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R. P. HANNA ET AL

2,491,973

CONDUCTOR SUPPORT

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2 Sheets-Sheet 1

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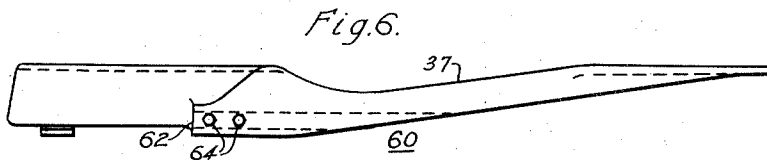
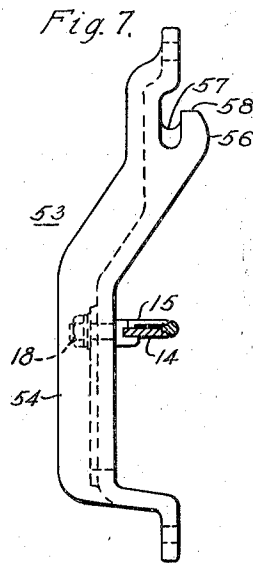
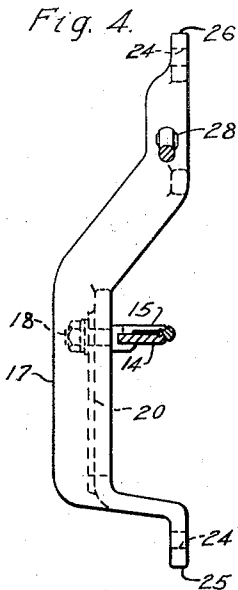
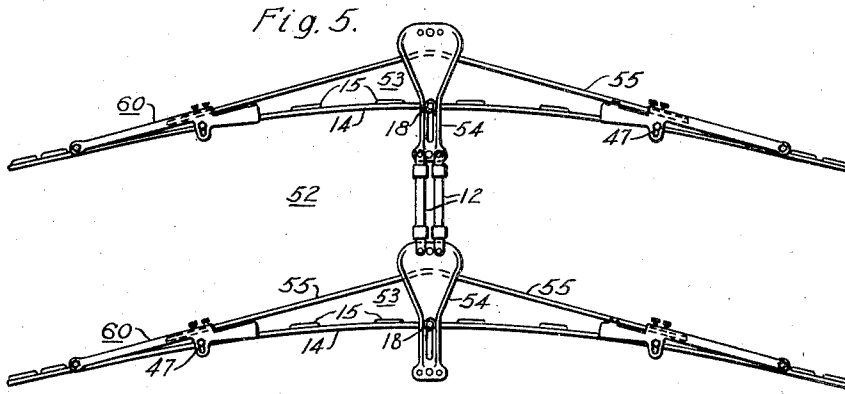
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2 Sheets-Sheet 2



WITNESSES:

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2,491,973

CONDUCTOR SUPPORT

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Our invention relates, generally, to trolley conductor supports and has reference, in particular, to curved segments for use in overhead trolley conductor systems.

Generally stated, it is an object of our invention to provide an improved trolley conductor support for overhead trolley conductor systems which is simple and inexpensive to manufacture and is easy to install and maintain.

More specifically, it is an object of our invention to provide for adjustably connecting an elongated conductor support member to a pull-off member intermediate the ends thereof and for connecting tension means between the pull-off member and the support member by means of end members pivotally connected adjacent the ends of the support member.

It is an important object of our invention to provide for pivotally connecting end members adjacent the ends of a conductor support in a curved segment and adjustably connecting tension members between the end members and pull-off means secured to the conductor support intermediate the ends thereof.

Another object of our invention is to provide for using a pull-off plate in a curved segment construction having a substantially open part at the end remote from the conductor support so as to permit threadedly adjusting tension means relative to the pull-off means.

Yet another object of our invention is to provide for connecting tension means between a pull-off member and the ends of an elongated laterally bendable conductor support by means of end members pivotally connected to the ends of the conductor support and provided with means for securing the tension means thereto in substantially the horizontal plane of a trolley conductor secured to the support.

It is also an object of our invention to provide for using a flexible tension member adjustably connecting the ends of a laterally bendable curved conductor support for maintaining the ends in different predetermined relationship to pull-off means intermediate the ends of the support member.

Other objects will, in part, be obvious and will, in part, be explained hereinafter.

In accordance with our invention, tension means for maintaining a predetermined curvature of a curved conductor support in a curved segment for a trolley conductor system are fastened adjacent the ends of the support by means of end members which are pivotally connected to the support adjacent the ends thereof

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and are provided with means for maintaining them in different predetermined angular relations thereto. The other ends of the tension means pass through openings in the side walls of a substantially open harp construction on the projecting end of the pull-off means, whereby an adjustable connection may be made by means of nuts threaded on the ends of the tension means projecting through the openings.

For a more complete understanding of the nature and scope of our invention, reference may be made to the following detailed description which may be studied in connection with the accompanying drawings, in which:

Figure 1 is a partial plan view of a curve construction for a trolley conductor system embodying the invention in one of its forms;

Fig. 2 is an enlarged side elevational view of an end member taken along the line II—II of Fig. 1;

Fig. 3 is a sectional view of the end member taken along the line III—III of Fig. 2;

Fig. 4 is an enlarged view taken along the line IV—IV of Fig. 1, showing the pull-off member in side elevation;

Fig. 5 is a plan view to a reduced scale of a curve construction embodying the invention in another of its forms;

Fig. 6 is an enlarged side elevational view of the end member shown in Fig. 5; and

Fig. 7 is an enlarged side elevational view of the pull-off member in Fig. 5.

Referring to Fig. 1, the reference numeral 10 may denote, generally, a curve construction for use with overhead trolley conductor systems comprising a pair of trolley conductor supports or segments 11 which may be connected together by means of insulator devices 12 for supporting a pair of trolley conductors (not shown) in spaced end curved relation. Since the supports 11 are substantially identical in construction and may be used separately where only a single trolley conductor is concerned, the description will be applied in detail to only one of the supports.

As shown, the support or segment 11 may comprise an elongated laterally bendable curved conductor support member 14 to which a trolley conductor (not shown) may be secured along the lower edge for guiding a current collector thereon by means such as the clamps 15, which may be positioned therealong in spaced relation. The conductor support member 14 may be positioned in operating relation in the trolley conductor system by means such as the pull-off means 17 which may be positioned transversely of the sup-

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port member and be adjustably secured thereto intermediate the ends thereof by means such as the stud bolt 18 which may be welded or otherwise secured to the support member 11 and a nut 19.

The support means 17 may, as shown in Figs. 1 and 4, comprise a channel shaped member having a central portion 20 with upwardly projecting flanges 21 adjacent the edges. The central portion 20 may be provided with an elongated opening 22 therein for receiving the stud bolt 18 in different operating positions. In order to provide for supporting the conductor support in the trolley conductor system, means, such as the openings 24, may be provided adjacent the ends of the support means 17 for attaching securing means thereto.

With a view to positioning the support member 14 and applying the supporting forces thereto in substantially the plane of a trolley conductor which may be secured along the lower edge of the support member, the support means 17 may be dished longitudinally so that the central portion in which the slot opening 22 is provided will be raised above the level of the depressed end portions 25 and 26. The end portion 26 on the convex side of the curved conductor support may be provided with a substantially open harp defined by the diverging side flanges 21 which may be provided with an enlarged central opening 27 therebetween. Suitable openings 28 may be provided in the flanges 21 communicating with the central opening 27 in substantially the horizontal plane of a trolley conductor on the conductor support for a reason which will be explained hereinafter in detail.

In order to provide for maintaining the support member 14 in a predetermined curvature tension members 30 may be utilized for adjustably connecting the ends of the support member 14 to the projecting end 26 of the pull-off means 17. The tension members 30 may comprise elongated rods of steel or any other suitable material having threaded end portions 32 disposed to extend through the openings in the side flanges 21 into the central opening 27. Nuts 33 may be provided on the ends of the tension means for effecting an adjustable connection with the pull-off means 17. The other ends of the tension members 30 may be provided with threaded portions 34 for effecting a connection to end members 35, whereby they may be connected to the conductor support adjacent the ends thereof. Means such as the rivets 36 may be provided for preventing the tension members from turning relative to the end members.

As shown in Figs. 1, 2 and 3, the end members 35 may each comprise an elongated downwardly inclined central body portion 37 having a substantially horizontal flange 38 adjacent the upper end with an opening therein for receiving connecting means, such as the bolt 40 secured to the support member 14, whereby the end member may be pivotally connected to the support member. Adjacent the lower end a threaded opening 42 may be provided in substantially the horizontal plane of the trolley conductor secured to the lower edge of the support member 14 for receiving the threaded end 34 of the tension member 30. A transverse opening 43 may be provided in conjunction with the opening 42 for receiving the rivet 36 to lock the tension member in the opening. The body portion 37 may also be provided with an extension 44 having a substantially horizontal flange 45 adjacent the upper edge provided with a slotted opening 46 on the side ad-

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jacent the support member for effecting an adjustable connection with the conductor support member by means of a bolt 47 and nut 48.

The flange portion 45 may be disposed to extend longitudinally of the support member 14 between the support member and the tension member so as to provide a deflector 50 for preventing a dewired current collector from wedging in the relatively narrow angular space between the support member 14 and the tension member 30. An ear 51 may be provided adjacent the lower edge of the deflector 50 which drops off from the flange 45 toward the tension member 30 to provide for reinforcing the deflector against damage by blows from a dewired current collector.

As shown in dotted outline, the curvature of the support member 14 may be readily varied by changing the position of the central portion thereof relative to the pull-off means 17 by positioning the bolt 18 in different positions in the longitudinal slot 22. At the same time the position of the nuts 33 on the threaded ends of the tension members 30 should be changed to provide for different positions of the ends of the support member 14 relative to the projecting end 26 of the pull-off means. At the same time the position of the bolt 47 in the slot 46 of the end member 35 may be adjusted so as to provide for the change in angular relations between the tension member and the end portion of the conductor support 14. Upon the adjustment of the support member 14 to the desired curvature, the nuts 33 may be locked together on the tension members, and the nuts and the bolts 18 and 47 may be tightened so as to secure the support member in the desired curved relation.

Referring to Fig. 5, the reference numeral 52 may denote, generally, a curve construction for trolley conductor systems wherein a pair of trolley conductor supports 53 may be positioned in spaced relation by means of insulator device 12 for supporting a pair of trolley conductors (not shown) in predetermined spaced relation.

The conductor supports 53 may comprise elongated laterally bendable curved support members 14 provided with clamps 15 for securing trolley conductors (not shown) thereto in predetermined operating relation along the lower edges thereof. The support members 14 may be positioned in the overhead system by means of pull-off members 54 which may be adjustably secured thereto intermediate the ends and may be provided with tension means 55 for maintaining them in predetermined curvatures.

The pull-off members 54 may, as shown in Figs. 5 and 7, be of substantially similar construction to the pull-off means 17 described in connection with Figs. 1 and 4 of the drawings. Instead of having a substantially open part adjacent the projecting end of the convex side of the support member with openings therein for securing the tension means, as described in connection with Fig. 1, the pull-off members 54 may be provided with projections 56 on the lower sides adjacent the projecting ends, having curved saddle portions 57 with lip portions 58 associated therewith for receiving the tension means 55.

The tension means 55 may be secured to the support members 14 adjacent the ends thereof by means of end members 60 which may be generally similar to the end members 35 described in connection with Fig. 1 of the drawing. As shown in Figs. 5 and 6, the end members 60 may be provided with openings 62 similar to the threaded openings 42 of the end members 35 except in

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that the openings 62 extend through the lower end of the body portion 37, and are provided with set screws 64 for adjustably securing the tension means therein.

In accordance with this embodiment of my invention, the tension means 55 may comprise a single relatively flexible cable, wire, bar or the like having the end portions secured in the openings 62 in the end member and having the central portion thereof positioned by the saddle 57 on the lower side of the projecting end of the pull-off member 54. By adjustably positioning either one or both ends of the tension member 55 in the openings 62, and adjustably positioning the bolts 42 and 47 which secure the conductor support to the pull-off means and to the horizontal flanges 45 of the end members, respectively, the curvature of the support members 14 may be readily changed and maintained at any desired predetermined curvature.

From the above description and accompanying drawings, it will be apparent that we have provided a simple and effective manner for adjustably connecting the ends of an elongated curved conductor support member to pull-off means connected intermediate the ends thereof. By pivotally connecting the end members to the conductor support member and providing for changing the angular relations therebetween, and for securing the end members and the conductor support member in different angular relations, a curved conductor support is provided which is readily adjustable to different curvatures and may be substantially rigidly maintained in any particular curvature to which it may be adjusted. Our construction provides a conductor support which is adjustable over a relatively wide range of different angles of curvature and is at the same time both simple and inexpensive to manufacture and durable in operation.

Since certain changes may be made in the above described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all the matter contained in the above description or shown in the accompanying drawing shall be considered as illustrative and not in a limiting sense.

We claim as our invention:

1. A trolley conductor support comprising, an elongated support member adjustable to different curvatures, means for securing a trolley conductor in predetermined relation to the lower edge of said member, pull-off means projecting to the convex side of said member intermediate the ends of the member, connecting means adjustably connecting the pull-off means intermediate the ends of said member, tension means extending from the projecting end of the pull-off means toward the ends of the body member, and end members each having one end connected adjacent one end of the support member and provided with connecting means adjacent the other end adjustably connecting said other end to the support member intermediate the pull-off means and the end of the support member to secure different angular relations of the end members with the ends of the support member for connecting the tension means thereto.

2. A trolley conductor support comprising, an elongated laterally curvable support member, means for securing a trolley conductor along the lower edge of the support member for guiding a current collector in a predetermined path, pull-off means adjustably connected to the support mem-

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ber intermediate its ends and projecting to the convex side thereof, and means adjustably connecting the projecting end of the pull-off means adjacent the ends of the support member including tension means connected to the pull-off means, and end members pivotally connected to the support member adjacent its ends and adjustably secured to the support member intermediate its ends and the pull-off means so as to be positionable in different predetermined angular relations with the ends of the support member.

3. A curved segment for a trolley conductor system comprising, an elongated laterally curvable body member, pull-off means adjustably connectable to said member intermediate its ends and projecting to the convex side thereof, means for securing a trolley conductor in predetermined operating relation with the lower edge of said member, and means connecting the projecting end of the pull-off means adjacent the ends of said member including tension means extending from the projecting end toward the ends of said member, and end members pivotally connected to the said member adjacent said ends, adjustably connected to the said member intermediate said ends and the pull-off means, and connected to the tension means.

4. A trolley conductor device comprising, an elongated laterally curvable metal bar having means for securing a trolley conductor along the lower edge for engagement by a current collector, pull-off means adjustably secured intermediate the ends of the metal bar and projecting to the convex side thereof, and connecting means connecting the projecting end of the pull-off means adjacent the ends of the bar including tension means secured to the projecting end of the pull-off means and end members pivotally connected adjacent one end to the support member adjacent its ends, and connected adjacent the other end to the support member intermediate the pull-off means and the end of the support member so as to be securable in different angular relations with the ends of the bar, said end members having portions between the bar and the tension means for deflecting a dewired current collector from wedging in the angular space therebetween.

5. A curved construction for an overhead trolley conductor system comprising, a laterally bendable elongated support member having means for securing a trolley conductor along the lower edge, pull-off means secured intermediate the ends of the support member and projecting to the convex side, means connecting the projecting end of the pull-off means and the ends of the support member including tension means adjustably connected to the projecting end of the pull-off means, and end members adjustably connectable adjacent the ends of the support member and connectable in different relative positions to the support member intermediate its ends and the pull-off means for securing the end members in different angular relation therewith.

6. In a curved segment for supporting an overhead trolley conductor, a support laterally bendable to different curvatures and having means for securing a trolley conductor along the lower edge, pull-off means adjustably secured to the support intermediate the ends thereof and projecting on the convex side for supporting the segment, means for adjustably connecting the projecting end of the pull-off means and the ends of the support in different predetermined relations including tension means connected to the projecting end of the pull-off means, and end members pivotally con-

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ected at one end to the support on the upper side adjacent the ends of the support and having dependent portions in substantially the same horizontal plane as the trolley conductor for effecting connections to the tension means, said end members having horizontally extending flanges with adjustable connecting means operable to secure the end members to the support intermediate the pull-off means and the ends of the support.

7. A trolley conductor support comprising, an elongated conductor support laterally bendable to different curvatures and having means for securing a trolley conductor along the lower edge thereof for engagement by a current collector, a pull-off member adjustably connected to the support intermediate the ends thereof and having a portion extending to the convex side thereof provided with substantially vertical flange means having openings therein, end members pivotally connected to the support adjacent the ends and provided with adjustable connecting means for connecting the end members to the support intermediate the pull-off member and the ends of the support for positioning the end members in different angular relations with the support, and tension members connected to the end members having threaded end portions projecting through openings in the flange means and provided with adjusting nuts for varying the curvature of the support.

8. A trolley conductor support comprising, an elongated conductor support bendable laterally to different curvatures, means for securing a trolley conductor along the lower edge of the support for engaging a current collector, a pull-off member positioned transversely of the support intermediate the ends and projecting to the convex side thereof said pull-off member having a relatively flat portion adjacent one end with an elongated slot for adjustably receiving securing means on the upper edge of the support and an enlarged depressed portion adjacent the other end having a central opening therein defined by divergent side walls with vertical side openings therein, end members having elongated body portions pivotally

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connected at one end adjacent the ends of the support and adjustably connected thereto toward the other ends, said end means being provided with laterally dependent side portions extending substantially to the horizontal plane of the trolley conductor, and tension members for maintaining different predetermined curvatures of the support having one end secured to the dependent side portions and having a threaded portion on the other end projecting into the central opening through said vertical side openings and provided with adjustable stop nuts.

9. A curved segment for a trolley conductor system comprising, an elongated support bendable in a horizontal plane to different curvatures and having means for securing a conductor along the lower edge, pull-off means positioned intermediate the ends of the support and extending on the convex side, said pull-off means being provided with a curved saddle portion adjacent the projecting end, end members secured to the support adjacent the ends of the support, and a flexible tension member adjustably extending from one end member to the other around the saddle, said tension member being adjustably secured to at least one of the end members.

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