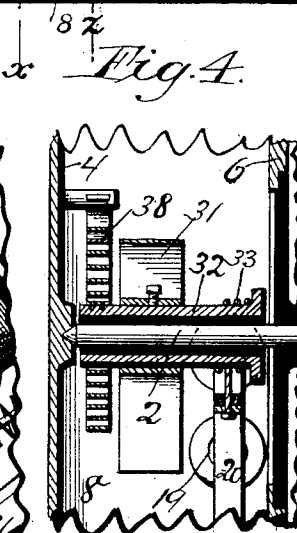
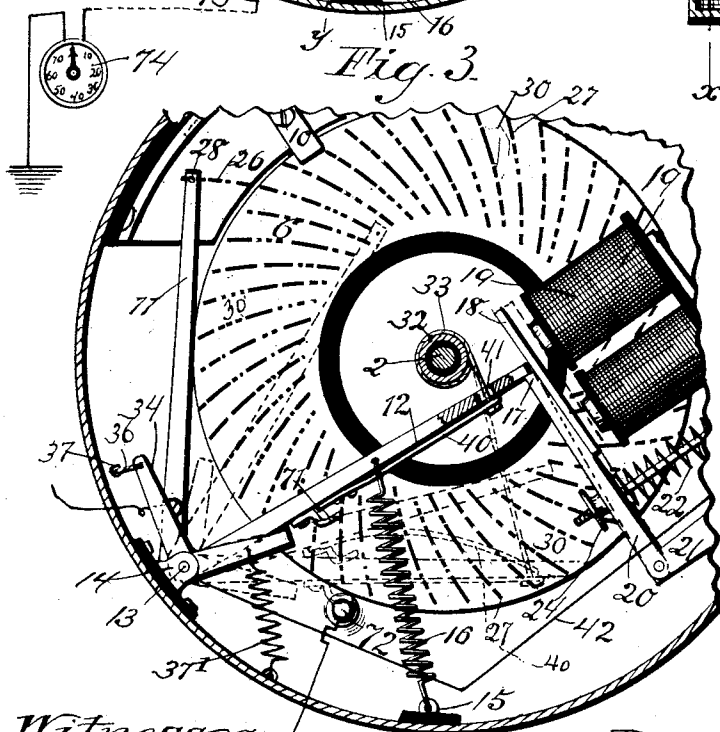
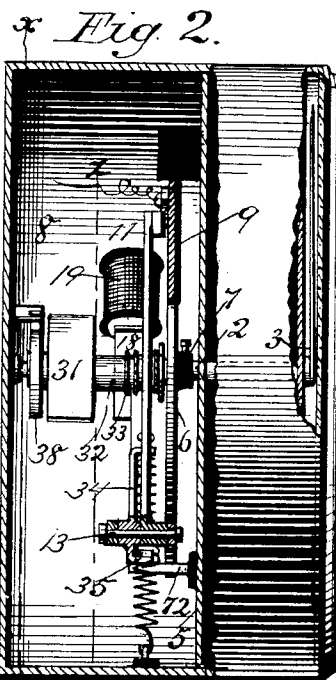
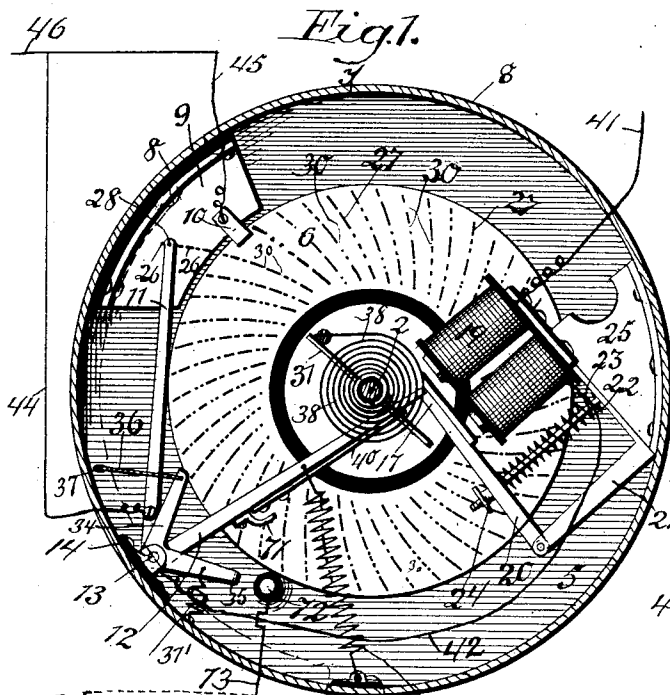


B. S. MOLYNEUX.
ELECTRIC FARE RECORDING SYSTEM.

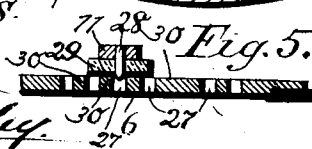
No. 464,513.

Patented Dec. 8, 1891.



Witnesses:

J. Jensen.
C. Hawley.



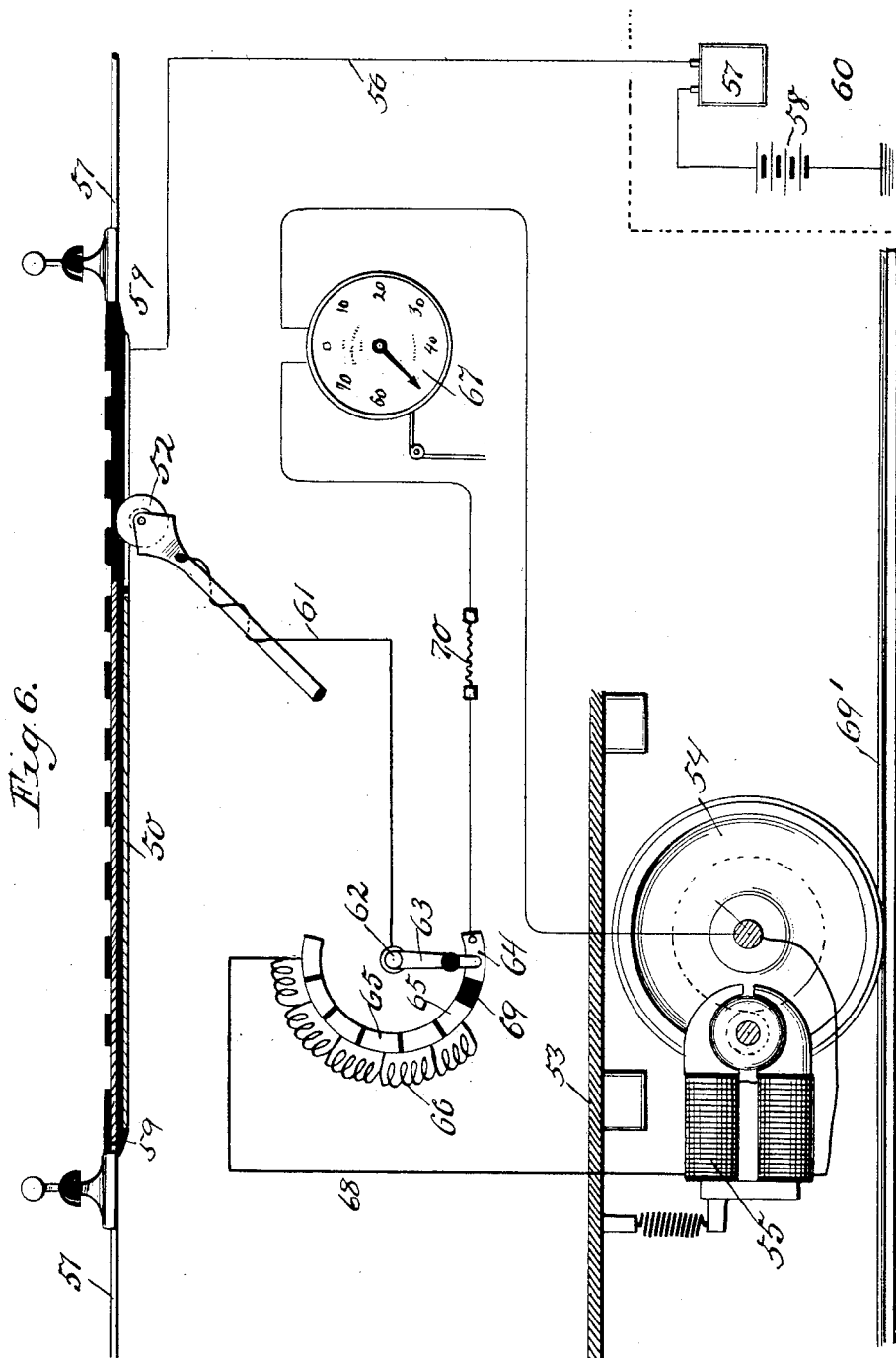
Barton S. Molyneux

By Paul M. M. Attys.

B. S. MOLYNEUX.
ELECTRIC FARE RECORDING SYSTEM.

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Witnesses
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UNITED STATES PATENT OFFICE.

BARTON S. MOLYNEUX, OF MINNEAPOLIS, MINNESOTA.

ELECTRIC FARE-RECORDING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 464,513, dated December 8, 1891.

Application filed February 28, 1891. Serial No. 383,304. (No model.)

To all whom it may concern:

Be it known that I, BARTON S. MOLYNEUX, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Electric Fare-Recording Systems, of which the following is a full, clear, and exact specification.

In general my invention relates to means for transmitting a signal indicative of the position of a hand or pointer with respect to its dial or tablet.

My invention relates especially to means whereby a record of the number of fares indicated upon the fare-register in each car of a street-railway system is transmitted to the central office at a predetermined time during the travel or run of such car—namely, at the moment when the car reaches a given point or points in the road.

The object of my invention is to provide means for automatically reading a dial or indicator-tablet provided at a distance whereby the position of the pointer with respect to the characters on the face of its dial is accurately disclosed to a person occupying a position removed from the particular clock or register.

To this end my invention consists in the system and apparatus hereinafter described, and particularly pointed out in the claims.

My invention will be more readily understood by reference to the following drawings, in which—

Figure 1 is a transverse view of an electric signal-transmitting device embodying my invention as seen from the line *xx* in Fig. 2. Fig. 2 is a side view of the same attached to the back of an ordinary mechanical fare-register, the view being taken from the line *yy* in Fig. 1. Fig. 4 is a partial cross-section on the line *zz* of Fig. 2, the same being slightly enlarged. Fig. 4 is a detail view showing the speed-governor employed in connection with the contact arm or lever. Fig. 5 is a detail drawing of the contact-lever and contact-plate. Fig. 6 is a diagrammatic representation of my electric fare-recording system.

I will first describe that part of my invention embodied in the transmitting-instrument shown in Figs. 1 to 5 of the drawings, where the same is illustrated as employed in connection with an ordinary mechanical fare-

register of the class usually observed in street-cars and adapted to be operated by a bell or pull cord provided within reach of the conductor.

The main shaft 2 of my device is in reality the shaft upon which the pointer or hand 3 on the face of the dial is secured, the shaft being prolonged and journaled in the rear wall 4 of my device, instead of, as usual, in the back 5 of the mechanical recorder. Upon this shaft is secured the contact plate or disk 6, preferably insulated therefrom by the bushing 7 and adapted to revolve therewith as the pointer is advanced on the dial. On the inner surface of the wall 8 of the instrument I secure the car-number contact-plate 9, insulating the one from the other. This contact-plate is arranged in the same plane with the contact-disk 6, and is electrically connected therewith by the bridge brush or block 10. The contact-lever 11 normally stands over this "special" plate and is provided with the spring-lever 12, formed in the same piece therewith, the two being pivoted by the pin 13 to the pivot-lock 14, secured on the wall 8 and insulated therefrom, as shown. A coiled spring 16 extends between the lever 12 and the insulated block 15, provided on the wall 8. The tendency of the spring 16 is to draw down the lever 12 and thereby pull the lever 11 down across the faces of the contact-plate 9 and plate 6 and into the position shown by the dotted lines in Fig. 3. Such action is normally opposed by the catch 17, provided in connection with the armature 18 of the electro-magnet 19. The catch-bar 20, the end of which forms the catch 17, is pivoted on a suitable support 21 and is normally held out by the force of the spring 22, provided about the spindle 23. This spindle has a threaded end provided with the head or burr 24, by means of which the downward movement of the lever 20 is limited and the armature adjusted with respect to the ends of the magnet-cores. A bracket 25 is provided to support the electro-magnetic device. It will be seen that a number of holes or indentations or recesses 26 and 27 are provided in the face of the contact-plate 9 and the disk 6, respectively, and, further, that the same are arranged in the arc of a circle equal to that described by the end of the lever 11 in its downward

movement. A small contact pin or point 28 is provided in the end of the contact-lever, as shown most clearly in Fig. 5. This pin extends through the glass, rubber, or other insulating-plate 29, adapted to bear or ride upon the surfaces of the contact-plate and the contact-disk. Each of the series of recesses or perforations in the contact-disk 6 represents a number or character on the face or dial of the fare-register. The disk 6, moving with the pointer 3 as the same progresses from one number to another, carries a corresponding row of perforations 27 into line with those upon the contact-plate 9 and into the path of the contact-pin 28 on the lever 11. Now it will be seen that when current is passed through the coils of the electro-magnet 19 the catch 17 will be drawn out of engagement with the end of the lever or arm 12, and the lever 11, carrying the contact-pin 28, moved across the perforations or holes in the plate 9 and that particular set of perforations happening to stand in line therewith, thereby making contact with the metal bridges 30, between the several perforations, which perforations and bridges being provided in predetermined positions a certain number of impulses are sent over the electric circuit of the instrument to actuate a suitable signaling or registering device included therein in said circuit. In order to prevent the levers 11 and 12 from moving too rapidly and thereby transmitting a confused signal, I provide a governing device adapted to limit the speed thereof. This governing device preferably consists in the fan or plate 31, secured on the hub or sleeve 32, provided loosely on the shaft 2. This hub is preferably insulated from the shaft in order to prevent the communication of electricity to the walls of the fare-register and a consequent shock to a person touching the same during the passage of the current through the device. The end of the lever 12 is connected with the hub 32 by the flexible cord 33, wound several times about the same. Now when the end of the lever is released from the catch 17 and is drawn down forcibly by the spring 16 force is exerted to unwind the cord 33 from the hub 32, thereby revolving the same on the shaft 2. This revolution is resisted by the counter-pressure of the wings of the fan 31 against the air, thereby preventing the sudden jerking down of the lever 12 and controlling the same, so that the speed thereof is comparatively slow and insuring a sufficient length of contact with the contact-bridges 30 of the plate and disk. The levers 11 and 12 are restored to their original positions after being released by means of the bell-crank having the lug or projection 35 adapted to engage the under-side of the lever 12. This lever may also be pivoted on the pin 13 and be adapted to be operated by means of the cord 36, passing through the opening 37 into the mechanical fare-register and connected with some moving part thereof or directly with the pull-cord, by means of which the

same is actuated. This bell-crank is arranged to operate each time a fare is rung up or indicated on the recorder and only engages with the lever 12 the first time the cord is pulled after the release of the said lever by the operation of the electro-magnetic catch or lock. A spring 37' is preferably provided to return the bell-crank 34 to the position shown in Fig. 1 after being pulled up into the Fig. 3 position.

To prevent disarrangement of the cord 33 on the hub when the levers are thrown back and when the said cord would otherwise be left loose between the hub and the end of the lever, I provide the light clock-spring 38 in connection with the hub and having its end permanently secured to the rear wall 4, whereby when the tension of the spring 16 is relieved the hub is quickly turned back to wind up the cord. Further, to prevent tangling of the cord on account of slow action of the clock-spring I provide the flat spring or strap 40 on the lower side of the lever 12 and adapted to bend down into the position shown in the dotted lines of Fig. 3 and keep the cord 33 taut. With this arrangement the small opening 41 is provided with a lever, through which the cord may pass, the end thereof being secured to the end of the flat spring 40. The clock-spring 38 is stronger than this spring 40, and hence gradually draws the same up against the arm 12, after which the instrument is again in readiness for operation. The circuit of the instrument may be traced through the wire 41 to the electro-magnet, thence by the strand 42 to the pivot-block 14, and from there out by way of the leg 44 or that numbered 45, both connecting with the main branch 46.

I have described my instrument as a circuit-closing signal-transmitter. It is obvious, however, that the reverse arrangement may be made so that the signals are transmitted by the breaking of the circuit or that the point 28 may normally rest in contact with the plate 9, so that the circuit will be completed directly from the leg 45 through the plate to the lever 11, thence by the way of the strand 42 to the electro-magnet, thereby doing away with the necessity of using strand 44. Thus the first impulse of current passing through the instrument releases the contact-lever, after which the circuit is made and broken by the passage of the contact-point over the perforations and bridges.

In Fig. 6 I have shown in diagram the full electric system. Each street-car carries the means for completing the circuit with the central station. In overhead electric conductor systems I provide at one or more points along the line—as, for instance, at each terminus—a secondary conductor 50, hung or attached from or in proximity to the main overhead conductor 51 and in position to be engaged by the trolley 52, extending from the top of the street-car, the floor 52 and one truck-wheel 54 of which are shown in connection

tion with the electric motor 55. This secondary trolley-wire 50 is entirely insulated from the main wire 51 and is connected by a wire 56 with the signal recording or registering instrument 57 and battery 58, provided at the office or central station of the street-railway. Insulation 59 is preferably provided for quite a distance between the main conductor and the ends of the secondary wire 50 to prevent the trolley 52 from bridging over between the two and heavily charging the circuit of the recording-instruments with current from the conductor 51. The trolley is shown in contact with the strip or wire 50. Now, tracing circuit from ground from station 60 current passes from the battery 58 through the instrument 57, the line 56, the strip 50, the trolley 52, and wire 61 to the pivotal post 62 of the lever 63, adapted to make contact with the plate 64 or with the plate 65 of the resistance device 66. From the plate 64 the circuit may be traced through the fare-recorder 67 to the axle of the car-truck and from thence to the rail 69 and ground. The circuit is thus completed through the electro-magnet of the fare-recorder to release the contact-lever and send a signal over the line to the instrument 57, adapted to make a record of the same.

Except when the car is passing beneath the strip 50 the contact-lever 63 would be pushed around to make contact with the resistance-box plates 65, and the trolley making contact with the main conductor current would pass from the wire 61 and lever 63 through whatever resistance happened to be in the line, if any, and by way of the branch 68 to the various windings of the electric motor 55, and thence to the car-axle, the rail, and to the ground.

It is obvious that the connections might be made in metallic circuit instead of grounded circuit.

Ordinarily the contact-lever 63 would only be thrown onto the insulated segment 69 to cut out all current from the motor. When, however, the car arrives under the strip 50, so that the trolley makes contact therewith, the driver throws the lever 63 onto the segment 64, thereby completing the circuit of the transmitting-instrument in the car. Just before the trolley leaves the strip 50 the driver moves the lever back upon the insulating-segment 69 or onto the first of the contact-segments 65.

In order to prevent damage to the transmitting apparatus, I provide the fusible plug 70 in the line between the segments 64 and the fare-register.

Where one or more trail-cars are coupled with the main motor-car, I provide similar transmitting-instruments in each car and connect them all in series, so that the signals are sent in from the different cars one after another. A simple means of making this connection consists in the contact-spring 71, provided on the lever 12 and adapted to make

contact with the post or point 72 when the lever is pulled down by the spring 15 from the post 72. A line 73 extends through a suitable electric coupling provided between the cars to the fare-register on the second car and thence to the ground. Thus as the signal has been sent in from the first transmitter provided in the register 67 the circuit is completed through the second instrument 74 in the trailer-car.

It is obvious that, instead of employing the Morse code indicated by the opening in the disk 6, I may employ sets of equidistant round holes, each set being separated by a considerable space, whereby a signal similar to that from the ordinary fire-alarm box is transmitted when the contact-lever 11 passes across the plate 9 and disk 6.

In the operation of the device in street-railway systems a recorder or register adapted to make a permanent printed record is provided at the central station or office. Each car is provided with a different plate 9 in the back of its fare-register, said plate being perforated to correspond with the number of the car or conductor. The disks 6 are obviously all the same. As the cars reach the end of the line, it will be seen that a signal is sent to the central office to indicate both the number of the car and the number of fares collected thereon during the trip or run. By noting the time at which the signals are received at the office an accurate record may be made to indicate whether or not the several cars arrive on time.

My invention is also applicable for use in connection with clock synchronizing systems or other time-records and signals, and, further, that the apparatus may be used with equal effectiveness upon all railway systems, whether the electric-supply conductors are arranged above or below the ground or in connection with special conductors and means for completing the central-office circuit, which means may consist in automatic devices or in simple flexible connectors adapted for use by the street-car driver or conductor at the time of the arrival of the car at any particular point on the road.

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

1. The combination, in an electric fare-recording system, of an electric circuit with a suitable recorder or register and a source of electricity included in said circuit, electric fare-registers carried by the several cars of the street-railway system, and means for connecting the same in said circuit at a predetermined point or points along the railway, substantially as described.

2. The combination, in a system of the class described, of a dial or tablet and an indicator-hand therefor with a disk or plate adapted to be operated by the movement of the one or the other, said plate provided with contacts corresponding to the characters on

the face of the dial or tablet, a contact-lever or arm adapted to engage said contacts, an electro-magnetic device provided in connection with said lever, an electric circuit including the same, a signal recording or receiving instrument, and a suitable source of electricity included in said circuit, substantially as described.

3. The combination, in a fare-recording system, with a car provided with a fare-register, of a fare-recorder located at a central station and an automatic transmitter controlled by said register and between said register and said recorder, whereby as the car passes a predetermined point a signal is transmitted to said recorder, substantially as described.

4. The combination, in a recording system, with a car provided with a suitable register, of a recorder located at a central station, and an automatic transmitter controlled by said register and between said register and said recorder, whereby the reading of the register is automatically transmitted to said recorder, substantially as described.

5. The combination, in a transmitting device provided in connection with a street-car fare-register and adapted to transmit signals corresponding to the figures on the dial thereof, of the shaft 2, with the contact-disk, the contact-lever, the electro-magnetic releasing device provided in connection with said lever, and means whereby said lever is drawn into contact with said disk upon being released, substantially as described.

6. The combination, with the shaft 2, adapted to move with the fare-register pointer 3, of a disk 6, provided with the series of contacts corresponding to the numbers upon the face of said register, the special number-plate 9, provided with a series of contacts indicating the number of the car, the levers 11 and 12, the electro-magnetic device adapted to engage the latter, means for drawing down said levers when released from engagement with said device, means for returning said lever after being released, and an electric circuit including said parts, as described.

7. The combination, in a transmitting device adapted for use in connection with a fare-register, of the common shaft 2, with the perforated disk 6, the perforated plate 9, the levers 11 and 12, the electro-magnetic device adapted to engage the lever 12, the spring 16, and means for returning said levers and for governing the movement thereof, substantially as described.

8. The combination, in a transmitting device of the class described, of the central pointer-shaft, with the perforated disk having contacts corresponding to the characters on the dial of the instrument to which the transmitting device is attached, said disk adapted to revolve with said shaft, a special number-plate 9, the levers 11 and 12, means for retaining the same in their upper positions, the same adapted to be operated to re-

lease said lever, means for drawing the lever down when released, means for returning the said lever, the loose shaft or hub provided concentrically with the said central shaft, the fan or wings 31, provided on each side hub, and a flexible cord attached to the end of the lever 12 and normally wound upon said shaft or hub, substantially as described.

9. The combination of the levers 11 and 12, pivoted on the block 14 with the contact plate or disk, the shaft 2, the hub 32, the cord 33, secured thereon and to the lever 12, the fan 31, and the returning-spring 38, substantially as described.

10. The combination of the levers 11 and 12, pivoted on the block 14 with the contact plate and disk, the shaft 2, the hub 32, the cord 33, secured thereon and to the lever 12, the fan 31, the returning-spring 38, the spring 16, means for returning said levers 11 and 12, and the flat spring 40, engaging the end of said cord, substantially as described.

11. The combination, with the shaft 2, of the perforated plate 9, the levers 11 and 12, the electro-magnetic locking device, means for drawing down said levers when released, contact-spring 71, and the contact-post 72, whereby after the lever 11 has traveled through its arc a contact is made with a connection extending to a second transmitting device, substantially as described.

12. The combination, with the overhead conductor, of the secondary strip insulated therefrom, the trolley 52, the street-car, the fare-register thereon, the electric transmitting device provided therewith, the electric motor provided on the car-truck, the contact-plates 64 and 65, the insulated segment 69, the lever 63, the connection 61 between the lever and said trolley, said transmitting device being included in a line of the circuit, extending from said plate 64 to ground, and a line extending from the strip or wire 50 through a suitable electric register located at a central station, substantially as described.

13. The combination, with the levers 11 and 12, of a pivotal block therefor, the spring 16, the electro-magnetic catch adapted to engage the same, and the bell-crank 34, provided with the leg 35, adapted to engage said levers, substantially as described.

14. The combination, in an electric fare-recording system adapted for use on an electric railway, of a main electric-supply conductor and the electric motor-car, with the contact device carried thereby and adapted to make contact with said conductor, a secondary contact-strip provided in the path of said device and with which the contact device is adapted to make contact, the secondary electric circuit connected with said strip or wire and including a suitable register or signal-receiving device, and an electric fare-register provided on said car and connected with said contact device, as and for the use specified.

15. The combination, in an electric fare-re-

5 cording device, with a car or cars, of the electric conductor 51, fare-registers, electric signal-transmitting devices provided in connection with the fare-registers thereon, the secondary contact strip or wire 50, provided in proximity to said conductor, but insulated therefrom, an electric circuit including the wire 50, the trolley and connections therefor, and the transmitting device, substantially as described.

10 16. The combination, with a registering device and an electric recording apparatus, of a series of electric contacts corresponding to the numbers of the register, a source of electrical supply, and means for electrically connecting said source of supply, said series of contacts, and said recorder, whereby the number indicated by said register is recorded by said re-

20 corder, substantially as and for the purpose set forth.

17. The combination, with an electric receiving or recording apparatus and a registering device, of contacts corresponding to the numbers of the register, and means for closing a circuit between one of the series of contacts corresponding to the number indicated on the register and the recording apparatus, whereby such number is automatically recorded, substantially as described.

In testimony whereof I have set my hand this 2d day of February, 1891.

BARTON S. MOLYNEUX.

Witnesses:

C. G. HAWLEY,
F. S. LYON.