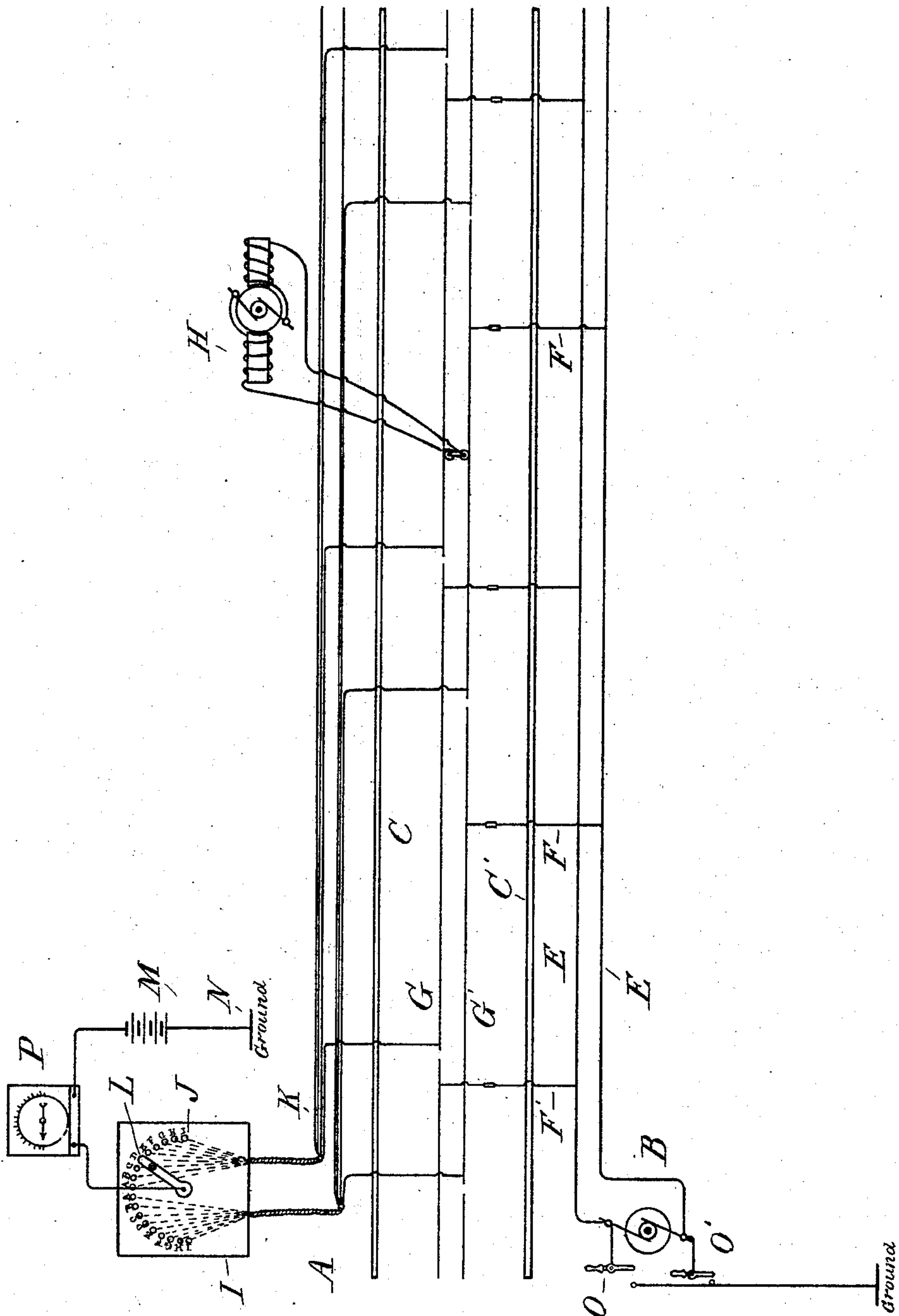


(No Model.)

J. F. CUMMINGS.  
ELECTRIC RAILWAY SUPPLY SYSTEM.

No. 524,976.

Patented Aug. 21, 1894.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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EUGENE M. ENGELMAN, OF MILWAUKEE, WISCONSIN.

## ELECTRIC-RAILWAY SUPPLY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 524,976, dated August 21, 1894.

Application filed September 22, 1892. Renewed January 17, 1894. Serial No. 497,201. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES F. CUMMINGS, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric-Railway Supply Systems, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates more specifically to improvements in the electrical distribution for electric railroads in which contacts on the moving vehicle take the current from conductors or bars which are kept at nearly uniform potential.

The objects of my improvement are to avoid the dangers and the disturbances in the traffic arising from the short circuiting of said conductors with the earth or other conductors, and to this end my invention consists in the peculiar arrangement and construction of the conductors in combination with permanent means for testing them in a manner to immediately detect and locate any fault, whereby no time is lost in searching and repairing, while at the same time the system may be kept in running order to permit traffic to go on uninterruptedly, all as more fully hereinafter described and shown in the accompanying drawing which shows my improvement in a diagrammatic plan of a section of the road at the central station.

A is the central station at which the electric power is generated; B indicates one of the generators and C C' the rails of a railway track. From this central station the two insulated metallic conductors E E' extend along the track, they form the main conductors for the electric power which is distributed by means of feeders F F' to two distributing conductors G G' which run in suitable relation to the track to enable the contacts on the vehicle to travel in contact therewith, and thereby connect the motor H which is supposed to be on the traveling vehicle in multiple circuit with the distributing conductors. The latter are insulated and divided electrically into sections each of which has its independent feed connection with the main conductors.

At the central station is located a switch board I having a movable contact L and a

number of fixed contacts J corresponding in number with the number of sections of the distributing conductors and these contacts are connected by test lines K with the sections of the distributing conductors, whereby each section thereof has its own independent test line represented on the switch board by a contact identified by its position on the switch board and otherwise with the exact position of the section to which it is connected. These test lines are preferably assembled into cables as shown, whereby they may be more conveniently disposed of. To the movable contact L is secured one terminal of a battery M, the other terminal of which is secured to a ground connection N. The fixed contacts are preferably arranged in a circular group around the pivotal center of the movable contact so that by turning the latter upon its pivot it will contact *seriatim* with the fixed contacts.

P is a galvanometer or other like electric indicating device operated by the passage of a current.

Each of the feeders F F' is provided with a safety fuse or other current limiting device so arranged as to break circuit if the current passing through it exceeds a certain amount. In practice these safety fuses are preferably inclosed within the junction boxes at the connections of the feeders with the main conductors, whereby their location is defined and accessible for replacing any one if it should happen to be blown out.

The generator B is provided with suitable switches O O' whereby either pole may be provided with a ground connection.

In practice the parts being constructed and arranged as shown and described they are intended to operate as follows: In the normal state of distribution, the whole system of conductors is insulated and may be disposed of in the ground in well protected closed conduits removing all danger of forming short circuits with the exception of the distributing conductors, which necessarily must remain exposed for contact with the trolley on the car, and it is from this condition which in the overhead system as well as in the so-called underground system in which slotted conduits are used danger and inconveniences arise from



short circuiting, which my construction is designed to obviate. To this end it will be seen that the operator in charge is now in position to ascertain in an instant whether every section of the two distributing conductors is properly insulated by merely giving the movable contact a turn over the fixed contacts, as the grounding of any one of the sections would be immediately shown at the indicator by the passage of a current owing to the closing of a circuit. The location of the grounded section being indicated by the contact on the switch board giving the indication steps may be taken to immediately repair the damage and thus with a frequent use of this means for testing the systems may be prevented from becoming inoperative.

Owing to the use of two insulated metallic conductors it is obvious that the formation of a ground on one or more sections of one of the conductors does not interfere with the operation of the system, but should a section of the other conductor become grounded too, then a short circuit would be formed through the ground between the ground sections of the distributing conductors. This would produce an abnormal flow of the main current through the feeders connected with such ground sections and as a result one of the safety fuses would blow out and thereby prevent all danger arising from a short circuit, at the same time the traffic on the line may still be maintained by connecting that pole of the dynamo the distributor conductor of which has a grounded section with the ground. In this case a sufficient current will still be furnished to the motor to carry the car along and thus ample provision is provided by my construction to maintain the traffic on the system provided ordinary care and vigilance in detecting and repairing are exercised.

What I claim as my invention is—

1. In an electric power system for railways, the combination with two insulated supply conductors two distributing conductors divided into sections independently connected by feeders to main supply conductors, of a switch at a central station having contacts

connected by independent test lines with the sections of the distributing conductor, an independent source of electricity having one terminal connected to the movable contact of the switch and the other to the ground and an electric indicating device in circuit with said source of electricity, substantially as described.

2. In an electric power system for railways, the combination with an electric source of power, of two insulated main conductors, two distributing conductors divided into sections independently connected by feeders with said main conductors respectively, safety fuses in said feeders, test lines extending from a central station independently to each section of the distributing conductors, an independent source of electricity having one terminal grounded, means for connecting the other terminal with each test line, and a galvanometer in circuit with the test lines, substantially as described.

3. In an electric power system for railways, the combination with the track rails and motor in a car, of an electric power generator, two main conductors, two insulated distributing conductors divided into sections independently connected by feeders with said main conductors, safety fuses in said feeders, traveling contacts on the car adapted to connect the motor circuit in multiple with the distributing conductors, means for grounding either pole of the generator, and independent test circuits for every section of the distributing conductors, said test circuits including an independent source of electricity, an electric indicator, and a switch for connecting the sections of the distributing conductors *seriatim* in circuit with said source of electricity and electric inductor, substantially as described.

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

JAMES F. CUMMINGS.

Witnesses:

M. B. O'DOHERTY,  
N. L. LINDOP.