(No Model.) 3 Sheets—Sheet 1.

A. ROSENHOLZ.

CONDUIT ELECTRIC RAILWAY.

No. 533,610. Patented Feb. 5, 1895.

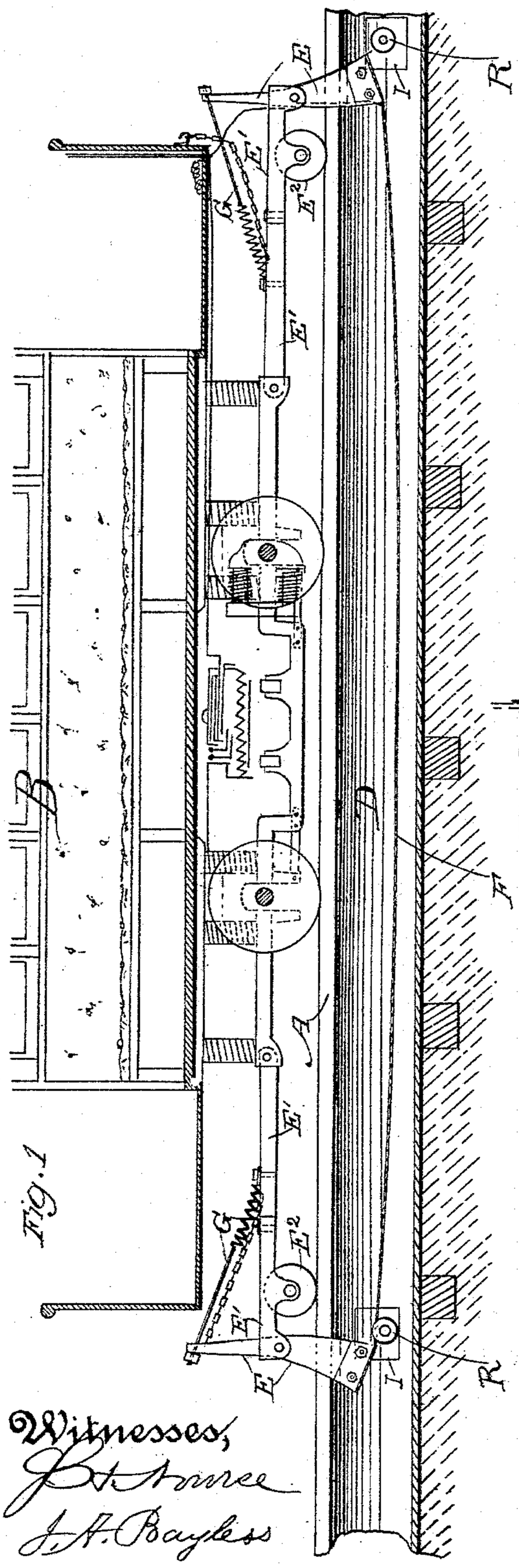

Fig. 1

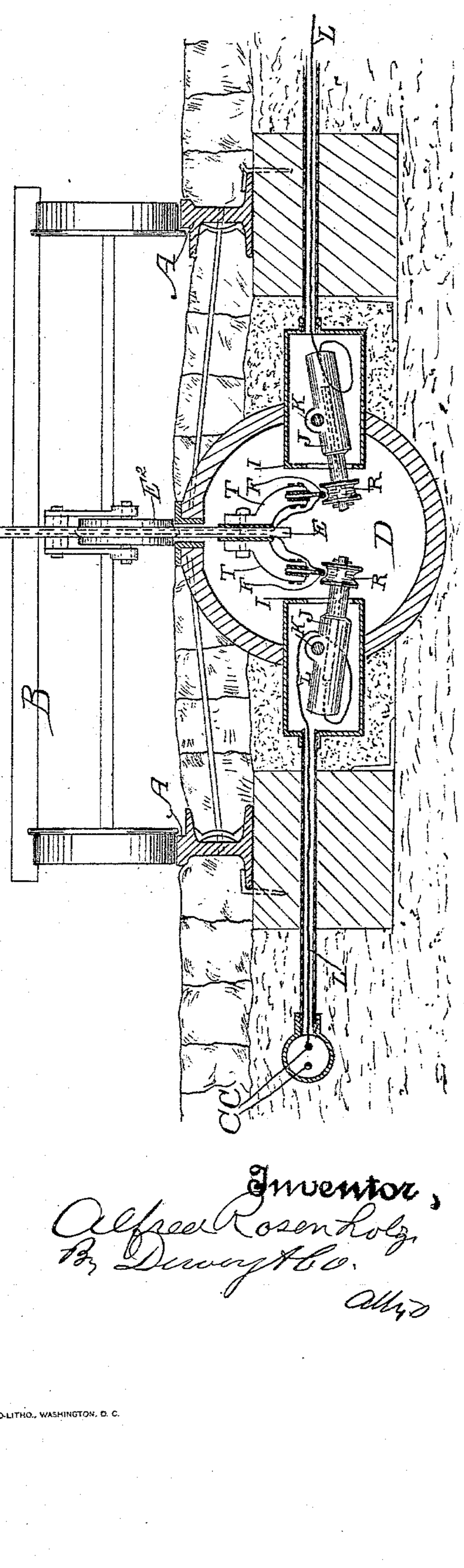

Fig. 2

Witnesses,
L. Stowe
J. A. Bayless

Inventor,
Alfred Rosenholz,
By Dewey & Co.
Attys

(No Model.)

3 Sheets—Sheet 2.

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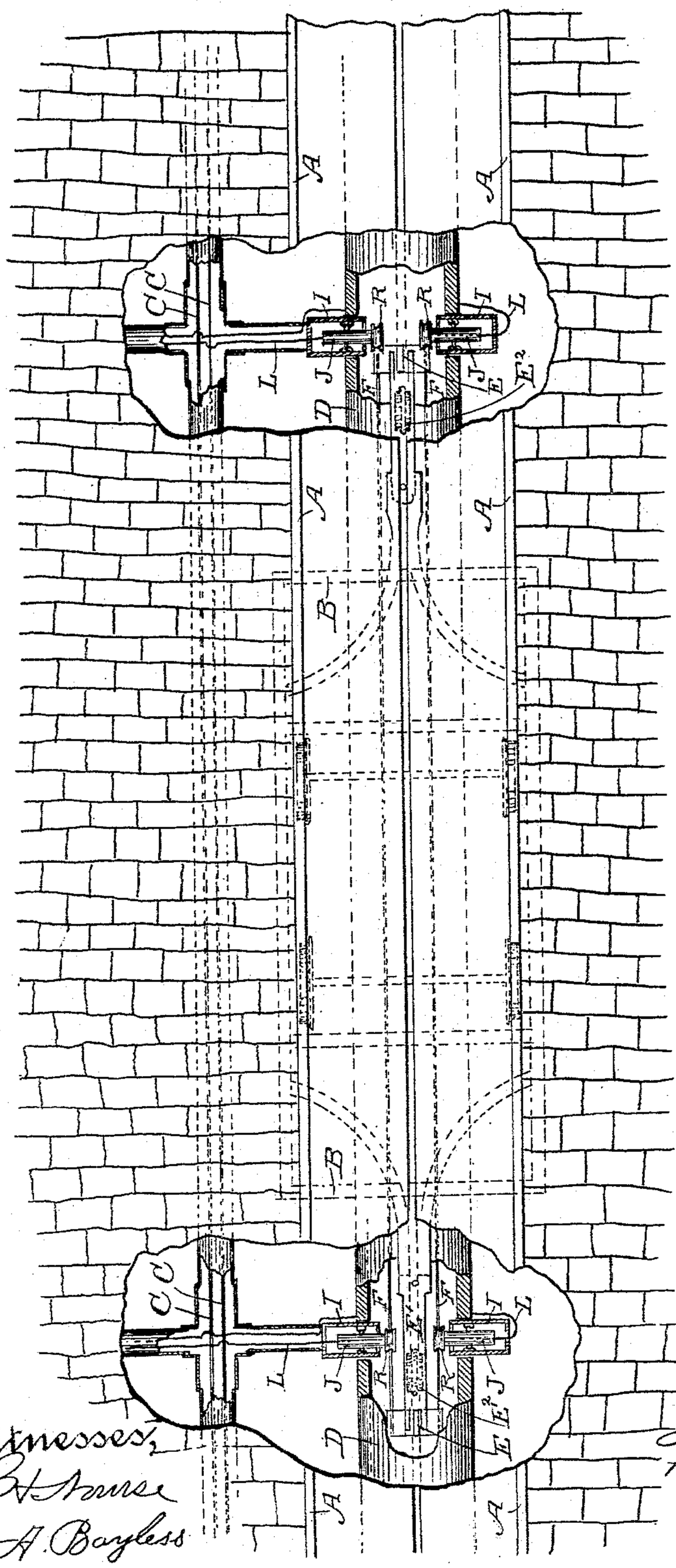

Fig. 3

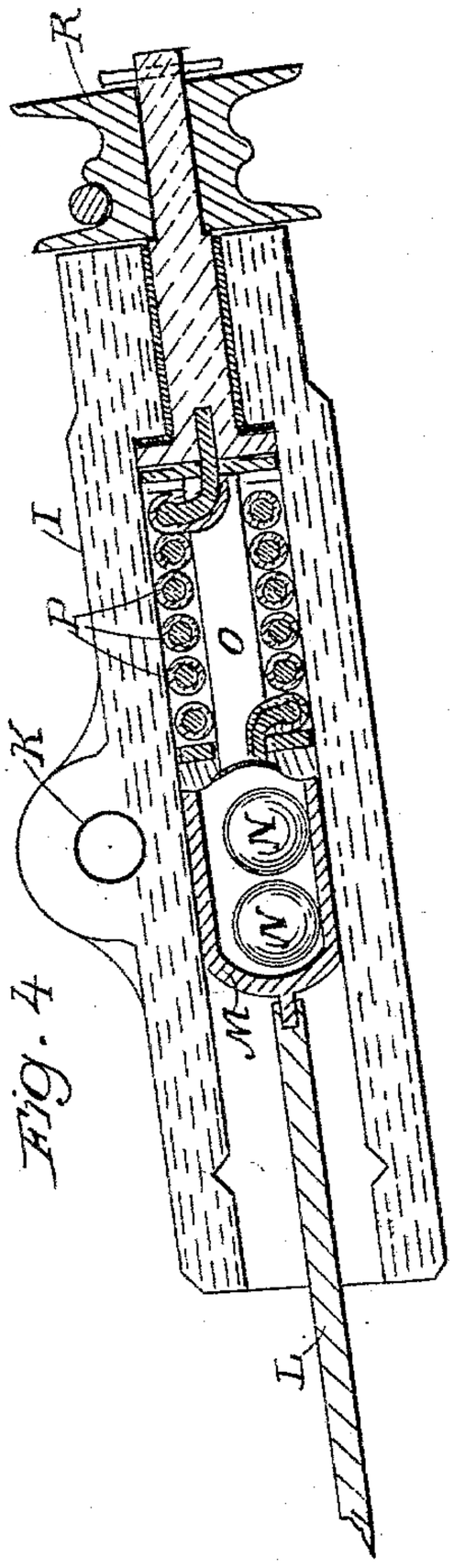

Fig. 4

Witnesses,
J. L. Snure
J. A. Bayless

Inventor,
Alfred Rosenholz.
By Dewey & Co.
Attys.

(No Model.) 3 Sheets—Sheet 3.

A. ROSENHOLZ.

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No. 533,610. Patented Feb. 5, 1895.

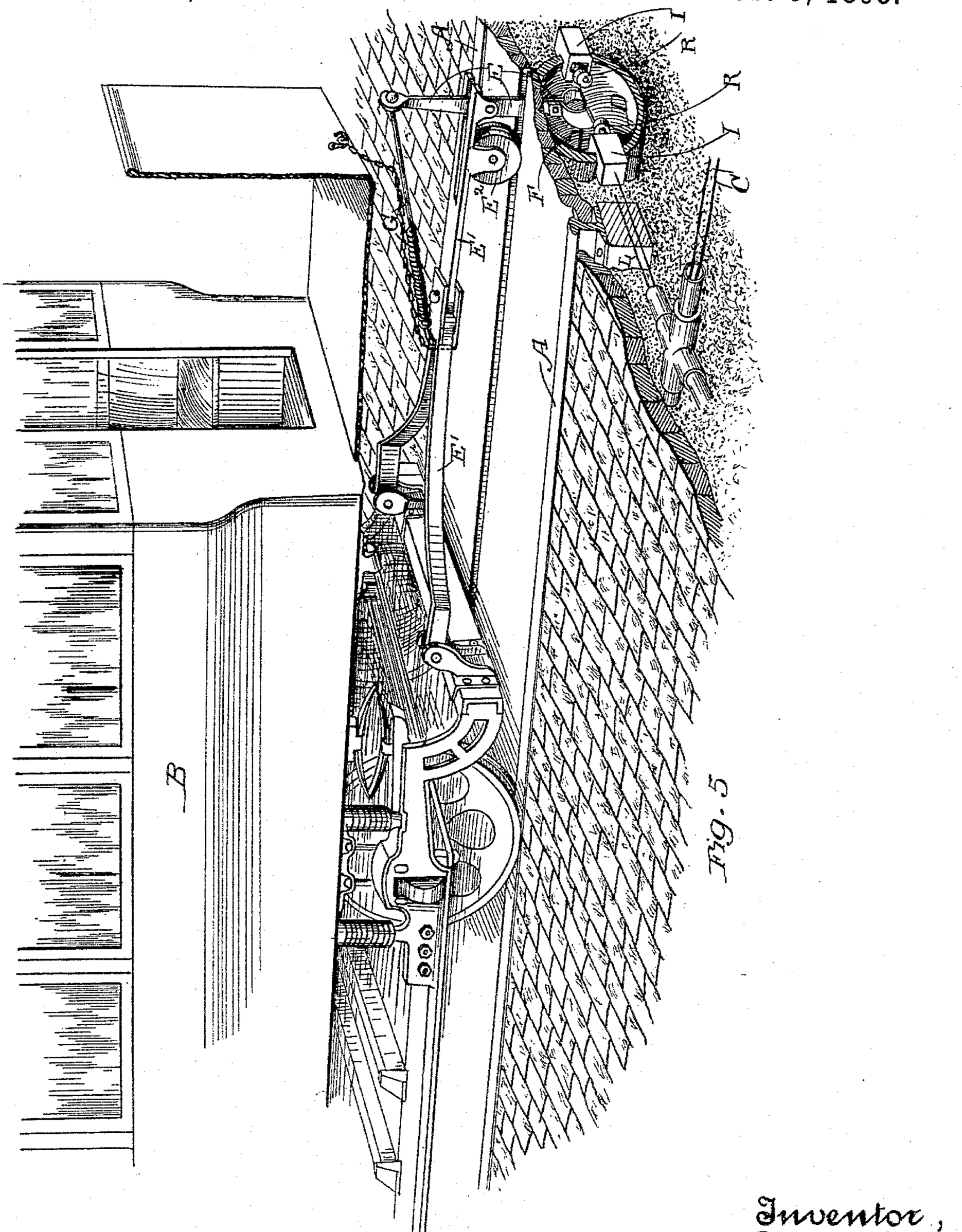

Fig. 5

Witnesses;
J. L. Stonee
J. A. Bayless

Inventor,
Alfred Rosenholz.
By Dumyat & Co.
Attys

UNITED STATES PATENT OFFICE.

ALFRED ROSENHOLZ, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO SAMUEL J. CLARKE AND HARVEY S. BROWN, OF SAME PLACE.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 533,610, dated February 5, 1895.

Application filed May 22, 1894. Serial No. 512,116. (No model.)

To all whom it may concern:

Be it known that I, ALFRED ROSENHOLZ, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Conduit Electric Railways; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in conduit electric railways, and it consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation showing a car and a section of a conduit. Fig. 2 is a transverse section of the conduit and connections. Fig. 3 is a plan section of the line. Fig. 4 is an enlarged view of one of the switches. Fig. 5 is a perspective view of part of a car and appurtenances, showing part of the under-ground devices.

The object of my invention is to provide a means for intermittently transmitting the current from the main line conductors, to the cars or motors as they pass along the track, and to thus successively supply motive power to the car from these connecting devices, the connection with each switch being cut off as soon as the car has passed.

A is a line of track upon which the car B is adapted to travel.

C C are the main conductors from the source of electric energy, these conductors being preferably properly inclosed and buried beneath the surface of the ground.

Where there are two lines of track, I have found it preferable to lay the conductors in a tube or other protective device between the lines of rails, so that the current may be taken to either line, as the cars pass. Between the rails of each track, I lay a conduit D of sufficient size to contain the mechanism which I employ for the purpose of making communication between the main conductor and the cars. This conduit is made with an open slot upon the upper side, and through this slot extend the arms E which are fulcrumed to opposite ends of the car body, or preferably supported from the truck frame of the car so as to have as little vertical vibration as possible. I have shown these arms connected with the wheel trucks by bars E′ jointed to allow of both vertical and lateral movement.

E^2 are wheels supporting the outer ends of the bars and the lever arms. These wheels are adapted to travel upon the slot iron above the surface of the ground, or they may be fitted to travel upon a rail or track within the conduit, the object being to steady the lever arms and maintain their position relative to the slot in the conduit through which they pass, independent of the oscillations of the car. The lower ends of these arms are connected by a stout wire or wires F, and the upper ends which are above the fulcrum points E′, are connected with elastic springs G. The tension of these springs is sufficient to act through the levers and keep the connecting wires at their lower ends, in a state of tension at all times. These lever arms extending down into the slot, the connecting wires will travel within the tube or conduit at all times. These wires are properly insulated where they pass up through the lever arms E, and at the upper end are connected with the motor upon the car. The lower ends of the levers are extended in the line of the travel, and are slightly inclined or curved upwardly so as to provide as long an incline as possible where the contact with the switches is made and broken, as the car passes over them, for the purpose of reducing the shock in making and breaking the connection.

The switches are located at intervals in the tube or conduit at such a distance apart that as the car passes along the track, the wire stretched between the lever arms E will form contact with one of these switches, and as long as it is passing over it, a current of electricity will be supplied to the motor upon the car. When the car has passed so far that the wire leaves this switch, it will immediately form contact with the next succeeding one, and be cut off from the one which it has passed, and the current will thus be successively applied from the main conductor.

Branch wires L from the main conductor lead into the conduit, being properly protected and insulated as shown, and they open into boxes I within the conduit.

It will be manifest that a single conducting wire may be employed, and the return cur-

rent may be made through the rails of the track, but I have in the present case shown two conducting wires, through one of which the current arrives, and through the other of which it is returned. In this case there will be two of the boxes I, one upon each side of the conduit, as shown in the transverse section, and the connection is made from one of these to the car and from the car to the other for the return current. In order to make this connection I have shown a peculiarly constructed switch. It consists of an insulated chamber J which is, in the present case, shown in tubular form, having a lug or hinge K upon the upper side by which it is pivoted within the chamber I. The branch wire L from the main conductor is coiled or bent as shown within the chamber I, and then enters the rear of the insulated casing J. The coil allows the movement of the casing J about its fulcrum without deranging the connection with the wire L. This wire L connects within the casing with a hollow chamber M containing movable armatures N. These armatures may be made in any suitable or desired form, either as slidable pieces or wheels adapted to roll within the chamber M, or in the form of balls which will roll therein. I prefer to use soft iron balls which will roll easily, and will be attracted by an energized magnet, and they may be coated with copper to increase their conductivity.

The connection between the conductor L and the chamber M charges the latter and the armature N with electricity. In line with this chamber M is a core O, around which a sufficient number of coils P of wire pass to energize it. The end of the core O adjacent to the chamber M is adapted to make contact with the armature N under certain conditions, and it is insulated from the chamber M so that when those conditions are not present, no current will pass from the conductor L through the core or the connecting wire.

The wire P connects directly with the grooved pulley R which is journaled upon the end of the spindle formed or connected with the core O, and this pulley is in the line of travel of the wire F which is connected with the levers E upon the car, and which travels within the conduit.

The operation will then be as follows: The weight of the rear ends of the pivoted insulated devices J is such that they will normally tilt about their fulcrum pins so that the end carrying the pulleys R will stand the highest, and the armatures N will roll or move to the rear end of the chamber M. When a car approaches and the wire F carried by it, passes over the pulley R, it tilts the device J so that the pulley end is the lowest. The armatures N rolling in the chamber M form contact with the end of the core O, and as they also form contact with the chamber M and the conductor L, a current immediately passes through the apparatus, and the core is energized sufficiently to retain the armatures N in contact and prevent their being disengaged by any jar or accidental motion. As long as they remain in contact, a current passes through the device and into the conducting wire F of the car which is traveling over the roller R, and the current is thus conveyed to the motor until the car has passed beyond the pulley R, when the latter will rise, and by the tilting of the device J, the armatures N will roll or move to the opposite end of the chamber M and break the connection. As shown in the cross section, there are two of these tilting devices J and connecting wires, one connecting with the incoming current, and the other upon the opposite side, with the outgoing current.

The plates E which extend down into the conduit through the slot upon the top have forks T attached to the lower end, and one branch of these forks carries a wire to form contact with the pulleys R upon one side while the other carries the wire which forms contact with the pulleys upon the opposite side.

The wires are insulated from each other where they pass up through the lever plate E, and the circuit is completed whenever the car wires pass over the pulleys, and is broken whenever it leaves them.

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

1. In a conduit electric railway, the slotted tube or tunnel, arms or levers fulcrumed to the car and extending through the slot into the tunnel, and having their lower ends extended in the line of the travel, and inclined upwardly, a conductor or conductors stretched between these levers and forming communication through them with a motor carried upon the car, said arms or levers being extended above their fulcrum points and having their upper free ends engaged by an elastic connection whereby the tension of the said conductor or conductors is automatically maintained, main conductors extending along the line of the track with branches extending from them at intervals into the conduit, and switch mechanisms adapted to form contact with the conducting wires carried by the car whereby the current is transmitted from the main conductor to the car and motor while such contact is complete.

2. In a conduit electric railway, a conduit or tube slotted upon the top, arms extending from the car down into the slot and having a conducting wire or wires extending between them and movable with the car, main conducting wires extending along the side of the track and branches extending from said main conductors into the conduit, a switch mechanism consisting of the laterally extending hinged tilting insulating device having an interior conducting chamber with which the branch wire connects, a pulley journaled upon the outer end of said tilting device in the path of said conducting wire or wires and adapted

to be engaged by and to form contact with the conducting wire of the car when the latter passes, a spirally wound magnet within said chamber having its coil connected directly with the pulley and movable armatures in said chamber whereby connection is made between the conducting chamber and the pulley, when the device is tilted and contact formed with the wire upon the car.

3. A switch or connecting device consisting of a laterally extending hinged insulated device with an interior conducting chamber, a branch wire connecting the main conductor with said interior conducting chamber, metallic balls or rollers forming contact with the interior of the chamber and adapted to move from end to end thereof as the chamber is tilted to opposite angles about its fulcrum point, a core spirally wound insulated from said chamber having a conducting pulley in the path of the main conductor, journaled upon a shaft connected therewith and the inner end adapted to form contact with the movable armatures when the device is tilted so that they roll into contact therewith, a car having lever arms fulcrumed to the car and extending above and below the fulcrum points, said arms being at the opposite ends of the car and extending down through the slot in the conduit, and wires stretched between the lower ends of said lever arms within the conduit adapted to form contact with each set of rollers as the car passes over them and to thus convey a current through the apparatus upon the car, said lower ends of the levers being extended in the direction of the travel and inclined upwardly, substantially as herein described.

In witness whereof I have hereunto set my hand.

ALFRED ROSENHOLZ.

Witnesses:
GEO. H. STRONG,
S. H. NOURSE.