Nov. 16, 1937. LE ROY W. KELSAY 2,099,117

TERMINAL MOUNTING

Filed Nov. 13, 1936 2 Sheets-Sheet 1

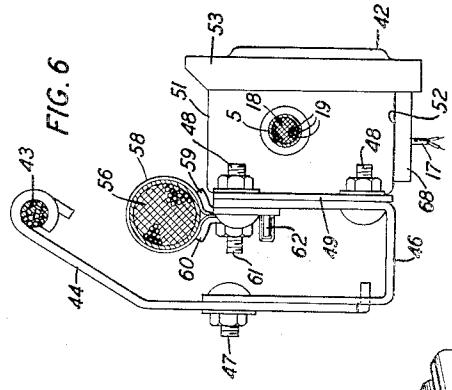

FIG. 6

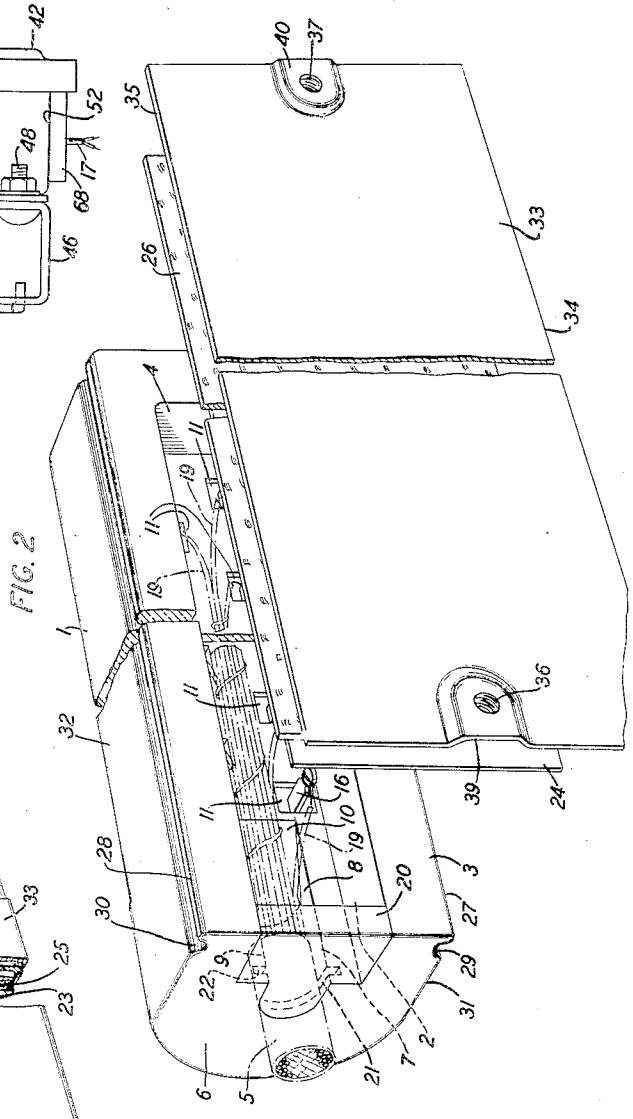

FIG. 2

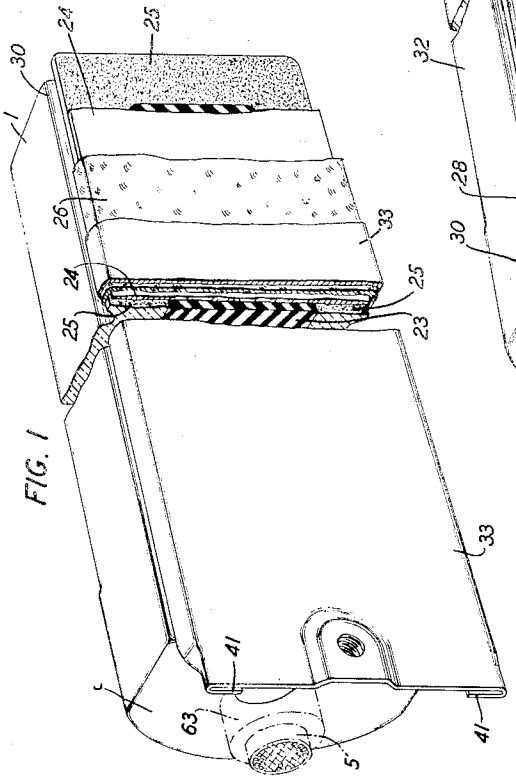

FIG. 1

INVENTOR
L. W. KELSAY
BY J. Mac Donald
ATTORNEY

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Filed Nov. 13, 1936 2 Sheets-Sheet 2

FIG. 3

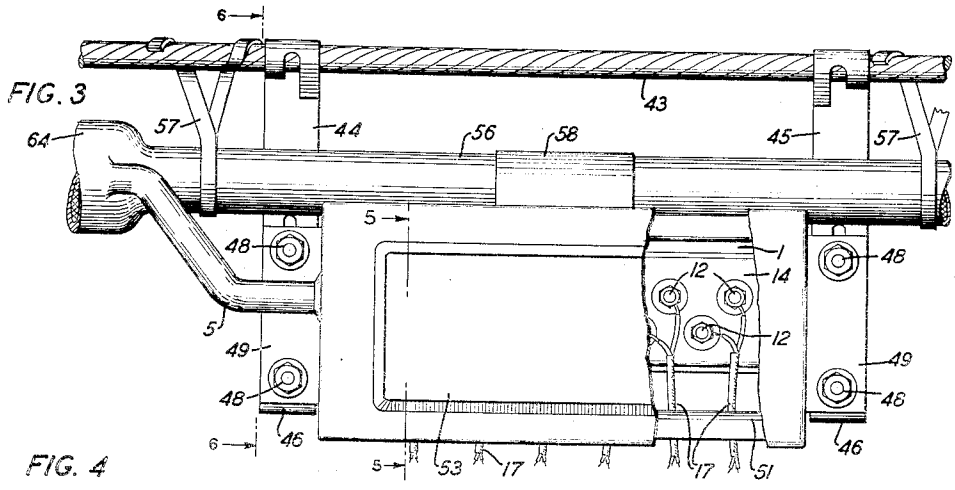
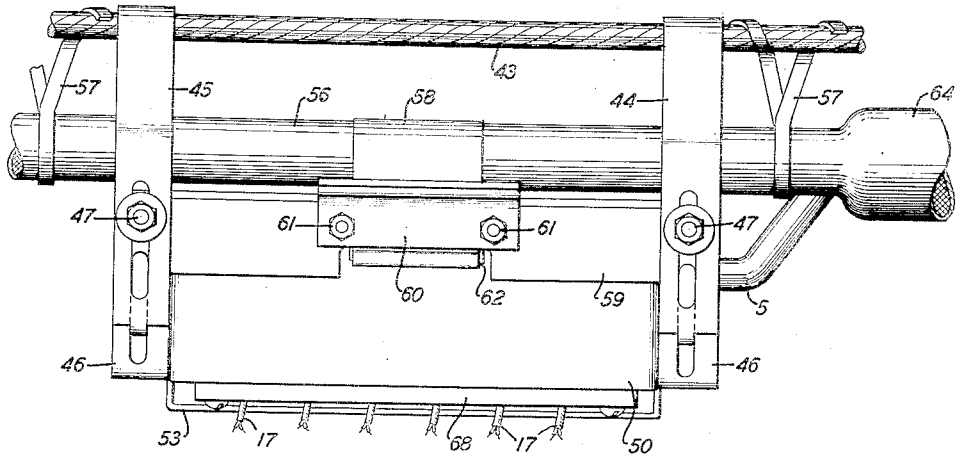


FIG. 4



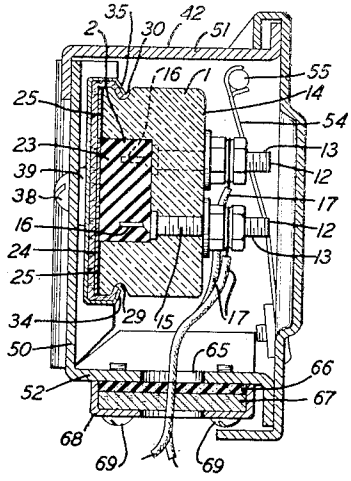


FIG. 5

INVENTOR
L. W. KELSAY
BY J. MacDonald
ATTORNEY

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UNITED STATES PATENT OFFICE

2,099,117

TERMINAL MOUNTING

Le Roy W. Kelsay, Summitt, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application November 13, 1936, Serial No. 110,647

4 Claims. (Cl. 247—7)

This invention relates to terminal mountings and more particularly to terminal mountings in which terminals are embedded in a body of insulating compound subject to change under changes in temperature.

The object of this invention is to provide means for preventing moisture from gaining access to the body of insulating compound.

The invention is applicable to cable terminals of the type in which a terminal box containing a terminal block is supported adjacent a desired point of connection in a lead covered cable.

A feature of the invention resides in a flexible covering for a portion of the terminal block in which terminals are embedded in insulating compound, the flexible covering being capable of following the contracting and expanding movements of the insulating compound caused by changes in temperature.

In the drawings,

Fig. 1 is a view in perspective and partly in section of the terminal block assembled with a covering arrangement for the back portion of the block and as seen from the back of the assembly and with portions broken away to disclose various elements in the structure;

Fig. 2 is a view similar to Fig. 1 but showing the parts in their relative positions before being assembled;

Fig. 3 is a front elevational view of a cable terminal box to which the invention is applicable, the cable terminal box being shown as supported by means of a messenger wire and having a stub cable connected to a line cable, the line cable being supported by means of the messenger wire. A portion of the door of the cable terminal box is broken away to disclose the interior of the box and the position of apparatus supported therein;

Fig. 4 is a back elevational view of the apparatus shown in Fig. 3;

Fig. 5 is an end view in section of the cable terminal box shown in Fig. 3, taken on the line 5—5 of Fig. 3 and showing the assembly of parts shown in Fig. 1, and in reverse position relative thereto; and

Fig. 6 is an end view partly in section of the apparatus shown in Fig. 3 and taken on the line 6—6 of Fig. 3.

Figs. 1 and 2 are drawn on an enlarged scale relative to the other figures.

In cable line systems, means are provided at predetermined points for connecting subscribers' lines to conductor wires in the cable line. To facilitate the making of such connections it is now the practice to have at the predetermined points, terminal arrangements electrically connected to predetermined conductor wires of the cable and having means for connecting drop wires to the terminal arrangement. The drop wires serve as conductors between subscribers' premises and the terminal arrangement. It is now the practice to have in the terminal arrangement a block of insulating material in which are supported spaced terminals, end portions of the terminals projecting into a recess formed in the back portion of the block of insulating material. Conductor wires are fanned out in the recess and are connected to the end portions of the terminals. The recess in the block is filled with an insulating compound and the block is secured to a comparatively stiff metal plate, extending across the recess of the block. The terminal arrangement above mentioned is usually housed in a protective casing and the casing is supported on a messenger wire adjacent the line cable. In some cases the terminal arrangement is subjected to changes in temperature of sufficient magnitude to cause the expansion or contraction of the filling of insulating compound in the block.

I have found that when the insulating compound shrinks, cracks may be formed in the insulating compound and moisture may be admitted through the cracks to the points of connection between the fanned out conductor wires and the terminals. The moisture admitted causes impairment of the service. I have also found that when the insulating compound shrinks and moves away from the comparatively stiff metal plate, a partial vacuum is formed in the recess in the block of insulating material and that when this partial vacuum condition occurs moisture is driven by means of the existing atmospheric pressure into the recess in the block.

In this invention I have provided a flexible shield across the recessed face of the block of insulating material. The flexible shield follows the expansion and contraction movements of the filling of insulating compound and prevents moisture from reaching the insulating compound.

To further point out the invention, reference will now be had to the drawings in which like parts of the figures are identified by the same numerals and in which 1 is a block of insulating material having a recess 2 formed in its back surface 3. The block 1 of insulating material may be made, for instance, of porcelain. The recess 2 is closed at one end by an end wall 4 and is open at the other end to permit insertion therein of one end of a stub cable 5. An end portion 6 of

the block 1 is enlarged and in this enlarged portion a recess 7 is provided to receive an end portion of the stub cable 5. The recess 7 is defined by spaced parallel side walls 8 and 9 and a curved end wall 10 as shown in Fig. 2. The recess 7 extends a comparatively short distance within the block 1 from the end 6 and has communication with the recess 2. The recess 2 extends almost the entire length of the block 1 from the end 6 and terminates at the end wall 4.

Spaced transverse apertures 11 are provided in the block 1 to receive terminals 12. Each terminal 12, as shown in Fig. 5, has a male threaded free end portion 13 projecting outwardly from a front face 14 of the block 1 and serving as a binding post and a shank portion 15 which projects transversely through the block 1. A flat end portion 16 of each terminal 12 projects into the recess 2 as shown in Figs. 2 and 5. The end portions 16 of the terminals 12 serve as terminating points for conductor wires in the stub cable 5. The male threaded free end portions of the terminals 12 serve as terminating points for drop wires 17 shown in Figs. 3, 4, 5 and 6.

The stub cable 5 is a predetermined length of lead covered cable comprising a sheath 18 of lead and a predetermined number of insulated conductor wires 19 enclosed in the sheath 18. A portion of the sheath 18 is stripped from an end of the stub cable 5 to expose the insulating conductor wires 19 and the exposed portions of the insulating conductor wires 19 are laid in the recess 2 of the block 1. An adjacent end portion of the sheath 18 projects as shown in Fig. 2 into the recess 7. The insulated conductor wires 19 are fanned out in the recess 2 and are electrically connected to the flat end portions 16 of the terminals 12, the insulating covering of each of the conductors 19 being removed at the respective points of connection to the flat end portions 16 of the terminals 12.

After the connections above-mentioned have been made so that each conductor wire 19 terminates in a required terminal 12, a block 20 of comparatively low melting point metal is formed in the open end of the recess 2, as shown in Fig. 2. The low melting point metal of the block 20 flows around the lead sheath of the stub cable 5 where the stub cable 5 enters the block 1 of insulating material. A groove 21 is provided in the recess 7 and near the outer end of the recess 7 to receive some of the metal of the block 20. When the block 20 is being formed, some of the comparatively low melting point metal flows into the recess 21 to provide a projection 22 on the block 20 to prevent accidental dislodgement of the block 20 from the block 1 of insulating material.

After the block 20 of comparatively low melting point metal is formed, the recess 2 in the block 1 is filled with insulating material 23. The insulating material 23 is a suitable insulating compound and a sufficient quantity of the insulating compound is placed in the recess to fill the recess 2. The insulating compound may be applied in liquid form or in a plastic or semi-plastic condition.

A strip 24 of flexible material is applied to the back surface of the block 1. The strip 24 is of sufficient length and width to cover the recess 2 and portions of the back surface 3 of the block 1. The strip 24 of flexible material must be impervious to water and must be flexible enough to be moved by the insulating material 23 when the insulating material 23 expands or contracts. I have found that copper foil is a suitable material to be used in making the strip 24. The strip 24 may be tinned to prevent oxidation of its surfaces. The strip 24 is cemented to the back surface 3 of the block 1 of insulating material and to the back surface of the block 20 of metal, the cement applied being shown at 25 in Figs. 1 and 5. The strip 24 is also applied to the outer surface of the filling of insulating material 23 while the insulating material 23 is in a plastic condition so that the inner surface of the strip 24 adheres to the filling of insulating material 23.

To further hold the strip 24 in place and to protect the strip from injury and still allow sufficient movement of the strip to accommodate expansion and contraction movements of the filling of insulating material, a cushion 26 is applied to the outer face of the strip 24. The cushion 26 may be made of sheet cork or other like compressible material. The cushion 26 is of sufficient width to cover the strip 24 and to pass over edge portions 27—28 of the block 1 and into grooves 29—30 provided in the respective sides 31—32 of the block 1. Against the outer face of the cushion 26 a plate 33 is applied. The plate 33 is longer than the block 1 and is of about the same width as the cushion 26. The plate 33 may be made of sheet copper or other material suitable for protecting the cushion 26 and for holding the cushion in place against the outer face of the strip 24. The long edge portions 34—35 of the plate 33 are crimped into the respective grooves 29—30 in the block 1 and carry the long edge portions of the cushion 26 into the grooves as shown in Figs. 1 and 5. The plate 33 is apertured at 36—37 in its end portions to receive mounting screws 38 for the assembly of parts above described, and portions 39 and 40 of the plate 33 are drawn inwardly of the plane of the plate and around the apertures to provide sufficient surface to receive screw threads. The apertures at 36—37, therefore, are internally threaded to receive the threaded ends of the screws 38. The four corner portions of the plate 33 are folded against the inner surface of the plate 33 as shown in Fig. 1 after the long edge portions have been crimped into the grooves 29 and 30 in the block 1. The folded portions as indicated at 41 in Fig. 1 extend inwardly from ends of the plate 33 to the adjacent ends of the block 1. In the figure, the folded portions are shown only on one end of the plate 33 since the other end of the plate 33 has been omitted to disclose the closed end of the block 1, the cement 25 and the covering members 24, 26 and 33 in their respective positions. It is understood, however, that there are folded portions on each end of the plate 33 corresponding to the folded portions shown at 41. By folding the corners of the plate 33 as shown at 41, the plate 33 is prevented from longitudinal movement along the block 1.

With the parts assembled as above described, the points of connection between the conductor wires 19 of the stub cable 5 and the terminals 12 in the block 1 are completely covered and sealed against the entrance of moisture. The insulating material 23, in the recess 2, may expand or contract and cracks may even develop in the insulating material 23 without resulting in short-circuiting of the conductor wires 19 of the stub cable 5 or the terminals 12 in the block 1, since there can be no leakage of moisture to these parts. It is particularly important to prevent the entrance of moisture to the filled-in portion of the block 1 of insulating material where a lead

covered stub having conductor wires covered with paper is used, since if moisture gets to the paper covering of the conductor wires 19, impairment in the line service results, the stub cable 5 being connected to a line cable as will be subsequently pointed out.

No moisture can enter the recess 2 in the block 1 where the stub cable 5 enters the block 1 since this end of the recess is sealed by means of the block 20 of comparatively low melting point metal. The strip 24 of copper foil prevents the entrance of moisture to the recessed portion of the block 1 occupied by the insulating material 23, since the strip 24 of copper foil is impervious to moisture and is cemented around its edges to the back 3 of the block 1. When the insulating material 23 expands, the strip 24 of copper foil moves outwardly and when the insulating material 23 contracts, the strip 24 of copper foil moves inwardly. Since the strip 24 of copper foil follows the contracting movements of the filling 23 of insulating material and remains in contact therewith, no space is developed between the filling 23 of insulating material and the adjacent surface of the strip 24 of copper foil. No vacuous condition, therefore, is developed in the sealed recess when the filling 23 of insulating material contracts. Since the recess 2 is filled to the level of the back surface 3 of the block 1 with the insulating material at temperatures above those likely to be encountered in service the insulating material will not expand sufficiently to exert outward pressure on the cushion 26 and plate 33. The cushion 26 of yielding material is provided against the inner surface of the plate 33 to make a tight connection at the points where the edges of the plate 33 are crimped into the longitudinal grooves 29 and 30 in the sides of the block 1 and so that the block 1 will not be fractured when the edges of the plate 33 are being pressed into the grooves 29 and 30. When the edges of the plate 33 are being pressed into the grooves 29 and 30 of the block 1 the adjacent edge portions of the cushion 26 are compressed to accommodate the inwardly pressed edges of the plate 33 and when the pressure is released from the edges of the plate 33 the adjacent edges of the cushion 26 expand and maintain a tight connection between the parts.

The assembly of parts above described may be used as a connecting means between a line cable in a telephone system and the premises of subscribers. When used for this purpose the connecting means is enclosed in a terminal box comprising a casing 42 and is fastened to a back portion of the casing by means of the machine screws 38. The casing 42 as shown in Figs. 3, 4 and 6 is suspended on a messenger wire 43 by means of hooks 44 and 45, the hooks 44 and 45 being attached to U-shaped brackets 46 by means of bolts 47 and the brackets 46 being attached by means of bolts 48 to extended end portions 49 of a back wall 50 of the casing 42. The casing 42 has a top wall 51, a bottom wall 52 and a cover 53. The cover 53 is hinged to the main portion of the casing 42 and provides a means of access to the interior of the casing 42 so that drop wires 17 may be connected to the terminals 12. Leaf springs 54 are attached to the cover 53 and engage studs 55 in the main portion of the casing 42 to retain the cover 53 in an adjusted open or closed position.

The messenger wire 43 supports the lead covered line cable 56 by means of cable rings 57. A band 58 of sheet metal is clamped around the line cable 56 to hold the casing 42 affixed to the line cable 56 so that there will be no relative movement of the parts. With the casing 42 clamped to the cable 56 in this manner any movement of the cable 56 results in a corresponding movement of the casing 42. The end portions of the band 58 are clamped between clamp plates 59—60 as shown in Fig. 6, the clamp plates 59—60 being pressed toward each other by means of carriage bolts 61—61 shown in Figs. 4 and 6. After passing between the clamp plates 59—60, end portions of the band 58 are bent over an edge of an outwardly turned flange 62 provided on the clamp plate 59. The clamp plate 59 is secured to the U-shaped bracket 46 and to end portions of the back wall of the casing 42 by means of the carriage bolts 48 in the upper portion of the structure. The carriage bolts 48 in the lower portion of the structure serve to secure the lower portion of the bracket 46 to the casing 42. End portions of the strap 58 are bent around three sides of the flange 62 with one end portion lying over and adjacent the other end portion. When the bolts 61 are tightened to press the clamp plates 59—60 toward each other, the pressure applied through the clamp plates 59—60 to the band 58 serves to clamp the band 58 closely around the lead sheathing of the line cable 56. When the band 58 is tightly clamped around the line cable 56, if the bolts 61 are further tightened, there is sufficient slippage of the end portions of the band 58 between the clamp plates 59—60 and over the edge of the flange 62 to prevent crushing of the lead sheath of the line cable 56. The frictional engagement of the bent over ends of the band 58 against the three sides of the flange 62 and the friction between the end portions of the band 58 and the clamp plates 59—60 where the band 58 passes between the clamp plates 59—60 is sufficient to permit tightening of the band 58 about the line cable 56, but is not sufficient to hold when pressures such as might crush the lead sheath of the line cable 56 are applied through movement of the clamp plates 59—60.

The stub cable 5 projects through an aperture in an end of the casing 42 and is surrounded adjacent its point of emergence by a rubber ring 63. The outer end of the stub cable 5 is connected to the line cable 56 by cutting out a portion of the lead sheath of the line cable, and by making suitable electrical connections between conductor wires in the stub cable 5 and the conductor wires of the line cable 56. A wiped joint 64 is then made between the lead sheath of the stub cable 5 and the lead sheath of the line cable 56.

Apertures 65 as shown in Fig. 5 are provided in the lower wall 52 of the casing 42. Across the apertures 65 and bearing against the lower surface of the lower wall 52 of the casing 42 is a strip of rubber 66 having slits provided therein in register with the apertures 65. A piece of sheet cork 67 is applied to the lower face of the strip of rubber 66. The strip of rubber 66 and the piece of sheet cork 67 are held in place by means of an apertured flanged plate 68 through which machine screws 69 extend into the lower wall 52 of the casing 42.

When a drop wire 17 is to be applied, the piece of sheet cork 67 is pierced at the required position and in line with an aperture 65 in the lower wall of the casing 42 and a slit in the strip of rubber 66. The drop wire 17 is then passed through the piece of sheet cork 67 and the strip of rubber 66. The drop wire 17 is connected to a predetermined terminal 12 within the casing

42. The free end of the drop wire 17 is carried to a subcriber's premises and is connected to the subscriber's telephone apparatus.

What is claimed is:

1. A terminal mounting comprising, in combination, a block of insulating material, a recessed portion in said block, spaced terminals supported in said block, end portions of said terminals extending into said recessed portion, insulating compound filling said recessed portion and surrounding said end portions of said terminals, a strip of metal foil covering said recessed portion and adhering to said insulating compound, a cushion of compressible material covering said strip of metal foil, and a plate of metal covering said cushion and engaging said block of insulating material to clamp said cushion against said strip of metal foil.

2. A terminal mounting comprising, in combination, a block of insulating material, a recessed portion in said block, spaced terminals supported in said block and extending into said recessed portion, a stub cable extending into the recessed portion in said block and having conductors fanned out in said recessed portion and electrically connected to said terminals, a body of insulating compound filling said recessed portion, a strip of metal foil covering said recessed portion and engaging said insulating compound and said block, a cushion of compressible material covering said strip of metal foil and a plate of metal engaging said cushion and clamped to said block of insulating material.

3. A terminal mounting comprising, in combination, a block of insulating material, a recessed portion in said block, longitudinal grooves in opposite wall members of said block, spaced terminals supported in said block and extending into said recessed portion, a stub cable extending into said block and having conductor wires fanned out within said recessed portion and electrically connected to said terminals, a body of insulating compound filling said recessed portion in said block and covering the points of connection between said terminals and the conductor wires of said stub cable, a strip of metal foil extending across the open face of said recessed portion and engaging said insulating compound and said block, a cushion covering the outer face of said strip of metal foil, a metal plate engaging the outer face of said cushion and edge portions of said cushion and of said metal plate bent into said longitudinal grooves in said block to clamp said strip of metal foil, said cushion and said metal plate to said block of insulating material.

4. A terminal mounting comprising, in combination, a block of insulating material, spaced longitudinal grooves in outer faces of said block, a recessed portion in said block, spaced terminals supported in said block and having portions extending into said recessed portion, a lead covered stub cable extending into the recessed portion of said block and having conductor wires fanned out within said recessed portion and connected to said terminals, a block of low melting point metal surrounding said lead covered cable at its point of entrance to said block and partly filling said recessed portion, a body of insulating compound filling the remaining portion of said recessed portion and covering the fanned out conductor wires of said stub cable and the points of connection between the conductor wires of said stub cable and said terminals, a strip of metal foil covering said recessed portion and cemented to said block of insulating material and to said block of low melting point metal and adhering to said body of insulating compound, a cushion of compressible material covering the outer face of said strip and the adjacent faces of said block of insulating material and of said block of low melting point metal and a metal plate engaging the outer face of said cushion and having edge portions crimped into said spaced longitudinal grooves in said block of insulating material.

LE ROY W. KELSAY.