July 23, 1940. J. J. TAYLOR 2,209,009

CONDUCTOR CLAMP

Filed May 17, 1939

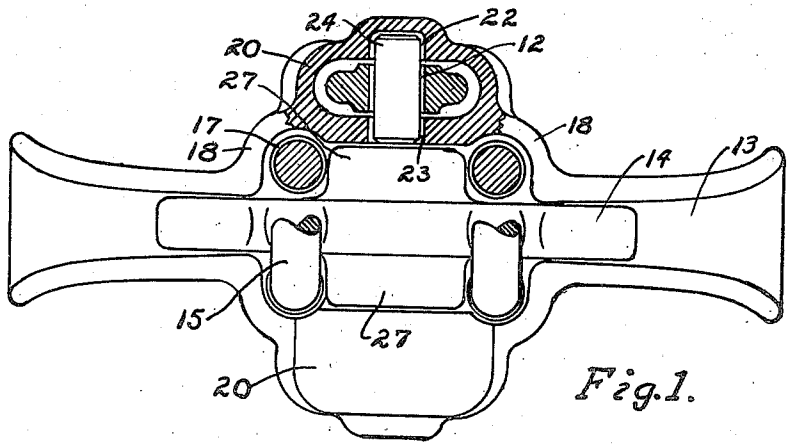

Fig. 1.

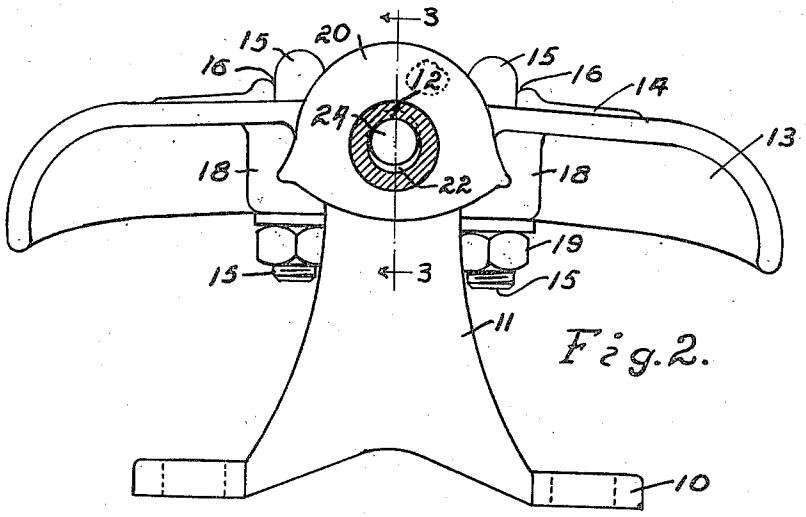

Fig. 2.

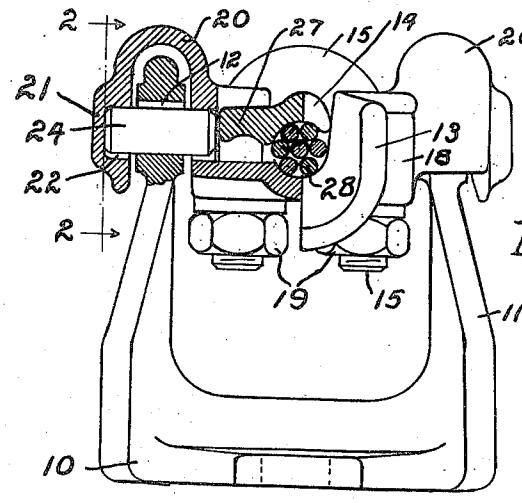

Fig. 3.

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Patented July 23, 1940 2,209,009

UNITED STATES PATENT OFFICE

2,209,009

CONDUCTOR CLAMP

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Application May 17, 1939, Serial No. 274,155

7 Claims. (Cl. 248—63)

This invention relates to supporting clamps for electrical conductors and particularly to pivoted clamps for ground wires such as are commonly used in connection with high voltage electrical transmission lines. Heretofore ground wires have sometimes been supported in clamps rigidly fixed to the supporting structure for the transmission line. Since the ground wires are usually at the same potential as the supporting structure, it is not necessary to provide insulation between the wire and its support and the clamp may therefore be fixed directly on the supporting structure. A rigidly fixed clamp, however, has been found to produce fatigue in the fibers of the ground wire at the points where the wire leaves the clamp. The wire vibrates due to windage and other causes, the vibration being predominately in a vertical direction, and since the wire is held rigidly at its support, the vibration produces bending and consequently fatigue in the wire where it leaves the support. To overcome this difficulty it has been proposed to mount the ground wire in a pivoted clamp, but where the clamp has been mounted on a fixed pivot the vibration of the wire has produced excessive wear on the pivoted support destroying the support in many cases within a short period of time. This wear is due not only to the vibration of the clamp about its pivot, but also to the frequent changes in the direction of the tension in the wire which gives rise to sliding movement of the support on its pivot where there is clearance between the pivot and the bearing. It has been found in practice that the direction of tension in the ground wire at its point of support changes frequently due to temperature differences and difference in wind velocities at opposite sides of the support. This is particularly true where long spans are carried by the support.

Another expedient which has been tried to avoid fatigue and to allow response to the changes in the direction of tension in the wire is to mount the clamp on a link which has pivotal connection with the clamp at its lower end. This link, however, must necessarily be comparatively short to avoid excessive distance between the ground wire and the top of the supporting tower, and a short link involves a comparatively large angle of movement in response to shifting tension in the ground wire. In some instances the movement has been found to be as much as 90° and the pivotal supports for the links have been worn out within a period as short as six months.

One object of the present invention is to provide a ground wire supporting clamp which will provide ample pivotal movement at the point of support and substantially eliminate wear of the supporting pivot.

A further object of the invention is to provide a pivotal support for a ground wire in which all of the movement at the pivotal support will be rolling movement and there will be no sliding movement between contacting faces.

A further object of the invention is to provide a conductor support having a pivot pintle which is easily assembled and disassembled and which is enclosed in a housing to protect it from abrasive material in regions where such material may be carried by the wind.

A further object of the invention is to provide a conductor support which shall be of improved construction and operation.

Other objects and advantages will appear from the following description.

The invention is exemplified by the combination and arrangement of parts shown in the accompanying drawing and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a top plan view with parts in section showing one embodiment of the present invention.

Fig. 2 is an elevation of the conductor support shown in Fig. 1 with a part of the pintle housing sectioned on the line 2—2 of Fig. 3.

Fig. 3 is an end elevation of the conductor support with parts in section on line 3—3 of Fig. 2.

The conductor support is provided with a base 10 which may be bolted on any suitable structure such as a tower for supporting a high potential transmission line. The base 10 is provided with upright spaced standards 11 having bearing openings 12 in their upper ends. A conductor support is mounted on the standards 11, the support comprising a cradle 13 for receiving the conductor and a keeper 14 for holding the conductor in place in the cradle. The keeper 14 is held in place by means of U-bolts 15 which engage notches 16 in the top of the keeper and which extend through openings 17 in lugs 18 at the sides of the cradle 13. The U-bolts are held in place by nuts 19 threaded on their projecting lower ends. At each side of the cradle 13 extending between and connecting the lugs 18 is a housing member 20 completely closed at its top and sides but open at its bottom to receive the upper end of a standard 11. The outer face of each housing 20 is provided with a boss 21 having a cylindrical recess 22 on its inner face. The

inner wall of the housing 20 is provided with a perforation 23 in alignment with the recess 22, and the recesses 22 and perforations 23 register with the bearing openings 12 in the standards 11. Pivot rollers 24 are loosely disposed within the bearing openings 12, 22 and 23; the rollers being of considerably less diameter than the openings 12, 22 and 23. The rollers are held in place by retainer lugs 27 projecting from opposite sides of the keeper 14. The outer faces of the lugs 27 bear against the inner ends of the rollers 24 as indicated clearly in Figs. 1 and 3.

In assembling the clamp, the base 10 is first secured on the supporting tower and the cradle placed between the projecting standards 11 with the upper ends of the standards extending into the housings 20. The roller bearings 24 are then inserted in place through the perforations 23 in the inner walls of the housings 20. The conductor 28 is then seated in the cradle 13 and the keeper piece 14 secured in place by the U-bolts 15. This will bring the retainer lugs 27 into engagement with the inner ends of the roller bearings 24 and lock the bearings in position. It will now be apparent, particularly from Figs. 2 and 3, that the roller bearings 24 rest on the bottom of the openings 12 in the standards 11 with a clearance space in these openings above the tops of the roller bearings. The cradle 13 is supported on the ends of the rollers 24; the openings in the walls of the housing members 20 resting on the upper elements of the roller bearings 24 at the opposite ends of the bearing pins. Since the openings for the pins 24 are materially larger than the pins themselves, the cradle will be supported upon a single element of each pin, and any pivotal movement of the cradle when the weight is directly downward, will take place about this element of support and there will be no sliding of the contacting surfaces relative to each other. If, however, the tension in the cable tends to draw the cradle in either direction transverse to the axis of the pins 24, the pins will act as roller bearings between the surfaces of the bearing openings so that the elements of contact will be progressively changed by the rolling action between the pins and their contacting surfaces until the elements of contact are in line with the new direction of the tension on the cable. The action is similar to that which takes place if one rolls a pencil over the top of a table beneath his palm. The pencil acts as a roller between the two bearing surfaces and there is no sliding movement between the pencil and either of the contacting surfaces. A similar rolling action occurs between the pin 24 and its contacting surfaces, the only difference being that the contacting surfaces are curved instead of flat. The action of the roller pin 24 may also be compared to that of the pinion in a set of planetary gears. Since there is no sliding movement between the bearing surfaces but only a rolling movement, there will be a minimum of wear although there is complete freedom of movement to permit vibration of the cable without bending at the points of support and to permit repeated shifting of the tension on the cable. In addition to the provision of pivotal movement without wear, the arrangement provides a supporting clamp in which the pivotal supports are enclosed in a protective housing, and in which the parts may be readily assembled and dissembled and are locked in place merely by the clamping of the keeper piece in position upon the supported cable.

As seen in Fig. 3 the axis of the pins 24 is slightly above the center of the cable 28 at its mid point in order to bring the pivotal axis in line with the axis of the cable at the points where the cable leaves the clamp. The direction of the pull on the clamp due to the tension of the cable is, of course, determined by the direction of the cable axis where it leaves the clamp and by arranging the pivotal axis in line with the cable pull, any tendency to rotate the clamp on its pivot due to the tension in the cable is avoided.

I claim:

1. The combination with a conductor clamp having a bearing opening therein of a roller pin loosely disposed in said opening and of less diameter than said opening, and a rigidly fixed support for said pin having a bearing opening in which a portion of said pin is disposed, the bearing opening in said support also being of greater diameter than the diameter of said pin, the difference in diameters of said pin and said openings being sufficiently great that said pin has free rolling contact with the surface of the bearing opening in said clamp and the surface of the bearing opening in said support when said clamp is moved relative to said support in a direction transverse to the axis of said pin.

2. The combination with a conductor clamp having a pair of spaced registering bearing openings therein, a rigidly fixed support for said clamp interposed between said openings and having a bearing opening therein in approximate registration with the openings in said clamp, and a roller pin loosely disposed in the openings in said clamp and extending through the opening in said support, said pin being of sufficiently less diameter than the openings in said clamp and said support to allow free rolling contact with the surfaces of said openings when said clamp is moved relative to said support in a substantially horizontal direction transverse to the axis of said pin.

3. A support for a conductor comprising a pair of cooperating bearing members, one of said members having a pair of spaced openings therein, the other of said members being disposed between said openings and having a bearing opening cooperating with the openings in said first bearing member, one of said members being rigidly fixed and the other being horizontally and pivotally movable relative to said fixed member and a roller pin disposed in said openings for connecting said members for pivotal movement relative to each other, said roller pin being of sufficiently less diameter than said openings to allow free rolling contact with the inner surfaces of said openings when said movable member is moved horizontally relative to said fixed member.

4. The combination with a cable clamp of a pivotal support for said clamp, comprising a housing member having a closed top, and side walls surrounding an internal recess and having bearing openings in opposite side walls thereof, one of said pivotal openings extending through its side wall to permit insertion of a pivot pin, the other pivot opening being closed at its outer end, a pivot bearing member extending into said housing member through the bottom portion thereof and having a bearing opening therein in substantial registration with the openings in the sides of said housing member, and a roller pin disposed in said openings and of less diameter than said openings and connecting said housing and said bearing member for relative pivotal movement, said openings all being substantially the same diameter and said pin being of substantially uniform diameter throughout and having free rolling contact

with the inner surfaces of said openings to facilitate relative shifting of said pin and members transversely of the axis of said pin by rolling engagement between the surface of said pin and the inner surfaces of said openings.

5. The combination with a conductor clamp having a conductor cradle and a keeper piece for securing a conductor in said cradle, of a pivotal support for said clamp having bearing openings and a roller pivot loosely disposed in said openings, said keeper piece being arranged to engage one end of said pivot and to retain said pivot in said openings when said keeper piece is in place in said clamp.

6. A conductor support comprising a rigidly fixed base member having spaced uprights thereon, said uprights having bearing openings therein, a cable clamp comprising a cable cradle having laterally extending housing members for receiving the ends of said uprights, said housing members having spaced bearing openings therein, pivot rollers disposed in the openings in said housing members and extending through the openings in said uprights, and a keeper piece for securing a cable in said cradle, said keeper piece having stops thereon for retaining said pivot rollers in position in said housing members, said pivot rollers being of sufficiently less diameter than the openings in said housing members and said uprights to facilitate rolling engagement between the surfaces of said pivot pins and bearing openings cooperating therewith when said clamp is shifted horizontally relative to its fixed support by different horizontal stresses on said conductor to facilitate relative shifting of said pivot rollers and bearing openings for stresses in different directions on said conductor clamp.

7. The combination with a rigidly fixed base, of a cable clamp pivotally mounted on said base, the pivotal mounting between said base and clamp comprising one member having spaced portions provided with registering bearing openings therein, another member interposed between said spaced portions and having a bearing opening therein and a bearing pin loosely mounted in said openings, the openings in said members all being of substantially the same diameter and the pin being of substantially uniform diameter throughout, the diameter of said pin being materially less than the diameter of said openings so that said pin has a line contact with the surface of each of said openings and rolls on the surface of said opening when said clamp is moved in a direction transverse to the axis of said pin.

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