980,526.

C. A. HUSE & S. M. BOWMAN.

ELECTRIC RAILWAY SYSTEM.

APPLICATION FILED FEB. 3, 1910.

Patented Jan. 3, 1911.

3 SHEETS—SHEET 1.

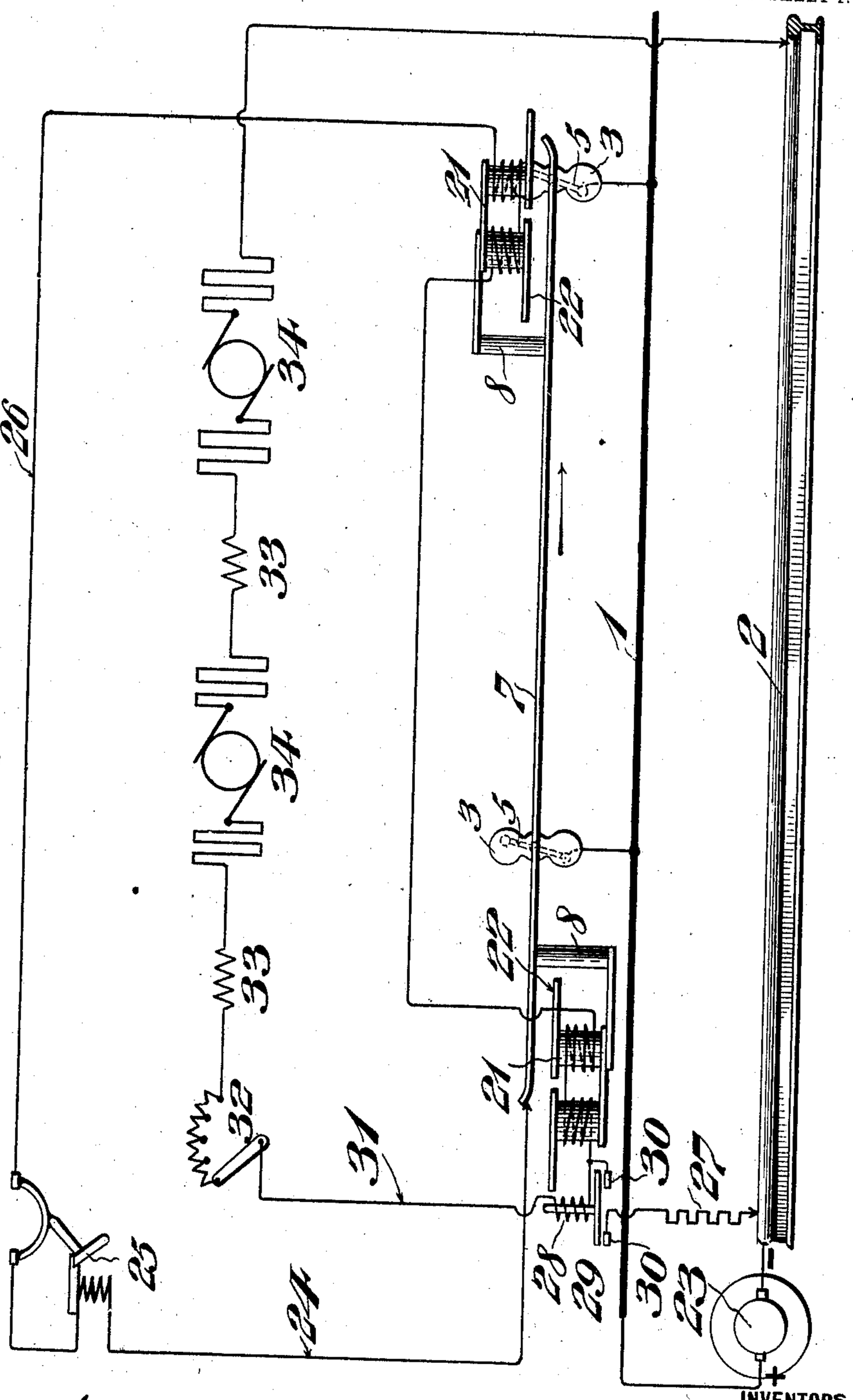

Fig. 1.

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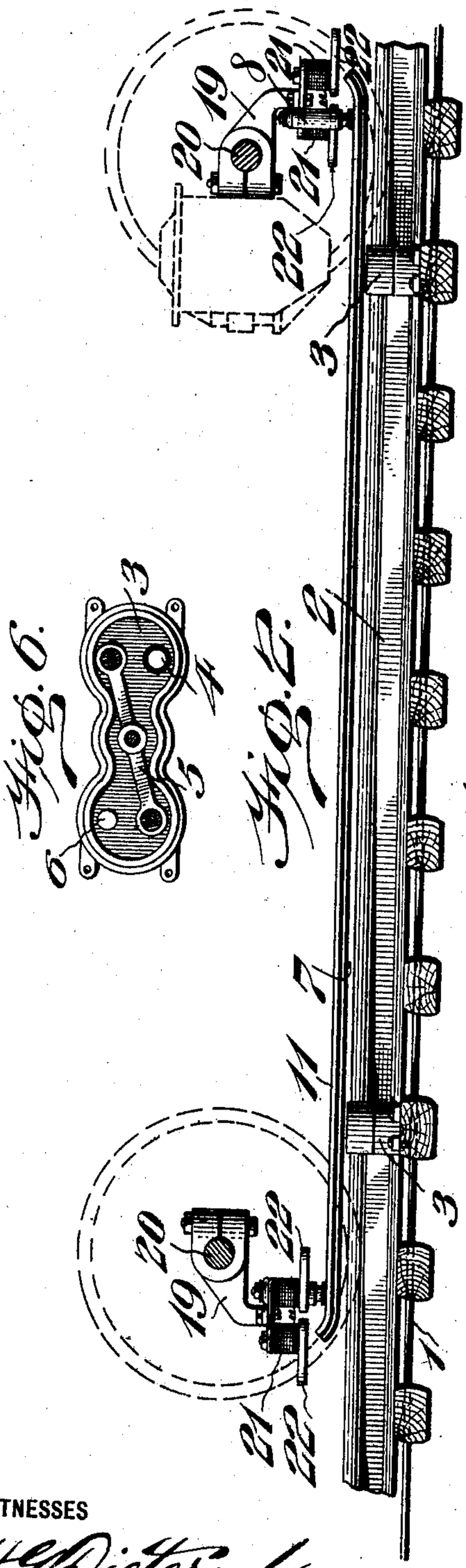

Fig. 2.

Fig. 3.

Fig. 6.

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3 SHEETS—SHEET 3

Fig. 4.

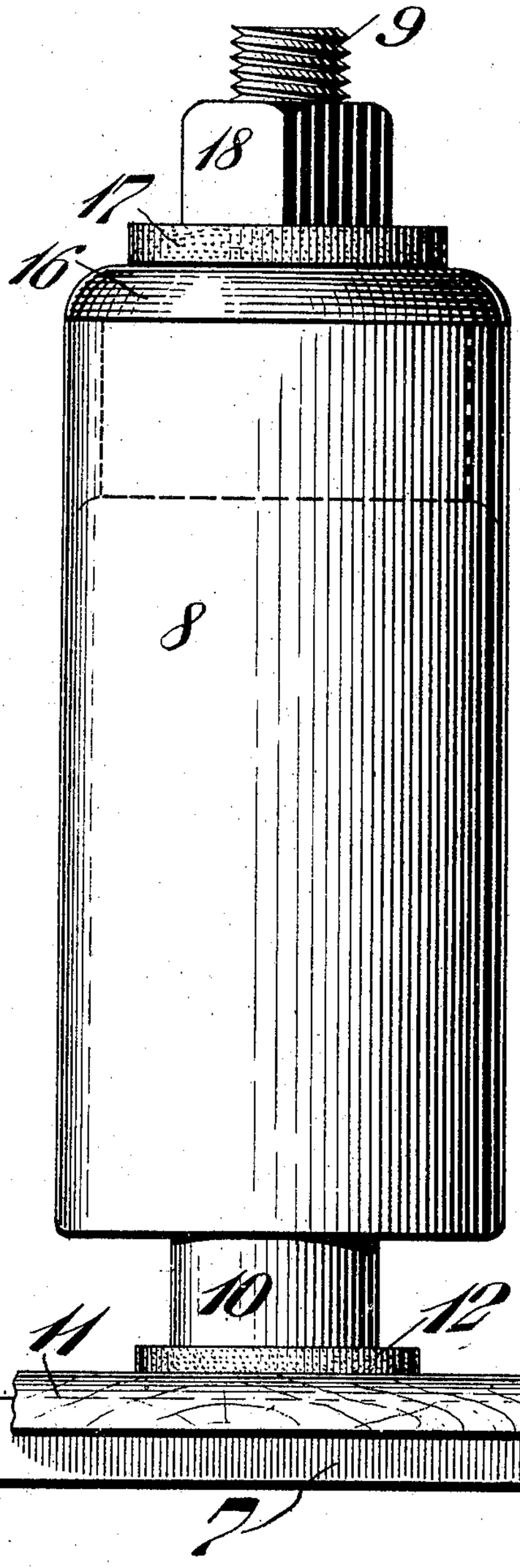
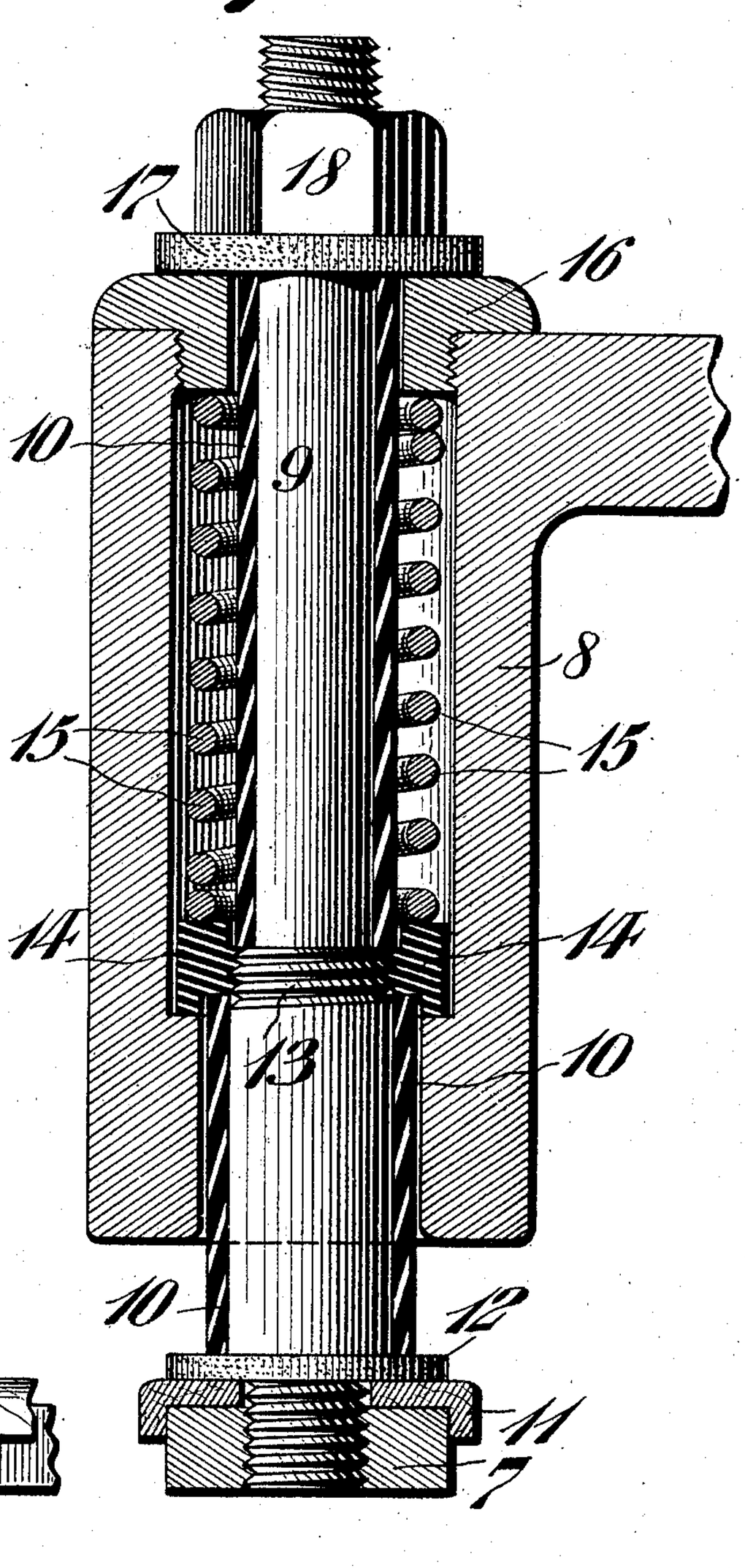


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRIC-RAILWAY SYSTEM.

980,526. Specification of Letters Patent. **Patented Jan. 3, 1911.**

Application filed February 3, 1910. Serial No. 541,768.

To all whom it may concern:

Be it known that we, CHARLES A. HUSE and SPENCER M. BOWMAN, both citizens of the United States, the former residing in the city of Williamsport, county of Lycoming, State of Pennsylvania, and the latter residing in the city and county of New York, State of New York, have invented a new and useful Electric-Railway System, of which the following is a specification.

This invention relates to electric railway systems and more particularly to that type wherein the motor receives its current from contact switch boxes spaced apart and positioned at regular intervals along the road bed, the same being connected to a main feed wire, but normally dead and only receiving current as the car passes thereover.

It is well known in surface systems using a third rail, that there is a constant source of danger from the electrified third rail and great caution must be taken to prevent passengers and the public generally from touching or coming in contact with the same.

It is an object of our invention to provide a system wherein the dangers of the third rail are eliminated and whereby the objectionable overhead trolley wires also become unnecessary.

In our present invention each car is provided with suitable devices, preferably magnets, which are energized either by an auxiliary current or by the main current and are so positioned as to pass in close proximity to the contact boxes along the roadbed, which latter as soon as brought into the magnetic field are operated to close the circuit including the main feed circuit, thus delivering, through the medium of shoes or like contacting devices, a current to the motors on the car.

It further consists of an arrangement of magnets so positioned that one of the magnets or one set of the magnets, as the case may be, operates to close the car circuit, while the other magnet or other set of magnets operates to break the circuit as the car is leaving the contact switch box.

It further consists of a circuit shunted from the magnetic circuit and adapted to carry a current of definite amperage, whereby the magnets are normally maintained in energized condition for starting purposes or the like, but which circuit is automatically broken as soon as the main circuit is closed through the car motors.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating our invention we have shown in the accompanying drawing one form thereof which is at present preferred by us, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which our invention consists can be variously arranged and organized and that our invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a diagram of the circuits and the adjuncts embodying our invention. Fig. 2 represents a side elevation of a portion of the car mechanism and track. Fig. 3 represents a plan of the same. Fig. 4 represents a side elevation of a supporting means for the collector or shoe. Fig. 5 represents a vertical section of the same. Fig. 6 represents a plan of a form of switch box with the top removed.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates a main feed wire suitably positioned along a road bed, of which the track rails 2 form a part and between which, in the present instance, are located contact switch boxes 3 spaced apart a predetermined distance and extending at regular intervals throughout the length of the said road bed. These switch boxes may be of any well known type wherein a pivoted or movable closure operates to make and break a circuit from the main feed wire, the said armature being controlled by suitable magnetic devices carried by the car itself.

In the present instance we provide a box to which the current from the main feed wire 1 is brought to a binding post 4 with which, in certain positions, the closure 5 is adapted to contact and convey the current to a second binding post 6. This latter is in electrical contact with the material of the box 3, whereby the box 3 becomes a live contact and delivers current to the car when a shoe, collector or the like comes in contact

therewith. As here shown, we provide a shoe or collector 7, preferably of such a length as to contact simultaneously with two of the boxes 3 and always be in contact with one of them, the same being supported at each end by means of a casing 8 forming a yielding support, whereby the shoe is normally held depressed in position to insure a proper contact with all of the boxes 3, while there is still a play permitted to allow for variation in height of the said boxes. These casings or holders in the present instance each consist of a tubular casing 8 having a stud bolt 9 slidingly mounted therein and preferably insulated therefrom by suitable insulation 10, as will be apparent. Each bolt 9 is secured to the collector 7, and suitable wood insulation 11 and fiber insulation 12 are mounted on top of the collector to further insulate the same against contact with the casing 8. As here shown, each bolt 9 is provided with a threaded portion 13 carrying thereon a bushing 14 preferably of insulating material, with which a spring 15 co-acts to maintain the collector normally in a depressed position. The opposite end of the spring 15 engages a suitable bushing 16, screw threaded into the casing 8 and from which the bolt 9 is insulated by means of the insulation 10 and a fiber ring 17 located between the bushing 16 and the nut 18, as will be seen. By this arrangement it will be apparent that should the collector contact with the box which is at a different height than any of the other boxes, a yielding movement is permitted.

The collector-supporting casings 8 are carried by a bracket 19 suitably mounted upon each car axle 20, which bracket 19 also supports a plurality of electromagnets 21, each of which has secured thereto preferably at the lower side, a bar of soft iron 22 or the like adapted to enlarge the magnetic field of the said magnets 21. As here shown these brackets 19 are preferably located upon opposite sides of the collector from each other, thereby bringing one magnet or one set of magnets in line with one side of the contact box 3 while the other magnet or other set of magnets is brought into alinement with the opposite side of the said boxes 3, this arrangement allowing the forward set of magnets to shift the switch contact to close the circuit while the other set of magnets reverses the movement of the switch and breaks the circuit. The magnets are preferably mounted so that the windings are parallel with the plane of the travel of the car in order to bring the magnetic field into a plane parallel with respect to the track rails. It is further preferable to wind the magnets with low resistance winding in order that the necessary current may be provided for the operation of the car.

Referring to the diagrammatic view shown in Fig. 1, 23 designates a suitable source of current supply, one terminal of which is connected as is customary, to the track rail 2 and the other terminal to the main feed wire 1. The current passes from the feed wire to the contact boxes 3, from which it is collected by the shoe 7 and passes through the wire 24 to a suitable hood switch or circuit breaker 25, thence by way of the wire 26 through the magnets 21 in series, after which it is divided, one branch passing through a suitable resistance 27 to the track rails 2 and the other to the motor circuit. The track branch is the shunt circuit referred to and is controlled by a suitable solenoid 28 having a bridge contact 29 adapted to engage contact points 30. The solenoid is also in series with the magnets 21 and the windings forming the coil are of sufficient cross-section to carry the current for the operation of the car. The solenoid 28 is adjusted for a predetermined strength of current and when this current is exceeded the contacts 29 and 30 are separated and the current passes through the main circuit comprising the wires 31, rheostat controller 32, resistances 33 and motors 34.

In operation of the system, the collector or shoe 7 is normally in contact with one of the boxes 3 and the current taken from the feed wire passes from the box to the collector and by way of the wires 24 and 26 through the magnets 21. As the core of the solenoid 28 is at this time in its lowermost position, due to the weight of the parts, the current passes through the bridging contact 29 and contacts 30 through the resistance 27 to the track 2. As soon, however, as the motorman operates the controller 32, a path of low resistance is opened to the flow of the current and the same passes through the motors, thereby propelling the car. The current flowing at this time through the motors, is of greater amperage than the circuit breaker or solenoid 28 is adjusted for, whereupon the armature core is drawn up, breaking the contact at the points 30, thereby throwing the shunt circuit entirely out of commission. As the car moves along the track the forward magnet or magnets 21 are brought over another switch box, whereupon the magnet field includes the closure 5 of that particular box and shifts the same to close the circuit between the binding posts and the body of the box so that as contact is made with the shoe 7 the current is delivered to the motor, as heretofore described. As soon as the car passes over the box last mentioned the other magnet or magnets 21 located at the rear of the car, bring a magnetic field directly over the opposite end of the switch armature and shift the same to break the circuit between the two binding posts thereof, thus leaving the box dead as far as any current is concerned.

It will now be apparent that we have devised a system which may be operated safely on all public thoroughfares and wherein there are no live wires, rails or boxes with which persons may come in contact and be injured or disabled by current therein. Furthermore, the system and its method of operation are exceedingly simple, inexpensive and may be readily installed.

It will now be apparent that we have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and which we have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, and means mounted on one side of said collector for successively closing a circuit through said switch boxes and means on the opposite side of said collector for successively breaking said circuit.

2. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector yieldingly mounted on a car for engagement with said boxes, a motor circuit, and means mounted on one side of said collector for successively closing a circuit through said switch boxes and means on the opposite side of said collector for successively breaking said circuit.

3. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, and a magnet mounted on each side of said collector, one of said magnets serving to successively close a circuit through said switch boxes and the other serving to successively break said circuit.

4. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, and a plurality of magnets mounted on each side of said collector, the magnets on one side of said collector serving to successively close a circuit through said switch boxes and the magnets on the opposite side of said collector serving to successively break said circuit.

5. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car and of a length to contact simultaneously with two of said boxes, a motor circuit, and a magnet mounted on each side of said collector, one of said magnets serving to successively close the circuit through said switch boxes and the other serving to successively break said circuit.

6. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car and of a length to contact simultaneously with two of said boxes, a motor circuit, and a plurality of magnets mounted on each side of said collector, the magnets on one side of said collector serving to close the circuit through said switch boxes and the magnets on the opposite side of said collector serving to break said circuit.

7. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car and mounted for engagement with substantially the center of each switch box, a motor circuit, a magnet mounted on one side of said collector to produce a magnetic field through one side of said switch boxes, and a magnet mounted on the opposite side of said collector to produce a magnetic field through the opposite side of said switch boxes.

8. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, a magnet mounted on each side of said collector, one of said magnets serving to successively close the circuit through said switch boxes and the other serving to successively break said circuit, and a circuit forming a shunt to said motor circuit.

9. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, a magnet mounted on each side of said collector, one of said magnets serving to successively close the circuit through said switch boxes and the other serving to successively break said circuit, a circuit forming a shunt to said motor circuit, and means to control said shunt circuit.

10. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit,

a magnet mounted on each side of said collector, one of said magnets serving to successively close the circuit through said switch boxes and the other serving to successively break said circuit, a circuit forming a shunt to said motor circuit, and a circuit breaker controlling said shunt circuit.

11. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, a plurality of magnets mounted on each side of said collector, the magnets on one side of said collector serving to successively close the circuit through said switch boxes and the magnets on the opposite side of said collector serving to break said circuit, a circuit forming a shunt to said motor circuit, and means to control said shunt circuit.

12. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, a plurality of magnets mounted on each side of said collector, the magnets on one side of said collector serving to successively close the circuit through said switch boxes and the magnets on the opposite side of said collector serving to break said circuit, a circuit forming a shunt to said motor circuit, and a circuit breaker controlling said shunt circuit.

13. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, and a plurality of magnets mounted on either side of said collector forming a magnetic field parallel with the plane of movement of the car.

14. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, and a plurality of magnets mounted in staggered relation, and forming magnetic fields parallel with the plane of movement of the car.

15. In a system of the class stated, a track, a main feed wire adjacent thereto, switch boxes along said track connected to said main feed wire, a collector carried by a car for engagement with said boxes, a motor circuit, a magnet mounted on each side of said collector, one of said magnets serving to successively close a circuit through said switch boxes and the other serving to successively break said circuit, a circuit forming a shunt to said motor circuit, and a circuit breaker in series with said magnets for controlling said shunt circuit.

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