

No. 788,290.

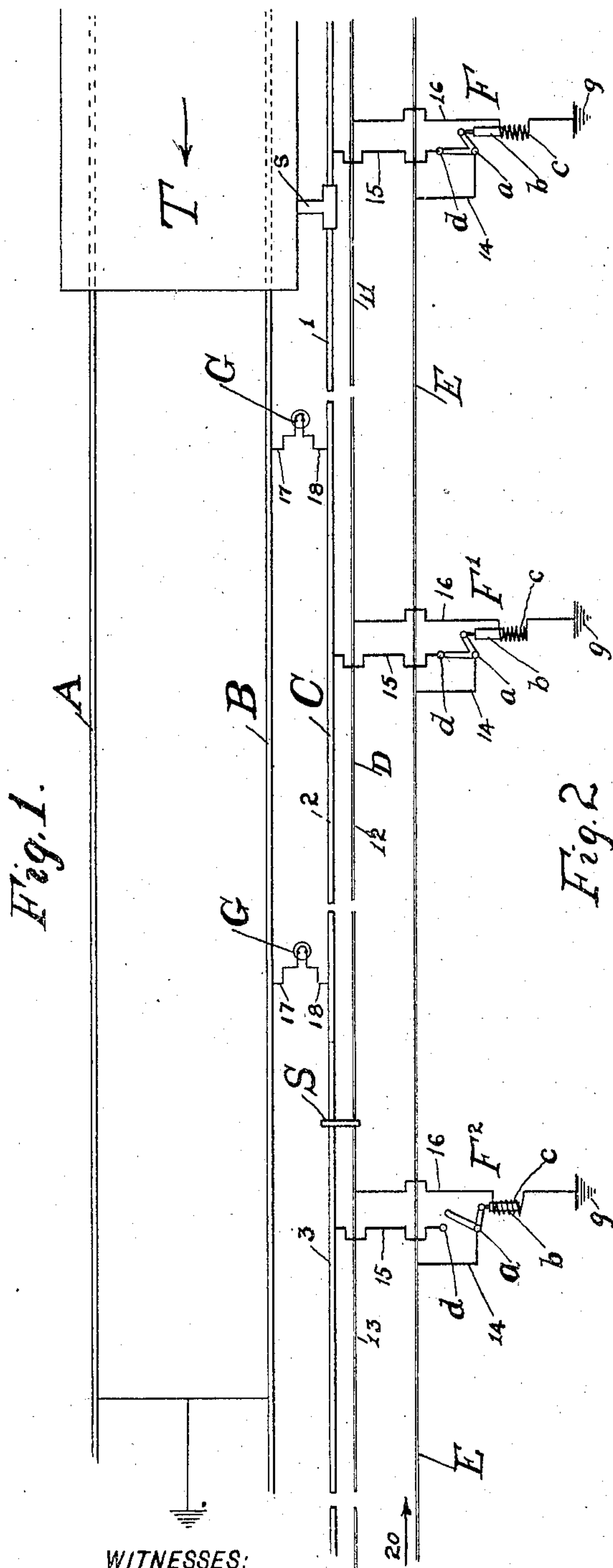
PATENTED APR. 25, 1905.

I. C. THORNE.

PROTECTED THIRD RAIL SYSTEM.

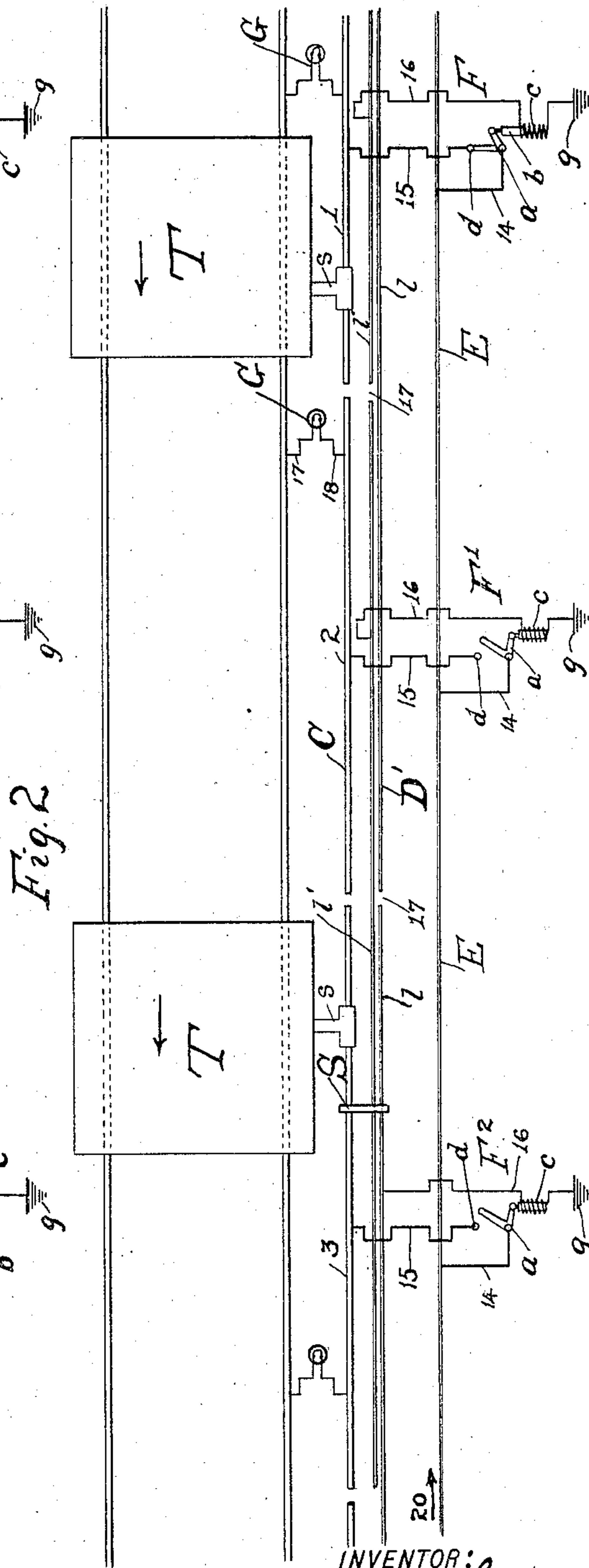
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2 SHEETS—SHEET 1.



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PROTECTED THIRD-RAIL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 788,290, dated April 25, 1905.

Application filed January 2, 1904. Serial No. 187,470.

To all whom it may concern:

Be it known that I, ISAAC C. THORNE, a citizen of the United States of America, residing at Glencove, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Protected Third-Rail Systems, of which the following is a specification.

My invention relates to means for rendering exposed conductors of electric currents of high voltage substantially harmless, and has particular reference to electric-railway systems in which an exposed conductor, generally termed the "third rail," is employed for the purpose of conveying the current to the motors contained in the car or cars for effecting propulsion. Heretofore it has been proposed to render this third rail or exposed conductor harmless by providing the same with a guard serving to protect against accidental contact of a person or persons with the live rail or conductor.

One object of my present invention is to retain the third rail or conductor in its present exposed condition and to provide in connection with the same an exposed safety-conductor arranged adjacent with the said third rail or conductor and extending substantially parallel with the same, so that any communication between the third rail or conductor and the safety-conductor at any point will immediately cut out the entire system or any predetermined section or sections thereof, thereby avoiding any serious accident to a person or persons by reason of the electric current and also stalling any and all trains on the line or any predetermined section or sections thereof.

Another object of my invention is to provide means whereby the entire line or any predetermined section or sections thereof may be cut out by the motorman in charge on the individual car or cars by electrically connecting the third rail or exposed conductor and the exposed safety-conductor through means under the control of said operator.

Another object of my invention is to permit any predetermined section or sections of the entire line to be cut out at any part of the

section or sections, as, for instance, in case of neighboring fires or conflagrations, where the current from the exposed conductor or third rail would prove dangerous to the firemen by simply effecting electrical connection between the third rail or conductor and the safety-conductor by means of a metallic bridge-piece laid across the two exposed conductors.

To this end my invention consists, essentially, in the combination, with an exposed primary conductor from which electric current is superficially delivered, of a second exposed safety-conductor arranged adjacent to the primary conductor and means for cutting out the primary conductor in whole or part when the two exposed conductors are connected for the passage of the current.

The nature of my invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a diagrammatic view of an electric-railway system embodying my invention and showing means for cutting out one section at a time. Fig. 2 is a similar view showing means for cutting out two predetermined sections simultaneously. Fig. 3 is a vertical transverse section taken through a car body and truck and the road-bed. Fig. 4 is a side elevation of Fig. 3.

Similar letters and numerals of reference designate corresponding parts throughout the several views of the drawings.

Referring at present to Fig. 1, the letters A and B designate the rails of a railway, of which the one B may be employed as a return-conductor for the current, as usual. C is the third rail or exposed conductor, which may be made continuous or, preferably, as here shown, in sections, (numbered 1, 2, and 3, respectively.) D is the safety-rail, arranged adjacent to the third rail or conductor C and extending substantially parallel to the same at a distance, say, of three or more inches apart and made in sections 11 12 13, &c., corresponding to the sections of said third rail or conductor, and E is the feeder which takes the current from the dynamo and supplies the same to the third rail or conductor. F, F',

and F^2 designate cut-outs, one for each section 1 2 3, &c., of the third rail or conductor C and placed in communication with the feeder E and with the sections of the third rail or conductor and the sections 11, 12, and 13 of the safety-conductor. Each cut-out consists of a contact-lever a , having its armature b adapted to be actuated by a solenoid or electromagnet c for the purpose of breaking a contact at d . The connection of each cut-out with the feeder E, the safety-conductor D, and the third rail or conductor C or the sections thereof is as follows: From the feeder E a wire 14 is led to the contact-lever a or its bearing, and from the contact d is conducted a wire 15 to the respective section 1, 2, or 3, &c., of the third rail or conductor C. One end of the solenoid or winding of the electromagnet c is grounded, as at g , and the opposite end of the solenoid or winding is connected by a wire 16 with the safety-conductor D. In view of the connections above described the current from the dynamo will pass along the feeder E in the direction of arrow 20, Fig. 1, and under normal conditions pass through the wires 14, levers a , contacts d , and wires 15 to the third rail or conductor C or the sections thereof, thus vitalizing said sections 1 2 3, &c., and permitting the current to pass to the motors of the car or cars through the shoe s of a usual construction attached to the car or cars. The safety-conductor D or its sections 11 12 13 are dead or without current under ordinary circumstances. If for some reason the third rail or conductor C or any one of its sections is placed in electrical communication with the safety-conductor D or any one of its sections, then a circuit is established from the feeder E through the third rail or conductor or its corresponding section and the safety-conductor D or its corresponding section and from thence through the wires 16, the solenoid or coil of the corresponding electromagnet c to the ground, thus vitalizing the solenoid or coil c and causing the cut-out lever a to leave the contact d . The circuit through the feeder E and the wires 14 and 15 to the third rail or the corresponding section thereof is consequently broken, and said third rail or conductor becomes devitalized and is rendered harmless. The cut-out is then in the position shown at F^2 in Fig. 1, the section 3 of the third rail or conductor and the section 13 of the safety-conductor D being devitalized, while the remaining sections are in working condition. In case of neighboring fires the corresponding section or sections of the third rail or conductor may be switched out by a bridge-piece, as S, of conducting material, laid across such sections, thus providing proper safety for the firemen. In order to indicate the existing condition of any section, I make use of signals, as G, connected by wires 17 and 18 with the return-rail and the third rail or conduc-

tor. These signals may be in the form of electric lamps or mechanical signals of any well-known description adapted to be electrically operated.

In Fig. 2 I have shown a system similar to that illustrated in Fig. 1, but so arranged that in case of an electrical connection between the third rail or conductor C and the safety-conductor D' at any one of their sections the corresponding section as well the preceding section is devitalized, thus affording protection against rear-end collisions. In this system the safety-conductor D' is composed of two lines of sectional conductors l and l' , having their interruptions staggered, so that when said two lines and the third rail or conductor C are bridged by a conducting material two cut-outs F' and F'' are operated to devitalize their corresponding two sections 2 and 3 of the third rail or conductor C. This system is of particular advantage in case of fog, where a train may be stopped at the beginning of a section or while partly on two sections.

In Figs. 3 and 4 I have shown the constructive parts of the road-bed in their proper relative positions and the car provided with means under the control of the motorman for the purpose of cutting out the third rail or conductor C by manual means. In the present instance I have shown a bridge-piece H, adapted to span the third rail or conductor C and the safety-conductor D, which said bridge-piece is hinged at e to a suitable bracket on the truck-frame T' of the car and has its inwardly-projecting arm attached, by means of a link f , to a crank g' , mounted on a sheave or chain-wheel h , adapted to be turned through the medium of a second sheave or chain-wheel i , provided with a suitable handle j , combined with a connecting-chain k . The handle j is placed within convenient reach of the motorman, who can operate the mechanism to cause the bridge-piece to span the two exposed conductors, thus throwing out the entire line or one or more sections, according to the arrangement of the system. With the single-section system the motorman could run sufficiently onto the section and then cut out the section by depressing the bridge-piece. With the double-section system the motorman can depress the bridge-piece at any point of the section, since the preceding section becomes devitalized simultaneously with the section that he is on. It is of course to be understood that any other suitable means for operating the bridge-piece may be substituted for those here shown.

While I have herein described my invention as applied to railway systems, it is of course to be understood that it may be applied in the industrial arts for many other purposes, the third rail or conductor being then simply a primary exposed conductor, adjacent to which is arranged the safety or dead

conductor, the proximity being such that contact with the primary conductor involves also contact with the safety-conductor, thus protecting workmen from dangerous contact under all circumstances.

What I claim as new is—

1. The combination with an exposed primary conductor from which current is superficially derived, of a second exposed safety-conductor arranged adjacent to the first conductor and forming part of an auxiliary normally open circuit, a feeder normally in electrical connection with the said primary conductor, and means for cutting out the primary conductor when the two conductors are connected for the passage of the current from the primary conductor to the safety-conductor.

2. The combination with an exposed primary conductor from which current is superficially derived, of a second exposed safety-conductor arranged adjacent to the first conductor and forming part of an auxiliary normally open circuit, a feeder normally in electrical connection with the primary conductor, and means for cutting out the primary conductor when the two conductors are connected for the passage of the current from the primary conductor to the safety-conductor by a bridge-piece adapted to span both conductors.

3. The combination with an exposed primary conductor from which current is superficially derived, of a second exposed safety-conductor arranged adjacent to the first conductor and forming part of an auxiliary normally open circuit, a feeder normally in electrical connection with the primary conductor, and cut-outs for devitalizing the primary conductor when the two conductors are electrically connected for the passage of the current from the primary conductor to the safety-conductor.

4. In an electric-railway system, the combination of a single line of exposed primary conductors for supplying current to the motor of the car; a safety-conductor arranged adjacent to this exposed line and forming part of an auxiliary normally open circuit; a feeder for supplying current to the said primary conductor normally in electrical connection with the exposed primary conductor, and means within the said auxiliary normally open circuit for cutting out the primary conductor when the latter and the safety-conductor are electrically connected for the passage of the current.

5. In an electric-railway system, the combination of a single line of exposed conductors for supplying current to the motor of the car; a safety-conductor arranged adjacent to the exposed line and forming part of an auxiliary normally open circuit; a feeder normally in electrical connection with the said primary conductor, and electrical ground connection with intermediate coil forming part of said

auxiliary normally open circuit and actuating-switch for cutting out the primary conductor when the two conductors are connected for the passage of a current from the primary conductor to the safety-conductor.

6. The combination with an exposed sectional primary conductor from which current is superficially derived, of a second sectional exposed safety-conductor arranged adjacent to the first conductor in corresponding sections and forming part of an auxiliary normally open circuit, a feeder normally in electrical connection with the said primary conductor, and means for cutting out individual sections when the corresponding sections of the two conductors are connected for the passage of the current from the primary conductor to the safety-conductor.

7. In an electric-railway system, the combination of a single line of exposed sectional conductors for supplying current to the motor of the car, a second sectional exposed safety-conductor arranged adjacent to the first conductor and forming part of an auxiliary normally open circuit, a continuous feeder normally in electrical connection with the primary conductors, and means within the said auxiliary normally open circuit for cutting out individual sections when the two sections of the primary conductor and safety-conductor are electrically connected for the passage of the current from the primary conductor to the safety-conductor.

8. In an electrical-railway system, the combination with a single line of exposed sectional conductors for supplying current to the motor of the car, a line of sectional safety-conductors arranged adjacent to the former forming part of an auxiliary normally open circuit, a continuous feeder normally in electrical connection with the primary conductors, and means in connection with the feeder; the sections of the primary conductor and the said safety-conductor and the ground for cutting out the primary conductor when the corresponding sections of the two conductors are connected for the passage of the current from the primary conductor to the safety-conductor.

9. In an electric-railway system, the combination of a single line of exposed primary conductors for supplying current to the motor of the car, a safety-conductor arranged adjacent to the former conductor and forming part of an auxiliary normally open circuit; a feeder for supplying current to the primary conductor and normally in electric connection with the latter, means on the car adapted to span both conductors; and means within the said auxiliary normally open circuit for cutting out the primary conductor when the two conductors are thus spanned.

10. In an electric-railway system, the combination of a sectional exposed primary conductor for supplying current to the motor of

the car, a sectional safety-conductor arranged adjacent to the former conductor, a continuous feeder for supplying current to the sections of the primary conductor normally in electric connection with the latter, and means for cutting out a plurality of corresponding sections of the primary conductor and the safety-conductor when electrical communication is established between the two conductors of one section.

11. In an electric-railway system, the combination of a sectional exposed primary conductor for supplying current to the car, a sectional safety-conductor arranged adjacent to the former conductor, a continuous feeder for supplying current to the sections of the primary conductor normally in electric connection with the latter, means for cutting out a plurality of corresponding sections of the primary conductor and the safety-conductor when electrical communication is established

between the two conductors of one section, and interpolated signals.

12. The combination with an exposed sectional primary conductor from which current is superficially derived, of a second sectional exposed safety-conductor arranged adjacent to the first conductor in corresponding sections and forming part of an auxiliary normally open circuit, a feeder normally in electrical connection with the said primary conductor, means for cutting out individual sections when the corresponding sections of the two conductors are connected for the passage of the current, and interpolated signals.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ISAAC C. THORNE.

Witnesses:

B. J. HILL,

A. FABER DU FAUR, Jr.