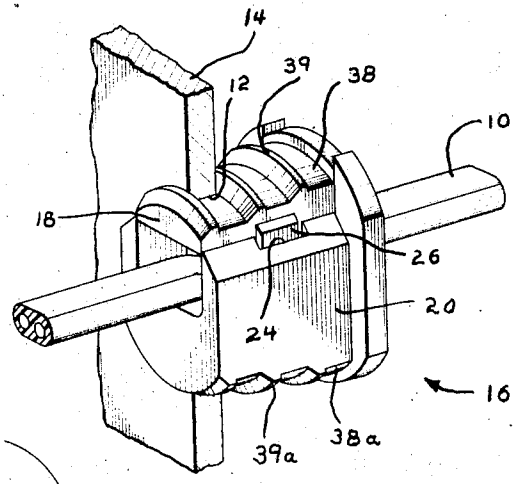
Jan. 28, 1969 D. R. COLDREN 3,424,856

STRAIN RELIEF BUSHING

Filed Feb. 16, 1967

Fig. 1



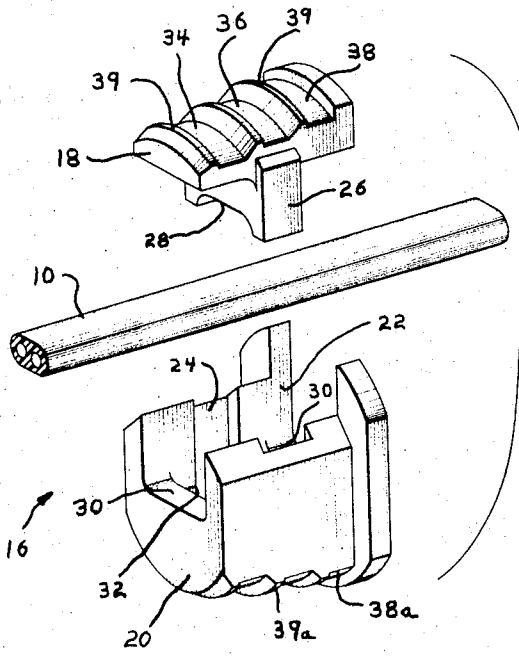


Fig. 2

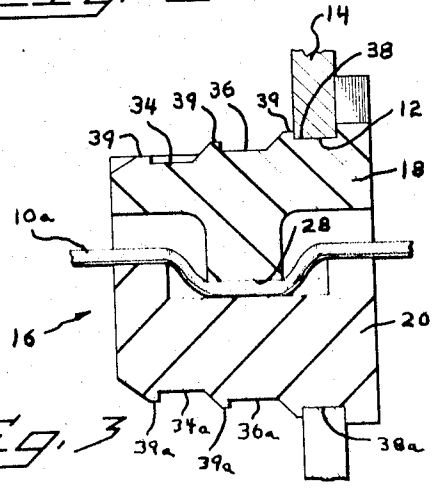


Fig. 3

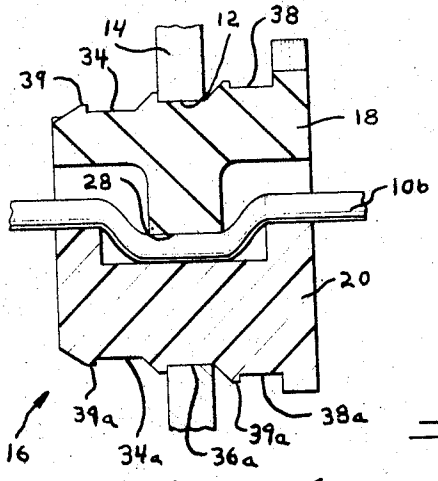


Fig. 4

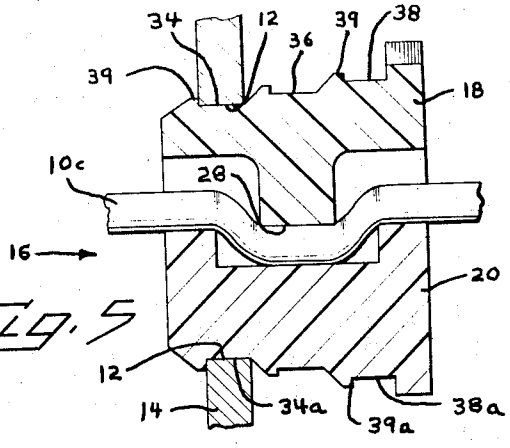


Fig. 5

United States Patent Office 3,424,856
Patented Jan. 28, 1969

3,424,856

STRAIN RELIEF BUSHING

Daniel Russell Coldren, Enola, Pa., assignor to AMP Incorporated, Harrisburg, Pa.

Filed Feb. 16, 1967, Ser. No. 616,597
U.S. Cl. 174—153 1 Claim
Int. Cl. H01b 17/26

ABSTRACT OF THE DISCLOSURE

A device for preventing axial movement of an electrical conductor relative to a panel aperture through which said conductor extends. The device is adjustable to accommodate various size conductors for mounting within a given size aperture.

Background of the invention

Field of the invention.—Strain relieving means for electrical conductor or similar rod-like member.

Description of the prior art.—Devices are known for providing strain relief for wire conductors. Known devices usable with a given size panel aperture are quite limited in the range of wire sizes which they may receive. This limitation of the known devices is a considerable drawback which this invention attempts to overcome.

Summary of the invention

This invention provides a device mountable within a panel aperture and capable of receiving a broad range of electrical conductor sizes. The device securely grasps the conductor, regardless of size, and prevents axial movement of the conductor relative to the panel.

Brief description of the drawings

FIGURE 1 is a perspective view showing a strain relief bushing embodying the teachings of the present invention;

FIGURE 2 is an exploded perspective view of the bushing of FIGURE 1;

FIGURE 3 is a cross-sectional view of a bushing used with an electrical conductor in the small wire size range;

FIGURE 4 is a cross-sectional view similar to FIGURE 3 and showing the bushing used with an electrical conductor in an intermediate wire size range; and

FIGURE 5 is a cross-sectional view similar to FIGURES 3 and 4 and showing a bushing used with an electrical conductor in the large wire size range.

Description of the preferred embodiment

The attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purpose of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

With reference to the drawings and in particular to FIGURE 1 there is shown an electrical conductor **10** passing through an aperture **12** formed in a panel or the like **14**. Although a single conductor **10** is shown it is to be understood that the principle of the present invention is also operative on a plurality of such conductors and also on other rod-like members which are similar in form to electrical conductors. The panel **14** illustrated

is merely representative of any structure having an aperture through which a conductor or the like may extend.

It is normally desirable when a conductor passes through a panel aperture to secure the conductor against axial movement relative to the panel. One purpose of so restraining the conductor is to prevent damage to the conductor termination lying beyond the panel. To this end there is provided a strain relief bushing indicated generally at **16** and preferably formed of a plastic material such as nylon. This bushing, better shown in FIGURE 2, is comprised of an upper part **18** and a lower mating part **20**. A radially extending slot **22** is formed in the part **20**, said slot serving to receive the conductor **10** and the upper part **18**. A pair of parallel grooves **24** are provided on opposite sides of the slot **22** and receive a depending section **26** formed on the part **18**. Section **26** has a lower arcuately shaped portion **28** which engages the conductor in use. The radially inward portion of slot **22** terminates in a pair of side ridges **30** separated by a recessed portion **32**. The two parts **18** and **20** of the bushing cooperate to surround a conductor and the portion **28** cooperates with the ridges **30** and recessed portion **32** to firmly grasp the conductor and prevent axial movement thereof.

As is apparent, the overall outside dimension of the bushing parts **18** and **20** in assembled form depends on the size and number of conductors passing therebetween. A relatively large conductor will cause the parts **18** and **20** to be in a relatively spread condition whereas a small diameter conductor will allow the parts **18** and **20** to assume a relatively closed position.

The unique feature of the strain relief bushing of the present invention is that the bushing will fit within a given size panel aperture regardless of the size or number of conductors passing through the bushing. To achieve this result the upper surface of part **18** is provided with a series of stepped surfaces **34**, **36** and **38** separated by flanges **39**. The lower surface of part **20** is provided with a series of stepped surfaces **34***a*, **36***a* and **38***a* separated by flanges **39***a*. As can be seen in FIGURES 3 through 5 the surfaces **34** and **34***a* cooperate to form a relatively small bushing periphery, the surfaces **36** and **36***a* cooperate to form an intermediate size bushing periphery, and the surfaces **38** and **38***a* cooperate to form a relatively large periphery.

FIGURES 3 through 5 illustrate bushing **16** mounted within a given size panel aperture but with varying size conductors passing through the bushing. In FIGURE 3 the conductor **10***a* is representative of a conductor which falls within the small size range. Since the conductor is relatively small the bushing parts are allowed to move into a relatively closed position, i.e. part **18** moves deep into the slot **22**, and therefore the bushing would be inserted into the panel aperture until the surfaces **38** and **38***a* engage the aperture sides. The force exerted by the aperture maintains the parts **18** and **20** in position and causes the depending portion **26** to firmly engage the conductor and prevent axial movement thereof. Slight changes in conductor size will result in slightly more or less pressure being exerted on the conductor but the surfaces **38** and **38***a* of the bushing will remain in proper engagement with the panel aperture.

In FIGURE 4 a conductor **10***b* is shown which is representative of conductors falling within an intermediate size range. Since the conductor **10***b* is somewhat larger than conductor **10***a* the bushing parts **18** and **20** are in a slightly spread condition and therefore the bushing cannot be fully inserted within the panel aperture but rather will be inserted only until the surfaces **36** and **36***a* engage the aperture sides. Once again a slight variation in conductor size is permissible, such variation merely resulting in varying force being applied to the conductor.

FIGURE 5 illustrates a conductor **10***c* which is representative of conductors falling into the relatively large size range. Such a conductor causes the bushing parts **18** and **20** to assume a spread position. In this position the bushing will only be insertable within the panel aperture sufficiently to allow the surfaces **34** and **34***a* to engage the aperture sides. Slight size variation is permitted as discussed previously.

Although the bushing parts are shown with three stepped surfaces to accommodate three different conductor size ranges, it is to be understood that this is the preferred arrangement but that two or more stepped surfaces would be within the scope and spirit of the invention.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. The actual scope of the invention is intended to be defined in the following claim when viewed in its proper perspective against the prior art.

I claim:

1. In a bushing for securing electrical conductors within a panel aperture, said bushing comprising a first part and a second part, said first part having a passageway extending therethrough for accommodating an electrical conductor, a conductor engaging surface disposed on said first part within said passageway, means for locating said second part within said passageway of said first part, a conductor engaging surface disposed on said second part in opposing relation to said conductor engaging surface on said first part whereby said first and second parts are

cooperable to engage an electrical conductor disposed therebetween, the improvement comprising a plurality of stepped surfaces disposed on the outer surface of said first part and lying parallel to said passageway, a plurality of stepped surfaces disposed on the outer surface of said second part and lying parallel to said passageway, said pluralities of stepped surfaces being in alignment with each other when said second part is located within said first part to form cooperating pairs of surfaces for engaging a panel aperture, each of said cooperating pairs of surfaces having a different peripheral dimension dependent upon the stepping between adjacent surfaces and upon the relative spacing between the conductor engaging surfaces of said first and second parts whereby said bushing is capable of receiving various size electrical conductors and fitting within a fixed size panel aperture.

References Cited

UNITED STATES PATENTS

951,505	3/1910	Mather	174—155 X
2,420,826	5/1947	Irrgang	174—153
2,424,757	7/1947	Klumpp	174—153
2,424,759	7/1947	Klumpp	174—153

FOREIGN PATENTS

837,717	5/1952	Germany.

LARAMIE E. ASKIN, *Primary Examiner.*

U.S. Cl. X.R.

16—2; 248—56