(No Model.)

3 Sheets—Sheet 1.

W. P. PATTON.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 495,996. Patented Apr. 25, 1893.

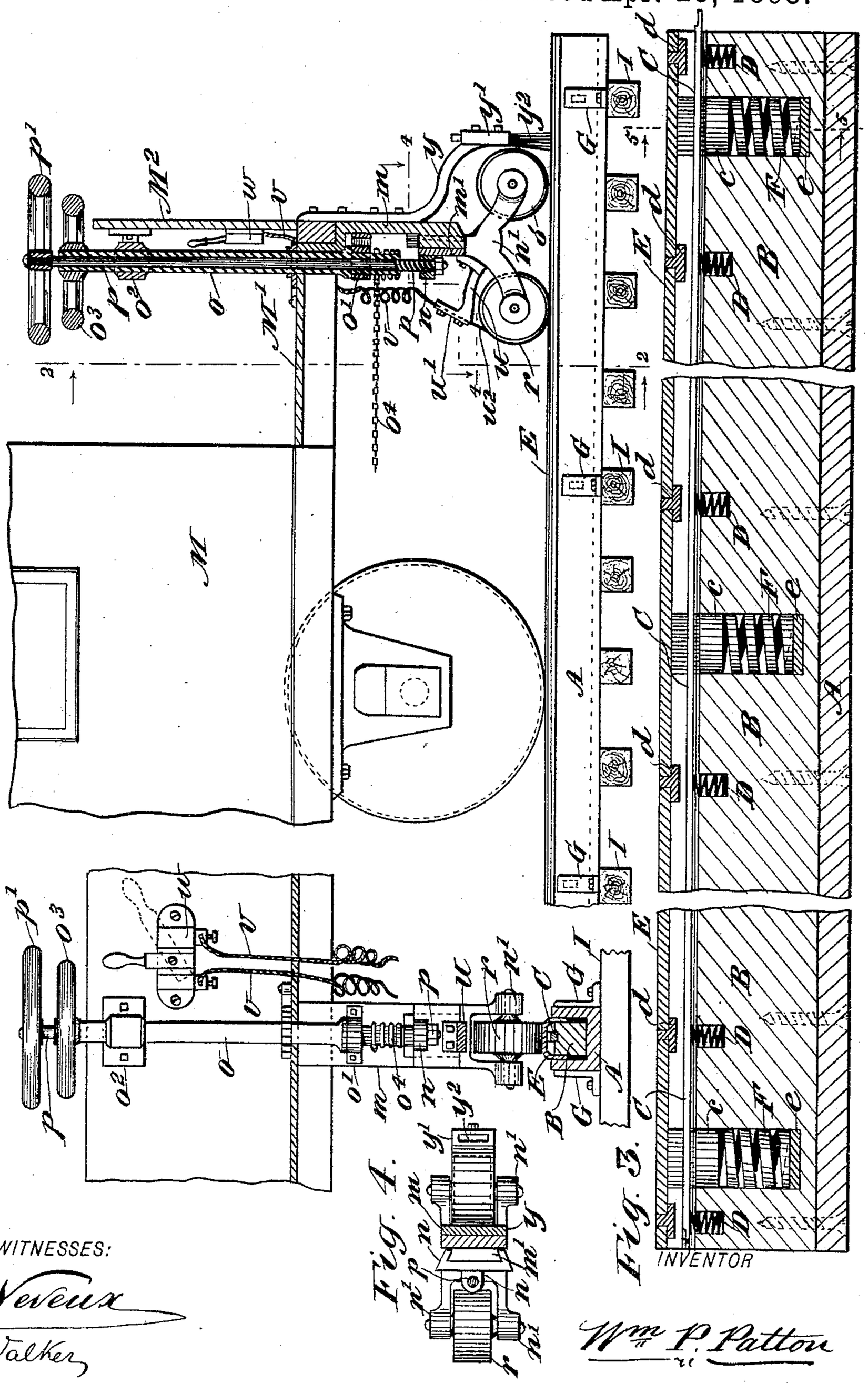


Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

WITNESSES:

C. Neveux

H. Walker

INVENTOR

Wm P. Patton

(No Model.) 3 Sheets—Sheet 2.

W. P. PATTON.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 495,996. Patented Apr. 25, 1893.

Fig. 1.

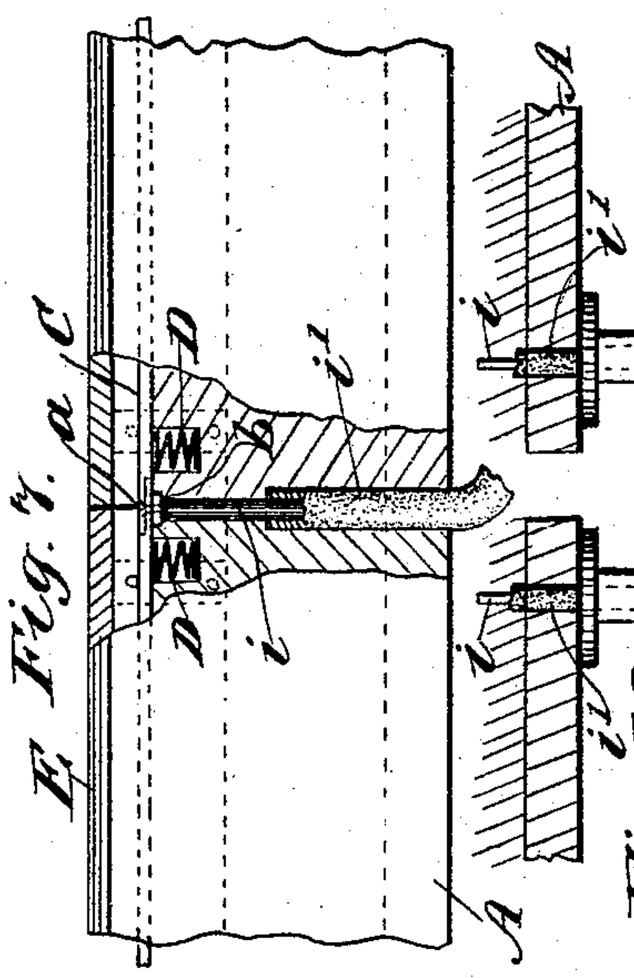


Fig. 12.

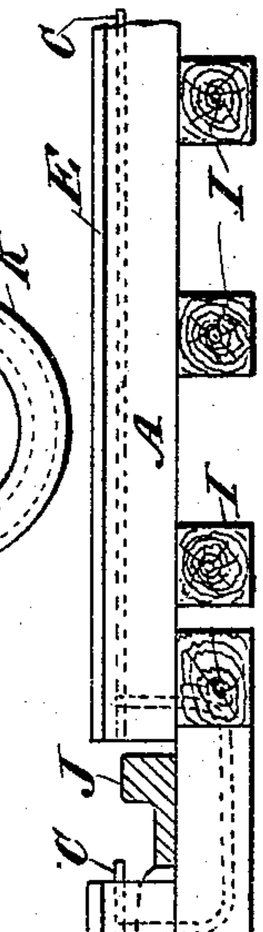


Fig. 9.

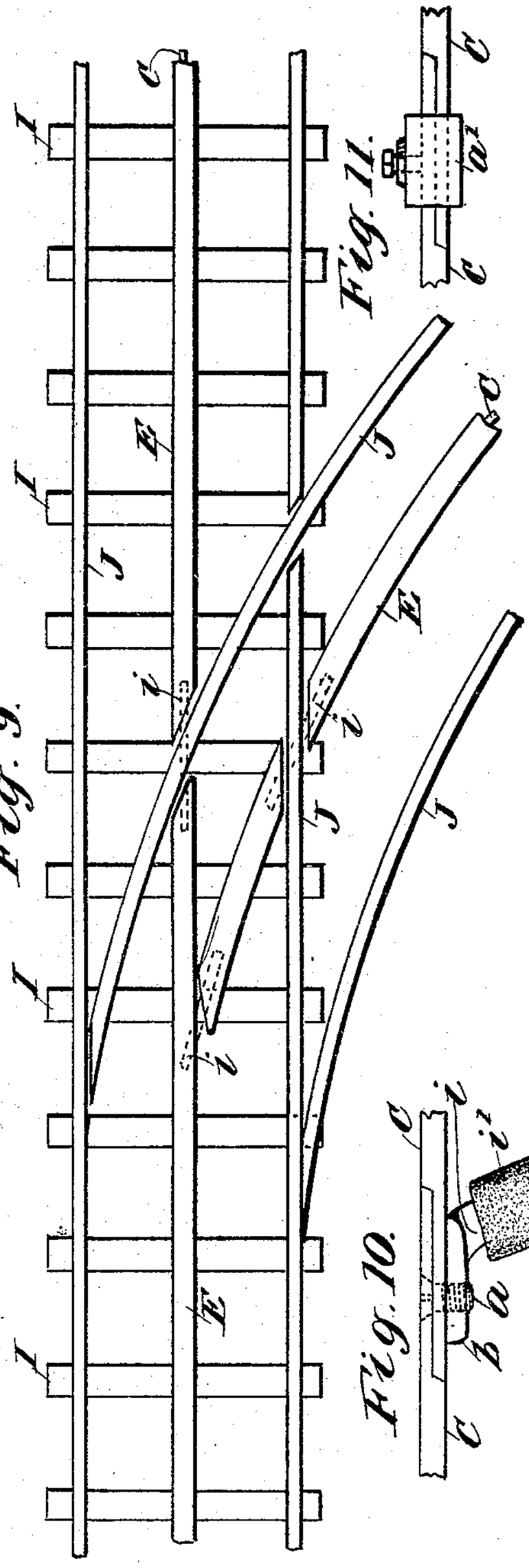


Fig. 11.

Fig. 6.

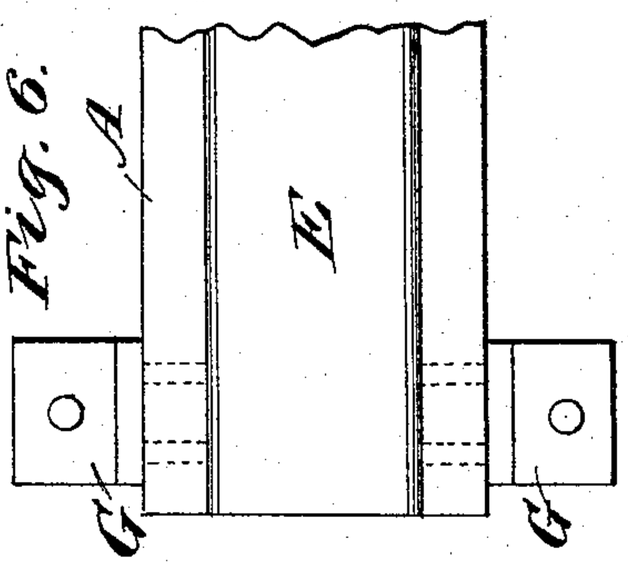


Fig. 8.

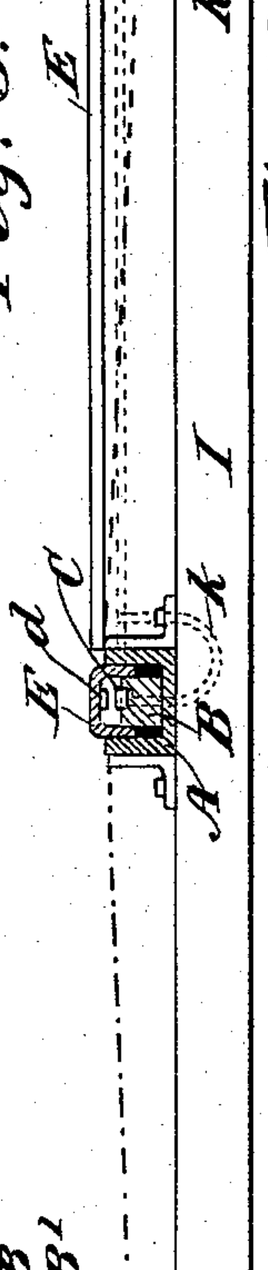


Fig. 10.

Fig. 5.

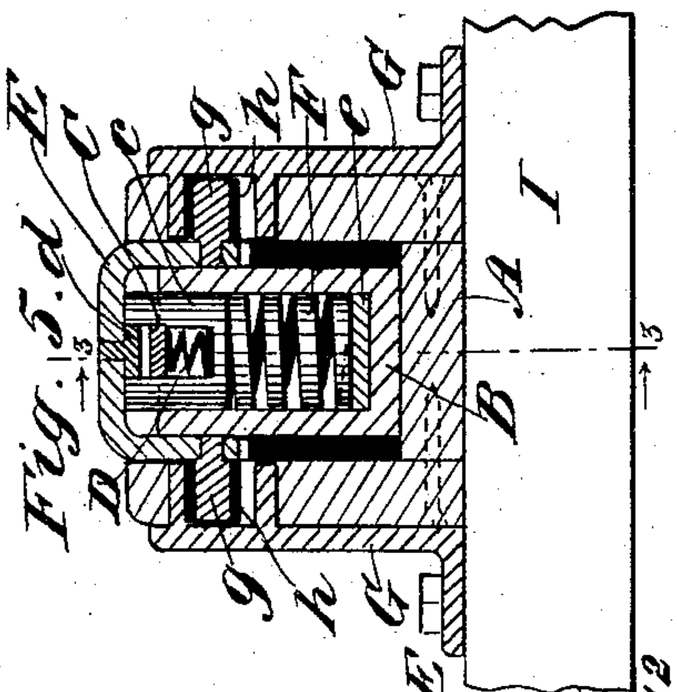
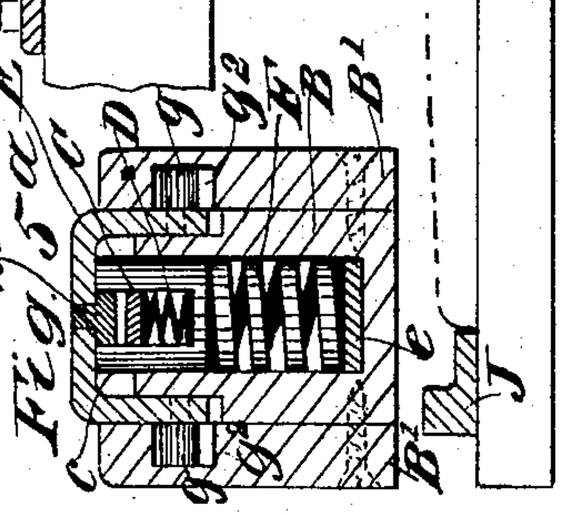


Fig. 5-a



WITNESSES:

C. Neveux

H. Walker

INVENTOR

Wm P. Patton

(No Model.)

3 Sheets—Sheet 3.

W. P. PATTON.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 495,996. Patented Apr. 25, 1893.

Fig. 13.

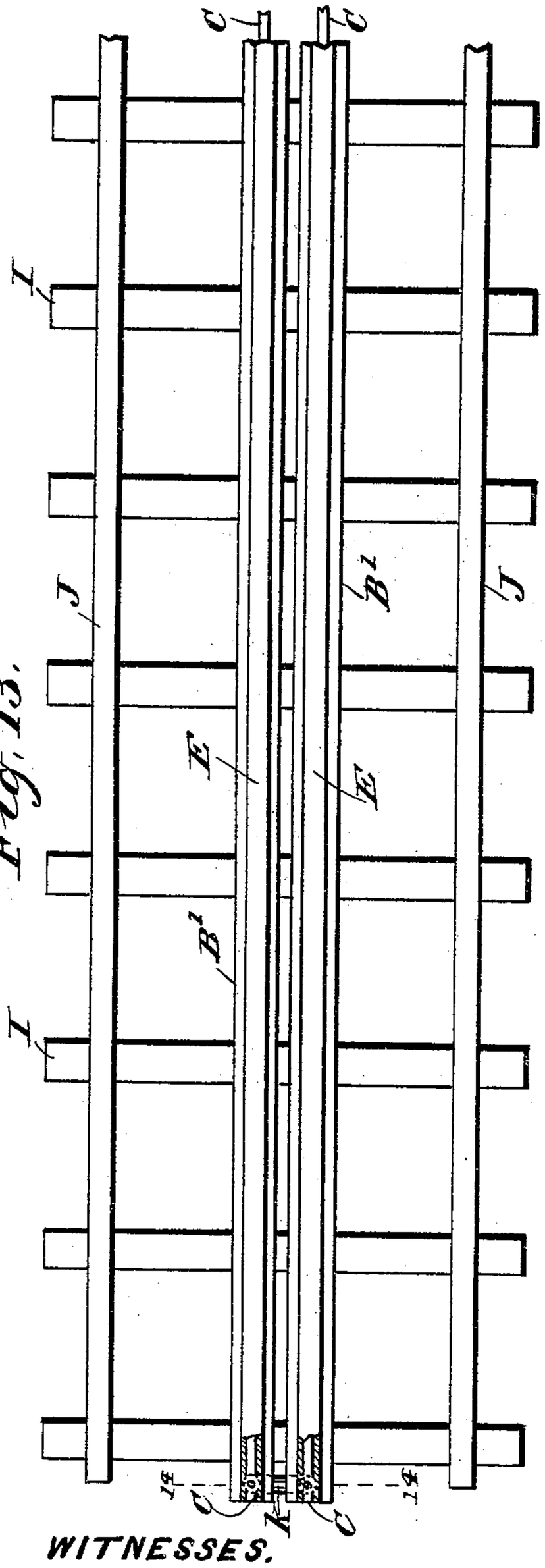
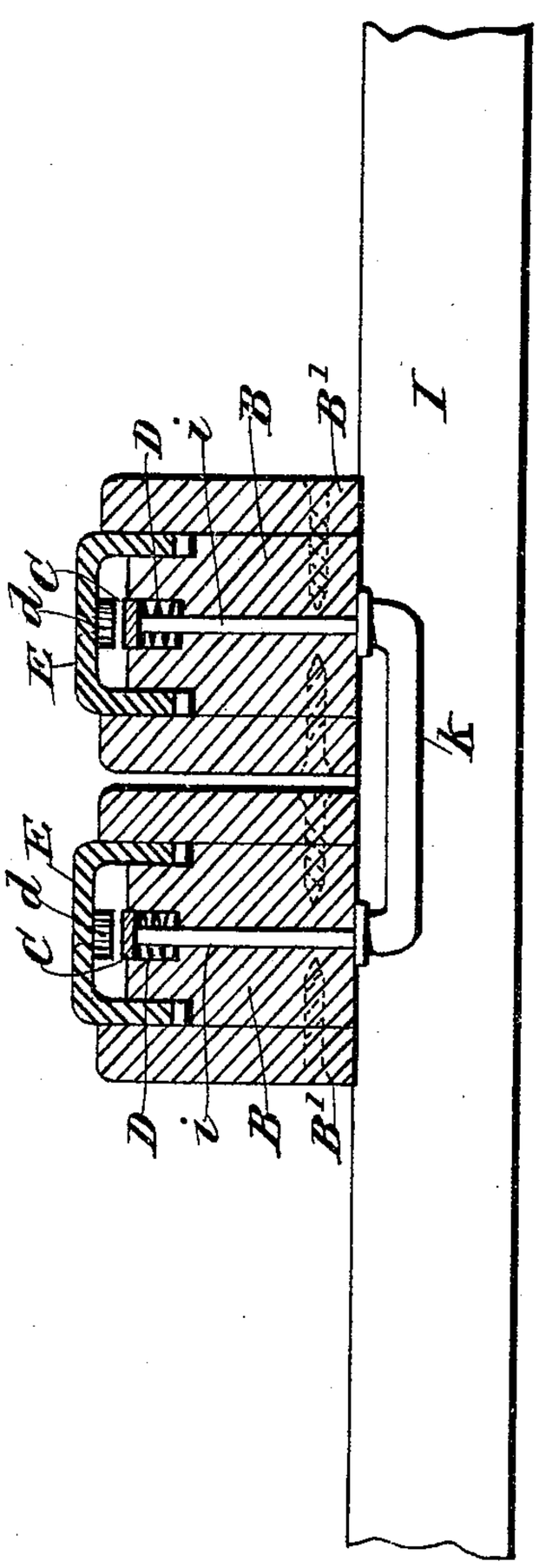


Fig. 14.



WITNESSES.

H. Walker

C. Neveux

INVENTOR.

Wm P. Patton

UNITED STATES PATENT OFFICE.

WILLIAM P. PATTON, OF NEW YORK, N. Y.

CLOSED-CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 495,996, dated April 25, 1893.

Application filed July 15, 1892. Serial No. 440,115. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. PATTON, of New York, in the county and State of New York, have invented a new and useful Electric-Railway System, of which the following is a full, clear, and exact description.

My invention relates to an improved system for the distribution of electric current, from a main station, to motors on cars, for propulsion of the latter on main lines, and branches of a railway.

The objects of my invention, and its nature, consist, in the provision of a simple, inexpensive, and practical method and means, for the above indicated purpose, which will avoid the employment of suspended overhead wires, or underground conductors for electric circuits; and in a perfectly safe manner, supply electrical energy from one or more stations, to motors on railway cars, effecting their propulsion without impediment, on a main railway line, or branches therefrom, under the complete control of an operator on each car.

The invention in detail comprehends the provision of a surface located positive conductor for electricity, which will be completely insulated, and so arranged, that while not in service, the exposed electric transmitter, will remain dormant, and only be rendered active, when the weight of a railway car is imposed on it. Furthermore provision is made of simple, and efficient mechanism for the successive depression, of a series of transmitters of electricity arranged in sequence, and the controlled conveyance of the electric current derived therefrom, to a motor on the car for its propulsion.

To the indicated ends, my invention consists, in the construction and combination of parts as is hereinafter described and claimed.

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

Figure 1, is side view broken, and partly in section of a car having a part of the improvement also in section and located on its platform. Fig. 2, is a vertical transverse sectional view in part, of a car front portion, and improved mechanism on it, taken on the line 2, 2, in Fig. 1. Fig. 3, is a longitudinal sectional view of part of the improvement, taken on the line 3, 3, in Fig. 5. Fig. 4, is a plan view in section, taken on the line 4, 4, in Fig. 1. Fig. 5, is a view in cross-section of parts taken on the line 5, 5, in Fig. 3. Fig. 5ª, is a view in cross section of a slightly modified construction of parts shown in Fig. 5. Fig. 6, is a plan view of one end portion of an electrical transmitter, that in series forms an essential feature of the invention. Fig. 7, is a side view of two abutting electric transmitters in sequence, broken away at the ends and also on one side where they impinge, showing interior parts. Fig. 8, is a transverse sectional view of a street railway track and road bed, with the improved electric transmitter device in position between the track rails, in transverse section, and a branch of said device laterally extended, and thereto connected. Fig. 9, is a plan view of a portion of a street railway track, a connecting side track, and the improved electric transmitter in position between said tracks and electrically connected, at the track junction. Fig. 10, is a detached, enlarged view of a portion of two sections of the electric conductor, lapped to form a connection, and joined to a branch conductor. Fig. 11, is an enlarged detached view of the joined ends of the electric conductor, and a binding clip therefor. Fig. 12, is a side view of a coupling device for the junction of two separated conductor sections, where a lateral branch railroad joins or crosses a main line as shown in Fig. 9. Fig. 13, is a plan view in part, of railroad track-rails, cross-ties therefor, and the improvement in duplicate, on the ties betwen the track rails shown broken away at one end, partly in section at the other end and electrically connected; and Fig. 14 is an enlarged view in cross section, on the line 14—14, in Fig. 13; or near the terminals of the conductors farthest removed from a source of electricity.

In the figures, A, represents a trough-like structure, that in length equals that of the "conductor section" that it is a part of; as for convenience in description of an element of the composite positive conductor device, such a piece considered entire, is designated a conductor section. The piece A, that receives and serves to insulate the metallic por-

tions of the conductor section from the earth, is preferably constructed of wooden planks, sufficiently strong to resist lateral strain; the two parallel side walls of the same being screwed or otherwise fastened to the side edges of the bottom piece, screws being preferred, as it is desirable in the assembling of parts, to be enabled to remove one side of the insulator trough A. Within the insulator trough an elongated wooden piece B, is introduced which is termed a saddle block, said piece having a length equal with that of the trough A.

The saddle block B, shown plainly in Figs. 3, and 5, is of a less breadth than the space between the side walls of the trough A, and is centrally secured on the bottom piece of the latter, so that an equal space is afforded between the parallel sides of both pieces A, B.

A longitudinal groove of proper depth and width, is formed at the transverse center of the saddle block B, in its top face, wherein the conductor strip C, is seated on supporting springs D, that are located in pockets formed in the saddle block at proper intervals apart, the springs named being designed to support the conductor strip elastically and in a level condition.

The conductor strips C, are by preference made rectangular in cross-section, of suitable width and thickness to adapt them when connected at the ends, to freely transmit electricity from a main station along the railroad whereon motor driven cars are to traverse.

The ends of the copper conductor strips C, are reduced in thickness, so as to permit a lapped joint to be formed without increasing thickness at the points of contact; and these lapped portions are secured together either with screws as at *a*, in Fig. 10, or by means of clip bands and set screws as indicated in Fig. 11, at *a'*, and in case a lateral conductor strip is to be joined to the main strip, at a point where the latter is lapped, this may be effected as shown in Figs. 7, and 10, *b*, representing the flattened end of the branch wire or strip.

Each conductor section, is furnished with a transmitter rail E, that is formed with two parallel side flanges joined together integrally by a transverse portion at right angles thereto, thus producing what is technically known as a channel bar or rail.

The length of the piece E, is equal with that of the saddle block B, and insulating trough A, in each conductor section, and is so proportioned in width, that its parallel sides will slide freely within the spaces between the trough sides and the saddle block.

In vertical perforations of proper diameter and depth, formed in each saddle block B, near its ends and at spaced intervals therefrom, a suitable number of cushion springs F, are placed; which are so proportioned in dimensions and strength, as to be adapted to sustain the transmitter rail E, above the conductor strip C, and near to it, as shown in Figs. 3, and 5; there being a carrier block *c*, provided for each spring, that is seated upon the same, and has contact above with the under side of the rail E.

It will be seen, that the blocks *c*, and springs F, of each conductor section, normally sustain the transmitter rail parallel with the upper surface of the saddle block B; and that the blocks *c*, are similarly slotted from their top ends downwardly, of a width and depth to freely admit the passage of the conductor strip C, through them, and allow the latter to reciprocate vertically, when depressed by the impinge of the contact plates *d*, on the rail E, and subsequently elevated by the return movement of the springs D, that support the conductor strip as before explained.

The springs F, are located on bed plates *e*, which are inserted in and rest upon the bottoms of the pockets that contain said springs, thereby providing a stable base for each spring.

Near each end of a transmitter rail E, there are two lugs *g*, oppositely secured on the sides of said rail, which projections are either made of a non-conductor of electricity, such as hard wood, or if constructed of metal, have an insulating sleeve *h g'*, placed on each lug, as shown in Fig. 5.

Opposite perforations are made in the sides of the insulating trough A, near its ends, for the introduction of the lugs *g*, and when in position on the railway bed, the keeper brackets G, are secured on cross ties I, so that one of these pieces will be opposite each lug; an integral collar *h*, on each bracket entering the perforation of the trough wall that contains said lug and encircles the latter, as represented in Fig. 5.

When in place, the upper sides of the lugs *g*, on a transmitter rail E, or the insulating sleeves *g'*, thereon, have contact with the upper terminals of the slots wherein the lugs are located, so that the vertical movement of the rail under pressure of the springs F, will be limited thereby.

Preferably, the spaces between the saddle block B, and sides of insulator trough A, below the side walls of the transmitter rail E, are filled with some cheap non-conductor of electricity that is water proof also, such as asphalt, or compositions of matter having a like nature; which provision will prevent water accumulation, and as a further preventive, the road bed should be either made water-proof, or be well drained.

The relative height of the conductor sections from the cross ties I, to the upper face of the transmitter rails E, should be such with regard to the height of the track rails J, (see Fig. 8) that the road bed may be given a proper pitch laterally from the center, the transmitter rail being slightly higher than the top edges of the insulating trough A.

When branch roads that are connected at any angle to the main line, are operated by the same source of electricity, an insulated

connection of conductor sections for said joining lines of railroad, is preferably effected as shown by dotted lines in Fig. 8, and by details in Figs. 7, 10, and 12; comprising a loop of copper wire *i*, incased by insulating material *i'*, and then jacketed with a lead pipe armor tube *k*, that is secured to the lower surface of the insulating troughs A; the ends of the wire loop being firmly affixed to adjacent portions of the conductor strips C, whereby the latter are rendered intact and capable of current transmission without loss of potential.

When the main line and branches if there be any of the latter, are in electric connection with a source of electrical generation at a station, the conductor strip C, as an entirety, will form the positive portion of an electric circuit; and to render the circuit continuous so that current transmission may be effected, the terminals of the conductor strips should be joined to track rails or be grounded; the rails being used by preference as a return conductor for the circuit. It will be evident that the support afforded to the series of transmitter rails E, will render each of these pieces independent of others in the line, and that the lugs *g*, will serve as guides in conjunction with the brackets G, so that an enforced depression of any transmitter rail will cause the contact plates *d*, to engage the upper surface of the conductor strip that is directly below the depressed transmitter rail.

The contact plates *d*, are secured to the transmitter rails E, at spaced intervals, preferably above the springs D, as represented in Fig. 3; these plates being made of a good conductor of electricity, are held a short distance away from the conductor strips when the rails E, are in a dormant condition.

The mechanism that by preference is employed to transmit the electric current from the circuit below to a motor (not shown) on a car M, is represented in Figs. 1, 2, and 4, consisting of a vertical bracket plate *m*, that is firmly affixed to the front of the platform M', depending therefrom a proper distance near its transverse center, so as to hang directly above the transmitter rails E. On the rear side, and lower end of the bracket *m*, a dovetail enlargement *m'*, is formed or secured, for the sliding engagement of a nut block *n*, which latter is grooved to fit upon the dovetailed edges of the part *m'*, as shown in Fig. 4. A hollow shaft *o*, is supported vertically, free to rotate, by its loose engagement with journal boxes *o'*, o^2, that are secured one above the other, on the rear side of the dash board M^2, on the front of the platform M', said shaft being axially coincident with the nut block *n*, that is threaded internally, for an engagement with the screw cut lower end of a cylindrical rod *p*, which is loosely inserted within the hollow shaft *o*. Upon the upper end of the shaft *o*, a hand wheel o^3, is affixed, of suitable dimensions to afford means for rotation of the shaft named, by the motor-man, when the brake chain o^4, is to be wrapped upon the lower end portion of the shaft *o*, and thus, set brakes (not shown) to arrest progressive motion of the car M. The rod or shaft *p*, is extended sufficiently above the hand wheel o^3, to permit the hand wheel *p'*, to be secured on the projected portion. On the nut block *n*, a bifurcated portion *n'*, depends below the bracket plate *m*, which is adapted to rotatably sustain two wheels *r*, *s*, properly spaced, and longitudinally disposed above the rail E, of a conductor section, as shown in Fig. 1. The rear wheel *r*, is made of metal that is a good electric conductor, or may be peripherally banded with such a material; the front wheel *s*, can be constructed of iron or hard wood. The wheels *r*, *s*, are of like diameter, and preferably equal in width to that of the transmitter rails E; for efficiency in service said wheels are so separated between their pivot centers, that while one wheel *r*, is engaged with a transmitter rail beneath the platform M', the forward wheel *s*, has impinging contact with a similar rail next in advance, so that the latter will be depressed and held until the rear wheel engages it. An arm *u*, is projected rearwardly from the block *n*, having a clamp *u'*, on its free end, wherein a conductor brush u^2, is secured so as to have contact with the peripheral surface of the wheel *r*, and receive electricity therefrom. The brush u^2, is connected with a motor (not shown) on the car M, by one end of an insulated wire *v*, that enters a switch *w*, on the dash board M^2, and thence is projected to the motor, so that the manipulation of the switch will control the transmission of current thereto. On the front side of the depending bracket plate *m*, a forwardly and downwardly bent arm *y*, is secured, having a brush holding box *y'*, on its lower end, wherein a broom y^2, is held in advance of the wheel *s*, and slightly bearing upon the transmitter rails E, when in service; this provision being made to effect the removal of snow, dust, or other obstructions that may be deposited on said rails, and that would interfere with the effective operation of the mechanism.

In service the hand wheel *p'*, is adjusted manually, so as to cause the wheels *r*, *s*, to press upon a transmitter rail E, and cause it to receive current from the conductor strips C, of the line, by an impinge of its contact plates *d*, on a portion of the copper conductor. It will be seen, that the establishment of an electric circuit through the depressed and engaged transmitter rail E, will cause a progressive movement of the car, which will be continued, by reason of the successive depressions sustained by the series of transmitter rails E; and as a moving car is above the rail depressed, which instantly resumes its normal elevation when pressure is removed. It will be obvious that a dangerous transmission of current will not be liable to occur from an accidental contact therewith, of other moving objects than a car, as men, or

quadrupeds, being lighter than a railway car, will not affect the dormant or non-electric condition of the transmitter rails should they tread upon them.

Slight modifications in form may be given to parts within the scope of my invention; as for example, the insulating shoe A, may be dispensed with, and the saddle block B, have longitudinal parallel channels formed in its upper portion, to permit the introduction therein, of the sides of the transmitter rail E, as shown in Fig. 5ª, side boards B′, that are secured removably upon the sides of the saddle block main portion, forming one wall of of each channel therein. Another slight alteration also shown in Fig 5ª, consists in formation of the lugs *g*, of metal without insulating sleeves; these projections from the sides of the transmitter rail E, having a loose engagement with socket holes g^2, formed in the side boards B′, which are of such a proportionate size vertically considered, as will permit the lugs to slide downwardly a limited distance when a car presses on the rail, and thus impose the contact plates *d*, on the conductor strip C; the rail E, being prevented from removal from the saddle block by the engagement of the lugs therewith, as explained.

While it is an advantage to employ the supporting springs D, for the conductor strips C, these may be dispensed with, and the latter be imposed in a shallow channel of the saddle blocks B, directly upon the latter.

Should an all metallic, completely insulated circuit be preferred, in place of using the track rails for a return member of the same, this can be provided by a duplication of the positive conductor line that has been described, and the connection of the outer terminals of the two series of conductor strips C; as represented in Figs. 13 and 14, these parallel and adjacent duplicates of the improvement being preferably provided with a connecting insulated loop of conducting wire *i*, secured so as to depend upon the lower sides of the conductor strips C, at or near their terminals which are farthest removed from dynamos, or other sources of electricity at a station, (not shown,) or if preferred, the conductor strips may be left unconnected, and thus be in open circuit, the device on the car being then duplicated as to the wheels *r*, *s*, and bracket supports therefor (not shown), so as to take up current from one of the insulated lines of conductor strips, through the transmitter rails E, and return it through the other line.

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

1. In an electric railway, the combination with an insulating elongated block on cross-ties of a railroad, and an electric conductor strip on the upper side of said insulating block, of a transmitter rail that is spring supported from the insulating block so as to be depressible only by weight of a car on the railroad, and lugs laterally projected from depending parts on the transmitter rail, and which loosely engage with the insulating block and limit the vertical movement of the transmitter rail, substantially as described.

2. In an electric railway, the combination with the insulating block on cross-ties of a main railroad between the track rails, an electric conductor strip thereon a transmitter rail on the block spring pressed vertically, and lugs projected from depending parts on the transmitter rail which loosely engage with slots in the sides of the insulating block, of a transversely extending insulating block on the before mentioned railroad track, a sequential insulating block on an intersecting railroad between its track rails, an electric conductor strip on each of the sequential blocks, a vertically reciprocating transmitter rail on each sequential insulating block, devices to limit the reciprocation of said rails on the blocks, an insulated electric conductor passing below one track rail of the main railroad and connecting the conductor strips on the sequential insulating blocks at adjacent ends, and an insulated electric connection between the adjacent end of the transverse conductor strip and the similar strip on the main railroad which extends longitudinally thereof, substantially as described.

3. In an electric railway, the combination with an insulating longitudinally grooved timber or block on a railroad bed, and an elongated electrical conductor thereon, of a bottom channeled spring supported transmitter rail, and laterally projecting lugs on the transmitter rail which loosely engage vertically elongated holes in side pieces of the insulating block, substantially as described.

4. In an electric railway, the combination with an insulating elongated block, an electric conductor thereon, and springs supporting said conductor, of a longitudinally channeled transmitter rail adapted to reciprocate vertically in longitudinal grooves of the insulating block, strong springs between this block and the transmitter rail, and lateral lugs on said rail that engage holes in the block, substantially as described.

5. In an electric railway, the combination, with an elongated insulating block that is longitudinally grooved on its upper side and secured on the ties of a railroad between track rails, an elongated electric conductor strip adapted to enter the groove of the block, and springs in pockets and adapted to press the conductor strip upwardly, of an inverted substantially U-shaped transmitter rail on the upper portion of the block embracing it, strong spiral springs seated in pockets formed in the insulating block adapted to normally support the transmitter rail near to the conductor strip, and devices adapted to loosely secure the transmitter rail on the insulating block, substantially as described.

6. In an electric railway system, the com-

bination with a series of elongated insulating blocks grooved on top, and secured on cross ties of a railroad between its track rails a series of spring supported and connected electric conductors thereon, a series of bottom channeled transmitter rails held on the blocks so as to play vertically, and a set of strong springs between the blocks and rails, of a rail depressing and current transmitting device on a railway car, adapted to successively depress the transmitter rails and conduct derived electricity from the depressed rail to the device on the car, substantially as described.

Signed at New York, in the county of New York and State of New York, this 6th day of July, A. D. 1892.

WILLIAM P. PATTON.

Witnesses:
C. NEVEUX,
H. WALKER.