(No Model.) 2 Sheets—Sheet 1.

# J. F. McLAUGHLIN.

## ELECTRIC RAILWAY.

No. 328,420. Patented Oct. 13, 1885.

FIG. 1.

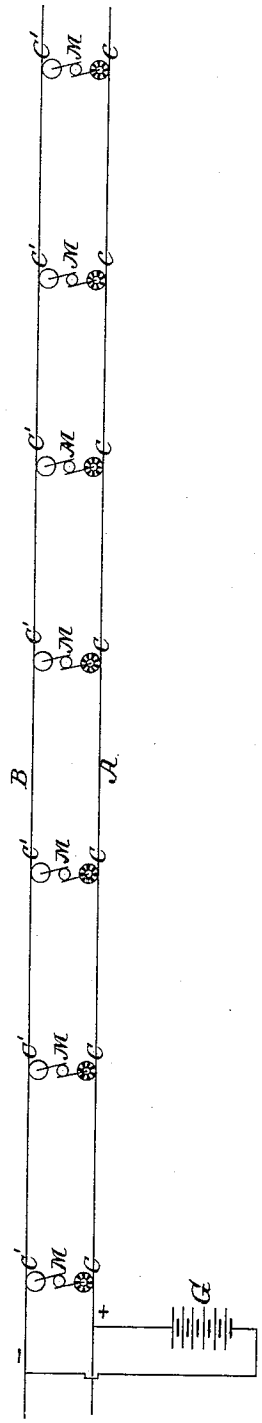



FIG. 5.

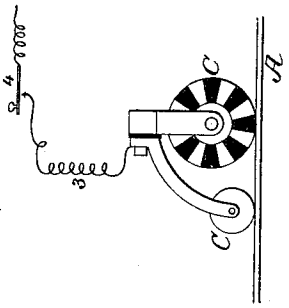



FIG. 3.

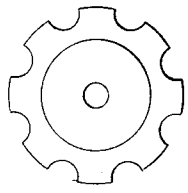


FIG. 2.

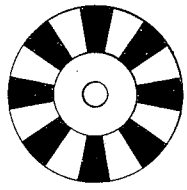
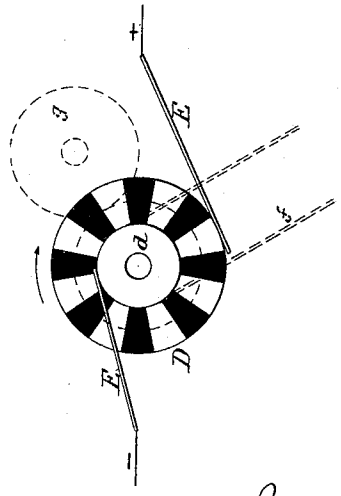


FIG. 4.




Witnesses
John E. Packer
James F. Tobin

Inventor
James F. McLaughlin
by his Attorneys.
Hodgson & Sons

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

# J. F. McLAUGHLIN.

## ELECTRIC RAILWAY.

No. 328,420. Patented Oct. 13, 1885.

FIG. 6.

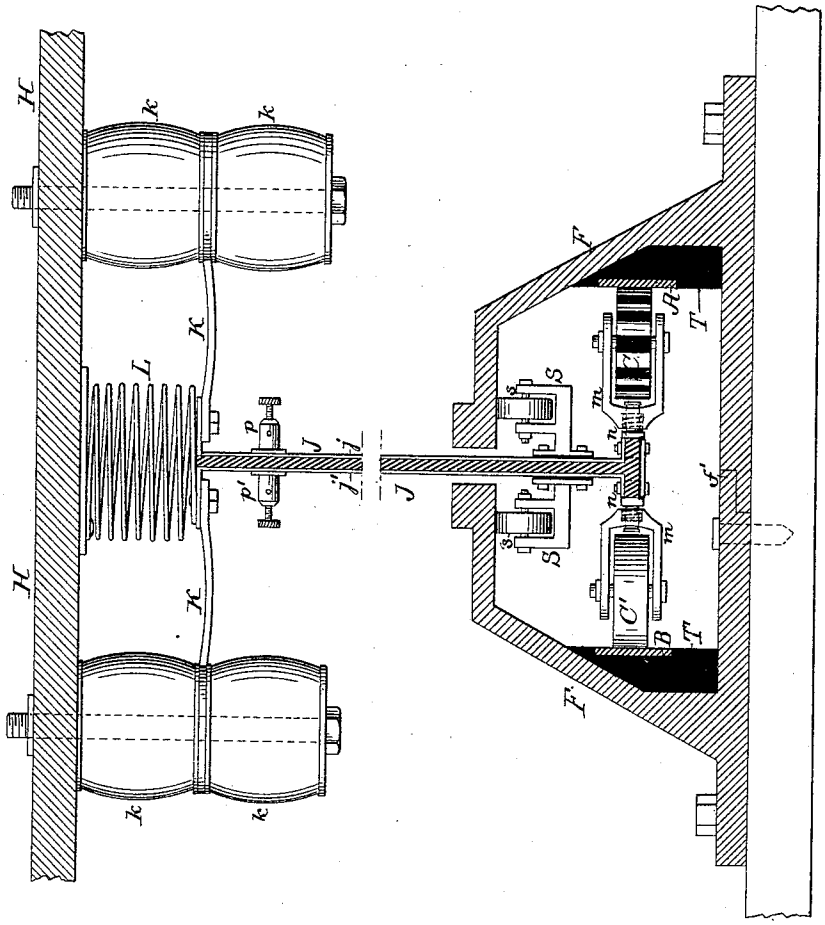
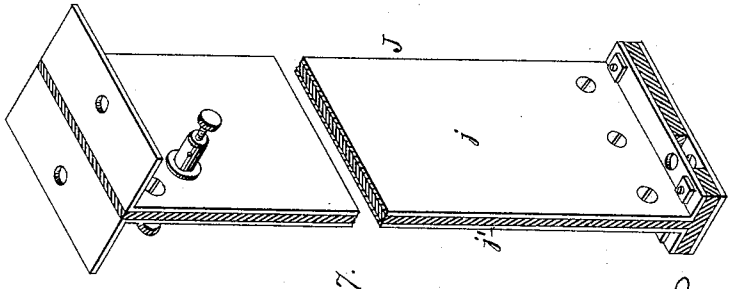



FIG. 7.




Witnesses
John E. Parker
James F. Tobin

Inventor
James F. McLaughlin
by his Attorneys.
Howson & Sons

N. PETERS. Photo-Lithographer, Washington, D. C.

# UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL ELECTRIC RAILWAY SYSTEM, (LIMITED,) OF SAME PLACE.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 328,420, dated October 13, 1885.

Application filed August 25, 1885. Serial No. 175,259. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Electrical Railways, of which the following is a specification.

My invention consists of certain improvements in electrical railway systems, the main object of my invention being to provide for the running of a larger number of cars on a circuit with the motors in multiple arc than is possible in the ordinary way.

In the accompanying drawings, Figure 1 is a diagram illustrating my improvement. Fig. 2 is an enlarged view of a contact-wheel which may be used in carrying out my invention. Fig. 3 is a view of a modified form of wheel. Fig. 4 is a view illustrating how the contact-wheel may be applied. Fig. 5 is a diagram illustrating a further modification. Fig. 6 is a vertical section of a construction which may be employed in carrying out my invention, and Fig. 7 is a perspective view of part of the same.

Referring to the diagram, Fig. 1, A and B represent the main conductors of the line, which may be the ordinary track-rails or conductors laid alongside thereof or in a conduit between the track-rails, and G is the stationary generator supplying the current to run the motors on the various cars, one of the conductors A B forming the outward conductor, while the other is the return-conductor.

M M represent the motors in the various cars, seven being illustrated in the diagram, and C C′ represent the contacts, which in this case are shown as being in the form of wheels running in connection with the conductors A B.

The number of cars which can be run in such a system of multiple arc is necessarily limited by practical considerations; but in order to increase the limit without increasing the size of the conductors, I supply the current from the main conductor to each motor in its derived circuit intermittently, but at such rapid intervals as not to interfere with the practically continuous operation of the motor, and the devices whereby the current is fed intermittently to the several motors are so arranged relatively to each other that the current will not at any specific moment be supplied to the entire number of motors on the section. In other words, some of the motors will be out of circuit while others are in circuit.

As a means of carrying this into practical effect, one or both of the contact-wheels C C′ may be constructed so as to make an interrupted connection with the said conductors A B by building the wheel up with alternating metallic and insulating segments, as illustrated in Fig. 2, or by notching the wheel, as shown in Fig. 3, so that as the car travels on the track and the wheel C, for instance, travels in contact with the conductor A, the motor of the car will receive an intermittent current from the conductor A, and in practical operation the contact-wheel C of the several cars will occupy different relative positions, so that while some of them at any one moment would be making contact with the electrical conductor A, others would be out of contact therewith, and although the number of motors out of circuit at specific different times might vary to some extent, yet for practical purposes that would not seriously interfere with their operation.

The rapidity of the making and breaking of the current supplied to each motor will prevent its intermittent character from interfering with its operation.

Other means may be provided for intermitting the current supplied to each motor without interfering with the current on the main conductor. For instance, the interrupting-wheel D (illustrated in Fig. 4) may be placed at any other point in each derived circuit instead of employing a segmental contact-wheel, suitable brushes E E′ being provided, one to bear on the compound portion of the wheel and the other on the metallic ring or hub *d*.

This circuit-breaker may be adapted to be operated by a belt, *f*, from any moving portion of the car or motor; or, if desired, may be driven continuously from clock-work mechanism *g*, or other motive power. In the latter case the circuit-breakers on the several cars may be timed to run in concert or synchro-

nously, so that a certain number of motors on the section or circuit will always be out of circuit at any time that the others are in circuit.

In practical operation, where one of the contact-wheels C is used to interrupt the circuit it will be necessary to provide for the contingency of the car stopping, so as to leave the wheel with the insulated portion thereof in contact with the conductor, as illustrated in Fig. 5. In such case a supplementary contact, *c*, may be provided with a conductor, 3, and switch or key 4, forming the branch circuit leading to the motor, which may be closed by the operator at any time to supply the current to the motor, when desired.

In carrying my invention into practical effect, I prefer to use the construction illustrated in Figs. 6 and 7, in which F is a conduit, which is laid centrally between the ordinary car-tracks, and containing on its opposite side walls longitudinal insulating-bars T, carrying the conductors A B, in this case preferably of flat copper strips.

I prefer to form the conduit F of two parts, with an overlapping joint, *f'*, at the bottom, as illustrated in Fig. 6, and the conduit thus made is bolted to the transverse sleepers.

H is the under side of a car, and from this is suspended the compound bar J, which carries at its lower end, within the conduit, the contact-wheels C C', adapted to run in contact with the conductors A A. This bar J, as illustrated in Fig. 7, consists of two metallic plates, *j j'*, with an intervening plate of insulating material, and the upper ends of the plates *j j'* are flanged and secured to spring-arms K, which are bolted to the under side of the body of the car, with intervening rubber or other springs *k*, preferably both above and below the yielding arms K.

I prefer also to employ a third spring, L, connected at its upper end to the under side of the car and at its lower end to the top of the bar J. These springs are employed to absorb and lessen the shock imparted to the bar J, carrying the contact-wheels, from the motion of the car.

The arms *m*, which carry the contact-wheels, are electrically connected to the plates *j j'* by any suitable mechanical means; but I prefer, in order to insure the wheels C C' being kept in contact with the conductors A B, to interpose springs *n*, Fig. 6, which tend to push the wheels outward in contact with the conductors A B at all times. The plates *j j'* may be provided with binding-posts *p p'*, to which are connected suitable conductors leading to the motor on the car.

In order to prevent the jumping of the car from raising the bar J and its contact-wheels C C' so far upward as to carry them out of contact with the conductors A B, I affix to the bar J brackets S, carrying anti-friction rollers *s*, adapted to come into contact with the under side of the top plates of the conduit when the bar is raised to any extent, and so keep the wheels C C' in contact with the conductors A B.

I claim as my invention—

1. The combination of a generator, line-conductors, and cars having motors in derived circuits of an electrical-railway system, with devices for intermitting the current in the derived circuits, substantially as set forth.

2. The combination of a generator, line-conductors, and cars carrying electric motors, with interrupting contact-wheels in connection with said conductors, substantially as described.

3. The combination of a generator, line-conductors, and cars carrying electric motors, with wheels to make connection with said conductors, one of said wheels being an interrupting-contact wheel and having a supplementary contact in a branch circuit to the motor, as specified.

4. The combination of the conduit carrying electrical conductors with a car having a suspended bar carrying contacts for said conductors and brackets provided with anti-friction rollers, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:
FRANK M. MILLER,
JOHN E. PARKER.