(No Model.)

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A. CASAZZA.

ELECTRIC RAILWAY.

No. 553,952. Patented Feb. 4, 1896.

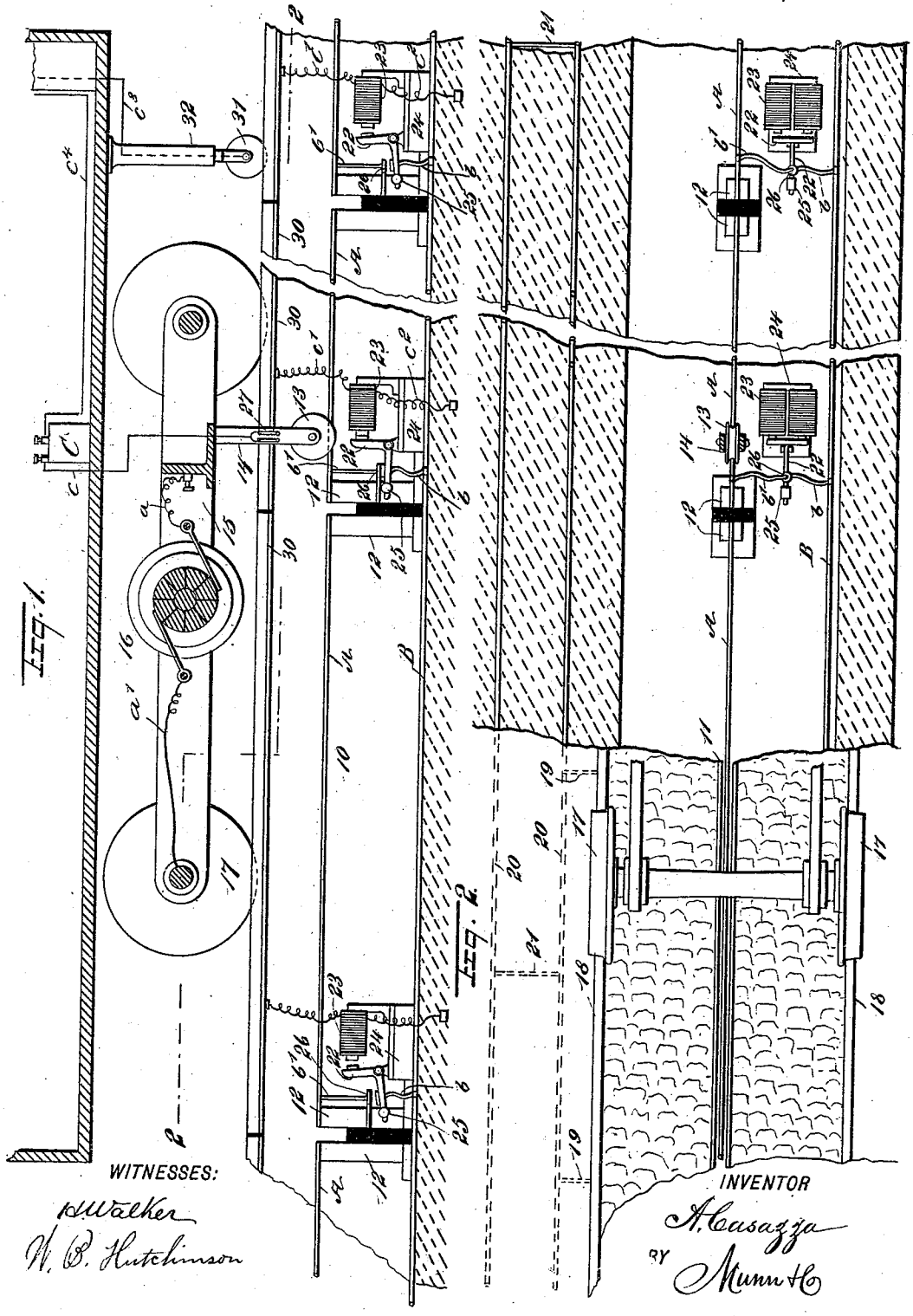

Fig. 1.

Fig. 2.

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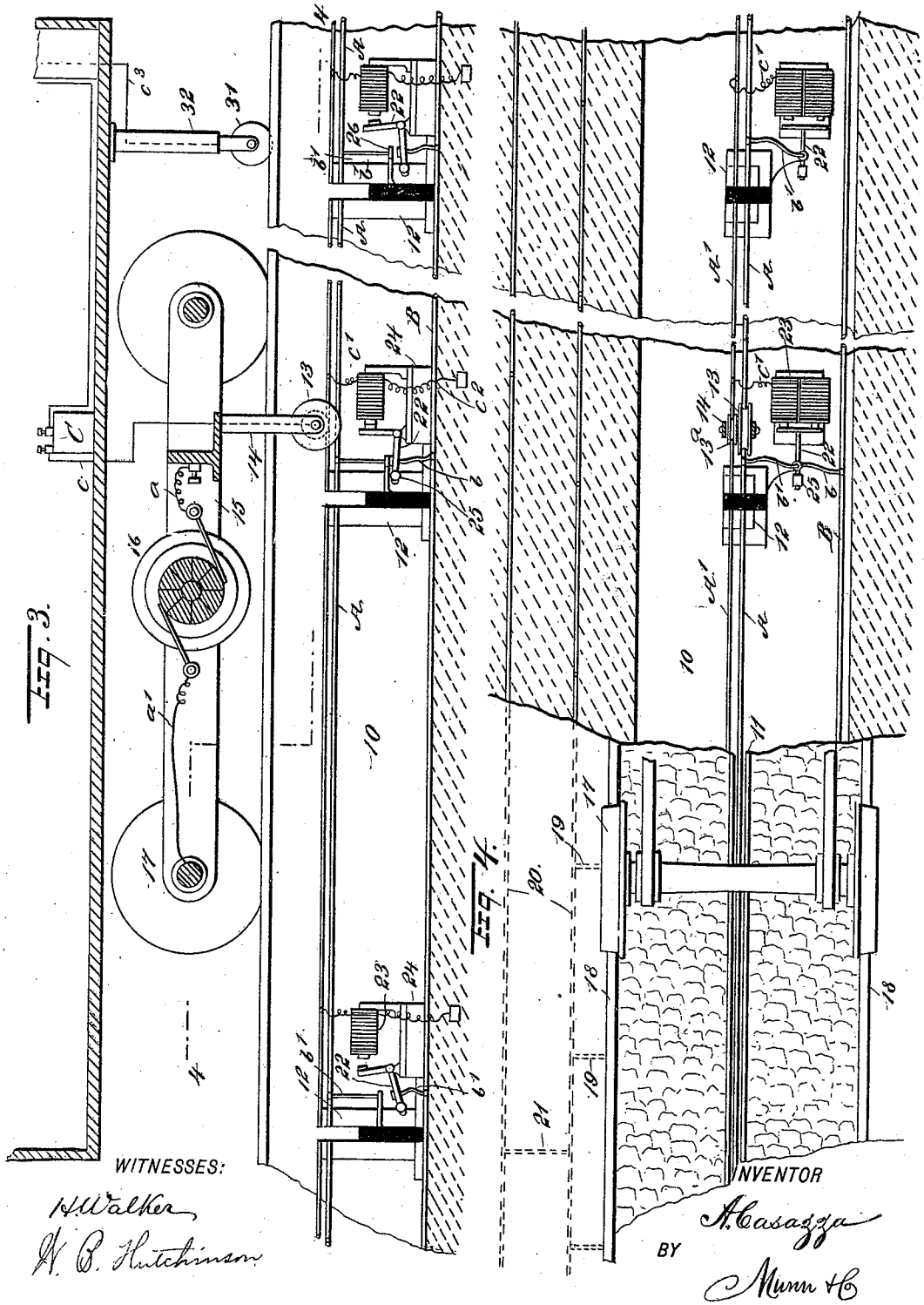

Fig. 3.

Fig. 4.

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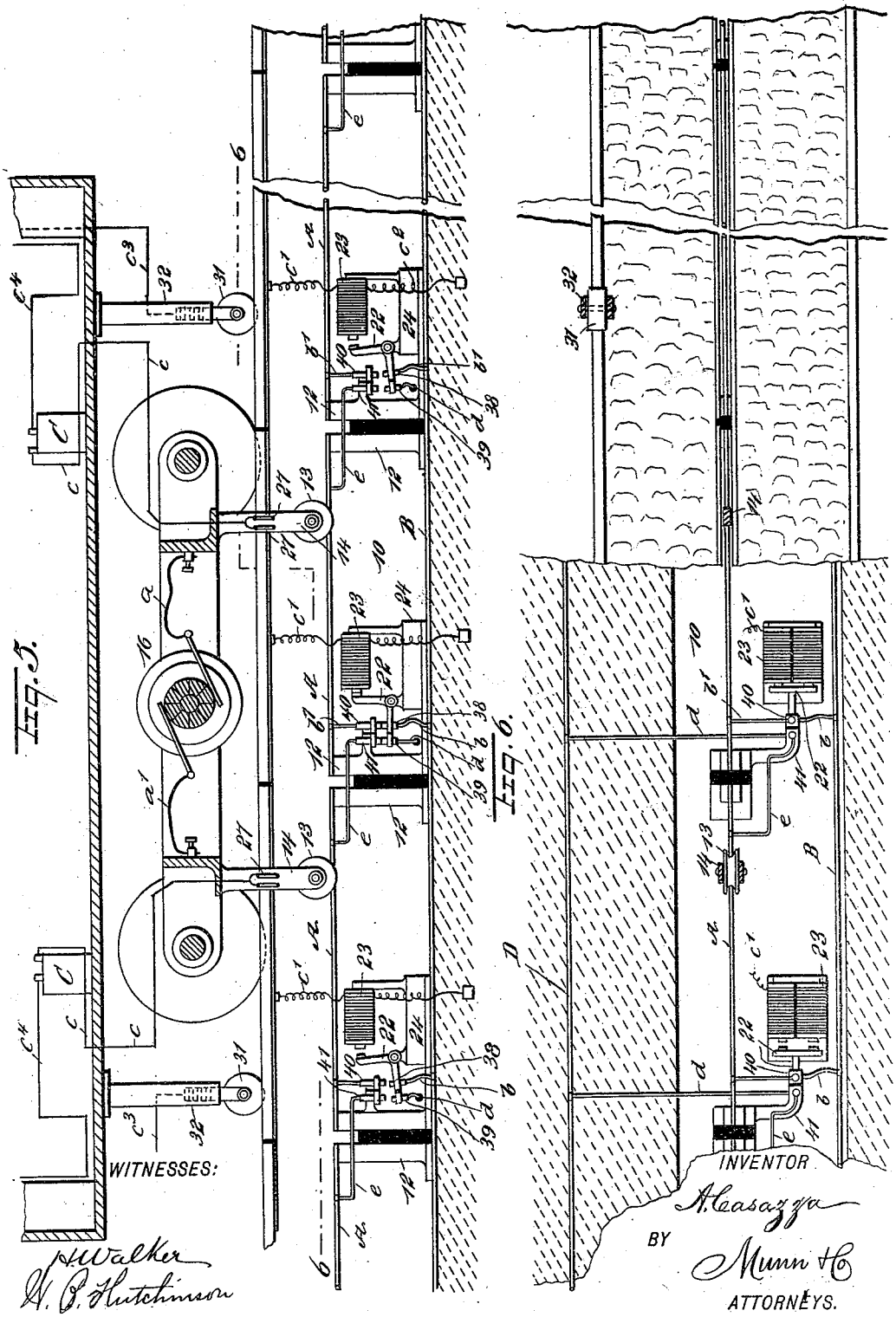

Fig. 5.

Fig. 6.

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Fig. 7

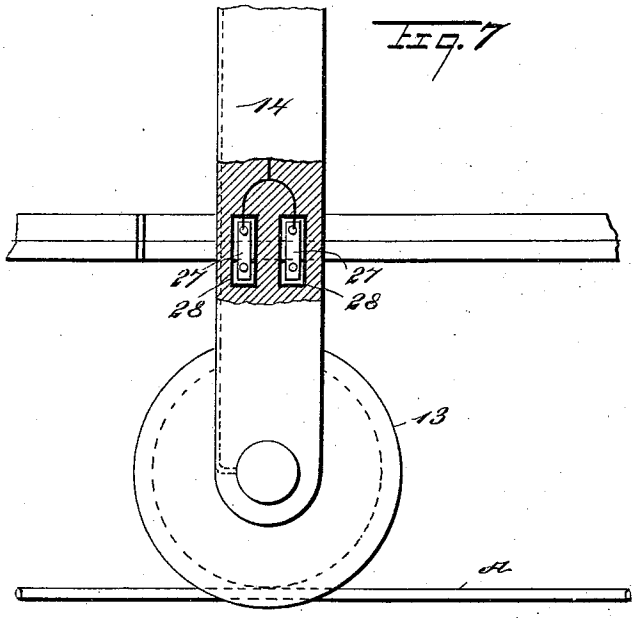


Fig. 8.

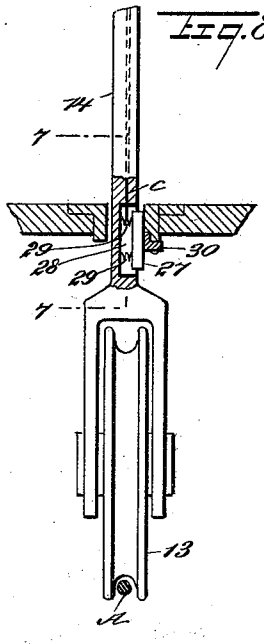


Fig. 9.

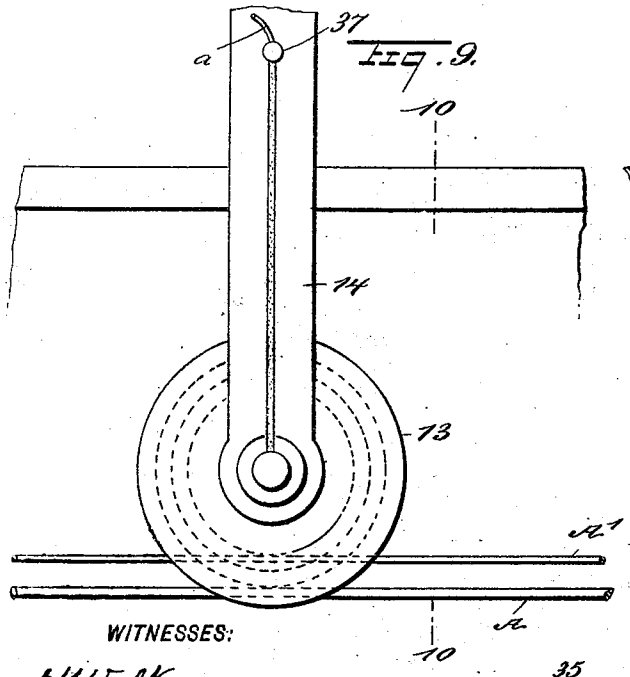


Fig. 10.

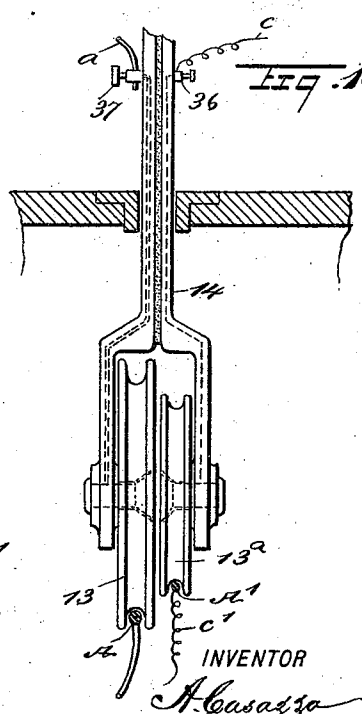
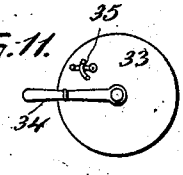


Fig. 11.



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UNITED STATES PATENT OFFICE.

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ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 553,952, dated February 4, 1896.

Application filed December 13, 1894. Serial No. 531,691. (No model.)

To all whom it may concern:

Be it known that I, AUGOST CASAZZA, of Hoboken, in the county of Hudson and State of New Jersey, have invented a new and Improved Electric Railway, of which the following is a full, clear, and exact description.

My invention relates to improvements in conduit electric railways; and the object of my invention is to produce a simple and efficient electric railway of this class, which has the line-wire or trolley-wire made up of a series of independent insulated sections, which has an automatic but easily controlled switch to switch several line-sections in and out of the circuit as the car passes along the track, so that under normal conditions the line-wire is dead and harmless, which has the switches operated by an independent local circuit, preferably energized by a storage-battery on the car, so that the switches may be operated without reference to the line-circuit, and which has the devices comprising it constructed and arranged in such a way that they are sure to operate and are durable and little likely to get out of repair.

To these ends my invention consists of an electric railway, the construction and arrangement of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken longitudinal section of a portion of the electric railway, showing a car with its motor in connection with the line and illustrating also a diagram of the circuit. Fig. 2 is a broken sectional plan on the line 2 2 of Fig. 1. Fig. 3 is a longitudinal section similar to Fig. 1, but illustrating a slightly-modified arrangement of the switch-circuits. Fig. 4 is a broken sectional plan on the line 4 4 of Fig. 3. Fig. 5 is a section similar to Figs. 1 and 3, but illustrating another modification of the railway in which the adjacent sections of the line are used, one for the supply-wire and the next for the return-wire. Fig. 6 is a broken sectional plan on the line 6 6 of Fig. 5. Fig. 7 is a broken side elevation, partly in section on the line 7 7 of Fig. 8, of the trolley shown in Fig. 1 and means for closing the switch-circuit. Fig. 8 is a front elevation, partly in cross-section, of the trolley shown in Fig. 7. Fig. 9 is a detail side elevation of the modified form of trolley and its connections shown in Figs. 3 and 4. Fig. 10 is a cross-section on the line 10 10 of Fig. 9, and Fig. 11 is a plan view of the main car-switch and illustrates in a general way how a switch may be connected for controlling the circuits of the switches along the line.

The railway is provided with the usual conduit 10, which may be of any customary kind, and which has the top slot 11 between the track-rails for the passage of the trolley-arm. Extending longitudinally through the conduit is the line-wire made up of sections A, which may be of any desired length, and which are insulated from each other, being supported on the supports or hangers 12. The trolley-wheel 13, which also may be of any usual kind, runs on the line-wire, and the trolley-arm 14 extends through the slot and connects with the truck-frame 15 which carries the motor 16, and the current from the line-wire passes through the trolley, the frame 15, the wire a, the motor 16, the wire a', one of the car-wheels 17, a track-rail 18, and grounds through the wires 19, 20, and 21. The wire a', as shown in Fig. 1, is connected to the axle of wheel 17, and said axle and the wheels thereon are insulated from the frame 15. The wires 20 are placed parallel with each other and are connected together at suitable intervals by the wires 21, and one of the wires 20 connects at frequent intervals with the rail 18 by the wires 19. This arrangement insures a quick grounding of the current.

Near the meeting ends of each pair of sections A of the line-wire is a tilting bell-crank armature 22, which forms a part of the switch controlling the current through these sections, and the bell-crank is pulled in one direction so as to close the circuit through the line-sections, as presently described, by magnets 23, which together with the bell-crank are mounted on a support 24, and the bell-crank is tilted in the opposite direction, so as to open the circuit, by a weight 25, although an equivalent spring may be used if preferred.

Each bell-crank 22 connects by a wire *b* with a feed-wire B, which extends longitudinally through the conduit 10, and when the bell-crank is actuated by its magnets 23 it rises against a contact 26, which is supported in its path, and the contact 26 connects by a wire *b'* with the adjacent line-section A.

The current through the magnets 23 is supplied from a battery C on the car, which is preferably a storage-battery, through a wire *c*, which leads to the contact-plates 27, which are held in recesses 28 (see Figs. 7 and 8) in the trolley-arm 14, these plates being pressed outward by springs 29 so as to contact through the conducting-strips 30, which are arranged along one side of the slot 11, being made up in sections corresponding in length to the sections A of the line-wire, and the strips 30 are insulated from each other and from the conduit. The two contact-plates 27 are used so that when the trolley-arm 14 is opposite the meeting ends of two of the strips 30 the plates will straddle the insulation, one being in contact with one strip 30 and the other with the next, so that a current is sure to pass. From the strips 30 the current is conducted to the magnets 23 by wires *c'* and from the magnets 23 to the ground by wires c^2. The other terminal of the battery C has also a ground connection by means of the contact-wheel 31, which runs on one of the track-rails and is journaled on a suitable arm 32 on the car, the wire c^3 leading from the wheel 31 to the switch 33 of the motor on the car, and from here the current passes by a wire c^4 back to the battery C.

The switch 33 is of the common kind, having an operating-handle 34, and on the switch-barrel is a supplemental switch 35, which is not shown in detail because it may be of any usual kind, and this supplemental switch may be arranged to control the circuit of the battery C.

It will be seen that when the trolley-wheel 13 is on a certain section of the line the current from the storage-battery C will pass through the wire *c*, the contact-plates 27, the conducting-strip 30, the wire *c'*, the magnets 23, the wire c^2 to the ground, the contact-wheel 31, the wire c^3, the switch 33 and the wire c^4 back to the battery. The closing of this circuit causes the magnets 23 to tilt the bell-crank armature 22 and bring the armature against the contact 26, thus closing the circuit through the motor 16, as already described. When the trolley 13 passes to the next section A of the line-wire, the contact-plates 27 will pass off the conducting-strip 30 to the next, and so the magnets 23 are de-energized and the weight 25 brings back the bell-crank 22 to its normal position, thus breaking the line-circuit.

In Figs. 3 and 4 I have shown a slightly-modified form of the invention, in which the conducting-strips 30 are dispensed with and a series of wire-sections A' substituted therefor, these sections being run parallel with the line-sections A, as Fig. 4 clearly shows. The trolley-arm 14 in this case is provided with an extra trolley-wheel 13^a, which is insulated from the trolley-wheel 13 and runs on the sections A'. The wire-sections A' are connected with the magnets 23 by wires *c'* precisely as the conducting-strips 30 are connected, and the trolley-wheels 13^a connect with the storage-battery by means of the wire *c'*, (see Figs. 3 and 10,) this wire connecting with the trolley-arm 16 by a suitable binding-post 36, and the wire *a* carrying the main current to the motor connects with the opposite side of the arm by a binding-post 37, (see Fig. 10,) and the two halves of the trolley-arm are insulated from each other, as shown in the same figure.

It will be seen that as the trolley runs along the line the switches comprising the magnets 23 and bell-cranks 22 will be operated precisely as already described, except that the current will pass through the trolley-arm 14 and trolley-wheel 13^a instead of through the conducting-strips 30 and plates 27.

In Figs. 5 and 6 I have shown another modification of railway in which the same general principle is carried out, but the line-sections A are used alternately as supply and return wires. As here illustrated the switches for the sections A are precisely as shown in Figs. 1 and 2, except that the bell-crank 22 carries two contacts 38 and 39, one of which connects by a wire *b* with the supply-wire B, while the other connects by a wire *d* with a ground-wire D. When the armature bell-crank is raised to close the circuit through a section A, these contacts 38 and 39 strike corresponding contacts 40 and 41, the former of which connects with a section A by the wire *b'*, while the latter connects by a wire *e* with the next section A. In connection with this arrangement two trolleys 13 and arms 14 are used, these connecting by wires *a* and *a'* with the motor 16. When the circuit is closed through the magnets 23 to raise the armature 22, so as to bring the contacts 38 and 39 against the contacts 40 and 41, the current passes from the supply-wire B through the wire *b*, the contacts 38 and 40, the wire *b'*, a line-section A, one of the trolley-wheels 13, the wire *a*, the motor 16, the wire *a'*, the second trolley-wheel 13, the second line-section A, the wire *e*, the contacts 41 and 39, the wire *d* and the wire D to the ground.

The car, in connection with the arrangement shown in Figs. 5 and 6, has storage-batteries C, contact-wheels 31, and the connections already described at each end of the car, so that the car may be run in either direction.

From the foregoing description it will be seen that the line-wire is completely cut out except when the car is in contact with it, and that by means of the local circuit on the car, in connection with the several switches along

the line, the current is sure to be switched into the line as required, and thus is used without loss and in safety.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electric railway, the combination of a generator, a feed-wire, a conduit having a slotted top, a line-wire composed of sections having their ends insulated and mounted on raised supports in the conduit, switch devices adapted when actuated to place the feed-wire in circuit with the sections of the line-wire, said switch devices each comprising a magnet and its armature, a car having a motor-circuit including a trolley-arm having a trolley adapted to traverse the sections of the line-wire, a conductor at the side of the conduit-slot extending parallel to the line-wire and composed of corresponding sections, each section of said conductor being connected to one switch device and a local circuit carried on the car and including spring-pressed plates adapted to traverse the sections of the conductor at the side of the slot in the conduit and extending parallel to the line-wire, substantially as set forth.

2. The combination with the electrically-operated switch, the trolley and the line-wire, of the spring-pressed plates on the trolley-arms, the conducting-strips opposite the said plates, and an electric circuit including a generator, the contact-plates, the conducting-strips, and the electrically-operated switch, substantially as described.

3. The combination, of the conduit having a conducting-strip at the slot, the switch in the conduit, the electrical connections between the conducting-strip and switch, the trolley-arm, the spring-pressed plates held in the trolley-arm and against the strip, and electrical connections with the plates, substantially as described.

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