No. 729,216. PATENTED MAY 26, 1903.

J. S. PEVEAR.

ELECTRIC RAILWAY.

APPLICATION FILED JAN. 28, 1903.

NO MODEL.

Fig. 1.

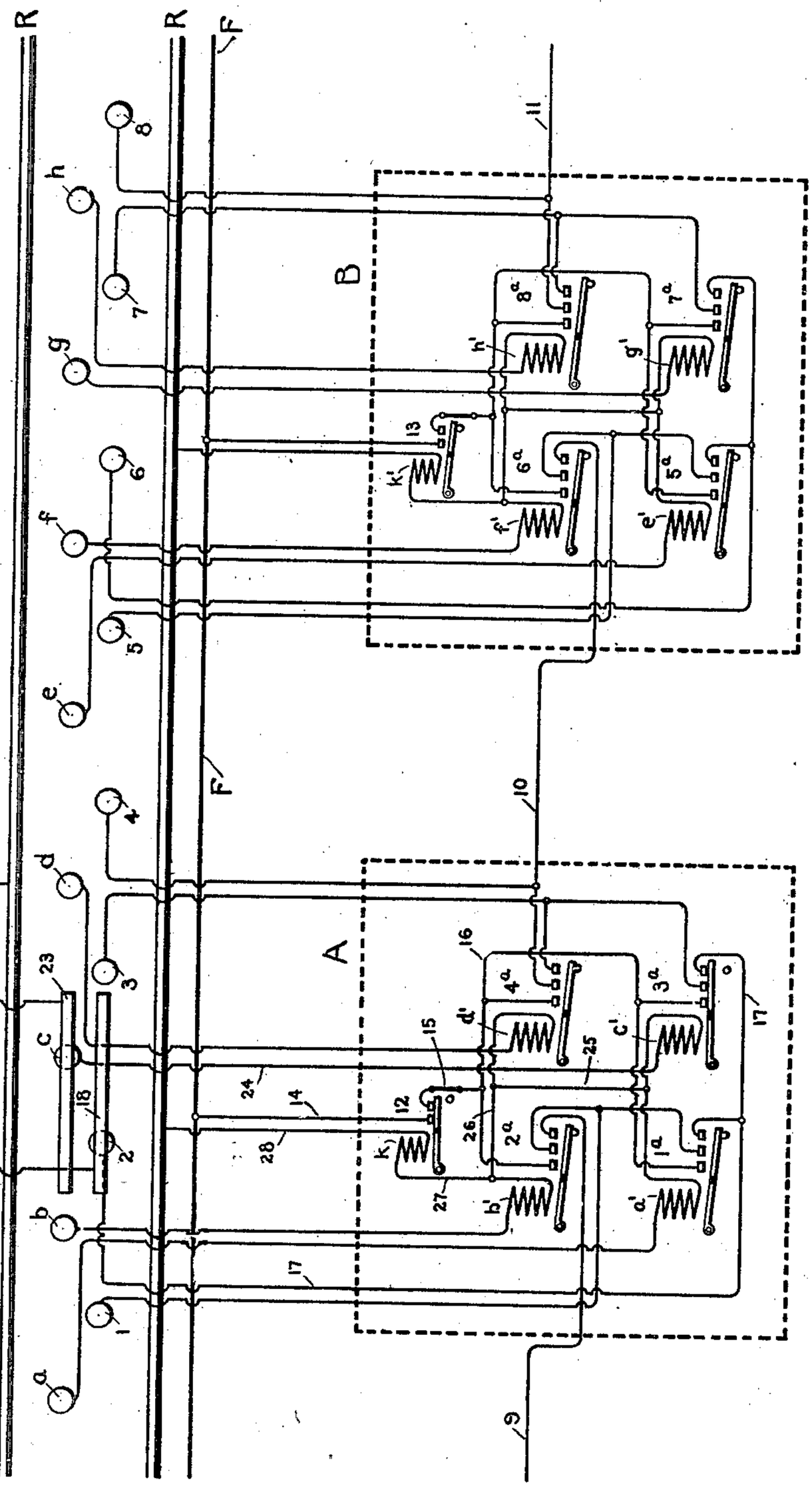
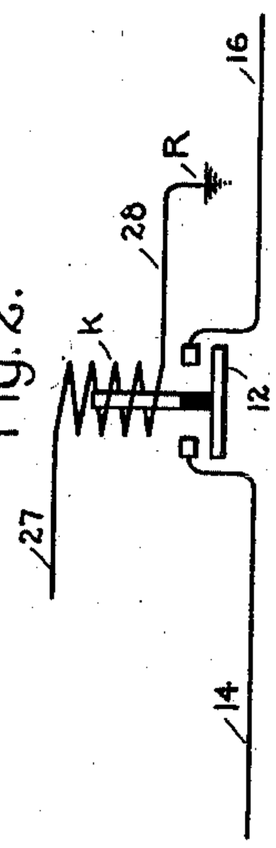


Fig. 2.



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No. 729,216. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

JESSE S. PEVEAR, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 729,216, dated May 26, 1903.

Application filed January 28, 1903. Serial No. 140,879. (No model.)

To all whom it may concern:

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

My invention relates to electric-railway systems, and more particularly to railway systems of the surface-contact or sectional-conductor type.

In the construction of electric railways of the surface-contact type it has been customary to locate the contact-studs in the roadway parallel to the service-rails and to mount the electromagnetically-actuated switches which control the connections between the feeder and said contact-studs within vaults or other protecting-housings located at intervals along the way. The group of switches in each vault is designed to control a certain section of the road, and the vaults are so constructed and located that the switches may be readily inspected and repaired when necessary. One of the main objections to railways of this type is that the surface-contact studs, which should be dead or deënergized except when a car is passing over them, are sometimes rendered dangerous, due to the leakage of current from the energized parts of the system. This is especially true when one contact of each electromagnetically-actuated switch is normally connected to the feeder and the other contact or contacts of said switch are normally connected directly to the contact-studs in the roadway.

The object of my invention is to eliminate almost entirely all possibility of accident and damage due to leakage of current from the switch-contacts or other live parts of the system to the contact-studs or other parts which are supposed to be normally deënergized and with which the public in general, and more especially the workmen and inspectors employed by the road, are liable to come in contact. To accomplish this result I mount within the vault or protecting-inclosure containing a group of switches or at any other convenient point an auxiliary switch the contacts of which are connected in circuit with the contacts of the electromagnetically-actuated switches between the feeder and said switches and the actuating-coil of which is located in the common return-circuit from the actuating-coils of said group of switches. The auxiliary switch is so connected relative to the switches in the vault that when a car enters the section controlled by the switches in that vault the auxiliary switch closes simultaneously with the first operating-switch of the vault and remains in its closed position so long as current is being drawn from that section. When the car leaves the section, the auxiliary switch opens and renders the vault dead until another car enters the section. The vault is thus made much safer for workmen and inspectors and the danger due to leakage-currents is almost entirely eliminated. When the auxiliary switch is mounted within the vault, it will be seen that there is only one normally energized point or contact within said vault. This switch may, if desired, be mounted in an auxiliary vault or protecting-housing, thus further reducing the danger of contact with energized parts while working within said vault.

In the accompanying drawings, which illustrate the preferred embodiment of my invention, Figure 1 represents diagrammatically a surface-contact electric-railway system having its switches located in vaults, each vault being protected by an auxiliary switch; and Fig. 2 represents diagrammatically, on a larger scale, the electrical connections of said auxiliary switch.

Referring now to the figures of the drawings, A and B, which refer to the spaces inclosed within the dotted-line squares, indicate two adjacent vaults or other protecting-casings, each containing a plurality of electromagnetically-actuated switches for connecting the working contact-studs 1 to 8, inclusive, in the roadway with the insulated feeder F. The leads or conductors from the switches contained in said vaults to the contact-studs of the roadway and also to the feeder F are supposed to be contained within insulated conduits. The working contact-studs 1, 2, 3, and 4, forming a section controlled by the switches in the vault A, are connected to the switches 1^a, 2^a, 3^a, and 4^a. The pick-up contact-studs a, b, c, and d of said section are connected

through the actuating-coils a', b', c', and d', respectively, of the switches in vault A to the track-rails R or to ground through a common return-conductor including in circuit the actuating-coil k of the auxiliary switch 12. The contacts of said auxiliary switch are connected in circuit between the feeder F and contacts on the respective switches contained in said vault.

The working contact-studs 5, 6, 7, and 8 are connected to the switches 5^a, 6^a, 7^a, and 8^a within the vault B. The pick-up contact-studs e, f, g, and h are connected, respectively, to the actuating-coils e', f', g', and h' of the switches in said vault and through said coils by way of a common return-conductor to the ground or track-rail return R. The actuating-coil k' of the auxiliary switch 13 is located in the said common return-circuit, and the contacts of said auxiliary switch are connected in circuit between the feeder F and the contacts of the respective switches in said vault.

The connections between the working contact-studs in the roadway and the electromagnetically-actuated switches in the vaults irrespective of the connections through the auxiliary switch, as shown in Fig. 2, is in accordance with the system shown and described in the patent to W. B. Potter, No. 589,786, granted September 7, 1897, certain contacts of said switches being connected to contacts on adjacent switches and each of said working contact-studs being connected to the connection between two adjacent switches, so that each stud may be energized by either of two adjacent switches. The last switch to be actuated in one vault is electrically connected to the first switch to be actuated in the adjacent vault. For instance, the switch 4^a in the vault A is electrically connected by means of the conductor 10 with the switch 6^a in the vault B. The switch 2^a is likewise connected electrically to a switch in the next adjacent vault through the conductor 9, and the switch 8^a is connected to a switch in the next adjacent vault on the other side of said vault B by means of the conductor 11.

A car adapted to operate on this system is represented diagrammatically at C, the collector-shoe 18, carried by said car, being adapted to engage the row of working conductors or contact-studs, while the collector-shoe 23, also carried by the car, is adapted to engage the row of pick-up contact-studs. The car-motor is represented by 20, and the auxiliary battery, carried by the car, by 30.

In the operation of this system it is necessary to initially energize one or more of the switches contained in one of the vaults in order to connect the working contact-studs with the feeder. This is accomplished by means of an auxiliary source of power, such as a storage battery carried by the car. When the switch 29 on the car is closed, a pick-up circuit is completed from one terminal of the battery 30, the other terminal of which is grounded, through the switch 29, conductor 22, collector-shoe 23, contact-stud c, conductor 24, actuating-coil c', conductors 25, 26, and 27, through the actuating-coil k of the switch 12, conductor 28, to ground or the rail return R. This closes both the switch 3^a and the auxiliary switch 12 and connects the motor carried by the car to the feeder F, as follows: From the feeder F, through the conductor 14, switch 12, fuse 15, conductor 16, switch 3^a, through the conductor 17, contact-stud 2, collector-shoe 18, conductor 19, motor 20, resistance 21, switch 29, through the battery 30, to the ground or rail return, thus recharging the battery; also through conductor 22, collector-shoe 23, contact-stud c, conductor 24, actuating-coil c' of the switch 3^a, conductors 25, 26, and 27, actuating-coil k of the auxiliary switch 12, conductor 28, to the ground or rail return. When the storage battery 30 is sufficiently recharged, the switch 29 is opened and all the current which passes through the motor flows through the return-circuit, as above indicated. As the car moves forward in either direction the pick-up contact-stud next in advance is energized by current flowing from the working contact stud or studs with which the collector-shoe 18 is at the time in engagement. The switches are thus successively energized, and since the actuating-coils of said switches are in circuit with the actuating-coil k of the auxiliary switch in said vault the said auxiliary switch is maintained closed until the car moves off of the last contact-stud of the section controlled by the switches in said vault. As the car enters the next section in advance the first switch of the group controlling said section is operated, together with the auxiliary switch of that section, by current from the feeder through the last operative switch of the preceding section. Whenever the car stops on a section or the motor-circuit is otherwise deprived of current, the switches in the vault immediately open, but may be closed again by means of current from the storage battery 30, as above described.

I have illustrated my invention as applied to a surface-contact system; but it is equally applicable to the so-called "sectionalized third-rail" system, in which long sectional conductors and short collector-shoes carried by the car are employed. It will also be clearly understood that the number of switches which may be located within a single vault is not limited to that herein shown.

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

1. In a sectional-conductor electric railway, a plurality of vaults located at intervals along the way, a plurality of switches in each vault adapted to control a certain number of the sections of the sectional conductor, and means independent of said switches for rendering each vault dead when no current is being taken from any of the sections of the sectional conductor controlled by the switches in the vault.

2. In a sectional-conductor electric railway,

a plurality of vaults located at intervals along the way, a plurality of switches in each vault adapted to control a certain number of sections of the sectional conductor, and an auxiliary switch adapted to disconnect said switches from the source of supply when no current is being taken from any of the sections of the sectional conductor controlled by the switches in the vault.

3. In a sectional-conductor electric railway, a plurality of vaults located at intervals along the way, a plurality of electromagnetically-actuated switches in each vault adapted to control a certain number of sections of the sectional conductor, and an auxiliary switch adapted to disconnect said switches from the source of supply when no current is being taken from any of the sections controlled by the switches in the vault, said auxiliary switch having its actuating-coil in circuit with the actuating-coils of the switches and its contacts in circuit with the contacts of said switches.

4. In an electric railway, a feeder, a sectional conductor, groups of switches for connecting the feeder with the sections of said conductor, and an auxiliary switch for each group of switches located in the feeder connection of the group and adapted to be closed simultaneously with the closing of the first operative switch of said group and to remain in its closed position so long as current is being taken from any of the sections of the sectional conductor controlled by the switches of said group.

5. In an electric railway, a feeder, a plurality of contact-studs arranged along the roadway, electromagnetically-actuated switches for connecting each of said studs to said feeder said switches being arranged in groups, and an auxiliary switch for each group the contacts of which are connected in circuit between the feeder and the switches of said group and the actuating-coil of which is connected in circuit with the actuating-coils of said switches.

6. In an electric railway, a feeder, a plurality of contact-studs arranged along the roadway, a group of switches for connecting said contact-studs to the feeder, and an auxiliary switch adapted to disconnect the switches of said group from said feeder when no current is flowing through any of the contact-studs controlled by the switches of said group.

7. In a surface-contact electric railway, a feeder, a group of switches for controlling a certain section of the roadway, a normally open feeder connection for said group of switches, and means for closing said feeder connection when a car enters said section and for opening said feeder connection when the car leaves said section.

8. In a surface-contact electric railway, a feeder, a group of switches for controlling a certain section of the roadway, a normally open feeder connection for said group of switches, and a switch independent of said controlling switches for closing said feeder connection when a car enters said section and for maintaining it closed only so long as current is taken from said section.

In witness whereof I have hereunto set my hand this 26th day of January, 1903.

JESSE S. PEVEAR.

Witnesses:
BENJAMIN B. HULL,
HELEN OXFORD.