

(No Model.)

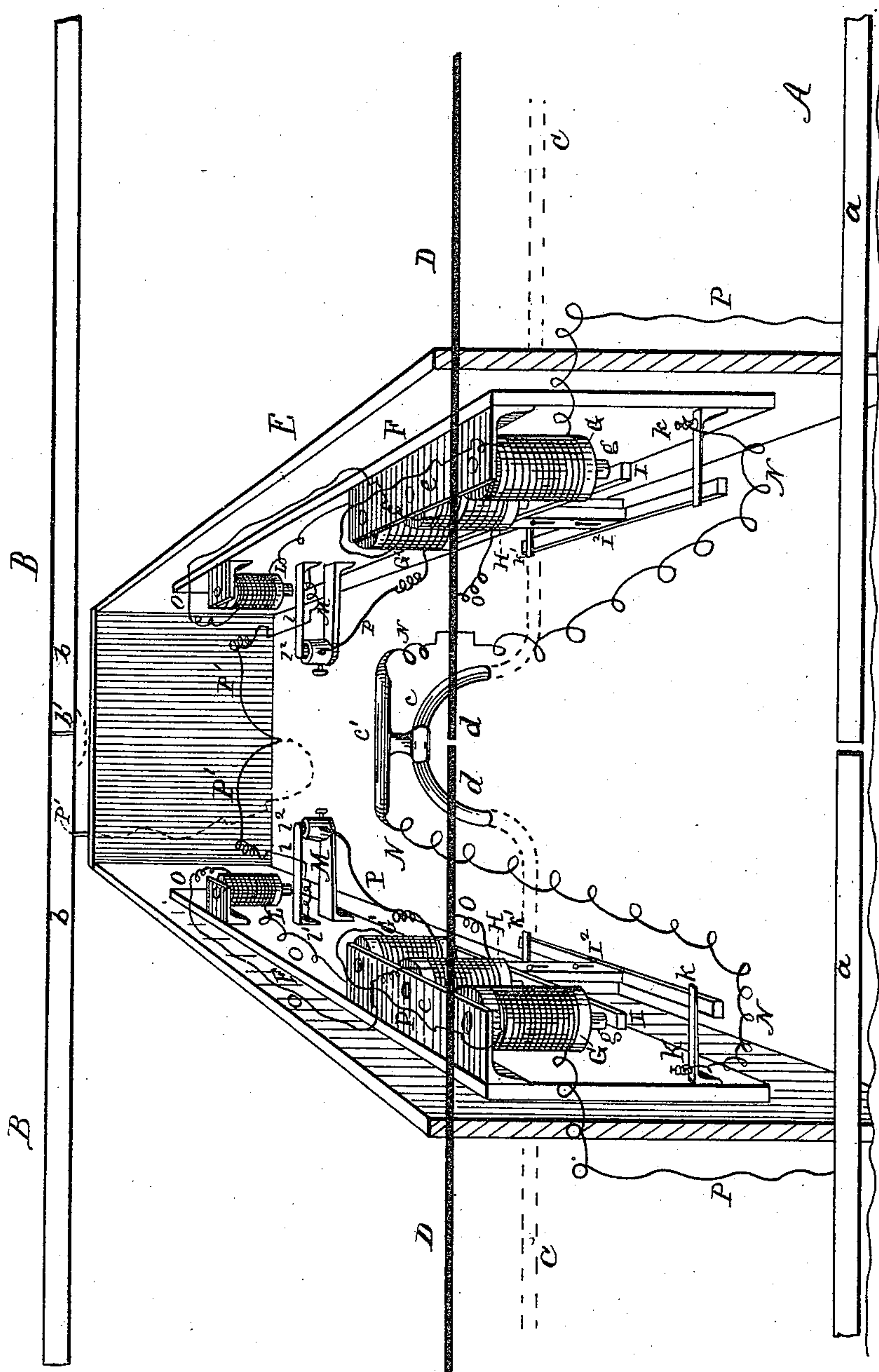
3 Sheets—Sheet 1.

M. WHELESS.
ELECTRIC STREET RAILWAY SYSTEM.

No. 441,211.

Patented Nov. 25, 1890.

Fig. 1.



Witnesses
Thos. Houghton.
M. E. Cowell.

Inventor
Malone Wheless
by M. H. Snigdetur
his Attorney

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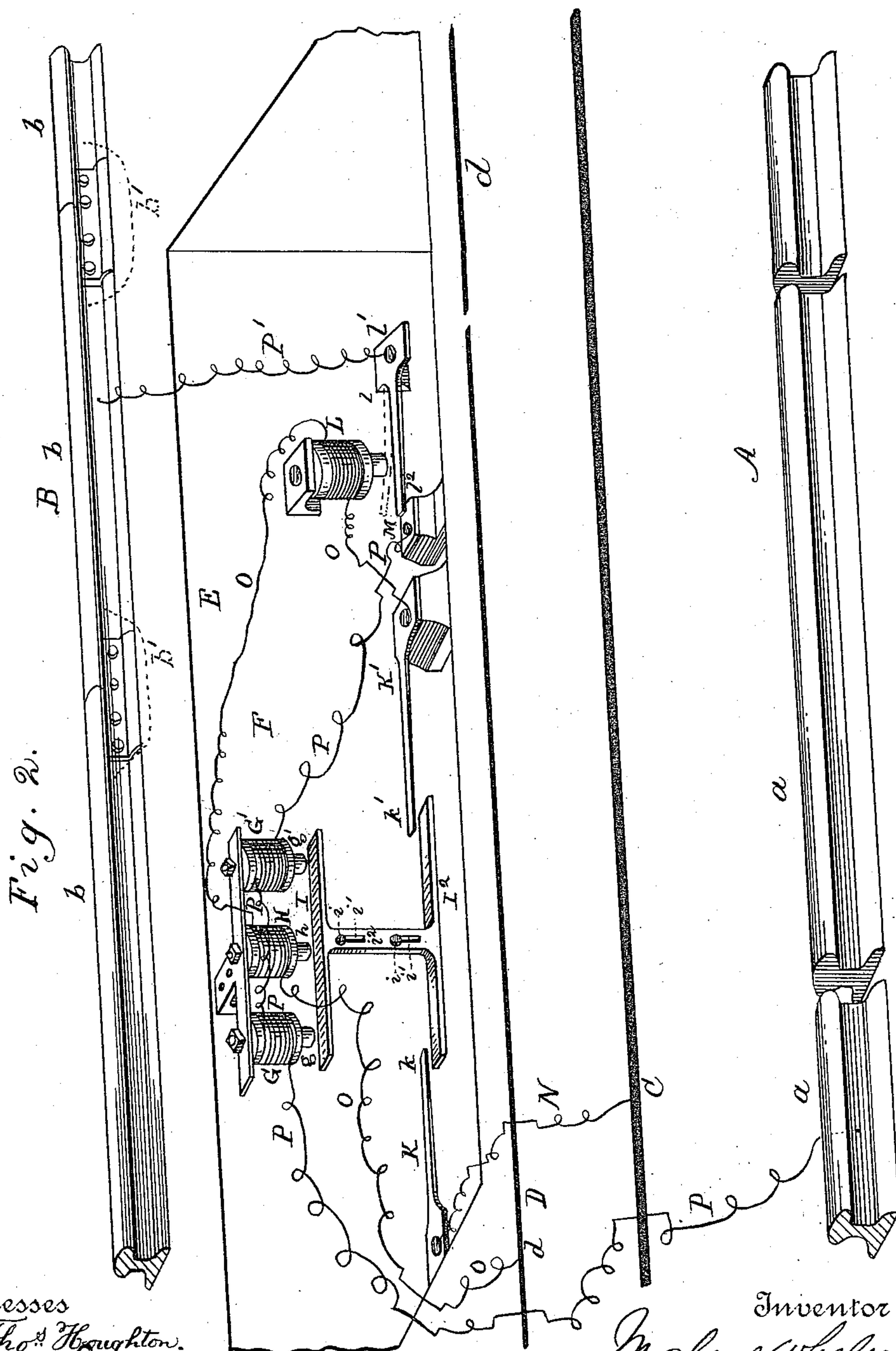


Fig. 2.

Witnesses
Thos. Houghton.
H. E. Lowell.

By his Attorney

Inventor
Malone Wheelless.
M. H. Singleton.

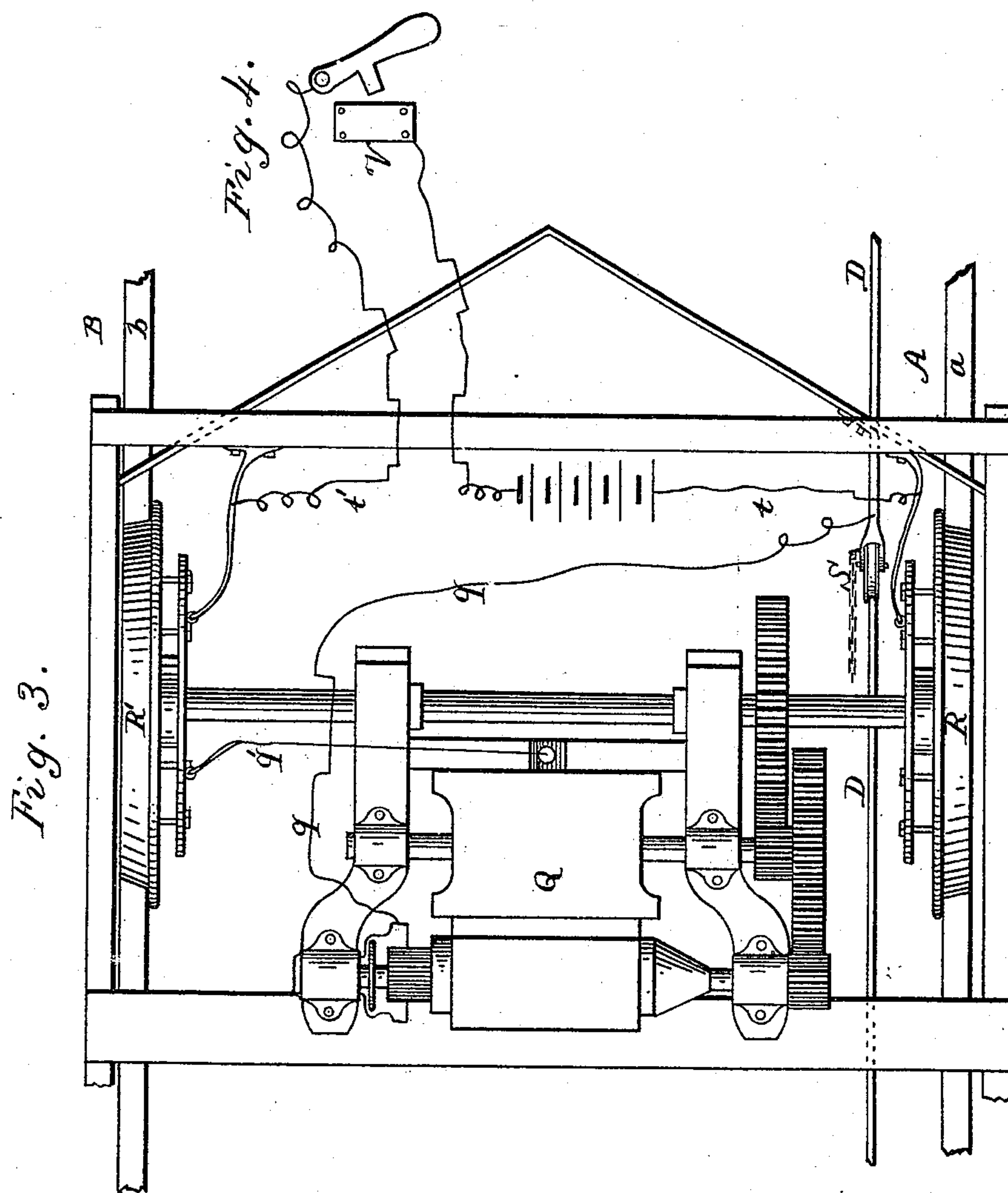
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Thos. Houghton.
M. E. Lowell.

Inventor
Malme Wheels,
per M. E. Houghton.
Attorney

UNITED STATES PATENT OFFICE.

MALONE WHELESS, OF NASHVILLE, TENNESSEE, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE WHELESS ELECTRIC RAILWAY COMPANY, OF ALEXANDRIA, VIRGINIA.

ELECTRIC STREET-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 441,211, dated November 25, 1890.

Application filed May 3, 1890. Serial No. 350,469. (No model.)

To all whom it may concern:

Be it known that I, MALONE WHELESS, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Electric Street-Railway Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of a trap containing the switching mechanism. Fig. 2 is an inside view, the parts being arranged in a slightly-different position. Fig. 3 is a plan view of a part of a car-frame, showing the connection of the motor and local circuits. Fig. 4 is a view of a form of switch used in the local on the car.

This invention relates to an improvement in electric street-railway systems, more particularly to that class wherein there is an insulated prime conductor or power-line, a working-conductor or trolley-line in sections insulated from one another, a local circuit on the car, and a switch in the local placed between the power-line and trolley-section, so that the local turns the current from the power-line into the trolley-sections. This class is illustrated in an application filed by me March 15, 1890, Serial No. 343,984.

The object of the present invention is to provide such means that the local is only used to turn the current from the power-line into each trolley-section, the working-connection between the two being maintained by the power-current, and the local is cut out, thus conserving the local current and insuring a "break" as soon as the power-current leaves the trolley-section. The present invention also keeps any "leakage," if there should be any, of the trolley-sections from maintaining a "contact" after the car has left any given trolley-section.

In the annexed drawings, the letters A and B indicate track-rails or other lines of con-

ductors, consisting of sections *a* and *b*, the former being insulated and the latter continuous, wires *b'* being used for better connection.

The prime conductor or power-line C is indicated by the dotted lines, this line being underground and only in sight at the part *c*, where it enters the trap.

D represents the working-conductor or trolley-line arranged in insulated sections *d*. As fully explained in the application referred to, there are to be as many of these sections as desired—the greater the number of trolley-line sections the less the liability of loss by leakage. The switching mechanism for each section is to be placed at any convenient location.

The drawings illustrate a trap for every two sections—one in front and one in the rear. This trap E is placed in the ground, is made of metal, water-tight, by preference, and is to be covered so as to be protected and yet accessible for inspection. In this trap E there is secured a switch-board F for each section. Only one need be described, as they are duplicates. Supported by a suitable holder *e* are three magnets G H G', conveniently arranged together, as shown, and having their cores *g h g'* projecting downwardly. The armature I of these magnets is an I-shaped frame, which is secured to the switch-board E by pins *i i*, passing through slots *i' i'* in the stem *i²* of said frame I. The bottom I' of this frame is a metallic strip insulated from the top of the frame.

Secured to the switch-board E are metallic springs K K', their free ends *k k'* being just above but normally out of contact with the ends of the strip I². Located conveniently near these devices is another magnet L, having an armature *l* of spring metal secured by one end *l'* and having its free end *l²* just above and normally in contact with a contact-piece M. The power-line C at the part *c* is made with a T-piece *c'*, so as to be convenient for connection to the two switch-boards. A wire N runs to the spring K. A wire O runs from the spring K' to the magnet L around the same, thence to the magnet H around the same, and thence to a trolley-

line section *d*. A wire P extends from an insulated section *a* of the line A to the magnet G around the same, thence to and around the magnet G', thence to the contact-piece M.

5 From the spring-plate *l* a wire P' passes to the continuous conductor B.

On Sheet 3 is shown the arrangement of parts on the car. Q represents an ordinary motor connected by a wire *q* to the trolley S, which bears on the trolley-line D and by a wire *q'* to one wheel R'. On the car is a battery T, one wire *t* of which extends to the wheel R and the other wire *t'* to the wheel R', one of said wires being provided with a switch V, such switch being placed at any convenient place on the car for ready access. When this switch V is closed, the current from the battery T flows through the wire *t*, wheel R, section *a* of line A, wire P around magnets G and G', contact-piece M, spring-plate *l*, wire P', line B, wheel R', and wire *t'* to battery. This vitalizes the magnets and draws up the armature I with the metallic strip I². This forms a contact between the strip and the spring-plates K K'. As soon as this takes place, the power-current streams out of the power-line or prime conductor, flowing through the wire N, spring-plate K, metallic strip I², spring-plate K', wire O around magnets L and H, trolley-line section *d*, trolley S, wire *q*, motor Q, wire *q'*, wheel R', and line B to generator, and this takes place as the car passes from section to section.

35 As the magnets G and G' are vitalized and draw up the I-piece and the power-line and trolley-line are connected, the consequent vitalization of the magnets L and H cuts into the local by the former and holds up the I-piece by the latter. Thus the local is only utilized, as the car comes upon a trolley-section, to switch this section onto the power-line, the current of the latter holding the connections. This only necessitates a battery-power in the local sufficient to make the contact, and the "cut-out" at magnet L reduces the use of the local current to a minimum. As soon as a car leaves a given section of the trolley-line, the connection of this section with the power-line is broken as the completed circuit is made through the car. The magnet H should, therefore, immediately become devitalized and the force of gravity break the contact between the strip I² and the plates K and K'; but perfect action in this regard might be hampered by two occurrences—one, residual magnetism, the other slight leakage due to imperfect insulation from grounding of the trolley-section. To avoid the possibility of the I-piece clinging to magnet H, the contacts K K' are made resilient. The resil-

65 iency of these plates should be of a power between that of the local current on the one hand, so as to be overcome by the power of this current and permit the contact to be made between them and the strip I², and that of the combined residual magnetism and leakage on the other hand, so that these spring-plates acting with gravity shall throw the I-piece down from the magnet H. 70

Having thus described my invention, what I claim is—

1. The combination of a continuous insulated prime conductor or power-line, an uncovered working-conductor or trolley-line in sections insulated from one another and normally out of electric connection with the power-line, a car carrying a motor and motor-circuit in electric connection with the working-conductor, a local circuit the source of electricity of which is on the car, a switch controlled by the local and located between the power and trolley line section for making a connection between the two, and a contact-preserver between the power and trolley line section which maintains the contact after the local makes it until the car leaves the section of the working-conductor, as set forth. 85

2. The combination of a continuous insulated prime conductor or power-line, an uncovered working-conductor or trolley-line in sections insulated from one another and normally out of electric connection with the power-line, a car carrying a motor and motor-circuit in electric connection with the working-conductor, a local circuit the source of electricity of which is on the car, a switch controlled by the local and located between the power and trolley line section for making a connection between the two, and a contact-preserver between the power and trolley line section which maintains the contact after the local makes it until the car leaves the section of the working-conductor, and a cut-out in the local controlled by the power-line, as set forth. 105

3. The combination of an insulated power-line, a trolley-line insulated therefrom, a local circuit having a magnet the armature of which connects the working-conductor to the power-line, and a magnet between the power and trolley lines which holds such connection, the contact-plates with which the armature makes the connection being resilient, as and for the purpose set forth. 110

In testimony whereof I affix my signature in presence of two witnesses. 115

MALONE WHELESS.

Witnesses:

THOS. HOUGHTON,
GRAHAM L. GORDON.