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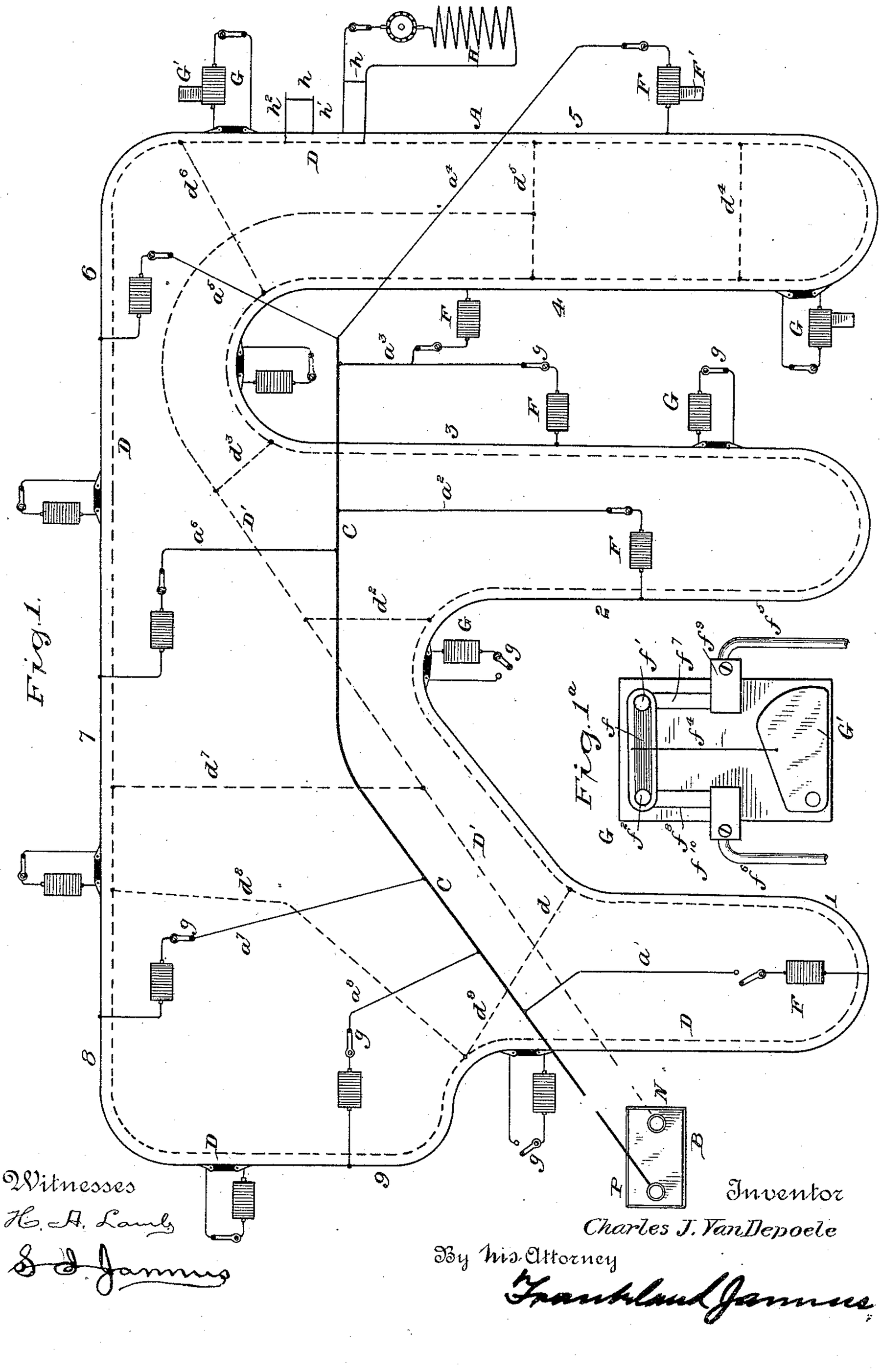
C. J. VAN DEPOELE.

ELECTRIC RAILWAY CONDUCTOR SYSTEM.

No. 429,981. Patented June 10, 1890.



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(No Model.) 5 Sheets—Sheet 2.

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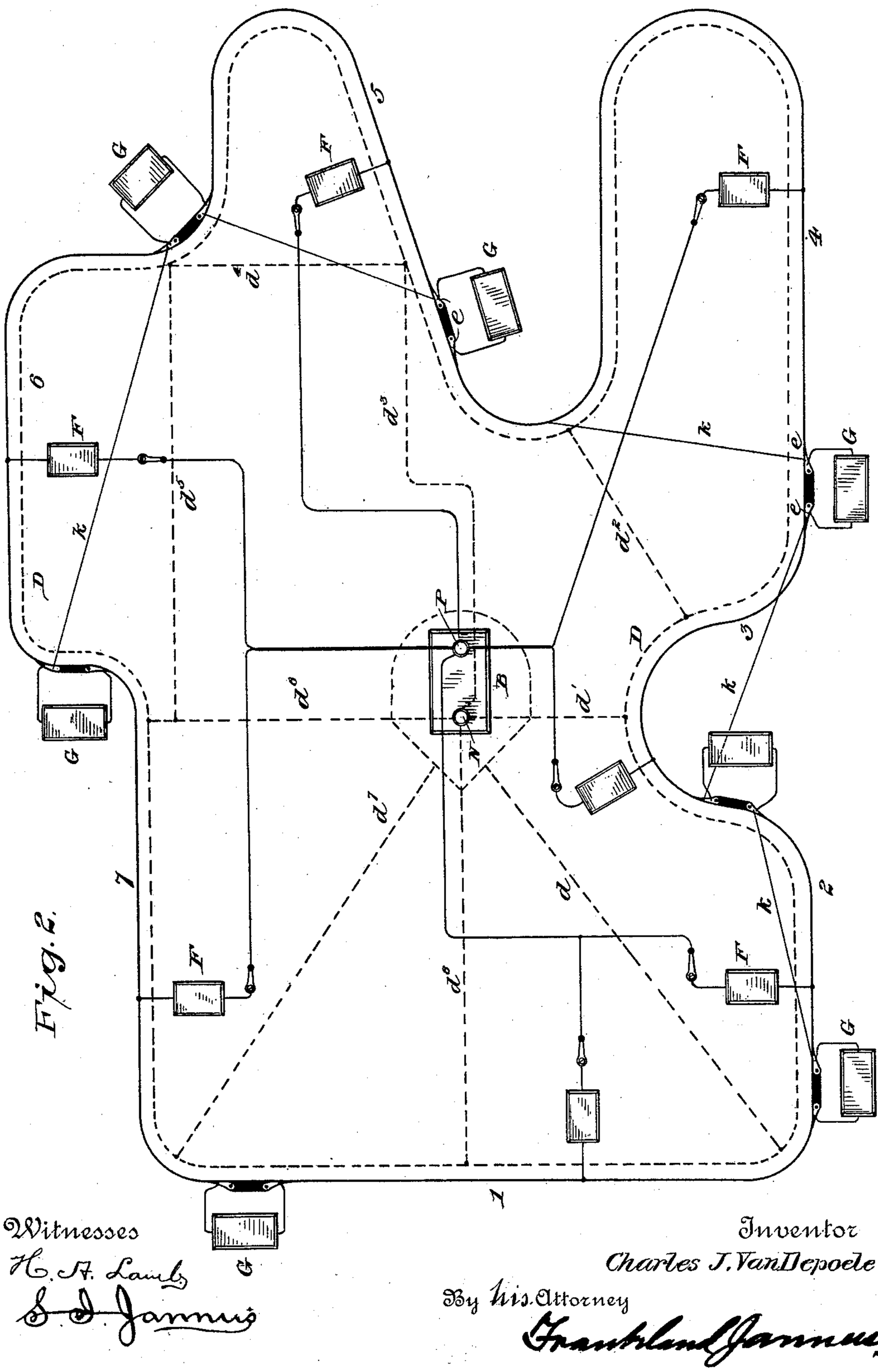

Fig. 2.

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ELECTRIC RAILWAY CONDUCTOR SYSTEM.

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Fig. 3.

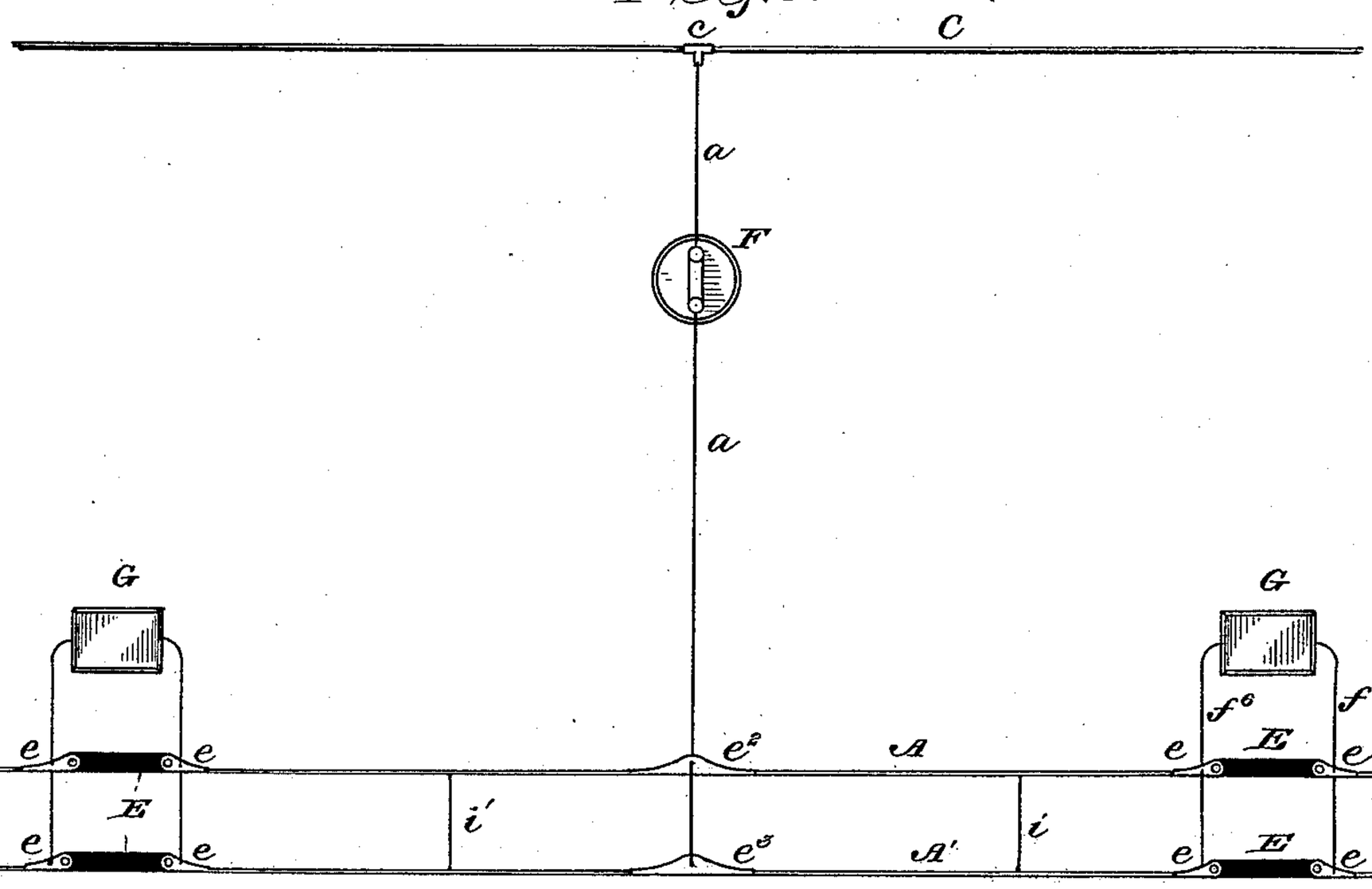


Fig. 4.

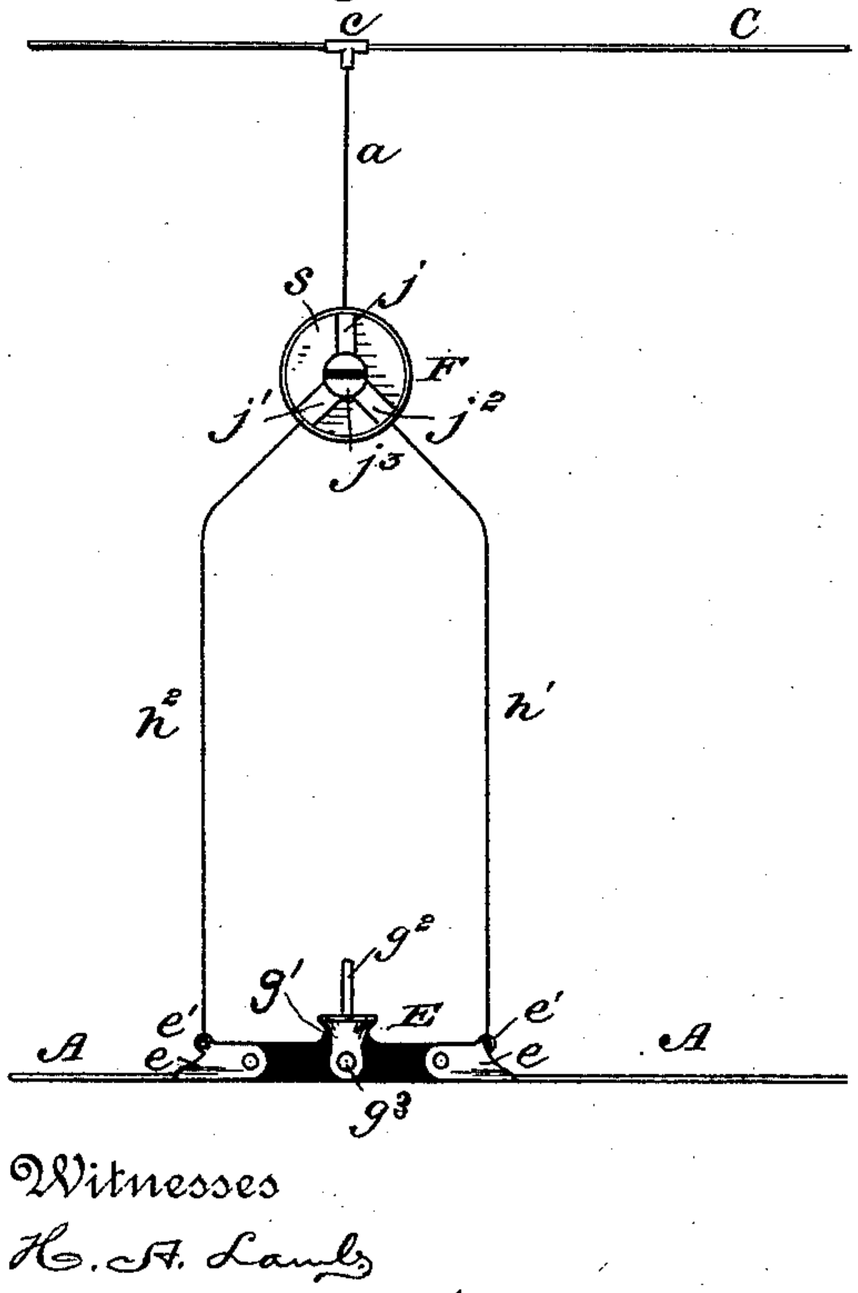
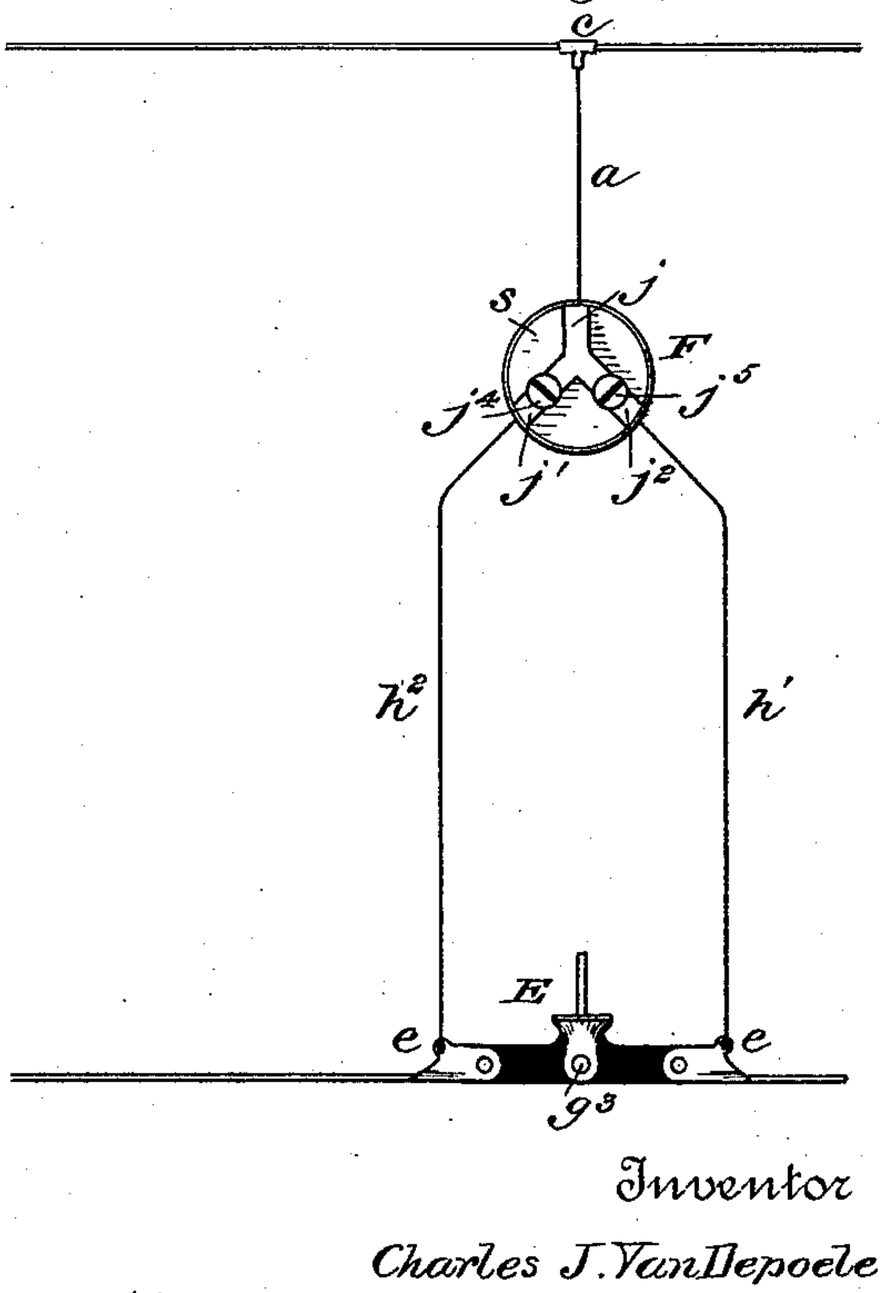


Fig. 5.



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ELECTRIC RAILWAY CONDUCTOR SYSTEM.

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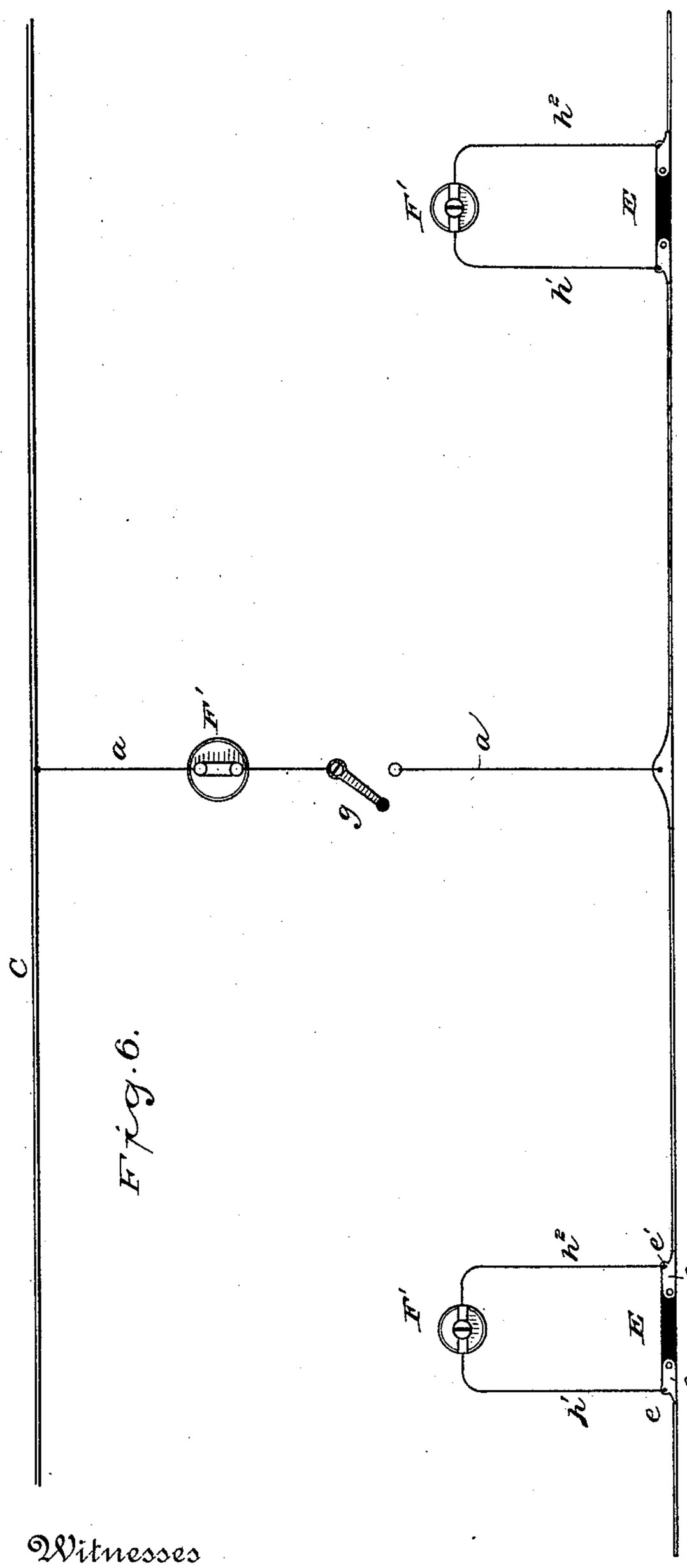

Fig. 6.

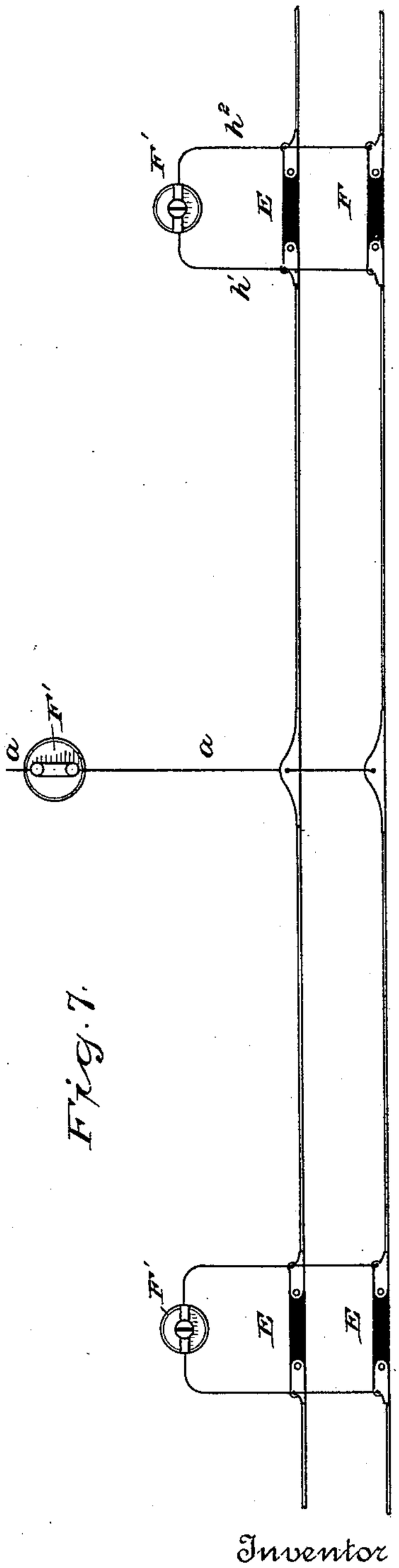

Fig. 7.

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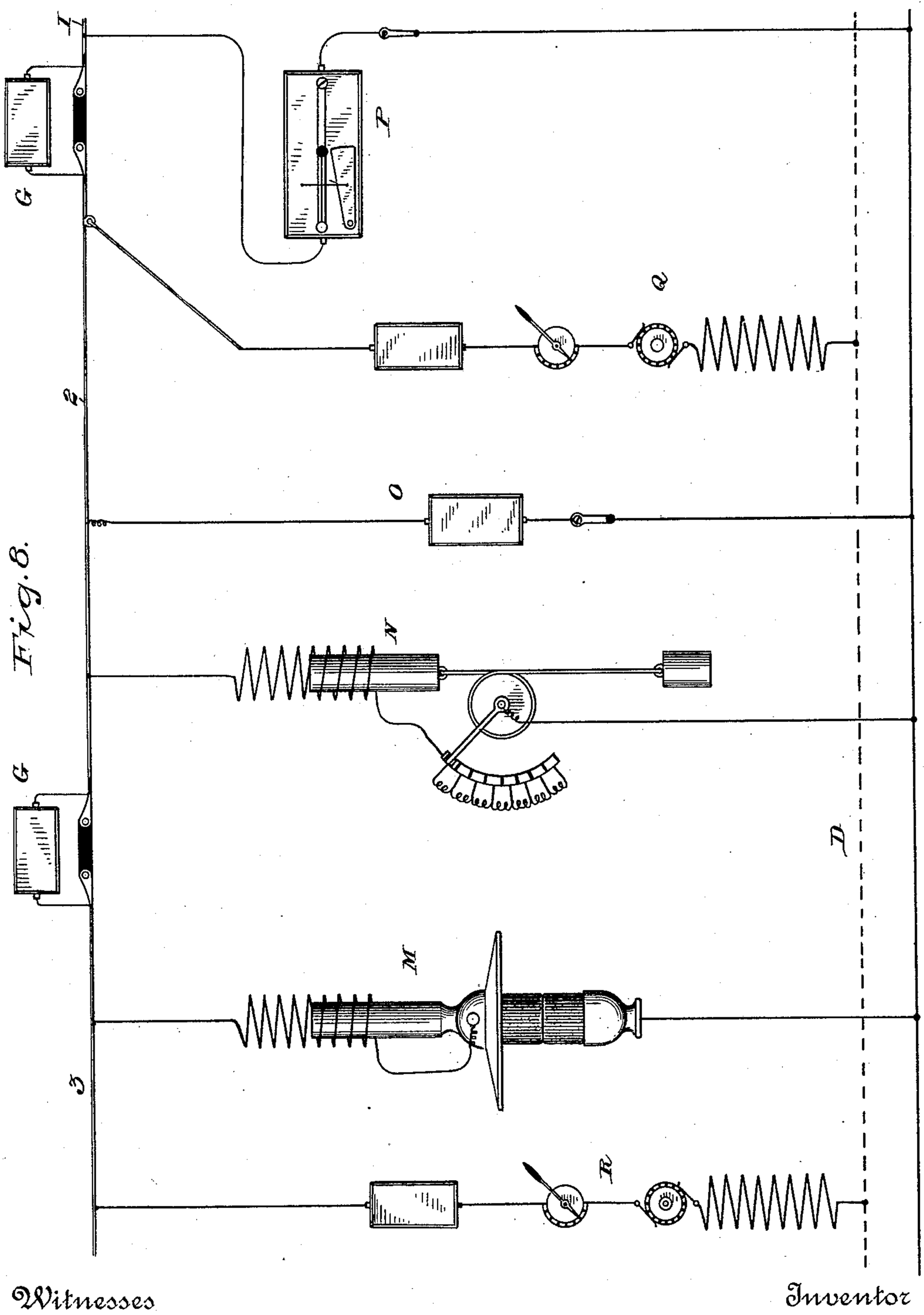

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

ELECTRIC-RAILWAY-CONDUCTOR SYSTEM.

SPECIFICATION forming part of Letters Patent No. 429,981, dated June 10, 1890.

Application filed April 9, 1890. Serial No. 347,230. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric-Railway-Conductor Systems, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in protective and other devices for systems of electrical distribution, and more especially with reference to such systems as are shown and set forth in my patent, No. 417,122, granted December 10, 1889. These systems comprise, broadly, a main or trunk feeder, lateral feeders, and bare working-conductors parallel with the railway-track, said working-conductors being connected to the main feeder through the lateral feeders. The sections of working-conductors are insulated from each other, and each one is connected by a separate lateral feeder to the main trunk-feeder. It is obvious that in a system of distribution where insulated sections are used it would not be prudent to rely entirely upon the single lateral feeder of any one section as a source of current, since if this were disabled by any accident that portion of the line would be deprived of current and any cars thereon rendered helpless. If, too, there were a break in the working-conductor, all that portion at the farther side of the break from the lateral feeder would be isolated and inoperative until the break was repaired. Again, it frequently happens in crowded cities that the streets are temporarily blockaded and a large number of cars will concentrate upon one section, in which case the demands for current upon starting up would be very excessive and might be more than the lateral feeder belonging to that section could either safely or economically carry. To prevent damage to the circuit and annoying delays, I provide fusible connections between the different working-sections of a resistance proportional to the desired potential of the current used. With such connections the adjacent insulated sections would tend to supply any excessive demand upon the section between them. Safety-connections are also put in circuit with each working-section and its lateral trunk-feeder, so that while all the sections and feeders will work in harmony under normal conditions should a short circuit occur on any section the fuses in the safety devices connecting it with its lateral feeder and the adjacent sections would be "blown" and that section completely isolated without affecting the rest of the line. An automatic signal in each fuse-box is provided which operates only when a fuse is blown. Another advantage of the sectional connections is that in case of a break in the working-conductor current would be fed right up to the break from both directions—on the one side from the adjacent section and on the other from either the adjacent section or the lateral feeder, or both. This enables cars to be run up to the break and to cross the short intervening space by their own momentum or by other power. In any event the delay caused would not be serious, as would otherwise be the case. Another arrangement I consider very advantageous is the connecting of the extremities of a section by a separate conductor when said section is in the form of a long loop. This enables a section upon which excessive demand is made to be fed from other than the adjacent sections without the current necessarily traversing the long loop of the adjacent section and wasting power thereby. This system of cross-connection may also be applied to the return-conductor with advantage.

Sometimes it is desirable to feed two insulated sections from the same lateral feeder, and for this purpose I provide fusible connections of V shape, to one arm of which the lateral feeder is connected, and to the other two arms short feeders, which are connected to the ends of adjacent insulated sections. In double-track railways where two overhead conductors of the same polarity are used no change is required in the safety devices used between sections, except simply making the wires connecting in the safety device long enough to include both conductors; but I may use separate safety devices for each. The lateral feeder is also connected to both parallel section-wires, forming practically one section of the overhead sectional system.

Other details will be hereinafter described,

and referred to in the accompanying drawings.

In the drawings, Figure 1 is a diagrammatic view illustrating an arrangement of trunk and feeder circuits, a railway system, and safety devices. Fig. 1ª is an enlarged detail of one of the connections shown in Fig. 1. Fig. 2 is a diagrammatic view similar to Fig. 1, except that the generating-station is centrally located with respect to the working, conductors and that the cross-connections are somewhat differently arranged. Fig. 3 shows a method of connecting in the lateral feeder and connections between sections when two working-conductors of the same polarity are used. Figs. 4 and 5 show means for connecting in the lateral trunk-feeders when it is desired to connect the same lateral feeder to the adjacent ends of two working-sections; also, means for attaching the cross-wire suspension devices to the separating insulating-pieces between the sections. Fig. 6 shows a lateral feeder and connections to the working-conductor. Fig. 7 shows the same as Fig. 6, except that two working-conductors of similar polarity are seen. Fig. 8 shows various details of construction of potential controlling devices, besides showing fusible connections between the sectional working-conductors in connection with such devices.

As seen in Fig. 1, A is the working-conductor or trolley-wire of a distributing system which is divided into insulated sections numbered, for convenience, from 1 to 9, inclusive. a' to a^8, inclusive, are the lateral trunk-feeders which connect the different sections of the working-conductor with the main trunk-feeder C. F F are fuse-boxes in circuit with the lateral feeders, and $g\ g$ are hand-switches to be used to break circuit when replacing blown fuses. G G are fuse-boxes connecting the ends of adjoining insulated sections. In all cases these fuse-boxes are provided with automatic signaling devices, which become visible when the fuses are blown, substantially as set forth in my said prior patent. A slightly-different form of fuse-box is shown in Fig. 1ª. G is the box; G′, the semaphore, adapted to drop into view when the detent f^4 is destroyed by the blowing of the fuse f, and $f^5\ f^6$ are the connections to the ends of two insulated sections. Strips $f^7\ f^8$ of conducting metal connect the fuse f with the binding-blocks $f^9\ f^{10}$. Section 5 of the conductor A is shown as being short-circuited at h across the circuit of the motor H, and the consequent blowing of the fusible connections between that section and the adjacent sections and between that section and the trunk-feeder, thus completely isolating the short-circuited section without affecting the rest of the line. D D are main returns, d' to d^9 being cross-connections placed so as to minimize the resistance of the return-circuit.

Fig. 2 illustrates a system similar to that shown in Fig. 1, except that the generating-station is practically equidistant from the different sections of the working-conductor, and a somewhat different distribution of the feed and return circuits is therefore necessary. A special feature of this system is the cross-connecting of the sectional conductors upon themselves. This is effected by means of short conductors $k\ k$, shown as being attached to the supporting-ears at the end of the insulated working-conductor, where the working-conductor A makes a long bend, as at sections 3, 4, 5, and 6. These cross-sections are not necessarily attached alone to the supporting-ears $e\ e$, &c., at the ends of sections, but may be placed intermediate thereto. The main object is to make it possible for current to get around a long loop without encountering the resistance of the working-conductor through the entire distance.

In Fig. 3 I show my feeder system and safety-connections as applied to a section where double working-conductors are used. C is the main trunk-feeder. a is the lateral trunk-feeder, leading into and out of the fuse-box F. Ears $e^2\ e^3$ are soldered, brazed, or otherwise secured to the working-conductors A and A′, and to these the trunk-feeder a is attached. The conductors are held in fixed relation or spaced by braces $i\ i'$. G is a fuse-box of the type shown in detail in Fig. 1ª, connected by conductors $f^5\ f^6$ to the half-ears $e\ e$, which support the ends of the sectional working-conductors and are mechanically united by insulators E.

Figs. 4 and 5 show another arrangement by which the same lateral feeder is connected to two separate sections. In Fig. 4 C is the main trunk-feeder; a, the lateral feeder connected to the fuse-box F, which consists of a shell or casing s and a three-way or fusible connection, the three arms $j\ j'\ j^2$ of which are adapted to receive the feeder a and the distributing-wires $h'\ h^2$, which at their opposite ends are connected to the projection e', formed upon and integral with the half-ear e. The insulator E, which connects and supports the ends of the separate sections A A′, carries a support g', riveted thereto, integral with which is a pin g^2, to which may be fastened the corresponding wires. The support g' is bolted to the insulator by bolt g^3. Fig. 5 is the same as Fig. 4, except in the detail construction of the fuse-box F, the Y of which is suppplied with two contact-screws j^4 j^5, instead of one, as seen at j^3, Fig. 4.

Figs. 6 and 7 show sections of single and double working-conductor, respectively. With the arrangement shown in either of these figures the current is taken from the feeder C through a fuse-box F′, which, as here shown, may be of the simplest form and not necessarily provided with a signaling device. A hand-switch g is also provided for opening the circuit a to replace a blown fuse. The same form of fuse-box F′ may be employed to span the insulation between the sections of working-conductor, if desired.

In Fig. 8 is shown part of sections 1 2 3 of the main working-conductor; also, portions of the return-conductor, (indicated in dotted lines,) and one of the lateral feeders and connections for supplying current from the feeder to the working-conductor. Between the feeder and the several sections of the working-conductor are connected a number of potential adjusting devices M N, safety devices O P being also shown in circuit therewith. These devices being fully shown and described in my said prior patent are not herein more specifically referred to. Translating devices, as motors Q R, are also shown in circuit between sections of the working-conductor and the return. It will be observed, however, that the automatic safety devices G G are interposed between sections 1 and 2 and 2 and 3 of the working-conductor in this figure, features which are not shown in my said patent.

The diagrammatic arrangements shown do not of course indicate any particular points as the one in which the several fuse-boxes employed in the system should be located; but I prefer to place them in positions where they would be at all times conveniently accessible. For example, the said safety devices may be contained in strong protective casings or boxes provided with a glass front, if desired, and said boxes should be furnished with fastening devices, and, in fact, be disposed substantially as are the fire-alarm boxes so generally in use. With such an arrangement the visual-signal, liberated by a blown fuse, would be readily seen by an inspector, and could be readily replaced. Convenient positions for the boxes would be attached to poles supporting the cross-wire or to the walls of adjacent buildings, although any convenient method of disposition may be adopted.

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

1. An electric-railway-conductor system comprising sectional working-conductors connected at their ends to adjacent sections by an insulating-support and electrically connected to each other by a fusible connection which spans the insulating-support, substantially as described.

2. An electric-railway-conductor system comprising separate sections of working-conductors connected at their adjacent ends by insulating-supports and electrically connected through a fusible connection adapted to be blown when the current in any one section exceeds the desired intensity, substantially as described.

3. An electric-railway-conductor system comprising a main trunk-feeder, lateral feeders leading therefrom to fuse-boxes, and a plurality of feeders leading from the fuse-boxes to separate sections of working-conductor, substantially as described.

4. An electric-railway-conductor system comprising a main trunk-feeder, lateral feeders leading therefrom to fusible connections, and a plurality of feeders leading from each fusible connection to separate working-conductors, substantially as described.

5. An electric-railway-conductor system comprising a main trunk-feeder, a lateral feeder leading therefrom to a fusible connection, and a plurality of feeders leading from the fusible connection and connected to and supplying one or more independent sections of working-conductor, substantially as described.

6. A system of electric-railway conductors comprising a trunk-feeder extending from the source of current into the field of distribution, a sectional working-conductor, the extremities of the sections connected by insulating-supports to form a substantially continuous line, fusible connections spanning the insulation between the sections, and feeders extending from the trunk to each working-section and each provided with a fusible cut-out, substantially as described.

7. An electric-railway-conductor system comprising a working-conductor following an irregular path approaching itself in its course and cross-connections between its nearest points, whereby the total resistance of the said working-circuit is lessened, substantially as described.

8. In a system of electric conductors, an insulated section of working-conductor following an irregular path connected upon itself by an independent conductor upon the shortest line between its extremities, substantially as described.

9. An electric-railway-conductor system comprising a working-conductor following an irregular path approaching itself in its course, said conductor formed of insulated sections united by insulating-supports, so as to form a substantially continuous line, and cross-connections between the ends of insulated sections traversing a devious path, said connections following the shortest distance between the ends of sections, substantially as described.

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

CHARLES J. VAN DEPOELE.

Witnesses:
FRANKLAND JANNUS,
STEPHEN JANNUS.