July 14, 1942. F. C. PETERSEN 2,289,992

STRAIN RELIEVING DEVICE

Filed Feb. 15, 1940

Fig. 1.

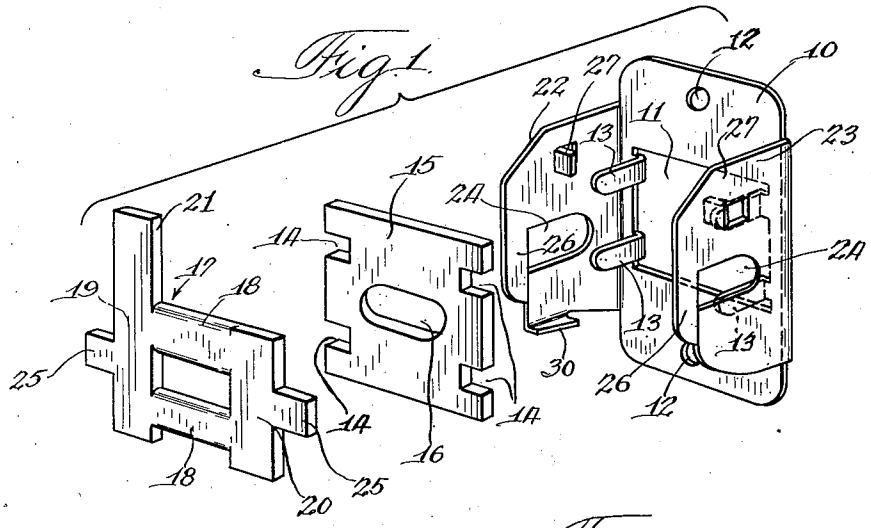


Fig. 2.

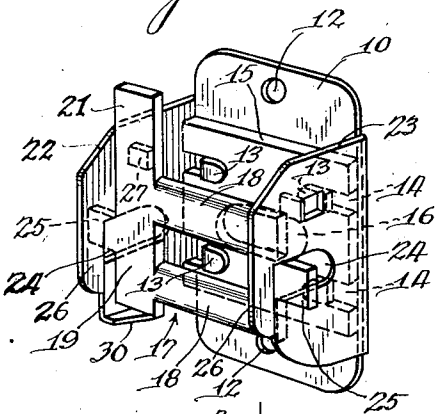


Fig. 4.

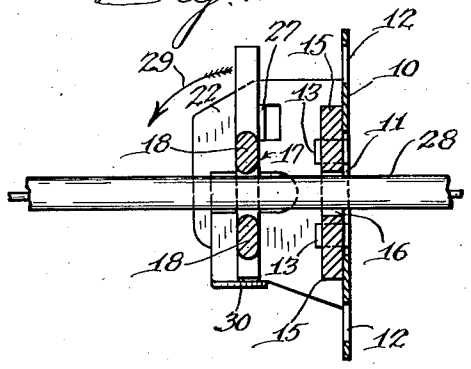


Fig. 3.

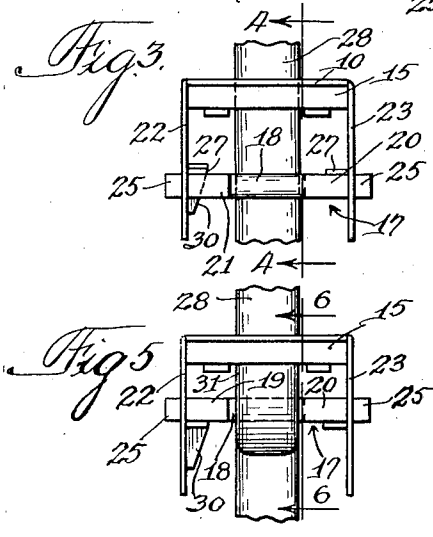
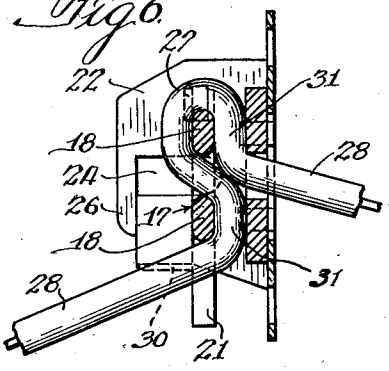


Fig. 5

Fig. 6.



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UNITED STATES PATENT OFFICE

2,289,992

STRAIN RELIEVING DEVICE

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8 Claims. (Cl. 173—322)

My invention relates to strain relieving devices for electric conductors and the like, more particularly to devices of this character that are adapted to be applied to panels through which suitable conductors pass for connection to terminals, and that effectively prevent the transmission to the terminal members of strains due to mechanical loads imposed on the conductors, and my invention has for an object the provision of a strain relieving device which is simple and economical in its construction and reliable in its operation.

In many different types of electrical apparatus it is standard practice to provide strain relieving devices mounted on panels or on similar elements through which conductors extend, in order to prevent the conductors from being pulled loose from their terminal members due to strains which are inevitably imposed upon the conductors during the use or the installation of the apparatus. Various types of strain relieving devices have heretofore been provided, many of which have been to a large extent satisfactory from the standpoint that they adequately absorb the strains and that they are readily removable or releasable. So far as I am aware, however, all of such prior devices have been so constructed as to exert on the conductor a constant pinching or clamping action which is objectionable, since it may eventually cause deterioration and failure of the insulation material surrounding the conductor wires.

It is therefore a further object of my invention to provide a strain relieving device which is capable of quick application and quick release, which consists of relatively few and simple parts, and which imposes no pinching or clamping action on the conductors except when a pulling force tending to move the conductor longitudinally is exerted thereon.

In carrying out my invention in one form, I provide means adapted to receive an electric conductor and to be rotated about an axis extending at a substantial angle to the conductor so as to form loops in the conductor partially encircling portions of the rotatable means, together with means for locking or holding the rotatable means in a position such that strains imparted to the conductors are transmitted by the loops to the rotatable means. More particularly, my improved strain relieving device comprises a base plate adapted to be secured to a suitable panel and having mounted on one face thereof an insulating member, the base plate and the member being provided with aligned conductor-receiving apertures. Suitable supporting portions extend rearwardly from the base plate, and a second insulating member is provided having a pair of arms extending substantially parallel to the base plate so as to provide a conductor-receiving space therebetween, this second member being rotatably mounted by means of pin and slot connections between the member and the supporting portions of the base plate. After a suitable conductor has been threaded through the apertures in the base plate in the first member and through the space between the arms of the second member, the second member may be rotated about an axis substantially parallel to the base plate so that the arms of the second member engage the conductor on opposite sides of the axis of rotation and form opposed loops therein partially encircling the arms.

In addition, I provide stop means positioned to engage a portion of the second member at a predetermined point in its rotation, whereupon further rotation of this member causes inward movement of the axis toward the first member to insure that the portions of the loops which lie between the two members snugly engage the arms of the second member, and releasable locking means are provided for locking or holding the second member in a predetermined strain relieving position after rotation thereto, so that strains imposed on the conductor are transmitted by the loops to the arms of the second member.

For a more complete understanding of my invention, reference should now be had to the drawing, in which:

Fig. 1 is a view in exploded perspective of a strain relieving device embodying my invention;

Fig. 2 is a perspective view of the device shown in Fig. 1, illustrating the parts in assembled relation before the conductor has been threaded through the device;

Fig. 3 is a top plan view of the device shown in Figs. 1 and 2, with a conductor threaded therethrough but before the device has been operated to its strain relieving position;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3;

Fig. 5 is a top plan view similar to Fig. 3, but showing the device after it has been operated to and locked in its strain relieving position; and

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 5.

Referring now to the drawing, I have shown my invention as applied to a strain relieving de-

vice of the type adapted to be secured to a panel through which electric conductors pass, the strain relieving device comprising a base plate 10 which is preferably stamped from sheet metal, and which is provided with a centrally located conductor-receiving aperture 11 and with a plurality of apertures 12 that are adapted to receive suitable screws or bolts, not shown, by means of which the base plate 10 may be secured to the panel if desired. As shown, the base plate 10 is likewise provided with a plurality of tabs or ears 13 which extend rearwardly therefrom adjacent the opposite edges of the apertures 11, and which are adapted to be received in suitable notches 14 in an insulating member 15 which includes a centrally located conductor-receiving aperture 16. The tabs 13 may be bent over and clinched, as shown in Fig. 2, so as rigidly to secure the insulating member 15 to the base plate 10 when the device is assembled.

In addition to the insulating member 15, my improved strain relieving device includes a second insulating member 17, shown best in Fig. 1, which comprises a pair of spaced apart arms 18 connected together at one end by a vertically extending portion 19 and connected together at the opposite end by an extending portion 20, one end of the portion 19 extending outwardly beyond the arms 18 to provide a locking portion 21, as will be more fully described hereinafter. In order properly to mount the insulating member 17 in rotatable relation with respect to the base plate 10 and the insulating member 15, the base plate 10 is provided, as shown, with a pair of rearwardly extending supporting portions 22 and 23, each of which is provided with a slot 24 for receiving extending portions 25 of the member 17 so as to provide pin and slot connections therebetween. As shown, the outer ends of the slots 24 are normally closed by wing portions 26 formed integrally with the supporting portions 22 and 23, and it will be apparent that these wing portions 26 may be temporarily bent outwardly in order to permit assembly of the insulating member 17 with the portions 25 thereof extending into slots 24.

Initially, the second insulating member 17 occupies the position shown in Figs. 2, 3, and 4, in which position the upper portions thereof engage suitable stop lugs 27 which extend inwardly from the supporting portions 22 and 23, and in which position the space between the arms 18 of the member 17 is aligned with the aperture 16 in the insulating member 15 so that a suitable conductor may be readily passed through the strain relieving device, as for example the conductor 28 shown in Figs. 3 to 6, inclusive.

After the conductor 28 has been passed through the strain relieving device, as shown in Figs. 3 and 4, the insulating member 17 may be rotated about the axis provided by the pin and slot connection between the member 17 and the supporting portions 22 and 23 in the direction of the arrow 29 in Fig. 4. Rotation of the member 17 in this direction causes the arms 18 to engage portions of the conductor 28 on opposite sides thereof and, as the rotation continues, loops are formed in the conductor which encircle the arms 18. It will be observed that in the initial position, illustrated in Figs. 2, 3, and 4, the member 17 occupies a position remote from the inner ends of the slots 24 which permits the member 17 to be rotated without encountering or engaging the insulating member 15. It will likewise be apparent, however, that when the member 17 has been rotated through an angle which is substantially greater than 90° but less than 180°, it will engage the stop lugs 27 and further rotation of the member 17 thereafter causes inward movement of the axis of rotation toward the inner ends of the slots 24 so that the member 17 pivots about the stop lugs 27 to the position illustrated in Figs. 5 and 6, in which position the member 17 is locked by engagement of the portion 21 thereof with a latch member 30 which extends inwardly from the lower edge of the supporting portion 22.

When the member 17 occupies the final position shown in Fig. 6, it will be observed that opposed loops are formed in the conductor 28, which loops encircle the arms 18 so that a mechanical knot is formed in the conductor. Preferably the stop lugs 27 and the latch 30 are so located that the member 17 in its final position is spaced from the member 15 a distance substantially equal to the thickness of the conductor 28 so as to insure that the portions 31 of the loops, which portions are located between the members 15 and 17 as shown in Fig. 6, snugly engage the arms 18 of the insulating member 17. Although no portion of the conductor 28 is positively pinched or clamped by the strain relieving device which the parts are in the position shown in Fig. 6, it will be apparent that any longitudinal forces exerted on the conductor 28 on either side of the strain relieving device will cause the opposed loops in the conductor to grip more tightly the arms 18 and thus transfer to the arms all of the strain imposed on the conductor. It is of course preferable that the arms 18 be formed with suitable rounded edges, as shown, so as to eliminate any tendency to cut or damage the insulation on the conductor 28. In actual tests of a device constructed as illustrated in the drawing, a weight of 35 pounds was applied to a conductor for a period of two hours without resulting in any cutting or damaging of the insulating material on the conductor.

When it is desired to release the conductor 28 for the purposes of rewiring or for any purpose which requires varying the position of the conductor 28 with respect to the strain release device, it is only necessary to press outwardly on the lower edge of the supporting portion 22 so as to release the latch 30 from engagement with the portion 21 of the insulating member 17, whereupon the member 17 may be rotated in a reverse direction, i. e., a clockwise direction as viewed in Fig. 6, so as to return the member 17 to the initial position illustrated in Figs. 2, 3, and 4.

Preferably the base plate 10 and the supporting portions 22 and 23, together with the tabs 13, the wings 26, the stop lugs 27, and the latch 30, are formed from a single piece of sheet metal by means of a suitable stamping operation, and the various parts thereafter bent so as to assume the relative shapes and positions shown in Fig. 1. It will now be apparent that I have provided an improved strain relieving device consisting of a relatively few parts and which may be quickly assembled, which may be readily operated to a strain relieving or locked position and quickly released therefrom when desired, and which is effective to absorb strains imposed on the conductor without exerting a constant pinching or clamping action on the conductor.

While I have shown a particular embodiment

of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A strain relieving device for securing an electric conductor or the like against longitudinal movement with respect thereto to prevent transmission of strains to conductor portions therebeyond when the conductor is subjected to longitudinal forces, comprising a member having a conductor-receiving aperture through which a conductor is adapted to pass freely when said member is in one position, means mounting said member for rotation from said one position to a second position about an axis substantially normal to the axis of said aperture, portions of said member on opposite sides of said aperture engaging the conductor during said rotation to form opposed loops in the conductor, and means for locking said member in said second position against return movement due to forces exerted on the conductor whereby strains imposed on said conductor are transmitted to said member by said loops and are absorbed by said locking and said mounting means.

2. A strain relieving device for securing an electric conductor or the like against longitudinal movement with respect thereto to prevent transmission of strains to conductor portions therebeyond when the conductor is subjected to longitudinal forces, comprising a member having a conductor-receiving aperture through which a conductor is adapted to pass freely when said member is in one position, means mounting said member for rotation from said one position to a second position about an axis extending through said aperture substantially normal to the axis of said aperture, portions of said member on opposite sides of said aperture engaging the conductor during said rotation to form opposed loops in the conductor, and means for locking said member in said second position against return movement due to forces exerted on the conductor whereby strains imposed on said conductor are transmitted to said member by said loops and are absorbed by said locking and said mounting means, said locking means being manually releasable to permit return movement of said member to said one position to release said conductor for longitudinal movement with respect to said device.

3. A strain relieving device for securing an electric conductor or the like against longitudinal movement with respect thereto to prevent transmission of strains to conductor portions therebeyond when the conductor is subjected to longitudinal forces, comprising a member having a pair of arms spaced apart to permit a conductor to pass therebetween, means mounting said member for rotation about an axis intermediate said arms and substantially parallel thereto whereby said arms engage portions of said conductor on opposite sides of said axis and form opposed loops therein, and means for locking said member in a position substantially 180° from its initial position to cause said opposed loops to encircle said arms on at least three sides whereby strains imposed on said conductor are transmitted to said arms by said opposed loops, said locking means preventing reverse movement of said member by strains transmitted thereto from said conductor.

4. A strain relieving device for securing an electric conductor or the like against longitudinal movement with respect thereto to prevent transmission of strains to conductor portions therebeyond when the conductor is subjected to longitudinal forces, comprising a fixed member having a conductor-receiving aperture, a second member having a pair of arms spaced apart to permit a conductor passing through said aperture to extend freely therebetween substantially normal to said arms, means mounting said second member rearwardly of said fixed member for rotation about an axis located in a plane through said arms, said axis being substantially parallel to and between said arms whereby said arms engage portions of said conductor on opposite sides of said second member and upon rotation of said member through an angle substantially greater than 90° form opposed loops in said conductor about said arms, one of said arms during said movement passing across said aperture in said fixed member, and releasable means for normally holding said second member in its rotated position against the forces exerted thereon by strains imparted to said conductor.

5. A strain relieving device for electric conductors and the like comprising a base plate, a first insulating member secured thereto, said member and said plate having aligned conductor-receiving apertures therethrough, supporting portions extending rearwardly of said base plate on opposite sides of said first member, a second insulating member having a pair of arms extending substantially parallel to said base plate and providing a conductor-receiving space therebetween, means including pin-and-slot connections between said second member and said supporting portions for mounting said second member with said space aligned with said apertures whereby a conductor may be freely passed through said device, said mounting means providing for rotation of said second member about an axis movable toward and away from said base plate, said arms upon rotation of said second member engaging said conductor on opposite sides of the axis of rotation to form opposed loops therein about said arms, stop means positioned to engage a portion of said second member at a predetermined point in said rotation, whereupon further rotation of said second member causes inward movement of said axis toward said first member to insure that the portions of said loops between said members snugly engage said arms, and means for locking said second member in a predetermined strain relieving position wherein strains imposed on said conductor are transmitted to said arms by said loops.

6. A strain relieving device comprising a fixed member having a conductor-receiving aperture, a second member having a pair of arms spaced apart to permit a conductor passing through said aperture to extend therebetween, means mounting said second member rearwardly of said fixed member for bodily movement toward and away from said fixed member and for rotation about an axis substantially parallel to said arms and to said fixed member, said arms upon rotation engaging said conductor on opposite sides of the axis of rotation to form opposed loops therein, stop means positioned to engage said second member at a predetermined point in said rotation whereupon further rotation causes bodily movement of said second member toward said fixed member to insure that the portions of said loops between said members snugly engage said arms,

and means for locking said second member in its rotated position.

7. A strain relieving device comprising a pair of substantially flat members having apertures for permitting a conductor to pass therethrough, one of said members including means for attachment to a panel or the like through which said conductor is adapted to extend, means mounting a second one of said members rearwardly of said one member with the apertures in said members substantially aligned so that said conductor may be freely drawn therethrough, means for rotating said second member to engage said conductor on opposite sides of the aperture through said second member and form opposed loops in said conductor whereby strains imposed on said conductor are transmitted to said second member by said loops, and means for locking said second member in its rotated position to prevent reverse movement of said member by said strains.

8. A strain relieving device for securing an electric conductor or the like against longitudinal movement with respect thereto to prevent transmission of strains to conductor portions therebeyond when the conductor is subjected to longitudinal forces, comprising a pair of members having apertures for permitting a conductor to pass therethrough, means mounting one of said members rearwardly of the other member with the apertures in said members substantially aligned so that said conductor may be freely drawn therethrough, means for rotating said one member to engage said conductor on opposite sides of the aperture through said one member and form opposed loops in said conductor whereby strains imposed on said conductor are transmitted to said one member by said loops, and means for locking said one member in its rotated position to prevent reverse movement of said one member by said strains.

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