May 11, 1954 R. E. GARRAWAY 2,678,346

ELECTRICAL TERMINAL

Filed Nov. 12, 1949

Fig. 1.

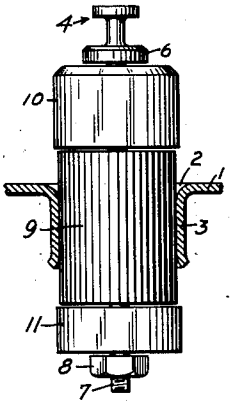


Fig. 2.

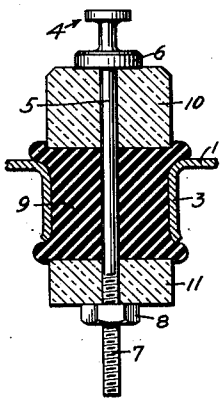


Fig. 3.

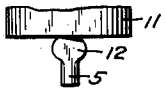


Fig. 4.

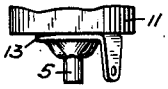


Fig. 5.

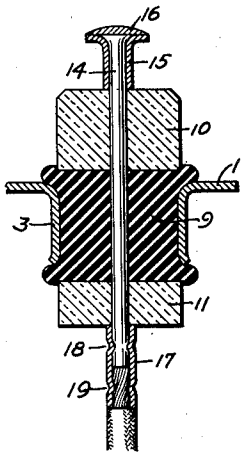
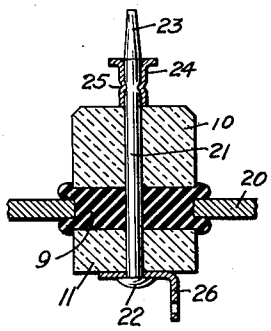


Fig. 6.



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ELECTRICAL TERMINAL

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Application November 12, 1949, Serial No. 126,735

1 Claim. (Cl. 174—153)

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This invention relates to electric terminals and more particularly to terminals of miniature size and mounting seal arrangements therefor.

In the electrical art hermetically sealed terminals usually comprise a glass-to-metal mounting seal, but such seals are relatively costly since they require a heat treatment and furthermore are easily broken when accidentally struck or subjected to lateral stress.

While efforts have been made to produce a mounting arrangement for electric terminals by using a molded flanged rubber grommet as a substitute for the glass, such constructions are applicable to large size only. This limitation to large sized terminal mounts in contrast to miniature sized terminal mounts in the order of 3/8 inch or less in overall diameter is due to the provision of cylindrical shanks on the rubber element for reception in enlarged recesses formed in the ceramic bushings located on opposite sides of the rubber element. When the size of the terminal is reduced, the bushings become too thin and therefore weak adjacent the enlarged recess and a reduction in size of the rubber shank results in an electric spacing between the terminal conductor and the mounting plate which is too small.

An object of the present invention is to produce an electric terminal having a seal arrangement that is hermetically tight, sturdy in construction, easily assembled and capable of being made in miniature sizes.

The terminal of the present invention is mounted in an opening contained in a wall by the use of an insulating sleeve-shaped grommet of elastic material capable of withstanding wide ranges of temperature having an inner diameter substantially equal to the diameter of the terminal conductor or rod and an outer diameter substantially equal to the diameter of the opening in the wall. On opposite sides of the grommet, bushings of ceramic or other rigid material are mounted on the rod. The rod is provided with a shoulder at one end and means on the other end for holding the bushing-grommet assembly under compression against the shoulder, whereby the grommet is squeezed between the bushings thereby forcing it tightly into engagement with the rod at the center thereof and outwardly tightly against the rim of the opening at the outer surface of the grommet. The hermetical character of the seal is insured by sufficient compressive force to squeeze portions of the grommet outwardly between the wall portion defining the opening and the insulating bushings. This and

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also the use of a solid conductor rod through the assembly provides a sturdy hermetical seal capable of withstanding wide ranges of both pressure and temperature.

The terminal according to the invention is also capable of different uses, for example, it may be used in the wall of a hermetically sealed container for connecting electrical components therein to circuits outside the container or may be used as a stand-off terminal for components on a chassis.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood, by reference to the following description of certain embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

Fig. 1 shows in side elevation a loose assembly of the terminal and the mounting elements thereof before compression of the grommet;

Fig. 2 is a view in longitudinal section of the terminal mount shown in Fig. 1 with the grommet under sealing compression;

Figs. 3 and 4 show two alternative forms for maintaining the assembly under compression;

Fig. 5 is a longitudinal sectional view of a further embodiment of the invention;

Fig. 6 shows an application of the terminal mount applied to the wall of a chassis.

Referring to Figs. 1 and 2 of the drawings, a wall 1 is shown with an extruded opening 2 therein defined by a rim 3 of cylindrical form extending at right angles to the plane of the wall 1. Disposed within the opening 2 is the loose assembly of one form of the terminal 4 of the present invention. The terminal comprises a conductor rod 5 having a shoulder 6 and a threaded end 7 onto which a nut 8 may be turned. Interposed between the shoulder 6 and the nut 8 is a grommet 9 of cylindrical shape comprised of an elastic material, such as synthetic rubber, preferably Silicon, and a pair of insulator bushings 10 and 11 of rigid material, preferably ceramic, although many other materials may be used. The bushings are positioned on opposite sides of the grommet so that when the nut 8 is tightened on rod 5 the bushings exert compressive force against the grommet thereby expanding the grommet in lateral directions tightly against the rod 5 and against the rim 3 of the plate 1. When the compression is exerted the assembly is positioned in the opening so that a bead of rubber is squeezed outwardly between

the plate and each of the bushings thereby insuring a hermetical yet flexible seal between the rod and the plate. The resilience of the grommet permits limited movement of rod 5 so that it gives resiliently when struck a lateral blow without damaging or breaking the seal.

While the clamping pressure placed upon the grommet 9 is shown in Figs. 1 and 2 to be brought about by a nut threaded on the rod 5, other means may be employed. By way of example, two other forms for maintaining the compression are shown in Figs. 3 and 4. In Fig. 3, the rod 5 is shown flattened at 12 so as to extend the surface thereof in the form of shoulders against the bushing 11, this pinching or flattening out of the rod portion being performed when the bushing-grommet assembly is held under compression in a jig or the like. In Fig. 4 a known form of lock nut 13 of the push-on type is applied to the rod 5 as the assembly is placed under compression. The lock nut is provided with inwardly disposed portions which bite into the rod when force is exerted to back up the nut.

In Fig. 5 I have shown another terminal construction. It comprises a terminal rod 14 which may comprise a simple piece of wire, such as tinned copper, to which an eyelet 15 is applied at one end, the end of the wire being peened over into the eyelet thereby fastening the eyelet securely to the wire. The ends of the eyelet and wire may also be covered by solder as indicated at 16. The terminal rod thus formed is assembled with the grommet 9 and the two insulating bushings 10, 11 as shown. A second eyelet 17 is applied at the opposite end of the terminal 14, and when the assembly is placed under compression, the eyelet 17 is pinched or crimped, as indicated at 18 into the surface of the rod thereby securely fastening the eyelet. The bushing-grommet assembly is thus held under compression between the shoulders formed by the eyelets 15 and 17. If desired the eyelet 17 may be of a length extending beyond the end of the rod 14 and this extension may be used for securing the wire lead 18 therein, such as by crimping as indicated at 19.

The eyelet 17 may also be used on the rod 5 in Figs. 1 and 2 to replace the threads 7 and nut 8, especially where the pin-like rods are used in the place of a simple piece of wire. It should also be understood that the solid conductor rod 5 may be replaced by a tubular eyelet type of conductor.

Referring to Fig. 6, the terminal assembly of my invention is shown applied to a chassis plate 20 as a stand-off terminal for the mounting of components, such as condensers, resistors, etc. The rod terminal 21 is provided at the bottom end thereof with a head 22 and at the other end with a tapered shank 23. The grommet 9 and bushings 10 and 11 are assembled on the rod 21 as before and an eyelet 24 is then applied onto the tapered shank and held tightly against

the bushing 10 as the grommet-bushing assembly is compressed against the head 22, and while in this position the eyelet is secured to the rod by crimping as indicated at 25. The tapered shank is important for assembly purposes, permitting easy application of the bushings, grommet and eyelet onto the rod. The outer flared end of the eyelet helps to support in stand-off relation the lead wires of components that are soldered to the end of the rod 21.

If desired, an apertured lug 26 may be received on the rod 21 adjacent the head 22 for electrical connections on that side of the chassis frame 20.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is given only by way of example and not as a limitation to the scope of my invention.

I claim:

A terminal for application to a wall having an opening therethrough, comprising an elongated conductor adapted to be disposed in said opening, an insulating grommet of elastic material having a uniform inner diameter substantially equal to the diameter of said conductor and a uniform outer diameter substantially equal to the diameter of the opening in the wall, said grommet being disposed concentrically within the perimeter of the said opening about a portion of the said conductor and extending slightly above and below the extremities of said wall, insulator bushings disposed on the portions of said conductor at opposite sides of the grommet, said conductor, said grommet and said bushings being mountable as a loose assembly in said opening, the grommet distending over the extremities of said wall and bushings when subjected to compression between said bushings, to make a tight seal between said conductor and said wall, and means to maintain said grommet under compression between said bushings whereby said grommet is maintained expanded inwardly tightly against said conductor and outwardly tightly against the perimeter of the opening.

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