July 29, 1947. F. KLUMPP, JR 2,424,756

STRAIN-RELIEF BUSHING

Filed March 15, 1945

FIG. 1

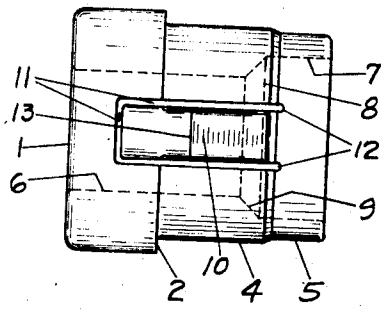


FIG. 3

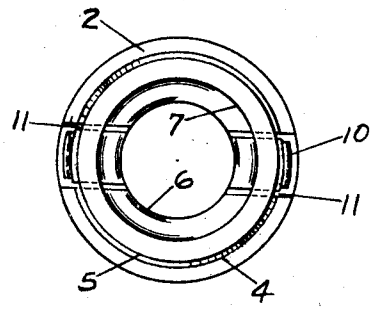


FIG. 2

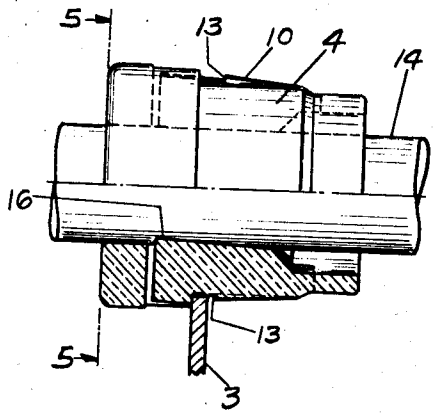


FIG. 4

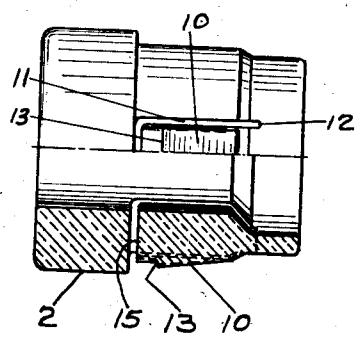
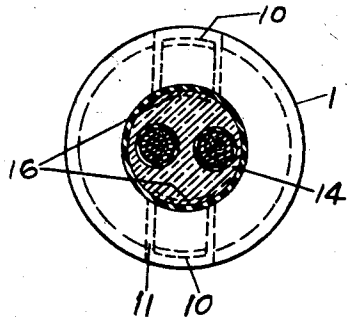


FIG. 5



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STRAIN-RELIEF BUSHING

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7 Claims. (Cl. 174—153)

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This invention relates to a strain-relief type of bushing adapted to be applied to an electrical cable and then pushed into a hole in a mounting plate or housing.

Heretofore it has been the practice to use soft rubber grommets or split bushings for holding cables in position in a mounting plate or housing, but I have found that the flexible grommets do not satisfactorily take up strains applied to the insulated wire or cable, and that split bushings act to pinch the outer part of the insulation on the cable and to force this up between the split portions of the bushings, thereby reducing the electrical resistance of the insulation at this point.

To overcome these and other objectionable features to the grommet and split bushing, it is the principal object of this invention to devise a non-split, strain-relief bushing which will provide a strong grip on the cable with which it is associated, and which will automatically lock itself in position, thereby holding the cable free from mechanical strains.

Another object of my invention is to provide a strain-relief bushing of strong tough insulating material which may be readily installed on the cable and to the mounting plate, and will provide maximum insulating qualities.

Other objects will be discerned from reading the following specification taken in connection with the annexed drawing, wherein the various Figures are on a much enlarged scale from actual devices which I have made. In the drawing:

Figure 1 is a plan view of one form of my improved type of bushing.

Figure 2 is a part-sectional and part-elevational view of the bushing shown in Figure 1 applied to a cable, a part of the mounting plate being shown.

Figure 3 is an end view of Figure 1, looking from right to left.

Figure 4 is a part-sectional and part-elevational view of a slightly modified form of bushing.

Figure 5 is a view on the line 5—5 of Figure 2.

In the various views, wherein like numbers refer to corresponding parts, 1 is a bushing of the non-split type, having a collar portion 2 which is adapted to engage the front side of a mounting plate 3 or some part of a housing into which the bushing is to be inserted. Extending away from the collar portion 2 is a body portion 4 that may be slightly tapered away from the collar 2. Preferably the end 5 is somewhat reduced in diameter from the body portion 4.

The bushing has a main bore 6 extending through the collar 2 and the body portion 4. The

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diameter of the bore 6 is approximately the same or slightly greater than the diameter of the cable which is to receive the bushing. A counter-bore 7 of considerably larger diameter than the bore 6 is provided at the end of the bushing opposite the collar 2. This counter-bore extends to a depth indicated by the broken line 8 which is near the beginning of the reduced diameter section 5. Preferably the junction between the counter-bore 7 and the hole or bore 6 is tapered as indicated by the broken line 9 to assist in slipping the bushing onto the cable.

The bushing 1 is provided with one or more—two being indicated in the drawing—fingers 10 as defined by the clearance spaces 11. The fingers have their base portions 12 positioned in the portion 5 which has a wall thickness much thinner than the other portions of the bushing. This thinness is due to the decreased exterior diameter of the portion 5 and the larger short counter-bore 7. This construction is to provide some flexibility at the base of the fingers 10. The fingers 10 normally project outwardly as clearly indicated in the drawing beyond the surface 4 within which they are positioned. The fingers are preferably tapered in a direction away from the collar 2 and are provided with a shoulder 13 that is so located as to automatically engage the back side of the plate or housing 3 when the bushing is pushed into place as indicated in Figure 2.

Since there is some resilience in the fingers 10, they will move back to lock the bushing in place after the bushing is pushed through a hole in the plate 3 at the point indicated in Figure 2. The act of pushing the bushing into the plate forces the fingers inwardly into gripping relation with the cable 14, it being understood that the thickness of the fingers within the body portion 4 is greater than the wall of the body portion 4, so that the plate 3 or housing is continually in engagement with the fingers 10 forwardly of the shoulder 13 and not in contact with the material of the body portion 4.

As shown in Figures 1 and 2, the fingers 10 project into the collar 2, whereas in Figure 4 the fingers 10 stop closely adjacent the collar 2 as indicated by the line 15, but otherwise the construction is the same as in Figure 1.

By reason of the construction described, I have provided a non-split strain-relief bushing which will securely grip a conductor or cable, and one which may be readily applied to the cable and inserted onto a mounting plate or housing without the use of special tools which are ordinarily required for split bushings; and my construction

also provides a bushing that has first-class insulating qualities. The gripping action just referred to is exemplified in Figures 2 and 5 wherein it is seen that the fingers 10 are pushed inwardly when the bushing is in place in the plate 3 so as to sufficiently compress the insulation of the cable 14 as indicated by the broken line 16 in Figure 5 to take up any torque strain applied to the cable.

What I claim is:

1. A strain-relief bushing of strong insulating material, the bushing having a complete circular collar portion and a portion preferably tapered extending from the collar to the opposite end, and a plurality of imperforate gripping fingers arcuately spaced around the bushing and having their bases near said opposite end of the bushing and extending up to the collar and into it, the fingers having a thickness greater than the wall of the bushing to the rear of the collar and normally projecting outwardly beyond the tapered surface of the bushing whereby when the bushing is pushed into a hole in a mounting plate, the fingers per se are forced into gripping relation with a conductor carrying the bushing and support the bushing independently of the tapered part of the bushing, the fingers having shoulders spaced from the collar for engaging a mounting plate on the side opposite to that engaged by the collar when the bushing is pushed into a hole in the mounting plate.

2. A non-split, strain-relief bushing of strong insulating material having a collar at one end and a tapered portion extending away from the collar, the bushing having a bore through at least the collar of a diameter approximately that of the cable to which it is to be applied, and a much larger bore at the end opposite the collar, and a finger having its base in the material over the larger bore, the finger extending toward the collar and protruding outwardly beyond the surface of the tapered portion and provided with a shoulder for engaging a mounting plate on the side opposite to that engaged by the collar when the bushing is pushed into a hole in the mounting plate.

3. A non-split, strain-relief bushing of tough insulating material having a cable-receiving hole of two diameters, the hole of smaller diameter being approximately the same as the diameter of the cable with which the bushing is to be used, an external collar on the bushing at the end of smaller diameter, a plurality of fingers arcuately spaced around the bushing and having their bases positioned in the material over the bore of larger diameter where the wall material is thinner, thereby giving flexibility to the fingers, the fingers being thicker than the wall of the bushing to the rear of the collar and normally protruding outwardly beyond the surface wherein they are positioned and having shoulders to engage a mounting plate on the side opposite to that engaged by the collar when the bushing is pushed into a hole in the mounting plate and also serving to directly grip the cable along a considerable length thereof.

4. In combination with a mounting plate having a hole to receive a bushing, a non-split bushing of tough insulating material, the bushing having a collar at one end to engage one side of the plate, while the opposite end is preferably tapered somewhat with fingers arcuately located therein but normally projecting outwardly beyond the surface in which they are located, the fingers having shoulders for automatically engaging the opposite side of the plate when the bushing is inserted into the hole in the plate, the end of the bushing opposite to the collar having a much thinner wall than elsewhere, the fingers having their bases in this thinner wall to give resilience to the fingers whereby when the bushing is inserted into the hole in the plate the fingers will be more readily forced by the plate into gripping position on the cable.

5. The combination of a mounting plate having a hole therein and a non-split cable bushing of tough insulation material for fitting in the plate hole so as to have parts thereof forced by the plate into gripping relation with the cable on which the bushing is mounted, said gripping parts comprising fingers normally projecting outwardly beyond the outer circular surface of the bushing in which they are located, the same fingers being thicker than the wall of the bushing but bendable inwardly by the plate to grip the cable along the greater part of the length of the fingers when the bushing is pushed into the hole in the plate, and to cooperate with means on the bushing for locking it to the plate.

6. The combination of a mounting plate having a hole therein and a non-split cable bushing of tough insulation material for fitting in the plate hole so as to have parts thereof forced by the plate into gripping relation with the cable on which the bushing is mounted, said bushing having a collar at one end and a main bore for the greater part of its length including the collar portion and of a diameter so the bushing will snugly fit the cable, and a short counter-bore at one end materially larger in diameter than the main bore, fingers having their bases in the thinner material over said counter-bore and extending to the collar, the fingers normally projecting outwardly above the surface in which they are located whereby when the bushing is inserted into the plate hole the fingers will be forced into gripping position with the cable, and shoulders on the fingers for cooperating with the collar to lock the bushing to the plate.

7. A strain relief bushing for holding an electrical conductor or cable in a mounting plate, the bushing being made of strong insulating material and having a complete circular collar and a portion preferably tapered, extending from the collar to the opposite end, a gripping finger having its base near said opposite end of the bushing and extending toward the collar, the finger being greater in thickness than the wall of the bushing away from the collar and normally projecting outwardly beyond the tapered surface of the bushing to insure that the finger will be moved into and held in gripping position with the conductor or cable by the mounting plate when the bushing is pushed into a hole in the plate, the finger having a shoulder for engaging the mounting plate on the side opposite to that which will be engaged by the collar.

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