No. 843,520. PATENTED FEB. 5, 1907.

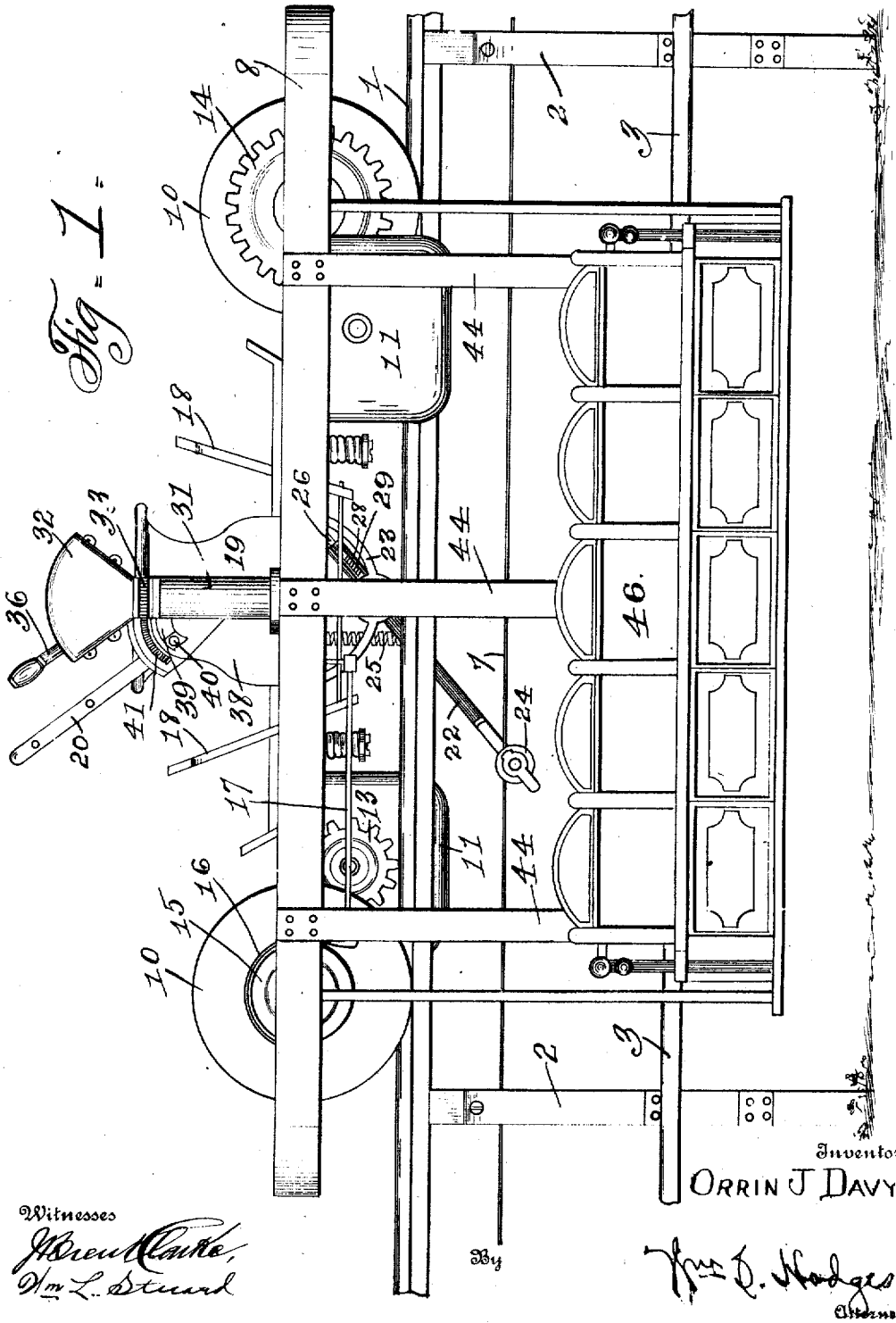
O. J. DAVY.

ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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No. 843,520. PATENTED FEB. 5, 1907.

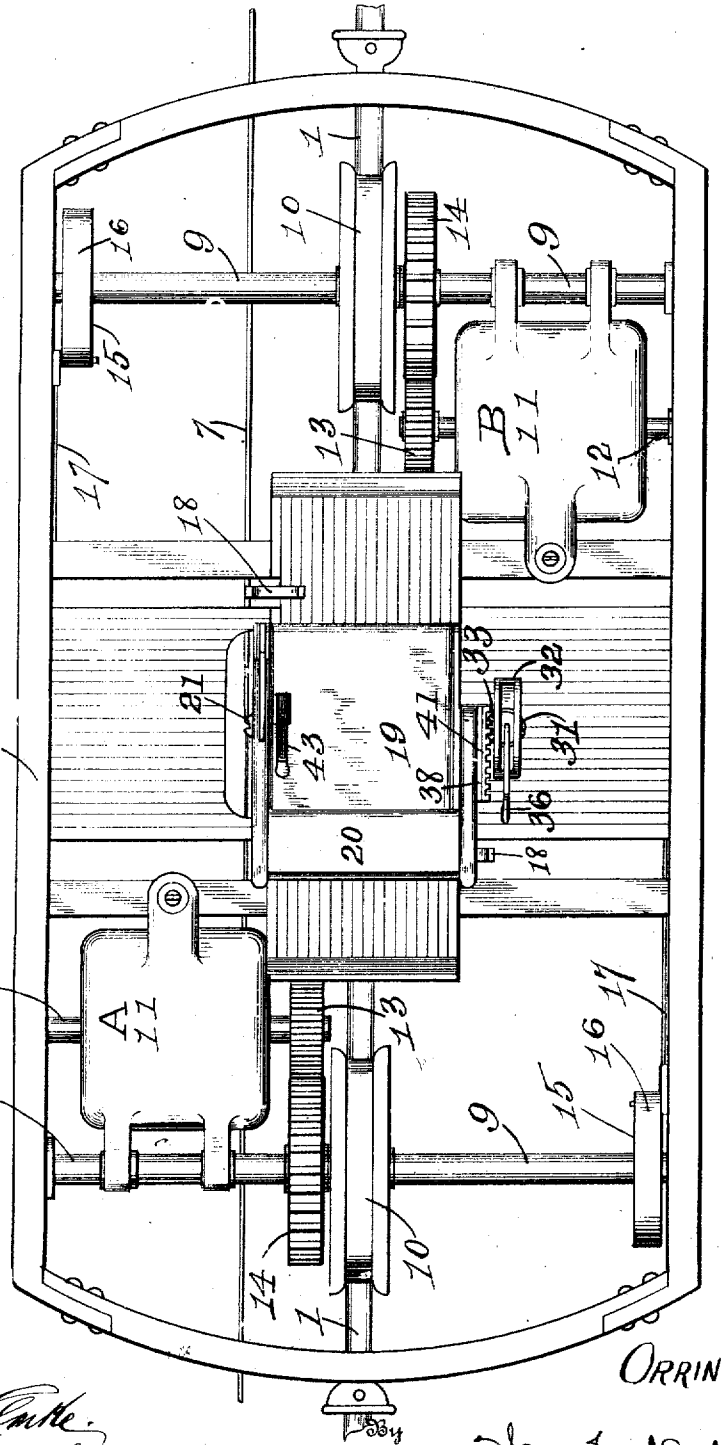
O. J. DAVY.

ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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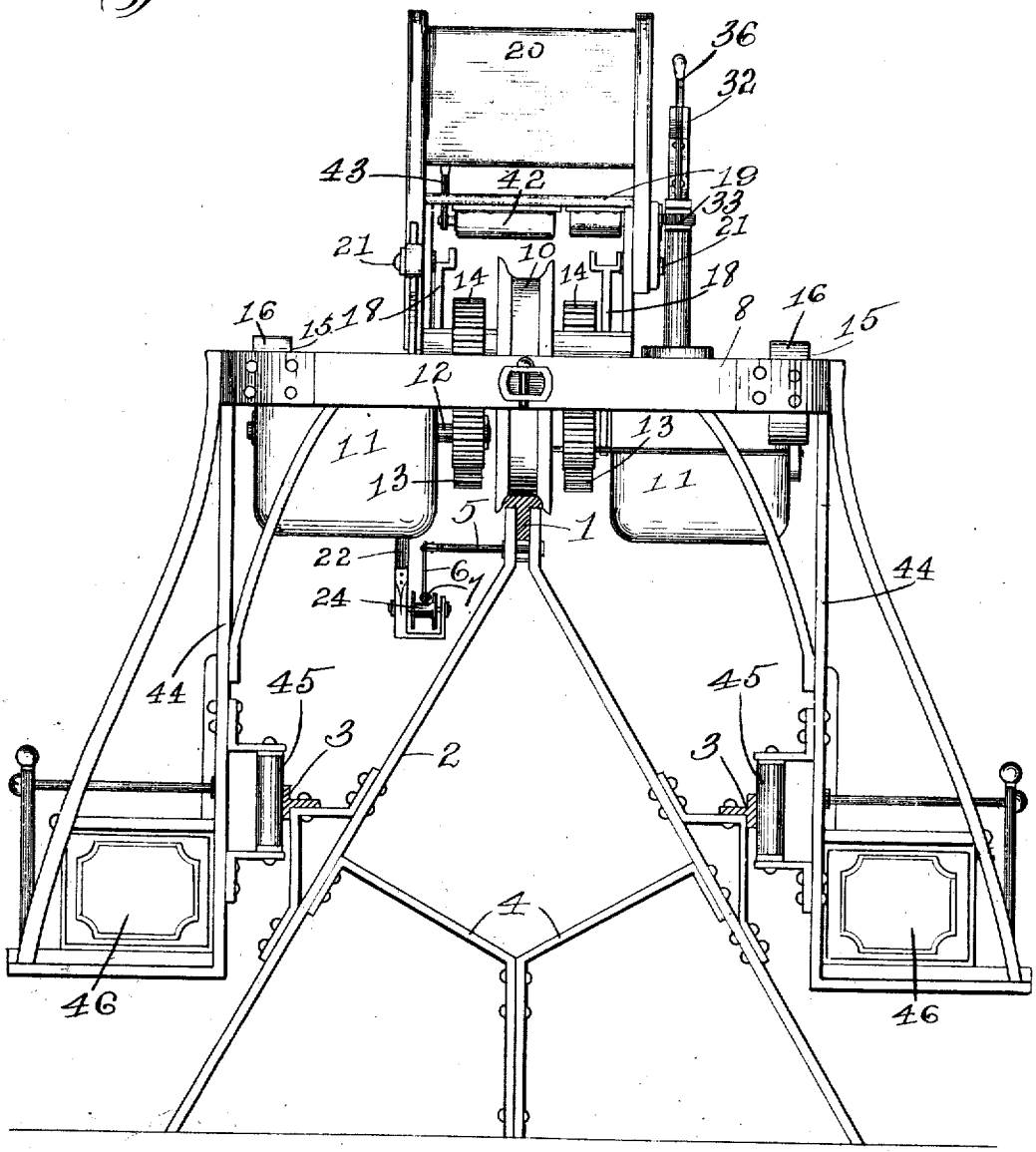
O. J. DAVY.

ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 3.

Fig. 3.



Witnesses

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No. 843,520. PATENTED FEB. 5, 1907.

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ELECTRIC TRAM SYSTEM.

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8 SHEETS—SHEET 4.

Fig. 4

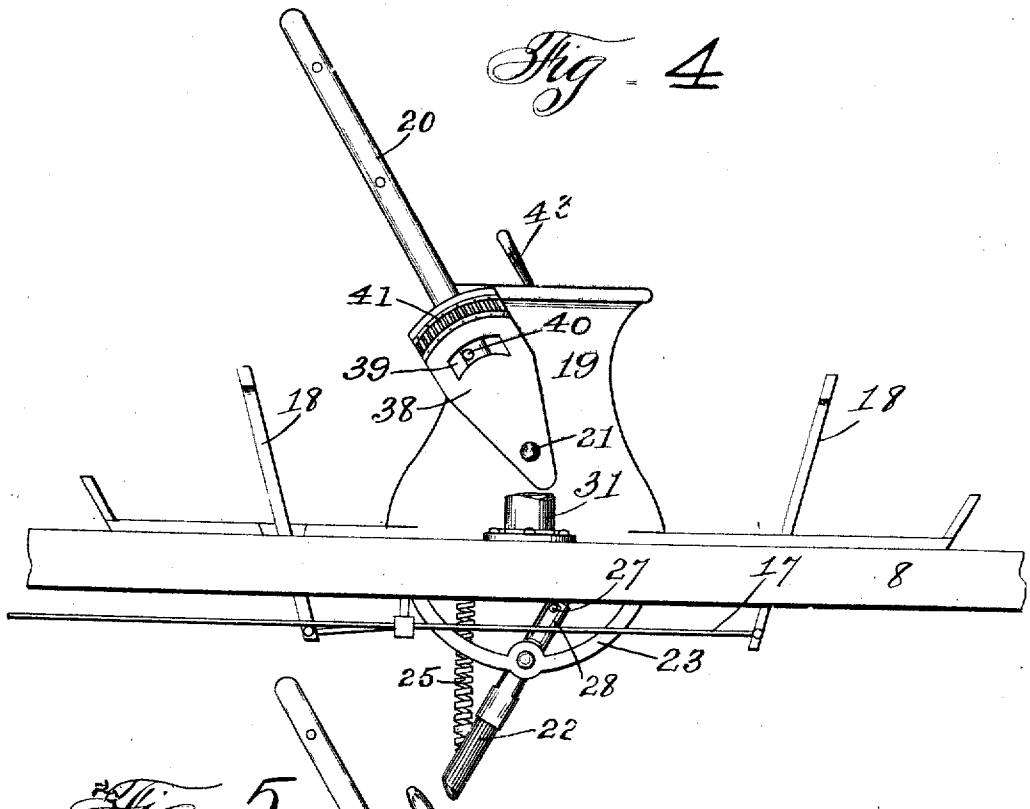
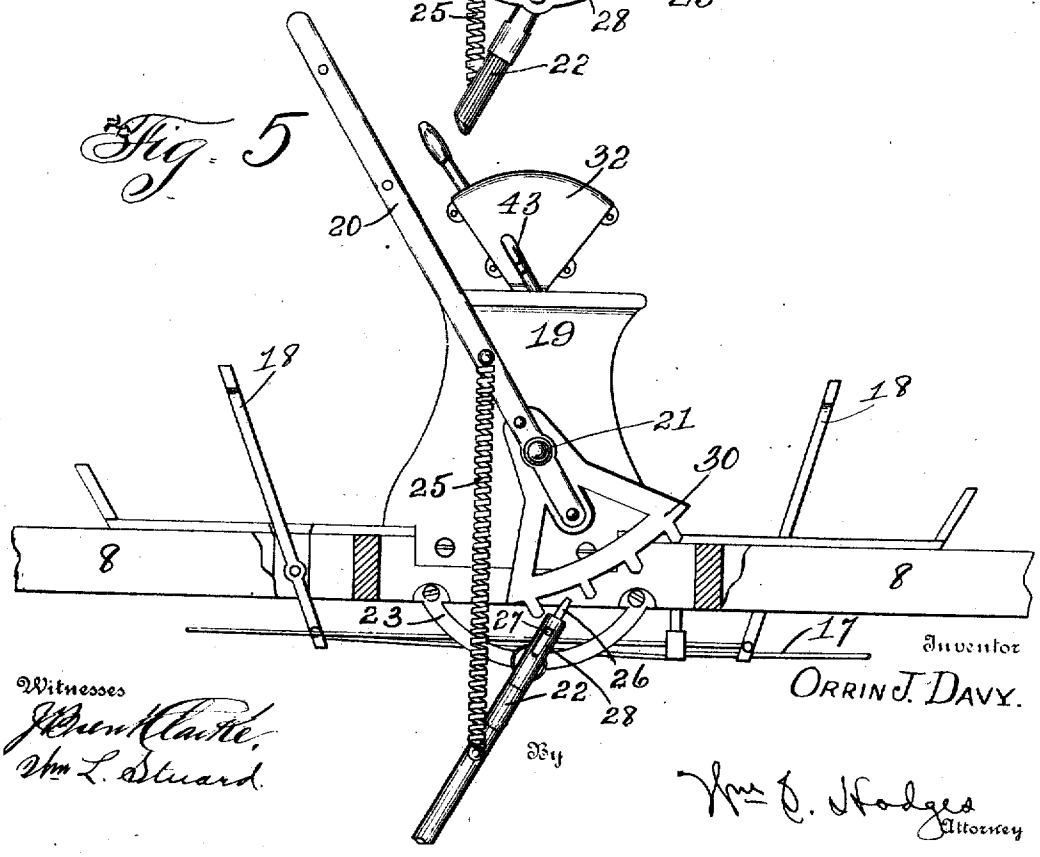


Fig. 5



Witnesses

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8 SHEETS—SHEET 5.

Fig. 6.

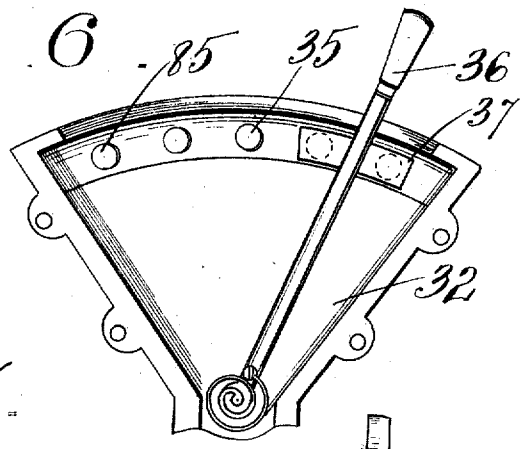


Fig. 7.

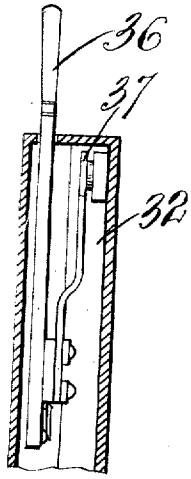
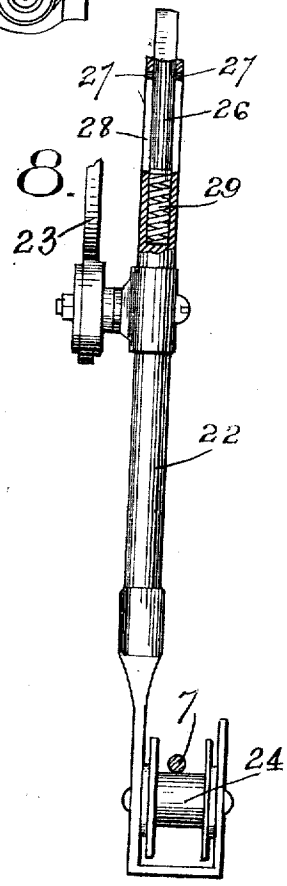


Fig. 8.



Witnesses

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No. 843,520. PATENTED FEB. 5, 1907.

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ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 6.

Fig. 9.

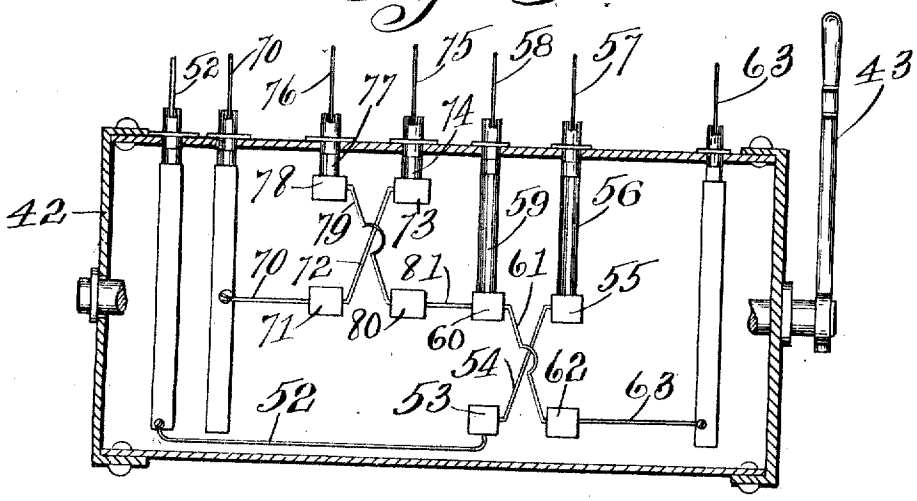


Fig. 10.

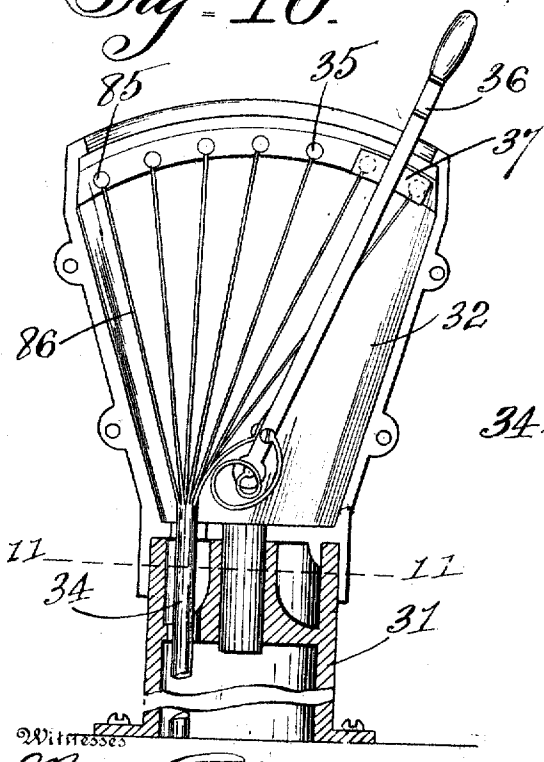
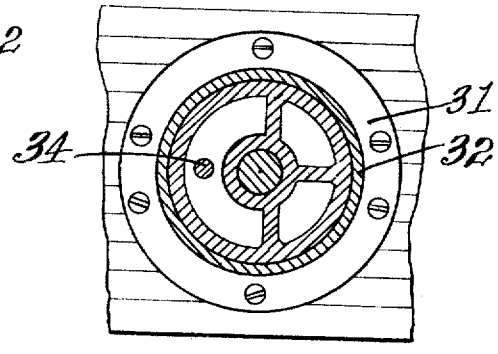


Fig. 11.



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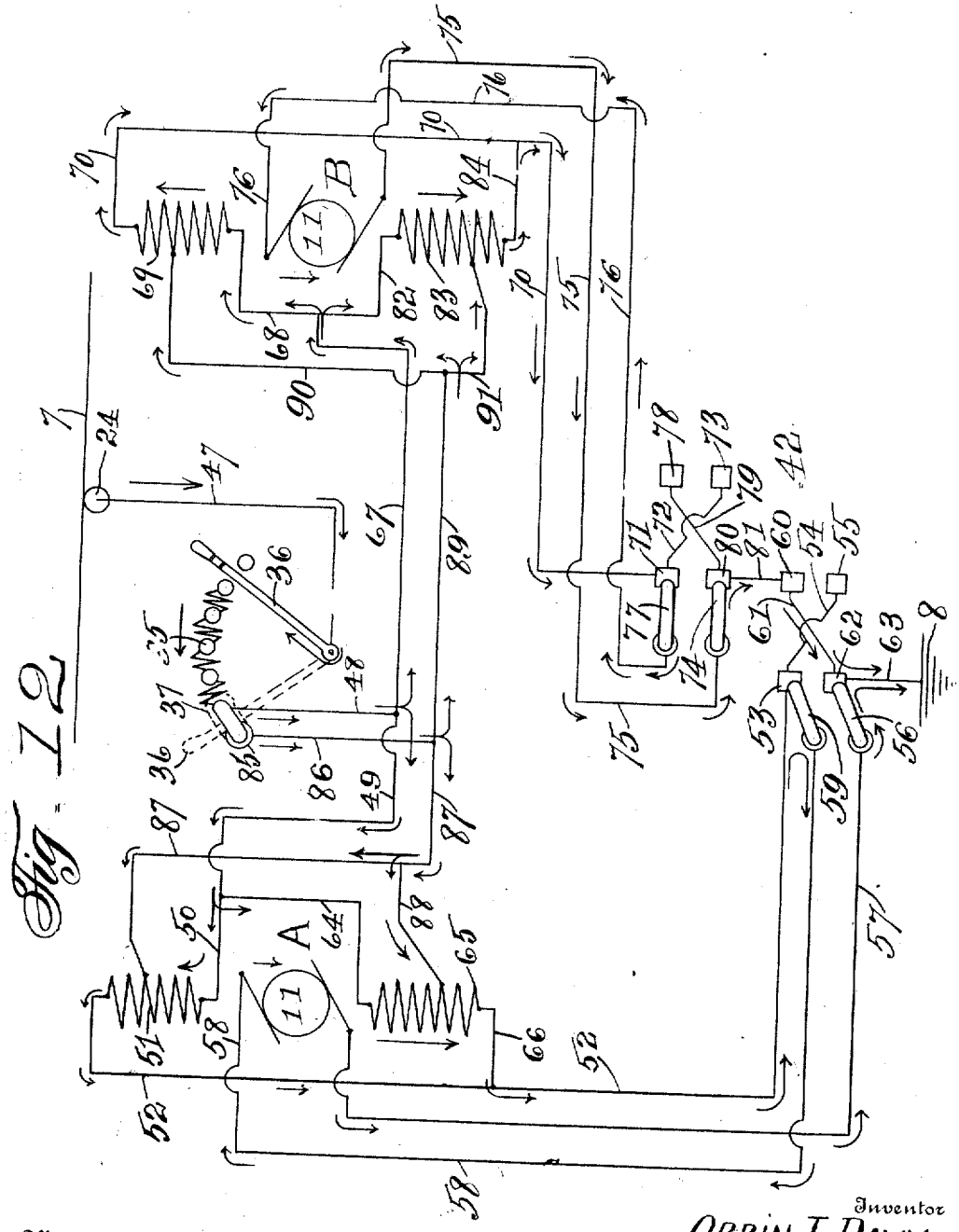
No. 843,520. PATENTED FEB. 5, 1907.

O. J. DAVY.

ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 7.



Witnesses

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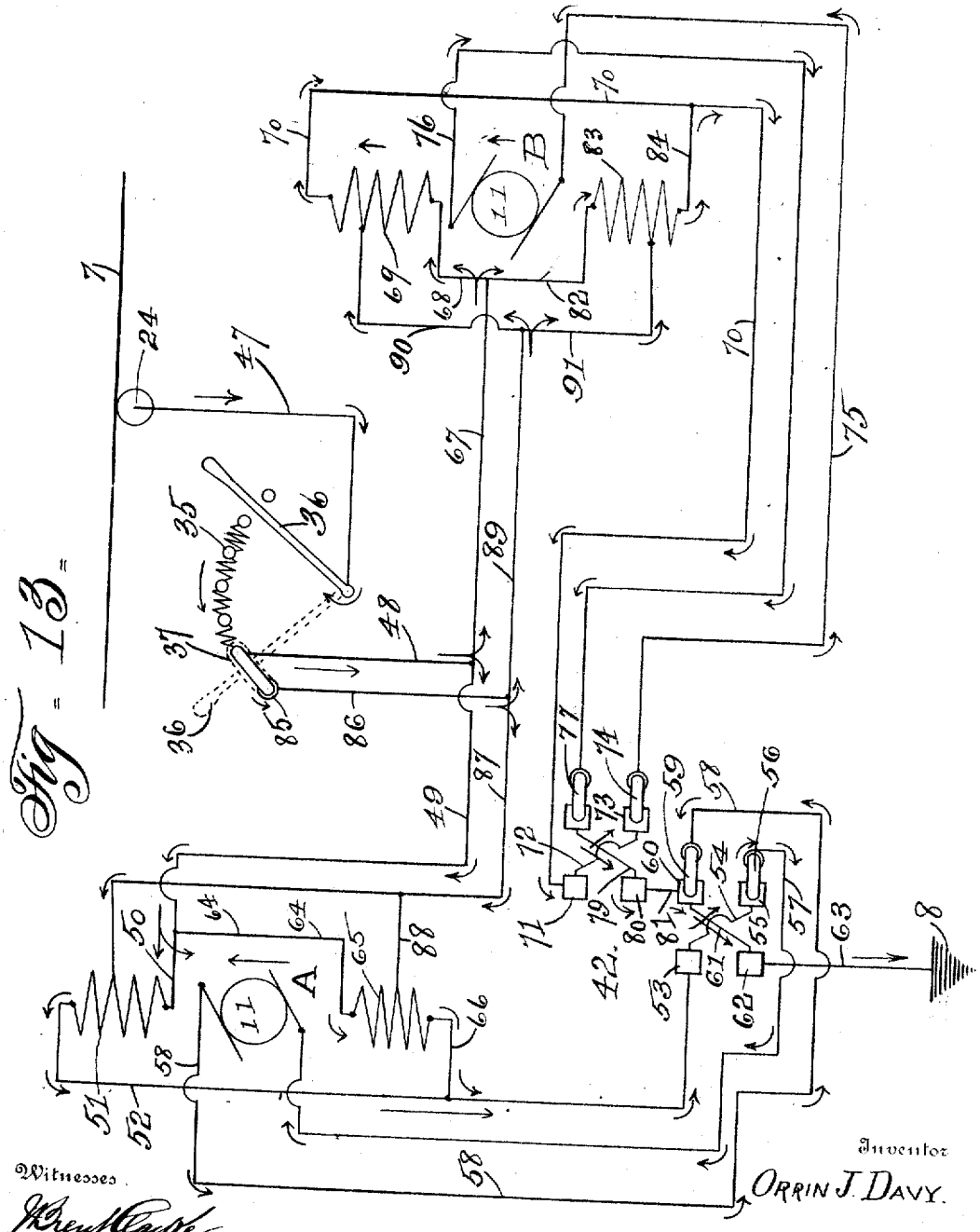
O. J. DAVY.

ELECTRIC TRAM SYSTEM.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 8.

Fig. 13.



Witnesses.

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UNITED STATES PATENT OFFICE.

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ELECTRIC TRAM SYSTEM.

No. 843,520. Specification of Letters Patent. Patented Feb. 5, 1907.

Application filed November 5, 1906. Serial No. 342,060.

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 Electric Tram Systems, of which the following is a specification.

This invention has relation to electric tram systems; and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The system is especially adapted for elevated roads; but it may be used to advantage upon surface and subway roads.

The object of the invention is to provide a system of the character indicated, which is so arranged that the motors, cars, or trains, as the case may be, are operated with safety and despatch and with the exercise of a minimum amount of care and headwork on the part of the operators. Mechanical means is provided which in a great measure will relieve the operator of the necessity of exercising forethought and discretion in the proper operating of the apparatus in his charge, thereby leaving his faculties free of mechanical detail and keeping them in reserve in case of exigency, emergency, or sudden or unexpected occurrences or conditions calling for immediate action and attention should such arise. The value of such arrangements is keenly appreciated by those in management where life and property is at stake and placed in the hands of subordinates, and the infallibility of mechanical appliances is far more desirable than the exercise of manual discretion, prompted in many instances by the fallible mind. In other words, the present system is designed to relieve its operators of much of the mental strain otherwise imposed upon them.

With these objects in view the system comprises a track or road-bed upon which cars, carriers, or trains are arranged to run, and which are propelled by electricity. The seat of the operator is in a great measure the controlling and safety element of the moving body or bodies. The seat is provided with a swinging back, which, as a matter of course, must be swung in the direction opposite to that in which the body is moving or is to move in order that the operator may occupy the same. Such movement of the back of the seat automatically reverses the trolley-arm, which is connected with the seat-back in such manner that such manipulation may be accomplished. Also the controller is automatically reversed by the swinging of the seat-back, so that the controller-lever will always be moved in the same direction with relation to the seat to cause the moving body to travel in the direction opposite to the inclination of the back of the seat. At the same time the swinging back automatically operates a reversing-switch or pole-changer in order that the electric current may be sent through the motor or motors in such direction as to cause the armatures thereof to rotate, whereby the moving body will travel in the direction opposite to that of the inclination of the seat-back. Means is provided for regulating the rate of speed of travel of the moving body, and safety-brake appliances are also located adjacent the seat and are adapted to be operated in a similar manner irrespective of the position of the seat-back. It will therefore appear that the operator at all times uses the appliances at his command in the same manner to cause the moving body to travel forward and in the same manner to cause the said body to stop and back. Therefore there is no possibility of his becoming confused at critical moments, and at the same time the appliances so simplify an otherwise complicated system that a novice or unskilled person may with the greatest degree of safety manipulate and operate the same, all of which results in a saving of time, labor, anxiety, and damage.

In the accompanying drawings, Figure 1 is a side elevation of a carrier mounted upon the tramway. Fig. 2 is a top plan view of the same. Fig. 3 is an end elevation of the carrier, showing the track in transverse section. Fig. 4 is a side elevation of one end of the seat. Fig. 5 is a side elevation of the opposite end of the seat. Fig. 6 is a side elevation of the controller-lever in the casing. Fig. 7 is a transverse sectional view of the controller-lever casing. Fig. 8 is a front elevation of the trolley-arm with parts in section. Fig 9 is a diagrammatic view of the pole-changer. Fig. 10 is a sectional view of the controller-post with parts removed. Fig. 11 is a horizontal sectional view of the controller-post cut on the line 11 11 of Fig. 10. Fig. 12 is a diagrammatic view of the wiring of a carrier, illustrating the course taken by

the currents when passing through the armatures of the motors in one direction; and Fig. 13 is a diagrammatic view of the wiring of a carrier, illustrating the course taken by the currents when passing through the armatures of the motors in the opposite direction.

As illustrated in the accompanying drawings, the tramway comprises a track 1, mounted upon the substantially A-shaped uprights 2, at an intermediate point of each leg of which is located a side bearing-rail 3. Each upright is provided with suitable intermediate bracing 4. The rail or track 1 may be of any desired or approved pattern or configuration. The cross-arm 5 extends laterally from the upper portion of each upright and is provided with a hanger 6. The said hangers throughout the system support the trolley-wire 7 in substantial parallel relation with the track 1, it of course being understood that the said trolley-wire support is at some convenient point provided with insulation which electrically separates the said trolley-wire from the track 1 and the uprights 2.

Each carrier comprises a frame 8, having journaled at its opposite ends the shafts 9 9. A traction-wheel 10 is mounted upon each shaft 9. The said traction-wheels travel upon the track 1. The motors 11 11 are supported in part by the frame 8 and the shafts 9. The said motors are located at diagonal opposite corners of the frame 8 and serve to counterbalance the structure. The armature-shafts 12 of the motors are provided with gear-wheels 13, which mesh with the gear-wheels 14, located upon the shafts 9. Each shaft 9 is provided with a disk 15, around which passes a band 16. The rods 17 connect the ends of said bands with the brake-levers 18. Thus speed-checking mechanism is provided. The seat 19 is located upon the frame 8 and is provided with a back 20, which is pivoted at the points 21 to the ends of the said seat 19. The trolley-arm 22 is pivoted to the hanger 23, which depends from the frame 8. The lower end of said trolley-arm is provided with a trolley-wheel 24, which runs against the under side of the current-wire 7. The pivotal point of the trolley-arm 22 is in vertical alinement with one of the pivots 21 of the seat-back 20. The coil-spring 25 is attached at one end to the seat-back 20 and at its other end to the trolley-arm 22, the points of attachment of the said coil-spring with the seat-back and the trolley-arm being at opposite sides of the pivot of the said pivoted members. The upper end of the trolley-arm 22 is hollow, and the pin 26 is slidably located therein. Said pin is provided with the laterally-extending lugs 27 27, which are located in the elongated slots 28, cut in the sides of the trolley-arm 22 and which limit the sliding movement of the pin 26. The coil-spring 29 is located within the trolley-arm 22 and bears at its lower end against the bottom of the hollow provided in the upper end of the said arm and bears at its upper end against the lower end of the pin 26. The tension of the said spring is such as to have a tendency to maintain the upper end of the said pin projected as far as possible beyond the upper end of the trolley-arm 22. The lower end of one side of the seat-back 20 is provided with the gear-segment 30, the teeth of which are adapted to engage the upper end of the pin 26. The controller-post is located upon the frame 8 at the opposite end of the seat 19. The controller-lever casing 32 is rotatably supported at the upper end of the post 31 and is provided at its base with the external gear-teeth 33. The wire cable 34 passes up through the post 31 and enters the casing 32, where the wires are separated and are attached to the points 35, as illustrated in Fig. 10 of the drawings. The controller-lever 36 is pivoted in the casing 32 and projects above the upper end thereof. The said controller-lever 36 is provided with the usual contact-finger 37, which is adapted to engage the points 35. The plate 38 is pivoted upon one of the pivots 21 of the seat-back 20 and is provided with an elongated arcuate slot 39. The side of the seat-back 20 is provided with a pin 40, which enters the said slot 39. The upper portion of the plate 38 is provided with a toothed rack 41, which meshes with the gear 33 of the casing 32. The pole-changing switch 42 is located under the seat 19. The pole-changing lever 43 passes through the seat 19 and has its upper end located in the path of the lower edge of the seat-back 20. The said pole-changing lever 43 is arranged to swing in a shorter arc than the seat-back 20.

From the foregoing description it is obvious that when the seat-back 20 is swung on its pivots 21 the teeth of the gear-segment 30 will engage the end of the pin 26 and cause the trolley-arm 22 to swing on its pivot against the tension of the spring 25. At the same time the spring 29, bearing against the lower end of the pin 26, will permit the said pin 26 to move longitudinally with the end of the trolley-arm 22 to compensate for the different arcs described by the segment 30 and the trolley-arm 22 in swinging, and thus the seat-back 20 and the trolley-arm 22 are swung simultaneously and are at all times lying in the same general direction with relation to the seat 19—that is to say, when the carrier is going in one direction the seat-back 20 and trolley-arm 22 will be inclined in the opposite direction with relation to the seat 19. At the same time that the seat-back 20 is swung the pin 40 will move until eventually it will engage the end of the slot 39 of the plate 38, when the said plates will also swing upon the pivot 21, to which it is attached, and the gear-teeth 41 thereof, engaging the gear-teeth 33 of the casing 32, will cause the said casing to describe a half-rota-

tion, which in turn will turn the controller-lever 36. Thus the position of the controller-lever 36 is always the same as that of the seat-back 20 with relation to the seat 19, and in order to start the carrier the said controller-lever 36 is always moved in the same direction with relation to the seat, and in order to stop the car is moved in the opposite direction with relation to the seat. At the same time that the seat-back 20 is swung the lower edge thereof engages the end of the pole-changing lever 43 and operates the same to send the current through the armatures of the motors in the opposite direction, as will be hereinafter explained. By reason of the fact that the lower edge of the seat 20 describes a different arc from the upper end of the pole-changing lever 43 the seat-back 20 will escape the upper end of the pole-changing lever 43 when the latter has reached the limit of its movement. Means, however, is provided, such as a spring, for causing the said pole-changing lever to move slightly in the reverse direction after it has been escaped by the seat-back 20 in order to bring the upper end of the same within the path of the said seat-back, so that it may be engaged by the seat-back when swung in the reverse direction. It will thus be seen that the controller-lever, the pole-changing lever, and the trolley-arm are at all times inclined in the same general direction with relation to the seat, and consequently the manipulation of such parts as are intended to be operated manually are accomplished in the same way irrespective of the direction in which the carrier is traveling. Thus the possibilities of confusing the operator are reduced to a minimum. The hangers 44 depend from the frame 8 and are provided with the rollers 45, which bear against the side rails 3. The said hangers are also provided with seats 46 or other receptacles for carrying a load.

The wiring of the carrier is as follows: The wire 47 extends from the trolley-wheel 24 to the controller-lever 36. The wire 48 is connected at one end with the points 35 and joins with the wire 49. Said wire 49 joins with the wire 50, which connects with the field 51 of the motor A. The wire 52 connects the field 51 with the point 53, located in the pole-changer 42. The wire 54 connects the point 53 with the point 55. The brush 56 is located in the path of the point 55, and the wire 57 is connected at one end to the brush 56 and at its other end to one of the brushes of the armature of the motor A. The opposite brush of the said armature is connected by the wire 58 with the brush 59. The said brush 59 is located in the path of the point 60 and the point 53. The wire 61 connects the point 60 with the point 62, and the wire 63 connects the point 62 with the ground, which in the present instance is the frame 8. The brush 56 is also located in the path of the point 62. The wire 64 connects the wire 50 with the field 65 of the motor A. The wire 66 connects the field 65 with the wire 52. The wire 67 connects the wire 48 with the wire 68. Said wire 68 connects with the field 69 of the motor B. The wire 70 connects the field 69 with the point 71 of the pole-changer 42. The wire 72 connects the point 71 with the point 73. The brush 74 is located in the path of the point 73, and the wire 75 connects said brush with one of the brushes of the armature of the motor B. The wire 76 connects the opposite brush of the motor B with the brush 77. The points 78 and 71 are located in the path of the brush 77. The wire 79 connects the point 78 with the point 80. The brush 74 is located in the path of the points 80 and 73. The wire 81 connects the point 80 with the point 60. The wire 82 connects the wire 67 with the field 83 of the motor B, and the wire 84 connects the field 83 with the wire 70. At the end of the stroke of the controller-lever 36 the contact-finger 37 will span from the end point 35 and rest upon the point 85. The wire 86 connects the point 85 and joins with the wire 87. The said wire 87 connects with the field 51, so as to cut out part of the said field-winding. The wire 88 connects the wire 87 with the field 65, so as to cut out part of the winding of the said field. The wire 89 connects the wire 86 with the wire 90. The wire 90 connects with the field 69, so as to cut out part of the winding thereof. The wire 91 connects the wire 89 with the field 83, so as to cut out part of the winding thereof.

The course of the current through the motors A and B is as follows: Assume that the points 62, 53, 55, 60, 80, 71, 78, and 73 are in the position as shown in Fig. 12 of the drawings—that is to say, brush 77 is in contact with point 71, brush 74 is in contact with point 80, brush 59 is in contact with point 53, and brush 56 is in contact with point 62. When the contact-finger 37 of the controller-lever 36 is moved into engagement with any one of the points 35, the current comes from the wire 7 through trolley-wheel 24 and wire 47 to the lever 36, through the contact-finger 37 of lever 36 to point 35, thence along wire 48 to wire 49, along wire 49 to wire 50, along wire 50 to field 51 of motor A, along wire 52 to point 53 of the pole-changer 42, along brush 59 to wire 58, through the armature 11 of motor A, thence along wire 57 to brush 56, thence to point 62, thence along wire 63 to the ground, which in the present instance is the frame 8 of the carrier. From the wire 50 the current also passes along the wire 64 to the field 65 of motor A, thence along wire 66 to wire 52, where it joins with the current passing along the said wire from the field 51. At the same time the current passes from wire 48 along the wire 67 to wire 68, thence along wire 68

to field 69 of motor B, thence along wire 70 to point 71 of the pole-changer 42, thence along brush 77 to wire 76, thence along said wire 76 to one of the brushes of the armature 11 of motor B, thence through the said armature to the opposite brush thereof, thence along wire 75 to brush 74, thence to point 80 of the pole-changer 42, thence along wire 81 to point 60, thence along wire 61 to point 62, and thence along wire 63 to ground 8. At the same time the current will pass from wire 67 along wire 82 to the field 83 of the motor B, thence through the said field and along the wire 84 to the wire 70, where it joins with the current coming from the field 69 of the said motor. Thus the electric current is sent through the armatures 11 of the motors A and B in one direction. When the lever 36 is moved to the forward end of its stroke, the contact-finger 37 will span the end point 35 and the point 85. Thus, in addition the courses above described, the current will also pass from the point 85 along the wire 86 to wire 87, thence along wire 87 to the field 51 of the motor A. The said wire 87 connects with the field 51, so as to cut out a portion of the winding thereof. At the same time the current will pass from the wire 87 along the wire 88 to the field 65 of the motor A. The said wire 88 also connects with the field 65 in order to cut out a portion of the winding thereof. At the same time the current will pass from the wire 86 along the wire 89 to wire 90, thence along said wire to the field 69 of the motor B. At the same time the current will pass from the wire 89 along the wire 91 to the field 83 of the motor B. The wires 90 and 91 connect with the fields 69 and 83, so as to cut out portions of the windings thereof. Thus when the controller-lever 36 is moved to the forward end of its stroke the current will follow the line of least resistance, and instead of passing down wire 48 and through all the windings of each motor-field it will pass down wire 86 and through only a small portion of the winding of each field. This reduced current is sufficient to keep the motors going after the same have been speeded up to maximum, and the current is accordingly shunted through the motor-fields in the manner described as a matter of economy.

When the seat-back 20 is swung in the opposite direction, the edge of the said seat will engage the pole-changer lever 43 in the manners above described and turn the same so that the point 87 of the pole-changer 42 will be brought in contact with the brush 77, the point 73 will be brought in contact with the brush 74, the point 60 will be brought in contact with the brush 59, and the point 55 will be brought in contact with the brush 56. The parts will then be in the position as illustrated in Fig. 13 of the drawings. Thus when the controller-lever 36 is moved so that the contact-finger 37 thereof engages any one of the points 35 the current will pass from the wire 47 through the contact-finger 37 and point 35 along wire 48 to wire 49, along said wire 49 to wire 50, thence through the field 51 of motor A, thence along wire 52 to point 53 of the pole-changer 42, thence along wire 54 to point 55, thence along brush 56 to wire 57, thence along said wire to one of the brushes of the armature 11 of the motor A, thence through said armature to the opposite brush of the same, thence along wire 58 to the brush 59 of the pole-changer 42, thence to point 60, thence along wire 61 to point 62, thence along wire 63 to ground 8. At the same time the current will pass from wire 49 along wire 64 to the field 65 of the motor A, thence along wire 66 to the wire 52. At the same time the current will pass from the wire 48 along the wire 67 to wire 68, thence along said wire to the field 69 of the motor B, thence through said field and along wire 70 to the point 71 of the pole-changer 42, thence along wire 72 to the point 73, thence through brush 74 and along wire 75 to one of the brushes of the armature 11 of the motor B, thence through said armature and the opposite brush thereof to wire 76, thence along wire 76 to brush 77, thence to point 78, thence along wire 79 to point 80, thence along wire 81 to point 60, thence along wire 61 to point 62, and thence along wire 63 to the ground 8. At the same time the current will pass from the wire 67 along wire 82 to the field 83 of the motor B, and thence through the said motor and along the wire 84 to the wire 70, where it joins the current passing along the last said wire. When the controller-lever 36 has been moved to the forward end of its stroke, the current will also pass through the finger 37 to point 85, thence along wire 86 to wire 87, thence along said wire to the field 51. At the same time the current will pass from wire 87 along the wire 88 to the field 65 of the motor A. At the same time the current will pass from the wire 86 along the wire 89 to wire 90, thence along the wire 90 to the field 69 of the motor B. At the same time the current will pass from the wire 89 along the wire 91 to the field 83 of the last said motor. As the wires 50, 88, 69, and 91 connect with the fields of the motors, as above described, the current is shunted through the windings of the said motors. In the description of the passage of the current as illustrated in Fig. 13 it will be observed that the current passes through the armatures 11 11 of the motors A and B in the opposite direction from the course taken by the current as shown and described for the diagrammatic view illustrated in Fig. 12 of the drawings. Thus the reversing of the motors is accomplished by the swinging of the seat-back 20.

Having described my invention, what I

claim as new, and desire to secure by Letters Patent, is—

1. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley-arm attached to the carrier, and means connecting the trolley-arm with the seat-back to cause the same to swing simultaneously.

2. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and means connecting the trolley with the seat-back to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat.

3. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and a spring attached at one end to the seat-back, and at the other end to said trolley.

4. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat, and a spring attached at one end to the seat-back, and at the other end to said trolley.

5. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, one of the said swinging members having a resilient means for compensating for the different arcs described by the said swinging members.

6. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, one of the said swinging members having a resilient means for compensating for the different arcs described by the said swinging members.

7. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, said trolley having a resilient means for compensating for the different arcs described by the said swinging members.

8. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, said trolley having a resilient means for compensating for the different arcs described by the swinging members.

9. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously, said trolley having a spring-actuated element for engagement with the seat-back to compensate for the different arcs described by the swinging members.

10. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, said trolley having a spring-actuated element for engagement with the seat-back to compensate for the different arcs described by the swinging members.

11. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to said seat-back, and a spring-actuated element attached to the trolley for engagement with the rack.

12. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to the seat-back, a spring-actuated element attached to the trolley for engagement with the rack, and a spring attached at one end to the seat-back, and at the other end to said trolley.

13. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging back.

14. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging back.

15. In a system of the character indicated,

a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the said swinging back.

16. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the said swinging back and the trolley to move simultaneously, and at all times incline in the same general direction with relation to the seat, and a pivoted pole-changing lever located in the path of the swinging seat-back.

17. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the swinging seat-back, the parts being so arranged as to incline at all times in the same general direction with relation to the seat.

18. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a trolley attached to the carrier, and a pivoted pole-changing lever located in the path of said swing seat-back and moving in a different arc therefrom.

19. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging seat-back and moving in a different arc therefrom.

20. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the said swinging seat-back and moving in a different arc therefrom.

21. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing said swinging back and the trolley to move simultaneously, and at all times incline in the same general direction with relation to the seat, and a pivoted pole-changing lever located in the path of the swinging seat-back and moving in a different arc therefrom.

22. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the swinging seat-back and moving in a different arc therefrom, the parts being so arranged as to incline at all times in the same general direction with relation to the seat.

23. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof.

24. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof.

25. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to the seat-back, a spring-actuated element attached to the trolley for engagement with the rack, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof.

26. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and a rotating controller-lever operated by the swinging seat-back.

27. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat, and a rotating controller-lever operated by the swinging seat-back.

28. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat to cause the same to swing simultaneously, a spring attached at one end to the seat-back, and at the other end to said trolley, and a rotating controller-lever operated by the swinging seat-back.

29. In a system of the character indicated,

a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat, a spring attached at one end to the seat-back, and at the other end to said trolley, and a rotating controller-lever operated by the swing seat-back.

30. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, one of the said swinging members having a resilient means for compensating for the different arcs described by the said swinging members, and a rotating controller-lever operated by the swinging seat-back.

31. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, one of the said swinging members having a resilient means for compensating for the different arcs described by the said swinging members, and a rotating controller-lever operated by the swinging seat-back.

32. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat-back having means for engagement with the trolley to cause the same to move simultaneously, said trolley having a resilient means for compensating for the different arcs described by the said swinging members, and a rotating controller-lever operated by the swinging seat-back.

33. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, said trolley having a resilient means for compensating for the different arcs described by the swinging members, and a rotating controller-lever operated by the swinging seat-back.

34. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously said trolley having a spring-actuated element for engagement with the seat-back to compensate for the different arcs described by the swinging members, and a rotating controller-lever operated by the swinging seat-back.

35. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, said seat having means for engagement with the trolley to cause the same to move simultaneously, and at all times incline in the same general direction with relation to the seat, said trolley having a spring-actuated element for engagement with the seat-back to compensate for the different arcs described by the swinging members, and a rotating controller-lever operated by the swinging seat-back.

36. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to said seat-back, and a spring-actuated element attached to the trolley for engagement with the rack, and a rotating controller-lever operated by the swinging seat-back.

37. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to the seat-back, a spring-actuated element attached to the trolley for engagement with the rack, and a spring attached at one end to the seat-back, and at the other end to said trolley, and a rotating controller-lever operated by the swinging seat-back.

38. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging back, and a rotating controller-lever operated by the swinging seat-back.

39. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging back, and a rotating controller-lever operated by the swinging seat-back.

40. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the said swinging back, and a rotating controller-lever operated by the swinging seat-back.

41. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swing-

ing trolley attached to the carrier, means for causing the said swinging back and the trolley to move simultaneously, and at all times incline in the same general direction with relation to the seat, and a pivoted pole-changing lever located in the path of the swinging seat-back, and a rotating controller-lever operated by the swinging seat-back.

42. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously and a pivoted pole-changing lever located in the path of the swinging seat-back, the parts being so arranged as to incline at all times in the same general direction with relation to the seat, and a rotating controller-lever operated by the swinging seat-back.

43. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a trolley attached to the carrier, and a pivoted pole-changing lever located in the path of said swing seat-back, and moving in a different arc therefrom, and a rotating controller-lever operated by the swinging seat-back.

44. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and a pivoted pole-changing lever located in the path of the said swinging seat-back and moving in a different arc therefrom, and a rotating controller-lever operated by the swinging seat-back.

45. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the said swinging seat-back and moving in a different arc therefrom, and a rotating controller-lever operated by the swinging seat-back.

46. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing said swinging back and the trolley to move simultaneously, and at all times incline in the same general direction with relation to the seat, and a pivoted pole-changing lever located in the path of the swinging seat-back and moving in a different arc therefrom, and a rotating controller-lever operated by the swinging seat-back.

47. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, means for causing the seat-back and the trolley to swing simultaneously, and a pivoted pole-changing lever located in the path of the swinging seat-back and moving in a different arc therefrom, the parts being so arranged as to incline at all times in the same general direction with relation to the seat, and a rotating controller-lever operated by the swinging seat-back.

48. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof, and a rotating controller-lever operated by the swinging seat-back.

49. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a means connecting the trolley with the seat-back to cause the same to swing simultaneously, and at all times incline in the same general direction with relation to the seat, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof, and a rotating controller-lever operated by the swinging seat-back.

50. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rack attached to the seat-back, a spring-actuated element attached to the trolley for engagement with the rack, and a spring attached at its ends to the seat-back and the trolley at opposite sides of the pivotal points thereof, and a rotating controller-lever operated by the swinging seat-back.

51. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a swinging pole-changer lever located in the path of the seat, and a rotating controller-lever operated by the swinging seat-back.

52. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, and a rotating controller-lever operated by the swing seat-back.

53. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rotating controller-lever located in the path of the swinging back, and means attached to the swinging back for engagement with the rotating controller-lever for operating the same at the intermediate portion of the stroke of the swinging seat-back.

54. In a system of the character indicated, a carrier, a seat located upon the carrier, a

swinging back attached to the seat, a swinging trolley attached to the carrier, a rotating controller-lever located in the path of the swinging back, a segment connected with said lever and having gear-teeth, said controller-lever casing having gear-teeth which mesh with the gear-teeth of the said segment, and means connecting said segment with said swinging seat-back.

55. In a system of the character indicated, a carrier, a seat located upon the carrier, a swinging back attached to the seat, a swinging trolley attached to the carrier, a rotating controller-lever located in the path of the swinging back, a segment connected with said lever and having gear-teeth and an elongated slot, said controller-lever casing having gear-teeth which mesh with the gear-teeth of said segment, a pin carried by the swinging seat-back and being located in the said elongated slot.

56. In a system of the character described, a carrier, a trolley-arm carried thereby, a pole-changer, and means for simultaneously reversing said trolley-arm and shifting said pole-changer.

57. In a system of the character described, a carrier, a trolley-arm carried thereby, a rotatable controller also carried thereby, and means for simultaneously reversing said trolley-arm and rotating said controller.

58. In a system of the character described, a carrier, a rotatable casing, a controller carried thereby, a pole-changer, and means for simultaneously shifting said pole-changer and rotating said controller-casing to reverse the same.

59. In a system of the character described, a carrier, a trolley-arm carried thereby, a rotatable controller also carried by said carrier, a pole-changer, and means for simultaneously reversing said trolley-arm, rotating said controller and shifting said pole-changer.

60. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a trolley-arm carried by said carrier, and means operated by said movable seat member to reverse said trolley-arm.

61. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a pole-changer, and means operated by said movable seat member for shifting said pole-changer.

62. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a rotatable controller-casing mounted on said carrier, a controller in said casing and means operated by the movable member of said seat to rotate said controller-casing to reverse the same.

63. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a trolley-arm mounted on said carrier, a pole-changer, and means operated by the movable member of said seat to reverse said trolley-arm and simultaneously shift said pole-changer.

64. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a trolley-arm mounted on said carrier, a rotatable controller, and means operated by the movable member of said seat to reverse said trolley-arm and simultaneously rotate said controller.

65. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a rotatable controller mounted on said carrier, a pole-changer, and means operated by the movable member of said seat to rotate said controller and simultaneously shift said pole-changer.

66. In a system of the character described, a carrier, a seat thereupon provided with a movable member, a trolley-arm mounted on said carrier, a rotatable controller also mounted on said carrier, a pole-changer, and means operated by the movable member of said seat to reverse said trolley-arm and to simultaneously rotate said controller and shift said pole-changer.

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

ORRIN J. DAVY.

Witnesses:
GEORGE G. SCHROEDER,
JOHN J. HIGGINS.