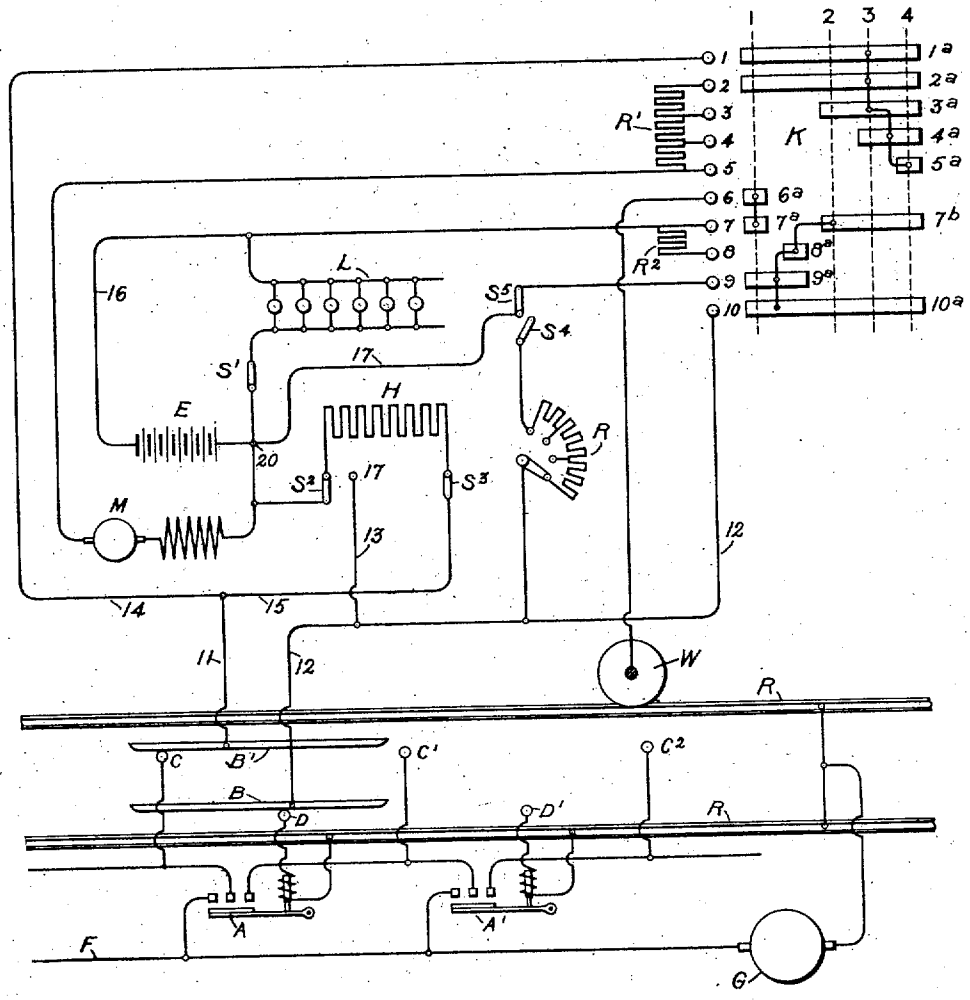
No. 850,117. PATENTED APR. 9, 1907.

W. B. POTTER.

ELECTRIC RAILWAY.

APPLICATION FILED SEPT. 24, 1902.



Witnesses.

George H. Tilden

Helen A. Ford

Inventor.

William B. Potter.

by Albert G. Davis

Att'y.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM B. POTTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC RAILWAY.

No. 850,117. Specification of Letters Patent. Patented April 9, 1907.

Application filed September 24, 1902. Serial No. 124,634.

To all whom it may concern:

Be it known that I, WILLIAM B. POTTER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

This invention relates to improvements in electric railways operated by the well-known closed-conduit or surface-contact system, wherein the working conductor consists of normally deënergized sections which are connected with the line or the feeder successively as the car proceeds. These conductor-sections, which may be either rails or small studs located in the road-bed, are adapted to be connected with the feeder by electromagnetic switches located along the way, the actuating-coils of which are successively energized as the car proceeds by current flowing from the feeder through one of the electromagnetic switches which has already been closed. To obtain the initial current to start the car, the actuating-coil of an electromagnetic switch is energized by an auxiliary source of power, such as a battery carried by the car.

The object of my invention is to so arrange the circuits—such as the motor, heating, and lighting circuits—on the car relative to the auxiliary source of power that the said auxiliary source of power may be used for various purposes other than picking up the electromagnetic switches initially.

A further object is to provide for recharging the auxiliary source of power with all or any desired part of the current flowing through the motor and heater circuits.

My invention consists of improvements in the car-circuits of the system shown and described in my Patent 589,786, issued September 7, 1897, as will be clearly pointed out in the following specification and specifically stated in the appended claims.

The accompanying drawing represents diagrammatically a surface-contact electric-railway system, such as is shown and described in the patent above referred to, embodying my invention.

Referring now to the figure, A A′, &c., represent electromagnetic switches of a surface-contact railway which are adapted to connect the positive contact-studs C C′ C^2, &c., with the feeder F, connected with the generator G. The negative contact-studs D D′, &c., are connected to the return-circuit (shown in the diagram as the service-rails R) through the actuating-coils of the electromagnetic switches A and A′. The contact-shoes B and B′, carried by the car, are adapted to engage, respectively, with the rows of positive and negative contact-studs.

The car equipment comprises a motor or motors, such as M, a storage-battery or auxiliary source of power E, heater or heaters H, a controller K, and a lighting-circuit L. The cylinder of the controller K is shown in development, as is customary in illustrating railway motor-controllers of this type. The fixed contacts of the controller are represented by 1 to 10, inclusive, and the movable contacts or segments mounted on the rotatable drum or cylinder of the controller are represented by 1^a to 10^a, inclusive, and 7^b.

The arrangement of the circuits shown provides means for charging the storage battery E with the full current taken by the motor or motors or by such portion of said current as may be found necessary to replace energy required for initially energizing the actuating-coils to pick up the switches and to light the car.

When it is desired to start the car and the electromagnetic switches A A′, &c., are all open, the controller K is moved into its first operative position and a circuit is completed from the auxiliary source of power carried by the car through the actuating-coil of one or more of the electromagnetic switches, thereby picking up said switch or switches. This circuit may be traced as follows: from the storage battery E through the conductor 17, switch S^5, fixed contact-finger 9 of the controller K, contact-segments 9^a and 10^a, fixed contact-finger 10, conductor 12, contact-shoe B, contact-stud D, through the actuating-coil of the electromagnetic switch A, service-rails R, through the car-wheel *w*, contact-finger 6 of the controller K, contact-segments 6^a and 7^a, contact-finger 7, conductor 16, to the other side of the battery E. The circuit from the feeder F through the car-motors, which is completed upon the closing of one of the electromagnetic switches, may be traced as follows: through the switch A, surface contact-stud C, contact-shoe B′, conductors 11 and 14, contact-finger 1 of controller K, contact-segments 1^a and 2^a,

contact-finger 2, resistance R′, through the motor M, battery E, conductor 16, contact-finger 7 of the controller K, the contact-segments 7^a and 6^a, contact-finger 6, to the service-rail return R, through the car-wheel *w*. A branch circuit leads from the motor-circuit just traced at 20 and conducts current through the conductor 17, switch S^5, contact-fingers 9 and 10 of controller K, through the actuating-coil of switch A, to return R, as above described. Consequently a portion of the current taken by the motors serves to recharge the storage battery and another portion of the current operates to maintain the switch A closed.

In moving from the first to the second position of the controller K the battery is connected in series with the pick-up coils of the electromagnetic switches instead of being connected directly to the return through the car-wheel *w*, as in the first position of the controller. When changing the battery connections from those shown as corresponding to the first position of the controller to those shown as corresponding to the second position of the controller, there is great liability of short-circuiting the battery. The resistance R^2, which is cut into the battery-circuit by means of the contacts 8 and 8^a of the controller K, is provided for the purpose of preventing such a short circuit.

In the second and subsequent operative positions of the controller the storage battery receives the full current taken by the motors, as also does the actuating-coil of the electromagnetic switch. Should it be desired to regulate the charge of the battery by closing the switch S^4 and adjusting the resistance R, the battery will be shunted of any predetermined portion of the current.

The arrangement of circuits shown on the drawing also provides for connecting the heaters H in series with the storage battery or in shunt thereto, depending upon whether or not the additional current passing through the heaters is required to maintain the charge of the battery. This is accomplished by means of the switches S^2 and S^3, which are adapted to connect the heater H to the positive contact-shoe B′ through the conductors 11 and 15 and to the connection between the motor M and the battery E when in the positions shown in the diagram. By throwing the switch S^2 into register with the contact 17 the heater is connected in shunt to the car-motor and in series with the actuating-coils of the electromagnetic switches as the car proceeds. During the winter, when heaters are used and the hours of lighting longest, the heaters will therefore provide a considerable percentage of current in excess of the charge for the battery received from the motor-circuit alone. The lighting-circuit L is so arranged as to be thrown across the terminals of the battery E by the operation of the switch S′, so that the lamps in said circuit will be maintained at approximately their full candle-power independent of the operation of the electromagnetic switches, which necessarily will be dropped when the controller K is moved to its "off" position and the car stopped. As the controller is moved from its first to its fourth operative position the resistance R′ in the motor-circuit is gradually cut out.

The arrangement of circuits shown on the diagram and described herein is merely a preferred form and many modifications within the spirit and scope of my invention will readily suggest themselves to persons skilled in the art to which this invention pertains.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric railway, the combination with a feeder, of conductor-sections, electromagnetic switches for connecting the feeder to the conductor-sections, an auxiliary source of power carried by the car, a motor or motors, means for completing a circuit through said auxiliary source and said switch-coils to initially energize the latter, means for connecting said auxiliary source of power in series with said motor or motors and said switch-actuating coils, and an adjustable resistance in shunt to the auxiliary source of power whereby the rate of recharge of the said auxiliary source of power may be varied as desired.

2. In combination, a main source of power, an auxiliary source of power, translating devices, means for connecting said auxiliary source and one of said translating devices in series with each other to said main source of power, and means for connecting another of said translating devices to said main source of power either in shunt or in series with said auxiliary source of power.

3. In an electric railway, the combination with a feeder, of conductor-sections, switches for connecting the feeder to the conductor-sections, motors and an auxiliary source of power carried by the car, and a controller for completing a circuit through said auxiliary source and actuating-coils for said switch to initially energize the latter and for connecting said auxiliary source in series with said motors and said coils.

4. In a sectional-conductor electric-railway system, electromagnetic switches for connecting the feeder with the sectional conductor, car-motors, an auxiliary source of power carried by the car, and a controlling-switch adapted when in one position to connect the auxiliary source to the actuating-coils of the switches and when in another position to connect the motors and auxiliary source of power and the switch-actuating coils in series.

5. In combination, a main source of power, an auxiliary source of power, a translating

device adapted to be energized from either source, a controller so constructed and arranged as to connect said translating device to said auxiliary source and then to connect said translating device and said auxiliary source in series with each other to said main source of power, and an adjustable resistance connected in shunt to said auxiliary source of power whereby the rate of recharge of the latter may be varied.

6. In combination, a main source of power, an auxiliary source of power, a translating device adapted to be energized from either source, a controller so constructed and arranged as to connect said translating device to said auxiliary source and then to connect said translating device and said auxiliary source in series with each other to said main source, and means for preventing said auxiliary source from being short-circuited while said connections are being changed.

7. In combination, a main source of power, an auxiliary source of power, a translating device adapted to be energized from either source, a resistance, and a controller so constructed and arranged as to connect said translating device to said auxiliary source and then to connect said translating device and said auxiliary source in series with each other to said main source and also to connect said resistance in circuit with said auxiliary source to prevent the latter from being short-circuited while said connections are being changed.

8. In a sectional-conductor electric-railway system, electromagnetic switches for connecting the feeder with the sectional conductor, car-motors, an auxiliary source of power carried by the car, a controller adapted when in one position to connect the auxiliary source to the actuating-coils of the switches and when in another position to connect the motors, the auxiliary source of power and the switch-actuating coils in series, and means for preventing said auxiliary source from being short-circuited while the controller is passing from one of said positions to the other.

9. In a sectional-conductor electric-railway system, electromagnetic switches for connecting the feeder with the sectional conductor, a car-motor, an auxiliary source of power, a controller adapted when in one position to complete a circuit through the auxiliary source of power and the actuating-coils of the electromagnetic switches to close said switches and when said switches are closed to connect the auxiliary source of power and the actuating-coils of said switches in shunt to each other and in series with the car-motor between the feeder and the return, and when in another position to connect the motor, the auxiliary source of power and the switch-actuating coils in series with each other between the feeder and the return.

10. In a sectional-conductor electric-railway system, electromagnetic switches for connecting the feeder with the sectional conductor, a car-motor, an auxiliary source of power, a controller adapted when in one position to complete a circuit through the auxiliary source of power and the actuating-coils of the electromagnetic switches to close said switches and when said switches are closed to connect the auxiliary source of power and the actuating-coils of said switches in shunt to each other and in series with the car-motor between the feeder and the return, and when in another position to connect the motor, the auxiliary source of power and the switch-actuating coils in series with each other between the feeder and the return, and means for preventing said auxiliary source of power from being short-circuited when the controller is moved from one of said positions to the other.

11. In combination, a main source of power, an auxiliary source of power, translating devices, a controller for connecting said auxiliary source of power to said main source of power through the translating devices and an adjustabl eresistance adapted to be connected in shunt to said auxiliary source of power whereby the whole or any desired part of the current taken by said translating devices may pass through said auxiliary source of power to vary the rate of recharge of the latter.

In witness whereof I have hereunto set my hand this 22d day of September, 1902.

WILLIAM B. POTTER.

Witnesses:

GEORGE DE B. GREENE,

HELEN ORFORD.