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M. J. GRIFFITH

SUSPENSION OF TROLLEY WIRES

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Fig.1.

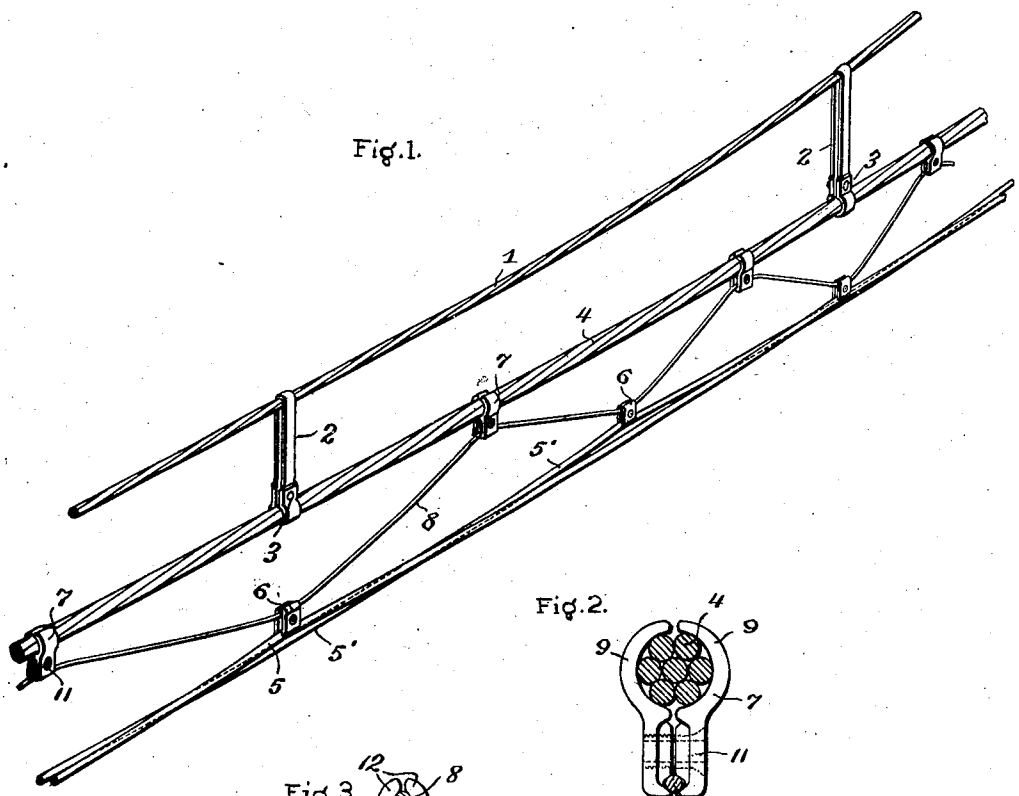
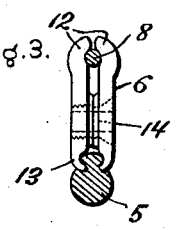



Fig.2.




Fig.3.




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# UNITED STATES PATENT OFFICE.

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## SUSPENSION OF TROLLEY WIRES.

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The present invention relates to electrical railways and more especially to trolley wire systems for electrified steam railways.

For reasons of economy of installation and practical operation in populous communities, it is desirable that the interurban street cars and the electrified steam railways be operated from the same electric system, or if not from the same system then from systems operating at the same electric potential which is very commonly fixed by municipal ordinance to relatively low voltages. In consequence of the restriction to low voltages, the current must be supplied in correspondingly great volume for the propulsion of the heavy trains of the electrified steam roads. The great volume of current must be supplied through the trolley wires to the trolleys or other forms of current collectors without causing destructive sparking between them even when the latter are moving at maximum train speed, and during all variations of temperature and weather conditions.

The object of my invention is to provide an improved system of suspension of trolley wires and feeder cables whereby very great volumes of current may be practically and satisfactorily collected therefrom by ordinary current collectors and without causing undue wear or breakage.

One embodiment of the invention is shown in the accompanying drawing in which Fig. 1 is a perspective view of a portion of a span of the improved suspension system; Fig. 2 is an end elevation of one form of clamp, and Fig. 3 a similar view of another form of clamp employed to connect certain wires.

The upper or supporting catenary cable 1 is of steel to provide the requisite tensile strength and is to be carried in the usual way above the road bed by bridges or towers (not shown). Looped hangers or droppers 2 are suspended from the catenary cable at distributed points throughout its length and each has at its lower end jaws 3 adapted to be clamped to a feeder cable 4 of copper of a size sufficiently large to conduct the maximum volume of current required. I have employed in practice a million circular mil cable for feeding five thousand amperes. By the use of droppers 2 of different lengths, the feeder cable 4 is suspended rectilinearly from the catenary cable 1 at a substantially fixed height above the road bed while the catenary assumes its characteristic sag between its points of support.

In order that the contact pressure between trolley wires and the current collector may be constant and uniform even when the latter moves at maximum speed, I employ a plurality of trolley wires 5, 5′ with their supporting clips 6 staggered so that the lower point of maximum sag in one wire will be opposite the high point in the adjacent wire.

The trolley wire clips 6 are connected to feeder wire clips 7 by a zigzag or lacing wire or cable 8 of copper which extends continuously from the lower end of one feeder clip 7 diagonally downward to a clip 6 on one trolley wire 5, then diagonally upward to a second feeder cable clip 7, and then diagonally downward to a clip 6 on the other trolley wire 5′.

The feeder clips 7 are each composed of two members with large upper jaws 9 to engage the feeder cable 4 and relatively small lower jaws 10 to engage the lacing wire or cable 8 and they are held together and caused to grip the feeder cable and the lacing wire or cable by turning home of a transverse set screw 11.

The trolley wire clips 6 are each similarly composed of two members with upper jaws 12 to engage the lacing wire or cable 8 and with lower jaws 13 to engage the trolley wire 5 or 5′, and upon turning home of the set screw 14 they are caused firmly to grip both of the wires. The angularity of the lacing wire 8 is somewhat exaggerated for the sake of clearness in Fig. 1, but in practice I space the clips 7 seven to eight feet apart while the spacing of the trolley wires 5, 5′ beneath the feeder cable 4 is four to five inches.

In this system the trolley wires are free to move upwardly in a very nearly uniform wave under the upward pressure exerted thereon by the current collector and without being restrained or resisted by the inertia of the massive feeder cable 4, and yet by reason of the gripping of the clamps on the several conductors there is constantly good and sufficient electrical connection between the feeder cable 4 and the trolley wires 5, 5′ throughout their length. Moreover, by reason of the positive mechanical connection between the trolley wires and the feeder cable, endwise movement of the former is

prevented, even in case it becomes broken and accordingly may be repaired without retensioning.

While I have shown and described the best embodiment of the invention known to me, I do not desire to be restricted thereto.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A system of trolley wire suspension comprising a catenary suspension cable, a massive feeder cable supported at intervals from said catenary wire, a trolley wire arranged beneath said cable, and a zigzag lacing conductor clamped to said feeder cable and to said trolley wire.

2. A system of trolley wire suspension comprising a massive feeder cable supported at intervals, two trolley wires arranged freely beneath said cable, and a zigzag lacing cable clamped to said feeder cable and to said two trolley wires in alternation.

3. A system of trolley wire suspension comprising a massive feeder cable suspended at intervals, two trolley wires arranged freely beneath and substantially parallel to said cable, and a zigzag lacing wire positively clamped to said feeder cable intermediate its points of suspension and to said two trolley wires in alternation.

4. A system of trolley wire suspension comprising a catenary suspension cable, a massive feeder cable suspended substantially horizontally and at frequent intervals from said catenary cable, a plurality of trolley wires arranged freely beneath said feeder cable, and a flexible lacing conductor rigidly attached to said feeder cable at frequent intervals and to each of said trolley wires in rotation at intervals intermediate its attachments to the feeder cable.

In witness whereof, I have hereunto set my hand this 14th day of February, 1924.

MORGAN J. GRIFFITH.