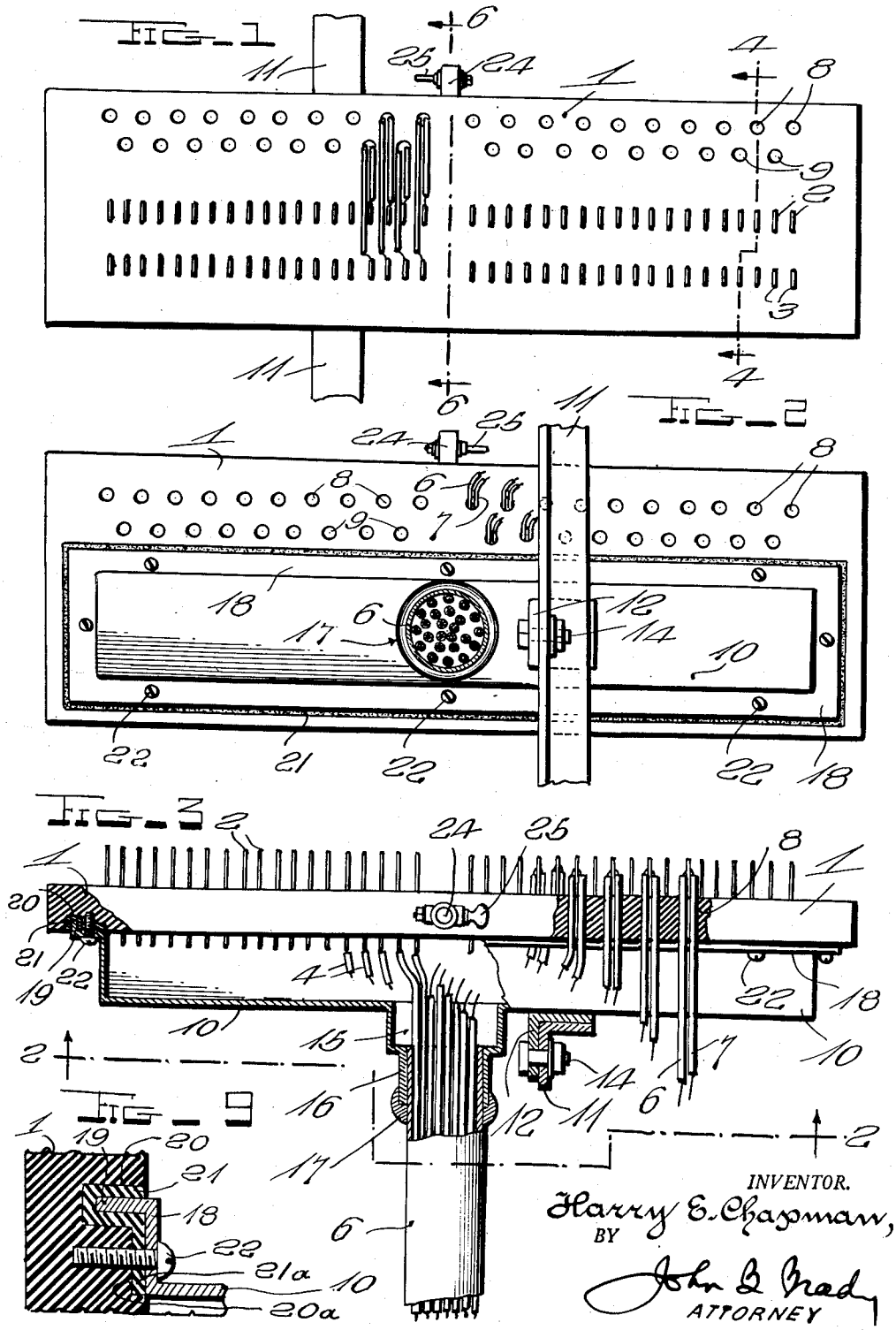
Jan. 26, 1954 H. E. CHAPMAN 2,667,529

TERMINAL AND FANNING STRIP FOR ELECTRICAL CONDUCTORS

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FIG. 4

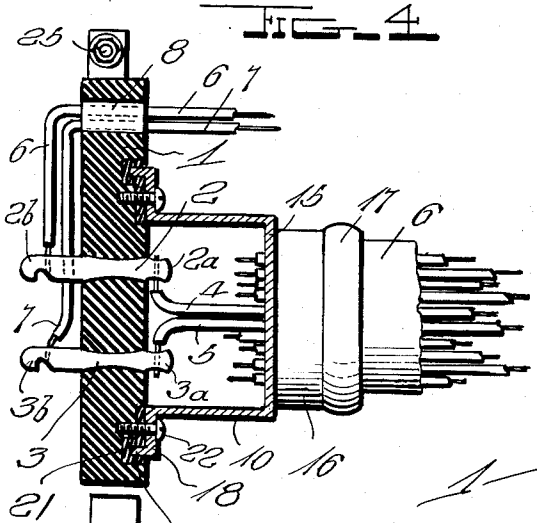


FIG. 5

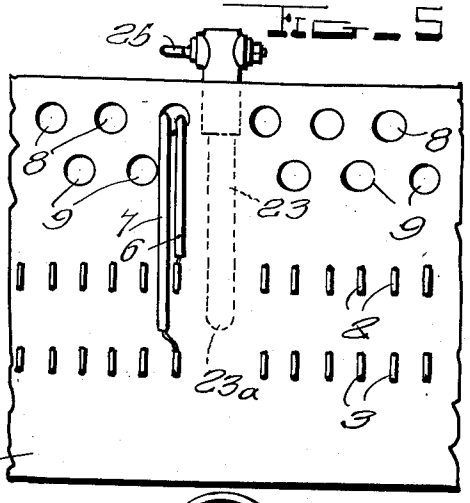


FIG. 6

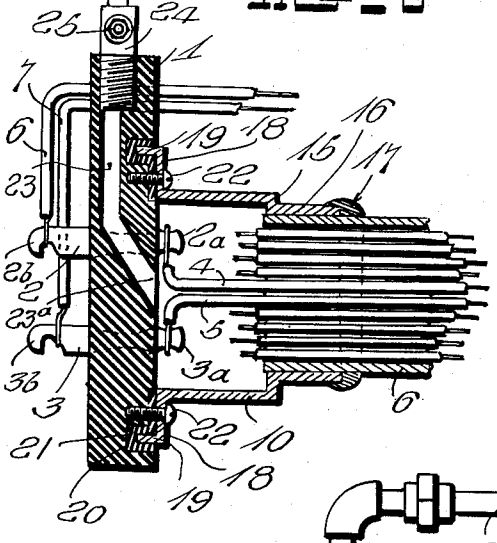
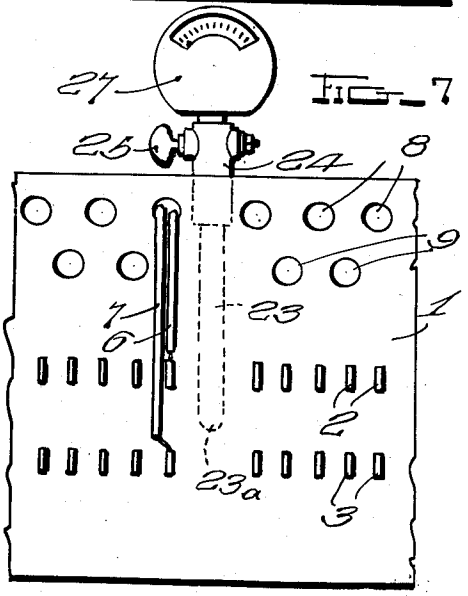


FIG. 7



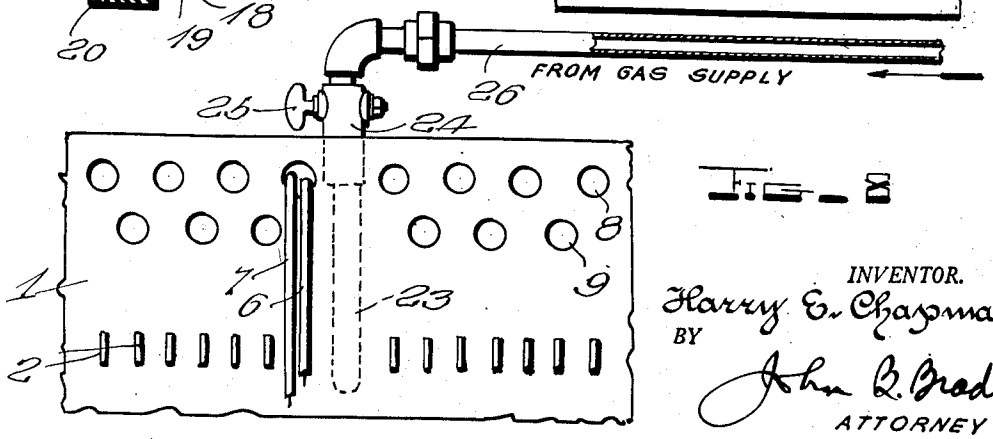


FIG. 8

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TERMINAL AND FANNING STRIP FOR ELECTRICAL CONDUCTORS

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Application December 29, 1949, Serial No. 135,650

5 Claims. (Cl. 174—19)

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My invention relates broadly to terminal strips for terminating electrical conductors, and more particularly to a sealed terminal strip for protecting the ends of electrical conductors against conditions of moisture and changes in humidity conditions.

One of the objects of my invention is to provide a composite construction of terminal strip for electrical conductors with means for enclosing the ends of the electrical conductors at the terminating connections for preventing dust or dirt or moisture or changes in humidity conditions from affecting the multiple conductors within a cable leading to the terminal strip.

Another object of my invention is to provide a composite terminal strip and fanning strip for terminating a multiplicity of conductors enclosed in a common sheath with an enclosing casing extending between the cable sheath and the terminal strip and conforming with rows of terminal connectors thereon, whereby electrical connections may be established between the multiple conductors of the cable and the connectors on the terminal strip, while moisture is effectively excluded from the terminal connectors or the interior of the cable sheath.

Still another object of my invention is to provide a composite fanning strip and terminal strip for a multiplicity of electrical conductors, in which the cable sheath enclosing the conductors is provided with an elongated chamber establishing sealed connection with the terminal strip for protecting the conductors within the cable from the entry of moisture or from changes in humidity conditions.

Still another object of my invention is to provide a construction of chamber which is readily attachable to the rack of an electrical termination installation, and serves to mutually support on one side a cable sheath and at the other side a composite terminal strip and fanning strip for the electrical conductors enclosed within the cable sheath for protecting the conductors within the cable sheath against moisture and changes in conditions of humidity.

Still another object of my invention is to provide a construction of cable terminating header having a multiplicity of electrical connectors supported therein for individual connection to the conductors within the cable sheath extending from the header, with provision in the header for introducing and/or removing gases with respect to the interior of the cable sheath.

Still another object of my invention is to provide a construction of cable terminating header

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having a multiplicity of electrical connectors supported therein for individual connection to the conductors within a cable sheath extending from the header, with provision in the header for measuring the pressure of gases within the cable sheath.

Other and further objects of my invention reside in the construction of a composite terminal and fanning strip for the multiplicity of conductors enclosed within a cable sheath, including a protecting chamber for the end of the electrical conductors at the terminating connections thereof, as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a front elevational view of the composite terminal and fanning strip of my invention; Fig. 2 is a rear elevational view of the composite terminal and fanning strip and illustrating the protective chamber, the cable sheath being illustrated in transverse section, the view being taken substantially on line 2—2 of Fig. 3; Fig. 3 is a top plan view of the terminal and fanning strip with parts thereof broken away to show the internal construction of the head; Fig. 4 is vertical sectional view through the composite fanning and terminal strip of my invention, taken substantially on line 4—4 of Fig. 1; Fig. 5 is a fragmentary elevational view of the composite terminal and fanning strip shown in Fig. 4, and illustrating particularly the position of the gas control valve and the port extending therefrom through the composite terminal and fanning strip to a position centrally of the protective chamber; Fig. 6 is a vertical sectional view taken substantially on line 6—6 of Fig. 1, and illustrating particularly the port for gas which extends through the composite terminal and fanning strip of my invention between the protective chamber and the valve with which the pressure measuring instrument connects; Fig. 7 is a fragmentary elevational view of the terminal strip showing the pressure measuring meter in position on the valve thereof;

Fig. 8 is a schematic view illustrating the manner in which connection is established with the valve in the composite terminal and fanning strip for introducing and/or removing gas from the interior of the cable sheath, and Fig. 9 is an enlarged fragmentary sectional view of the seal provided between the terminal and fanning strip and the protective chamber.

My invention is directed to the permanent sealing of electrical conductors whose insulation may be paper, plastic, textile, jute or other in-

sulating material and whose sheath may be lead, plastic, steel armor or jute, when said conductors must be brought out for distribution and joining with other conductors as in circuits pertaining to telephone, telegraph, radio, carriers and power circuits.

In telegraph and telephone circuits including carrier and radio, it is customary when using lead covered cable with paper insulated conductors, to splice in a short length of textile insulated conductors to join these conductors to the terminal strips for distribution because paper insulated conductors do not lend well to termination once the outside sheath has been removed.

The purpose of this invention is to provide a moisture proof seal between the cable sheath and the terminal block with the juncture point of the conductors and the terminal lugs of the terminal block within this sealed chamber.

In the conventional manner of terminating these cable conductors, the sheath of the cable is removed for distance necessary to provide a conductor length to reach the individual terminal lugs after being pulled through a fanning strip, then the extending conductors, or jumper wires, are pulled through a fanning strip on the opposite side and the conductors connected to the other end of the terminal lugs, in this manner both ends of the terminal lugs are exposed and the cable conductors have no protection from the point juncture with the lugs and the end of the cable sheath. In a termination of this kind, paper insulated conductors can not be used.

The composite terminal strip and fanning strip in the structure of my invention differs very materially from conventional terminal strips which generally comprise a T-shaped fanning strip of wood and a strip of insulation material extending therefrom in the nature of a horizontal shelf. The fact that such shelf has been horizontally disposed in the past in conventional installations, has resulted in collection of dirt and dust and solder lumps, which have often reduced the operating efficiency of the terminal facility. In the structure of my invention I have completely eliminated the conventional wood T-shaped section and the arrangement of horizontal shelf. As distinguished therefrom, the terminal strip in the assembly of my invention is maintained in substantially vertical plane, so that there is no danger of the strip of insulation material serving as a collector of dust or dirt or the connectors becoming short-circuited under conditions of the dropping of lumps of solder.

The conventional paper insulated conductors which are employed in telephone and telegraph cables, for example, are highly moisture absorbent, and the cable header of my invention is particularly adapted for the protection of such paper insulated conductors by the introduction through the terminal strip of a gas which is confined around the terminal connections of the several conductors and within the cable sheath. The pressure of this gas may be readily measured by a meter which is readily introduced into the valve that is permanently mounted on the composite terminal and fanning strip, and which is removable and insertable with respect thereto intermediate the periods at which the gas line may be connected with the valve.

Referring to the drawings in more detail, reference character 1 designates the composite terminal and fanning strip of my invention, the strip being formed from insulation material in which there is moulded the horizontal rows of electrical connectors represented at 2 and 3, projecting on opposite sides of the terminal strip 1. The opposite ends of the electrical connectors 2 and 3 are provided with solder lugs 2*a* and 2*b* and 3*a* and 3*b*, to which electrical connection may be readily made. I have designated the input connections to the solder lugs 2*a* and 3*a* as completed by conductors 4 and 5 leading from the interior of the cable sheath represented at 6. The output connections from solder lugs 2*b* and 3*b* are represented at 6 and 7, leading through the fanning strip apertures designated by rows 8 and 9 in the terminal strip 1. The fanning strip apertures in the rows 8 and 9 are alternately positioned for accommodating the output conductors leading from the solder lugs on the ends of the horizontally extending connectors 2 and 3. The chamber 10 which protects the electrical connections which are established between the ends of the paper insulated conductors 4 and 5 within cable sheath 6, is supported on the rack structure represented generally at 11. The rack structure 11 may be the conventional angle iron rack employed in the conventional cable termination system, and establishes connection with an angle member 12 through detachable bolt 14 where angle member 12 is fastened to the rear wall of the chamber 10. The rear wall of the chamber 10 extends for a distance substantially equal to the effective length of the terminal and fanning strip 1 sufficient to enclose the rows of electrical connectors 2 and 3. The rear wall of chamber 10 is provided with an enlarged entrance-way 15, having the section thereof reduced at 16 to provide a cylindrical sleeve enveloping the end of the cable sheath 6 into which the cable sheath extends. The cable sheath 6 is generally formed from lead and the junction between the lead cable sheath 6 and the metallic substantially cylindrical sleeve 16 is formed by wiping or soldering the junction, as represented at 17. In installations where a plastic or braided sheath cable is used, the junction is sealed by a tape effective for joining the plastic cable sheath to the metallic, substantially cylindrical, sleeve 16. The elongated metallic chamber 10 has a flat flange 18 coextensive therewith extending in substantially rectangular contour. The flat flange 18 has a peripheral skirt 19 extending normal thereto which is aligned with a substantially rectangular groove 20 and adjoining recess 20*a* conjointly forming a substantially L-shaped peripheral recess in the terminal and fanning strip 1. The rectangular groove 20 is provided with a resilient sealing gasket 21 therein with an integrally formed resilient flange portion 21*a* coextensive with the gasket 21. The peripheral skirt 19 and flat flange 18 of the chamber 10 are pressed into engagement with the sealing gasket 21 and the flange portion 21*a* thereof, respectively, forming an effective seal on both sides of the forwardly extending peripheral skirt 19 and beneath the flat flange 18. Thus, an addition to the seal provided between the interior face of flat flange 18 compressing resilient material of the flange portion 21*a* and the surface of the fanning and terminal strip, a sealing serpentine path is provided around the peripheral skirt 19 of the chamber 10 in groove 20, thus insuring a substantially gas tight joint between chamber 10 and the terminal and fanning strip 1. In order to insure the maintennace of a tight connection between chamber 10 and the fanning and ter-

minal strip 1, a multiplicity of spaced screws 22 extends through the flat flange 18 and are screw-threaded through the resilient flange portion 21*a* of resilient sealing jacket 21 into the terminal and fanning strip 1 as shown more clearly in Fig. 9.

The enclosing, substantially gas tight chamber, provided between the cable sheath 6 and the fanning and terminal strip 1, is supplied with gas, or gases removed therefrom through the port 23, which extends vertically through the fanning and terminal strip 1, and opens into the interior of chamber 10, as represented at 23*a*. The other end of the port 23 opens into a valve 24 permanently attached to the fanning or terminal strip. Valve 24 is provided with a key controlled cock 25, to which there may be removably attached the gas supply or exhaust line represented at 26 in Fig. 8, or to which there may be attached the pressure measuring instrument represented at 27 in Figs. 6 and 7, for reading the condition of gas pressure within the cable sheath 6, and within the protective chamber 10. I may provide the header with a permanently attached measuring instrument for indicating pressure conditions within the cable sheath or chamber, independently of the means for introducing or exhaustnig gas from the interior of the cable sheath or chamber.

I have found the protective chamber of my invention highly efficient in installations employing paper insulated conductors, which may be carried through the end of the cable and directly connected with the rows of connectors in the terminal strip without the necessity of splicing in short lengths of textile insulated conductors and the incidental coupling of the sheaths enclosing the paper covered insulated conductors and the section of sheath enclosing the textile insulated electrical conductors, which have constituted such an extensive time consuming factor in conventional cable installations. The gas enclosing chamber affords such complete protection to the electrical conductors within the cable sheath that the paper insulated conductors can be readily terminated on the electrical conductors 2 and 3 without fear of breakdown of the electrical insulation.

Among the advantages of my invention is the protection offered by a cable whose sheath is lead, textile, jute, plastic or steel armor, and which may be carried up to the point where the conductors are connected to the terminal lugs, providing complete protection against moisture to conductors whose insulation may be paper, textile, plastic or jute, wherever located, in damp basements, attics, or any place where moisture is prevalent, for conductors carrying current for telephone, telegraph, radio, public address, carrier or power circuits, providing as complete a seal against moisture or humidity as the cable sheath itself.

My invention provides a new and novel method of terminating the extending, or jumper wires, in that they enter the fanning strip from the back and top of the terminal strip and extend downward to the terminal lugs. The terminal lugs lay in a horizontal position with the jumper wires approaching from the top and connected to the lugs. Thus, excess solder may easily be removed from the lugs. Moreover, there is no shelf for small ends of wire to cling and cause trouble as in the conventional type terminal strips.

The invention insures a more orderly and neater terminal rack due to the fact that the cable is brought to the terminal strip without opening the sheath and exposing the conductors, with less surface for dust and dirt to collect.

While I have described my invention in certain of its preferred embodiments, I realize that modifications and changes may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is as follows:

1. A terminal strip comprising a panel of insulation material, a multiplicity of electrical connectors arranged in a row and extending through said panel and projecting on opposite sides thereof, connecting means on the opposite ends of said electrical connectors, a chamber having one side opening toward said panel and detachably supported on the surface of one side of said panel and enclosing the projecting ends of said electrical conductors, a cable sheath enclosing a multiplicity of electrical conductors extending through substantially the center of one side of said chamber on an axis substantially normal to the plane of said panel and forming a protective enclosure for the conductors extending from said cable to the projecting ends of said electrical connectors on said panel, the open side of said chamber having transverse and longitudinal dimensions within the dimensional limits of said panel, the junctions betwen said chamber and the sheath of said cable, and between said chamber and said panel being substantially gas tight, a transversely disposed port extending through said panel between the opposite surfaces thereof and opens into said chamber, and means detachably connectible with the said panel in alignment with said port for introducing and/or exhausting gas with respect to said chamber.

2. A composite terminal and fanning strip assembly which includes a hollow chamber terminating in an open side having a peripheral flange therearound and a cable entrance substantially in the center of the other side, a panel of insulation material extending across the peripheral flange of said chamber and beyond the dimensional limits thereof, electrical connectors carried by said panel and projecting on one side thereof into said chamber and projecting beyond the other side thereof and forming electrical terminals, said panel being perforated along one edge thereof beyond the dimensional limits of said chamber for guiding electrical conductors therethrough into connection with said electrical terminals, a cable sheath having a multiplicity of electrical conductors therein supported in said cable entrance, the electrical conductors in said cable establishing connection with the projecting ends of said electrical connectors within said chamber, said cable entrance being disposed on an axis substantially normal to the plane of said panel, a bracket connected with said chamber immediately adjacent said cable entrance for supporting said assembly through said chamber, said panel having an internally disposed port for gas extending on an axis substantially parallel with the surface of the panel from a position adjacent one edge thereof to a position centrally thereof opening within said chamber, and means for introducing or exhausting gas with respect to said chamber through said port from a position at the edge of said panel.

3. A composite terminal and fanning strip comprising a panel of insulation material having a row of apertures extending substantially hori-

zontally adjacent one edge thereof, rows of electrical connectors embedded in said panel beneath said apertures and projecting on opposite sides of said panel, a sheath enclosing a multiple conductor cable, a chamber having an open side portion and a solid side portion, said sheath being connected substantially at the center of said solid side portion of said chamber and enclosing the projecting ends of the electrical connectors which project from the said panel for enclosing the electrical conductors connected with said connectors and extending through said sheath, the open side portion of said chamber being connected with the surface of the side of said panel substantially within the dimensional limits of said panel and said sheath extending on an axis substantially normal to the plane of said panel, said panel adjacent said chamber being provided with a groove of substantially L shaped section substantially within the dimensional limits of said panel with a resilient L shaped gasket extending into said groove, said chamber including a flat peripheral flange establishing connection with one portion of said L shaped gasket in said groove and a projecting marginal skirt on said chamber extending into another portion of said L shaped gasket in said groove.

4. A composite terminal and fanning strip comprising a panel of insulation material having a row of apertures extending substantially horizontally adjacent one edge thereof, rows of electrical connectors embedded in said panel beneath said apertures and projecting on opposite sides of said panel, a sheath enclosing a multiple conductor cable, a chamber having an open side portion and a solid side portion, said sheath being connected substantially at the center of said solid side portion of said chamber and enclosing the projecting ends of the electrical connectors which project from the said panel for enclosing the electrical conductors connected with said connectors and extending through said sheath, the open side portion of said chamber being connected with the surface of the side of said panel substantially within the dimensional limits of said panel and said sheath extending on an axis substantially normal to the plane of said panel, said panel adjacent said chamber being provided with a groove of substantially L shaped section substantially within the dimensional limits of said panel with a resilient L shaped gasket extending into said groove, said chamber including a flat peripheral flange establishing connection with one portion of said L shaped gasket, a projecting skirt on said chamber extending into another portion of said L shaped gasket in said groove, attachment means extending through the flat peripheral flange of said chamber and through one portion of said L shaped gasket and into said panel for securing said chamber in position with respect to said panel, and a support attached to said chamber for wholly supporting said panel with respect thereto.

5. A composite terminal and fanning strip comprising a supporting panel of insulation material having a marginal groove formed in one surface thereof substantially within the dimensional limits of the panel and formed with fanning apertures beyond the limits of the groove, a resilient gasket inset in said groove, a chamber open at one side thereof and an enclosing wall extending across the other side thereof, a cable sheath carried by said enclosing wall, said open side terminating in a marginal flange establishing coacting connection with said resilient gasket, means extending through said marginal flange and through said resilient gasket and into said panel for interconnecting said panel and said chamber, connecting members extending substantially normal to said panel and terminating at one side of said panel within said chamber, and at the other side of said panel at connecting positions thereon, said panel having a passageway formed transversely therethrough extending from one edge of the panel to a position at the surface of said panel within said chamber intermediate said connecting members and means connected with said passageway at the edge of said panel for introducing and/or exhausting gas within or from said chamber through said passageway, and conductors extending through said cable sheath and connected with said connecting members, and other conductors extending through said fanning apertures and connected with the ends of said connecting members at the side of said panel opposite the side which supports said chamber, said cable sheath being located on an axis extending substantially normal to the plane of said panel.

HARRY E. CHAPMAN.

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