

[54]	PRE-ASSEMBLED CABLE TERMINATION	3,542,942	11/1970	Johnson et al.	174/73 R
[75]	Inventors: Wayne F. Varner, Woodbury; Gerald A. Wyatt, Shoreview, both of Minn.	3,548,070	12/1970	Duenke	174/19 X
[73]	Assignee: Minnesota Mining and Manufacturing Company, St. Paul, Minn.	Primary Examiner—Laramie E. Askin Attorney, Agent, or Firm—Alexander, Sell, Steldt & DeLaHunt			
[22]	Filed: Oct. 4, 1974				
[21]	Appl. No.: 511,995	[57] ABSTRACT			
[52]	U.S. Cl. 174/19; 174/73 R; 174/75 D	A pre-assembled oil-filled termination for high voltage electrical cables comprises a rubbery liner fitting around the cable-end and sealed within a tubular insulating shell, the space between shell and liner being filled with insulating liquid.			
[51]	Int. Cl. H02g 15/22				
[58]	Field of Search 174/12 BH, 19, 20, 31 R, 174/73 R, 73 SC, 75 R, 75 D, 80, 142				
[56]	References Cited	9 Claims, 7 Drawing Figures			
	UNITED STATES PATENTS				
	3,471,628 10/1969 Harmon	174/19 X			

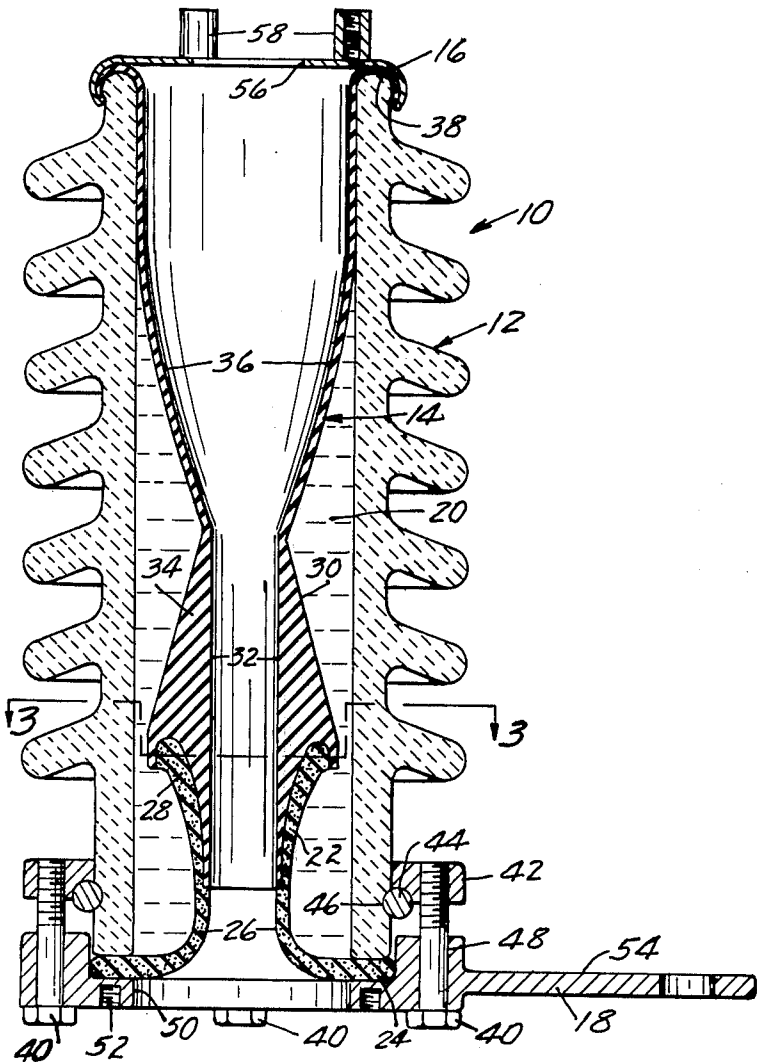


FIG. 1

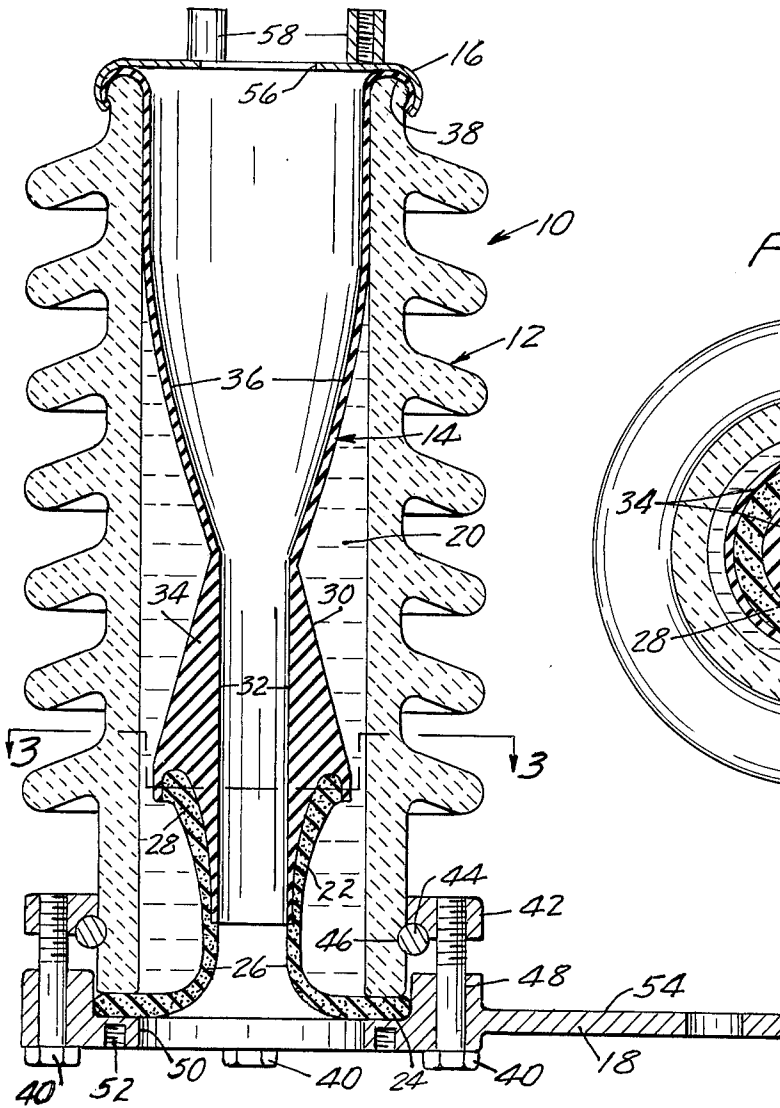


FIG. 3

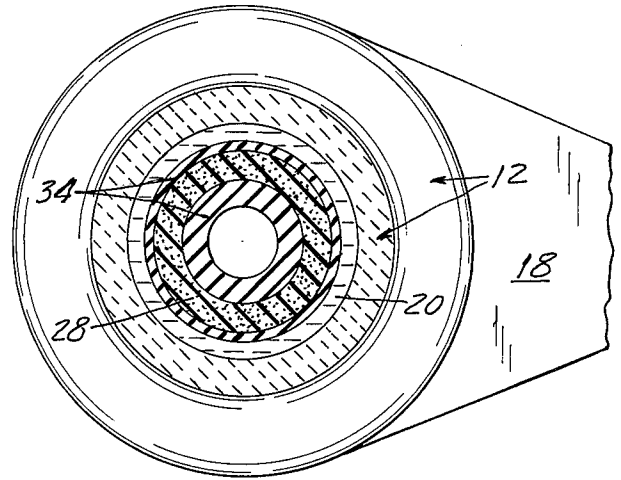


FIG. 2

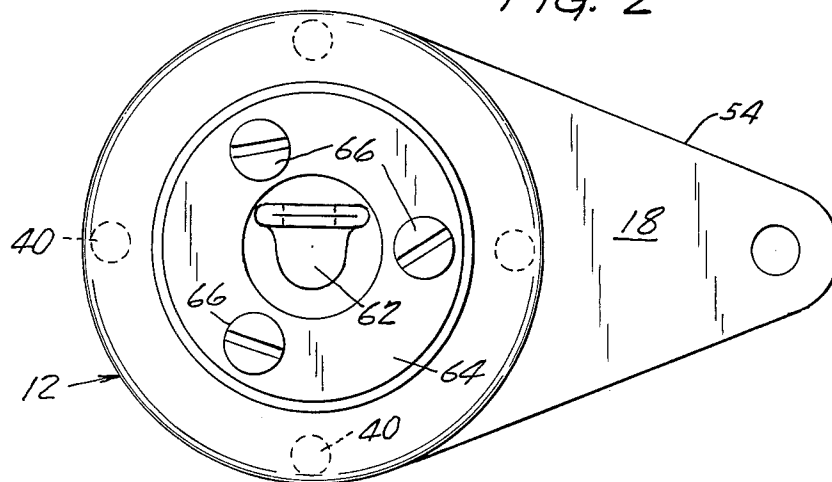


FIG. 5

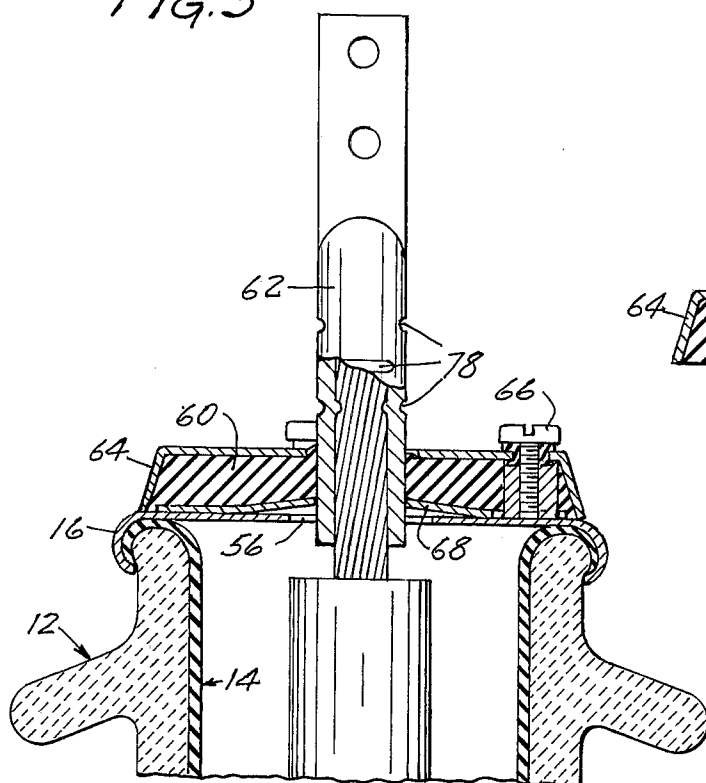


FIG. 4

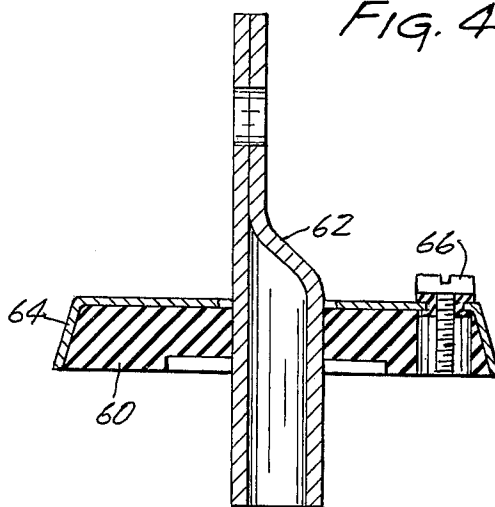


FIG. 7

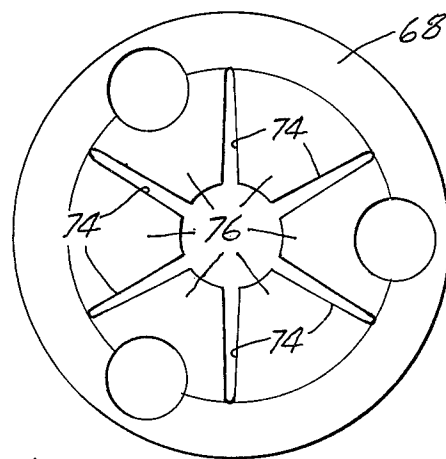
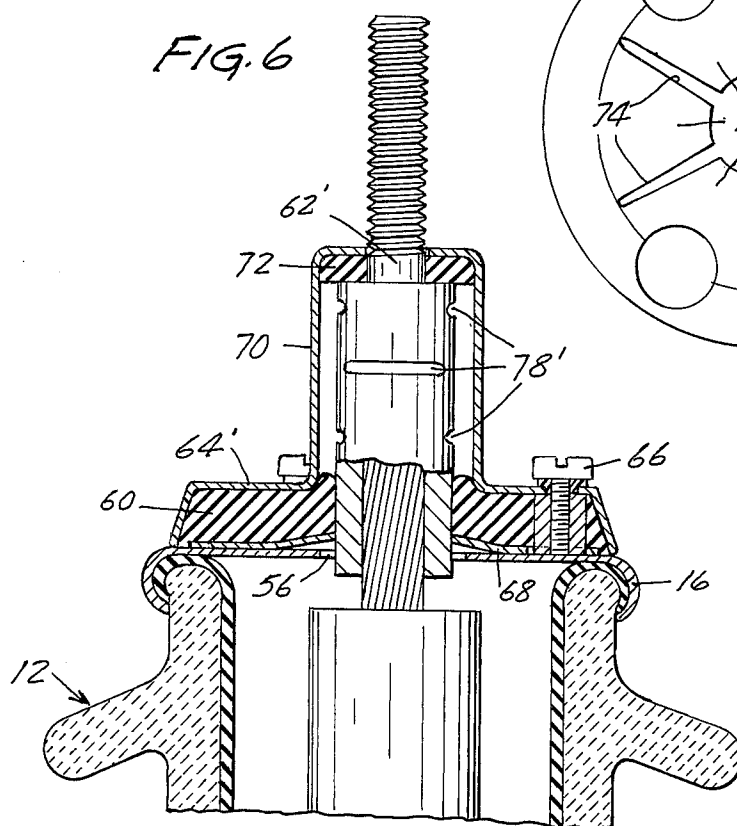


FIG. 6



PRE-ASSEMBLED CABLE TERMINATION

This invention relates to the termination of high voltage electrical cables and more particularly to terminators therefor. There is provided an oil-filled terminator which conforms to cables of a wide range of diameters while eliminating all voids which might cause problems with corona. A built-in stress cone which likewise conforms to various cable sizes is also provided.

The terminator of U.S. Pat. No. 3,471,628 must be filled with oil after being applied to the cable. U.S. Pat. No. 3,548,070 requires the application of pressure to the oil chamber. The cable must be forced through grease-retaining diaphragms of the terminator described in U.S. Pat. No. 3,542,942.

The terminator of the present invention, on the other hand, requires no filling with oil, no adjustment of oil pressure during installation, and no puncturing or displacing of diaphragms, yet provides a close void-free fit between the terminator and the surface of the cable.

In the drawing,

FIG. 1 is a longitudinal sectional view of the terminator,

FIG. 2 is a top plan view,

FIG. 3 is a transverse sectional view taken approximately at line 3—3 of FIG. 1,

FIG. 4 is a sectional view of a cap member and terminal lug for the terminator,

FIGS. 5 and 6 are partial sectional representations of alternative forms of cap members and terminal lugs as applied over a cable-end, and

FIG. 7 is a plan view of a spring washer as used in the cap member of FIG. 6.

The terminator 10 consists essentially of an elongate exteriorly flanged tubular insulating body 12, preferably of ceramic; a flexible elastically deformable tubular liner 14, together with a cap 16 and a supporting flange 18 serving as means for effecting a hermetic seal between the ends of the body and the corresponding ends of the liner; and an insulating oil 20 completely filling the space between the body and liner.

The liner 14 is composed of three portions. The entry portion 22 is of semiconductive oil-resistant rubbery composition. It diminishes from a wide flange-like open end 24 to a narrow throat section 26 and then again enlarges in a stress cone configuration 28. The intermediate portion 30 is of uniform internal diameter equal to that of the throat 26, thereby defining a channel 32, while the outer wall increases in diameter along the inner surface and over the curved lip of the stress cone 28 and then again decreases, forming a thick-walled section 34. The remaining portion 36 has a uniformly thin wall section and gradually flares or increases in diameter from the end of the channel section to the end of the body 12. Portions 30 and 36 are of electrically insulative oil-resistant rubbery composition.

The liner 14 is hermetically sealed to the ends of the body 12 by the metal cap 16 and flange 18. The cap 16 is crimped over the end of the liner 14 and onto the rounded edge 38 of the body to form a permanent seal. The flange 18 is supported on bolts 40 inserted in flange 42 fitting against split ring 44 lying within a circumferential groove 46 in the outer wall of the body 12. The bolts pass through outer holes 48 in the supporting flange 18. The central part of the supporting flange is perforate to provide cable access opening 50, and is drilled and tapped as at 52 to permit attachment of a dependent shield or cover, not shown. An extension

sion 54 serves for bolting the entire terminator to a supporting crossbeam as well as for ground connection.

The cap 16 is also centrally perforate at opening 56 and in the modification shown in FIG. 1 carries three uniformly spaced internally threaded hollow bosses 58. A rubbery washer 60 (FIG. 4) carrying a hollow deformable metal terminal lug 62 fits over the cap and is held in place and under compression by a cover 64 and screws 66 which screw into bosses 58.

In a modified version shown in FIG. 5, a spring washer 68 is placed between the cap 16 and the washer 60. Radial slits 74 extending outwardly from the inner circumference of the washer form independent tabs 76 which are forced into tight engagement with the terminal 62, thereby providing additional strain relief. The washer 68 may initially be flat, in which case the central opening is slightly smaller in diameter than the terminal lug 62 so that engagement between the two occurs as the terminal is forced through the washer. Preferably, the diameter of the opening is increased by a slight upward offsetting of the tabs 76, as shown in the drawing, so that the washer passes easily onto the lug and then grips it firmly when flattened under the pressure applied through the washer 60 and cover 64.

In the modification shown in FIG. 6, the cover 64' has a central extension 70 through which the threaded end of the modified terminal 62' passes. The terminal fits against a sealing washer 72 in the extension and is thereby held from movement out of the terminator, while the spring washer 68 prevents movement in the other direction. The structure is particularly advantageous in compensating for variations in length experienced during the crimping of the terminal lug 62' onto the cable-end.

In the application of the terminator to an insulated power cable, the tip of the conductor is bared and any outer layer of insulation is removed, exposing the shield layer. The cable is then coated with insulating grease and forced into the terminator through the channel 32 until the bare tip extends through the hole 56 in the cap 16. The terminal lug 62 is fitted onto the conductor tip and mechanically crimped in place, as at crimp areas 78, 78'. The cable is then pulled back until the terminal is centered in the cap 16, and the spring washer 68, rubbery washer 60 and cover 64 are added and fastened in place.

An additional supporting or sealing member may be attached around the cable at the lower surface of the support flange 18 if desired, being secured by lag bolts in holes 52, but in many applications is not required and may be omitted. The grease facilitates entry of the cable and fills any voids which might otherwise remain between the cable-end and the wall of the channel 32. The oil displaced by insertion of the cable-end in the intermediate portion of the tube 14 causes deformation of the remaining portion 36 without creating any voids between the tube and the body 12. The throat area 26 of the tube 14 provides conductive contact between the exposed shield of the cable and the semiconductive stress cone 28. The entire installation is completed rapidly and with a minimum of effort.

What is claimed is as follows:

1. A high voltage cable termination comprising a rigid tubular insulating body, a rubbery sleeve lying within said body and hermetically sealed thereto around both open ends thereof, and an insulating liquid enclosed within the space between said sleeve and

body, said sleeve including a thick-walled portion, having a constant internal diameter, adjacent one end, and a thin-walled portion, with gradually increasing internal diameter, extending from said thick-walled portion to the other end.

2. Termination of claim 1 wherein said thick-walled portion includes a semiconductive component in the form of a stress cone expanding outwardly from said internal diameter in the direction of said thin-walled portion.

3. Termination of claim 2 wherein said semiconductive component is hermetically sealed to the end of the insulating body by a centrally perforate metal base supporting said body and making grounding contact with said component.

4. Termination of claim 1 wherein said thin-walled portion is hermetically sealed to the end of the insulating body by a centrally perforate metal end cap.

5. Termination of claim 4 wherein is included a terminal connector lug extending through the centrally perforate cap, and retaining means for said lug supported by said cap.

5 6. Termination of claim 5 wherein said retaining means comprises an elastomeric washer surrounding said lug and a compression cup attached to said cap for holding said washer under compression.

10 7. Termination of claim 6 wherein said retaining means includes clamping means for preventing axial movement of said lug.

8. Termination of claim 7 wherein said clamping means includes a spring washer slotted radially inwardly to provide spring tabs for gripping said lug.

15 9. Termination of claim 8 wherein said tabs are offset from the plane of the periphery of said spring washer.

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