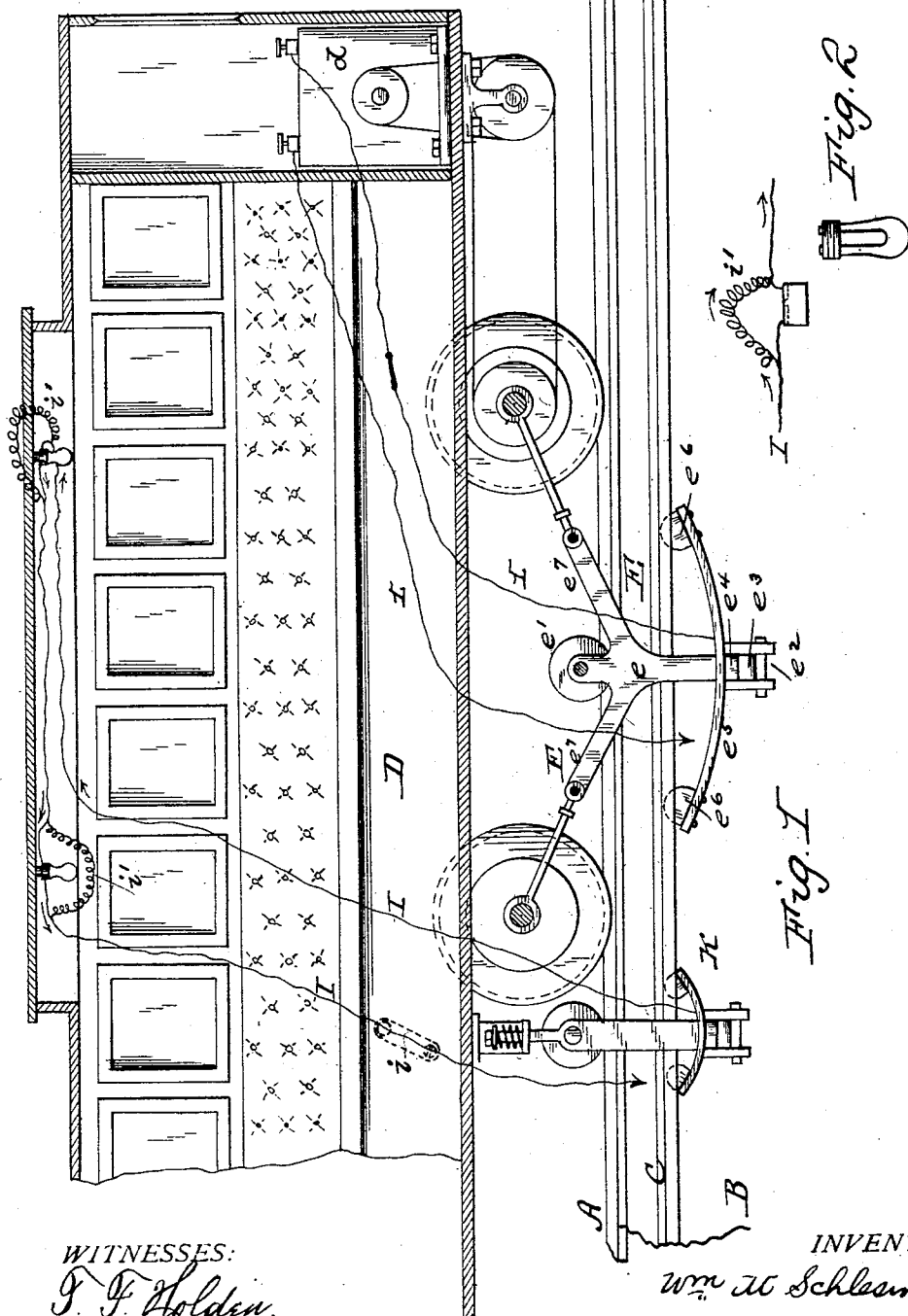


W. M. SCHLESINGER.
ELECTRIC RAILWAY.

No. 561,821

Patented June 9, 1896.



WITNESSES:

J. F. Holden.
Geo. R. Byington

INVENTOR,

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(No Model.)

5 Sheets—Sheet 2.

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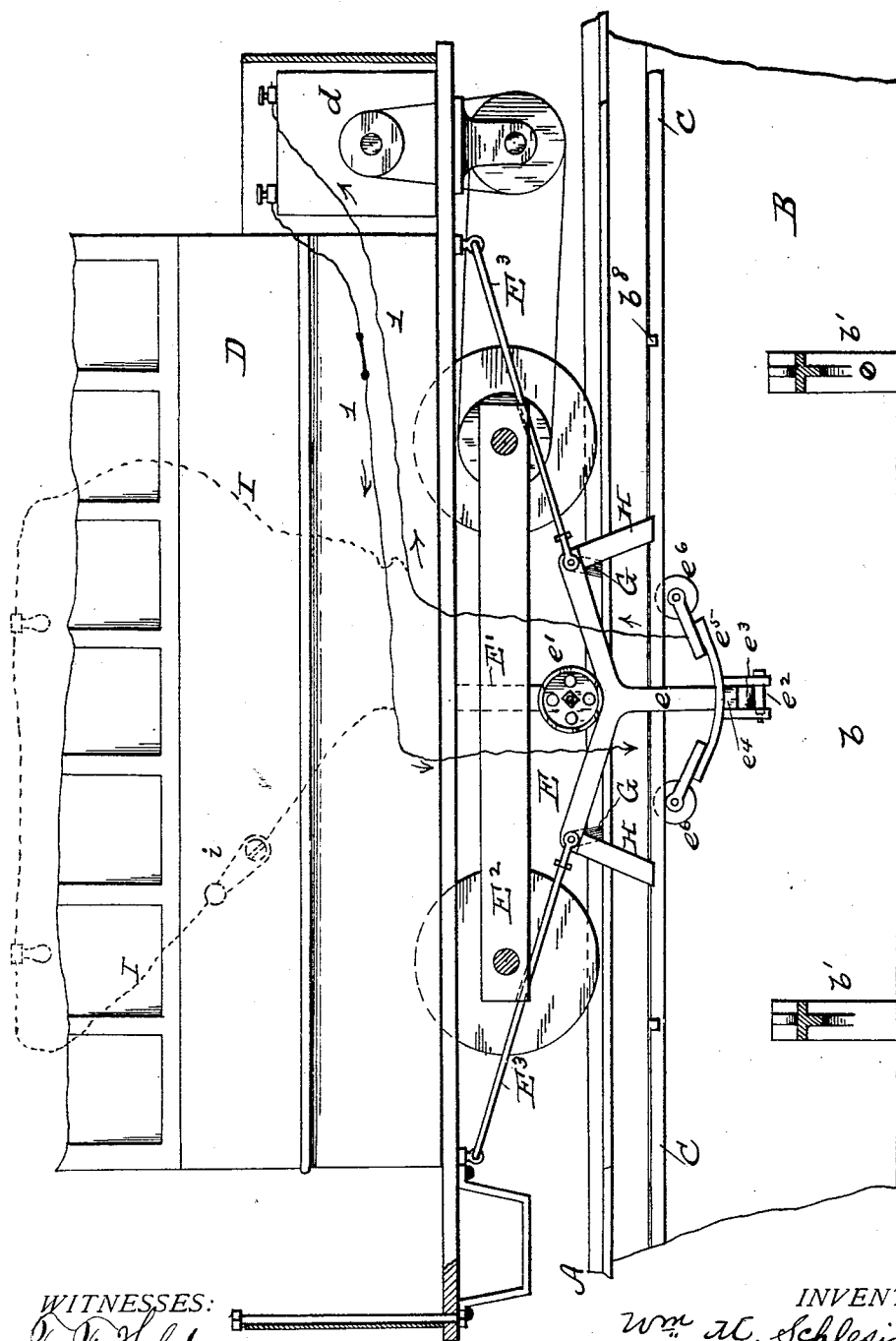


Fig. 3

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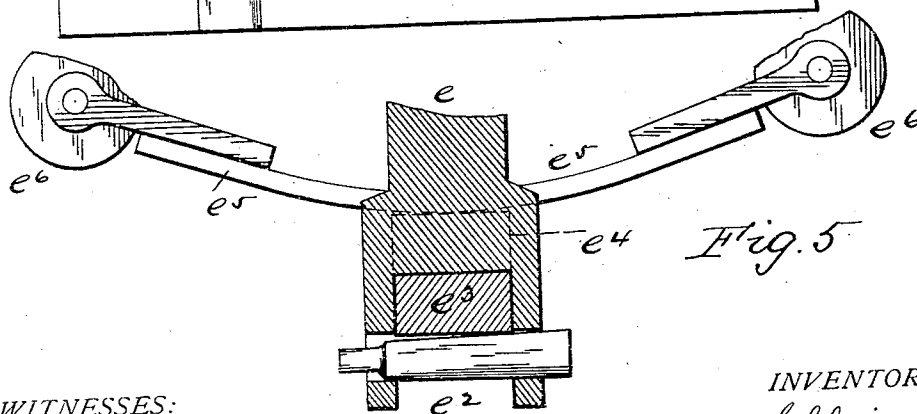
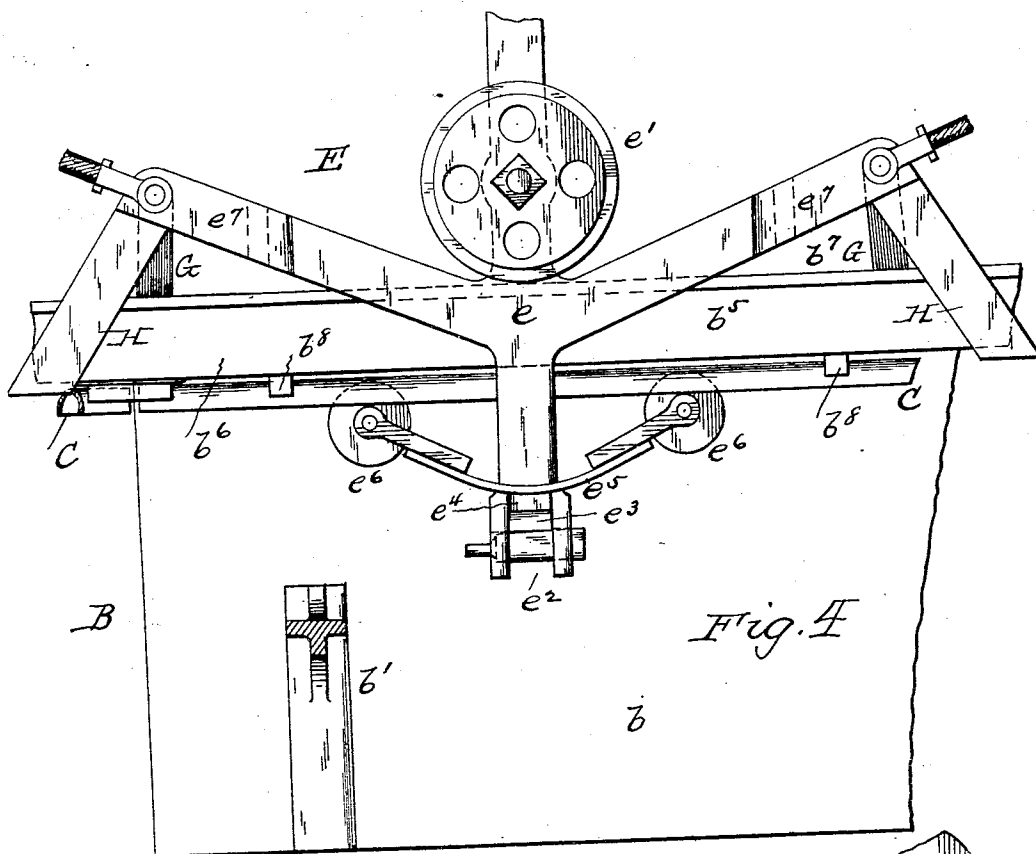
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5 Sheets—Sheet 3.

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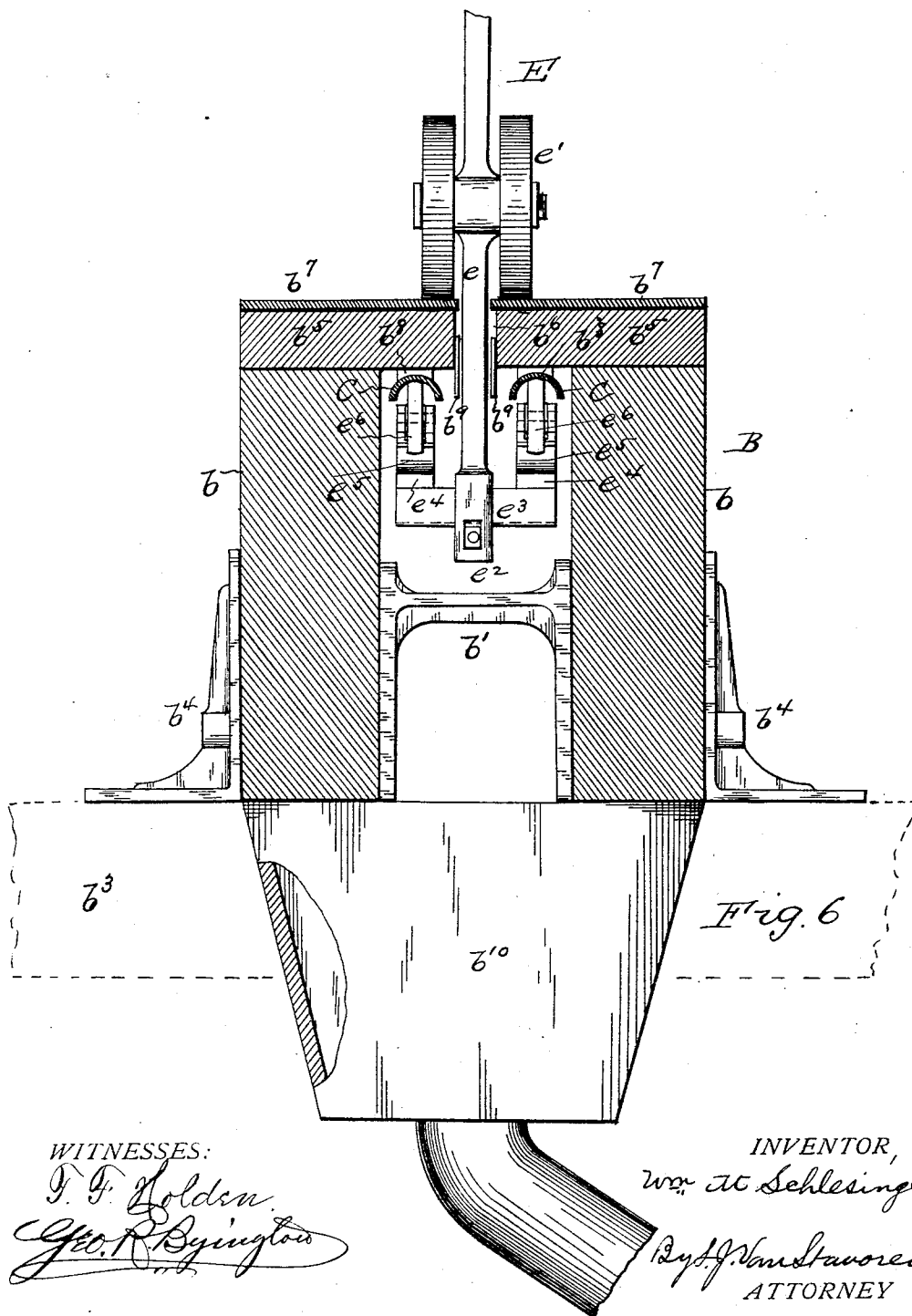
(No Model.)

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5 Sheets—Sheet 5.

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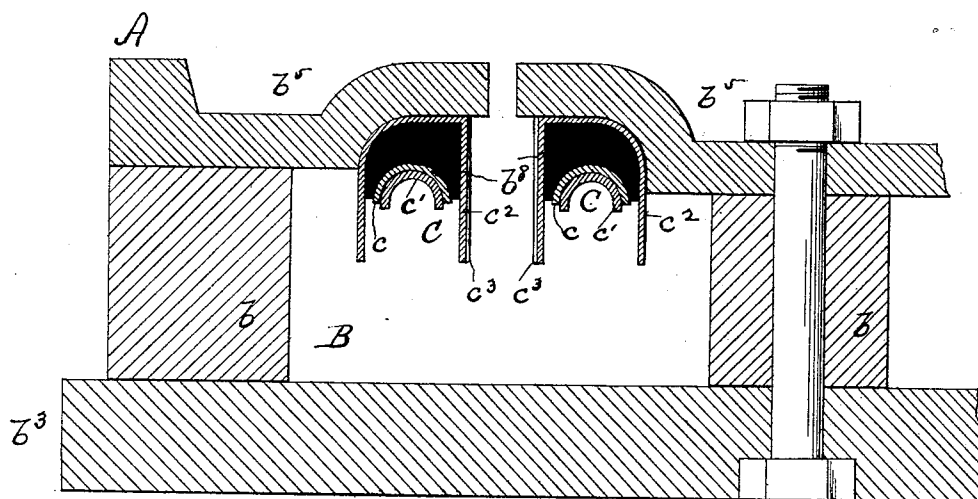


Fig. 7

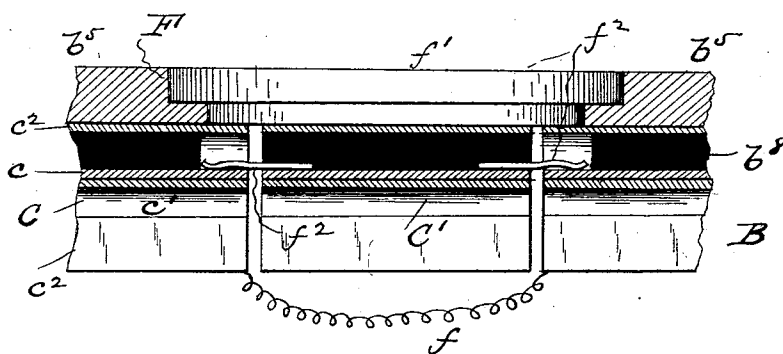


Fig. 8

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UNITED STATES PATENT OFFICE.

WILLIAM M. SCHLESINGER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO JOHN I. McDUFFEE, TRUSTEE, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 561,821, dated June 9, 1896.

Application filed August 4, 1885. Serial No. 173,533. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. SCHLESINGER, a subject of the Queen of Great Britain, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1 is a longitudinal sectional view, partly in elevation, of a portion of a car and line of way of an electric railroad embodying my improvements. Fig. 2 is a detail elevation showing one of the lamps for the car unscrewed from its holder or removed from the car-lamp circuit. Fig. 3 is a view similar to Fig. 1, showing the scrapers and brushes on the traveling frame connecting the line and car-motor circuits and modified arrangement of circuit for the car-lamps. Fig. 4 is an enlarged view of said frame and of the conduit for the line conductors. Fig. 5 is an enlarged sectional elevation of the contact-rollers, their spring-supports, and the lower part of the traveling frame. Fig. 6 is a transverse section, partly in elevation, of the conduit, the line conductors, and the traveling frame. Fig. 7 is a like view showing preferable form of conduit when located adjacent to one of the track-rails, and also preferable mode of construction of line conductors and insulating devices therefor; and Fig. 8 is a longitudinal section of a portion of the conduit, showing a construction of manhole-cover and line-conductor connections at the manholes located along the line of way of the conduit.

My invention has relation to electric railways, comprising line conductors fed from a generator located at a station or stations along the line of way, and cars having a motor-circuit and traveling frame connecting the motor and line-circuits; and it has for its principal objects to provide an inexpensive, simple, and durable conduit for the line conductors; to thoroughly insulate the latter from the conduit; to so constructing line conductors that they afford as little resistance as possible to the passage of the line-current and yet present hard or durable wear-

ing surfaces for contact with the brushes or rollers on the traveling frame or connections of the car; to providing the conduit with manholes having covers to which are affixed sections of the line conductors and arranging the latter at the manholes to permit their covers to be removed without breaking the line-circuit; to provide the car with traveling connections arranged and constructed to insure positive contact between the car-motor and the line-circuits under varying conditions of travel or service, and, finally, to electrically lighting the cars by a current which is either a division of the line-current or the current passing to the car-motor, or, in other words, the current for lighting the car is independent of or does not pass to and through the car-motor.

My invention accordingly consists of the combination, construction, and arrangement of parts comprising an electric railway as hereinafter described and claimed, having reference particularly, first, to a conduit composed of two vertical side pieces of, preferably, wood connected by suitable inside cross-bars or brackets and stayed by outside brackets, and of top bars with central slot between them, and having an upper lining or surface of metal and an under support for the line conductors; second, to compound line conductors composed of two different kinds of metal, or of a copper and an iron or steel plate suitably joined together and offering different resistances to the passage of the current; third, to line conductors fastened to rubber or other insulating blocks or supports inclosed in a fiber trough or casing suitably attached to the conduit; fourth, to a manhole-cover having affixed sections of line conductors provided with contact-springs; fifth, to a car traveling frame or connection composed of a wheeled carriage traveling or rolling along the top of the conduit and having spring-supported rollers or brushes which bear against the line conductors, and, sixth, to a car-lamp or other electric circuit having either its separate traveling brush or connections with the line-circuit or divided from the motor-circuit in advance of the motor.

In the drawings, A represents a line of track for an electric railway; B, the conduit

for the line conductors C; D, the car having electric motor *d* in gear with the car-axes in any suitable manner, and ⁵ the traveling frame for the connection between the car-motor circuit I' I' and line conductors C.

The conduit B, when placed in the center between the tracks A, is preferably composed of two vertically-arranged sides *b*, of wood or other desired material, connected by inner ¹⁰ metal cross-bars or brackets *b'*, of preferably an inverted-U shape, as shown more plainly in Fig. 6. These brackets are screwed or otherwise attached to the side pieces *b*. The latter are preferably laid upon the cross- ¹⁵ ties *b³* of the tracks, and are secured to and stayed or braced thereon by the outside fastening or right-angle brackets *b⁴*. Upon the top of the side pieces *b* are placed, preferably, covers or bars *b⁵*, arranged to have a ²⁰ central longitudinal slot *b⁶* between them. These covers when made of wood have upon their upper surfaces metal plates or faces *b⁷*, and upon their under surfaces the insulated blocks *b⁸* for supporting the line conductors ²⁵ C. When the covers or bars *b⁵* are made of metal, no facings or linings are required. The lower part of the sides of the slot *b⁶* is protected by metal facing-strips *b⁹*, which extend downwardly into the conduit to or below the lower edge or plane of the conductors ³⁰ C, to protect them from the weather and from dirt or other material entering or thrown into the conduit. The bottom of conduit B may at intervals along its length have outlet pipes or drains *b¹⁰*, (see Fig. 6,) for connection with ³⁵ a sewer or other like fixture.

Any suitable form of conductor C may be employed. In most of the figures of the drawings I have shown a conductor which is segmental in cross-section, as I prefer this form. ⁴⁰ To provide a conductor of low resistance and of great durability, I prefer to make it of two parts or sections of different metals having different degrees of hardness, (see Figs. 7 and ⁴⁵ 8,) wherein the outer or larger section *c* is of copper and the inner section *c'* is of iron or steel. The former or copper strip conducts the current and the latter forms a hard contacting-surface for the brushes or rollers on ⁵⁰ the traveling frame E. These sections may be connected together in any suitable manner to form stiff or rigid lengths of conductors C. To thoroughly insulate the latter, I prefer to secure them to india-rubber blocks ⁵⁵ *b⁸*, incased in a trough *c²*, made of fibrous or analogous material, (see Fig. 7,) and cement or otherwise secure the same to the top plates *b⁵* of the conduit. The adjacent or opposing faces of the troughs *c²* are lined with tin or ⁶⁰ metal *c³* to protect them against the weather and against wear or damage by the insertion of dirt or fixtures into the conduit or its slot.

When the conduit is placed to one side of the longitudinal center of the tracks or adjacent to one of the track-rails, one top plate ⁶⁵ of the conduit and one of the rails are formed in one piece, as shown in Fig. 7, and the re-

maining top plate is bolted or otherwise fastened to the transverse sleepers or ties *b³*.

Along the conduit, at suitable intervals, ⁷⁰ are manholes F, at which places the conductors are broken and electrically connected by a wire *f*. The broken or filling-in sections C' of the conductors are secured to the man- ⁷⁵ hole-cover *f'* and are provided with spring-fingers *f²* for making electrical contact between sections C' and the adjacent ends of conductors C when the cover is in position upon the manholes. This described construction ⁸⁰ provides easy access to the conduit without breaking the electric connection of the line conductors and affords a continuous circuit throughout the conductors when the man- ⁸⁵ hole-covers are or are not in place.

The traveling frame E is composed of a ⁸⁵ slot iron or bar *e*, mounted upon wheels or rollers *e'*, which travel upon the top plates *b⁵* of conduit B or their metal linings *b⁷*. Said frame may be attached directly to the car, as indicated by dotted lines E', Fig. 3, to a frame ⁹⁰ E², mounted upon the car-axes, or to the car by means of cords or rods E³, or to axles by means of said cords or rods, as indicated in Fig. 1, or any other suitable connection of said frame ⁹⁵ E with the car may be made whereby as the car moves the frame travels therewith. The frame-rod *e* depends through conduit-slot *b⁶* below the conductors C, and is provided with, preferably, a bifurcated end *e²*, into which is ¹⁰⁰ suitably keyed a cross-bar *e³*. Upon the ends of bar *e³* are attached blocks *e⁴*, to which in turn are secured curved springs or elastic bars *e⁵*, having at their extremities rollers or wheels ¹⁰⁵ *e⁶*, as shown in Fig. 3, or brushes or rubbing-block, as indicated in Fig. 1, which rollers or brushes are adapted to the inner or lower surfaces of the conductors C to make electrical contact therewith for the car-motor circuit I' I'. The springs *e⁵* are so disposed in ¹¹⁰ relation to frame rollers or wheels *e'* and contact rollers or brushes *e⁶* that the former are drawn down upon or impinge under pressure against the top surface of the conduit, and the latter have an upward forcible contact against the conductors C, whereby said rollers ¹¹⁵ and brushes are maintained at all times in close or hugging contact with the surfaces against which they impinge. At the same time the elasticity of the springs *e⁵* is such that they admit of either the rollers *e'* or the ¹²⁰ contact-brushes *e⁶* yielding to the inequalities of the conduit and conductors without breaking contact.

To keep the top of the conduit free from obstructions or from dirt in the line of travel ¹²⁵ of wheels *e'*, brushes G are secured to the frame E or its longitudinal arms *e'* in advance of said wheels.

To keep the conduit-slot *b⁶* open or clean, I attach scrapers or knives H to the arms *e'* ¹³⁰ of frame E. These knives or scrapers depend into the conduit-slot and free it or its sides from any accumulation of dirt.

Brushes G and scrapers H are attached to

both ends of frame E to act as the car moves either forwardly or backwardly.

The lamp-circuit I of the car may be a loop from the motor-circuit I' I', as indicated in Fig. 3, and have a cut-out or switch *i*, or it may have its own separate traveling frame or connections K, as illustrated in Fig. 1, which frame is constructed and arranged for operation, as above described, for frame E. This lamp-circuit may have a switch or cut-out, as indicated by dotted lines *i* in said figure, or a high resistance *i'* may be placed in the circuit around each lamp, so that when any of the lamps are removed from their holder, as shown in Fig. 2, the circuit is still complete, though the lamps are out of such circuit. If desired, the lamp-circuit may be used for other than illuminating purposes.

The provision of a separate light or lamp circuit having individual traveling connections with the line conductors makes the current supply for the lights independent of that for the motor, and this is a practical advantage in electric railroading for the reason that any defect either accidentally or otherwise happening to the motor or its traveling connections at night or when the lights are burning they still continue to burn while the defect in the motor or its connections is repaired, if capable of repair, and if not the light-circuit and its traveling connections can then be used for the motor as well as for the lights by making suitable connections, and travel of the car continued, thereby preventing blocking of the line.

What I claim is—

1. The slotted conduit B, composed of separate vertical side pieces *b*, connected at intervals along their length by inside inverted-U-shaped transversely-arranged brackets *b'*, and correspondingly stayed by outside brackets *b''*, and of top bars or covers *b'''*, having exterior metal facings *b''''*, and interior conductor-supports, substantially as shown and described.

2. The slotted conduit B, for the conductors of electric railways composed of separate vertical side pieces *b*, secured together at intervals along their length by transverse brackets *b'*, and correspondingly stayed by outside brackets *b''*, and of top bars or covers *b'''*, having outside metal facings *b''''*, and slot-facings *b'''''*, depending into the conduit to or below the conductors, substantially as shown and described.

3. In an electric railway, electric conductors each composed of two superposed metal plates of different degrees of hardness and the harder metal plate being below the softer metal plate, in combination with a car having traveling brushes which have an upward-pressure contact against the under or bottom surface of the harder metal plate, substantially as shown and described.

4. In an electric railway, conductors composed of superposed plates of copper and iron or steel, the latter being beneath the former,

in combination with a car having traveling brushes which have an upward-pressure contact with the under side of the iron or steel plates of the conductors, substantially as shown and described.

5. An electrical conductor composed of superposed plates of copper and iron or steel of segmental form in cross-section, in combination with, traveling brushes contacting with the steel or iron plate of the conductor, substantially as shown and described.

6. In an electric railway, the conductor C, mounted upon insulation *b''*, inclosed in a fibrous trough or casing *c''*, substantially as shown and described.

7. In combination with a slotted conduit B, the conductors C, insulation *b''*, and fibrous troughs or casings *c''*, having metal facings *c'''*, substantially as shown and described.

8. In an electric railway a conductor conduit or support and a car having a separate frame traveling upon the conduit along with the car and provided with contact-brushes arranged to force in opposite directions the frame against the conduit and the brushes against the conductors, substantially as shown and described.

9. In combination with a support or conduit B, having conductors C, of a car having separate roller frame or truck E, traveling along with the car upon the conduit or support and provided with contact-brushes having supporting devices arranged to force in opposite directions, the frame against the conduit and the brushes against the conductors as and for the purpose set forth.

10. In an electric railway the conduit B, having manholes, the conductors C, broken at said manholes and electrically connected by a wire *f*, in combination with covers having conductor-sections *C'*, and contact-fingers *f''*, substantially as shown and described.

11. In combination with conduit B, and conductors C, the traveling frame E, having rollers or brushes supported upon springs arranged to force in opposite directions the brushes against the conductor and the frame against the conduit, substantially as shown and described.

12. The frame E, having scrapers H, brushes G, and spring supporting or yielding contact rollers or brushes *e''*, substantially as shown and described.

13. In an electric railway the combination of, a conduit having conductors, a car having motor or electric circuits and a frame attached to or moving with said car and having rollers for travel upon said conduit, and contact-brushes having yielding or spring bearings arranged to force in opposite directions the frame against the conduit and the brushes against the conductors, substantially as shown and described.

14. In an electric railway having a conduit with line-circuit and a car with motor or electric circuit, a traveling frame or connection attached to the car, moving upon the conduit,

and having brushes secured to yielding supports arranged to force in opposite directions the frame against the conduit and the brushes against the conductors, substantially as shown and described.

15. The combination of, a railway-car, a propelling electric motor supported thereby, a contact frame or plow extending into the slotted conduit to make connection with a stationary conductor inclosed therein, and a supporting-truck therefor connected to the car adapted to ride on the outside of the conduit.

16. The combination of, a railway-car, a propelling electric motor supported thereby, a contact-plow extending into the slotted conduit to make connections with a stationary

conductor inclosed therein and a supporting-truck therefor, connected to the car, adapted to ride on the outside of the conduit.

17. In an electric railway the combination of, a conduit with line conductors therein, of a car, a truck attached to the car and moving upon the conduit and having brushes secured to the yielding supports arranged to force in opposite directions the frame against the conduit and the brushes against the conductors.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM M. SCHLESINGER.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.