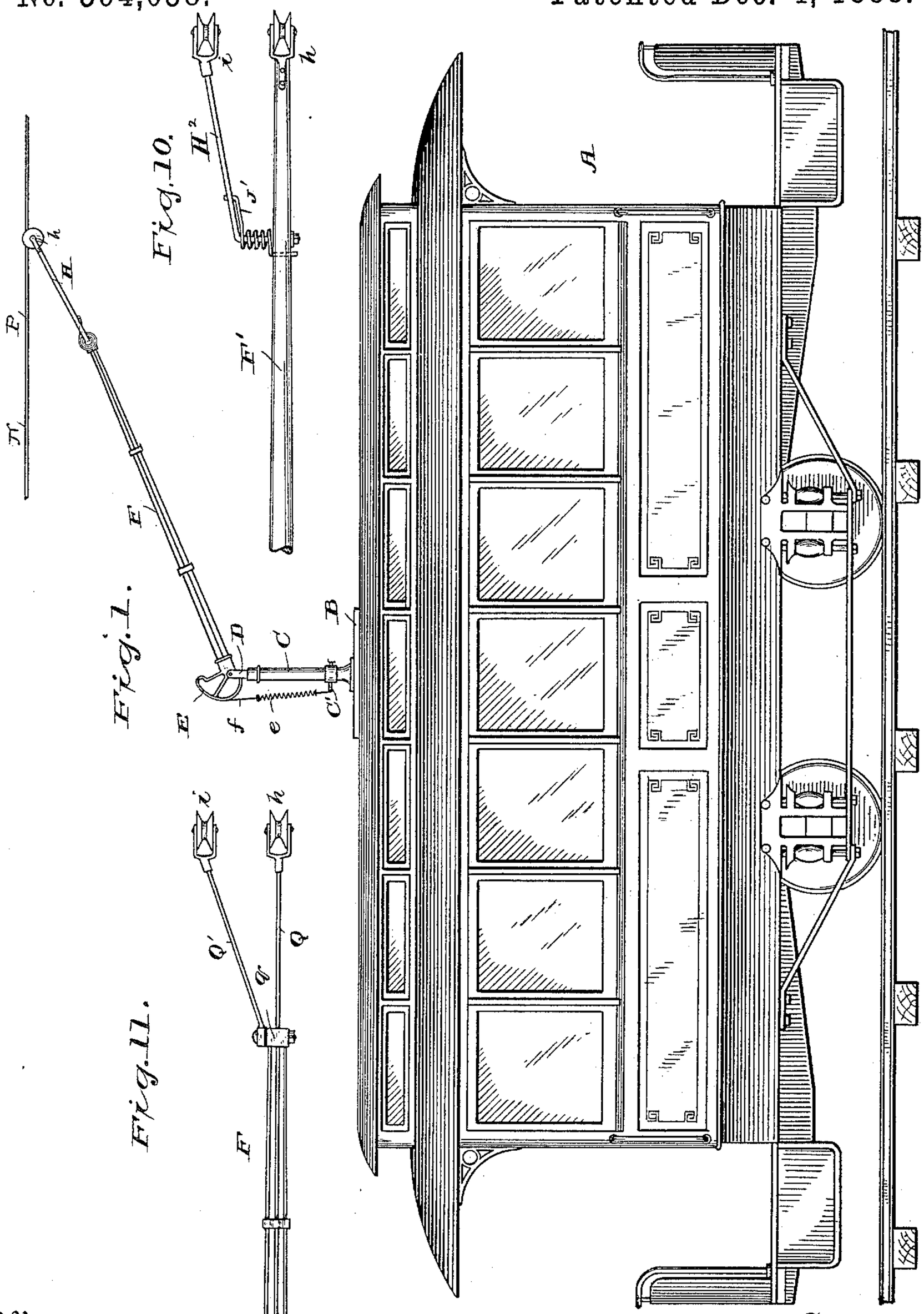
(No Model.) 3 Sheets—Sheet 1.

C. J. VAN DEPOELE.

DUPLEX UPWARD PRESSURE CONTACT.

No. 394,038. Patented Dec. 4, 1888.



Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

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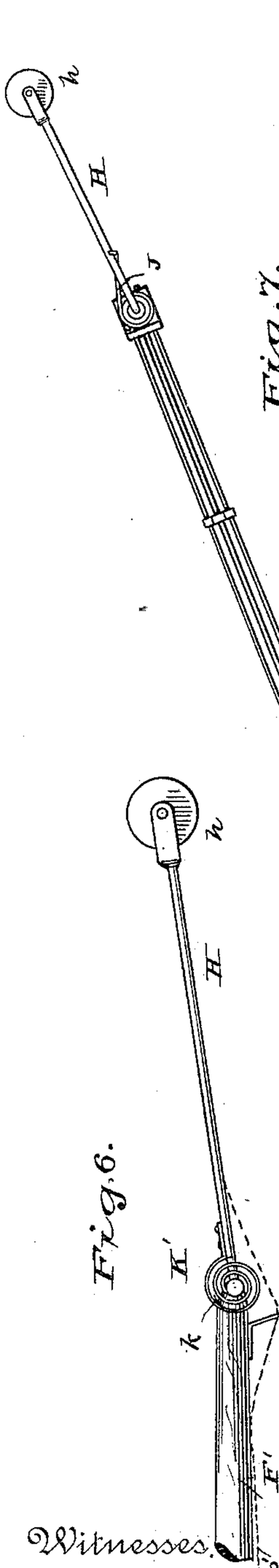

Fig. 7.

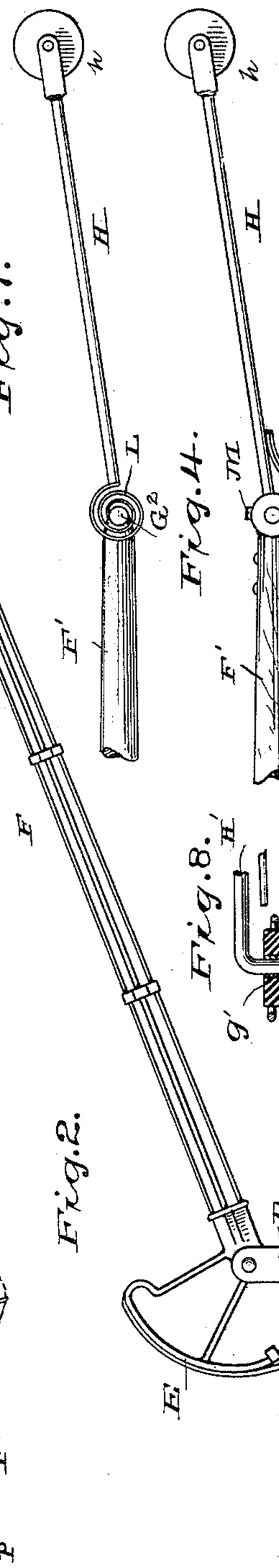

Fig. 4.

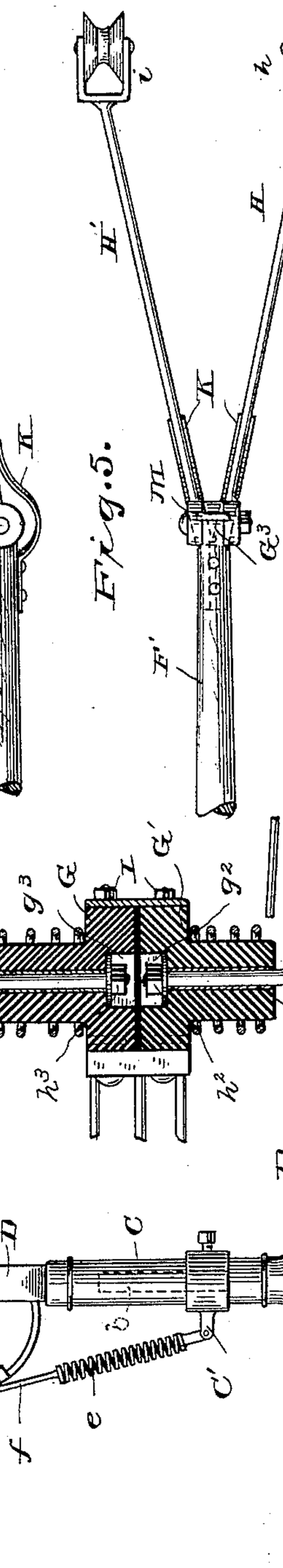

Fig. 5.

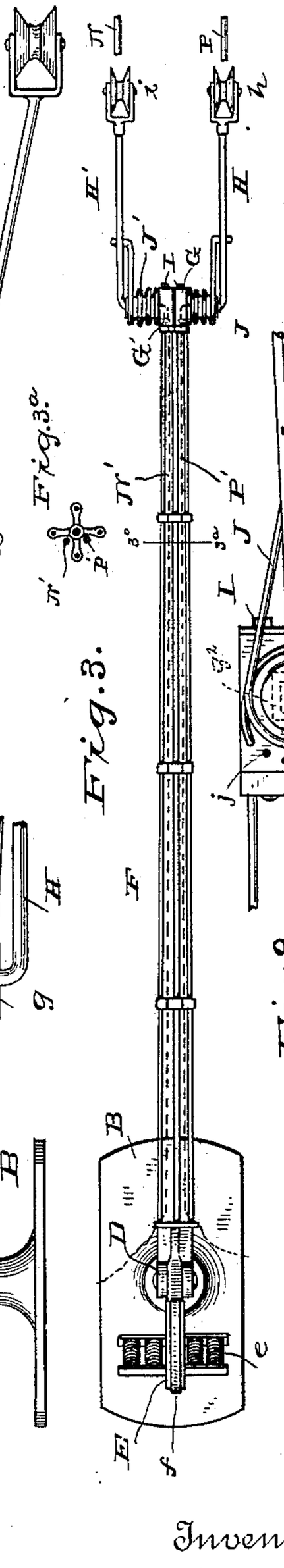

Fig. 3a.

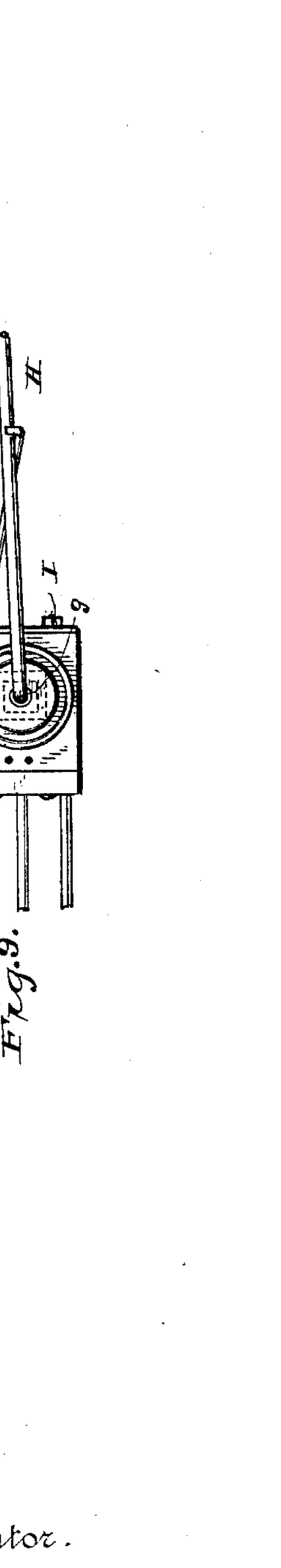

Fig. 3.

Fig. 9.

Fig. 8.

Fig. 2.

Fig. 6.

Witnesses.

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(No Model.) 3 Sheets—Sheet 3.

C. J. VAN DEPOELE.

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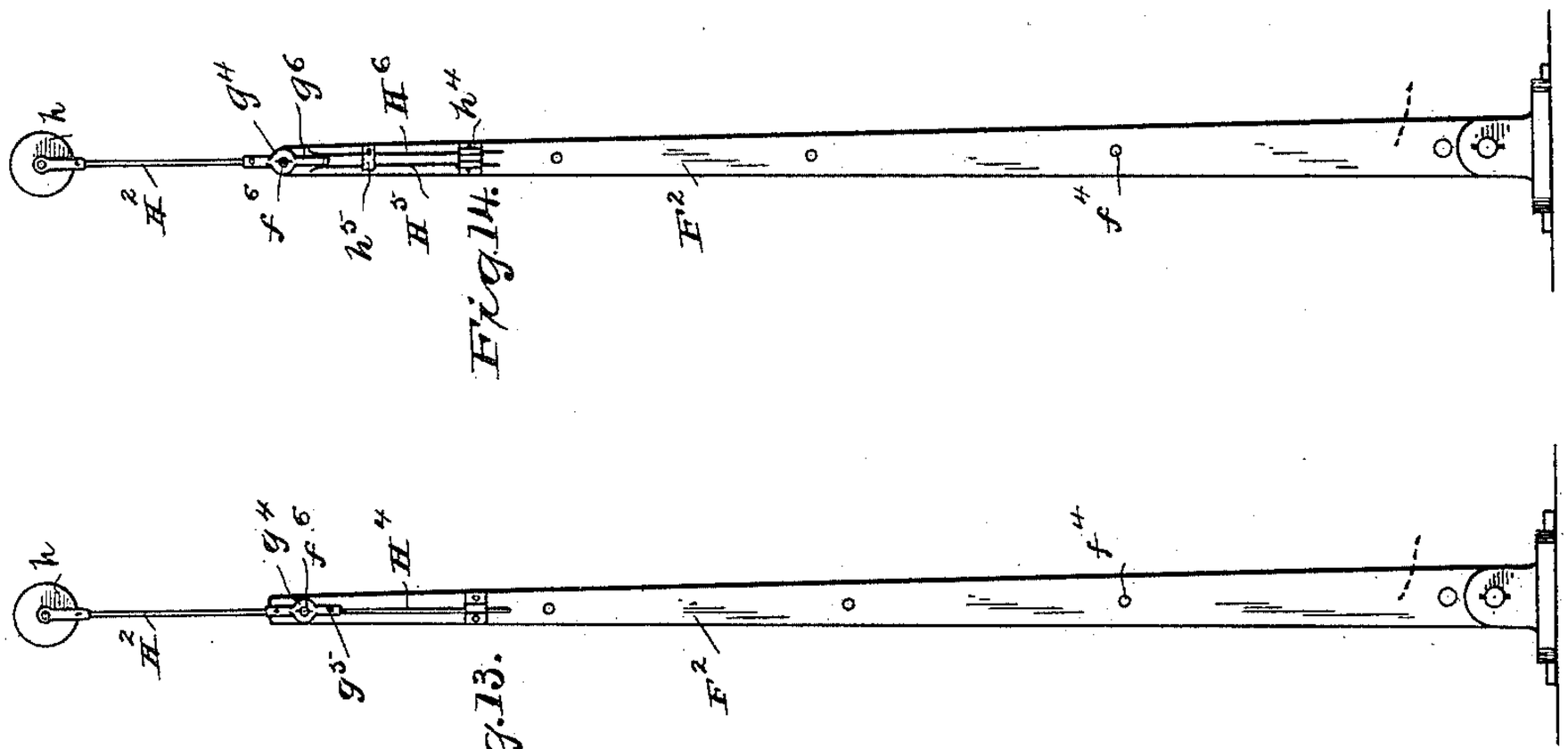

Fig. 14.

Fig. 13.

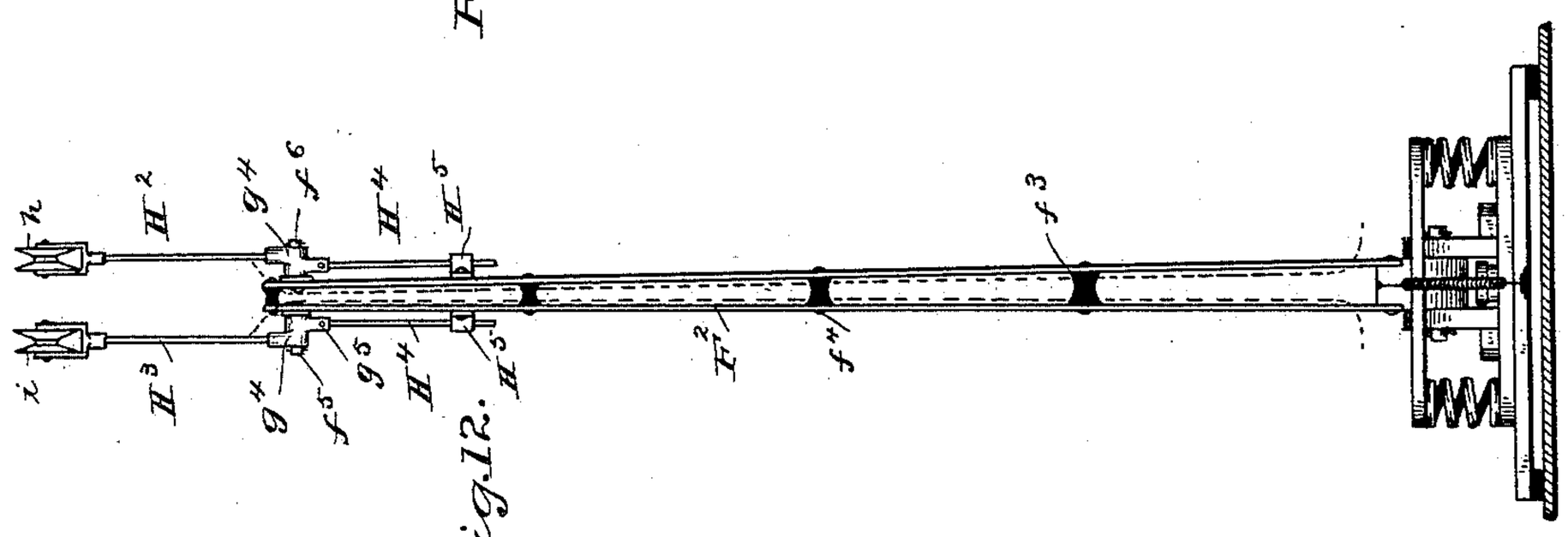

Fig. 12.

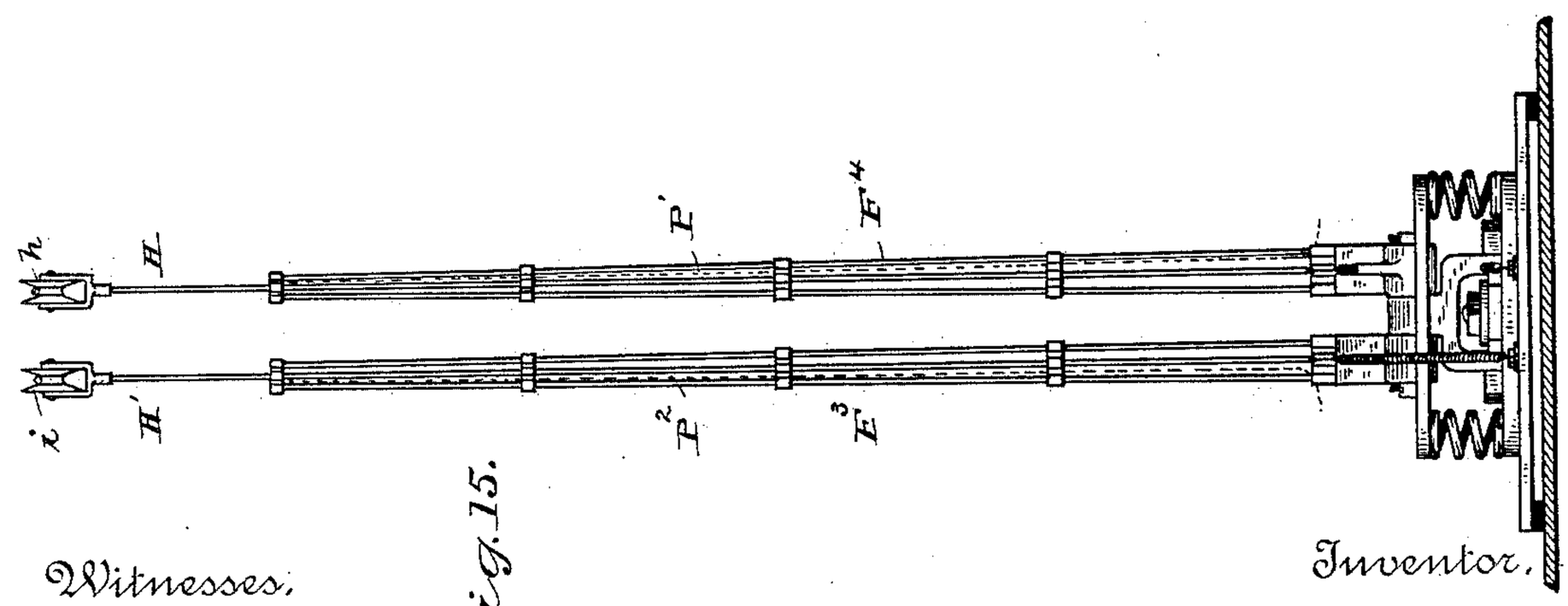

Fig. 15.

Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

DUPLEX UPWARD-PRESSURE CONTACT.

SPECIFICATION forming part of Letters Patent No. 394,038, dated December 4, 1888.

Application filed September 7, 1888. Serial No. 284,799. (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 Duplex Upward-Pressure Contacts, of which the following is a description.

My invention relates to improvements in devices for establishing a traveling electrical contact between a moving vehicle and a plurality of fixed suspended conductors.

The present invention relates, chiefly, to a duplex form of contact device for maintaining contact with both conductors when both positive and negative line-conductors are suspended above the track in contradistinction to the system employing but a single overhead conductor for each track, the track-rails themselves being utilized as the return-circuit.

The construction, arrangement, and operation of my improved contact device will be hereinafter fully described, and referred to in the appended claims.

In the drawings, Figure 1 is a side elevation showing a car provided with duplex contact devices embodying my invention. Fig. 2 is an elevation, on an enlarged scale, showing a contact-arm, its support, and the contact devices. Fig. 3 is a plan view of the arm and contact devices shown in Fig. 2. Fig. 3^a is a section on line 3^a 3^a of Fig. 3. Fig. 4 is an enlarged detail in elevation showing a different arrangement of the springs by which the independent contact-carrying fingers are actuated. Fig. 5 is a plan view of what is shown in Fig. 4. Figs. 6 and 7 are also enlarged details showing other forms of spring-support for the independent contact-carrying fingers. Fig. 8 is a detail view, on an enlarged scale, showing the attachment of the spring-fingers of Fig. 3. Fig. 9 is an elevation of the details shown in sectional plan in Fig. 8. Figs. 10 and 11 are plan views showing slightly-modified constructions. Fig. 12 is a plan view, and Fig. 13 a side elevation, showing a somewhat different construction, also embodying my invention. Fig. 14 is a side elevation showing another form of spring. Fig. 15 is a plan view showing two complete and independent arms.

Similar letters denote like parts throughout.

As seen in the drawings, A represents the car, upon the roof of which is mounted a base, B, suitably insulated therefrom and formed with upwardly-extending post or stem *b*. Upon the stem *b* is pivotally mounted a sleeve, C, formed or provided at its upper extremity with a fork, D, in which is hinged an eccentric or cam, E, from the rearward portion of which extends an arm, F, which, as seen in Figs. 1, 2, and 3, is formed of a number of steel wires or rods assembled and secured together to form a truss pole or arm.

To the lower portion of the sleeve C is adjustably secured a short arm, C′, to which are attached the lower ends of a spring or springs, *e*, the upper extremities of which are connected to a band, *f*, passing over the face of the eccentric E, and by means of which the tension of the springs *e* is communicated to the face of the eccentric E, exerting an upward pressure upon the arm F and the contact device or devices carried thereby.

The construction so far described is not claimed in the present application, since it is included in the subject-matter of another application filed by me August 9, 1888, Serial No. 282,332, and it is only referred to herein by way of illustration.

To the extremity of the arm F is attached a block or cross-head formed of two portions, G G′, each of which may be a block of insulating material; but they may also be of metal lined with insulation and insulated each from the other. The blocks G G′ are extended laterally in the form of hollow trunnions, each of which forms a horizontal insulated bearing, *g g′*. The blocks G G′ are secured to the extremity of the arm F in any suitable manner, as by bolts I. A pair of short arms or fingers, H H′, are pivotally supported at their inner ends in the insulated bearings *g g′*, and provided at their extremities with contact-rollers *h i*, for engaging the conductors P N.

Each contact-carrying arm is provided with an upwardly-acting spring, J J′. As seen in Figs. 1, 2, and 3, these springs are of resilient wire, the inner ends of each of which are inserted in one of a series of holes, *j*, in the blocks G G′, then coiled about the exterior of the trunnions or journal-boxes *g g′*, and turned out-

wardly to engage the fingers H H′, pressing them upwardly with the desired degree of force, which can be adjusted by placing the inner ends of the springs in one or other of the series of holes *j*. The inner ends of the fingers H H′ extend through their bearings *g g′* and into enlarged recesses g^2 g^3 in the inner faces of the blocks G G′, when they are secured by nuts or stops h^2 h^3, which are of sufficient size to limit the upward movement of either of the fingers when disengaged from the conductor. Other forms of stops may also be used, as will appear. The fingers H H′, being separately mounted and spring-actuated, will move independently to accommodate themselves to the unavoidable differences in the height of the conductors. The arm F is pressed upwardly by the tension-springs *e*, and the fingers H H′ are also separately pressed upward, in order, as just stated, to compensate for any irregularity in the height of the conductors. The tension of the springs actuating the fingers should therefore be practically equal to that of the main tension-spring *e*, so that the contact arm and fingers will maintain a substantially straight line of connection between the inner end of the said arm F and the devices in contact with the under side of the conductor, allowing, of course, for variation in height of the fingers H H′ where the suspended conductors are not in the same horizontal plane.

In Figs. 4 and 5 I have shown two leaf-springs, K K, each secured directly to the contact-arm F′, which is in this instance of insulating material—as wood. The springs K K press upwardly against the under sides of the fingers H H′.

In Fig. 6 a coiled spring, K′, is shown; and in this instance the springs are adjustably secured to their support by a rotatable sleeve or collet, *k*, to which the inner end of the spring is attached, so as to vary the tension as required.

In Fig. 7 I have shown the fingers as being wholly supported upon tension-springs L, but not directly secured to the cross-head G. With this construction the springs are secured to the insulating-supports or cross-head G^2, and at their outer extremities directly secured to the inner ends of the fingers H H′.

As seen in Figs. 4 and 5, fixed stops or projections M are formed upon the cross-head G^3, instead of upon the inner ends of the fingers themselves, to limit the upward movement of the fingers either in case of a preponderance of strength in the springs controlling the fingers or in case one or both thereof should become disengaged from the conductor.

In Fig. 6 a cord or chain may be secured to the under side of the fingers and to the arm F to prevent them turning over backward when disengaged from the conductor. It will be obvious that the conductor by which the current is led from the contact device to the car may be utilized for this purpose.

In the form shown in Figs. 1, 2, and 3 the steel truss-pole, previously referred to, is utilized with this construction, and care is required to thoroughly and efficiently insulate the fingers from each other and from the arm F, the current being led from the contact device or fingers by separate conductors P′ N′, supported in any convenient manner upon the arm F, and extending to the car, and thence to the motor.

As seen in Figs. 4, 5, 6, and 7, a wooden pole or arm, F′, is substituted for the arm F, and with this construction the insulation of the fingers is simplified, and conductors extending therefrom pass down through or upon the arm F′ and to the car.

The construction and forms already described will be found to possess many practical advantages; but my invention is not limited to the precise constructions already described, and the invention may be modified in several particulars. For example, a contact-arm such as already described in my hereinbefore-referred-to application may be used and establish contact with one of the suspended conductors, and one spring-actuated finger be added thereto to engage the other conductor. Such constructions are shown in Figs. 10 and 11. In Fig. 10 is seen a wooden arm, F′, provided at its outer end with a contact-trolley, *h*, and to this arm is attached an independent spring-finger, H^2, carrying at its outer end a trolley, *i*. The finger H^2 is formed with an angular bend at its inner end, the said bent portion being pivotally supported upon or within the arm F′. As indicated, the said arm being of wood, the inner end of the finger is fitted through an aperture therein and upwardly pressed by a spring, J′, coiled about its lower end and engaging the arm F′ and the finger H^2.

Independent fingers, each provided with a contact-trolley and made of resilient material, so as to require no additional springs, may also be used. As seen in Fig. 11, the arm F is provided with an extended portion, Q, in the form of a thin resilient rod or strip. A second similar rod or strip, Q′, is provided, which latter is attached to a block or head, *q*, at the extremity of the rod F, in a position diverging from the extension Q sufficiently to engage the second conductor.

In Figs. 12, 13, and 14 a somewhat different but equivalent construction is shown. The arm F^2 is formed of two strips or bars of wood or other insulating material separated by blocks f^3, also of insulating material, and firmly united by bolts f^4, passing therethrough.

At or near the extremity of the arm F^2 are secured pivots or bolts f^5 f^6, each secured in one of the wooden bars f' f^2 and projecting laterally therefrom. Upon each of the pins f^5 f^6 may be placed a bushing, f^7, of insulating material. (Indicated in dotted lines in Fig. 12.) The bushing is, however, not essential, since the pivot-pins are each separately mounted in an insulated support. Upon each

of the lateral bearings, formed as just described, is pivotally mounted a rocking arm, g^4 g^4, provided with a socket at its upper part for receiving the lower ends of fingers H^2 H^3, which are provided at their outer extremities with contact-trolleys *h* *i*, as previously described. The rocking arms g^4 are each provided at their lower parts with a downwardly-extending lug, g^5, in each of which is secured a rod or bar spring, H^4. The lower extremities of the springs H^4 pass through guide-bearings H^5, through which said springs have endwise movement, so as to permit of their free action upon the rock-arms and fingers to hold the latter in alignment with the arm F^2, except, of course, when said springs yield in following the depressions of the conductors with which the trolleys respectively are in contact.

In Fig. 14 duplex springs H^5 H^6 are shown, and said springs are rigidly attached to the supporting-arm F^2 at their lower extremities by a suitable clamp, h^3 h^4. The upper extremities of the springs H^5 H^6 bear, respectively, against opposite sides of a lug or extension, g^6, upon the lower part of the rock-arm g^4, tending to hold said rock-arm and the finger supported thereby in alignment with the arm F^2. The springs H^5 H^6 are desirably connected by a clamp, h^5, which is rigidly attached to one of said springs and incloses the other one, but in a manner allowing endwise movement of the said last-mentioned spring, so that while the stiffness of said springs is added to by their being united in the clamp h^5 their freedom of movement remains.

It will also be understood that two independently-moving contact-arms similar to the one shown in another pending application, filed August 9, 1888, Serial No. 282,331, may be employed, if desired, with good results. Such an arrangement is shown in Fig. 15; but the method of supporting the arm is not herein referred to, since it is not essential, and, furthermore, because it forms part of the subject-matter of my said other application.

While I have claimed my invention as comprising two independent insulated contact-making devices, and stated that said contact devices are for engagement, respectively, with the positive and negative supply-conductors, I do not consider that the use of a greater number of independently-moving or independently spring-pressed arms would be in any way a departure from the present invention.

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

1. An upward-pressure contact-arm provided with two independent insulated contact-making devices, substantially as described.

2. The combination, with a plurality of suspended supply-conductors, of an upward-pressure contact device comprising a plurality of independent insulated contacts adapted to engage the said supply-conductors, substantially as described.

3. The combination, with an upwardly-spring-pressed movable arm, of one or more independently-movable spring-pressed insulated fingers mounted upon said arm and carrying a contact trolley or trolleys, substantially as described.

4. The combination, with a movable upwardly-spring-pressed contact-arm, of a pair of insulated upwardly-spring-pressed contact-carrying fingers separately mounted in the outer extremity thereof, substantially as described.

5. The combination, with an upwardly-spring-pressed movable arm, of contact-fingers provided with trolleys at their outer extremities, said trolleys engaging parallel supply-conductors, and tension-springs for independently pressing said fingers upwardly against the conductors, substantially as described.

6. The combination, with an upwardly-spring-pressed movable arm, of duplex independent contact-carrying upwardly-spring-pressed fingers and separate adjustable tension-springs for pressing said fingers upwardly against the conductors, substantially as described.

7. The combination of a contact-arm, springs and compensating devices for applying a substantially constant pressure thereto throughout its range of movement, independent contact-carrying fingers at the outer extremity of the arm for engaging the conductors, and springs for maintaining upward pressure of the fingers, said springs exerting substantially the same upward pressure as the springs controlling the supporting-arm, substantially as described.

8. The combination, with a moving vehicle and a motor propelling the same, of an upward-pressure contact-arm, insulated independent contacts at the outer extremity thereof adapted to engage positive and negative supply-conductors, and positive and negative branch conductors extending from the separate contacts to the motor, substantially as described.

9. The combination, with an upward-pressure contact-arm, of contact-carrying fingers mounted upon said arm and provided with means for separately pressing said fingers against the conductors, and stops for limiting the upward movement of the fingers, substantially as described.

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

CHARLES J. VAN DEPOELE.

Witnesses:

FRANKLAND JANNUS,

FRANK T. OKELL.