

(No Model.)

2 Sheets—Sheet 1.

W. C. KEITHLY.
ELECTRIC RAILWAY TROLLEY SYSTEM.

No. 563,244.

Patented June 30, 1896.

Fig. 1.

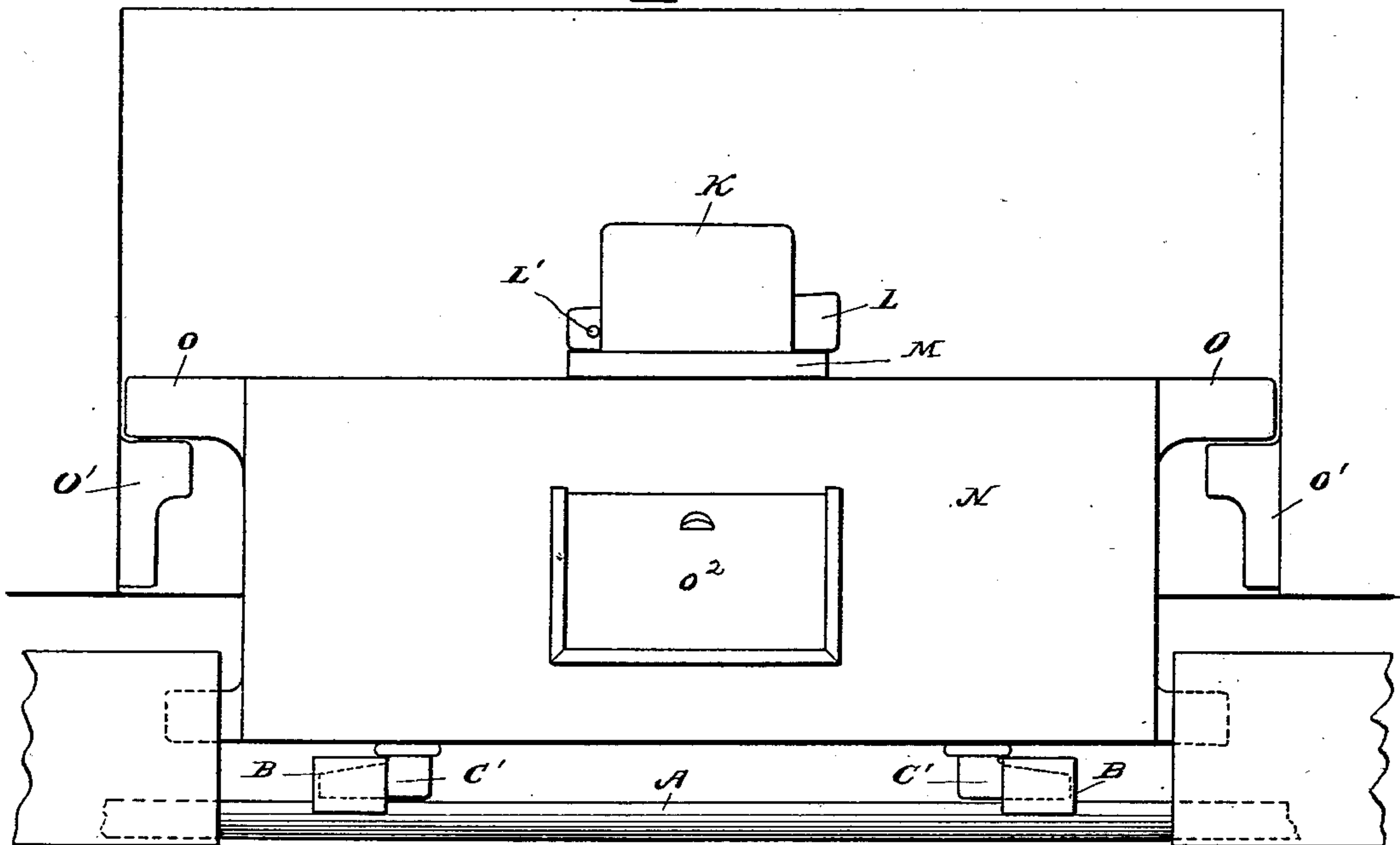
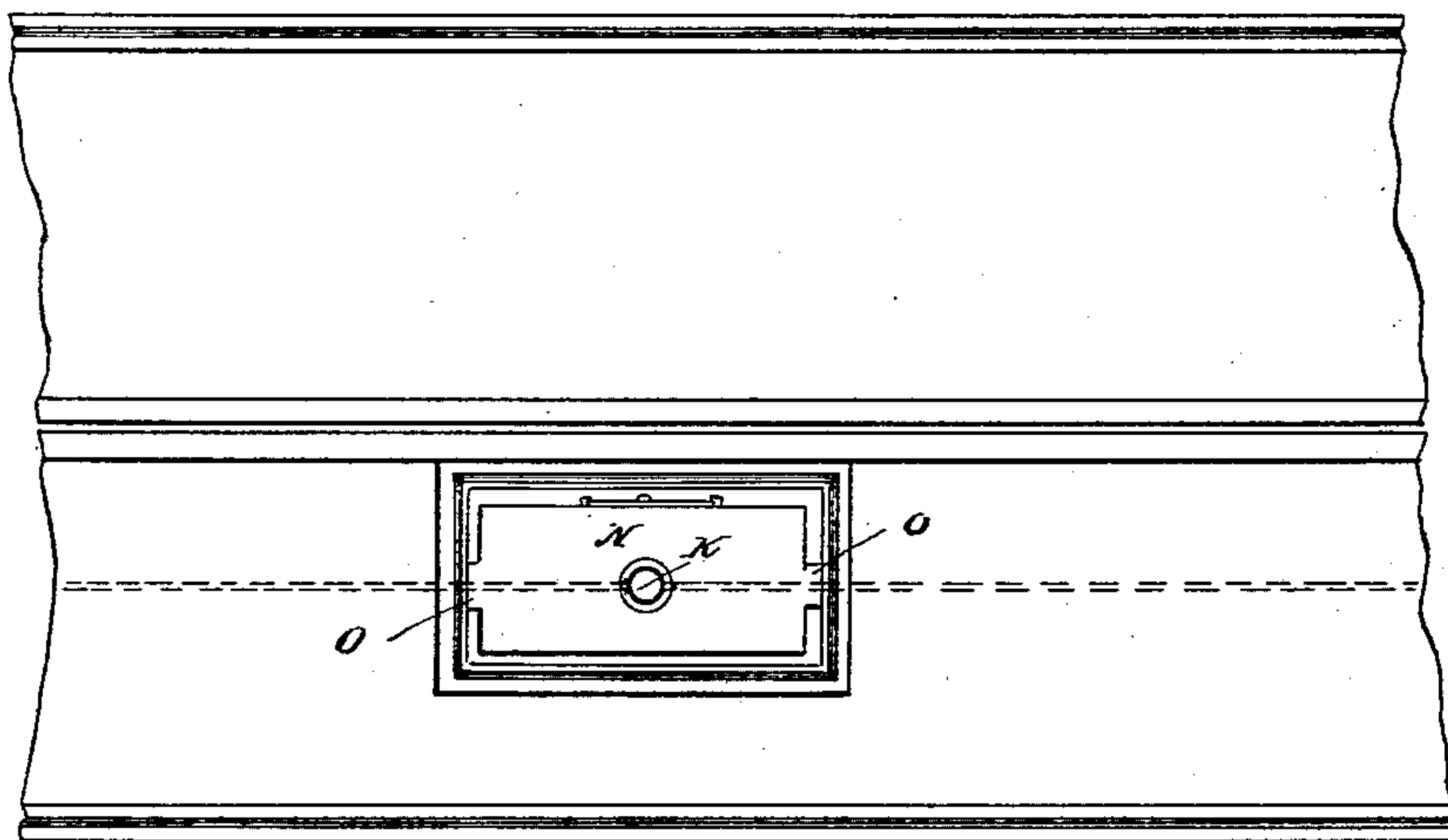


Fig. 3.



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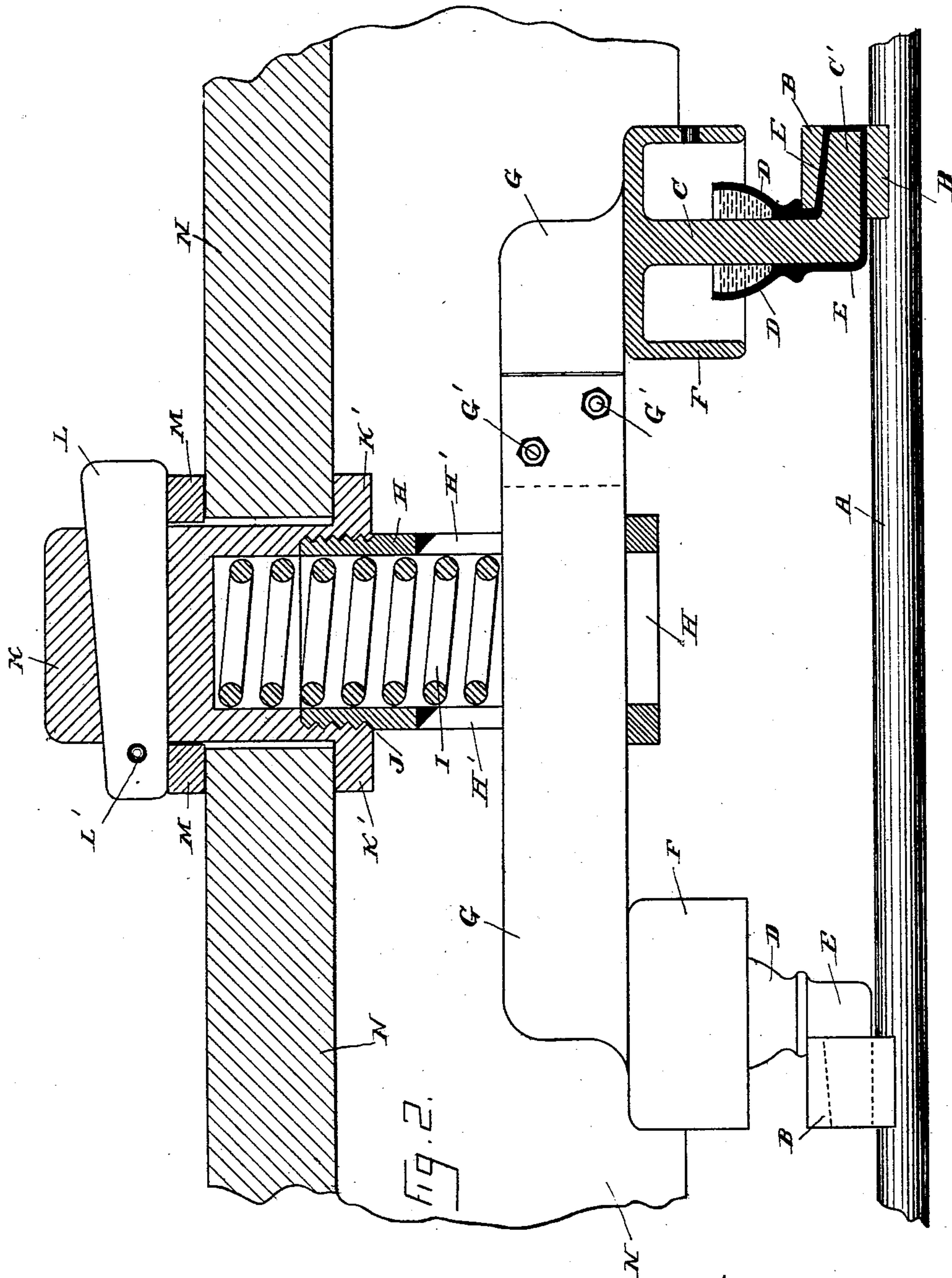
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WITNESSES.
Balmain Vate.
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INVENTOR.
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UNITED STATES PATENT OFFICE.

WILLIE C. KEITHLY, OF SAN FRANCISCO, CALIFORNIA.

ELECTRIC-RAILWAY TROLLEY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 563,244, dated June 30, 1896.

Application filed October 22, 1895. Serial No. 566,553. (No model.)

To all whom it may concern:

Be it known that I, WILLIE C. KEITHLY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Electric-Railway Trolley Systems; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in electric-railway trolley systems having underground conductors, and more particularly to the hangers therefor.

The objects which the present invention is designed to accomplish are to prevent leakage of the current from the conductor due to surface moisture on the conductor and hangings, to provide flexible connections for the said hangings, to accommodate the strain of the trolley, to provide means for applying this electric system to the structures now in use on the cable-roads without rebuilding any part of them, and to accomplish the foregoing with mechanisms simple and durable not liable to get out of order or to need repair.

In the drawings, Figure 1 is a side elevation of the casing in which the hangers are mounted. Fig. 2 is an enlarged view showing in detail the construction and mounting of the hangers. Fig. 3 is a plan view of a track, showing in dotted lines the location of the hanger casings.

For the purpose of description with reference to the drawings, we will let the letter A designate the conducting-wire on which the current is carried for the motors. At suitable intervals this wire is provided with the lugs B, which are brazed on the said wire. The lugs are perforated lengthwise of the said wire to receive the hooked ends C' of the arms C. The arms C are extended downward from the cross-bar G, which is formed in two parts, to be joined by the bolts G'. By means of this construction the hooked ends C' may be inserted in divergent directions into the perforations in the lugs B. This construction permits of a very tight joint being formed by the hooked ends in the lugs B.

The cross-bar G and the arms C are con-

structed of metal, and in order to insulate them from the wire A the hooked ends are covered with a suitable insulating-cement or hard-rubber or fiber covering where they would come in contact with the wire or the lugs B. In some cases I form of this same insulation the oil-cups D, which surround the arms C, but as a rule the manner of constructing the cups, hereinafter described, is preferred.

The cross-bar G is formed of flat metal turned on edge and mounted in guide-slots H' of the hollow metal tube H. The cross-bar is maintained in its normal position in the bottom of the slots H' by the spiral spring I, which rests upon the top of the bar and forces it downward or outward. The tube H is threaded at the upper end to screw into the lower end of the plug K. The plug K is formed from hard rubber, fiber, cement, or other insulating material, and is constructed in either a round or square shape to suit the perforation in the top of the box N through which the plug is extended. It is by this plug K that the hangers and wire are suspended. For this purpose the plug is slotted at the top to receive the wedge-shaped key L, which when driven into the slot forces the plug securely into position. The key is locked in position by the pin L'.

The washer M is slipped over the plug K and rests under the ends of the key L. By varying the washer from thin to thicker the plug may be raised to compensate for wear. The plug K is provided at the lower end with the flange K', which rests against the lower side of the top N of the box. The under side of the plug is bored to receive the spring I and is threaded to receive the tube H. Thus it will be observed that the leakage of the current from the wire A to the ground through this hanger is prevented by the interposition of insulation E between the wire and the arms C and the insulating-plug K, into which the metal tube H and spring I are received. And again, as will be described, the supporting-box is constructed of insulating material.

While the direct leakage, or leakage by reason of metallic contacts, is thus provided against, I further prevent the leakage which is due to transmission through surface moisture which accumulates on the parts forming the hangers. This surface moisture is the

cause of a large proportion of the leakage which takes place in underground electric systems. To overcome this difficulty and guard against such leakage, I have provided
5 the oil-cups D, which are mounted on the arms C of the hangers. These cups are preferably constructed of cement, as an insulating substance, while being durable and impervious to oil. The cups are forced on the
10 arms C and rest on the top of the insulating-covering E. Provision is made, by sealing the joint, that the oil does not leak out of the cups. To protect the cups from water leaking down from the ground-surface and falling
15 into the cup, I have provided the hoods F, which overhang the cups, as shown.

It will be understood that where insulating material of any specific kind has been described any other may be used without changing the spirit of this invention.
20

The casings or inverted boxes for supporting the hangers are preferably constructed of terra-cotta. They are provided with the lugs O on the side which rest on the brackets O', fastened in the side of the manholes.
25 The plug, carrying the hanger, is extended through the top of the casing, so as to permit the key L' to be knocked out and permit the hanger to drop. This exposes the plug by
30 the removal of the cover to the manhole.

In the side of the casing I have provided the slide or door O², by means of which the cups are made accessible for supplying oil.

Having thus described this invention, what
35 I claim is—

1. In an electric-railway trolley system having an underground conducting-wire, the combination of the conducting-wire having perforated lugs securely fastened thereto at
40 intervals, with detachable hangers, the ends of which enter the perforations in said lugs in divergent directions, and having a break in the connection between the said hanger

ends to allow such entrance in the said lug, suitable fastenings to secure the break in the
45 said connection, a spring-bearing for said connection to relieve the strain on the trolley, and a guide to control the movement of the hangers, substantially as described.

2. In an electric-railway trolley system, the
50 combination of the conducting-wire, A, the hanger, G, having the ends, C, the insulation, E, interposed between the said wire and ends, C, and the cup, D, constructed of insulating material and adapted to hold oil around the
55 said ends, substantially as described.

3. In an electric-railway trolley system, the combination of the conducting-wire, A, the hanger, G, having ends, C, to engage the said wire, insulation, E, covering the ends, C,
60 where they engage the wire, a cup adapted to hold oil around the said ends, C, and the covering, F, to protect the said cups from water falling into them from above, substantially
65 as described.

4. In an electric-railway trolley system having an underground conducting-wire, with hangers to support the said wire, inverted casings to support the said hangers and shed the water therefrom, insulating
70 suspending-plugs connected to the said hangers and extended through the said casing, pins to hold the said plugs in position adapted to be inserted in the said plugs above the said casings, manholes to receive the said cas-
75 ings at suitable intervals, and supporting devices to suspend the said casings within the said manholes, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two wit-
80 nesses.

WILLIE C. KEITHLY.

Witnesses:

E. F. MURDOCK,
BALDWIN VALE.