Sept. 27, 1932. B. H. WOODRUFF 1,880,166

RADIO LEAD AND LIGHTNING ARRESTER

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FIG. 1

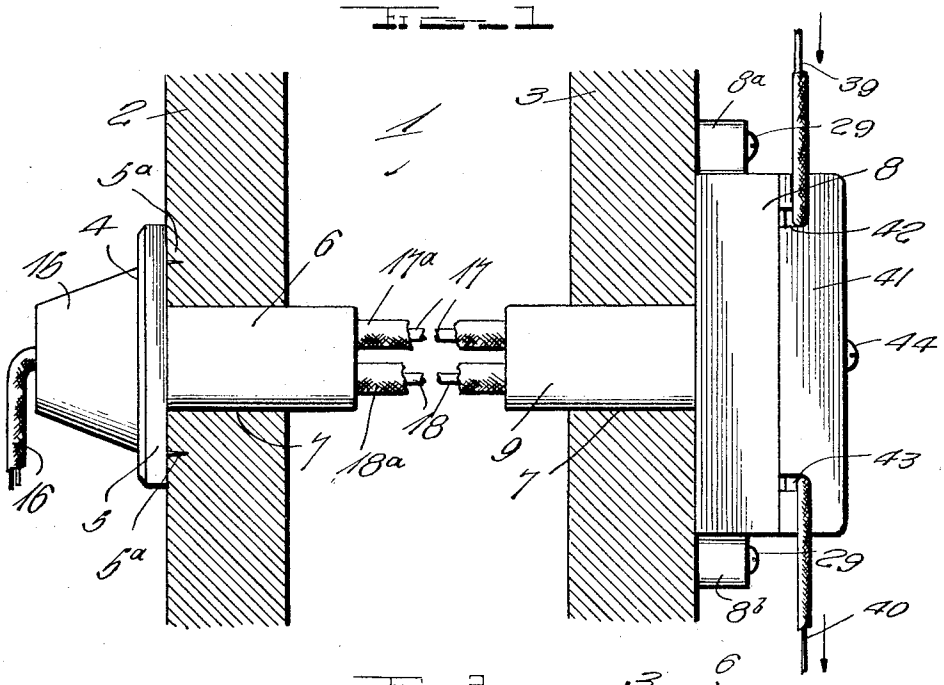
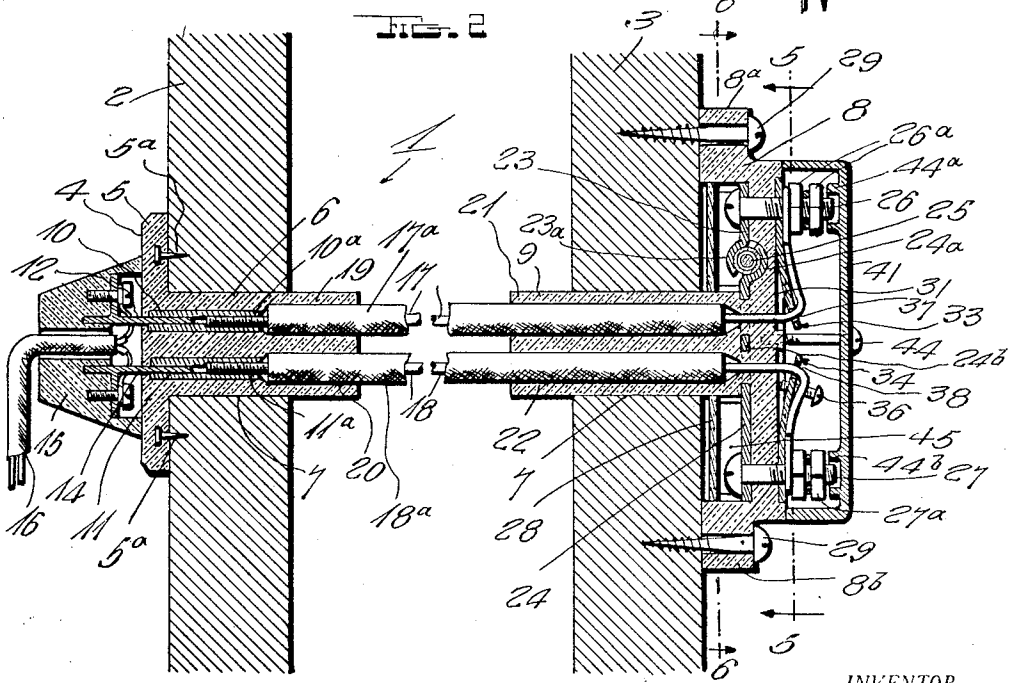


FIG. 2



INVENTOR.
B. H. Woodruff
BY John B. Brady
ATTORNEY

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FIG. 3

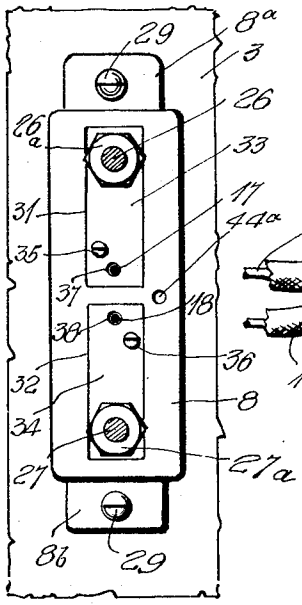
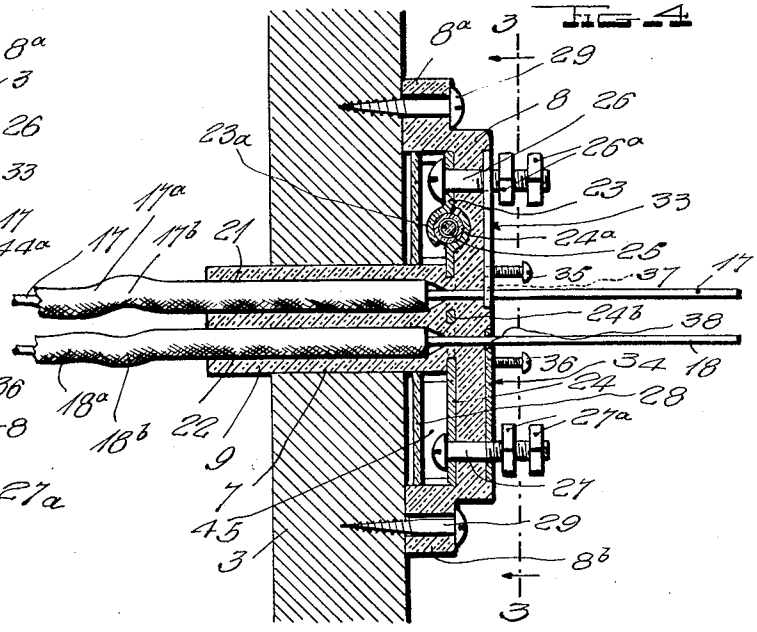


FIG. 4



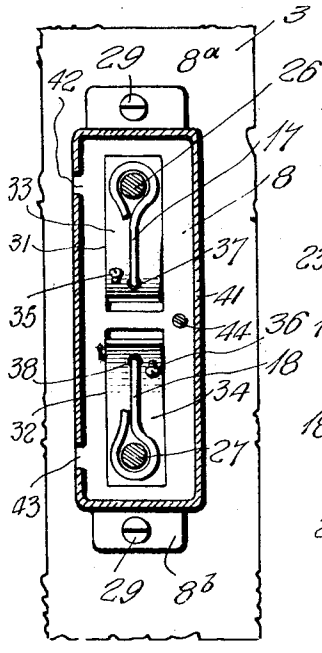


FIG. 5

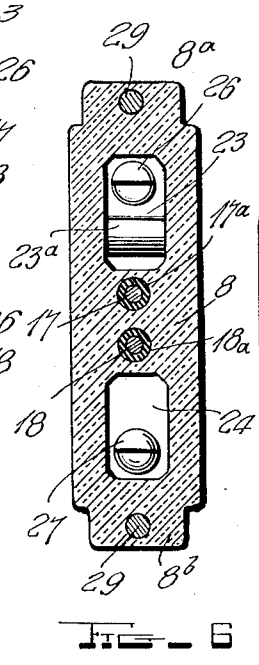


FIG. 6

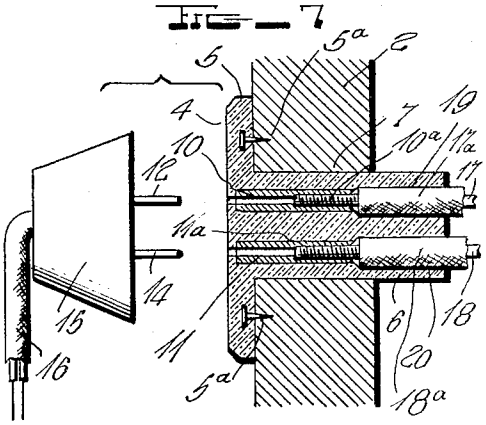


FIG. 7

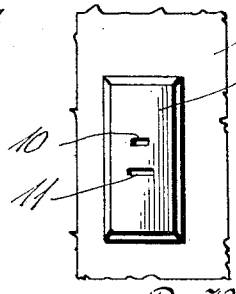


FIG. 8

INVENTOR.
B. H. Woodruff
BY John B. Brady
ATTORNEY.

Patented Sept. 27, 1932 1,880,166

UNITED STATES PATENT OFFICE

BEN H. WOODRUFF, OF MERIDIAN, MISSISSIPPI

RADIO LEAD AND LIGHTNING ARRESTER

Application filed June 22, 1931. Serial No. 546,101.

My invention relates broadly to radio communication systems and more particularly to a radio lead and lightning arrester installation for establishing connections between an antenna ground system and the radio communication apparatus.

One of the objects of my invention is to provide a construction of radio lead and lightning arrester which may be inexpensively manufactured on a quantity production basis and which will insure an efficient transfer of radio frequency energy between an antenna ground system and radio communication apparatus.

Another object of my invention is to provide a simplified construction of radio lead and lightning arrester for facilitating the installation of radio broadcast receiving apparatus and insuring high insulation between the antenna and ground leads and the wall structure through which the leads must pass in establishing interconnection between an antenna ground system and a radio broadcast receiver.

Still another object of my invention is to provide a construction of fixture which may be readily manufactured and marketed to meet the demand which has heretofore existed for a practical form of insulated lead-in system for radio broadcast receivers.

A still further object of my invention is to provide an arrangement of insulated lead-in system for radio receiving installations constructed and arranged for installation through wall structures of different thicknesses with means for adjusting the tension on the lead-in conductors for insuring a tight interconnection between parts of the fitting and the wall structure through which the fitting passes.

Other and further objects of my invention reside in the arrangement of tensioning means for the conductors which comprise the radio lead as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the radio lead and lightning arrester extending through a wall structure which is illustrated in section; Fig. 2 is a cross-sectional view taken through the parts of the radio lead and through a wall structure and illustrating the interconnection of the lightning arrester with the conductors constituting the radio lead; Fig. 3 is an elevational view with parts shown in section looking at the front of the terminal block and showing the antenna ground connections for the radio lead, the view being taken on line 3—3 of Fig. 4; Fig. 4 is a cross-sectional view through the lightning arrester and the exterior end of the radio lead showing the conductors prior to the tensioning thereof under control of the tensioning members which form a part of the radio lead installation; Fig. 5 is a cross-sectional view through the housing of the lightning arrester taken on line 5—5 of Fig. 2 and showing the tensioning means in position for exerting a predetermined tension on the conductors forming the radio lead; Fig. 6 is a cross-sectional view through the lightning arrester block on the exterior end of the radio lead taken on line 6—6 of Fig. 2; Fig. 7 is a view showing the antenna ground plug which leads to the radio receiver, the plug being illustrated in position preparatory to insertion in the sockets which are connected with the conductors constituting the radio lead; and Fig. 8 is an elevational view showing the connector plate into which the connecting plug leading to the radio receiver is insertable for establishing antenna ground connections to the radio broadcast receiver.

The radio lead and lightning arrester of my invention has been developed to meet the demand for a practical form of lead-in conductor and protector for radio broadcast receivers. The radio lead of my invention is manufactured inexpensively on a quantity production basis and fills the requirement for establishing electrical connection between an antenna ground system and a communication apparatus while maintaining high insulation and avoiding radio frequency losses. The radio lead and lightning arrester of my invention meets the demand for a unit available in the form of builders hardware and which may be installed with the erection of a home for providing connections between the antenna ground system outside of the exterior

wall of the house and the radio apparatus inside of the house. The radio lead and lightning arrester of my invention may be readily installed in dwellings and buildings by drilling a three-quarter inch diameter hole through the entire wall. One insulated fixture is mounted on the inside wall of the house or building and terminates in a pair of preformed sockets for receiving the pins of a connecting plug in a pre-arranged manner so that connection between the radio apparatus and the antenna-ground in the proper way is assured. A pair of conductors are screw threaded into the rear of the connecting members which comprise the aforesaid sockets and extend through the wall, being threaded through apertures in an insulating fitting attached to the exterior of the wall. The fitting on the exterior of the wall is equipped with a lightning arrester which is bridged across terminals connected with the antenna ground system exterior of the building. I provide means on the exterior fitting for subjecting the conductors to tension, thereby drawing the fittings toward each other for securing a tight joint between the fittings and establishing a seal between the insulation on the conductors and the exterior fitting and the wall structure through which the radio lead passes. The tension means also takes up any excess length of the conductors which might tend to permit the conductors to sag within the wall structure. This construction facilitates the installation of the radio lead and lightning arrester through walls of various thicknesses, inasmuch as the conductors, after being anchored at their inside ends to the sockets which receive the pin terminals leading to the radio apparatus, may be passed through the wall structure, the insulation shaved off for an appropriate distance passed through the exterior fitting, and the ends of the bare conductors secured around the terminal screws on the exterior fitting. The extra length of the conductors may be clipped off at the terminal posts. Thereafter the excess length of the conductors within the wall structure may be taken up by the adjustment of screw members on the lightning arrester block.

Referring to the drawings in detail, reference character 1 designates the gap between the inside and outside portions of a wall structure shown at 2 and 3, respectively. The interior fitting is indicated by reference character 4, comprising an insulated plate portion 5 and the rearwardly extending plug portion 6. The fitting 4 is adapted to be inserted through a bore 7 which is drilled through the wall structure. The plate 5 is centered and rigidly secured with respect to the wall 2 by the entry of pins 5*a* into the wall 2 as shown in Figs. 1, 2 and 7. The bore 7 extends through the entire wall including the exterior portion 3 thereof. The exterior insulated fitting 8 is provided with a longitudinally projecting rearwardly extending plug portion 9, which is projected through the bore 7 in the exterior portion of the wall designated at 3. The interior fitting 4 has a pair of socket inserts represented at 10 and 11 molded therein. The socket inserts are formed at the extremities thereof which lie adjacent the inside face of the fitting 4 into pin receiving receptacles of predetermined construction for receiving the pins 12 and 14, respectively of the plug 15 which is connected through flexible lead 16 with the antenna ground terminals of the radio apparatus adjacent the terminal outlet provided by the fitting 4. The pins 12 and 14 are so spaced and formed that they can only enter the sockets 10 and 11 in the fitting 4 in a pre-arranged manner. The spacing of the sockets 10 and 11 and the corresponding pins 12 and 14 is such that the usual connecting plug on the power circuit leading to the radio apparatus will not enter the sockets 10 and 11. Furthermore the plug on the lead extending to any electrical appliance cannot be inserted in the sockets 10 and 11 due to their shape and spacial relation so that accidents due to the wrong insertion of plugs in the socket are avoided. In other words the radio outlet connector is so distinguished from the usual power outlet connector that there can be no confusion or mis-connection between the connectors.

The opposite extremities of the sockets 10 and 11 are shaped into cylindrical bores which are interiorly screw threaded at 10*a* and 11*a* to receive the screw threaded ends of the conductors 17 and 18, as shown. The conductors 17 and 18 are each insulated as represented at 17*a* and 18*a* and the ends thereof are received in enlarged sockets 19 and 20 in the projection 6 of the fitting 4. In this way the conductors 17 and 18 are insulated from each other and are maintained in predetermined spacial relation for the passage thereof through the wall structure.

The bore 9 of the fitting 8 is also provided with aligned bores 21 and 22 for receiving the insulation 17*a* and 18*a* of conductors 17 and 18. These bores terminate immediately adjacent the plane of the lightning arrester electrodes shown at 23 and 24. The lightning arrester electrodes 23 and 24 are set into a longitudinally extending recess 45 in the fitting 8 and terminate in curvilinear portions at 23*a* and 24*a* forming a suitable clamping structure for the resistance element 25. This arrangement provides sparking faces on each side of the resistance element 25, and establishes a pair of safety gaps for the lightning arrester. The lightning arrester terminal plate 23 is secured to the fitting 8 by means of the antenna terminal post 26, screw threaded to receive nuts 26*a* thereon. The lightning arrester electrode plate 24 is secured to the

fitting 8 by means of the ground terminal post 27 having screw threaded nuts 27*a* secured thereon. The inside of the recess 45 is closed by an insulating plate 28 secured thereon on opposite sides of the projecting portion 9, as shown. The fitting 8 is provided with a pair of lugs 8*a* and 8*b* through which securing screws 29 are passed for mounting the fitting 8 on the exterior of the wall 3. The lightning arrester electrode plate 24 is molded into the material of the fitting 8 as has been shown in Figs. 2 and 4 with a central portion 24*b* located between the conductors 17 and 18, the plate 24 being apertured for the passage of conductors 17 and 18 therethrough with a substantial thickness of insulation surrounding each conductor and preventing any tendency of short-circuit between the conductors 17 and 18 and the metal of plate 24.

The fitting 8 is provided with a pair of longitudinally extending recesses 31 and 32 on the exterior thereof in which there are arranged the resilient adjustable strip members 33 and 34 respectively. The resilient adjustable plate members 33 and 34 are secured by terminal screws 26 and 27 respectively and are free to be laterally adjusted away from or toward the recesses 31 and 32 respectively by means of adjusting screws 35 and 36 as shown. The resilient adjustable plate members are apertured at 37 and 38 to permit the passage of the conductors 17 and 18 as shown, which conductors are passed through the plate members 33 and 34 and are then bent laterally with respect thereto and looped around the terminal posts 26 and 27 respectively as has been shown in Figs. 2 and 5.

In installing the radio lead and lightning arrester with respect to the wall of a building the wires 17 and 18 are pulled through the fitting 8 with the insulation 17*a* and 18*a* entering the longitudinally extending sockets 21 and 22. The ends of the conductors 17 and 18 are then clamped as shown in Fig. 4 and are looped around the terminal posts 26 and 27 as shown in Figs. 2 and 5.

As will be observed, the conduit wires 17 and 18 are, during the process of passing them through the building walls, more or less distorted and in order to insure a permanent water tight fitting of the fixture against the outer wall of the building, I straighten out these wires in a unique and novel manner. As will be observed, I pass the bare ends of the wire through apertures 37 and 38 in the plates 33 and 34, loop them around the fastening bolts, tighten the nuts 26*a* and 27*a*, and clip off the excess length at the bolts. Upon screwing home the screws 35 and 36 carried by the resilient plates 33 and 34, it will be readily seen that the fastening wires, being anchored at both of their extreme ends will straighten out, eliminating the sagging at 17*b* and 18*b*, and hence press the fixture against the outer wall, thus preventing entrance of extraneous matter and insuring a permanent water tight connection.

The antenna conductor is shown at 39 connected to the terminal post 26. The ground conductor is shown at 40 connected to the terminal post 27. A cover member 41 is secured over the top of the fitting 8 and is provided with slots 42 and 43 through which the conductors 39 and 40 pass to the terminal posts 26 and 27, respectively. The cover member 41 is secured in position on fitting 8 by means of screw 44 which is secured into a screw threaded aperture in the fitting 8. Projecting bosses 44*a* and 44*b* are provided on the inside face of the cover member 41 for centering the cover over the terminal posts 26 and 27.

The arrangement of the conductors with respect to the fittings is such that a continuous insulating surface is obtained at all points. The conductors are threaded through the insulated projecting portions 6 and 9, the insulated coverings 17*a* and 18*a* on the conductors 17 and 18 snugly fitting into the bores through the projecting members 6 and 9 providing an electrically insulated and a moisture tight joint, avoiding losses and preventing leakage of high frequency currents.

The radio lead and lightning arrester constructed in accordance with my invention has been found highly practical, and successful and efficient in its operation, and while I have described my invention in one of its preferred embodiments, I desire that it be understood that modifications and changes may be made within the scope of the appended claims, without departing from the spirit of my invention.

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

1. A radio lead and protective device comprising a pair of insulation members adapted to be inserted in opposite sides of a wall structure, terminals formed on one of said insulation members, conductors connected with said terminals and extending through said wall structure, said conductors being threaded through the other of said insulation members, antenna ground terminals carried by the last mentioned insulation member, the conductors being connected with said terminals, and means supported on said last mentioned insulation member for stretching said conductors taut intermediate said wall structure.

2. In a radio lead, a pair of insulation members adapted to be inserted through aligned apertures drilled through a wall structure, recesses in one of said insulation members for receiving the pin terminals of an insertable plug, conductors attached to terminals in said recesses and threaded through the other of said insulation mem-

bers, antenna ground terminals carried by the last mentioned insulation member, said conductors being connected with said terminals, and means carried by said last mentioned insulation member for stretching said conductors taut through said wall structure.

3. A radio lead comprising a pair of insulation members having means projectible through aligned bores in opposite sides of a wall structure, a pair of terminals carried by each of said insulation members, a removable plug connectible with the terminals in one of said insulation members, conductors secured to the terminals in said first mentioned insulation member and threaded through the other of said insulation members and attached to the terminals carried by said last mentioned insulation member, and means on said last mentioned insulation member for stretching said conductors taut through said wall structure.

4. A radio lead and protective device comprising in combination with a wall structure, a pair of insertable insulation members adapted to be laterally aligned through a bore from opposite sides of said wall structure, terminals carried by each of said insulation members, sockets leading to the terminals in one of said insulation members, a removable plug insertable into said sockets, conductors attached to the rear of the terminals in said sockets, said conductors being threaded through the other of said insulation members and connected to the terminals thereon, means on said last mentioned insulation member for stretching said conductors taut, and a safety gap carried by said last mentioned insulation member and connected across the terminals thereon.

5. A radio lead and lightning arrester comprising a pair of insulation members insertable in an aligned bore on the inside and the outside of a wall structure, terminals carried by each of said insulation members, the terminals in said insulation members being adapted to receive the prongs of an insertable plug, conductors attached to said last mentioned terminals and threaded through the insulation member on the outside of the wall structure, and means carried by said last mentioned insulation member for stretching said conductors taut intermediate said wall structure.

6. A radio lead comprising a pair of insulation members insertable in an aligned bore from the inside and outside of a wall structure, one of said insulation members having a pair of socket terminals therein adapted to receive the pin terminals of an insertable plug, a pair of conductors secured to said socket terminals and threaded through the other of said insulation members, a pair of terminal posts carried by said last mentioned insulation member for forming connections with said conductors, and means supported by said last mentioned insulation member for longitudinally stretching said conductors intermediate said wall structure.

7. A radio lead comprising a pair of insulation members insertable in an aligned bore from the inside and outside of a wall structure, one of said insulation members having a pair of socket terminals therein adapted to receive the pin terminals of an insertable plug, a pair of conductors secured to said socket terminals and threaded through the other of said insulation members, a pair of terminal posts carried by said last mentioned insulation member for forming connections with said conductors, a safety gap disposed between the terminals on said last mentioned insulation member, and means carried by said last mentioned insulation member for stretching said conductors taut intermediate said wall structure.

8. A radio lead comprising a pair of insulation members insertable in an aligned bore from the inside and outside of a wall structure, one of said insulation members having a pair of socket terminals therein adapted to receive the pin terminals of an insertable plug, a pair of conductors secured to said socket terminals and threaded through the other of said insulation members, a pair of terminal posts carried by said last mentioned insulation member for forming connections with said conductors, said last mentioned insulation member including a longitudinally extending plate of insulating material, a safety gap on one side of said plate connected between the terminals carried by said insulation member, means on the other side of said plate for engaging said conductors in the course of the passage thereof around the terminals on said insulation member, and adjustable means extending through said last mentioned means for stretching said conductors taut intermediate said wall structure.

9. A radio lead and protective device comprising a pair of insulated members adapted to be inserted through aligned bores from the inside and outside of a wall structure, the insulated member adjacent the inside of the wall structure carrying a pair of terminal sockets adapted to receive the pin terminals of a connecting plug, conductors secured to the rear of said socket terminals and threaded through the other insulated member, antenna ground terminals carried by said last mentioned insulated member, a safety gap supported by said last mentioned insulated member and bridged across the terminals thereon, and an independent tension adjusting device for each of said conductors connected with the terminals on said last mentioned insulated member for stretching said conductors taut intermediate said wall structure.

10. A radio lead and protective device comprising a pair of insulated members adapted to be inserted through aligned bores

from the inside and outside of a wall structure, the insulated member adjacent the inside of the wall structure carrying a pair of terminal sockets adapted to receive the pin terminals of a connecting plug, conductors secured to the rear of said socket terminals and threaded through the other insulated member, antenna ground terminals carried by said last mentioned insulated member, a safety gap supported by said last mentioned insulated member and bridged across the terminals thereon, a pair of longitudinally extending recesses in said last mentioned insulated member, a resilient strip disposed in each of said recesses with one end thereof anchored by the respective terminals on said insulated member, adjusting screws passing through each of said strips, said strips engaging said conductors as said adjusting screws are adjusted against said recesses for stretching said conductors taut intermediate said wall structure.

11. In a radio lead, a pair of insulated fittings projecting through the inside and outside portions of a wall structure, parallel extending bores in each of said fittings, terminals carried by said fittings, insulated conductors extending through the bores in said fittings with insulation covering thereon filling said bores and forming a tight joint therewith, connections between the ends of said conductors and the terminals on said fittings, and spring means connected with said terminals for stretching said conductors taut intermediate said wall structure.

12. In a radio lead, a pair of insulated fittings projecting through the inside and outside portions of a wall structure, parallel extending countersunk passages through said fittings, conductors having insulated coverings thereon having a diameter substantially equal to the size of said countersunk passages, terminals carried by said fittings, said conductors passing through said passages and having their ends connected with said terminals, with the insulation thereon filling the counterbored portions of said passages as a packing for establishing a tight joint between said conductors and said fittings, and spring means connected with said terminals for stretching said conductors taut intermediate said wall structure.

In testimony whereof I affix my signature.

BEN H. WOODRUFF.