May 11, 1943. J. W. CHANNELL 2,318,755

DISTRIBUTING TERMINAL

Filed March 7, 1941

Fig. 1.

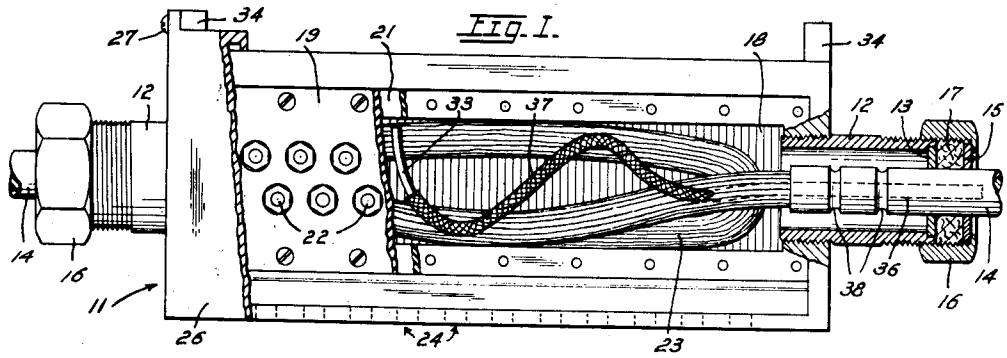


Fig. 2.

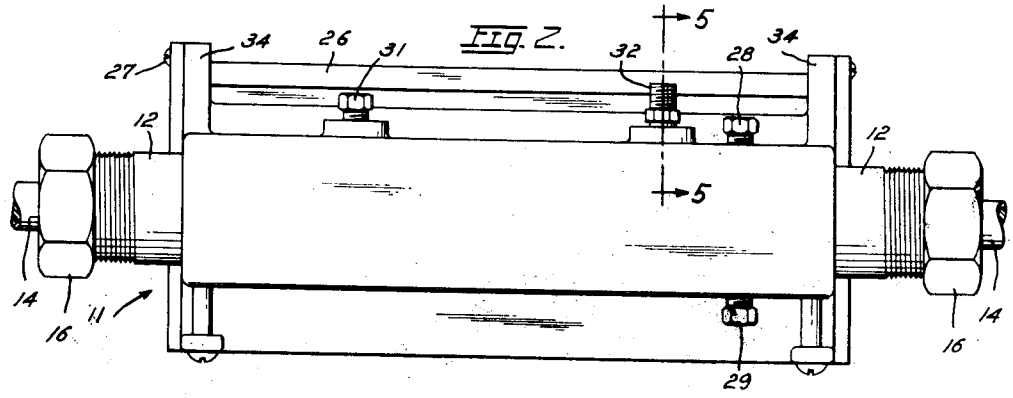
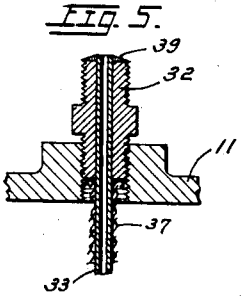


Fig. 5.



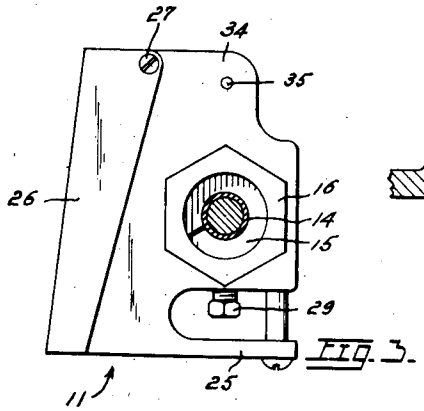


Fig. 3.

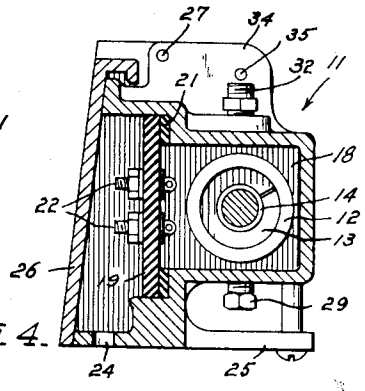


Fig. 4.

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DISTRIBUTING TERMINAL

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Application March 7, 1941, Serial No. 382,202

3 Claims. (Cl. 174—17)

My invention relates to distributing terminals for lead sheathed electric cables, particularly aerial telephone cables. Among its more important objects are; first, to eliminate the present necessity for making wiped joints at such terminals; second, to greatly reduce danger of trouble developing at terminal installations, as by reason of broken joints at terminal tails, spur holes, or cutting by clamps; third, to facilitate inspections, and thus to reduce the time and expense required therefor; fourth, to afford better means for applying and maintaining permanent internal gas pressure in aerial cables; fifth, to minimize danger to men, and liability of injury to materials, while making terminal installations in connection with aerial telephone cables; and, sixth, to effect substantial savings in cost of installed equipment of the nature indicated.

My objects are attained in the manner illustrated in the accompanying drawing, in which—

Figure 1 is a front elevation of my complete distributing terminal, in cooperative relation to an aerial telephone cable; certain parts being shown broken, and other parts in central longitudinal section, for convenience in making this disclosure;

Figure 2 is a rear elevation of the construction shown in Fig. 1;

Figure 3 is an elevation of the left end of the construction shown in Fig. 2;

Figure 4 is a central cross-sectional view of the construction shown in Fig. 3; and

Figure 5 is view of a detail portion of the construction, in central longitudinal sectional elevation taken on the line 5—5 of Fig. 2, and on a much enlarged scale.

To facilitate understanding thereof, the figures of the drawing are not made to exact proportionate scale. They also are somewhat diagrammatic in nature. Similar reference numerals refer to similar parts throughout the several views.

My invention comprises a one piece box-like structure which is shown generally at 11. This may well be made as a casting of aluminum alloy, finished where necessary for tight joints. The end walls of the struiture are bored and tapped at two directly opposite points, for accommodating relatively large and co-axial tubular nipples 12, which are screwed into said openings with gas-tight joints. The outer ends of the nipples have shallow counterbores, for containing and seating radially split washers 13, the bores of the washers being of such size as to slidingly fit the sheath of lead-covered telephone cable 14. Slightly larger radially split washers 15, with bores which also fit the cable, are employed in the terminal in spaced co-axial relation to washers 13. Gland nuts 16 are adapted to be screwed upon the outer ends of nipples 12, and to engage the outer faces of washers 15 at their peripheries. In service, suitable compressible packing material 17, fills the spaces between the two split washers within the respective gland nuts, and I have found that ordinary electric rubber tapes are well adapted for this purpose. The described co-operative arrangements of elements 12 to 17 constitute stuffing-boxes, through which cable sheaths 14 may pass with gas-tight joints.

Chamber 18, within the box-like structure, is provided with a gas-tight closure; consisting of a terminal plate 19, of vulcanite or similar insulating material, and a gasket 21. The required number of spaced terminal studs 22 are screwed through the plate in a gas-tight manner, and their inner extremities are adapted for having severed ends of exposed cable conductors 23 soldered thereto. The outer ends of these studs are available for having branch telephone wires connected thereto. Holes 24, in the main casting of structure 11, serve to position the branch wire extremities directly below the respective pairs of terminal studs; and arms 25, integral with said casting, serve to support the branch wires before forming the customary drip loops therein, prior to passing through holes 24. These arms also prevent subjecting the studs to appreciable lateral stresses, which otherwise they would be called upon to sustain.

A cover 26, hinged to the main casting at 27, serves to protect the outer face of terminal plate 19, and the outer ends of studs 22.

A screw plug 28 provides means by which chamber 18 may be filled. A similar plug 29 allows of draining the chamber. A third plug 31, at the other end of the device, permits of inserting a thermometer in the chamber. A small screw nipple 32, threaded at both ends, affords support and connection for a short length of small copper tubing 33, and also attaching means for an ordinary pneumatic tire valve (not shown) at its outer end. Finally, the device is provided with an upstanding flange or ear 34 at each end, and with opposed holes 35 in these two ears, whereby the whole terminal may be hung upon the cable strand. The two holes 35 are vertically above nipples 12, and they are spaced from the nipples the right distance to allow the normal spacing of the strand and cable to be maintained at the terminal.

The terminal is adapted to be used in conjunction with a through electric cable. By a through

cable, it is understood that the cable does not have any joints or splices, or is otherwise separated.

Installations of my invention to aerial telephone cables are made in the following manner.

First, the terminal is hung from the cable strand, by hooks or lashing wire, engaging holes 35.

Second, when the cable itself is strung, it is pulled through the two nipples 12, with gland nuts 16 in position thereon but the split washers and packing material omitted. Slack is left in the cable at each terminal, to enable the operations described below to be performed.

Third, the entire terminal is slid along the cable a sufficient distance, say to the left, to enable the cable to be prepared in the desired manner for permanently enclosing certain of its portions within the terminal. Circular cuts are made in the cable sheath, spaced correctly for exposing the desired length of cable conductors. A longitudinal cut is then made in the sheath between the circular cuts, and that portion of the sheath is opened up and removed.

Fourth, when the terminal is to be used as a gas dam, a length of small and flexible copper tubing 33 is pushed into the core of the cable for about six inches, as indicated by dotted lines 36 in Fig. 1. The tubing is within a loosely woven fabric sheath 37, doubled over the penetrating end of the tubing, for insulating purposes. Both of the cable sheath ends then have spaced circular grooves 38 formed therein, in the manner indicated in Fig. 1; to prevent the damming material from running back into the cable, except for a short distance at the sheath ends. Such grooving is standard practice in many organizations, and need not be described in detail here.

If the terminal is not to be used as a dam, the copper tubing, and the grooving, are not necessary.

Fifth, the right hand gland nut 16 is unscrewed and slid along the cable to the right. One of the large washers 15 then is bent laterally in such manner that its radial slit opens up, and all the cable conductors are passed through the opened slit (a few at a time) into the bore of the washer. Then this washer is slid to the right along the cable sheath, up to the gland nut. All the cable conductors then are threaded through one of the small split washers 13, in the same manner, and this washer is slid along the cable sheath to the right.

Sixth, the terminal itself is slid along the cable sheath well to the right, and its left hand gland nut is unscrewed and slid well to the left. The other large split washer 15 first, and the other small split washer 13 afterward, are then placed on the cable sheath at the left, in the manner already described.

Seventh, the terminal then is centered over the sheath opening, in such manner that the sheath ends are just within the inner ends of nipples 12. The two small washers 13 are placed in their shallow counter bores, at the outer extremities of the nipples; and ¾" rubber tape is wrapped around the cable sheath against the small washers. The tape wrappings are built up until their diameters are about the same as the outer diameter of nipples 12. The two large washers 15 are then placed against the respective tape wrappings, and gland nuts 16 are screwed tightly upon their respective nipple extremities.

Eighth, when small copper tubing 33 is employed, its free end is passed through the bore of nipple 32, and it is soldered to the nipple at its outer extremity, in the manner shown in Fig. 5 at 39.

Ninth, the severed ends of the cable conductors are soldered to the inner ends of the proper terminal studs 22, rubber gasket 21 is placed in position, and terminal plate 19 is screwed tightly in position against the gasket.

Tenth, a small pet cock is substituted temporarily for plug 29; and, with the cock partially closed, melted cerese wax, at a temperature of about 375° F., is poured through the opening afforded by plug 28. When a reading of 265° F. is obtained on a thermometer inserted through the opening made available by plug 31, the pet cock is closed. The temperature then will gradually drop; and, when it has reached 200° F., the pet cock should be fully opened and the still hot cerese wax be allowed to drain off completely. The thermometer then is removed, and plug 29 is substituted for the pet cock. The terminal then is completely filled with asphalt, at a temperature of 240° F. Finally plugs 28 and 31 are replaced, and a capped pneumatic tire valve (not shown) is screwed upon nipple 32.

It will be evident that terminals of the kind described, may be used advantageously to dead-end telephone cables, where distribution is to be made to branch wires. In such cases a pipe cap may be used in place of the split washers, tape packing, and gland nut, on the farthermost nipple 12.

It also will be apparent that my improved method of making gas-tight cable joints may, in itself, be utilized to advantage in cable splicing, where there are no branch connections to be made. In such cases, brass pipe sleeves of suitable length, properly threaded and counterbored at each end, may be employed for making gas-tight joints with the cable sheaths, in the manner herein described.

At branch splices, a pipe cap, or a special finished casting, can be bored and threaded for two or more nipple stuffing boxes of the character shown in Fig. 1.

By placing my terminals on the strand, and running the cable through them, it is possible to make gas-tight dams for the purpose of isolating any cable section desired. Gas nipples 32 may be used either for testing or applying gas, without the use of the furnace or soldering iron hitherto required. Two such nipples may be employed, of course, connected to copper tubes in the respective sheath ends of the cable. In such cases the nipples may be bridge-connected if desired, outside of the terminals; and cut-off valves may be placed in this bridge connection, to make it possible to isolate a cable section.

When my terminal is not to be used as a dam, the ends of a single copper tube, bent originally in the form of an S or a figure 8, may be shoved into each cable sheath end. This will, of course allow gas to flow directly through the terminal.

It will be appreciated that my invention, unlike the distributing terminals which now are known in the art; has no branch cable tail to splice into the main cable, and employs easily and safely adjustable stuffing boxes in place of the difficult and troublesome wiped joints which hitherto have been necessary.

I claim:

1. In combination, an electric cable having a cylindrical sheath, and a gap in the sheath exposing its conductors, a terminal box through which said cable extends, the exposed portion of the

conductors and the gap being confined within said box, a gas supply nipple extending from the inside to the outside of the box, a tube having one end in communication with the supply nipple at the inside of the box, the other end of said tube being fitted into the sheath to supply gas to the interior of the sheath, the portion of the sheath receiving said tube being clenched therearound to prevent the admission of the gas delivered into the sheath into the interior of the box, and the box having means whereby unoccupied space therein may be filled with insulating material.

2. In combination; an electric cable having a sheath which affords a gap whereby the conductors may be exposed; a terminal box enclosing said gap, and through which said cable extends; a gas-supply tube leading from the exterior of the box, by way of said gap, into said sheath to a point spaced from the gap; a gas-tight seal between the walls of said tube and said sheath where they are opposed; insulated binding posts, extending through a wall of said box, whereby contact may be made with said exposed conductors separately and respectively; and means for filling unoccupied space in the box with insulating material.

3. In combination; an electric cable having a sheath which affords an opening whereby the conductors may be exposed; a terminal box enclosing said opening, and through which said cable extends; gas-supply means leading from the exterior of the box to a point within said sheath spaced from said opening; a gas-tight seal for preventing escape of gas from said sheath at said point, into said opening; insulated terminal means extending through a wall of said box, whereby connection with said exposed conductors may be made separately and respectively; and means for filling unoccupied space in the box with insulating material.

JAMES W. CHANNELL.