ABSTRACT OF THE DISCLOSURE

A connector block boot molded of pliant thermoplastic material shaped to enclose, in a fluid-tight manner, a connector block for electrical conductors. The boot includes a plurality of integral nipples having closed outer ends and a stepped body sized to have a snug fit with the installation of different diameter conductors when the excess at the outer end is cut off to the proper size. The boot includes a flanged access opening formed with interlocking tongue and groove seam means effective, when closed, to exclude fluids and adapted to be opened for servicing operations. A spring clip may be assembled over the closed seam to provide more positive sealing action.

This invention relates to nonconductive boots for electrical conductors, and more particularly to a connector block boot formed of molded thermoplastic material having integral nipples sized to accommodate conductors of a wide variety of sizes.

Metallic connector blocks are commonly employed to provide a mechanically strong high capacity conductive path between conductors of the same or different sizes. It is necessary to enclose such connector assemblies in a protective housing providing highly reliable insulative cover as well as one capable of excluding moisture under severe and adverse conditions. It is also desirable that such protective enclosures be accessible for servicing inspection and the connection of additional conductors and then reclosed with the same highly reliable sealing capabilities.

Devices heretofore provided for these purposes are subject to numerous shortcomings and disadvantages sought to be eliminated by the present invention. To this end, the present invention comprises a unitary boot assembly formed of pliant, resilient, heavy-duty, nonconductive thermoplastic material. This boot includes a plurality of nipples stepped axially thereof with each step having internal diameters sized to have a forced frictional fit with different size conductor sheaths. The outer smaller diameter end of each is molded closed and is cut away only when the nipple is needed to accommodate a conductor. The boot is provided with an elongated flanged access opening through which the conductor block may be assembled and manipulated while being assembled to a conductor. The access opening includes a pair of wide flanges provided along their facing surfaces with interlocking tongues and grooves cooperating to form a strong fluid-tight seal when pressed together. If desired a spring clip may be inserted between the exterior surfaces of the mated flanges to apply pressure to the seam parts and provide greater security against leakage.

Accordingly, it is a primary object of the present invention to provide a connector block boot of unique rugged construction adapted to accommodate electrical conductors of assorted sizes and capable of excluding moisture and foreign matter under adverse conditions. Another object of the invention is the provision of a unitary connector block boot adapted to provide an insulative protective fluid-tight enclosure for the terminals of electrical conductors and a terminal block interconnecting the same.

Another object of the invention is the provision of a unitary boot of impervious shatterproof insulative material adapted to be assembled over electrical conductors and a connector block fitting and to be sealed closed without need for fasteners or tools and adapted to be reopened for servicing and then reclosed.

Another object of the invention is the provision of a simple, inexpensive, rugged boot of nonconductive material adapted to be assembled about electrical conductors in a manner excluding fluids and foreign material and used either above ground or buried underground.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a perspective view of a typical embodiment of the invention boot assembled to a group of conductors and showing a portion of the spring closure clip broken away;

FIGURE 2 is a sectional view on an enlarged scale taken along line 2--2 on FIGURE 1;

FIGURE 3 is a sectional view along line 3--3 on FIGURE 2;

FIGURE 4 is a fragmentary perspective view showing the access opening in expanded open condition; and

FIGURE 5 is a fragmentary sectional view on an enlarged scale taken along line 5--5 on FIGURE 2.

Referring more particularly to FIGURES 1, 2 and 3, there is shown a preferred embodiment of the invention boot, designated generally 10, and molded in two complementally shaped cup-shaped halves 11, 12. As herein shown by way of example, the interior of each cup-shaped half is generally rectangular in shape and the side walls converge toward the bottom at a very slight slope to facilitate removal from the mold. The rim edges are provided with an outwardly projecting flange integral with the periphery of each half, the flange attached to half 11 being designated 13, and that integral with half 12 being designated 14. Desirably the flanges projecting from one longer side of halves 11 and 12 are wider than the others for a purpose to be explained presently.

One of the two halves, as 12, is considerably deeper than the other and provided along its bottom wall with a plurality of integral stepped nipples 15, 15 with the larger diameter portion merging with the bottom wall of the boot. Each of the separate steps has an internal diameter slightly smaller than the diameter of the conductor sheath to be accommodated. It will be understood that, owing to this stepped construction, each nipple has a forced frictional fit with any one of several standard size conductors. The outer ends 16 of the nipples are molded closed to exclude moisture and foreign matter in the event the nipple is not needed in a particular operating environment.

If a nipple is to be used with a small size conductor, only end wall 16 is cut away permitting the conductor to be forcibly telescoped into the nipple. If a larger size conductor is to be accommodated then the entire smaller diameter stepped portion of a nipple is cut off and the stepped portion of intermediate diameter provides a water tight seal with the conductor sheath. Thus it will be understood that each of the nipples is employed in a similar fashion to accommodate different size conductors in a fluid tight manner.

A typical conductor block 20 is shown in FIGURES 2 and 3. This block is formed of metal, as brass, and provided with a row of transverse openings 21. Opening through one edge of the block is a threaded opening
to receive a clamping set screw 23. The tip of these screws is preferably equipped with a clamping pad 24 loosely attached to the inner end of the nut in the manner best shown in FIGURE 2.

As will be apparent from FIGURE 3, boot 10 is considerably larger interiorly thereof than connector block 20, the extra space being desirable to facilitate feeding the prepared end of a conductor into the proper one of the connector block openings 21 and also manipulate a tool to wrench the conductor clamping screws 23.

The juxtaposed surfaces of flanges 13 and 14 along three sides of the boot are preferably bonded or heat fused together as indicated at 28 in FIGURE 3. This bonding prevents slippage of opposite ends of the flanges projecting from the fourth side of the boot. These latter flanges are preferably formed with complementally shaped interlocking tongues and grooves 30, 31 shaped to have snug fitting interlocking surfaces effective to prevent the passage of moisture therethrough when forcibly closed together. Owing to the fact that the opposite ends of these tongues and grooves are bonded or heat fused together, moisture cannot enter from these ends nor can it seep between the snuggly fitting surfaces of the seam. Flanges 13 and 14 preferably project outwardly beyond the tongues and grooves to provide pull tabs 34, 35 easily grasped between the thumb and finger of each hand and pulled inwardly as indicated by the arrows in FIGURE 4 to open the seam when it is desired to again gain access to the interior of the boot.

Under particularly severe or hazardous operating conditions it is found that the interlocking tongues and grooves 30, 31 may not provide maximum protection against the entrance of water and moisture. Under such circumstances it may be desirable to employ a strong clip 38 of stiff but resilient elastomeric material and having lip edges 39 shaped as best shown in FIGURE 3. The entrance ends of these lips are preferably flared to provide a pilot mouth useful in guiding the clip into assembled relation over flanges 13, 14, it being understood that the spacing between the inner surfaces of the lips is substantially less than the combined thickness of the contacting flanges 13, 14. Accordingly the assembly of the clip over the flanges acts to stress the clip and hold the surfaces of the flanges firmly pressed together throughout the full length of the access opening.

The manner of using and assembling the described boot will be quite apparent from the foregoing detailed description of the components. The individual conductors 40 are prepared by trimming away a length of the sheath sufficient for insertion of the conductor proper beneath the clamping pad 24. Desirably the sheath is trimmed away on a taper as indicated at 41 in FIGURE 3, thereby facilitating the telescopic insertion of the conductor into a section of nipple 15 sized to have a snug fit with the sheath of the conductor. The smaller diameter and unusable portion of the nipple is trimmed away to permit insertion of the conductor into the particular nipple section having a close fit with that particular conductor.

The conductors and nipples having been prepared, the workman disengages tongues and grooves 30, 31, and inserts the connector block through the access opening 33. The prepared conductors are then forcibly fed through the nipples and the terminal ends are seated beneath the associated ones of the loosened clamping screws 23. This having been done, each clamping screw is firmly tightened.

After all connectors have been inserted and clamped, the serviceman may fill the vacant space interiorly of the boot with spongy nonconductive material to hold the parts against relative movement and avoid risk of the conductors moving along the nipples. This having been done the tongues and grooves 30, 31 along the length of the access opening 33 are forced into interlocking closed position. Desirably the nonconductive spring clip 38 is then assembled lengthwise of the seam with lips 39 pressing the flaps firmly together inwardly of tongues and grooves 30, 31.

At any time the serviceman wishes to gain access to the boot, he may do so by first removing clip 38, grasping pull tabs 34, 35 and pulling them away from one another to disengage the interlocked tongues and grooves 30, 31. After the servicing operation has been completed the seam is reclosed and keeper clip 38 is reassembled in the same manner described above.

Claim:
1. A connector block boot comprising a housing of plant flexible elastomeric material shaped to enclose a terminal block of conductive material having a plurality of individual conductor clamps, one wall of said housing having a row of nipples integral therewith each sized to have a fluid-tight fit with the sheath of a respective electrical conductor, said housing having an access opening along one side thereof, a flange member projecting outwardly along either side of said access opening and having their adjacent surfaces positioned to lie against one another normally but being readily held spread apart to provide unobstructed access to a terminal block and the conductor clamps thereof when the latter are being serviced, and means extending along said flange members parallel to one another and shaped to interseat in a fluid-tight manner to preclude entry of moisture into said boot while said access opening is closed.
2. A connector block boot as defined in claim 1 characterized in that said means for holding said flange members closed includes an elongated spring clip of generally U-shape in cross section with the spacing between the ends of the legs thereof substantially less than the combined thickness of said flange members, said clip having a length corresponding generally to the length of said flange members along said access opening and adapted to embrace said flange members to hold the latter firmly pressed together to seal said access opening closed.
3. A connector block boot as defined in claim 1 characterized in that said means for holding said flange members closed includes a plurality of thermoplastic interlocking tongue and groove seam-forming members sealed closed crosswise of their opposite ends.
4. A connector block boot as defined in claim 1 characterized in that said nipples are closed across the outer end thereof until needed to embrace an electrical conductor whereupon the outer end portion of the nipple is seable.
5. A connector block boot as defined in claim 4 characterized in that said nipples are stepped axially thereof to provide a plurality of generally cylindrical stepped sections of different diameters from the base to the outer end thereof with each section sized to embrace a different size conductor snugly and in a fluid-tight manner, and a cylindrical section of inadequate size for a particular conductor being readily seable from the outer end of a cylindrical section of a proper size for the conductor to be accommodated.
6. A connector block boot as defined in claim 1 characterized in that said boot is formed in generally cup-shaped halves having complementally shaped flanges projecting from the rim edges thereof and having their juxtaposed surfaces along all except one side thereof.
7. A connector block boot as defined in claim 6 characterized in that the juxtaposed surfaces of the flanges along said one side are formed with parallel tongues and grooves shaped to interlock with one another as pressure is applied to said flanges from their exterior surfaces.
8. A unitary connector block boot comprising an elongated generally rectangular housing formed of plant resilient elastomeric material having initially closed nipples projecting outwardly from one longer side wall thereof, said housing having integral flanges extending along at least three sides thereof and lying in a plane remote from said nipples and extending crosswise of the axes thereof, said housing having an
opening between the flanges extending along one longer side of said housing and the remainder of said flanges having the outer edge portions bonded together, and means carried by the flanges bordering the opening into said housing for normally holding the opening closed in a fluid-tight manner.

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