No. 842,222. PATENTED JAN. 29, 1907.

G. A. MEAD.

CATENARY SUSPENSION FOR TROLLEY WIRES.

APPLICATION FILED NOV. 23, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

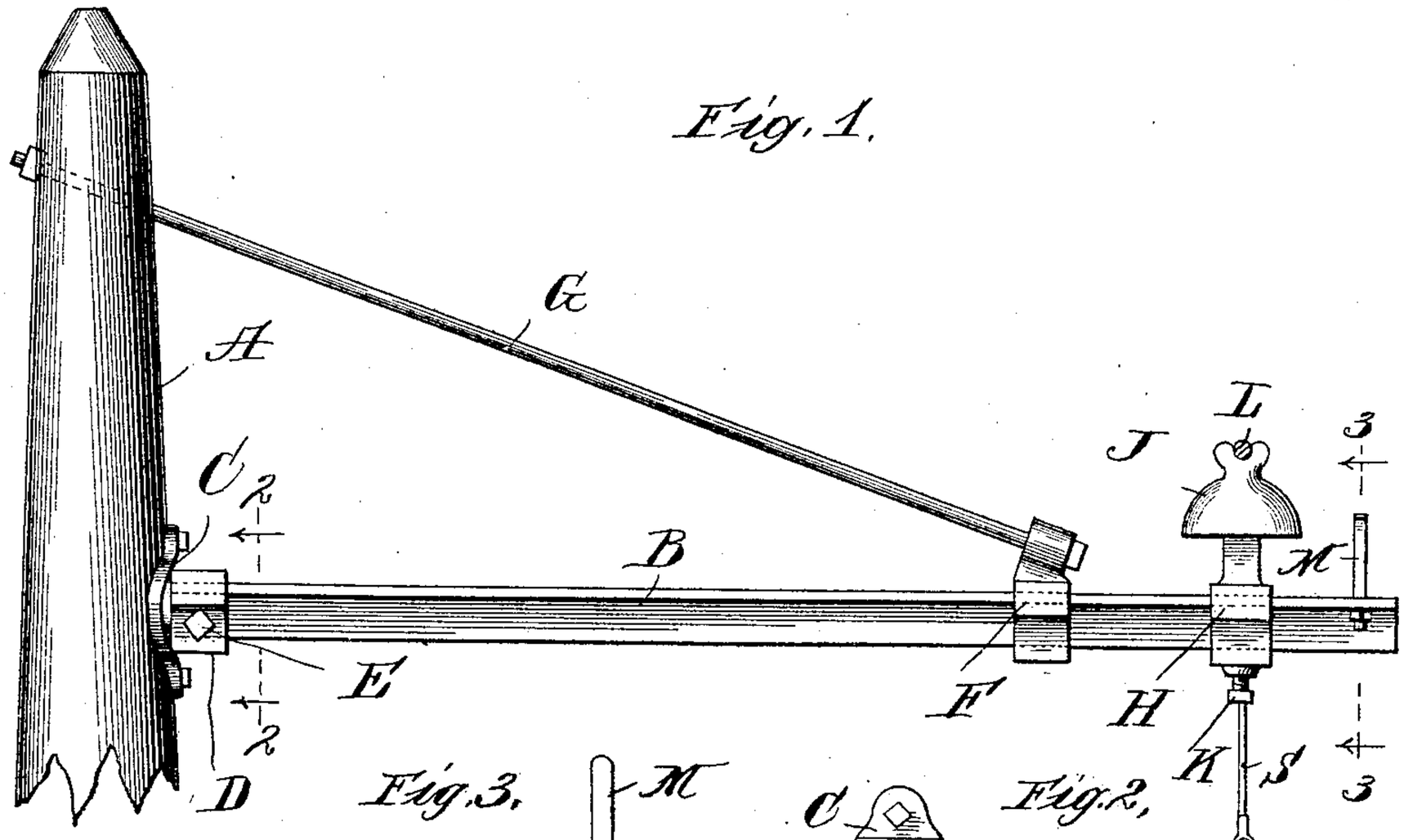


Fig. 3.

Fig. 2.

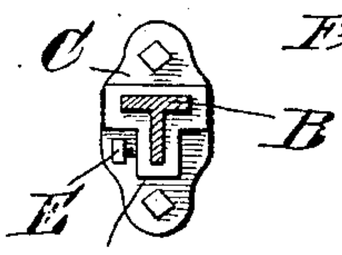


Fig. 6.

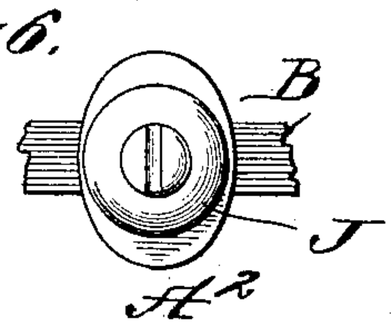


Fig. 5.

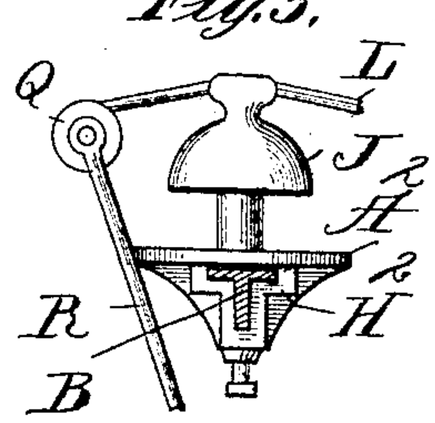
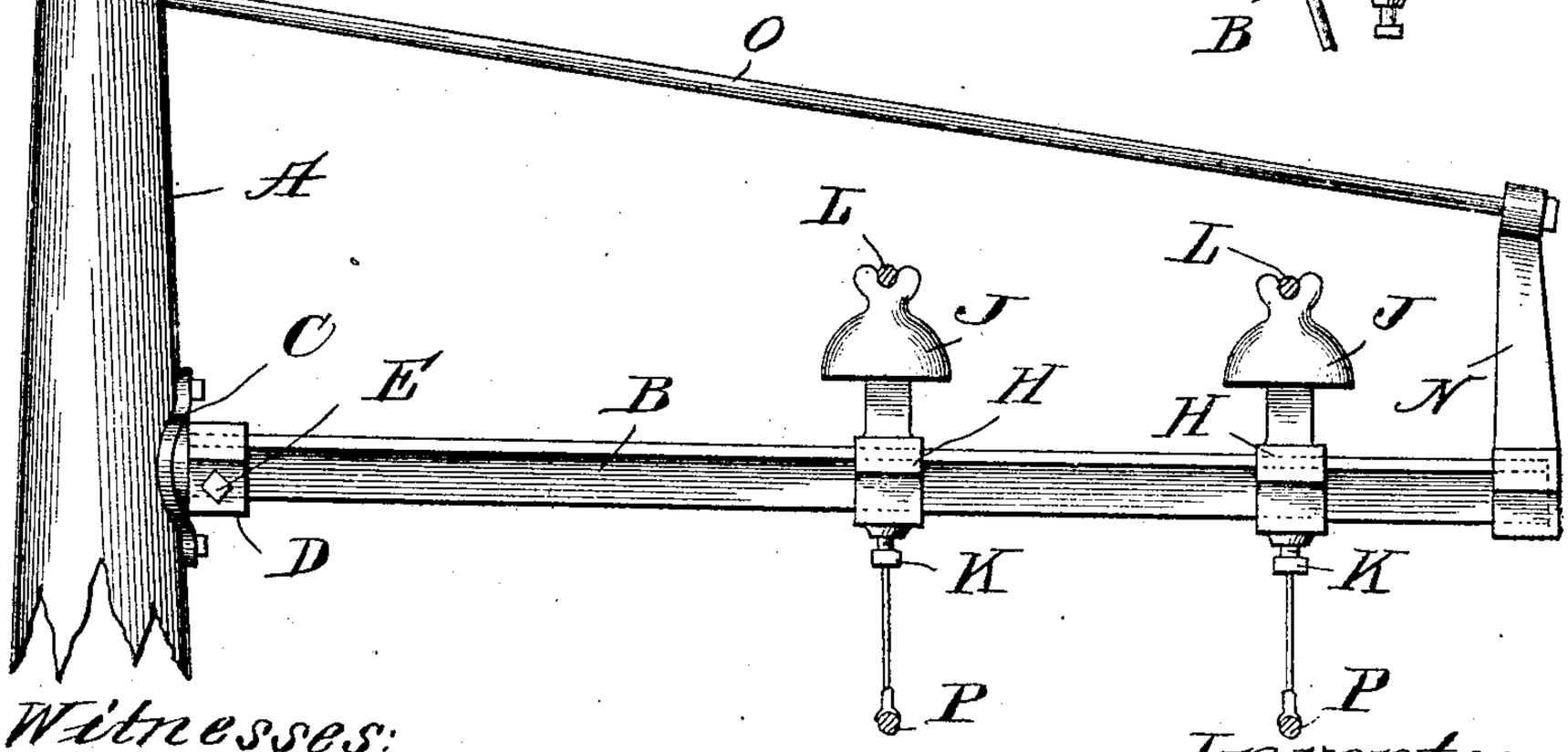


Fig. 4.



Witnesses:
G. A. Pauberschmidt
E. C. Semple

Inventor:
George A. Mead
By Brown & Darby
Attys.

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2 SHEETS—SHEET 2.

Fig. 11.

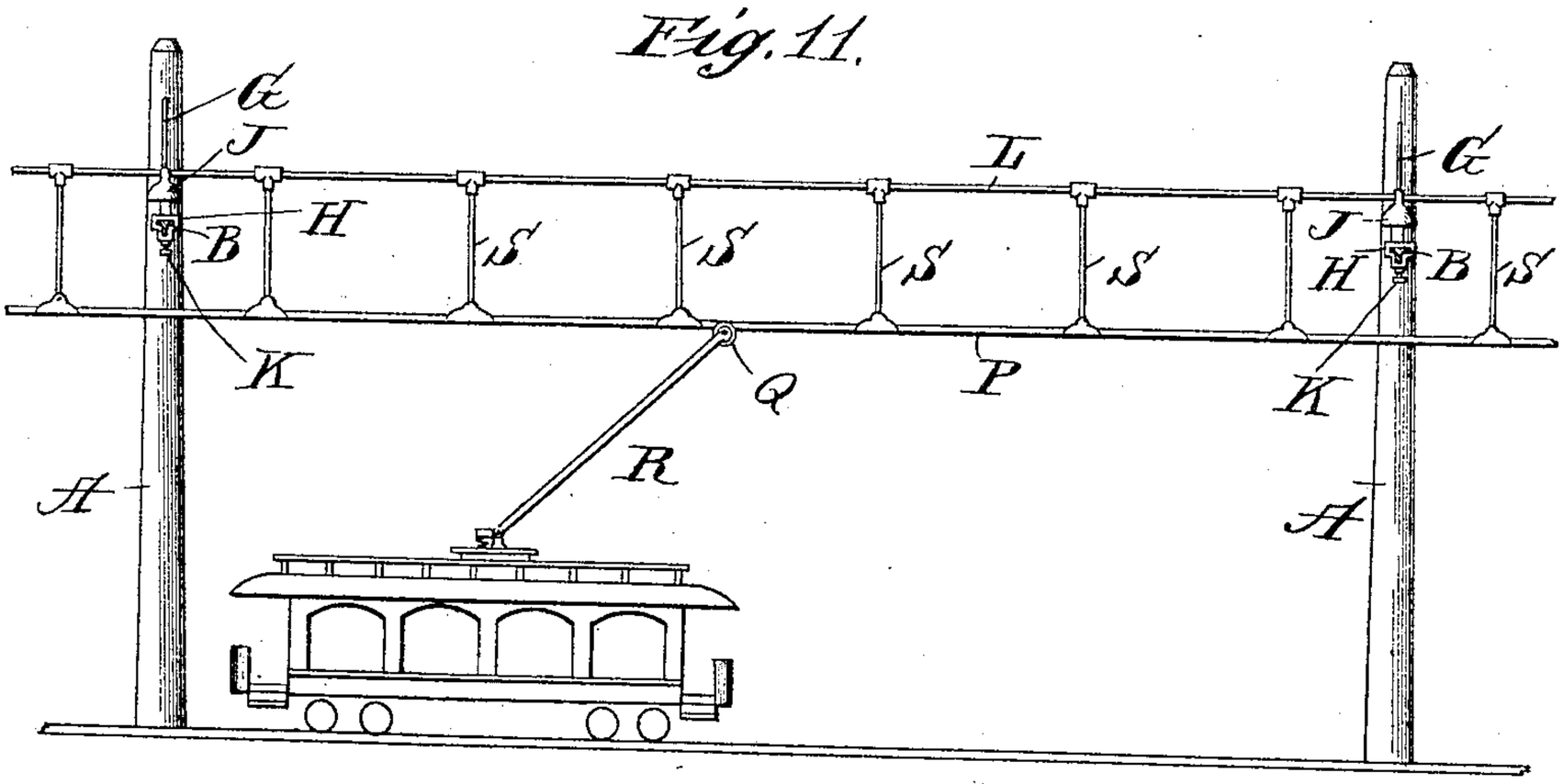

Fig. 9.

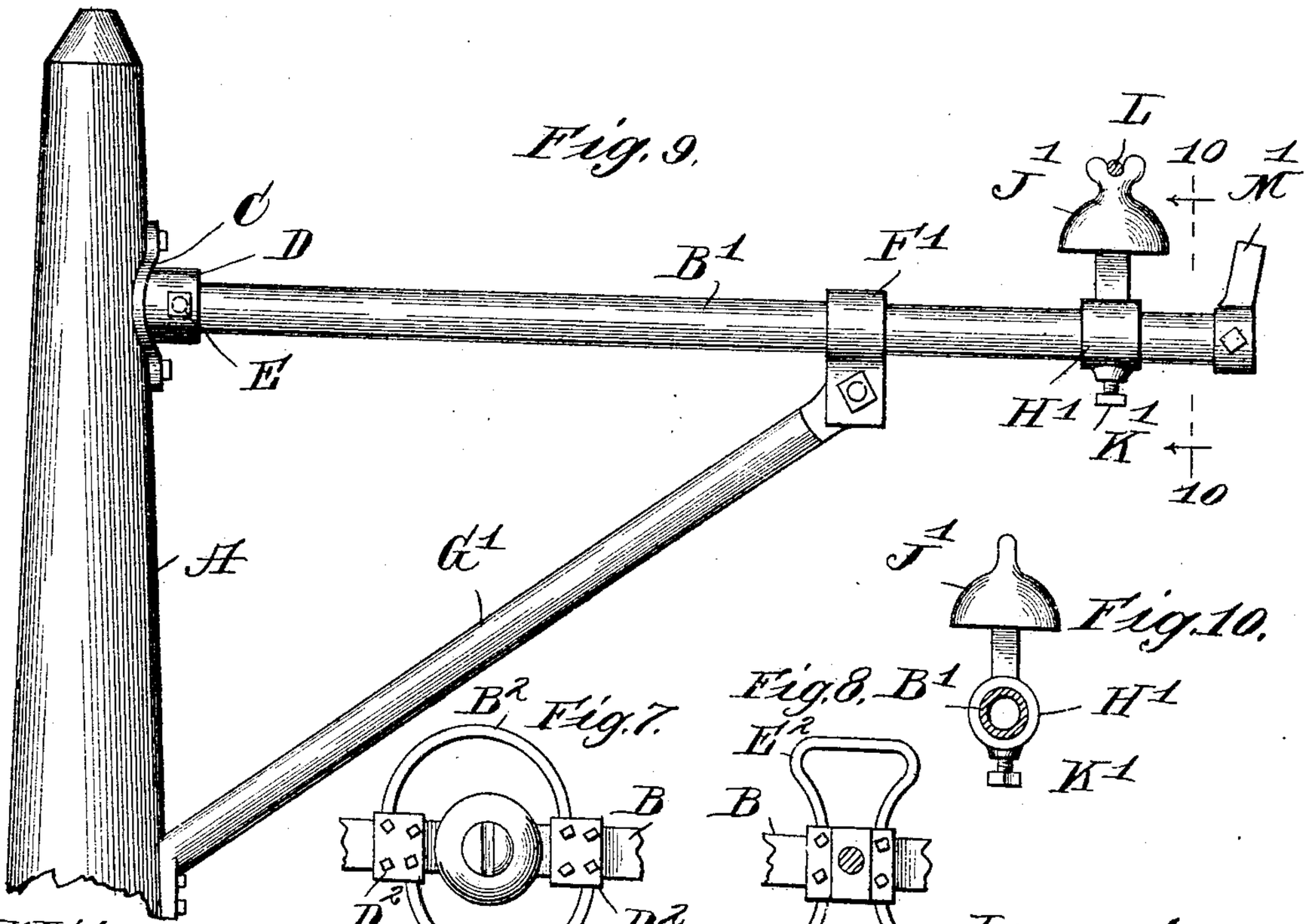

Fig. 10.

Fig. 7.

Fig. 8.

Witnesses:
G. A. Paubenschmidt
E. C. Semple

Inventor:
George A. Mead
By Brown & Darby
Attys.

UNITED STATES PATENT OFFICE.

GEORGE A. MEAD, OF MANSFIELD, OHIO.

CATENARY SUSPENSION FOR TROLLEY-WIRES.

No. 842,222. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed November 23, 1904. Serial No. 233,938.

To all whom it may concern:

Be it known that I, GEORGE A. MEAD, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented a new and useful Catenary Suspension for Trolley-Wires, of which the following is a specification.

This invention relates to catenary suspension for trolley-wires.

The object of the invention is to provide a construction of catenary suspension for trolley-wires which is simple and efficient.

A further object of the invention is to provide means for suspending a trolley-wire adapted to carry currents of high voltage.

A further object of the invention is to provide means for efficiently suspending a trolley-wire in such manner as to maintain the same in true and proper alinement for the operation of street or other cars at high speeds.

A further object of the invention is to provide means for suspending trolley-wires for electric-car lines wherein danger to pedestrians through the breaking or falling of the trolley-wire carrying live current is reduced to a minimum.

A further object of the invention is to provide means for efficiently protecting the trolley-wire insulators from danger of injury or breakage through the trolley-pole striking the same in case of accidental displacement thereof from the trolley-wire.

Other objects of the invention will appear more fully hereinafter.

The invention consists, substantially, in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in side elevation of a construction of catenary suspension for trolley-wires embodying the principles of my invention, the supporting-post being broken off. Fig. 2 is a detail view in cross-section on the line 2 2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is a similar view on the line 3 3, Fig. 1. Fig. 4 is a view similar to Fig. 1, illustrating modified features of construction embraced within the spirit and scope of my invention. Fig. 5 is a broken detail view of an insulator-support and an associated guard whereby the insulator is protected against the danger of the trolley-pole striking the same. Fig. 6 is a plan view of the construction shown in Fig. 5. Figs. 7 and 8 are detail views similar to Fig. 6, showing modified forms of insulator-guards embraced within the spirit and scope of my invention. Fig. 9 is a view similar to Figs. 1 and 4, showing a modified form of catenary support embraced within the spirit and scope of my invention. Fig. 10 is a view in transverse section on the line 10 10 of Fig. 9 looking in the direction of the arrows. Fig. 11 is a view in elevation of a section of electric road, showing a catenary suspension of trolley-wire embraced within the spirit and scope of my invention.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In the use of electric currents of high voltage for the operation of electric cars it is desirable to support the trolley-wire at frequent and short intervals in order to maintain the wire with as few sags or dips as possible, thereby producing a more nearly straight condition of the trolley-wire for the trolley-wheel to travel along. This is exceedingly important in the case where high speed of the car is desired. It is also desirable to support the trolley-wire at frequent intervals as a matter of safety to the public should the trolley-wire break or fall, rendering imminent danger of contact with an exposed conductor carrying a current of high voltage. It is also desirable to provide means whereby the trolley-wire is efficiently insulated and where the insulator-supports for the trolley-wire are protected against the danger of breakage through the trolley-pole striking the same in case such pole becomes accidentally displaced from bearing contact against the under side of the trolley-wire. The attainment of these desirable objects, among others, by a construction which is simple and efficient is among the special purposes of my present invention.

In the drawings reference-sign A designates a post or pole, designed to be placed to one side of or between the tracks of electric-railway road-beds, from which the trolley-wires are supported.

B designates an arm adapted to be supported upon the post A in any suitable or convenient manner. In the particular form shown, to which, however, my invention is not to be limited or restricted, a casting C is secured to the post A and is provided with a

socket D, in which is received one end of arm B, said arm being held in such socket in any convenient manner—as, for instance, by means of a set-screw E. The arm B may be of any suitable shape in cross-section—that is, it may be irregular in shape in cross-section, as clearly shown in Figs. 1, 2, 3, and 4, or it may be in tubular or cylindrical form, as indicated at B′ in Figs. 9 and 10. In practice I prefer to employ an arm of irregular shape in cross-section, such shape being better adapted to maintain clamps, castings, or brackets, hereinafter referred to, without danger of rotative displacement upon said arm. The arm B′ B extends laterally from the supporting-post A and may be braced to such post in any suitable or convenient manner. For instance and as shown in Fig. 1, a strain-casting F may be secured to the arm B and connected by a strain-brace G to the post A. Instead, however, of this strain-brace G being arranged at its post end at a point above the bracket C said strain-brace may be located at its post end below the bracket C, as shown in Fig. 9, wherein G′ designates the strain-brace, and F′ the strain-casting clamped or secured to the arm B′ and to which one end of strain-brace G′ is connected, the other end of said brace being connected to the post A at a point below the bracket C. In practice, however, I prefer the arrangement shown in Fig. 1.

H designates a supporting-casting for an insulator J. This casting is designed to be slipped over the end of arm B and to be adjusted lengthwise of said arm and clamped and held in any suitable or conveinent position and in any suitable or convenient manner—as, for instance, by means of set-screw K—the corresponding parts in the form of construction shown in Figs. 9 and 10 being designated by reference-signs H′, J′, and K′.

The insulators J may be of the usual or any well-known type of construction, provided with a seat in the upper end thereof to receive and support what I will term a "messenger-wire" L.

From the foregoing description it will be seen that the messenger-wire L is supported over or above the arms B B′, and therefore, in case the messenger-wire should become loose or displaced from its seat in any one of the insulator-supports J J′, instead of falling to the ground or to the street or on the road-bed of the railroad such wire would catch upon and be supported by the arm B B′, and this I regard as a most valuable feature of my invention.

If desired and in order to prevent the messenger-wire, in case it should become loose and displaced from its seat upon insulator J or J′, from slipping over to the free end of the arm B B′, suitable means may be provided for retaining such messenger-wire upon the supporting-arm B. In Figs. 1 and 3 I have shown one form of construction embodying this idea, wherein a pin M is arranged to be secured adjacent the outer or free end of arm B and outside of the insulator-supporting bracket H. A similar arrangement is shown in Fig. 9, wherein the pin M′ is provided with a sleeve arranged to be slipped over the end of arm B′ and clamped or held thereon in any suitable or convenient manner and at a point outside the insulator-supporting bracket H′.

In Fig. 4 I have shown a slightly-modified arrangement of retaining device for the messenger-wire L in case it should become displaced from its seat upon the insulator J, wherein a bracket or casting N is arranged to be received upon the outer end of the arm B and such bracket or casting extending at its upper end to a point above the messenger-wire and its supporting-insulator J and a strain-brace O being connected at one end to the upper end of bracket or casting N and at the other end to the post A. Thus it will be seen that I combine the messenger-wire-retaining device with a strain-brace for supporting the arm B. In this case it will be observed that the messenger-wire passes between the strain-brace and the arm B and inside of the arm or bracket N or between said bracket and the post A. Consequently all danger of the messenger-wire becoming displaced from its seat in its supporting-insulator and slipping off end of arm B is avoided.

Reference-sign P designates the trolley-wire and against which in the operation of the road the trolley-wheel Q, carried by the trolley-pole R, bears. The trolley-wire P is suspended at frequent intervals from the messenger-wire L in any suitable or convenient manner—as, for instance, by the suspending connections S. In practice I propose to make these suspending connections S for the trolley-wire flexible, so as to avoid danger of the passage of the trolley-wheel along the trolley-wire P imparting a pounding action to the trolley-wire, which would be transmitted through such connections S to the messenger-wire, thereby tending to unseat or displace the messenger-wire from its seat in its supporting-insulators J J′. In practice I propose to employ suspending devices S at frequent intervals or short distances apart, whereas the posts A may be placed at the usual or any desired intervals or distances apart along the roadway of the line. In this manner the trolley-wire is most efficiently supported and insulated and held in truly straight position, thereby avoiding sag or dip and enabling the car to attain a high degree of speed and reducing to a minimum the danger of the trolley-wheel jumping the trolley-wire, while at the same time reducing to a minimum the danger to pedestrians using the roadway in case the trolley-wire should

fall or break, for in such case, being suspended from the messenger-wire at frequent intervals, in case of a break of the trolley-wire the ends would still be maintained at a sufficient height above the surface of the roadway to avoid danger of accidental contact with the exposed and charged or live wire, and by reason of supporting the messenger-wire at a point above the supporting-arms B B′ the danger of the trolley-wire falling is obviated, since should for any reason the messenger-wire be displaced from its seat in its supporting-insulator it would still be caught and held or supported by the arm B or B′, and the provision of the retaining-pins M M′, Figs. 1, 3, and 9, or the bracket or casting N, Fig. 4, prevents the messenger-wire from riding off the end of arm B B′.

It sometimes occurs in the operation of electric-car lines that the trolley-pole R jumps the trolley-wire P or becomes displaced therefrom, whereby its upper or free end is caused to swing violently upwardly. In such cases it frequently happens that the trolley-pole strikes the insulator-supports for the trolley-wire, cross-braces, and the like. In a construction embodying the principles of my invention as above described this objection is obviated, since the use of cross-braces is avoided, and the only harm or injury resulting from the trolley-pole jumping the trolley-wire would be in such pole striking an arm B B′. However, in order to avoid the danger of the trolley-pole striking an insulator J J′ and breaking the same it may sometimes be desirable to provide the insulators with guards. In Figs. 5, 6, 7, and 8 I have shown various forms of insulator-guards which are simple and efficient for protecting the insulators against breakage through the striking thereagainst of the trolley-pole. In the forms shown in Figs. 5 and 6 I provide the insulator-supporting casting H^2 with an extended flange A^2 of sufficient extent to receive the blow of the trolley-pole, as indicated in Fig. 5, and to protect the insulator from such blow.

It is obvious that the same result may be accomplished in many other specifically different ways. For instance, in Fig. 7 castings B^2 C^2 may be secured by collars or sleeves D^2 upon arm B and on opposite sides of the insulator and serving as guards to protect the insulator J from injury. In Fig. 8 I have shown another form of guard, comprising castings E^2 F^2, extending on opposite sides of the insulator-supporting casting and clamped or secured to such casting. I do not desire, therefore, to be limited or restricted in respect to the construction of insulator-guard.

It may sometimes be desirable to support two or more trolley-wires from each arm. I have shown such an arrangement in Fig. 4, wherein two brackets or castings H are shown supported upon arm B each carrying an insulator J, each insulator supporting a messenger-wire L, from each of which messenger-wires a trolley-wire P is suspended. This arrangement I desire to include within the spirit and scope of my invention.

From the foregoing description it will be seen that I provide an exceedingly simple and efficient catenary suspension for trolley-wires wherein the trolley-wire is efficiently insulated and is held truly straight, permitting the operation of street-cars therealong at high speeds and permitting the use of electric currents of high voltage without danger to the public through being exposed to the ends of live wires in case the trolley-wire should break or drop and wherein the insulator-supports are protected against injury or accidental breakage through the ordinary operation of the cars.

It is obvious that many variations and changes in the details of construction and arrangement would readily occur to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the exact details shown and described; but,

Having now set forth the object and nature of my invention and various constructions embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a catenary suspension for trolley-wires, an arm of irregular shape in cross-section, a casting sleeved thereon, an insulator carried by said casting at a point above said arm, a messenger-wire supported by said insulator, a trolley-wire, and means for suspending said trolley-wire from said messenger-wire.

2. In a catenary suspension for trolley-wires, an arm, an insulator supported thereon, a guard for said insulator, a messenger-wire supported by said insulator, a trolley-wire, and means for suspending said trolley-wire from said messenger-wire.

3. In a catenary suspension for trolley-wires, an arm, a casting mounted thereon, an insulator supported by said casting at a point above said arm, a guard to protect said insulator from injury, a messenger-wire supported by said insulator, a trolley-wire, and means for suspending said trolley-wire from said messenger-wire.

4. In a device of the class described, the combination of a support, an arm, an insulator adjustably mounted on the arm, and at a point above said arm, a messenger-wire supported by the insulator, a conductor-wire, means for supporting said conductor-wire from the messenger-wire, and a brace passing over the insulator and engaging the arm and the support.

5. In a device of the class described, the

combination of a support, a horizontal arm, a casting adjustably mounted on said arm, an insulator mounted on the casting above the arm, a suspension-cable supported by the insulator, a conductor suspended from the cable, and a brace spaced from and passing over the insulator, one end of the brace being connected with the free end of the arm and the other end being connected to the support.

6. In a device of the class described, the combination of a support, a horizontal arm, an insulator located above the arm and adjustably mounted thereon, means for securing the insulator in its adjusted position, a brace located above the insulator and with one end secured to the support, and means for connecting the free end of the brace to the arm beyond the insulator.

7. In a device of the class described, the combination of a support, a horizontal arm irregular in cross-section, an insulator located above said arm and adjustably mounted thereon, means for securing the insulator in its adjusted position, a brace, one end of which is secured to the support above the insulator, and means operatively related to the free end of the arm, and extending to a point above the insulator, to which the free end of the brace is secured.

In witness whereof I have hereunto set my hand, this 19th day of November, 1904, in the presence of the subscribing witnesses.

GEORGE A. MEAD.

Witnesses:

H. C. SCHWABLE,

F. W. MILLER.