No. 703,361. Patented June 24, 1902.

W. H. WRIGHT.

THIRD-RAIL SYSTEM OR MAGNETO ELECTRIC RAILWAY.

(Application filed Aug. 19, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. I.

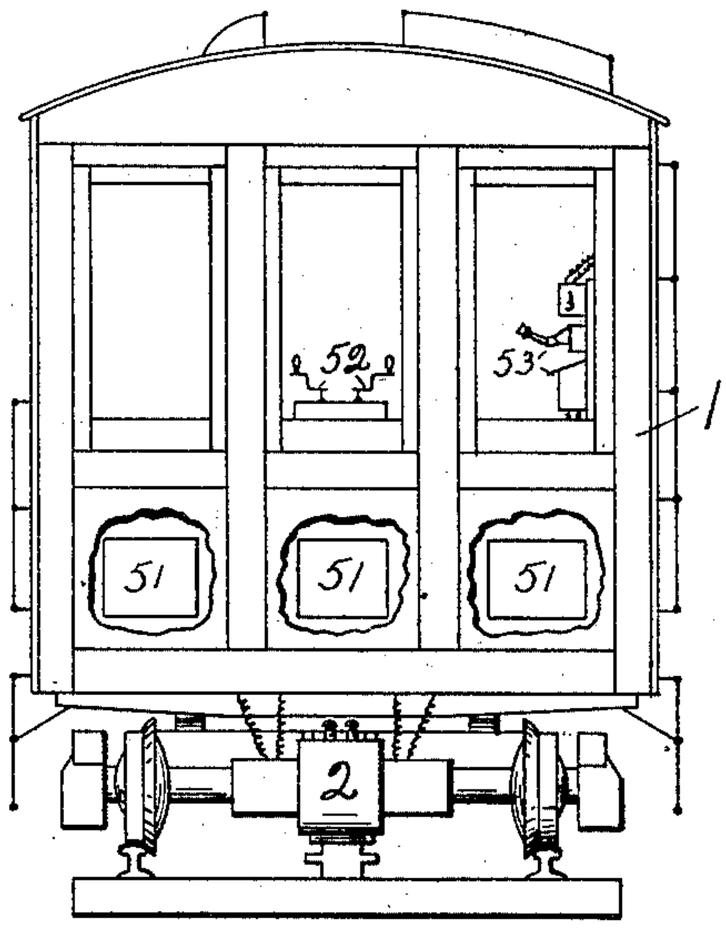

Fig. IV.

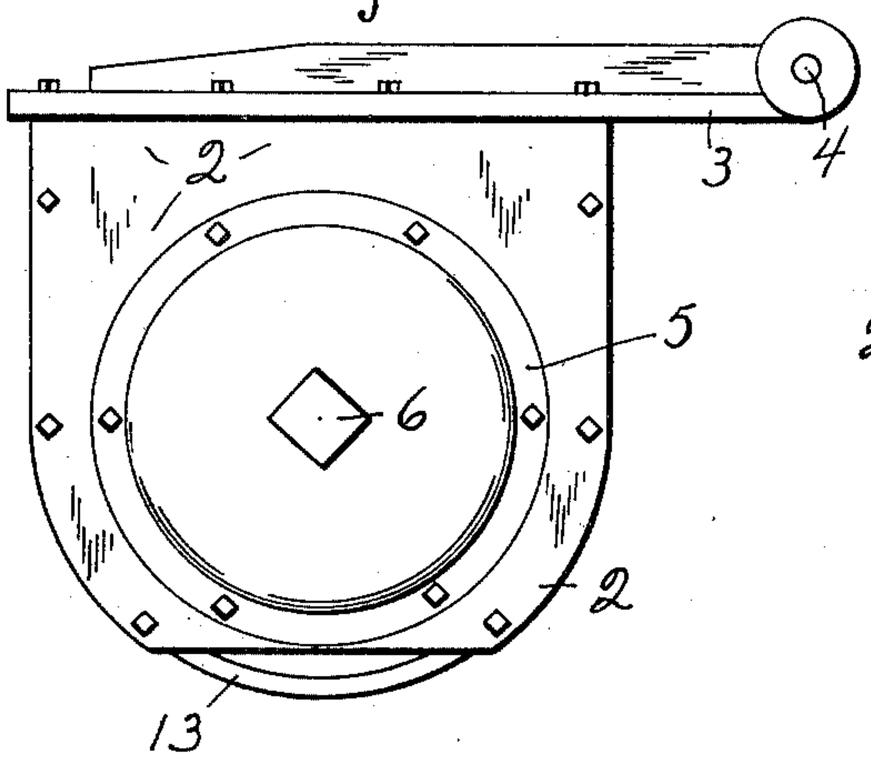

Fig. V.

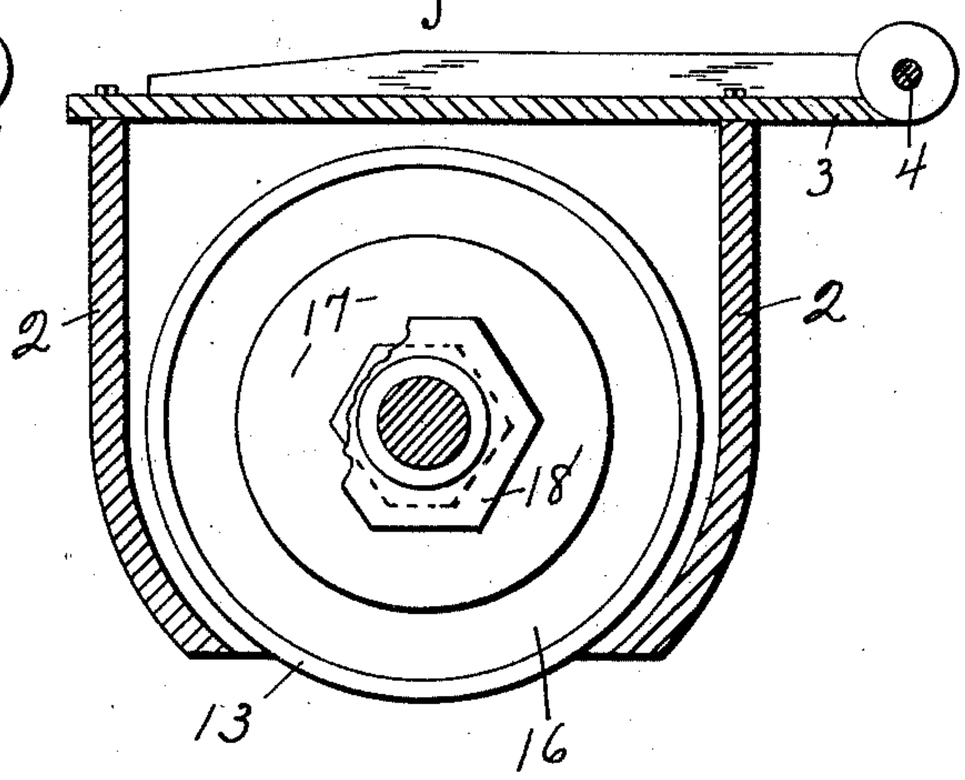

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Fig. III.

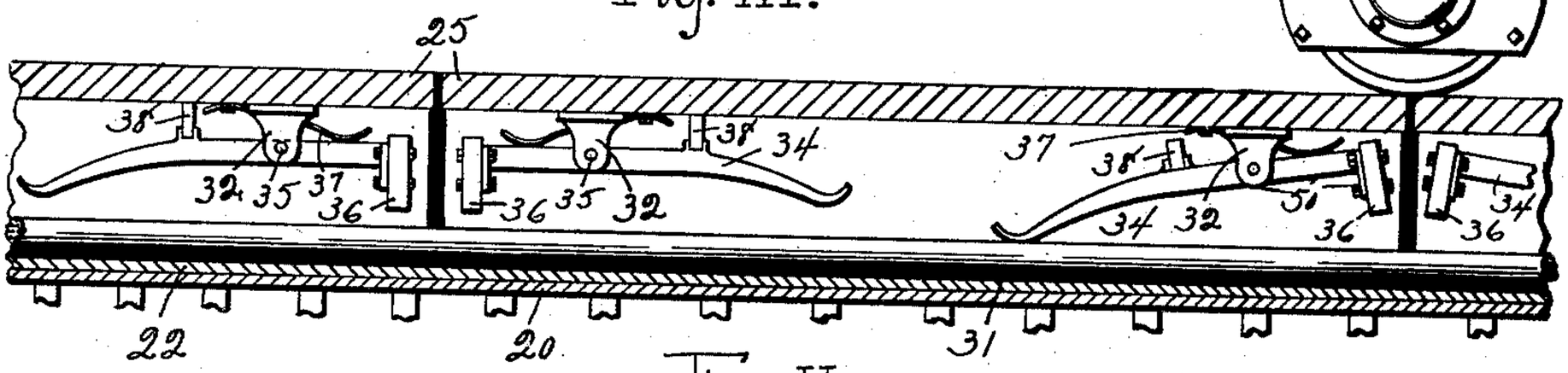
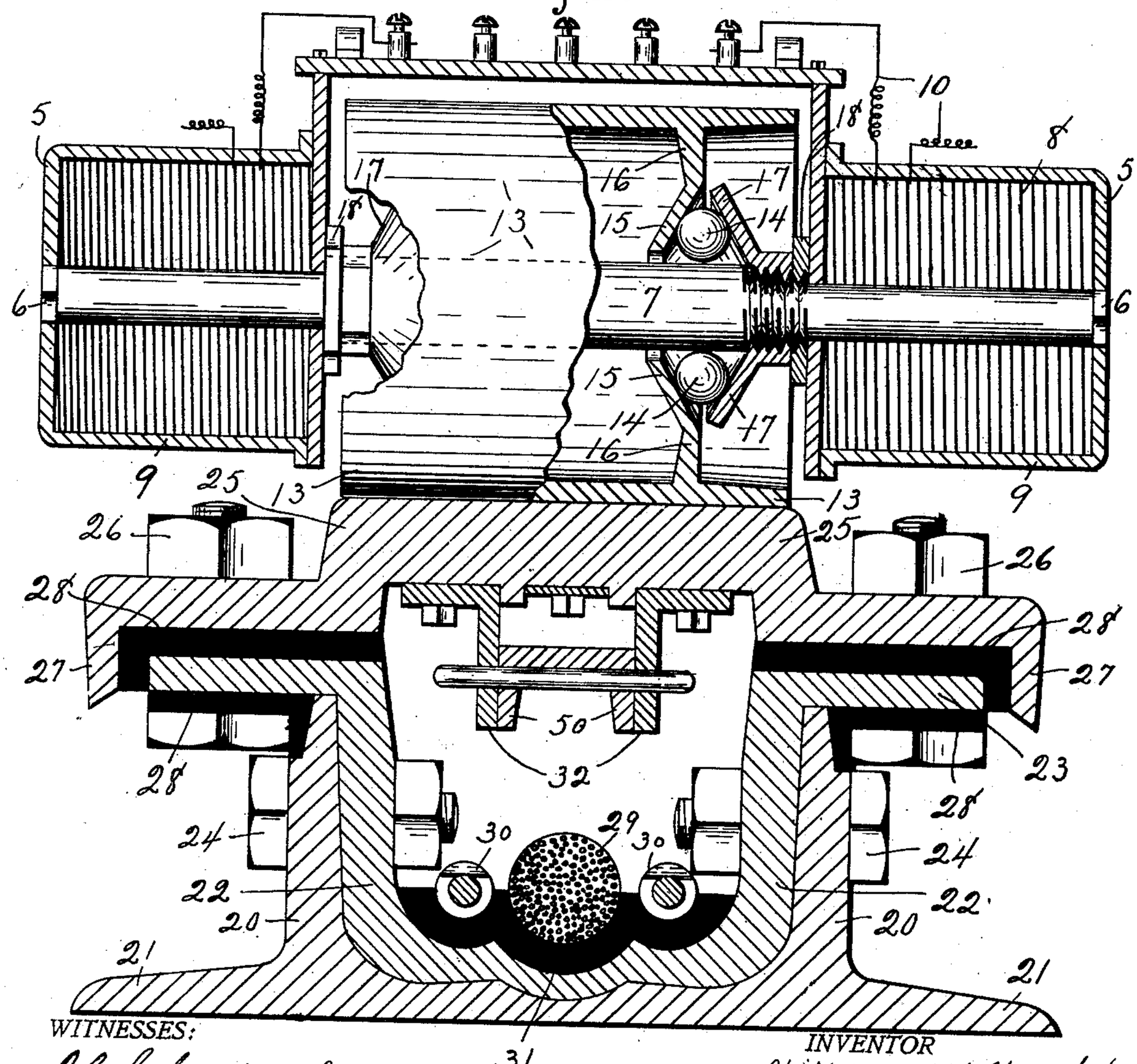


Fig. II.



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THIRD-RAIL SYSTEM OR MAGNETO-ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 703,361, dated June 24, 1902.

Application filed August 19, 1901. Serial No. 72,473. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WRIGHT, of Buffalo, in the county of Erie, in the State of New York, have invented new and useful Improvements in Third-Rail Systems or Magneto-Electric Railways, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to a third-rail system of electric railways in which a conductor is arranged in the conduit below the third rail and elements operated by magnets on the car to make a temporary connection between the conductor and the third rail. My invention relates to these magnets and also to the details of construction of the intermediaries or intermediary connecting elements and of the conduit and the car; and it consists principally in the arrangement of a fixed magnet sustained in a suitable frame hinged to the car at right angles to the rail and forming an axle for the contact-trolley; also, in pivotally supporting within the conduit levers in constant connection with the third rail and provided with magnets arranged at right angles thereto, which coöperate with the main magnet to depress the levers to make contact with the conductor temporarily during the passage of the car.

My invention will be understood by reference to the accompanying drawings, in which the reference-numerals of the specification indicate the same parts in all of the figures.

Figure I is an elevation of the car end, showing relation to third rail and conduit. Fig. II is an enlarged cross-section of the conduit and magnet. Fig. III is a longitudinal section of the conduit, showing the contact-levers both in operative and separated positions. Fig. IV is an end elevation of the trolley-wheel and magnet-shell detached. Fig. V is a section of the preceding.

In the figures, 1 indicates the car; 2, the trolley frame or shell hinged by arm or arms 3 at bearing 4 to the car-truck at any suitable position. This shell has end plates 5 5, in which fit the squared end 6 6 to hold in fixed position the electromagnet 7, which may be excited from the main conductor, as here indicated, by coils 8 8 on its end, contained within the caps 9 9, energized through wires 10 10 from any suitable source of supply, such as a storage battery carried on the car. Within this shell 2 is journaled on the magnet as an axle the contact-trolley 13, provided with antifriction-bearings, of which 14 indicates the balls, 15 cups on flanges 16, 17 corresponding cups threaded to the end of the axle, and 18 the jam-nut, also fitted to the thread on the bar-magnet. Both the cup and jam-nut are made of hexagonal or other suitable angular form, as here shown, to fit the wrench.

Referring more particularly to Fig. II, 20 is the base of the combined third rail and conduit, having the extending flanges 21 21, to which is fitted the intermediate U-shaped section 22, having flanges 23 23 on its upper end and retained in position by bolts 24 24. 25 is the third rail, forming the upper section or top of the conduit, retained in position on flanges 23 by bolts 26 and having the outwardly and downwardly depending flanges 27 to guard against dampness and short circuit thereby. The third rail is formed of short sections insulated from each other. 28 is suitable insulation completely to insulate the third rail from the conduit, in which is arranged the conductor 29 in the form of a wire rope or other suitable form additionally insulated. Conductors 30 30 may also be arranged within the conduit for telephone or telegraph, all carefully insulated by insulating material 31. Within the conduit are bolted to the third rail the lever-brackets 32, in which are pivotally supported the intermediaries 50, (best shown in Fig. III,) which temporarily make connection between the conductor and the insulated section of the third rail when the car is passing. These intermediaries are composed of the levers 34, pivotally supported at 35 and having bolted to their ends the temporary magnets 36, arranged at right angles to the rail and parallel to the main armature-magnet, with which they coöperate. 37 is the spring for normally maintaining the lever out of contact with the conductor, which is overcome by the attraction of the magnets when the car is passing, and 38 indicates stops. The levers are brass. Each section of the third rail may be provided with one or more intermediaries—two as shown in Fig. III, where on the right they are shown in operative contact position with the trolley passing from one sec-

tion of the third rail to the next and energizing this section of the rail through the intermediaries temporarily while the car is passing. On the left in Fig. III is shown the inoperative position of these intermediaries when unaffected by the passage of the car and the magnets.

51 51 indicate storage batteries suitably arranged in the car, which are kept continually charged from the main conductor and of sufficient force and capacity to enable the car to run from twenty-five to fifty miles independent of the main conductor in case of accident. 52 indicates the switch, and 53 a telephone or telegraph instrument on the car, which may be used by a proper system of wiring and interposition of resistance to communicate between the cars of the train, different trains, or stations.

By my invention I have produced an arrangement of parts for the magno-electric propulsion of cars of various descriptions which is simple, economical, durable, and very effective in operation.

In the trolley-shell, conveniently hinged to the car to adapt itself to inequalities, is sustained the bar-magnet at right angles to the rail, which affords a convenient support for the trolley-wheel carried thereon by the anti-friction-bearing and maintains constant contact with the third rail without being affected by its irregularities. This arrangement and combination of operating magnet and trolley is simple and compact.

Referring to the operation of the magnet itself, heretofore magnets for similar purposes have been arranged either vertically or parallel with the rail, so that the rail formed an armature for the poles of the magnet or magnets and the circuit was closed between the rail and outer magnets, leaving no surplus current to act on the inside of lower magnet; but by the present arrangement I cut out one of the upper or outer poles of the magnets, thus permitting the magnetic current to pass from the rails to the lower magnet with full force. I arrange the trolley-electromagnet at right angles with the rail, which shuts off the north and south current combined and takes a one-pole current from the center of the magnet, which will pass through the rail without making an armature of it. I call this the "consequential" pole. By this arrangement the combined magnet and trolley are always in positive continuous metallic contact with the third-rail temporary conductor, thereby insuring a perfect magnetic current-contact between the trolley and the temporary conductor, also the intermediaries. The brass forms a good electric conductor for the current to pass upward, but a non-conductor for the magnetic current downward. The temporary magnets on the levers are energized by induction as the trolley passes over them. In operation the current is passed through the coils of the trolley-electromagnet, forming a strong magnetic current which acts directly on the intermediary magnet, causing the lever to make contact with the main conductor and transferring the electric current through the rail and trolley to the storage battery, charging the same continuously, and from the battery to the switch on the car to the motor and return-current.

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

1. In an electric railway, a third rail, a conductor-conduit arranged beneath said rail and parallel thereto, means for connecting during the passage of the car the third rail to the conductor, an electromagnet on the car to operate said connecting means, means for energizing said magnet, and a trolley-wheel journaled on said electromagnet and arranged to make contact with the third rail.

2. In an electric railway, a third rail, a conduit arranged beneath said rail and parallel thereto, means for making connection temporarily during the passage of the car between said conductor and said third rail, a bar-electromagnet supported on the car, coils arranged on the ends of the said bar-magnet, means for energizing said coils, and a contact trolley-wheel journaled on said bar-magnet and arranged to make contact with the third rail.

3. In an electric railway, a third rail, a conduit arranged beneath said third rail and parallel thereto, a main conductor arranged in said conduit and suitably insulated therein, means for making connection between the third rail and the main conductor during the passage of the car, a trolley-shell hinged to the car, a bar-electromagnet sustained in a fixed position in said shell and arranged at right angles to the third rail, coils on the end of said bar-magnet, means for energizing said coils, a trolley-wheel arranged in said shell and adapted to make constant contact with the third rail, said trolley-wheel being journaled by ball-bearings on the bar-magnet.

4. In an electric railway, a third rail, a conduit arranged beneath said third rail and parallel thereto, the third rail forming the top of the conduit, a main conductor arranged in said conduit and suitably insulated, means for temporarily making connection during the passage of the car between the under surface of the third rail and the main conductor, a trolley-shell provided with end plates and a supporting-arm, a hinged connection between said supporting-arm and the car or truck, a bar-magnet having angular ends fitted to the end plates and arranged at right angles to the third rail, coils on the ends of said bar-magnet, means for energizing said coils, a contact trolley-wheel to make contact with the third rail journaled on said bar-magnet by ball-bearings, internal flanges on the trolley-wheel forming cups, corresponding cups threaded to fit the bar-magnet, jam-nuts also threaded to fit said bar-magnet, and

suitably connecting the trolley-wheel to the motor.

5. In a magneto-electrical system of propelling cars, a conduit, a main conductor suitably insulated in said conduit, a sectional third rail forming the top of the conduit composed of insulated sections and forming a temporary conductor parallel with the main conductor, intermediaries journaled on the under surface of the third rail, a bar-magnet arranged on the car at right angles to the third rail for magnetically influencing the intermediaries temporarily to make contact between the main conductor and the third rail, a contact trolley-wheel journaled on said bar-magnet, suitable wiring on the car, and a motor on the car.

6. In a combined conduit and third rail for an electric-railway system, a rail-base of U shape having outwardly-extending flanges at its base, an intermediate U-shaped piece fitted to said base and having outwardly-extending flanges, bolts connecting the intermediate piece to the base, a third rail forming the top of the conduit having an upwardly-extending rail-section, outwardly-extending flanges and downwardly-extending flanges on the ends of said outer flanges, insulating material arranged beneath said third-rail section and the intermediate piece, bolts for securing the third-rail section to the intermediate piece, means for insulating said bolts, and a main conductor suitably insulated and arranged in said conduit.

7. In an electric railway, a car, a third rail, a conduit beneath said rail and parallel thereto, a main electric conductor within said conduit, an electro bar-magnet placed in a horizontal position below the car with its polar ends arranged at right angles to and above the rail and its middle portion centrally over the rail, said bar-magnet held stationary in a metal frame and hinged to the car-truck, means for adjusting a trolley-wheel to the central surface portion of said bar-magnet, means for proper wiring of said magnet, means for proper insulation, means for conducting the electric current from the main conductor upward through the rail and said bar-magnet to the car, means for conducting the magnetic current downward from the consequential pole or middle portion of said bar-magnet through the rail; substantially as shown and described.

8. In an electric railway, a third rail, a closed conduit within said rail, a main electric conductor in said conduit, a sectional metallic cover to combined rail and conduit, forming a temporary conductor parallel with the main conductor, intermediaries journaled to lower side of said temporary conductors, said intermediaries held in a normal non-contacting position, an electromagnet and trolley arranged at right angle to the third rail, and in metallic contact with the temporary conductor, coils on the ends of said electromagnet, means for energizing said coils direct from the main conductor and means for magnetically influencing the temporary conductor direct from the consequential pole of the electromagnet.

9. In an electric railway, a combined third rail and closed conduit, a main conductor in said conduit properly insulated, intermediary magnets in the conduit, means for magnetically influencing the intermediary magnets from the temporary conductor by induction, said temporary conductors being suitably insulated from each other and the main rail, a three-pole magnet on the car, magnetic means extending from the three-pole magnet in metallic contact with third rail for closing electric circuit between the temporary conductor and main conductor, magnetic means for forming a metallic contact between the intermediary magnets and the main conductor, means for forming a metallic contact between the temporary conductor and main conductor, the car, a motor on car and suitable wiring on car.

10. In a magneto-electric system for propelling railway-cars, a closed conduit, a main electric conductor within said conduit suitably insulated, a sectional third rail forming the top of the conduit composed of insulated sections and forming a temporary conductor parallel with the main conductor, intermediaries journaled on the under surface of said rail and always in continuous metallic contact with the same, said intermediaries operated by magnetic induction, a three-pole electro bar-magnet sustained in a shell frame and in a fixed position at right angles to the third rail, a trolley-wheel journaled on said bar-magnet in metallic contact with the temporary conductor, coils on said magnet, means for energizing said electromagnet direct from the main conductor, a car, a motor on the car, suitable wiring on the car, means for conducting the electric current from the main conductor to a storage battery on the car and means for energizing the coils or electromagnet from the storage battery.

In testimony whereof I have hereunto signed my name.

WILLIAM H. WRIGHT. [L. S.]

Witnesses:
GEO. W. CARR,
L. M. BUFFUM.