(No Model.) 2 Sheets—Sheet 1.

C. J. KINTNER.

ELECTRIC RAILWAY SWITCHING MECHANISM.

No. 511,627. Patented Dec. 26, 1893.

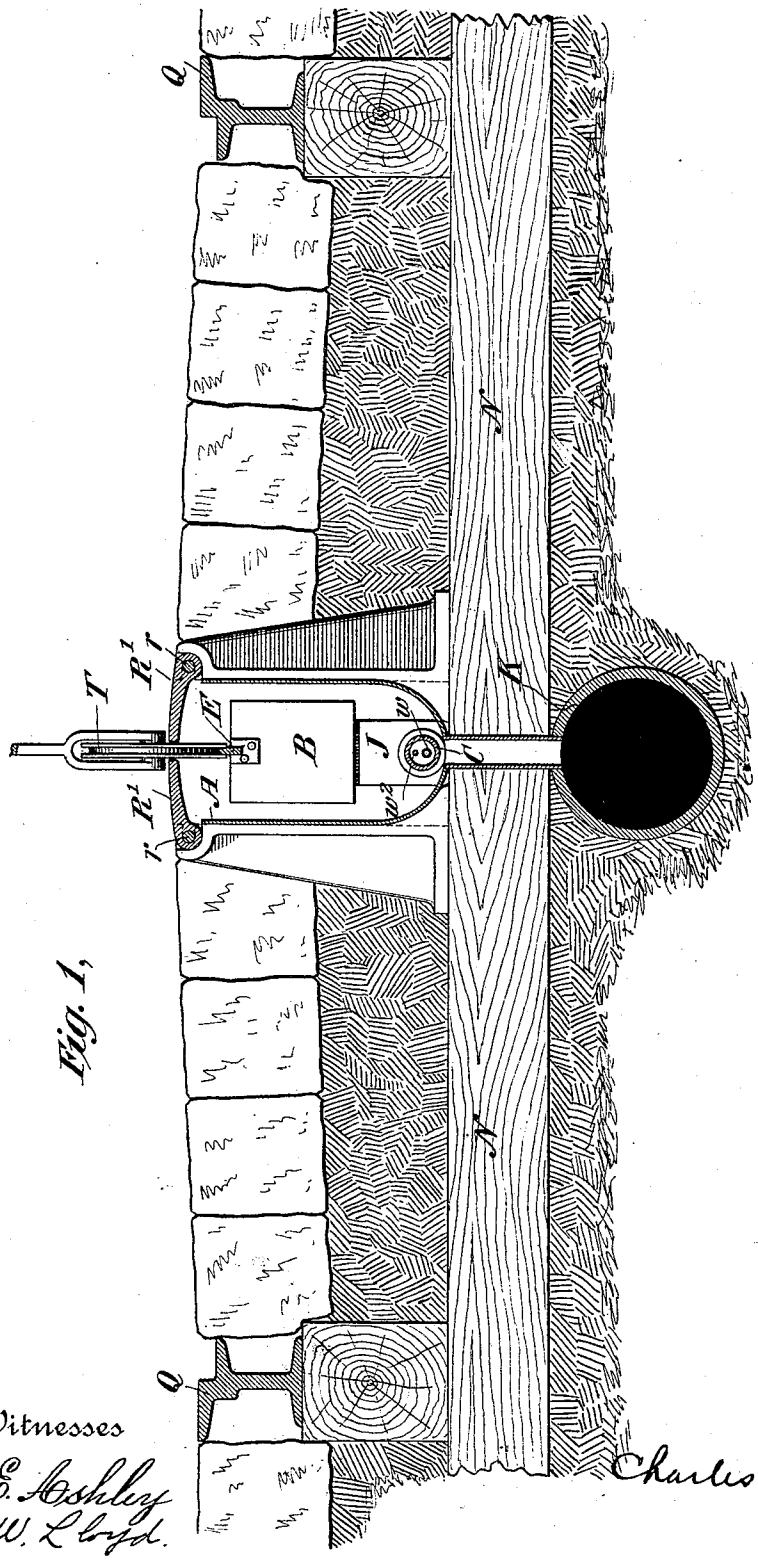

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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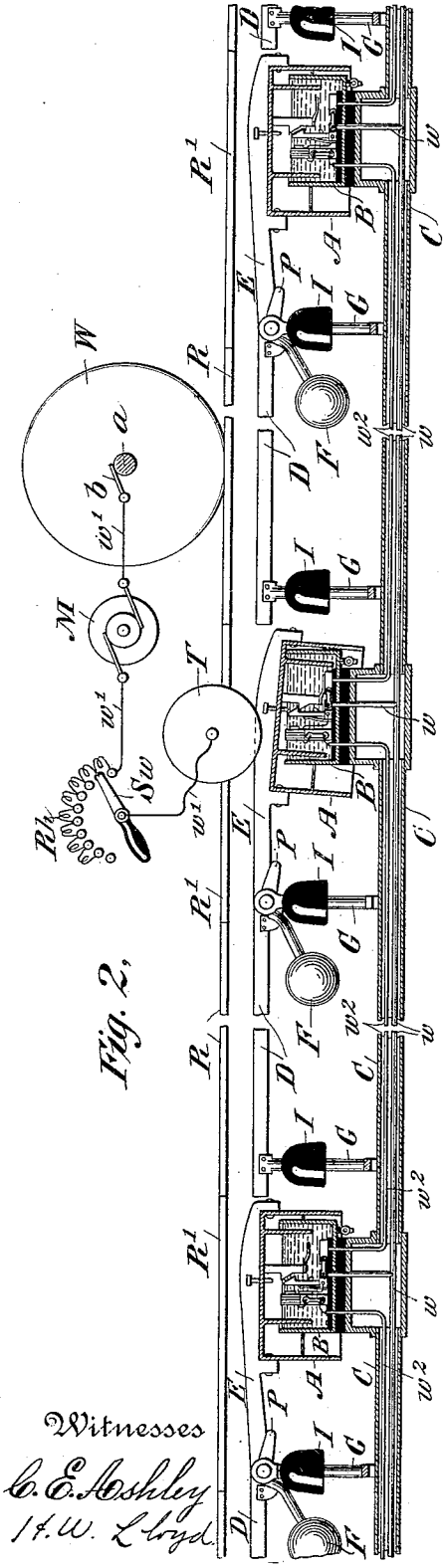

Fig. 2.

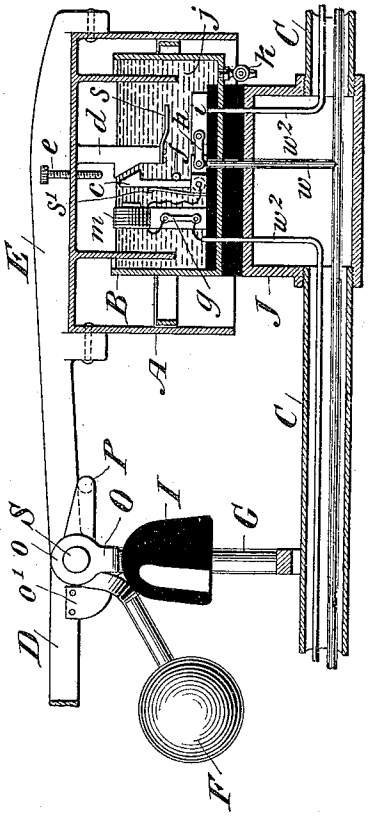

Fig. 3.

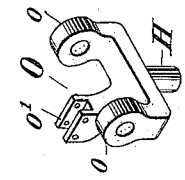

Fig. 6.

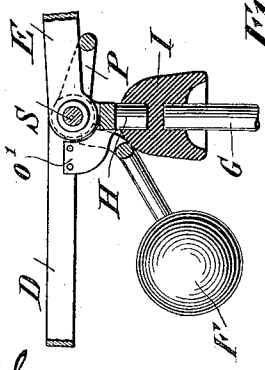

Fig. 4.

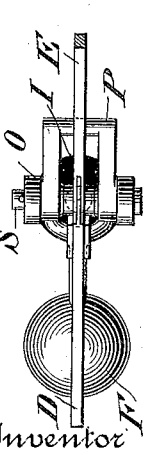

Fig. 5.

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ELECTRIC-RAILWAY SWITCHING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 511,627, dated December 26, 1893.

Application filed June 24, 1893. Serial No. 478,709. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. KINTNER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have made a new and useful Invention in Electric Railways, of which the following is a specification.

My invention is directed particularly to improvements in that type of electric railways known in the art as conduit systems in which the propelling current is taken from sectional or branch conductors which are normally disconnected from a current feeder or main and successively adapted to be connected thereto and disconnected therefrom as the car or vehicle advances over the route.

My invention will be fully understood by referring to the accompanying drawings and to the following specification.

Figure 1 is a transverse section of the road-bed of a street railway illustrating my invention in part sectional part elevational view. Fig. 2 is a vertical longitudinal sectional view illustrating the sectional conductors, the current main, the switch boxes, and also a diagrammatic view of circuit connections through a car *en route*. Fig. 3 is an enlarged sectional view of one of the switch boxes, its pivoted switching lever, and circuit connections with the current feeder or main. Fig. 4 is an enlarged detail view of one of the switch controlling levers illustrating also in sectional view the manner of supporting on insulators the sectional conductors. Fig. 5 is a plan view of the same portion of the apparatus as seen looking at Fig. 4 from the top toward the bottom of the drawing, and Fig. 6 is a perspective view of one of the supports for the fixed trolley conductors and its hinged switching lever.

Referring now to the drawings in detail in which like letters of reference represent like parts wherever used, N represents the cross-ties of usual form carrying timbers or stringers on which rest tramway rails Q Q. K is a drain or sewer located beneath the cross-ties and connected at intervals preferably near the switch boxes by drainage pipes to the slitted conduit, which is supported near the center of the road-bed upon top of the ties N as clearly shown. This conduit is of the usual pattern and incloses a conduit C located directly beneath the slit, said conduit C being connected at intervals to switch boxes J resting upon the cross-ties N.

D D are sectional trolley conductors which are supported at intervals by insulators I on upright standards G secured in turn to the conduit C, these sectional trolley conductors lying preferably directly below the slit and in alignment with the trolley.

w is a current feeder or main which is connected at one end to one pole of the dynamo, not shown, the other pole thereof being connected to earth in the usual manner. This feeder *w* is located wholly within the metal conduit C and is insulated in the most secure manner, being provided at intervals with branches which run through the upper portions of the switch boxes J to fixed contact points *f* connected through fuses *h* to contact plates *i*. On top of each of the boxes J and insulated therefrom is an open cup B, to the bottom of which the contact plate *i*, fuse *h*, and operative parts of the switching mechanism are secured. Each of these cups is preferably partially filled with some light oil, as petroleum. At one end of each of the trolley sections is pivoted, and in alignment therewith, a switching lever E to the free end of which is attached an inverted cup or bell A having downwardly extending flanges adapted to extend into the oil or insulating liquid in the switch box or cup B. To the bottom side of this cup is secured a conducting arm *d* carrying at its lower and free end a yielding contact spring *s* adapted, when in its lower position, to contact with the contact plate *i*.

c is a hooked armature lever provided with a spring *s'* adapted to hold it in its forward position, and *m* is an electro-magnet secured on a standard to the bottom of the switch box B, *g* being a fuse located in circuit with the electro-magnet *m* and a derived or releasing circuit w^2, there being one of these releasing electro-magnets and corresponding circuits and parts for each switch box. Each switch lever E is electrically connected to its corresponding fixed sectional conductor D with which it is in direct alignment and it is pivoted on a standard H secured to the upper portion of the insulator I, its pivotal points being at *o o* in the yoke O which is of metal

and provided with lugs or ears o' adapted to sustain one end of the fixed trolley section D. To the same pivotal bearings $o\ o$ is secured a weighted lever P, the short arm of which rests under the pivoted lever E, and to the long arm of which is secured an operating weight F having sufficient weight to hold the switch lever E in its upward position as shown in Figs. 3 and 4, so that the contact spring s is normally disconnected from the contact plate i in the bottom of the switch box.

T is the trolley wheel which is illustrated as of sufficient diameter to extend into the slitted conduit and is supported by a trolley arm carried by the car in the usual manner.

w' is the motor circuit, Sw the operating switch, Rh a rheostat, M the propelling motor, b a contact brush adapted to carry the current from the motor through the axle a of one of the wheels W of the car to the tram rail Q which is connected to earth in the usual manner and adapted to carry the current to the other pole of the dynamo. Over each of the switching levers E is located a pair of hinged doors R R' hinged or pivoted at the sides of the conduit at $r\ r$ in such manner as to render access easy to the switch boxes.

The operation of the apparatus is as follows: A car is supposed to be traveling from right to left. See Fig. 2. The trolley T has just left one of the fixed sections of trolley conductors D and has passed upon the next succeeding switching lever E pressing it down into its lower position against the influence of the lifting lever P and its operating weight F. When the free end of the lever E reaches its lowest point the hooked armature lever c, see Fig. 3, is forced behind the hook on the arm d, thereby locking the lever E in its lower position. Circuit is therefore closed from the current main w through stationary contact plate f, fuse h, fixed contact plate i, spring s, arm d, switch lever E to the trolley T and also to the fixed sectional conductor D upon which the trolley T will now pass. The current therefore passes through the trolley, the trolley conductor w', switch Sw, motor M, contact brush b, axle a, wheel W by the tram rail Q back to the other pole of the generator. At the moment that the circuit is made through the arm d, spring s, and plate h, a derived circuit is closed from the current main through the next switch box in the rear, through the fixed plate f, fuse h, fixed contact plate i, contact spring s, arm d, armature lever c, electro-magnet m, branch conductor w^2 to the switch box over which the trolley is now standing where it joins the path of the current already described. This derived circuit therefore energizes the electro-magnet m in the rear switch box, thereby releasing the hooked arm d and allowing the weight F and lever P to restore the switching lever E to its normal position leaving the circuit ruptured between spring s and contact plate i in that box. As the car advances therefore the trolley takes the propelling current for the motor M through the fixed sectional conductor D over which it is now passing. When the trolley T passes upon the next switch lever E of the next succeeding section it will in like manner depress that switch lever and lock it in its operative position, simultaneously releasing the switch lever over which the trolley is now standing. Should any one of the switch arms E be locked down and for any reason fail to be released by the action of its corresponding releasing magnet m, the screw e in the top of the switch box may be turned until its free end comes in contact with the hooked end of the armature lever, and ultimately releases the arm d. When it is found necessary to examine the switch boxes the hinged doors or traps R' are thrown open and the pivoted switch levers E and bells A carried thereby are tilted upward about the pivots o, thereby affording convenient access to all of the insulated portions. The oil j may be drawn off by a cock k and the fuses g and h restored if burned out or any other repairs made in a very short space of time. Each bell or cup A is provided preferably with a light rubber gasket or ring adapted to keep out dust or dirt. It is apparent that with this arrangement of circuits both the current main w and the branch releasing conductors w^2 may be absolutely insulated and located permanently in place, the exposed portions lying above the level of water in the conduit and rendered free of access by the hinged bell-shaped switch boxes A which together with the pivoted levers E are of sufficient weight to prevent their being raised by any undue flow of water in the conduit.

It will be noticed that the weighted levers P are so arranged that any sudden blow due to the rapid movement of the trolley T will not seriously injure the operative parts of the apparatus. In the place of these weighted levers I may utilize springs, although I prefer the arrangement shown.

It will be appreciated by those skilled in the art that the relative resistances of the circuits which supply current through the switch boxes to the sectional trolley conductors E D from the current main or feeder w and the branch or derived circuits w^2, w^2, &c., running through the switch releasing electro-magnets m, m, &c., in the switch boxes must be so regulated that sufficient current will pass through the aforesaid magnets and energize them in sequence as the trolley wheel T passes from section to section. This may be effected in any manner well understood by electricians, such for instance as the placing of resistance coils directly in the main circuit between each pair of branches running from the main w to adjacent switch boxes, which resistances shall in each instance, if deemed best, approximate that of any one of the magnets in any switch box, such matters of proportioning the distribution of electrical currents being well un-

derstood by those skilled in the art; or any other well understood method of proportioning the current between the current main w and the releasing circuits $w^2 w^3$ may be adopted by the builder of the system.

I believe it is broadly new with me to provide sectional trolley conductors with pivoted switches located in alignment with said sectional conductors and switching apparatus rendered easily accessible by such an arrangement, and my claims are to be construed as of the most generic nature in this particular. It is also apparent that the sectional trolley conductors might consist entirely of pivoted levers E where the sections are not of unusual length.

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

1. In an electric railway system a current main or lead insulated throughout its length; a series of pivoted sectional trolley conductors located in alignment with each other and provided with locking mechanism for holding them in locked position in circuit connection with the current main, and additional means for releasing them as the propelled car or vehicle passes over them in succession.

2. In an electric railway system a current main or lead insulated throughout its length, in combination with a series of pivoted sectional trolley conductors located in alignment with each other and provided with locking mechanism for connecting and locking them operatively in electrical contact with the current main, substantially as described.

3. In an electric railway system a current main or lead insulated throughout its length and provided with branches extending into open topped cups or boxes; a series of hinged sectional trolley conductors carrying each an inverted cup which incloses the first named cup in combination with circuit connections within said cups for connecting the sectional conductors to the current main or lead in sequence.

4. In an electric railway system an insulated current main or lead located in or near a slitted conduit and having branch connections extending into open topped cups located near the slit, in combination with pivoted sectional trolley conductors provided with bells or cups inclosing circuit connections and locking and releasing devices for successively connecting each sectional trolley conductor with the current main, and in like succession releasing it as the propelled car or vehicle passes over the route.

5. In an electric railway system a current main or lead insulated throughout its length and provided with branch connections extending into open topped cups or boxes; a corresponding series of cups or boxes attached to pivoted sectional trolley conductors and adapted to cover the first named set of boxes, means within the switch boxes for making circuit connections between the current main or lead and the sectional conductors, and additional means for normally maintaining the circuit broken between the current main and the sectional conductors, substantially as described.

6. In an electric railway system a current main or lead insulated throughout its length; a series of pivoted sectional trolley conductors located in alignment with each other and carrying each an inverted cup or bell inclosing circuit connections to the current main at fixed points, in combination with locking mechanism for holding the circuit permanently closed during the time that the vehicle is over the section, and additional means for rupturing the circuit when the vehicle passes on to the next succeeding section in advance, substantially as described.

7. In an electric railway system a current main or lead insulated throughout its length and a series of switch boxes consisting of telescoping cups, the upper cup being attached in each instance to a pivoted lever, in combination with locking mechanism in each box for holding the free ends of the pivoted levers in depressed position substantially as described.

8. In an electric railway system a current main or lead insulated throughout its length; a series of open topped or cup-shaped switch boxes inclosing fixed circuit connections with the current main; a series of telescoping or inverted removable cups carrying movable circuit connections and attached each to a pivoted trolley section, in combination with weighted levers one for each trolley section, and locking mechanism for holding the free ends of the pivoted trolley sections in depressed position substantially as described.

9. In an electric railway system a current main or lead insulated throughout its length; a series of fixed sectional trolley conductors, in combination with a series of pivoted sectional trolley conductors located in alignment with the fixed conductors and having locking mechanism and circuit connections at their free ends for connecting them electrically with the current main or lead, substantially as described.

10. In an electric railway system a current main or lead insulated throughout its length; a series of fixed sectional trolley conductors located in alignment with the slit of a surrounding slitted conduit, a series of short pivoted trolley conductors secured one to each fixed trolley conductor and provided at its free end with locking mechanism and circuit connections located in water tight switch boxes for connecting the trolley sections in succession to the current main or lead, substantially as described.

11. In an electric railway system a current main or lead insulated throughout its length and having branch circuit connections with open topped switch boxes located in close proximity to the surface of the road-bed and in alignment with the slit of a surrounding

conduit; pivoted sectional trolley conductors provided each with an inverted cup or bell having movable circuit connections adapted to contact with fixed circuit connections in the switch boxes, in combination with fuses, substantially as described.

12. In an electric railway system a current main or lead insulated throughout its length, in combination with a series of fixed sectional trolley conductors each provided with a pivoted section having circuit connections and locking mechanism for connecting and holding the free end thereof in electrical contact with the current main, substantially as described.

In testimony whereof I have hereunto subscribed my name this 23d day of June, 1893.

CHARLES J. KINTNER.

Witnesses:
M. M. ROBINSON,
SILAS B. BOSTRIED.