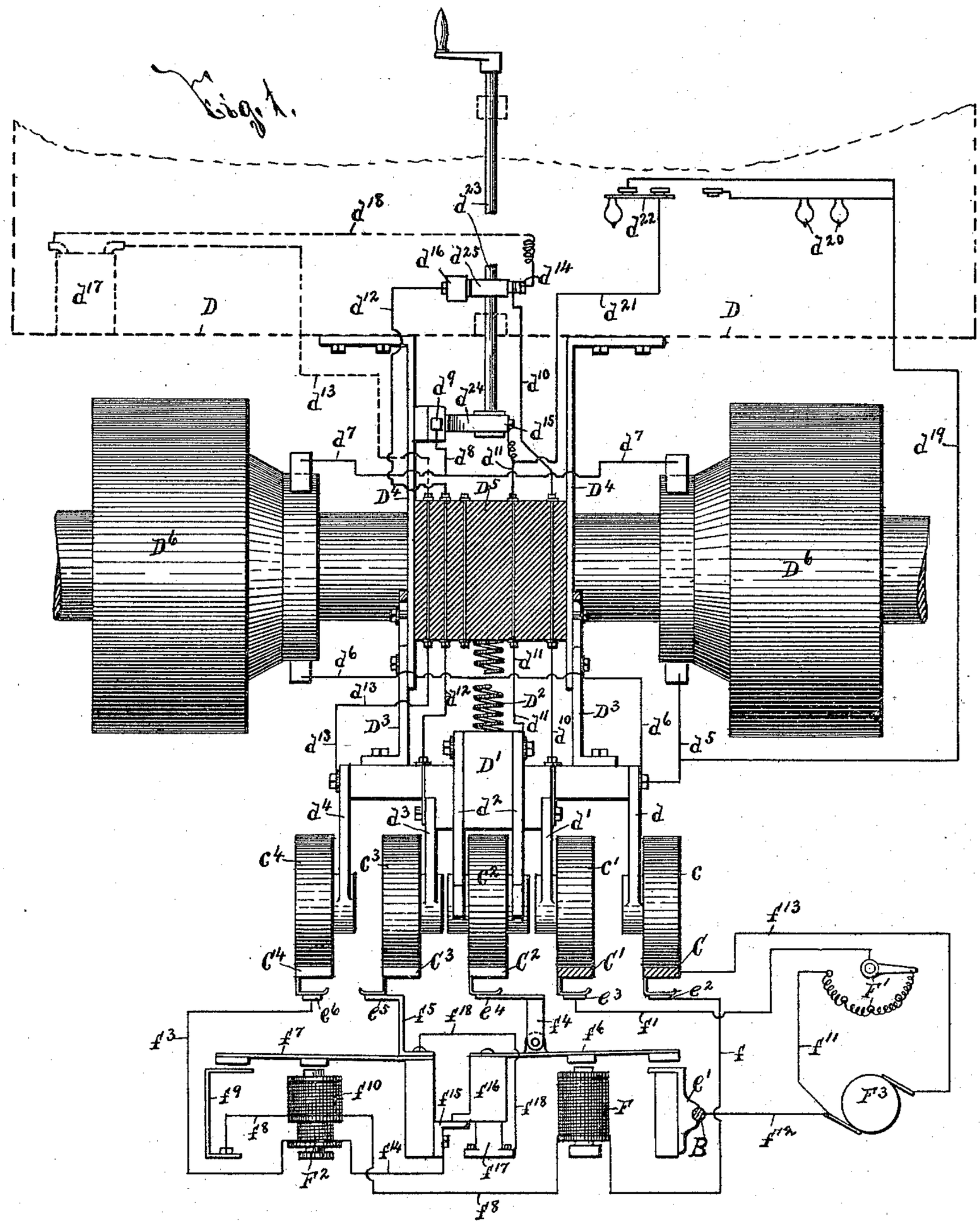
(No Model.) 3 Sheets—Sheet 1

B. E. OSBORN.

ELECTRIC RAILWAY SYSTEM.

No. 573,033. Patented Dec. 15, 1896.



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ATTORNEYS.

(No Model.) 3 Sheets—Sheet 2

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Fig. 3.

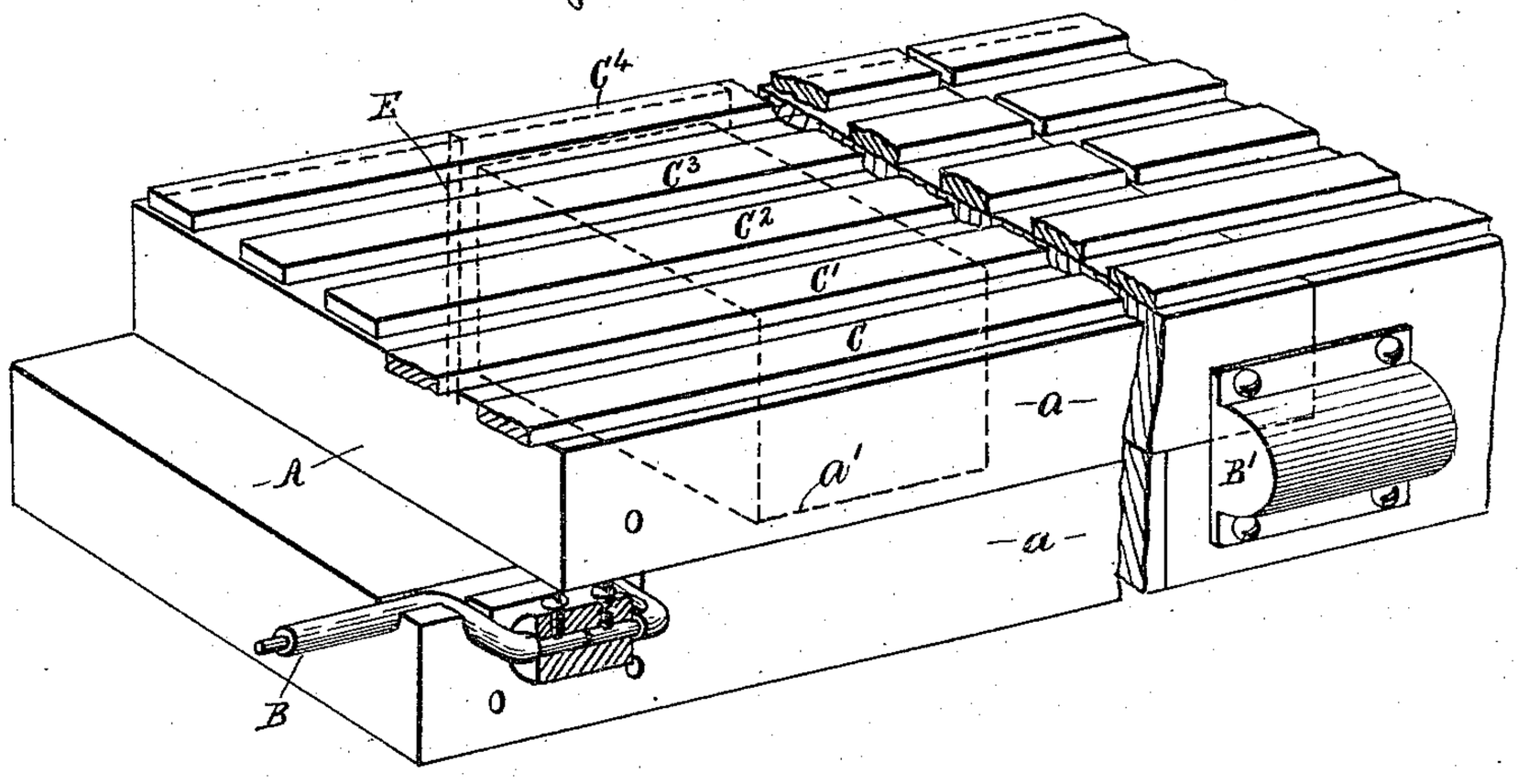
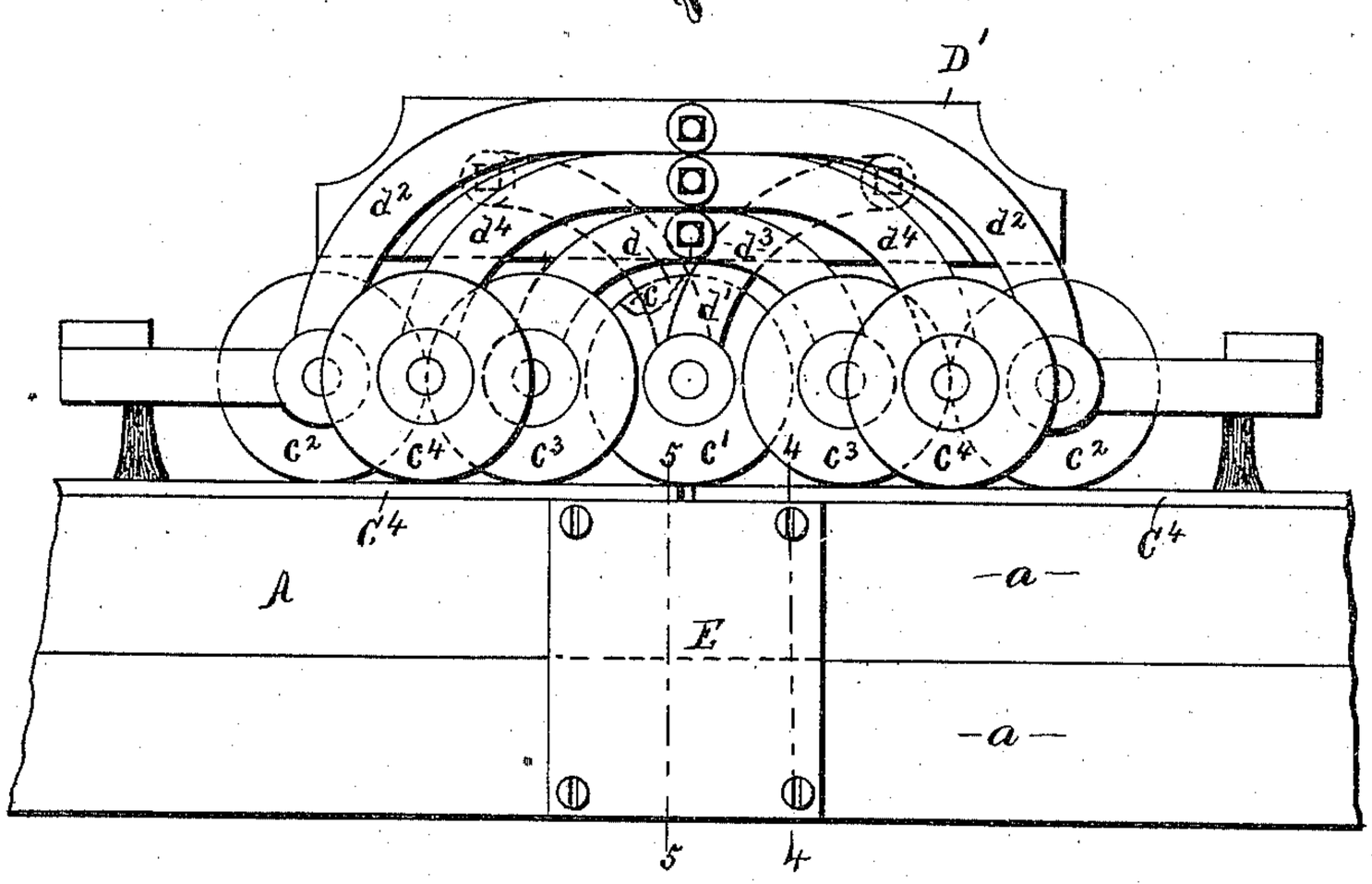


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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ELECTRIC RAILWAY SYSTEM.

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Fig. 4.

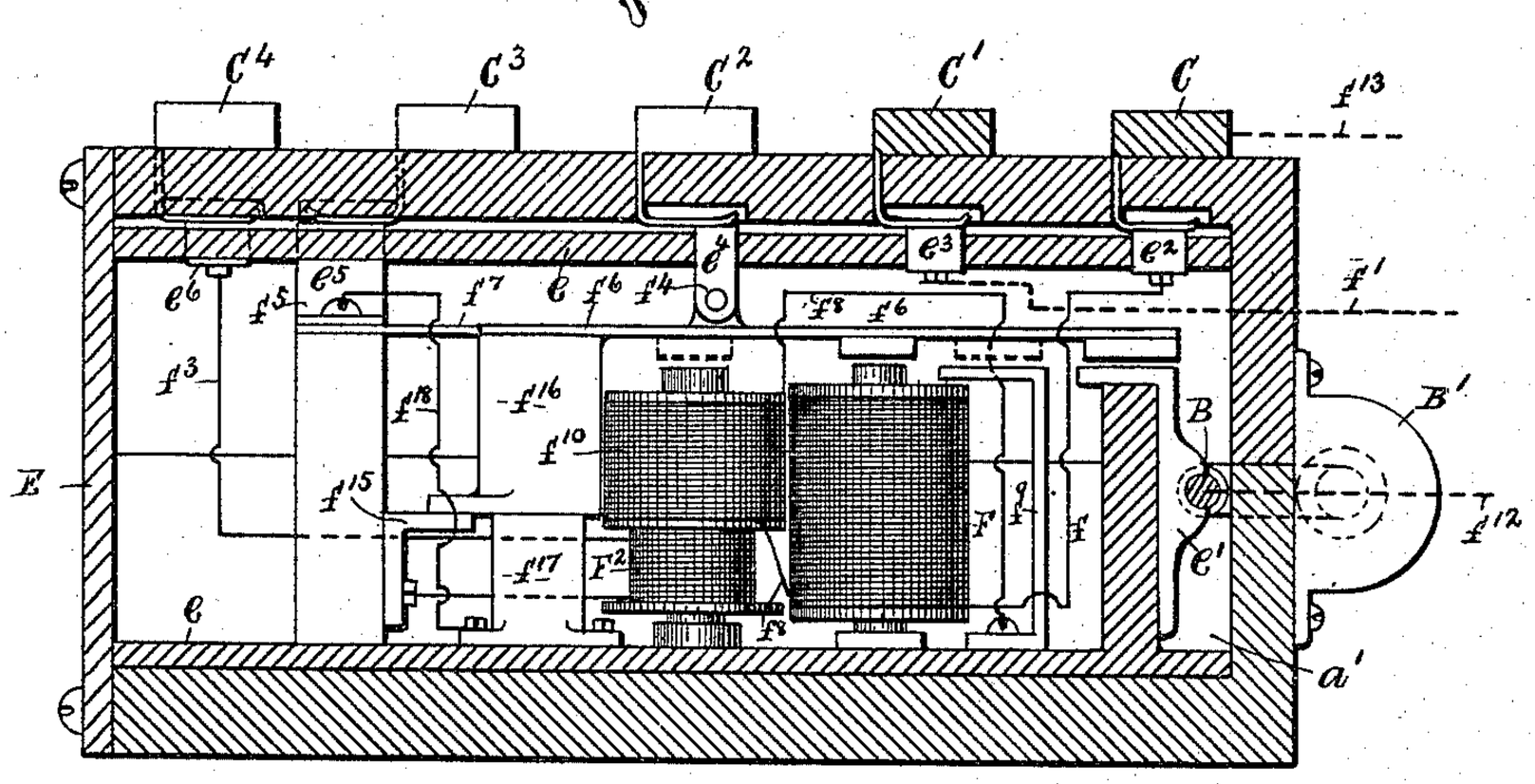
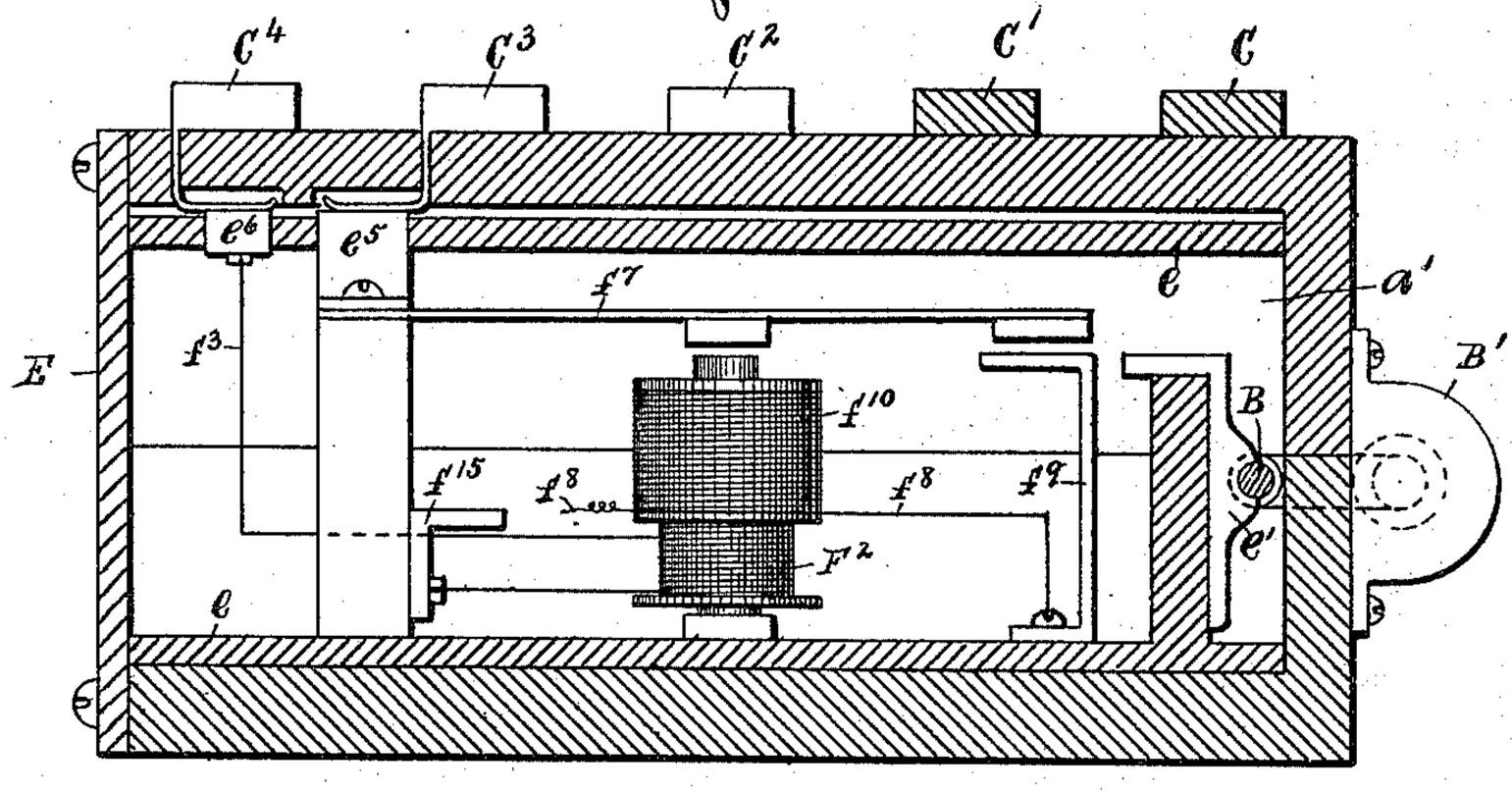


Fig. 5.



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UNITED STATES PATENT OFFICE.

BYRON E. OSBORN, OF AUBURN, NEW YORK.

ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 573,033, dated December 15, 1896.

Application filed April 10, 1896. Serial No. 587,013. (No model.)

To all whom it may concern:

Be it known that I, BYRON E. OSBORN, of Auburn, in the county of Cayuga, in the State of New York, have invented new and useful Improvements in Electric-Railway Systems, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in electric-railway systems of the class set forth in my prior patents, Nos. 549,580 and 556,516, dated, respectively, November 12, 1895, and March 17, 1896, which are provided with a main or power conductor for conveying an electric current to a trolley or terminal movable along the railway, and has for its object the production of a device which is particularly practical, efficient, and safe, and is of such construction as to prevent undue passage of the current from the main or power conductor; and to this end it consists, essentially, in the general construction and arrangement of the component parts of the system, all as hereinafter more particularly described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a vertical section, partly broken away, of a portion of a railway system embodying my invention and parts of a vehicle movable along the same, the casing or conduit of the system being omitted, the parts supported thereby being shown diagrammatically, and the portions of the vehicle with the exception of its shaft and motors being indicated by dotted lines. Fig. 2 is an isometric view of a portion of the casing or conduit for my improved system. Fig. 3 is a side elevation of a portion of the casing or conduit of my improved electric-railway system, the trolleys of a movable vehicle for said system, and the supports for the trolleys; and Figs. 4 and 5 are transverse sections taken, respectively, on lines 4 4 and 5 5, Fig. 3.

A represents a casing or conduit, B the main concealed conductor, and C C′ C^2 C^3 C^4 the exposed conductors. The casing or conduit A is of any desirable form, size, and construction, and is suitably arranged and supported between the rails, (not illustrated,) along which is movable a vehicle D. (Partly illustrated at Fig. 1.) This casing or conduit A preferably consists of short sections which are arranged end to end and are each composed of separate longitudinal divisions *a a*, formed of insulating material and secured together one above the other by fastening means. (Not illustrated.) Suitable pockets or chambers *a′*, Figs. 4 and 5, extend inwardly from one of the longitudinal side faces of the casing or conduit A and are formed of less height and length than the thickness and width of said casing. The pockets or chambers *a′* preferably consist of cut-outs formed in the adjacent faces of the divisions and are closed by plates or supports E.

The main conductor B, which is of any desirable form, size, and construction, is incased or concealed by the casing or conduit A, and preferably consists of short divisions projecting beyond the ends of the sections of said casing or conduit. The opposite ends of the divisions of the conductor B are formed with angular bends, Figs. 2 and 5, which are suitably united and are protected by supplemental casings or boxes B′, secured to the adjacent longitudinal side walls of the casing or conduit A. The conductor B is passed through the inner ends of the pockets or chambers *a′* and is provided with an insulating coating that encircles its entire surface with the exception of the portions thereof which are arranged in the pockets or chambers *a′* and are left bare for permitting electrical contact therewith.

The conductors C C′ consist of continuous strips mounted on the casing or conduit A, and the conductors C^2 C^3 C^4 consist of sections arranged end to end at the side of said continuous strips. The upper faces of the conductors C C′ C^2 C^3 C^4 are engaged by trolleys or movable terminals *c c′* c^2 c^3 c^4, which are connected to suitable supports *d d′* d^2 d^3 d^4, secured in any desired manner to the vehicle D. As here illustrated said supports are fixed to a yielding plate or head D′, forced downwardly by a spring D^2 and provided with arms D^3, which are movable lengthwise of arms D^4 D^4, depending from the vehicle D and having their lower ends arranged on opposite sides of a plate D^5, formed of insulating material.

The support d is connected by conductors d^5 d^6 to corresponding brushes of the motors D^6 for the vehicle D, and the opposite brushes of said motors are connected together by a conductor d^7, which is connected by a branch conductor d^8 to a terminal d^9. The supports d' d^2 d^3 d^4 are respectively connected by conductors d^{10} d^{11} d^{12} d^{13} to terminals d^{14} d^{15} d^{16} and one pole of a battery d^{17}, carried by the vehicle D, and the opposite pole of said battery is connected by a conductor d^{18} to the terminal d^{14}. A shunt-conductor d^{19} extends from the conductor d^5 and is provided with separate branches, one of which has electric lamps d^{20} connected in circuit therewith, and a second shunt-conductor d^{21} extends from the conductor d^{11} and is provided with a switch d^{22}, which at night connects the conductor d^{21} to the branch conductor provided with the lamps d^{20} and during the day connects said conductor to the other branch conductor. An actuating shaft or spindle d^{23} is supported by the vehicle D and is provided with suitable switches d^{24} d^{25} for connecting the terminals d^9 d^{15} d^{14} d^{16}.

The plates or supports E, previously mentioned, are secured to corresponding ends of hollow receptacles e, which are formed of insulating material, are arranged within the pockets a', and contain suitable electrically-operated means controlled by the battery d^{17} for governing the transmission of a current from the conductor B to the motors D^6. The receptacles e are provided with conducting-pieces e' for engaging the bare portions of the conductor B within the pockets a' and additional conducting-pieces e^2 e^3 e^4 e^5 e^6, which engage yielding shoulders or arms arranged at the top of the pockets a' and suitably connected to the conductors C C' C^2 C^3 C^4. The conducting-pieces e^2 e^3 e^6 are respectively connected by conductors f f' f^3 to magnets F, a source F' of a reduced current, and magnets F^2, and the conducting-pieces e^4 e^5 are suitably connected by conductors f^4 f^5 to armatures f^6 f^7, actuated by the magnets F F^2.

The magnets F are connected by conductors f^8 to fixed terminals f^9, normally separated from the free ends of the armatures f^7, and said conductors are provided with helical coils f^{10}, surrounding the magnets F^2, for additionally attracting the armatures f^7, which operate as switches to complete the connection between the magnets F and the conducting-pieces e^5.

The source F' of the current of reduced energy preferably consists of a resistance device connected by a conductor f^{11} to a generator F^3, which is also connected by wires f^{12} f^{13} to the conductors B C. The magnets F^2 are connected by wires f^{14} to fixed terminals f^{15}, and weighted ends f^{16}, of magnetizable material, are formed upon the armatures f^6 and engage the terminals f^{15}. The weighted ends f^{16} thus form switches for completing and breaking the circuits to the magnets F^2 and are held in position by permanent magnets f^{17}, connected by wires f^{18} to the electrical connections f^5 between the armatures f^7 and the conducting-pieces e^5. The unweighted ends of the armatures f^6 are normally disconnected from the conducting-pieces e' and are engaged therewith when the magnets F are energized.

In the operation of my invention the switches d^{24} d^{25} are actuated to connect the terminals d^9 d^{15} d^{14} d^{16}, whereupon a current is free to pass from one pole of the battery d^{17} along the conductor d^{13}, support d^4, trolley or terminal c^4, sectional conductor C^4, conducting-piece e^6, conductor f^3, magnet F^2, conductor f^{14}, terminal f^{15}, weighted end of armature f^{16}, permanent magnet f^{17}, connections f^{18} f^5, conducting-piece e^5, sectional conductor C^3, trolley or movable terminal c^3, support d^3, conductor d^{12}, terminal d^{16}, switch d^{25}, and wire d^{18} to the opposite pole of said battery. This current energizes one of the electromagnets F^2, which attracts its armature f^7 and engages the free end thereof with the terminal f^9. The reduced current is then free to pass from its source F' along the conductor f', conducting-piece e^3, continuous conductor C', trolley or terminal c', support d', conductor d^{10}, terminal d^{14}, switch d^{25}, terminal d^{16}, conductor d^{12}, support d^3, trolley or movable terminal c^3, sectional conductor C^3, conducting-piece e^5, conductor f^5, armature f^7, fixed terminal f^9, helical coil f^{10}, connection f^8, magnet F, connection f, conducting-piece e^2, continuous conductor C, and connection f^{13} to the generator F^3. This reduced current additionally attracts the armature f^7, owing to its passage through the helical coil f^{10}, and also energizes the magnet F for engaging the unweighted end of the armature f^6 with the conducting-piece e'. The main or power current is then free to pass from the generator F^3 along the conductor f^{12}, main or power conductor B, conducting-piece e', armature f^6, conductor f^4, conducting-piece e^4, sectional conductor C^2, trolley or movable terminal c^2, support d^2, conductor d^{11}, terminal d^{15}, switch d^{24}, terminal d^9, and conductors d^8 d^7 to the motors D^6, and thence along the conductors d^5 d^6, support d, trolley or movable terminal c, continuous conductor C, and conductor f^{13} to the generator F^3. During the passage of the main or power current to the motors D^6 a current is free to pass from the conductor a^{11} along the shunt-conductor d^{21}, switch d^{22}, and shunt-conductor d^{19} to the conductor d^5. As here illustrated and described, my improved electric-railway system is designed for use in connection with metallic circuits for the electric currents; but it will be obvious that, if desired, the motors D^6 may be grounded in the usual manner through the rails over which the vehicle D is movable, and wires f f^{13} may lead to the ground, thus obviating the necessity of the conductor C and the trolley or movable terminal c.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying

drawings, and it will be particularly noted that the main or strong current is free to pass only when the conductor B therefor is connected to the section of the conductor C^2 beneath the vehicle C, and that this connection is not liable to be unduly made, since it is controlled by a source of electric energy, as a battery d^{17}, and switches d^{24} d^{25}, carried by said vehicle. As the exact detail construction and arrangement of the parts of my improved electric-railway system may be considerably varied without departing from the spirit of my invention, I do not herein specifically limit myself thereto.

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

1. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, additional electromagnets for governing the operation of the former electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose set forth.

2. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, permanent magnets for holding the connecting-pieces in their normal position, additional electromagnets for governing the operation of the former electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose specified.

3. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, switches for completing and breaking the circuits connected to said electromagnets, additional electromagnets for actuating the switches and governing the operation of the former electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose described.

4. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, additional electromagnets for governing the operation of the former electromagnets, switches operated by the former electromagnets for completing and breaking the circuits connected to the additional electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose specified.

5. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, additional electromagnets for governing the operation of the former electromagnets, means operated by the connecting-pieces for normally completing the circuits connected to the additional electromagnets, permanent magnets for holding the connecting-pieces and said means in their normal position, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose set forth.

6. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, switches for completing and breaking the circuits connected to said electromagnets, additional electromagnets for actuating the switches and governing the operation of the former electromagnets, additional switches operated by the former electromagnets for completing and breaking the circuits connected to the additional electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose specified.

7. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, switches for completing and breaking the circuits connected to said electromagnets, additional electromagnets for actuating the switches and governing the operation of the former electromagnets, means operated by the connecting-pieces for normally completing the circuits connected to the additional electromagnets, permanent magnets for holding the connecting-pieces and said means in their normal position, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose described.

8. In an electric-railway system, the com-

bination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, additional electromagnets for governing the operation of the former electromagnets, helical coils surrounding the additional electromagnets and connected in the circuits leading to the former electromagnets, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose set forth.

9. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, a conductor for conveying the main current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, additional electromagnets for governing the operation of the former electromagnets, helical coils surrounding the additional electromagnets and connected in the circuits leading to the former electromagnets, means operated by the connecting-pieces for normally completing the circuits connected to the additional electromagnets, permanent magnets for holding the connecting-pieces and said means in their normal position, and means carried by the vehicle for controlling the operation of the additional electromagnets, substantially as and for the purpose specified.

10. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, an exposed conductor for conveying the current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, a second exposed conductor for conveying a current of reduced energy to said electromagnets, additional electromagnets for governing the operation of the former electromagnets, a third exposed conductor connected to the additional electromagnets and means carried by the vehicle for engaging the exposed conductors and controlling the operation of the electromagnets, substantially as and for the purpose described.

11. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, an exposed conductor for conveying the current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, a second exposed conductor for conveying a current of reduced energy to said electromagnets, additional electromagnets for governing the operation of the former electromagnets, a third exposed conductor connected to the additional electromagnets, means operated by the connecting-pieces for normally completing the circuits connected to the additional electromagnets, permanent magnets for holding the connecting-pieces and said means in their normal position, and means carried by the vehicle for engaging the exposed conductors and controlling the operation of the electromagnets, substantially as and for the purpose set forth.

12. In an electric-railway system, the combination of a moving vehicle, a concealed conductor for the passage of the main current, an exposed conductor for conveying the current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, a second exposed conductor for conveying a current of reduced energy to said electromagnets, additional electromagnets for governing the operation of the former electromagnets, a third exposed conductor connected to the additional electromagnets, a generator, a fourth exposed conductor connected to the generator and to the electromagnets for operating the connecting-pieces, a fifth exposed conductor connected to the source of a current of reduced energy, and means carried by the vehicle for engaging the exposed conductors and controlling the operation of the electromagnets, substantially as and for the purpose specified.

13. In an electric-railway system, the combination of a moving vehicle, a concealed continuous conductor for the passage of the main current, an exposed sectional conductor for conveying the current to the vehicle, independently-movable connecting-pieces for connecting said conductors, electromagnets for operating the connecting-pieces, a second exposed sectional conductor for conveying a current of reduced energy to said electromagnets, additional electromagnets for governing the operation of the former electromagnets, a third exposed sectional conductor connected to the additional electromagnets, means operated by the connecting-pieces for normally completing the circuits connected to the additional electromagnets, permanent magnets for holding the connecting-pieces and said means in their normal position, a generator, an exposed continuous conductor connected to the generator and to the electromagnets for operating the connecting-pieces, a second exposed continuous conductor connected to the source of a current of reduced energy, and means carried by the vehicle for engaging the exposed conductors and controlling the operation of the electromagnets, substantially as and for the purpose described.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Auburn, in the county of Cayuga, in the State of New York, this 31st day of March, 1896.

BYRON E. OSBORN.

Witnesses:
K. H. THEOBALD,
H. E. CHASE.