(No Model.) 2 Sheets—Sheet 1.

N. J. HALPINE.

ELECTRIC RAILWAY SYSTEM.

No. 560,988. Patented May 26, 1896.

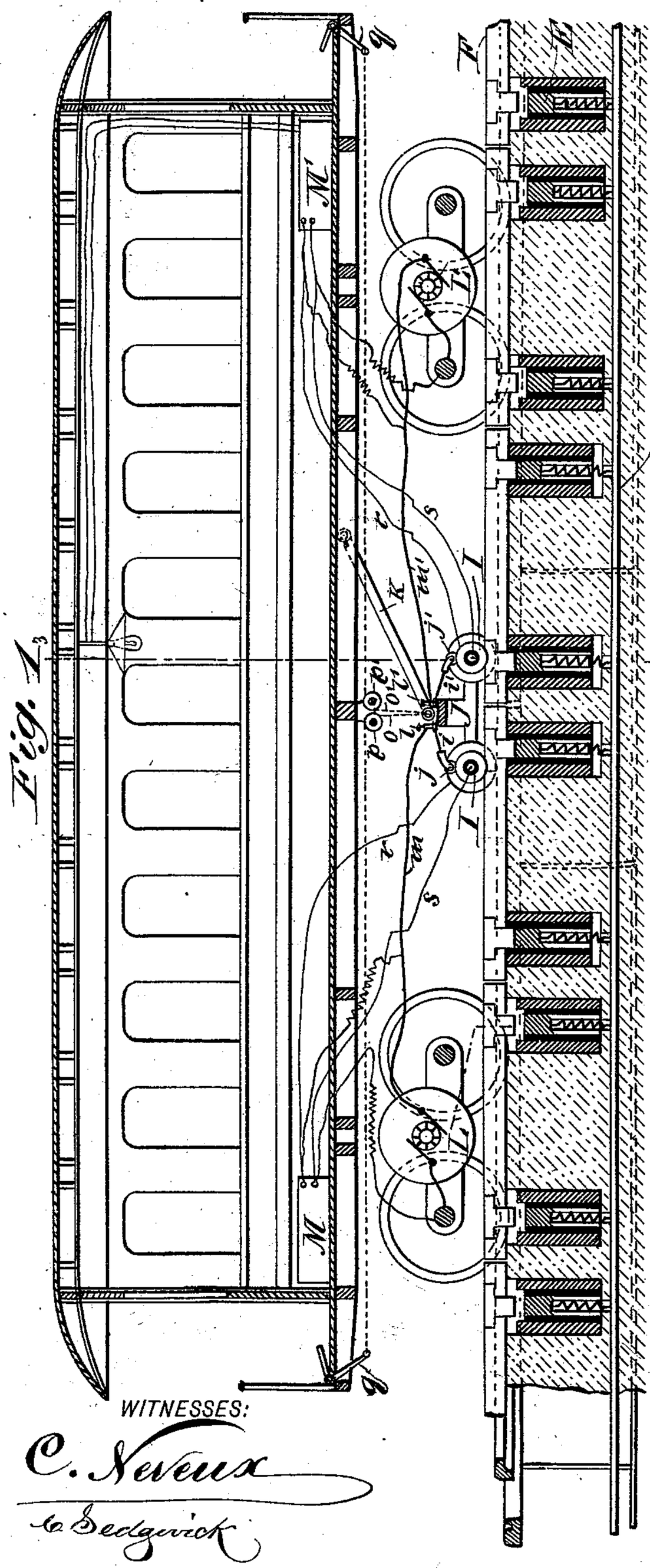

Fig. 1.

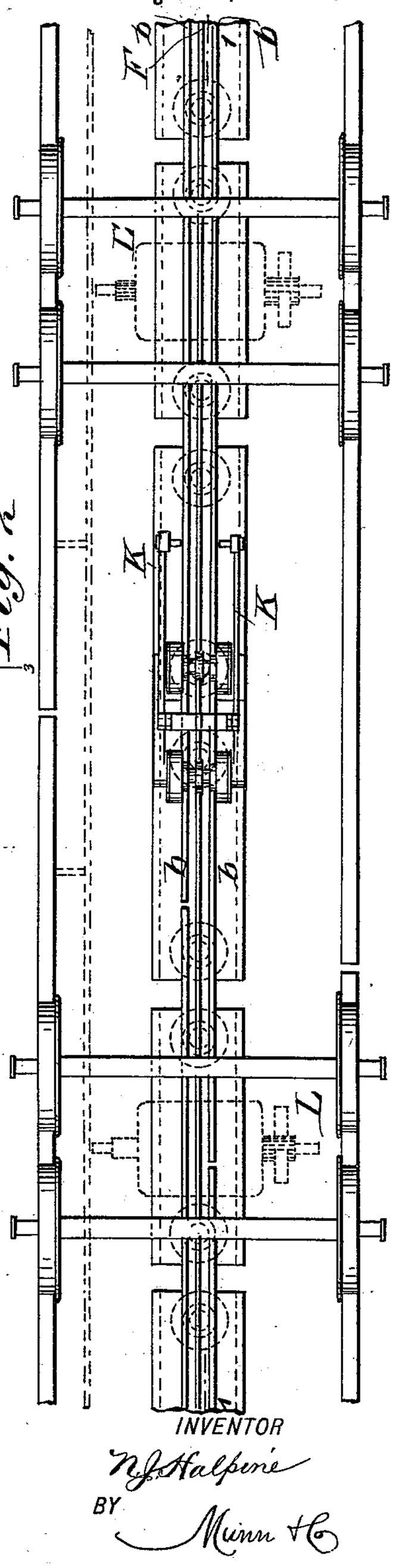

Fig. 2.

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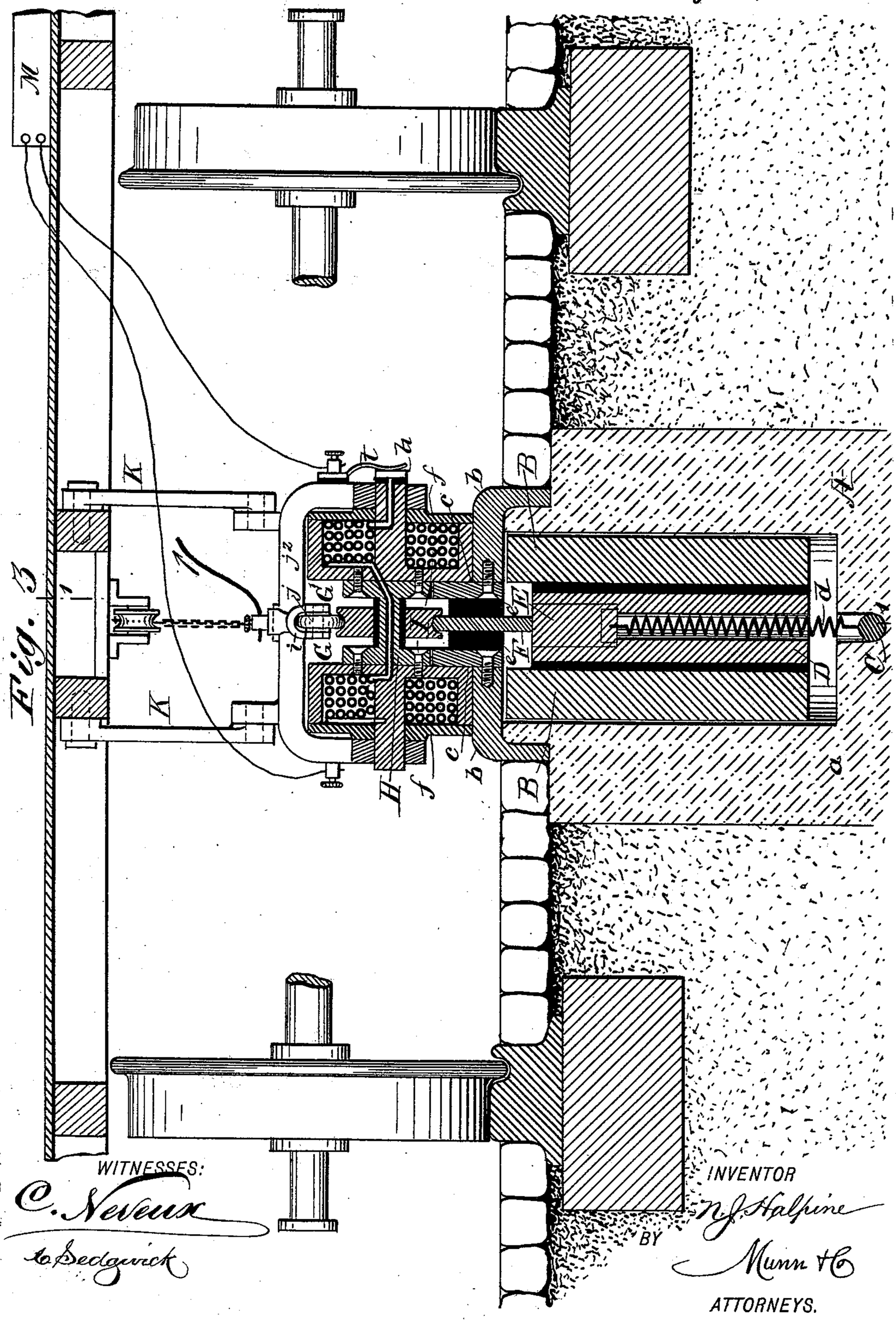

WITNESSES:

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UNITED STATES PATENT OFFICE.

NICHOLAS J. HALPINE, OF THE UNITED STATES NAVY.

ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 560,988, dated May 26, 1896.

Application filed February 1, 1893. Serial No. 460,606. (No model.)

To all whom it may concern:

Be it known that I, NICHOLAS J. HALPINE, a lieutenant in the United States Navy, have invented a new and Improved Electric-Railway System, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side sectional elevation of a railway car and conduit constructed according to my improved system, the section being taken on the lines 1 1 in Figs. 2 and 3. Fig. 2 is a plan view of the rails, conduit, and car-trucks; and Fig. 3 is a vertical transverse section of the conductors, track, and a portion of a car, taken on line 3 3 in Fig. 1.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to provide an electric system for street-railways in which the current will be taken from the main electric continuous conduit to the motor through a sectional conductor, the sections of which are shorter than the car, so that the conductor will be protected by the car while the car is receiving a current from the conductor, the whole being arranged so that the portion of the track not occupied by the cars is not charged with the current.

My invention consists in a conduit provided with a conductor furnished with electromagnetic circuit-closers arranged in such relation to the sections of the conductor that one or more of the sections may be put in connection with the main continuous conductor by the car as it passes over the track, the car being furnished with one or more motors which utilize the current and return it to the track, from which it is carried back to the generator.

The conduit A is preferably located between the track-rails and is formed of an outer casing *a*, of asphaltum or other suitable material, provided with sleeves B at or near the ends of the sections of the conducting-rail, the said sleeves being surmounted by trolley-rails *b*, which extend to the inner surfaces of the sleeves B, the said trolley-rails being supported by the asphalt. To the inner edges of the trolley-rails *b* are secured the plates *c*, which extend throughout the entire length of the trolley-rails.

In the bottom of the conduit A is placed the main conductor C, and within the iron sleeves B are secured the hollow cylinders D, each carrying in its upper end a contact-piece E, connected with the upper end of the spiral connecting-wire *d*, the lower end of the said wire being attached to the main conductor C. The outer hollow cylinder D is secured to the sleeve B with intervening insulation.

Between the trolley-rails *b* is placed the conducting-rail F, which is insulated from the plates *c* by strips *e* of insulating material inserted between the plates *c* and the conducting-rail F. On the trolley-rails *b* are placed the cylindrical magnets G G′, which are attached to the flanges *f* of the central portion of the shaft H, the central cores of the cylindrical magnets forming part of the shaft H. Each magnet consists of a cylindrical shell of iron, containing a coil surrounding the shaft H. One terminal of the coil-magnet G is connected with the shaft H, while the other terminal is carried through the central part of the shaft H and connects with one terminal of the wire of the magnet G′. The remaining terminal of the said wire extends out axially through the central portion of the core of the magnet and is provided with a contact-piece *h* at the outer end thereof, the said wire and contact-piece being insulated from the core of the magnet.

Upon the central part of the shaft H, but insulated therefrom, is placed a contact-wheel I, which rolls in contact with the conducting-rail F. Two pairs of cylindrical magnets, each carrying a contact-wheel I, are journaled in the truck-frame J, and the said truck is connected with the body of the car by means of links K. To the cross-bar j^2 of the truck J are attached spring-arms *i i′*, which carry the contact-rollers *j j′*, capable of resting on the contact-wheels I. The spring-arms *i i′* are connected with binding-posts *l l′*, which receive the wires *m m′*. From the cross-bar j^2 extend chains or cords *o o′* over pulleys *p p′*, and attached to the longer arm of levers *q*, pivoted to the car-platform. The shorter arm of the said levers extends above the platform, where it may be pressed by the foot of the driver whenever it is desirable to discontinue the current through the motor.

I preferably provide the car-trucks with motors L L′, the current passing through the wires *m m′* to the motors, and from the mo-

tors through the truck-wheels to the track, by which it is returned to the dynamo. The car carries a storage battery M, which utilizes part of the current flowing through the motor, a sufficient amount of resistance being inserted in the circuit of the battery to limit the amount of the charging-current, and the wires *r s* run from the storage battery to the trolley, the wire *r* being connected with the truck-frame J, while the wire *s* is connected with the spring *t*, carried by the truck, but insulated therefrom and bearing on the contact-piece *h*. In this manner the magnets are made to take a current from the storage battery M, thus keeping the magnets charged. Although one battery will answer every purpose in any case, I prefer to employ an auxiliary storage battery M′, to be used independently upon the second pair of magnets, or to be used in alternation with the battery M.

The operation of my improved electric-railway system is as follows: The main conductor C being charged and the storage battery M being charged, the cylindrical magnets G G′ are energized, and as they pass over the track-sections *b* they render them magnetic. When the sleeves B are attracted, causing them to rise and carry the contact-pieces E into contact with the conducting-rail F, the current flows through the section of the rail with which contact is made to the contact-wheels I and *j*, thence through the wire *m* to the motor L and to the track, as before described. A part of the current passes from the wire *m* to the storage battery M, and the circuit from the storage battery is completed through the truck, as in the case with the motor. As the car proceeds the contact-wheel I makes electrical contact in the manner just described with the sections of the conducting-rail F in succession.

With my improved construction no connection between the conducting-rails and the track-rails can be made except through the trolley carrying the electromagnets.

In addition to the use of the storage batteries for establishing electrical connection between the main conductor and track-sections I propose to use the storage batteries for illuminating the car, by this means providing a uniform current for lighting purposes.

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

1. In an electric-railway system, the combination of an electric car, a main conductor, a sectional conducting-rail, a series of contact-forming armatures electrically connected with the main conductor and adapted when operated to establish connection between the said main conductor and the sectional conducting-rail sectional trolley track-rails of magnetic material located at opposite sides of the sectional conducting-rail, an electromagnetic trolley for rendering said trolley-rails magnetic and thereby operating the contact-forming armatures, and means for completing the circuit between the sectional conducting-rail and the ground or return rails through the car-motor, substantially as specified.

2. In an electric-railway system, an electric conduit provided with a continuous conductor C, a series of insulated armatures E connected electrically with the main conductor, a sectional conducting-rail F, sectional trolley track-rails *b*, cylindrical electromagnets G, G′, arranged to roll upon the sectional trolley track-rails *b*, the contact-wheel I, carried by the shaft of the electromagnets, but insulated therefrom, the contact-wheel *j*, one or more electric motors L, and the storage battery M for charging the magnets G, G′, substantially as specified.

3. The combination, with the double electromagnetic trolley provided with cylindrical magnets and furnished with an electrical contact-wheel, of a cord or chain connected with the double trolley and with the angled foot-lever pivoted to the platform of the car, and connected with the trolley-operating cord or chain, substantially as specified.

4. In an electric-railway system, a conduit formed of the conduit A, the iron plates B, the main continuous conductor C, the insulated armatures E connected electrically with the main conductor, the sectional trolley track-rails *b*, and the sectional insulated conducting-rail F, substantially as specified.

5. The combination, with the main conductor and electromagnetic trolley, constructed as herein described of the storage battery receiving its charging-current from the main conductor and connected electrically with the lamps carried by the car and with the electromagnets of the trolley, substantially as specified.

NICHOLAS J. HALPINE.

Witnesses:
ADELAIDE M. HALPINE,
JOHN S. PAINE.