so that it may be attracted downward and so that it may rise again, I provide helical springs *i*, which serve as the sole support of the whole armature, the lower ends being attached to the armature and the upper ends to the truck-beams *c*. The armature is, therefore, movable up and down and, therefore, away from and toward the magnet *e* in an elastic manner. On opposite ends of the armature *h* are tubes *j*, suspended therefrom rigidly, and extending into these tubes are helical springs *k*, the lower ends carrying push-blocks *l*, so that when the latter are pushed downward against any object they are thus moved by yielding springs. As indicated in the drawings, the pushing takes place against balls *m*, which project into grooves of a longitudinal nature cut into the blocks, and which rest upon lever-arms *n*, whose fulcrum is at *o* in each instance. The brake-shoes *p* are pivotally carried upon the same lever, and are held in the proper position in relation to the wheels by links *q*, the upper ends being pivoted to the angle-irons *d* and the lower ends to the said brake-shoes. The said levers have other arms *r*, which nor-

mally bear or nearly bear against the angle-irons *d*, and which are regulated as to their distance from the angle-irons by means of adjustable springs *s*, the lower ends of which are attached to the arms *r*, and the upper ends to the angle-irons *d*, by means of adjusting-screws *t*. When the said screws *t* are lowered, the brake-shoes may be brought nearer to the wheels *a*, to make up, for example, for the wear of the wheels or the shoes or both. The arms *n* of the levers are also provided with grooves for supporting the balls *m*, and so located that when the blocks *l* are pushed downward the balls *m* may roll backward and forward in the said grooves, and thereby form a practically frictionless slide between the arms *n* and the block *l*. It will be noticed by this construction that an apparently slight movement of the armature of the magnet will cause a greater movement of the shoes *p*, and on account of the links *q* and the pivot connection of the shoes to the said levers, whose arms are *n* and *r*, the shoes will always press upon the wheels at all points of the surface intended to be in contact with the surface of the wheel.

It is important to notice that my brake corresponds to an air-brake in that it is fully provided with a cushion action. The motion of the blocks *p* takes place around the pivots *o*, and the motion is communicated by means of two sets of springs *i* and *k*, and, therefore, however suddenly the armature *h* is attracted and by whatever power, the shoes will still have, and be subjected to, a yielding pressure.

The remaining details of the device, in so far as my invention is concerned, are as follows: The windings of the magnet are indicated by the letter *e'*, easily apparent in Fig. 1, the letter *e* in Fig. 2 indicating the magnet as a whole. The core of the magnet itself, that is, the stationary core, is lettered *u*.

I claim as my invention—

1. An emergency electric brake for street-cars, consisting of the combination of an electromagnet, brake-shoes for the wheels, an armature for the magnet, an elastic connection between the armature and the car, and an independent elastic connection between the armature and the brake-shoes, the elastic connections being of such a nature that the armature is free to move in any and all directions within prescribed limits.

2. An emergency electric brake for street-cars, consisting of the combination of an electromagnet extending from side to side of said car, brake-shoes for the wheels, an armature for the magnet, extending throughout the whole length thereof, and suspended from the car-truck by helical springs, and carrying the tubes on the under side thereof, at or near the ends, and in the plane of the wheels, helical springs hanging downward from said armature, within said tubes, and projecting beyond the ends thereof, which are connected to blocks *l*, provided with grooves, levers having arms provided with grooves opposite the grooves in the blocks, balls located in the said grooves, pivotal connections between said shoes and said arms, angle-irons *d*, supporting said levers, said magnet and links *q*, which are pivoted to said angle-irons and to said shoes, and adjustable tension-screws connecting said levers to said angle-irons.

3. In an electric brake apparatus, the combination of an electromagnet inverted under a car, and rigidly connected thereto, and having an armature elastically connected to the car, brake-shoes for the wheels provided with horizontal operating-arms adapted to move circularly, pushing-blocks for the arms connected elastically to the armature, and balls which are confined within grooves cut both into said arms and into said blocks.

4. In an electric brake apparatus, the combination of an electromagnet inverted under a car, and rigidly connected thereto, and having an armature elastically connected to the car, brake-shoes for the wheels provided with horizontal operating lever-arms adapted to move circularly pushing-blocks for the arms connected elastically to the armature, balls which are confined within grooves cut both into said arms and into said blocks, and other arms for said lever, which are elastically adjustable with reference to the car, but rigid with reference to the other arms.

5. An emergency electric brake for street-cars, consisting of the combination of an electromagnet, brake-shoes for the wheels, levers for operating the brake-shoes, an armature for the magnet, and ball-bearings between the levers and bars, which are elastically connected to the armature.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of February, 1896.

BENJAMIN F. CARD. [L. S.]

Witnesses:
W. R. SPOONER,
ARLEY I. MUNSON.