Jan. 28, 1936. F. G. BOVARD 2,028,894

CONDUCTOR CLAMP

Filed Aug. 29, 1934 3 Sheets-Sheet 1

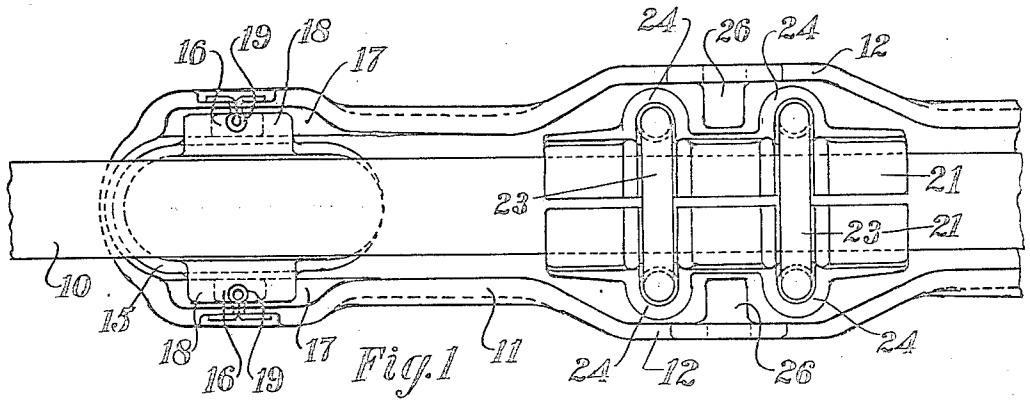


Fig. 1

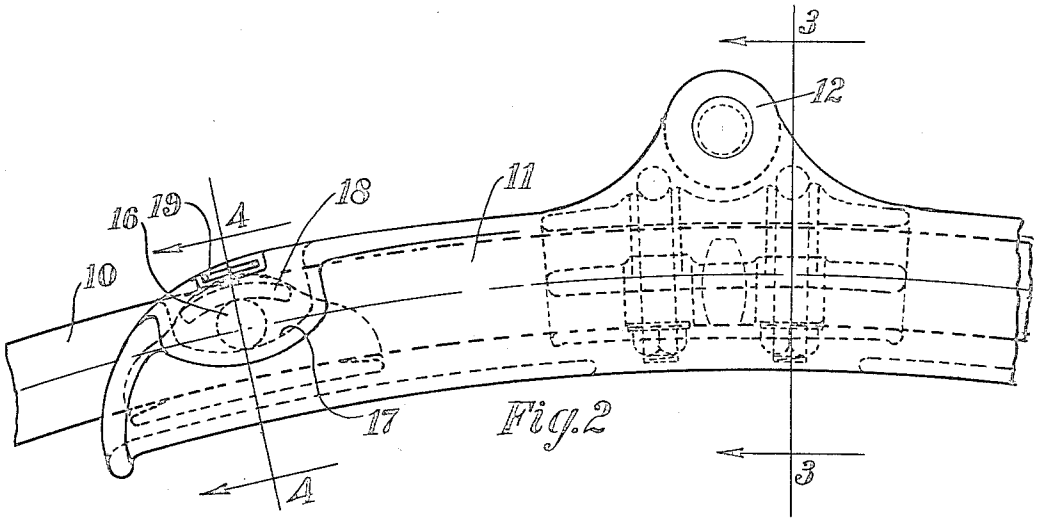


Fig. 2

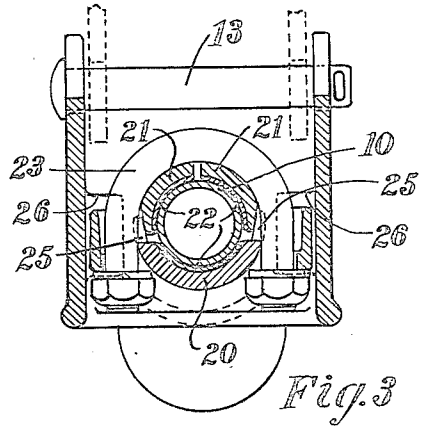


Fig. 3

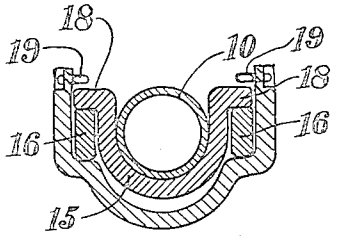


Fig. 4

INVENTOR
Floyd G. Bovard.
BY Alphens J. Crane
ATTORNEY

Jan. 28, 1936. F. G. BOVARD 2,028,894

CONDUCTOR CLAMP

Filed Aug. 29, 1934 3 Sheets-Sheet 2

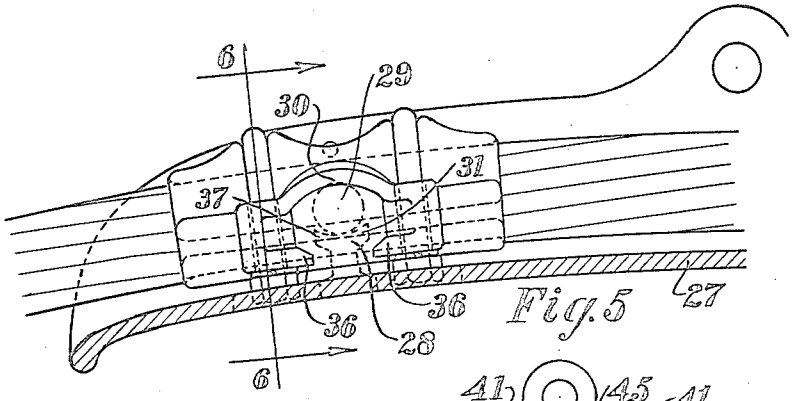


Fig. 5

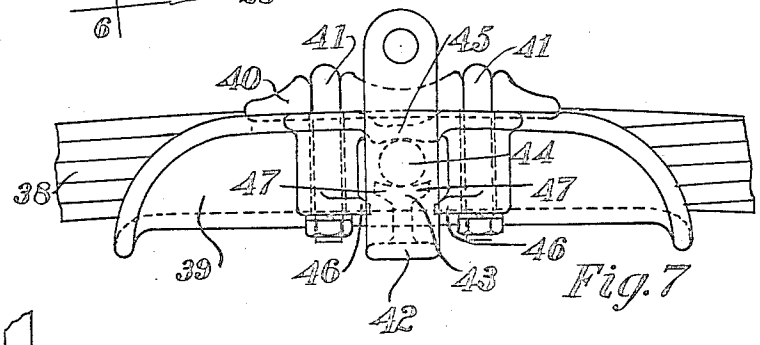


Fig. 7

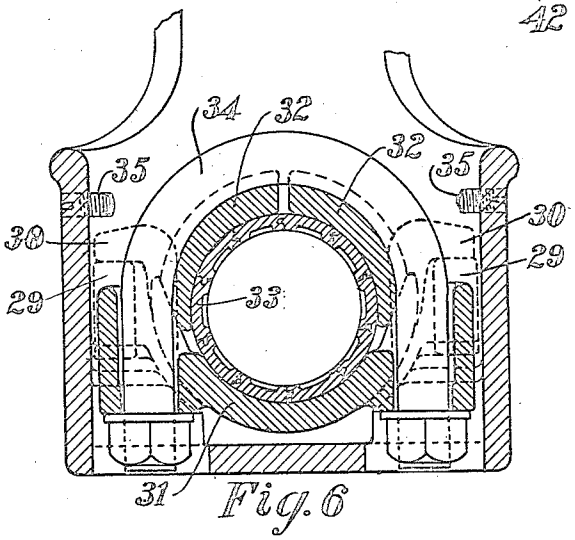


Fig. 6

INVENTOR
Floyd G. Bovard.
BY Alfred J. Crane
ATTORNEY

Jan. 28, 1936. F. G. BOVARD 2,028,894

CONDUCTOR CLAMP

Filed Aug. 29, 1934 3 Sheets-Sheet 3

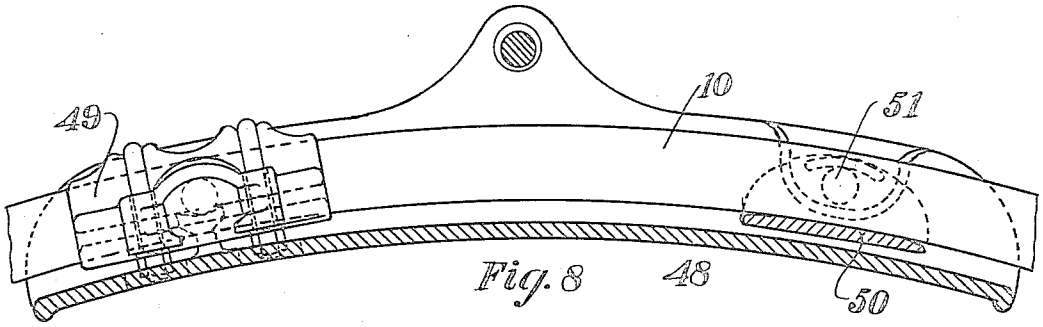


Fig. 8

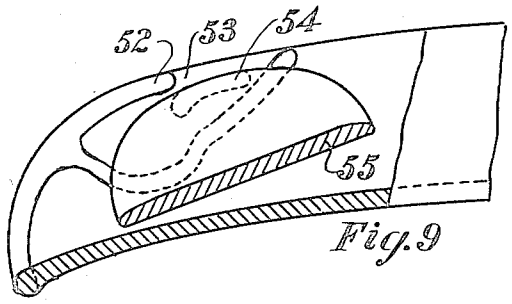


Fig. 9

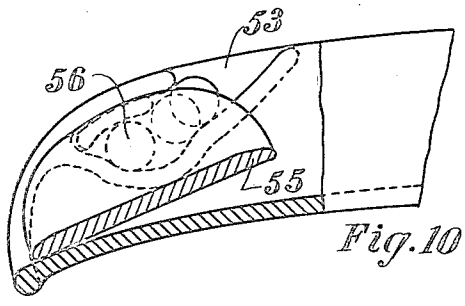


Fig. 10

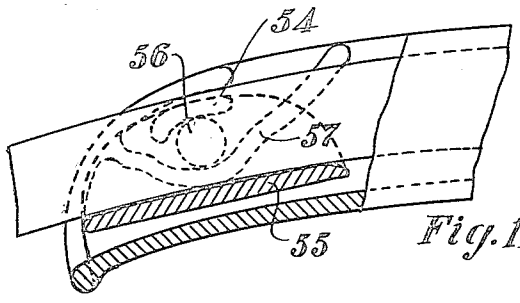


Fig. 11

INVENTOR
Floyd G. Bovard.
BY Alpheus J. Crane
ATTORNEY

Patented Jan. 28, 1936

2,028,894

UNITED STATES PATENT OFFICE

2,028,894

CONDUCTOR CLAMP

Floyd G. Bovard, Akron, Ohio, assignor to The Ohio Brass Company, Mansfield, Ohio, a corporation of New Jersey

Application August 29, 1934, Serial No. 741,981

9 Claims. (Cl. 248—63)

This invention relates to suspension clamps for electrical conductors, and particularly to clamps for supporting heavy conductors such as are used on high tension transmission lines.

One object of the invention is to provide a conductor support which will reduce the stresses placed upon the conductor to a minimum.

Another object of the invention is to provide a conductor support which will leave the conductor as free to move as possible.

Another object of the invention is to provide a conductor support which will transmit to the string of insulators, by which it is carried, a minimum amount of any vibrations present in the conductor.

A further object of the invention is to provide means for clamping a conductor which will grip the conductor about substantially its entire periphery and effectively hold the conductor without injury thereto.

A further object of the invention is to provide a conductor support which shall be economical to manufacture, easy to install, and 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 drawings and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a fragmentary top plan view of a conductor support illustrating one embodiment of the invention.

Fig. 2 is an elevation of the device shown in Fig. 1.

Fig. 3 is a transverse section on line 3—3 of Fig. 2.

Fig. 4 is a transverse section on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary elevation with parts in section showing a modified form of the invention.

Fig. 6 is a transverse section on line 6—6 of Fig. 5.

Fig. 7 is an elevation of a conductor clamp embodying some features of the invention.

Fig. 8 is an elevation with parts in section showing another modification of the invention.

Figs. 9, 10 and 11 are fragmentary sectional views showing different steps in the process of assembling one feature of the invention.

In the operation of electrical transmission lines, and particularly those having heavy conductors for heavy current work, it is found that the conductors are apt to break after a period of time, due to fatigue set up by vibration at the points of support. It is also found that the supporting insulators are apt to be injured if excessive vibration is transmitted to them from the conductor. In the present invention these and other difficulties incident to the support of electrical conductors are avoided by means of a supporting clamp in which the conductor rests and which is suspended from the insulator string.

In the form of the invention shown in Figs. 1 to 4 inclusive, the numeral 10 designates a conductor which may be of the hollow type, and which is carried in a saddle 11 which is in the form of a trough having ears 12 by which it is pivotally suspended from the insulator string by means of a pivot pin 13 or other suitable support. The conductor 10 rests loosely in cradle members or seats 15 which are mounted at opposite ends of the saddle 11 and are supported by rollers 16 arranged to travel on tracks or run-ways 17. The side walls of the saddle member 11 are spaced outwardly adjacent the run-ways 17 to provide pockets for the rollers 16. The seats 15 are provided with outwardly extending flanges 18 which rest upon the upper peripheries of the rollers 16 so that the cable seats 15 are free to tilt pivotally about their points of support and to travel in the direction of the length of the cable 10. The flanges 18 and the rollers 16 are retained in their pockets by any suitable retainer, such as cotter pins 19. This permits the cable to adjust itself on its support so as to relieve any stress which otherwise might be imparted to the cable if it were held rigidly.

The amount of longitudinal movement of the cable relative to the supporting saddle is limited by a stop member or clamp secured to the cable at the middle of the supporting saddle. This clamp comprises a bottom member 20 having a curved face arranged to conform to the contour of the cable. A plurality of cooperating contact bars 21 are also provided with curved faces for engaging the conductor. If desired, sheet liners 22 may be interposed between the clamping members 20 and 21 and the periphery of the cable 10.

The clamping members are held against the periphery of the cable by U-bolts 23 which engage openings in ears 24 extending outwardly from the sides of the bottom member 20. The bottom member 20 may be made sufficiently flexible that its upper edges will be bent inwardly by U-bolts 23 a sufficient amount to produce sub-

stantially uniform pressure throughout the entire contact surface of the member 20. Since a plurality of contact members 21 are employed, it is apparent that they will be moved inwardly against the cable, giving substantially uniform pressure about the entire periphery of the cable. If desired, the upper edges of the contact member 20 may be provided with upwardly extending wedge shaped flanges 25 which engage beveled faces on the lower edges of the adjacent contact members 21 to press the edges of these contact members inwardly against the cable. The sides of the supporting saddle 11 are bent outwardly to accommodate the stop formed by the clamping members 20 and 21, and inwardly projecting lugs 26 extend between the ears 24 to limit longitudinal movement of the cable relative to the supporting saddle 11. Sufficient clearance is provided between the lugs 26 and ears 24 to permit sufficient longitudinal movement of the cable for preventing excessive stresses. Abnormal longitudinal movements, such as would otherwise occur in case the cable is broken, are however prevented. The bottom portion of the saddle 11 is cut out to accommodate the lower ends of the U-bolts, as shown clearly in Fig. 3. The stop member clamped to the cable at the middle of the saddle is carried entirely by the cable and does not rest upon the saddle nor bear against the saddle in any way except to limit excess longitudinal movement of the cable relative to the saddle.

Instead of providing a central stop for limiting longitudinal movement of the cable, as shown in Fig. 1, the cable seats at the ends of the supporting saddle may be clamped to the cable and provided with means for preventing excess longitudinal movement of the cable relative to the saddle. An arrangement of this kind is shown in Figs. 5 and 6. In these figures the supporting saddle is designated by the numeral 27 and is provided with a run-way 28 at each side of the saddle for supporting rollers 29 on which the flanges 30 of the cable seats rest. The flanges 30 are formed integral with the bottom member 31 of a cable clamp, similar to that shown in Fig. 3. A plurality of clamping members 32 cooperate with the bottom member 31 to grip the cable 33. These clamping members are pressed against the cable by U-bolts 34 in a manner similar to the operation of the U-bolts 23 in Fig. 3. Stud screws 35 may be used to retain the gripping seats in place and prevent them from being lifted sufficiently to permit the escape of the rollers 29. Excess longitudinal movement of the cable is prevented by stops 36 arranged to engage beneath projecting ends 37 of the run-way 28. Where a gripping seat member, like that shown in Fig. 5 is provided at each end of the cable, it will be unnecessary to provide a stop at the middle of the saddle since excessive longitudinal movement will be limited by the stops on the clamping seat members. The seat members, however, are free to pivot about the rollers 29 to accommodate themselves to any angular position of the cable and also free to move longitudinally of the supporting saddle 27 to prevent longitudinal stresses in the cable.

For some purposes, especially for lighter work, the form of supporting clamp shown in Fig. 7 may be employed in which the cable 38 is clamped directly to the saddle member 39 by means of a keeper piece 40 and U-bolts 41. A suspension bracket or fitting 42 is provided with roller seats 43 supporting rollers 44 which engage flanges 45 extending laterally from the upper edges of the saddle 39. The rollers 44 thus provide a trunnion support for the saddle 39 and also permit limited longitudinal movement of the saddle relative to its support. Excess longitudinal movement is prevented by stops 46 disposed in position to engage the projecting ends 47 of the run-way 43.

In the form of the invention shown in Fig. 8, the saddle 48 is provided at one end with a clamping seat 49, like that shown in Fig. 5, and at its opposite end is provided with an open seat 50, like that shown in Fig. 1. The clamping seat 49 in this case will be relied upon for limiting excess longitudinal movement of the conductor 19 relative to the saddle 48 and the cable will be free to move any desired extent relative to the seat 50. For normal longitudinal movements of the cable, the seat 50 will travel upon its roller support 51 but for any excessive movement, the cable is free to slide on the seat.

In place of providing removable retainers, as shown at 19 and 35 in Figs. 4 and 6, the pocket for retaining the supporting roller for the cable seat may be shaped to retain the roller and seat in place, as shown in Figs. 9, 10 and 11. In this case the pocket is provided with an overhanging flange 52 leaving an opening 53 through which the flange 54 on the seat 55 may be inserted into the pocket, as shown in Fig. 9.

After the seat has entered the pocket, it may be moved to an extreme position, as shown in Fig. 10, which provides sufficient space for the roller 56 to be inserted through the opening 53. After the roller has been inserted, the seat may be returned to its operating position, as shown in Fig. 11, in which case the flange 54 approaches the run-way 57 so as prevent escape of the roller 56. This arrangement will retain the roller and seat in position so long as the cable is in place and until the seat is intentionally moved to the abnormal position shown in Fig. 10 to permit removal of the roller.

I claim:

1. The combination with a conductor, of a support for said conductor, a seat for said conductor mounted on said support, and a roller bearing having relatively travelling connection with both said seat and support to facilitate longitudinal movement of said seat relative to said support.

2. The combination with a conductor, of a support for said conductor, a seat for said conductor mounted on said support, and a roller bearing having relatively travelling connection with both said seat and said support and constituting a pivotal mounting for said seat and facilitating movement of said seat relative to said support in the direction of the axis of said conductor.

3. The combination with a conductor, of a support for said conductor, said support having a track thereon, a roller mounted on said track to travel thereon in the direction of the axis of said conductor, and a seat for said conductor carried by said roller for movement along said track in the direction of the axis of said conductor.

4. The combination with a conductor, of a support for said conductor having horizontally extending arms, tracks at the ends of said arms, rollers mounted on said tracks, conductor seats carried by said rollers and movable thereon in the direction of the axis of said conductor, said rollers constituting pivotal supports for said seats, and a stop for limiting the longitudinal movement of said conductor relative to said support.

5. The combination with a conductor, of a seat for said conductor and a roller bearing for supporting said seat, said roller bearing having relatively travelling connection with said seat and constituting a pivotal support for said seat and facilitating movement of said seat in the direction of the axis of said conductor.

6. The combination with a conductor, of a clamp for gripping said conductor, said clamp comprising a contact member for engaging a portion of the periphery of said conductor, a plurality of cooperating contact members in addition to said first-named contact member, said first-named contact member having lugs thereon, and U-bolts engaging said cooperating contact members and said lugs for clamping said contact members against the periphery of said conductor, said contact members being peripherally displaced from one another about said conductor and said first named contact member having flanges at the edges thereof overlapping the edges of the other contact members respectively.

7. The combination with a conductor, of a clamp for said conductor comprising a main contact member and a plurality of cooperating contact members, said contact members extending about different peripherally displaced portions respectively of the periphery of said conductor, means for clamping said contact member against said conductor, and roller bearing means for supporting said clamp.

8. The combination with a conductor, of a clamp for supporting said conductor, said clamp comprising more than two contact members disposed at different angular positions about said conductor and each extending less than 180 degrees about the periphery of said conductor, means for clamping said contact member against said conductor, and a roller bearing for supporting said clamp to facilitate longitudinal movement thereof with said conductor, said roller bearing constituting a pivotal support for said clamp.

9. The combination with a conductor, of a support for said conductor having substantially horizontally extending arms and a pair of conductor seats mounted respectively on the outer ends of said arms, said seats being movable with said conductor relative to said arms in the direction of the axis of said conductor, and roller bearings having relatively travelling connection with both said seats and arms to facilitate movement of said seats in the direction of the axis of said conductor while providing pivotal supports for said seats.

FLOYD G. BOVARD.