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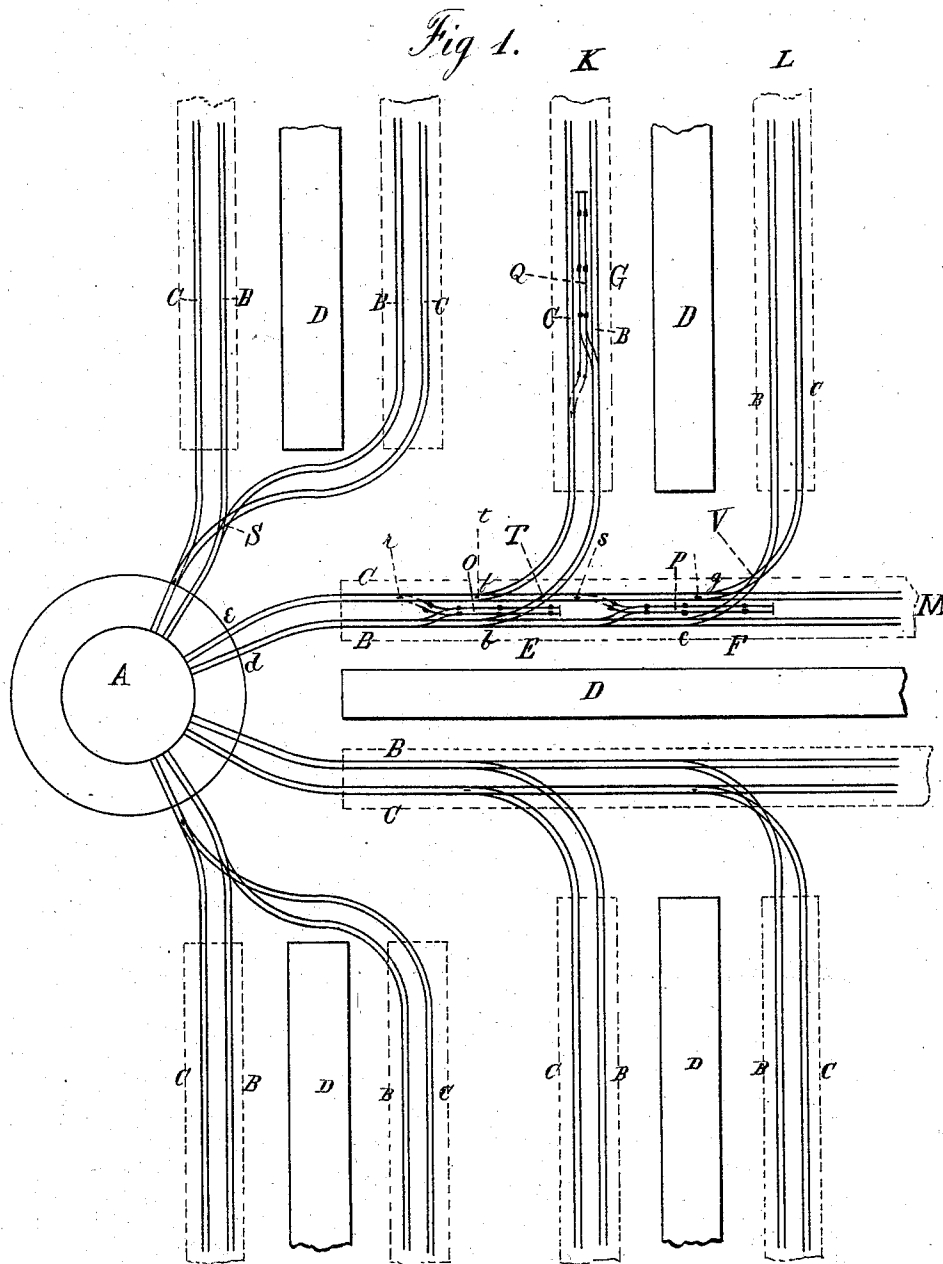
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E. N. DICKERSON, Jr., & C. G. CURTIS.

AUTOMATIC ELECTRIC RAILWAY.

No. 270,209.

Patented Jan. 9, 1883.



Witnesses:
Geo. W. Malt
Wm. Gardner.

Inventors:
E. N. Dickerson Jr.
Chas. G. Curtis

(No Model.)

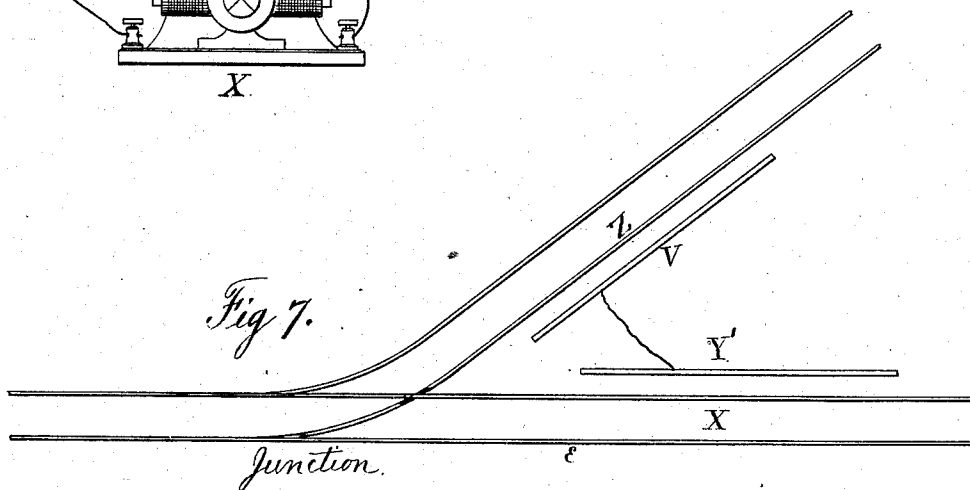
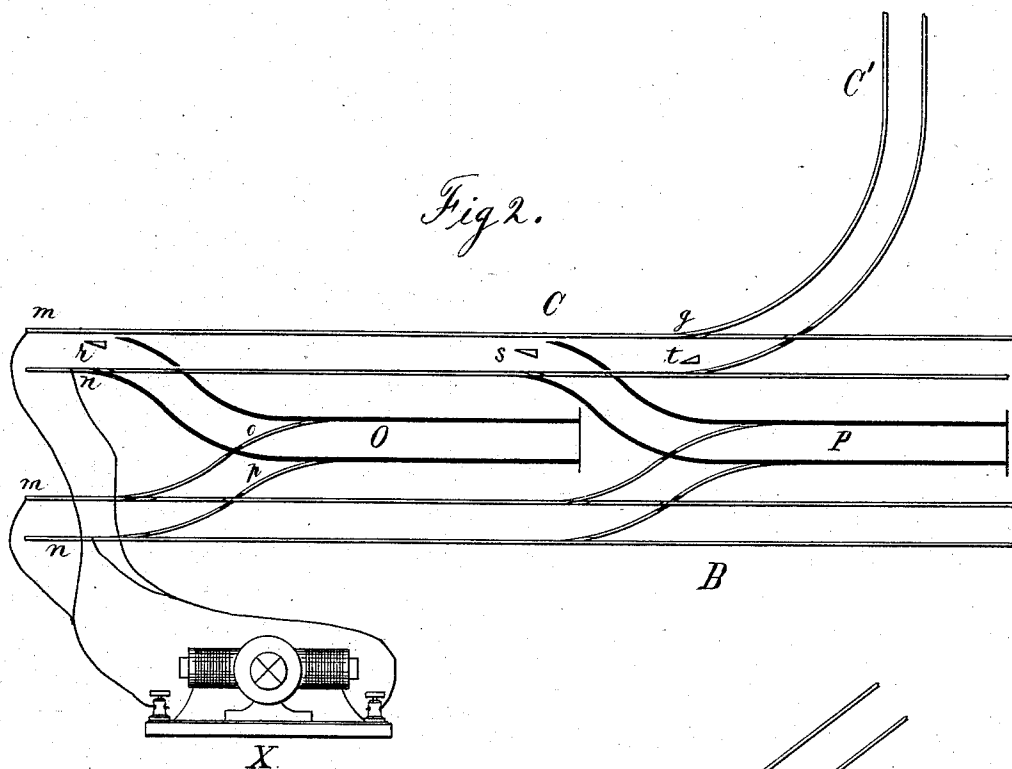
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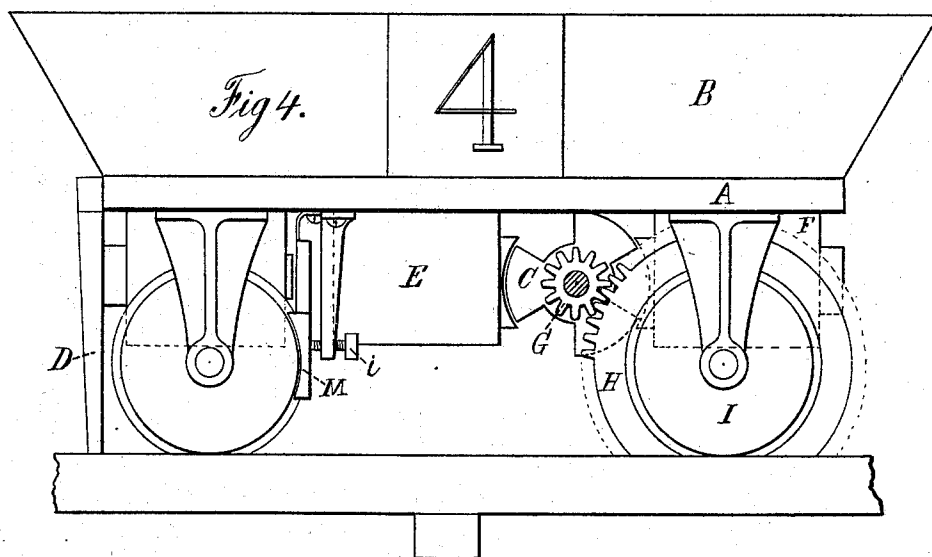
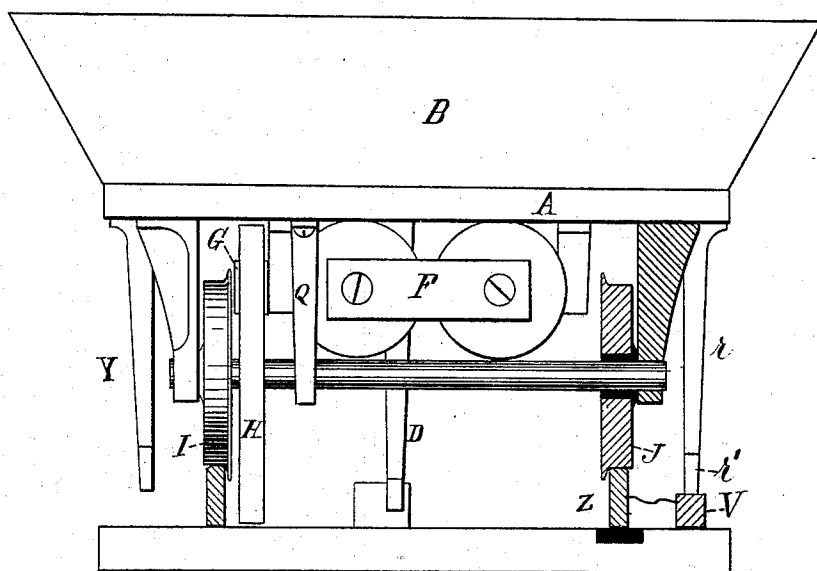
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Fig 3.



Witnesses.

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5 Sheets—Sheet 4.

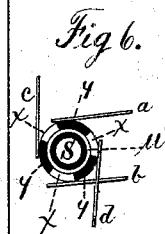
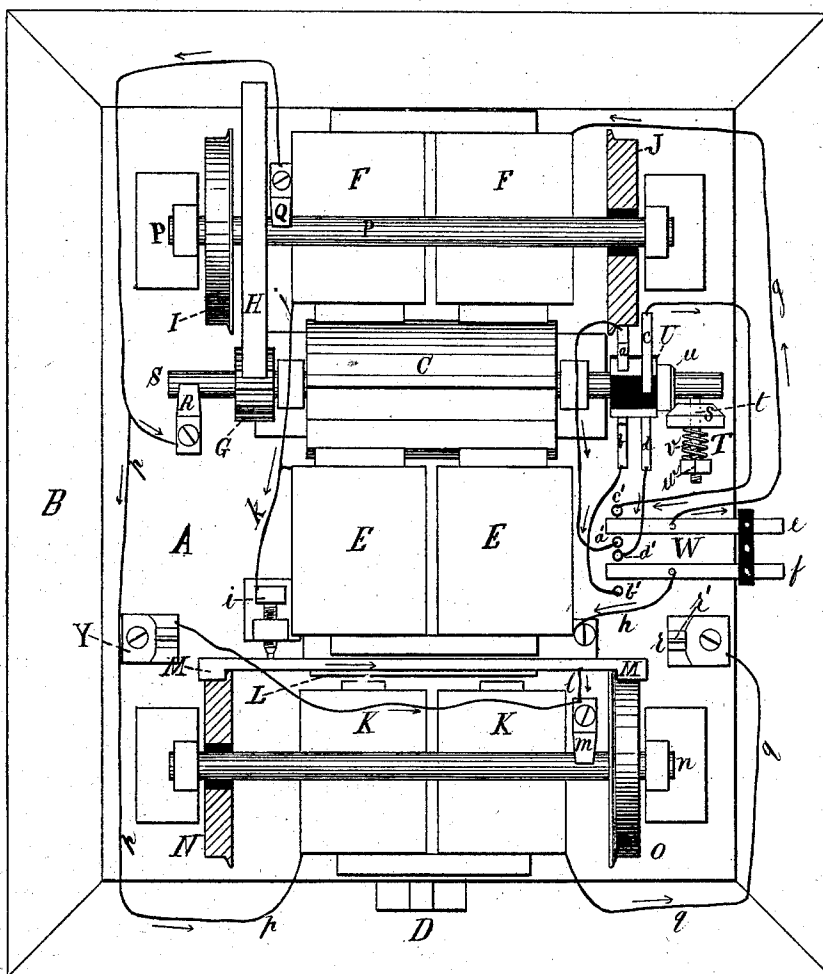
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Fig 5.



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Fig. 8.

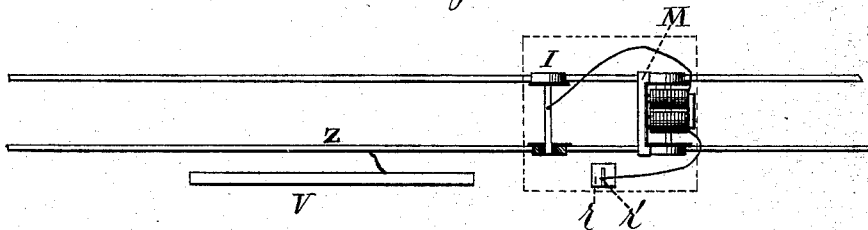
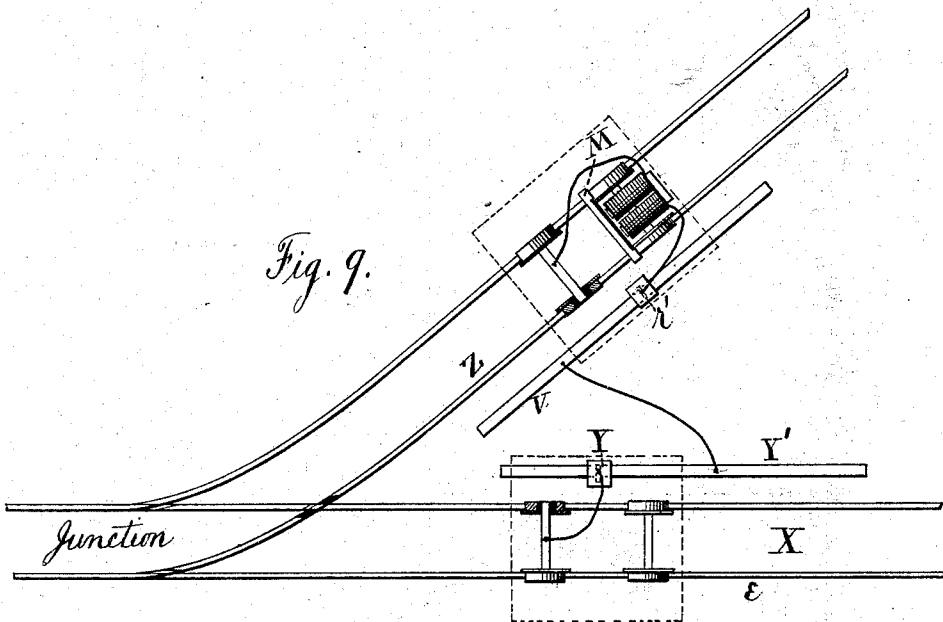


Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWARD N. DICKERSON, JR., AND CHARLES G. CURTIS, OF NEW YORK, N. Y.

AUTOMATIC ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 270,209, dated January 9, 1883.

Application filed July 24, 1882. (No model.)

To all whom it may concern:

Be it known that we, EDWARD N. DICKERSON, Jr., and CHARLES G. CURTIS, citizens of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Automatic Electric Railways, of which the following is a specification.

Our invention relates to electric railways generally, and is especially applicable to those designed to carry small parcels automatically—that is, without any person riding upon the cars from place to place—though some of the improvements are applicable to other kinds of electric railways. As shown, it is arranged to be placed in a store or house for the purpose of conveying small parcels or other matter from the counters to a central station or desk; and it consists, first, of two sets of tracks which branch out in various directions from the central desk and extend to all the counters, one of which sets serves to convey the goods and cash from the counters to the central desk, and the other of which serves as return-tracks to convey the parcels and change back to the counters; second, of small cars suitable for carrying packages and money, which are propelled upon these tracks by means of electric motors fixed to the cars and actuated by electric currents conveyed to them through the rails of the track, acting as conductors; and, third, of some economical source of electric current—a dynamo-electric machine, for instance—which is electrically connected with the rails of the various tracks in such a manner as to supply all the cars in motion at any one time with the proper amount of electric current. Each counter is provided with a side track arranged so as to be conveniently accessible to the corresponding salesman, upon which the cars intended for that are automatically switched, and upon which the empty cars remain until again required. These side tracks not being in electrical connection with the source of electric current, no current acts to propel the cars while standing on them, and it is only necessary for the clerk or salesman to deposit the purchased article, together with the money, in the car, push the car by hand from the side track onto the direct track, when it will automatically start and be propelled to

the central desk, where the operator will switch it on the return-track, upon which it will be conveyed back to the counter, containing the article wrapped up and the proper change. In what follows we have assumed the tracks to be erected overhead directly above the long counter-tables at such a height that they can only be reached by the salesmen; but it is obvious that the most desirable disposition of the tracks with respect to the counters would depend entirely upon the general arrangement and size of the establishment, and consequently could not be determined beforehand.

In the accompanying drawings, Figure 1 is a plan showing one-half of a system of tracks, together with the counters and central desk, arranged in a store according to our invention. Fig. 2 is a detail plan of the tracks, showing the arrangement at each counter. Fig. 3 represents an end view of one of the cars constructed according to our invention. Fig. 4 is a side view of the same. Fig. 5 represents a plan view of the car inverted, so as to show the electrical arrangement and connections. Fig. 6 represents an end view of the commutator of the electric motor. Fig. 7 is a plan of a junction of two tracks, showing our contrivance for automatically preventing collision. Fig. 8 is a plan of a car upon the track, showing the mode of operation of our automatic brake apparatus. Fig. 9 is a plan of a junction of two tracks, showing the mode of operation of our contrivance for automatically preventing collision.

The same letters of reference refer to identical parts in Figs. 3, 4, and 5.

In Fig. 1, A represents the central station or desk, where the goods and cash are received from the counters; B B B B, &c., the tracks upon which the goods are transmitted to the central desk, which we shall call the "direct" tracks; C C C C, &c., the tracks upon which the wrapped parcels are returned to the counters, which we shall call the "return" tracks; D D D D, &c., the cases or shelves containing the stock of goods, and the dotted lines the counters or tables upon which they are displayed in the usual manner.

The various sets of tracks which emanate from the central desk being arranged in the

same way, we shall only explain the arrangement of those tracks which extend to the counters K, L, and M, for example.

The direct tracks B and B over the counters K and L join at the points *b* and *c* with the direct track B from the counter M, so that the cars from these three counters enter the central desk at the point *d*, all on the same track, and, similarly, the cars respectively intended for these three counters all leave the central desk at the point *e* on the same return-track C, and are automatically switched off at the points *f* and *g*, respectively, to the return-tracks C and C of the counters K and L, as hereinafter explained, one direct and one return track from the central desk thus being employed to convey the cars to and from several different counters. Each entire counter M, for example, which may be of any length, is divided into as many sections as there are salesmen at that counter, or, as desired, and at each section E F, &c., are placed short side tracks, O P, &c., joined to the direct and return tracks B and C, upon which side tracks the cars intended respectively for these sections are automatically switched when returning on the track C, and where they remain until ready to be sent to the central desk again. In the same way all the other counters are provided at each section with side tracks. Wherever the direct and return tracks cross each other, as at the points S, T, and V, for example, it is intended to have them erected one above the other, in order that the cars on one track may not interfere with those on the other. The detail arrangement of the tracks at two of these sections and the automatic switching devices are shown in Fig. 2, in which B represents the direct track, C the return-track, C' a branch track extending to another counter, and O and P side tracks at different sections of the same counter. At each point where a side or branch track joins the main track guides *r*, *s*, and *t* are fixed between the rails, but at different positions laterally, and each car is provided with a corresponding arm, D, Figs. 4 and 5, projecting downward, so as to engage with the guide and throw the car on the branch or side track. Hence it is only necessary, in order to cause a car to reach any desired counter or section thereof, to set the projection D on the car laterally in such a position with respect to the rails that it will pass all the guides except the one *r*, for example, by which it will be switched upon the desired section O; or, if the projecting arm D were set nearer to the inner rail, *n*, it would clear the guide *r* and strike the guide *s*, or if nearer still it would clear both *r* and *s*, and the car would go on the branch track C' to another counter. Another plan would be to have a different car for each section of counter, with the projections already set to correspond to the positions of the guides, each car being numbered or otherwise marked to indicate the section to which it belongs.

The dynamo-electric machine X, which sup-

plies the actuating-current, is connected at the points *n* and *n*, one end with one rail of each track C and B, its other end being connected at the points *m* and *m* to the other rails of the same tracks, as shown, the two rails of each track being of course electrically insulated from each other. The rails of the side tracks, O and P, are shown in solid black to indicate that they are not electrically connected to the dynamo-machine, the momentum of the cars after leaving the main rails C being sufficient to carry them to the end of the siding. Whenever a car standing on the side track, O, for example, is to be sent to the central desk, it is only necessary to push it upon the switch-rails *o* and *p*, which are in electrical connection with the rails of the track B, whereupon it is supplied with the actuating-current and automatically propelled to the central desk.

It is clear that the rails of the track must be insulated at the points where they intersect, as shown in Fig. 2, in which the insulating material is shown in solid black; otherwise the rails of the track would become cross-connected, and the electric motors of the cars thereby short-circuited. All the other tracks are electrically connected in the same manner, each rail being connected to one terminal of the dynamo-machine, and consequently all the tracks of the entire system are operated in multiple or derived circuit, and since all the cars on the same track make independent connections to each rail, the cars are all operated on the multiple-circuit system, under which arrangement it is possible, as is well known, to increase or diminish the number of cars in circuit without materially affecting those in operation at the same time.

The construction of the car is shown in Figs. 3, 4, and 5. It consists of a light frame or platform, A, of some non-conducting material, suitably mounted upon flanged wheels, and carrying a box or receptacle, B, in which the goods and money are deposited, an electric motor fixed to the under side of the platform A, and an electric brake.

The motor consists of two fixed electro-magnets, E E and F F, between the poles of which revolves the armature C, the shaft of which carries a pinion, G, geared into a spur-wheel, H, on the axle of the driving-wheels I and J.

The electric brake consists of an electro-magnet, K K, fixed to the platform A, having an armature, L, upon the ends of which are fastened shoes M M, which are pressed against the treads of the wheels N and O by the attraction of the electro-magnet K K, the rails of the track being electrically connected to the dynamo-machine X and the treads of the wheels being in constant contact with these rails. The current for actuating the motor is taken from one rail by the wheel I, whence it flows to the axle P, thence through the spring or brush Q, which rests against the axle P, (the other wheel, J, being insulated from the axle P, as shown, in order to prevent the cur-

rent from passing directly to the other rail.) thence to the shaft S of the electric motor through the brush R. To the other end of the shaft S is attached a centrifugal speed-governor, T, consisting of a radial arm, *t*, on which slides a metal block, *s*, pressed against the metallic collar *u* of the commutator U by a spring, *v*, the tension of which spring opposes the centrifugal force of the block *s* when the arm is revolving, and retains said block in contact with the collar *u* so long as the speed of rotation is within a certain limit. From the brush R the current flows through the shaft S, thence through the radial arm *t* and spring *v* to the block *s*, thence to the commutator U through the metallic collar *u*, which forms part of the commutator, and which is insulated from the shaft S by a ring, *u'*, of insulating material, as shown in Fig. 6. When the speed exceeds the predetermined limit, which may be set at any desired point by screwing the nut *w* so as to alter the tension of the spring *v*, the metallic contact between the block *s* and the collar *u* is broken, and since the current which propels the car is made to flow through this point of contact, the propelling force ceases to act, and the speed of the car gradually diminishes until contact is again made, when the current flows through the motor, as before, which thus automatically regulates its own speed, and consequently the speed of the car. From the collar *u* the current flows to the commutator U, which consists (Fig. 6) of a metallic cylinder or drum fixed to but insulated from the shaft S, having three insulating pieces, *y y y*, sunk in its convex surface, so as to leave exposed three metallic surfaces *x x x*, as shown, which make connection with two sets of metallic springs or brushes, *a b* and *c d*, one of which sets is arranged to cause the motor to rotate in one direction, the other being arranged to produce rotation in the opposite direction. These brushes *a b* and *c d* are respectively connected by wires, as shown, to the four contact-points *a'*, *b'*, *c'*, and *d'* of the switch W, by means of which switch one set of brushes or the other may be utilized, according to the direction in which the car is to move.

The switch W consists of two bars, *e* and *f*, pivoted in the middle, and preferably connected by a link, (not shown,) which bars are respectively connected by wires *g* and *h* to the electric motor-magnets E E and F F. When the bars *e* and *f* are turned so as to connect with the switch-points *c'* and *d'*, the current flows through the corresponding brushes, *c* and *d*, and the motor rotates in one direction, while if the bars are turned to connect with the points *a'* and *b'* the other brushes, *a* and *b*, convey the current, and the motor rotates in the opposite direction. After flowing through the electro-magnets E E and F F the currents reunite and flow through the wires *j* and *k* to the set-screw *i*, against the point of which the brake-shoe M is pressed by a suitable retract-

ile spring of sufficient tension to withdraw the brake from the wheels when not attracted by the electro-magnet K K, and from the set-screw *i* the current flows through the brake-shoe and connecting-wire *l* to the spring *m*, by which connection is made to the axle *n*, thence through the tread of the wheel O to the return conducting-rail of the track, thus completing the circuit through the car, the other wheel, N, on the same axle being insulated, as before, to prevent short-circuiting the motor.

The object in making the driving-current pass through the set-screw *i* and brake M is to break the circuit through the motor, and thereby stop the car more quickly whenever the brake is applied, which is done by passing the driving-current through the electro-magnet K K.

The spring Q, by which the current is taken off from the axle P, is connected to one end of the electro-magnet K K by a wire, *p*, and the other end of this electro-magnet is connected by a wire, *q*, (see, also, Fig. 3,) to an arm, *r*, which projects downward from the platform of the car and terminates in a flexible spring or brush, *r'*, so placed as to make connection to an auxiliary metallic strip or rail, V, (see Fig. 3,) which is laid along parallel to the track at the point where the car is to stop, and connected to the return conducting-rail Z of the track. Hence whenever the brush *r'* comes in contact with the strip V a circuit is completed through the electro-magnet K K, by which the brake is applied, the circuit through the motor thereupon broken, and the car stopped.

The mode of operation of this device is obvious from the plan, Fig. 8. When the car indicated by the dotted lines reaches the connecting-strip V, which is in connection with the track-rail Z, a circuit from the rails is completed through the electro-magnetic brake M by means of the brush *r'* and the wheel I of the car, and the brake is thereby applied automatically. Such rails V may be combined with the track to automatically stop the cars at any desired points, and they may be also employed to automatically prevent collision of two cars at a junction of two or more tracks, as follows: Suppose two cars, one on each track, to be approaching the junction, Figs. 7 and 9, in the same direction, these figures representing the junction, &c., of two of the direct tracks upon which the cars are being transmitted from the counters to the central desk, it is clear that a collision must occur unless one of the cars be stopped before it reaches the junction, while the other car is allowed to proceed. This result we accomplish by placing a connecting-strip, V, along parallel to the track Z at a proper distance from the junction, which strip is designed to come in contact with the brush *r'* of the car on the track Z for the purpose of applying the brake, as we have already explained; but instead of connecting this strip V directly to the return conducting-rail of the track Z, so as to complete the circuit through

the brake, as before, it is connected to another strip, Y', designed to come in contact with an independent brush, Y, Figs. 3 and 5, carried by the car on the track X, which brush is connected by a wire, as shown, to the spring M, through which connection is made to the return conducting-rail *c* of the track X by means of the axle *n* and wheel O. The brush B has nothing to do with the automatic brake of the car on the track X, and is employed solely to connect the strip B with the return conducting-rail *c*, and since the rail *c* is connected with the corresponding rail of the other track, Z, a circuit is completed through the brake of the car on the track Z by means of the car on the track X whenever the latter car is passing over the strip Y' at the same time that the former car is passing over the strip V. The brush Y of the car which is on the track X, as already explained, does not affect the brake on that car, and therefore this car is not stopped before reaching the junction, but is allowed to proceed exactly as if the other car were not approaching on the other track. By this device, whenever two cars arrive at the junction at the same time, the one on the branch track Z will be brought to a stand-still and caused to wait until the one on the main track has passed the junction or has left the end of the strip Y', when the circuit by which the brake is applied to the car on the branch track will be broken, the circuit through its motor re-established, and the car allowed to proceed to the central desk.

The only essential conditions for the successful operation of this device are that the strips V and Y' should be so situated with respect to the junction that the car on the main track can only fail to complete the circuit through and apply the brake to the car on the branch track when one of the cars arrives at the junction sufficiently in advance of the other to avoid all danger of collision.

We do not confine ourselves to a car of any particular form of construction, nor to any particular style of electric motor for propelling the cars, nor to any particular kind of brake mechanism.

In order to maintain the amount of current supplied by the dynamo-electric machine or other source of electric current practically constant, an automatic current-regulating device, of which there are many well-known forms, may be arranged to automatically throw more or less current through the track-circuits, according as the combined electrical resistances of these circuits is diminished or increased, which change in resistance is produced by the addition or removal of the cars from circuit. It is obvious, likewise, that our system can be extended to the conveying of parcels throughout a city or town. When desired, the wheels of our carriage or car may be magnetized in the well-known way, so as to insure sufficient friction or adherence between the rails and the wheels.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in an electric railway system, of two or more tracks branching or diverging at different points from one central or main track, switch-blocks or equivalent means placed at the junctions of said branch tracks with said main track and set at different positions laterally with respect to the track, three or more cars adapted to be automatically propelled by the electric current, and provided with automatic selecting contrivances respectively adjusted to engage with their corresponding switch-blocks, and thereby direct each car to its appropriate branch track or allow it to proceed upon the main track according to the position at which the said selecting contrivance is set, substantially as described.

2. In an electric railway, the combination, with an electric railway-car, of an automatic electric brake mechanism and a device located on or near the track and arranged to apply the said brake when the car reaches a certain point on the track, substantially as described.

3. The combination, in an electric railway system, with two connecting-tracks and two cars driven by electric currents, one car being provided with an automatic brake and the other car being provided with a circuit-connecting device, of the stationary connecting contrivance, substantially as specified, whereby when both cars arrive at the junction at the same time one of the cars is caused to arrest the movement of the other car until the junction is clear, substantially as described.

4. The combination, in an electric railway, of a stationary conductor electrically connected with one of the current-supplying conductors or rails of the track, and a car provided with an automatic brake and a circuit-connecting device arranged to make connection to the stationary conductor, and thereby apply the brake to the car, substantially as described.

5. The combination, with the electric propelling-motor of an electric railway-car, substantially as described, of an electro-magnetic friction-brake, constructed to be applied to the wheels automatically, when the car reaches a certain point on the track, by means of the electric current conveyed to the car through current-supplying conductors or rails of the track, and a circuit-breaking device operated by the said brake and arranged to break automatically the circuit of the current passing through the said motor when the said brake is applied, substantially as and for the purpose set forth.

6. The combination, in an electric railway system, of conducting and insulating rails, as shown, and the automatic switching contrivances, whereby the car may be driven upon the conducting-rail to the automatic switching device, and then allowed to come to rest upon the insulating-rail at the desired point, substantially as described.

7. The herein-described system of automatic electric store-service, consisting of two or more direct tracks leading from the stations of the salesmen to a central desk or station, two or
5 more return-tracks leading from the desk to the said stations, a source of supply of electric current electrically connected with the said tracks, and cars or carriers adapted to be con-

veyed upon said tracks and propelled by electric currents conveyed to them through the rails thereof, substantially as set forth.

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