Nov. 10, 1931. L. PONTECORVO 1,831,685

LONGITUDINAL SUSPENSION FOR OVERHEAD CONTACT LINES FOR ELECTRIC RAILWAYS, TRAMWAYS, ETC

Filed July 17, 1929 3 Sheets-Sheet 1

Fig. 1

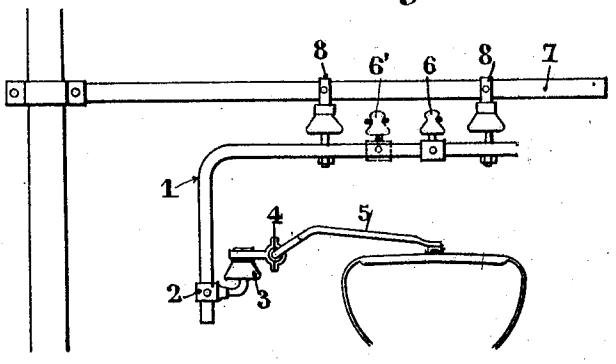

Fig. 2

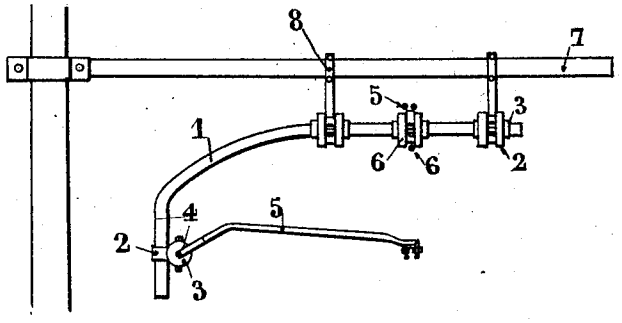

Fig. 2b

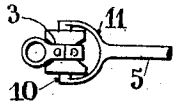

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Fig. 3

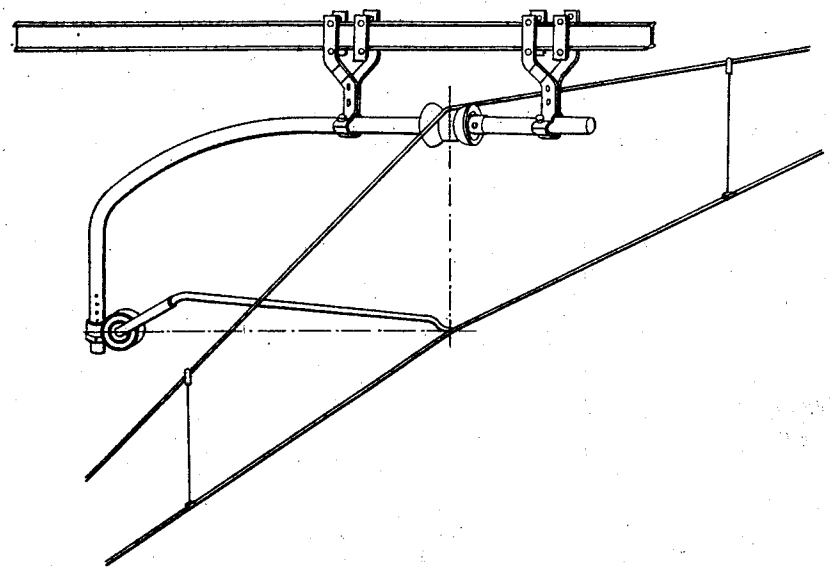

Fig. 4

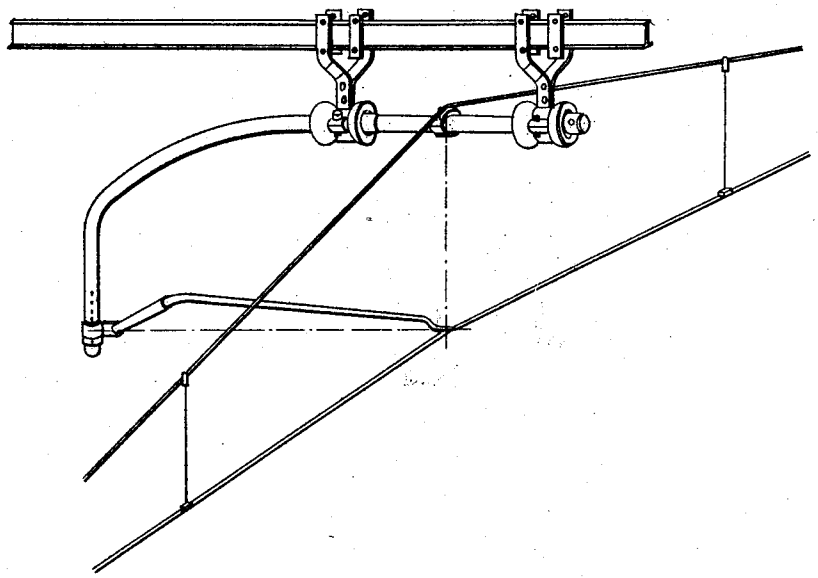

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Fig. 5

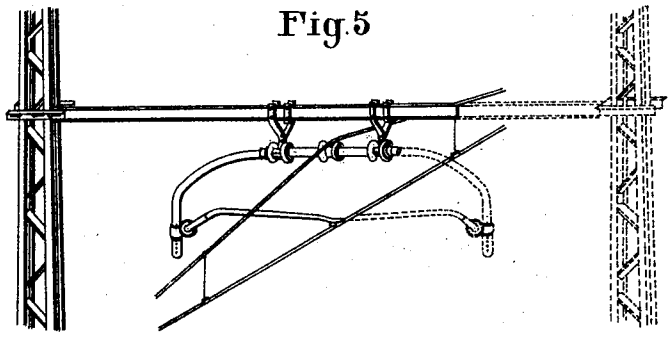


Fig. 6

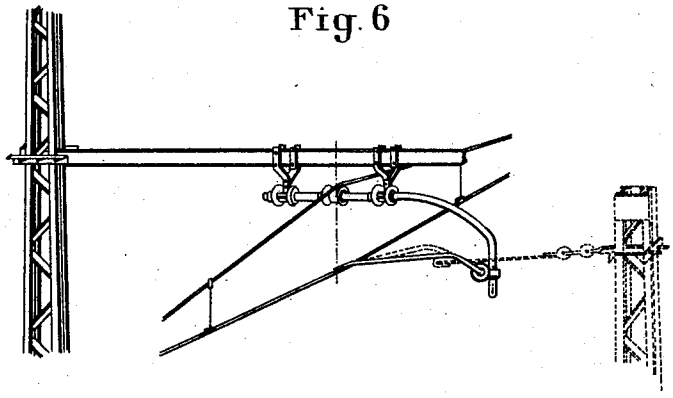
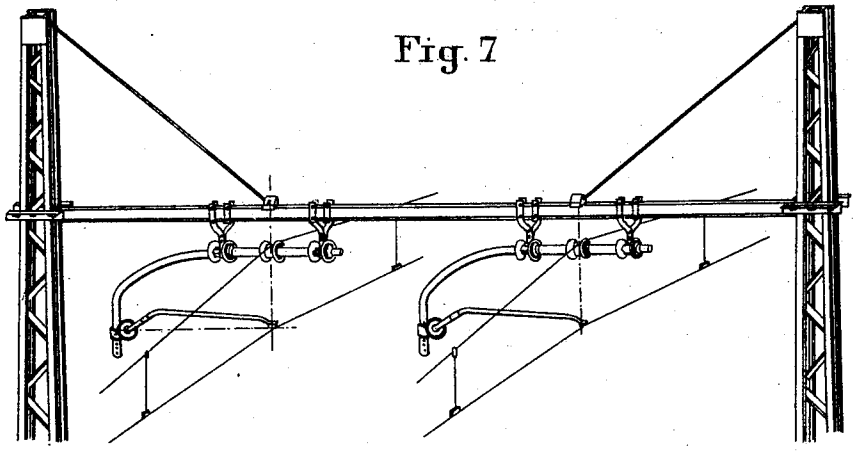


Fig. 7



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1,831,685

UNITED STATES PATENT OFFICE

LELLO PONTECORVO, OF MILAN, ITALY

LONGITUDINAL SUSPENSION FOR OVERHEAD CONTACT LINES FOR ELECTRIC RAILWAYS, TRAMWAYS, ETC.

Application filed July 17, 1929, Serial No. 379,030, and in Spain October 29, 1928.

The present invention relates to the longitudinal suspension of overhead contact lines for electric railways, tramways and so forth.

The importance of having the strongest and simplest possible overhead contact lines for electric railways is well known. It is also essential that parts which have been deteriorated by wear or accident should be capable of being replaced as quickly as possible so that interruptions in operation should be of brief duration whilst the number of interruptions is reduced to a minimum.

The distance of the girder supports from the track varies and consequently in most longitudinal suspension systems (overhead systems) it is necessary to use tie-rods of different lengths secured by separate insulators to the girder supports, which latter are preferably bent inwards as may be required. In some systems the tubes or rods supporting the wires are subjected to compression instead of to tension so that it is not only necessary to make them of larger dimensions but the wires or cables are exposed to danger by reason of the considerable strain at sharp curves.

With ordinary longitudinal suspension systems, where the suspension catenary and the contact line or lines are each separately insulated, six insulators are necessary for double insulation.

By means of the system of longitudinal suspension according to the present invention the above disadvantages are eliminated whilst the number of insulators required is reduced, that is to say the chief source of disturbances in the system is removed. The present type of suspension combines in a single system all the mechanical parts and insulators required for fitting up the cables, suspension lines and contact lines and is capable of withstanding all vertical, transverse and longitudinal stresses. The suspension thus remains entirely free and is independent of the distance between the girder support and the track. By means of the present arrangement all the mechanical and electrical fittings referred to may be easily removed and quickly replaced. The resulting suspension is strong, simple and efficient.

Figure 1 is a front elevational view of the invention,

Figure 2 is a similar view showing a modification,

Figure 2b is a plan view of a detail,

Figure 3 is a perspective view of a modified form of the invention,

Figure 4 is a further view of a further modification,

Figures 5, 6 and 7 are perspective views showing various methods of mounting the invention.

The results above described are obtained by the following method of construction illustrated diagrammatically in Figure 1 of the accompanying drawing.

A rigid support 1, which is angular or curved, consists of a vertical portion and a horizontal portion. Slidably mounted on the vertical portion is a ring or clamp 2 carrying an insulator 3 to which there is secured by a vertical and horizontal hinge 4 a tie-rod 5 for holding the contact line or lines in their transverse position. This tie-rod 5 is of predetermined length and of such a shape that the contact member of the trolley loop can pass freely and without shock.

On the horizontal portion of the support 1 are slidably mounted one or more insulators to which are secured the suspension wire or wires of the catenary or catenaries. To these insulators may also be secured the feeding wires or cables or auxiliary lines (earth, telephone, telegraph, signal etc. wires).

The angular or curved support is attached to the girder support by a support which may be horizontal or vertical.

On a horizontal support 7 are slidably mounted one or two clamps 8 so as to enable the suspension to be moved transversely of the track, that is to say the whole catenary system and the contact lines may be moved without modifying the relative position of the wires. In addition to this transverse movement vertical movements may be obtained by moving the horizontal support 7 on a vertical pole. With such an arrangement it is possible to obtain a large range of movements so that in practice it is possi-

ble to make all the necessary adjustments of the overhead system.

The vertical support or supports consist of one or more clamps 9 which can be moved vertically or horizontally so as to obtain the same results as above described.

The angular or curved support 1 may be of any suitable section, preferably tubular, which has the advantage of allowing horizontal insulators to be used as shown in Figure 2, with a central hole into which is fitted a ring through which the curved support passes and to which the insulators are secured where required. These insulators enable the clamps 8 for securing the system to the horizontal support to be of a more practical shape. The same also applies to the clamps 9 for securing the support 1 to the vertical pole. The insulator 3 of the jointed arm 5 may also be of the same horizontal type with a central bolt 10 and a forked head 11 to which the arm 5 is secured (Figure 2b).

The suspension above described is doubly insulated. For single insulation the construction in extremely simple. Two of the insulators may be eliminated and one or other of the methods shown in Figures 3 and 4 adopted.

The characteristic features and advantages of the suspension system according to the present invention are as follows.

1. Clamps 8 follow the whole suspension to be moved transversely of the track without any other change in the installation. Thus for example the position of the suspension cable and contact line may be readily varied at any time which is an important advantage when the system is in operation as it enables the track to be moved within predetermined limits.

2. The suspension is reversible (Figure 5). This feature enables the girder support to be placed on either side of the track according to the nature of the ground, thus avoiding separate suspensions or anchorings. On curves the tie-rod for holding the wires in position transversely may be so placed that it is always subjected to tensional strain and never to compression (Figure 6).

It is only with a tie-rod always subjected to tensional strain that an efficient curve can be obtained on the line as the rod merely tends to return the contact line to its normal initial position, corresponding to the height of the joint after the line has been displaced from this position by the trolley loop or as a result of oscillations or vibrations.

When a curve is formed by means of hinged arms subjected to compression, with the axis of the joint on a level with the contact lines in the position of rest, then whenever the trolley loop raises the lines they tend to rise still more and to remain in the position into which they have moved thus reducing the pressure on the trolley loop. If the axis of the joint is placed above the contact lines in the position of rest then due to the pressure of the trolley loop the wires reach a point of rigid resistance without elasticity, or at least they lose some of their elasticity.

3. The suspension may be used to replace a tie-rod for holding the wires in position in cases where the girder support cannot be placed on the outside of the curve of the track (Figure 7) thus eliminating special constructional work.

4. The system may be applied equally well and without any supplementary fittings in cases where there are two or more tracks. (Figure 7). With other systems of suspension it is generally necessary to install at stations special fittings different from those on open tracks.

It will be understood that the above description is given solely by way of example and that various modifications may be made in the dimensions and details without departing from the scope of the invention.

I claim:—

1. A longitudinal suspension for overhead contact lines comprising a supporting member, insulators on said member, a supporting arm horizontally mounted on one of said insulators, said supporting arm being hinged in such a manner as to be capable of vertical and horizontal movement, said supporting arm being adapted to have the contact wire secured thereto while the suspension wires are connected to the other insulators, a supporting structure from which said supporting member is suspended, said supporting structure comprising a horizontal member and a vertical member and means for adjusting the supporting member horizontally and vertically on said supporting structure.

2. A longitudinal suspension for overhead contact lines comprising a supporting member, insulators on said member, a supporting arm horizontally mounted on one of said insulators, said supporting arm being hinged in such a manner as to be capable of vertical and horizontal movement, said supporting arm being adapted to have the contact wire secured thereto while the suspension wires are connected to the other insulators, a supporting structure from which said supporting member is suspended, said supporting structure being so constructed that it is capable of being moved transversely to the track and of being used for supporting contact wires at curves.

LELLO PONTECORVO.