

O. J. DAVY.

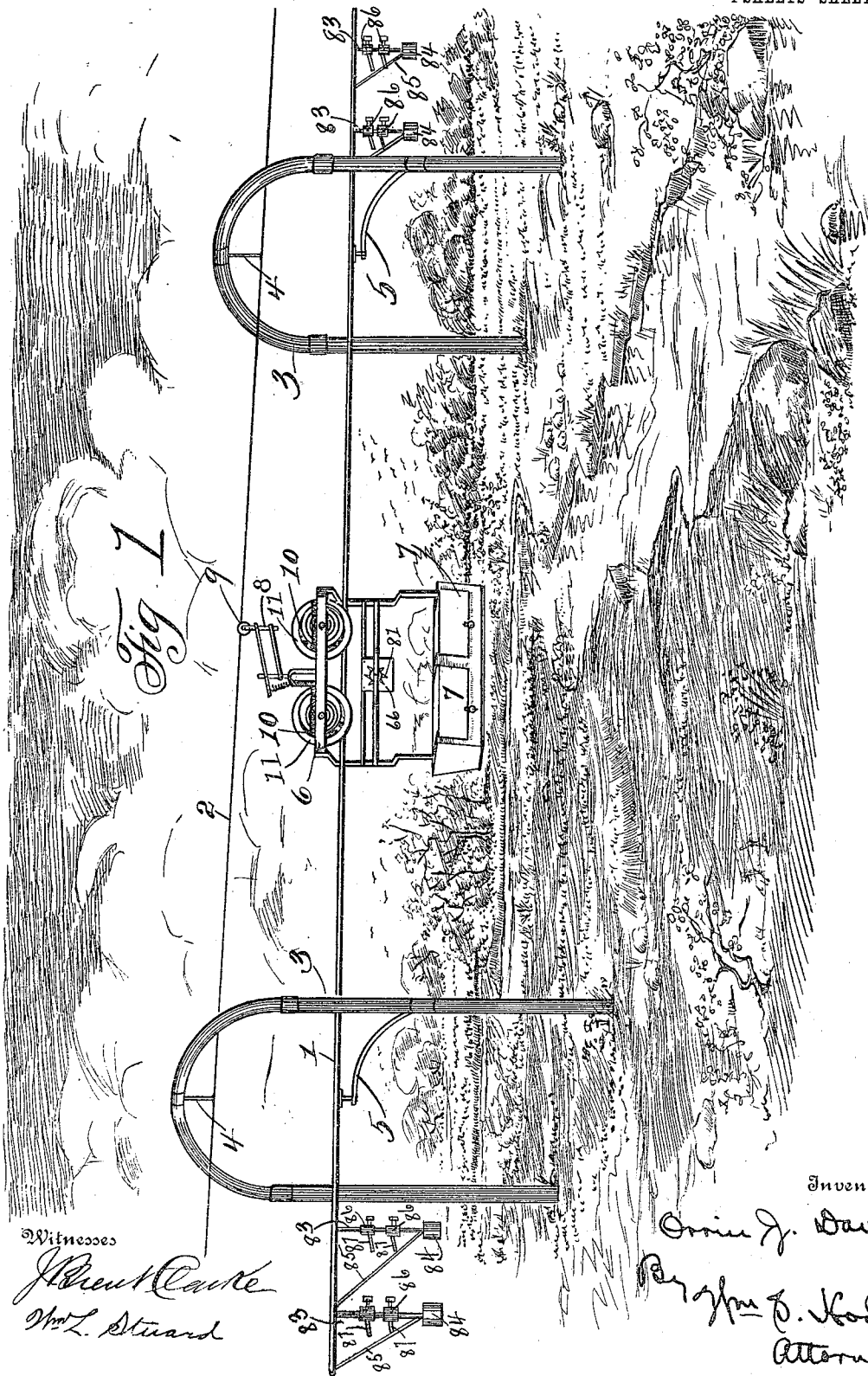
AERIAL ELECTRIC TRANSPORTATION.

APPLICATION FILED OCT. 2, 1906. RENEWED NOV. 13, 1909.

961,430.

Patented June 14, 1910.

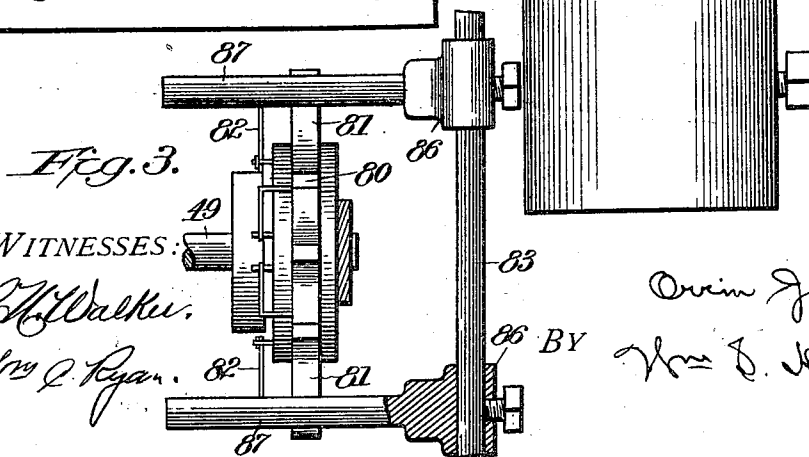
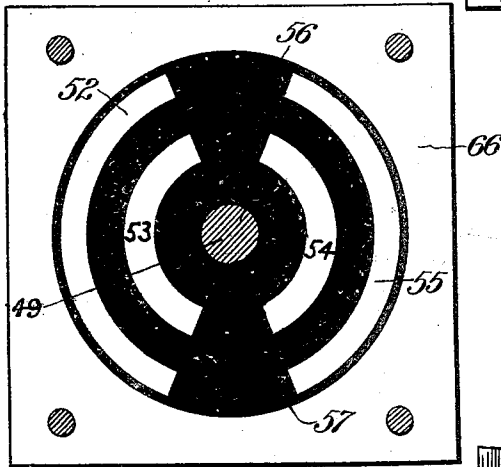
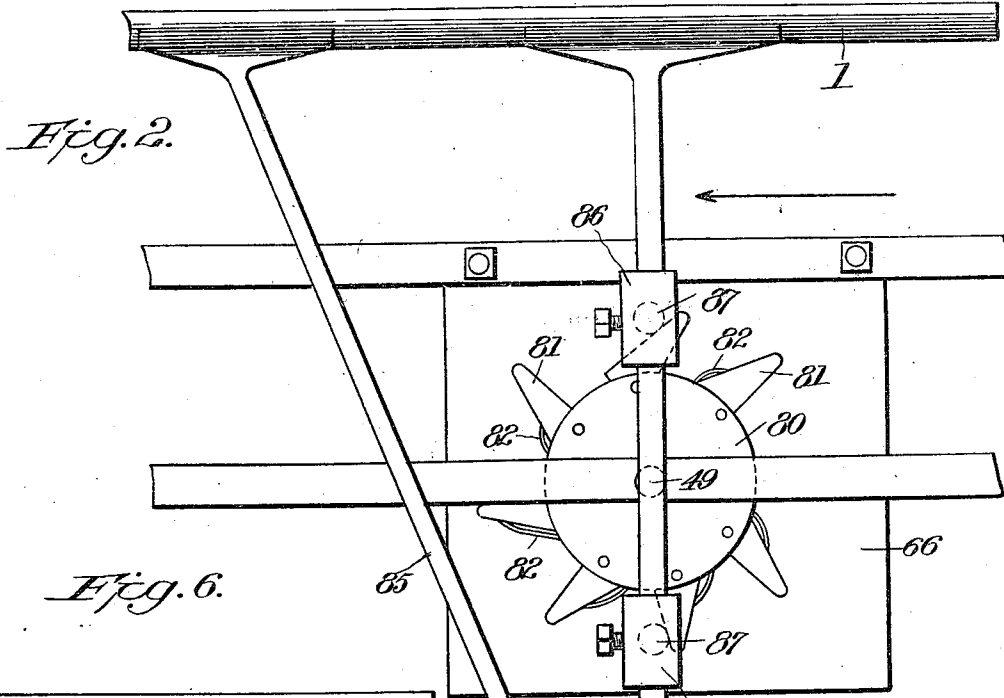
4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.



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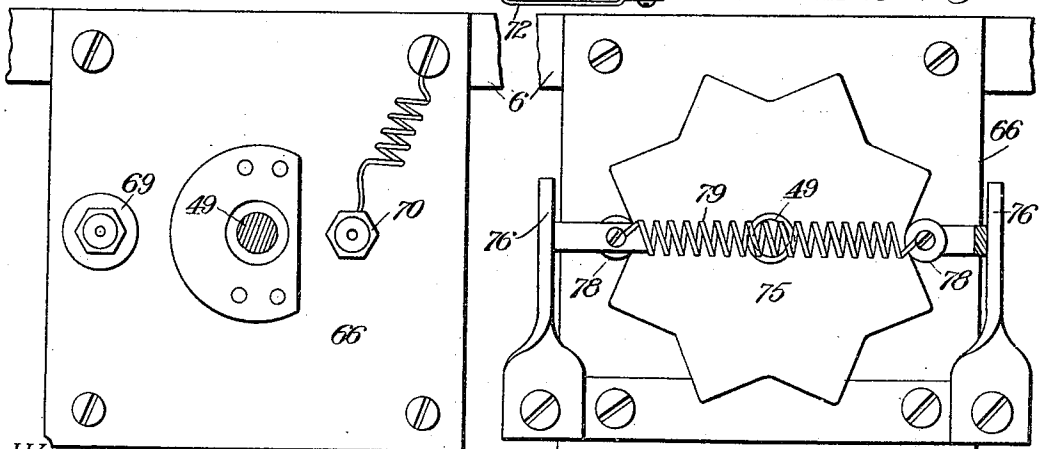
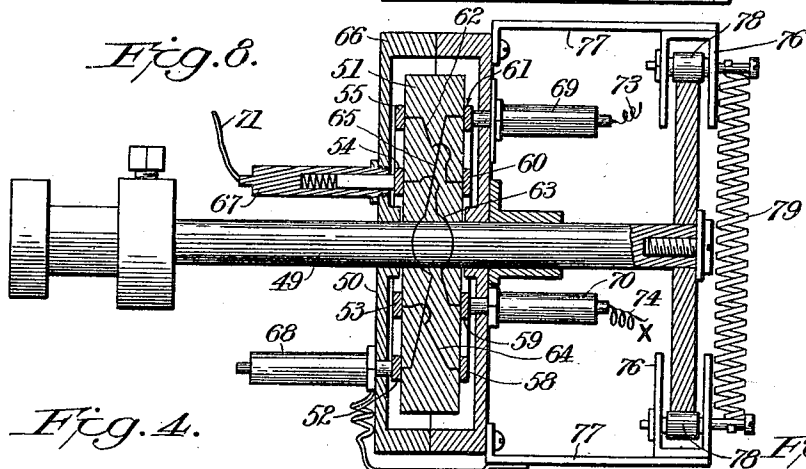
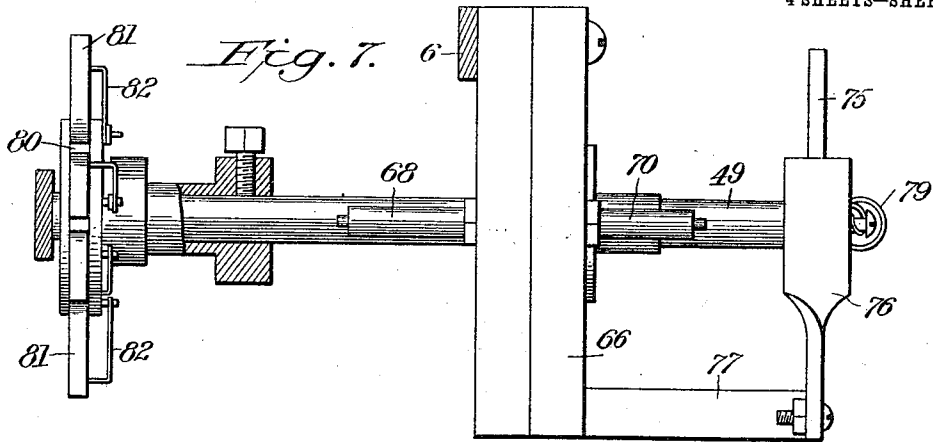
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AERIAL ELECTRIC TRANSPORTATION.

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4 SHEETS—SHEET 4.

Fig. 9.

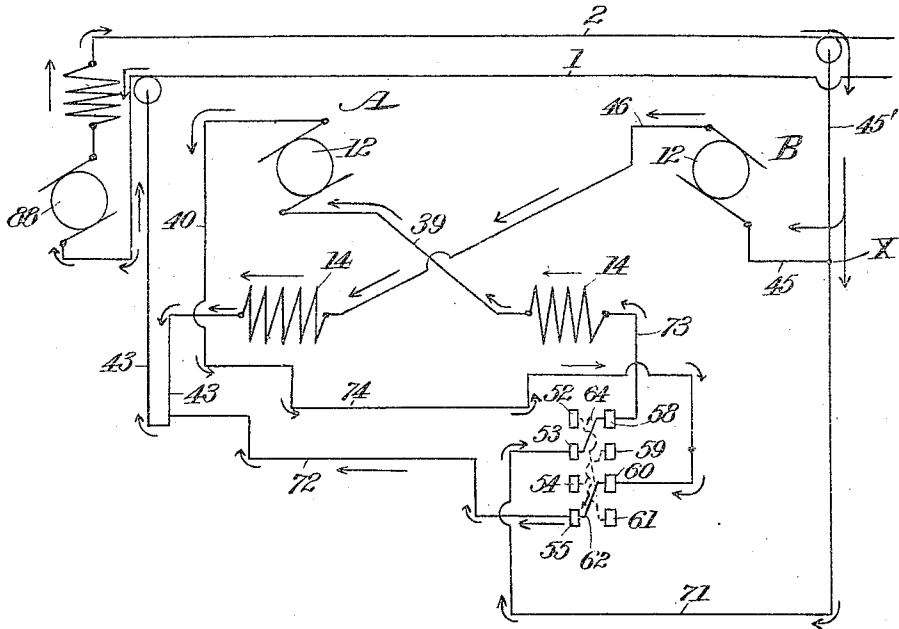
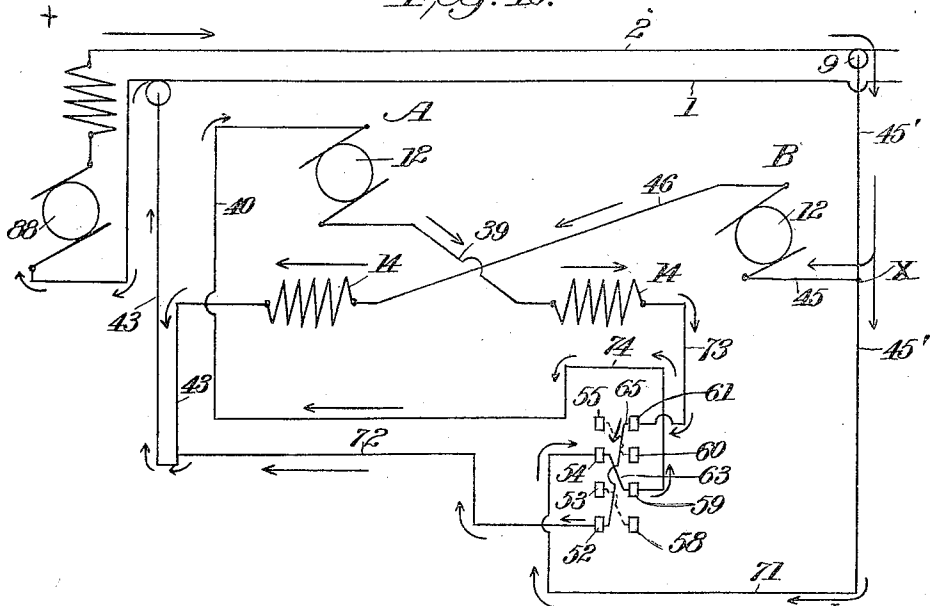


Fig. 10.



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UNITED STATES PATENT OFFICE.

ORRIN J. DAVY, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO INDUSTRIAL MOTOR COMPANY, A CORPORATION OF SOUTH DAKOTA.

AERIAL ELECTRIC TRANSPORTATION.

961,430.

Specification of Letters Patent. Patented June 14, 1910.

Application filed October 2, 1906, Serial No. 337,073. Renewed November 13, 1909. Serial No. 527,902.

To all whom it may concern:

Be it known that I, ORRIN J. DAVY, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Aerial Electric Transportation, of which the following is a specification.

This invention has relation to aerial electric transportation, and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The invention has for its object the production of a monorail system of the character described provided with means whereby the car or carrier may be automatically stopped and reversed.

A further object is to provide an improved pole changer to control the electric current.

A further object is to provide means whereby the pole changer is successively operated to cut off the current and then reverse the motor or motors.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1, is a perspective view of a portion of the system. Fig. 2, is a side elevation of a portion of the track indicating the position of the ratchet wheel when engaging the pin. Fig. 3, is a side elevation of the pin in engagement with the ratchet wheel. Fig. 4, is a side elevation of the pole changer with parts removed. Fig. 5, is a side elevation of the pole changer showing the star wheel located thereon. Fig. 6, is an interior view of the pole changer with one of the sides thereof removed. Fig. 7, is an edge elevation of the pole changer with parts in section. Fig. 8, is a transverse sectional view of the pole changer. Fig. 9, is a diagrammatic portion of the system illustrating the course of the current when rotating the fields of the motors in one direction; and Fig. 10, is a diagrammatic view of the system illustrating the course of the current when rotating the fields of the motors in the opposite direction.

The system comprises the elevated cable or track 1, above which is suspended a single current or supply wire 2. The means for supporting the cable 1, and wire 2, consists of the inverted U-shaped uprights 3, having their ends planted in the ground, and having the hangers 4 depending from their tops

to which the wire 2 is suitably attached. The brackets 5, are supported by the said uprights, and the said brackets in turn support the track or cable 1.

As will be hereinafter explained, the said track 1, and wire 2, are connected with the opposite poles of a generator, and cooperate with each other in completing the circuit of the current conducted to the carrier arranged to travel upon the said track. The carrier comprises the frame 6, which is provided with the depending receptacle or receptacles 7. The trolley arm 8, is mounted upon said frame and carries a trolley wheel 9, which runs along the under side of the wire 2. The shells 10, 10, of the motors are provided with the grooved annular flanges located medially thereof, and which constitute the traction elements of the carrier for engagement with the cable 1. In the said motors the armatures 12, 12, are mounted upon suitable shafts, which are retained against rotation. The fields 14 are adapted to rotate about the armatures in unison with the shells 10, 10.

The pole changer 50 is located upon the shaft 49. The said pole changer comprises the disk 51 of insulating material. The segments 52, 53, 54 and 55 are arranged upon one of the faces of the disk 51, and are separated at their ends by the insulating material 56 and 57 (see Fig. 6). On the opposite face of the disk 51, the segments 58, 59, 60 and 61 are located and are separated by insulating sections similar to the sections 56 and 57, shown in Fig. 6. The wire 62 electrically connects the segment 55 with the segment 60. The wire 63 electrically connects the segment 54 with the segment 59. The wire 64 electrically connects the segment 50 with the segment 58, and the wire 65 electrically connects the segment 52 with the segment 61. The said wires 62, 63, 64 and 65 extend transversely of the disk 51. The said disk 51 is inclosed within the casing 66, and said casing is provided on one side with a brush 67, the end of which is in the path of the segments 53 and 54. The same side of the casing 66 is provided with a brush 68, the end of which is in the path of the segments 52 and 55. The opposite side of the casing 66 is provided with a brush 69, the end of which is in the path of the segments 58 and 61. The same side of the casing 66 is also provided with a brush

70, the end of which is in the path of the segments 59 and 60. The wire 71 connects the brush 67, with the wire 45' at the point X. The wire 72 connects the brush 68, with the frame 6, which is electrically connected with the track 1. The wire 73 connects the brush 69, with the field of the motor. The wire 74 connects the brush 70, with the commutator of said motor.

The star wheel 75 is fixed to the shaft 49. The arms 76 are pivoted to the lateral extension 77, extending from the casing 66, and the wheels 78, 78 are journaled in the said arms 76. The coil spring 79 connects the said arms 76, 76 together, and retains the wheels 78, 78 in contact with the periphery of the star wheel 75. The said star wheel is provided with eight points. The ratchet wheel 80 is fixed to the shaft 49, and is provided with eight pivoted ratchets 81, which are held in extended position by the springs 82. The said ratchets 81 are restrained from moving on their pivotal point in one direction, but are free to move on their pivots in the opposite direction. The track 1, near its terminals, is provided with the depending rods 83, to the lower ends of which are attached the suspended weights 84. The braces 85 are attached at their lower ends to the rods 83, and at their upper ends to the track 1. The collars 86, 86 are adjustably attached to the rod 83, and are provided with the laterally extending pins 87, 87, which are disposed transversely with relation to the track 1, and the ratchet wheel 80. The said pins 87, 87 cross the paths of the ratchet 81. The said rods 83 are as above stated arranged in pairs near the terminals of the track, sufficient distance being allowed between the members of each pair for the purpose of permitting the carrier to check its flight after the current is cut off by the ratchet wheel 80, coming in contact with one of the initial pins 87, before coming in contact with a subsequent pin 87, which operates the said wheel 80, and pole changer 50, to turn on the current, and reverse the operation of the motors as will be hereinafter explained.

Presuming that the star wheel 80 is approaching the pins 87 in the direction as indicated by the arrow in Fig. 2, and presuming that the rod 83, shown in the same figure, is the initial rod, the lower pin 87 will engage a ratchet 81, which extends below the wheel 80. At the same time the ratchet 81, located at the top of the wheel, escapes under the upper pin 87. The contact between the lower pin 87, and the lower ratchet 81, causes the wheel 80 to describe a partial rotation, and such rotation is transmitted through the shaft 49, which turns the pole changer 51, so that the insulated sectors 56 and 57 are brought opposite the ends of the brushes 67, 68, 69 and 70. Thus the current

is cut off. When the star wheel 80 approaches the next rod 83, the flight of the motor has been checked and the pins operate in conjunction with the ratchets 81, as above described, and the pole changer 50 is turned in the same direction, so that the brushes 67, 68, 69 and 70 are brought in contact with the segments at the opposite edges of the sectors 56 and 57, and thus the motors are caused to rotate in the opposite direction. In again passing, the pins above referred to, the pole changer 51 is rotated by the upper pins 87, and thus the position of the pole changer is advanced in order that the operation above described may be repeated when the carrier arrives at the opposite end of the line. The course of the current is as follows:—The track 1, and the line 2, are electrically connected with the opposite poles of the generator 88. The current starts from the said generator, passes along current wire 2, from thence through the trolley wheel 9, down the wire 45' to point X, where it splits. Part of the current passes down the wire 71 to the segment 53, thence along wire 64 to segment 58, thence along the wire 73 to the field 14, of motor B, thence along the wire 39 to the armature 12, of motor A, thence along wire 40, which is in motor A, to the wire 74, which is outside of the said motor, to the segment 60, thence along wire 62 to the segment 55, thence along wire 82 to the frame of the motor, thence along the track 1, back to the generator 88. At the same time the current passes from point X along wire 45 to the armature 12, of the motor B, thence along wire 46 to the field 14, of the motor A, thence along wire 43 to the frame of the motor, thence along the track 1, back to generator 88.

When the pole changer 50 is reversed in its position as above described, the segments from 52 to 61 inclusive will be reversed as illustrated in Fig. 10, of the drawing. When this occurs the current starts from the generator 88, passes along the wire 2, of the trolley wheel 9, thence along wire 45' to the point X. The current then splits and part of it passes along wire 71 to segment 54, thence along wire 63 to segment 59, thence along wire 74 and through wire 40 to the armature 12, of the motor A, thence along wire 39 to the field 14, of the motor B, thence along wire 73 to the segment 61, thence along wire 65 to the segment 52, thence along wire 72 to the frame of the motor, thence along the track 1, back to the generator 88. At the same time the current passes from point X, along wire 45 to the armature 12, of the motor B, thence along wire 46 to the field 14, of the motor A, thence along wire 43 to the frame of the motor, thence along track 1, back to the generator 88. Thus the course of the current is traced

in Fig. 9, of the drawing, when the carrier is traveling in one direction, and when the carrier arrives at the end of the line, the pole changer is operated as above described, and the course of the current is as illustrated in Fig. 10, of the drawing, which causes the motors to operate in the reverse direction.

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

1. As an improvement in electric transportation, a carrier, a pole changer mounted thereon and formed of a rotatable disk having its opposite sides provided with spaced apart contact segments, and spaced apart stationary means independent of the carrier for imparting a plurality of consecutive rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier.

2. As an improvement in electric transportation, a carrier, a pole changer formed of a rotatable disk mounted in said carrier and provided on its opposite sides with spaced apart contact segments, conductors extending from the contacts on one side to those on the other side, and spaced apart stationary means independent of the carrier for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier.

3. As an improvement in electric transportation, a carrier, a pole changer formed of a disk mounted in said carrier and having its opposite sides provided with spaced apart contact segments, conductors extending from the contacts on one side to the contacts on the other side, spaced apart stationary means independent of the carrier for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier, and means for normally preventing rotation of said disk.

4. As an improvement in electric transportation, a carrier, a pole changer formed of a rotatable shaft mounted in said carrier, and a disk mounted to rotate with said shaft, said disk having its opposite sides provided with spaced apart contacts, and spaced apart stationary means independent of the carrier for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier.

5. As an improvement in electric trans-

portation, a carrier, a pole changer formed of a rotatable shaft mounted in said carrier and having a disk mounted to rotate therewith, said disk having its opposite sides provided with spaced apart contacts, spaced apart stationary means independent of the carrier for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier, and means for normally preventing rotation of said shaft.

6. As an improvement in electric transportation, a carrier, a pole changer formed of a rotatable disk mounted in said carrier, said disk having its opposite sides provided with spaced apart contacts, spaced apart stationary devices independent of the carrier for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier, a casing surrounding said disk, and brushes carried by said casing and intercepting the path of movement of said contacts.

7. The herein described improvement in electric transportation comprising a carrier, a rotatable shaft mounted therein, a disk mounted on said shaft and having its opposite faces provided with pole changing contacts, a star wheel secured to said shaft, and arms supported by the carrier frame and provided with means for yieldingly engaging the periphery of the star wheel to normally prevent rotation thereof in either direction.

8. The herein described improvement in electric transportation comprising a carrier, a rotatable shaft mounted therein, a disk secured to said shaft and having its opposite faces provided with pole changing contacts, a star wheel secured to said shaft, arms supported by the carrier frame, and pivoted members supported by said arms and engaging the periphery of said star wheel to prevent rotation of said shaft in either direction, and a spring for holding said members in operative position.

9. The herein described improvement in electric transportation comprising a carrier, a shaft mounted in said carrier, a disk secured to said shaft and having its opposite faces provided with pole changing contacts, a star wheel secured to said shaft, means for rotating said shaft, and arms supported by the carrier frame and provided with means yieldingly engaging the periphery of said star wheel to normally prevent rotation of said shaft in either direction.

10. The herein described improvement in electric transportation comprising a carrier,

a shaft, means secured to one end of said shaft to rotate the same, means for actuating said rotating means, a star wheel carried by the other end of said shaft, means supported by said carrier for yieldingly engaging the periphery of said star wheel to normally prevent rotation of said shaft in either direction, and a disk secured to said shaft intermediate of its ends and having its opposite sides provided with pole changing contacts.

11. As an improvement in electric transportation, a carrier, a pole changer formed of a shaft having a disk mounted thereon, said disk having its opposite faces provided with contacts, a ratchet wheel secured to said shaft, and spaced apart stationary devices independent of the carrier for consecutively engaging the ratchet wheel to each impart a partial rotation thereto to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of the carrier.

12. The herein described improvement in electric transportation comprising a pole changer formed of a shaft, a disk secured thereon and having its opposite sides provided with contacts, and a ratchet wheel secured to said shaft to rotate the same, said ratchet wheel being provided with pivoted ratchet members.

13. The herein described improvement in electric transportation comprising a pole changer formed of a shaft, a disk secured thereon and having its opposite sides provided with contacts, and a ratchet wheel secured to said shaft to rotate the same, said ratchet wheel being provided with spring pressed ratchet members, and means to limit the movement of said ratchet members in one direction.

14. As an improvement in electric transportation, a carrier, a pole changer formed of a rotatable shaft mounted in said carrier and having a disk thereon, said disk having its opposite faces provided with contacts, a ratchet wheel secured to said shaft, spaced apart stationary devices independent of the carrier for consecutively engaging the ratchet wheel to impart a plurality of consecutive partial rotations to said pole changer to first shut off the current and subsequently reverse the same, the rotation of said pole changer being always in the same direction irrespective of the direction of movement of the carrier, and means for normally preventing rotation of said shaft.

15. The herein described improvement in electric transportation comprising a pole changer formed of a shaft, a disk secured thereon and having its opposite sides provided with contacts, a ratchet wheel secured to said shaft to rotate the same, said ratchet wheel being provided with pivoted ratchet

members, and means to normally prevent oscillation of said shaft.

16. The herein described improvement in electric transportation comprising a pole changer formed of a shaft, a disk secured thereon and having its opposite sides provided with contacts, a ratchet wheel secured to said shaft to rotate the same, said ratchet wheel being provided with spring pressed pivoted ratchet members and means to limit the movement of said ratchet members in one direction, and means to normally prevent oscillation of said shaft.

17. The herein described improvement in electric transportation comprising a mono-rail track, a conductor wire, means for supplying current thereto, a carrier mounted on said track and having a contact engaging said current wire, a pole changer supported by said carrier, and spaced apart stationary devices arranged adjacent said track for imparting a plurality of consecutive partial rotations to said pole changer to first shut off the current and subsequently reverse the same, the rotation of said pole changer being always in the same direction irrespective of the direction of movement of the carrier.

18. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier and comprising a disk having its opposite sides provided with contacts, and spaced apart stationary devices arranged adjacent said track for imparting a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same, the rotation of said disk being always in the same direction irrespective of the direction of movement of said carrier.

19. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier and comprising a shaft, a disk secured to said shaft and having its opposite faces provided with contacts, a ratchet wheel on said shaft, and spaced apart stationary devices adjacent said track arranged to engage said ratchet wheel to impart a plurality of consecutive partial rotations to said disk to first shut off the current and subsequently reverse the same.

20. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier, and a plurality of pins adjacent said track to periodically impart a series of successive partial rotations to said pole changer in the same direction.

21. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier, and a plurality of pins arranged in pairs adjacent said track to impart successive movements to said pole changer in the same direction as said carrier moves in opposite directions.

22. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier, and weighted rods suspended from said track, each of said rods being provided with means for imparting successive movements to said pole changer.

23. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said

wire, a pole changer supported by said carrier, and weighted rods suspended from said track and provided with pins arranged in pairs to impart successive movements to said pole changer in the same direction.

24. The herein described improvement in electric transportation comprising a track, a conductor wire, a carrier mounted on said track and having a contact engaging said wire, a pole changer supported by said carrier, rods suspended from said track, said rods being arranged in pairs, weights secured to the lower ends of said rods, and a plurality of pins adjustably secured to each rod and arranged to engage said pole changer.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ORRIN J. DAVY.

Witnesses:

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