April 12, 1927. 1,624,399

W. R. ELLIS

CLAMPING DEVICE

Filed Oct. 3, 1925 2 Sheets-Sheet 1

Fig. 1.

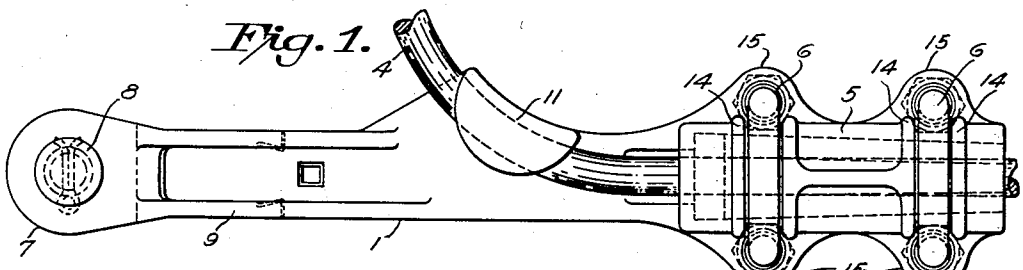


Fig. 2.

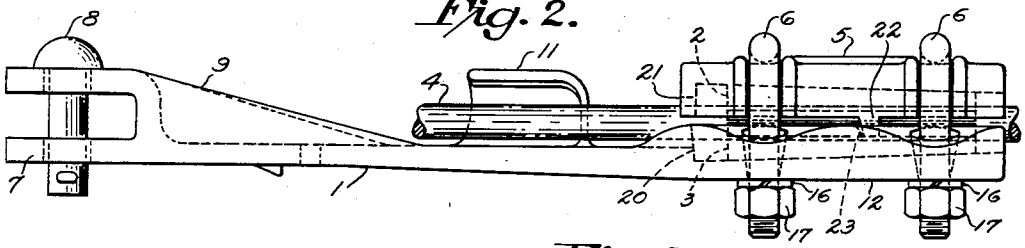


Fig. 3.

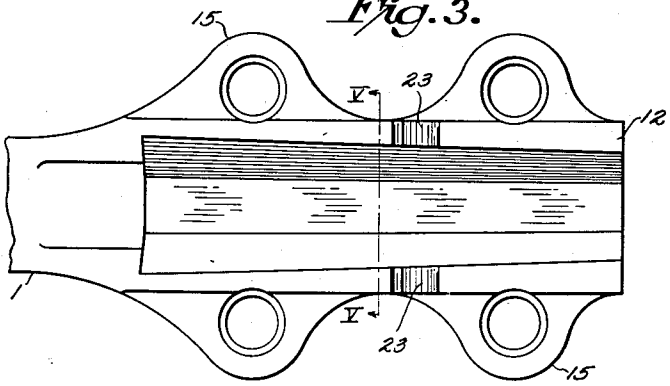


Fig. 4.

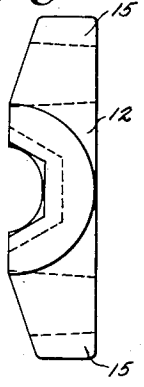
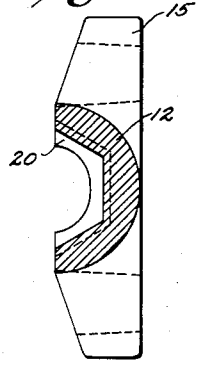


Fig. 5.



WITNESSES:

S. H. Voelker

F. H. Miller

INVENTOR

Walter R. Ellis.

BY

Wesley G. Carr

ATTORNEY

April 12, 1927. 1,624,399

W. R. ELLIS

CLAMPING DEVICE

Filed Oct. 3, 1925 2 Sheets-Sheet 2

Fig. 6.

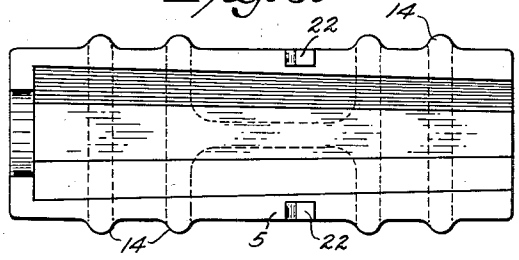


Fig. 7.

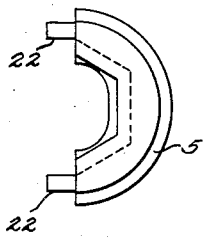


Fig. 8.

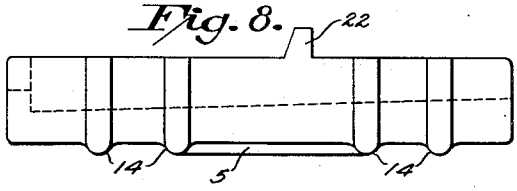


Fig. 9.

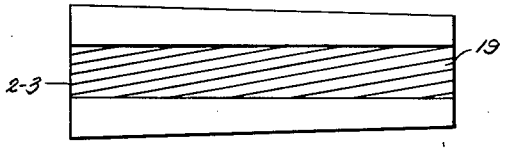


Fig. 10.

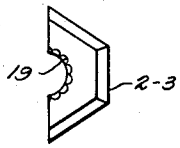


Fig. 11.

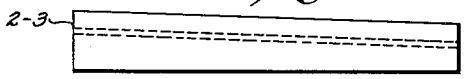
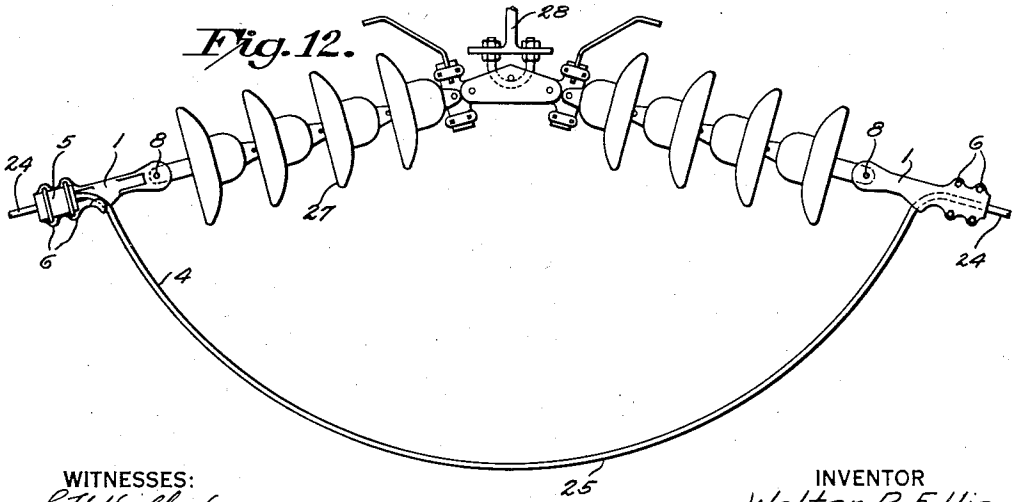


Fig. 12.



WITNESSES:
J. H. Walker.
F. Miller

INVENTOR
Walter R. Ellis.
BY
Wesley G. Carr
ATTORNEY

Patented Apr. 12, 1927. 1,624,399

UNITED STATES PATENT OFFICE.

WALTER R. ELLIS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CLAMPING DEVICE.

Application filed October 3, 1925. Serial No. 60,286.

My invention relates to clamping devices and particularly to devices for clamping and suspending high-tension transmission-line conductors.

One object of my invention is to provide a device of the above-indicated character that shall be simple and durable in construction, economical in manufacture and effective in its operation.

Another object of my invention is to provide a conductor clamp that shall be so flexible as to the variety of sizes of conductors which it will accommodate as to reduce the number of parts necessary to be carried in stock.

Another object of my invention is to provide a supporting clamp for a transmission conductor that shall so compensate for dimensional changes in the conductor as to effectively grip the same.

Another object of my invention is to provide a clamp that shall be adapted to effectively clamp conductors of relatively soft material, such as aluminum, without the use of shields between the conductor and the clamp.

Another object of my invention is to provide a clamp that shall automatically vary its clamping force in accordance with variations in the load force on a member clamped thereby.

A further object of my invention is to provide a transmission line clamp that shall be neat and compact in construction and constituted of substantially a minimum number of parts.

In transmission-line strain-clamp practice, it has been usual to construct the clamps of channel members, for the reception of the conductors, with a plurality of U-bolts or machine bolts for clamping the conductors therein. With this construction, it frequently happens that, in time, the clamping forces of the bolts so relax as to release the conductors or to require periodic tightening of the clamps.

In an effort to obviate the above-mentioned objection, clamps have been constructed of relatively great lengths to accommodate more clamping bolts, so that many of the more effective clamps have become unwieldy in size and number of parts and complicated and expensive in construction.

However, even with the added complication and expense, when employed in certain service and with certain conductors, the above-mentioned clamps may still require occasional tightening.

It is my aim to overcome all of the objections to the clamps of prior use by providing a clamp that shall not only be automatically responsive to load forces in the conductor, or other element being clamped, to clamp the same more securely, but that shall be simply and economically constructed of substantially a minimum number of parts and require no attention after its initial mounting.

Accordingly, in practicing my invention, I provide a clamp comprising a movable direct clamping element or elements and relatively stationary parts for so positioning, directing and limiting the movement of said elements as to effectually accomplish my purposes.

Figure 1 of the accompanying drawings is a side elevational view of a clamp constructed in accordance with my invention, showing a conductor clamped in position therein,

Fig. 2 is a plan view of the device shown in Fig. 1,

Fig. 3 is an enlarged detail view of a portion of the device shown in Fig. 1, with parts broken away and removed,

Fig. 4 is an end view of the device shown in Fig. 3,

Fig. 5 is a view taken along the line V—V of Fig. 3,

Figs. 6, 7, 8, 9, 10 and 11 are detail views of parts of the device shown in the other figures, and

Fig. 12 is a view showing the positions of a plurality of the clamps of my invention in practice and as related to other parts of a supporting-and-insulating transmission-line structure.

The device comprises, in general, a main body member 1, a pair of similar clamping elements or members 2 and 3 movably mounted on the member 1 for supporting a conductor 4, a member 5 stationarily related to the member 1 for holding the elements 2—3 in operative position and a plurality of U-bolts 6 for securing the member 5 to the member 1.

The body member 1, similarly to former

clamping devices of this general type, comprises an elongated body portion having a clevis 7 for co-operation with a bolt 8 adjacent to one end thereof, reinforcing ribs 9 and a curved lug or ear 11 around which the conductor 4 is adapted to be bent but, in contradistinction to the prior art devices, further comprises a portion 12 adjacent to its other end for the reception of the members 2, 3 and 5 and the bolts 6.

The portion 12 is provided with a longitudinally extending channel of substantially half-hexagonal cross-sectional contour, as more clearly indicated by Fig. 5, the sides and bottom of which similarly slope and converge from the inner extremity of the channel toward the outer end thereof.

The member 5 is similarly channeled, so that when it is in position opposite the portion 12, the combined channels bound a space of tapered substantially hexagonal shape. The cross-sectional contour of this space may be of other shape and adapted for co-operation with one member, or any practical number of members, similar to the member 3, as desired.

Ridges 14 on the member 5 and apertured lugs 15 on the portion 12, assisted by lock washers 16 and nuts 17, so position the U-bolts 6 that, when the elements 2 and 3 are in position, the member 5 may not move longitudinally of the conductor 4 and the member 1 and further, may not become separated from the structure.

The elements 2 and 3, which are duplicates of each other, closely conform, in outer contour, to the tapered hexagonal space between the members 1 and 5 in which they are disposed and are each provided with an inner channel portion having a fluted or serrated surface 19, as shown more clearly in Fig. 9, conforming, in general, to the conductor 4 which, in this instance is preferably a twisted stranded cable.

The channels in each of the members 1 and 5 are longer than the elements 2 and 3 to allow the latter longitudinal play therein and are terminated at the inner ends thereof, by transverse portions 20 and 21, respectively, for limiting the inward longitudinal movement of the elements.

The member 5 may be provided with lugs 22 for co-operation with notches 23 in the member 1 to assist the bolts 6 in preventing forward movement of the member 5 on the member 1.

The radii of the channel portions 19 are preferably adapted to a particular conductor, as are the serrations preferably made to conform to the individual twisted strands of the conductor but, since the adjacent edges of the elements 2 and 3 do not come together, conductors of slightly different radii may be effectively clamped thereby. Further, the serrations, instead of fitting individual strands may be utilized as biting edges for gripping solid cylindrical conductors.

The distance of the outer sloping surfaces of the elements 2 and 3 from the center thereof permits other similar elements of the same overall dimensions to be adapted to receive conductors of widely different diameters by enlarging the channels 19. Thus, instead of requiring a separate clamp for each different size of conductor, clamps of the same general size, shape and weight, except for the differences noted above in the channels of the elements 2 and 3 are adapted for all of the conductors. It may, however, be advisable, in some instances, to provide the fixed-dimensioned portions of the clamp in one or more additional sizes to more economically accommodate the widest variety of conductors.

In assembling the parts in the conductor 4, the longitudinal positions of the elements 2 and 3 in the members 1 and 5 will be determined by the size of the conductor, a large conductor requiring the elements 2 and 3 to be initially placed closer to the transverse portions 20 and 21 and a smaller conductor requiring the elements to be placed farther from the transverse portions.

In this position, the bolts 6 are tightened by turning the nuts 17 against the lock washers 16 until the member 5 is brought down on the element 2, and the latter and the element 3 grip the conductor as tightly as in usual clamping devices.

In the usual form of clamp having non-longitudinally movable clamping jaws, it was thought that loosening was caused by the back turning of the bolt nuts and, in certain cases, this may have been the cause.

However, loosening of the clamp may be caused without change in the initially adjusted positions of the nuts by a change involving a reduction in the diameter of the conductor under tension.

In either case, compensation is effected by the clamp of my invention by a longitudinal movement of the elements 2 and 3 in the direction of tension. That is, the conductor 4 tends to pull the elements 2 and 3 out of the clamp but, by reason of the sloping outer surfaces of the elements and the smaller opening between the outer ends of the members 1 and 5, the only result is a further tightening of the conductor in the clamp in accordance with the change in the diameter of the conductor or the degree of tension therein.

Thus, a clamp is provided that is not only lighter in weight, simpler and more compact in construction, more economical to manufacture and more flexible in the variety of conductors which it will accommodate but that will operate more effectively over a longer period without attention. Further,

by the construction wherein the elements 2 and 3 grip the conductor 4, over a relatively great portion of its area, the usual shields for the protection of soft conductors, such as aluminum, are eliminated, to effect a still further economy.

Referring to Fig. 12, a pair of the clamps of my invention are shown in co-operation with the conductor 4, in connection with what is known as a dead-end structure, in which one or two portions 24 of the conductor are under tension from the next adjacent supporting structures or towers and an intermediate or end portion 25 droops free of the mechanical load between two of the clamps or is led from one of the clamps to a power station or other position.

In such dead-end structure, the clevis portion 7 of the member 1 is secured, by the bolt 8, to the outer-end insulator of a string of insulators 27, the inner end of which is secured to a portion 28 of the supporting structure.

Where only one of the insulator strings 27 is employed, the slack portion 25 of the conductor leads to the power station or other position, above mentioned, and if two of the insulator strings 27 are employed, as shown, the portion 25 is looped between the two clamps of my invention. Aside from the specific construction of my improved clamp, however, this construction is old in practice and is illustrated only to facilitate a full and proper understanding of the invention.

While I have shown and described a particular form of device, together with a particular use therefor, it may be caused to assume other forms and be adapted for other uses without departing from the spirit and scope of my invention, as set forth in the appended claims.

I claim as my invention:

1. A conductor-supporting clamp comprising a body member, an outer holding member, a plurality of similar clamping members disposed between said members and automatically movable relatively thereto to compensate for reduction in the cross-sectional area of the conductor caused by load forces, and means for locking said body and holding members against longitudinal relative movement in both directions.

2. A conductor clamp comprising a body member embodying a channel having a surface sloping longitudinally of the conductor, a clamping member in the channel for receiving the conductor, said clamping members being duplicates, a second clamping member over the conductor, a second member having a channel and a similarly sloping surface for the second clamping member, and means for holding the members together, said clamping members being automatically movable relative to the body member to increase the clamping action thereof under load forces.

3. A conductor clamp comprising a body member embodying a channel having a surface sloping longitudinally of the conductor, a clamping member in the channel for receiving the conductor, a second clamping member over the conductor, a second member having a channel and a similarly sloping surface for the second clamping member, and means for holding the members together, and preventing longitudinal relative movement of the channeled members in both directions, said clamping members being automatically movable relative to said channeled members to increase the clamping action thereof under load forces.

4. A conductor clamp comprising a body member embodying a channel having a surface sloping upwardly from an intermediate portion toward one end thereof and a transverse shoulder at the inner end of the channel, a clamping member in said channel having a surface conforming to the sloping surface thereof and a groove to receive the conductor, a similar clamping member disposed over the conductor, a member having a channel and a shoulder similar to the body member disposed over the second clamping member, and means for holding the members together and preventing longitudinal relative movement of the channeled members, said clamping members being automatically movable relative to said channeled members.

5. A conductor clamp comprising a body member embodying a channel having a surface sloping longitudinally of the conductor, a conductor-clamping member in the channel, a second conductor-clamping member opposite said first clamping member, a second member having a channel and a sloping surface similar to the body member for the second clamping member, said second channeled member having outer transversely-extending grooves, and means for holding the members together including a plurality of U-bolts having the looped portions thereof in said transverse grooves and the legs thereof extending through the body member.

6. A conductor clamp comprising a body member embodying a channel having a surface sloping longitudinally of the conductor, a conductor-clamping member in the channel, a second conductor-clamping member opposite said first clamping member, a second member having a channel and a sloping surface similar to the body member for the second clamping member, said second channeled member having outer transversely-extending portions, and means for holding the members together including elements cooperating between said transversely-extending portions and the body member.

7. A conductor clamp comprising a body member embodying a channel having a sur-

face sloping longitudinally of the conductor, a conductor-clamping member in the channel, a second conductor-clamping member opposite said first clamping member, a second member having a channel and a sloping surface similar to the body member for the second clamping member, and means surrounding a portion of said second channeled member and cooperating with the body member for holding the members together.

In testimony whereof I have hereunto subscribed my name this 15th day of September, 1925.

WALTER R. ELLIS.