Oct. 4, 1949. B. EASTON 2,483,815

ELECTRICAL PLUG AND JACK CONNECTION

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Fig. 1.

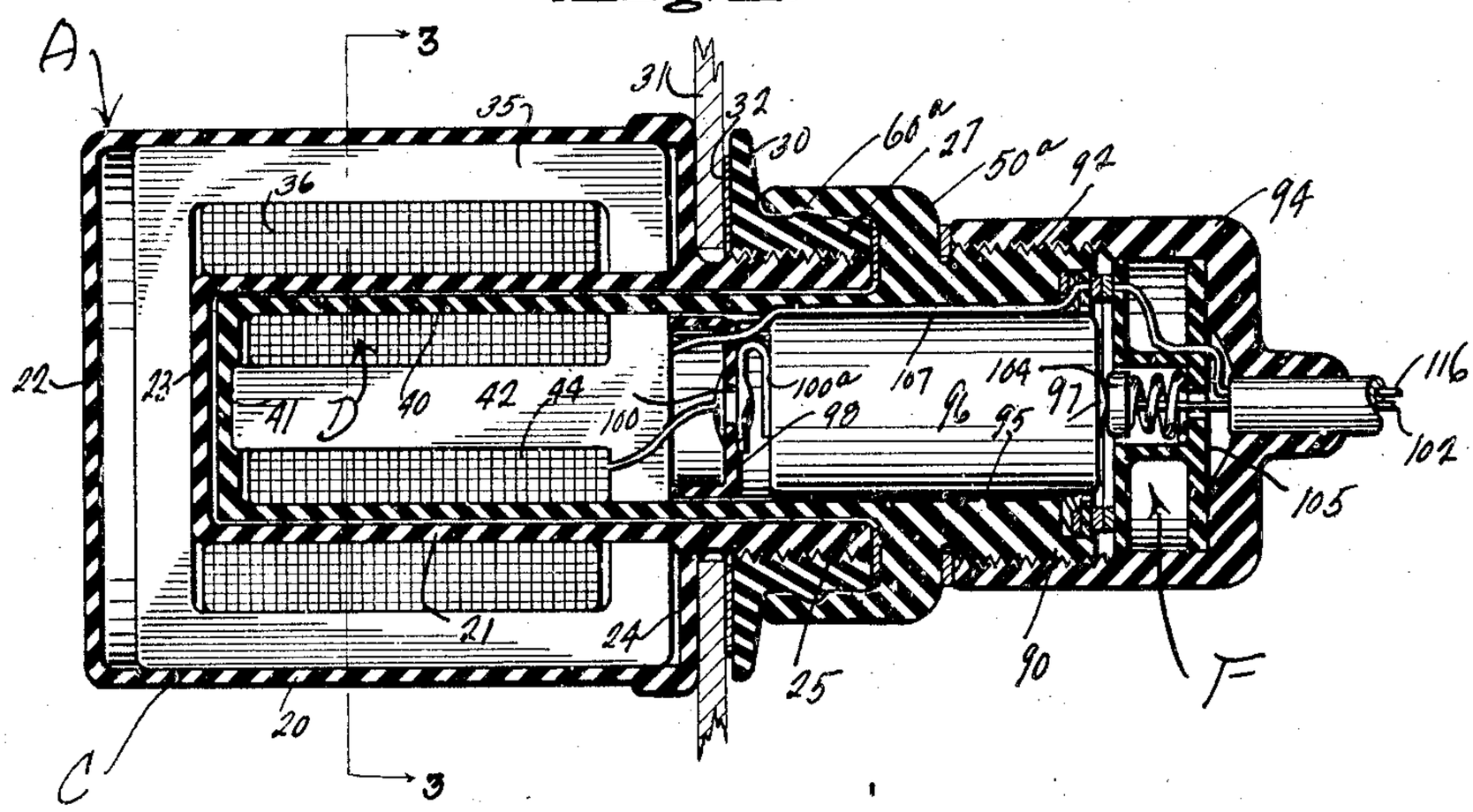

Fig. 2

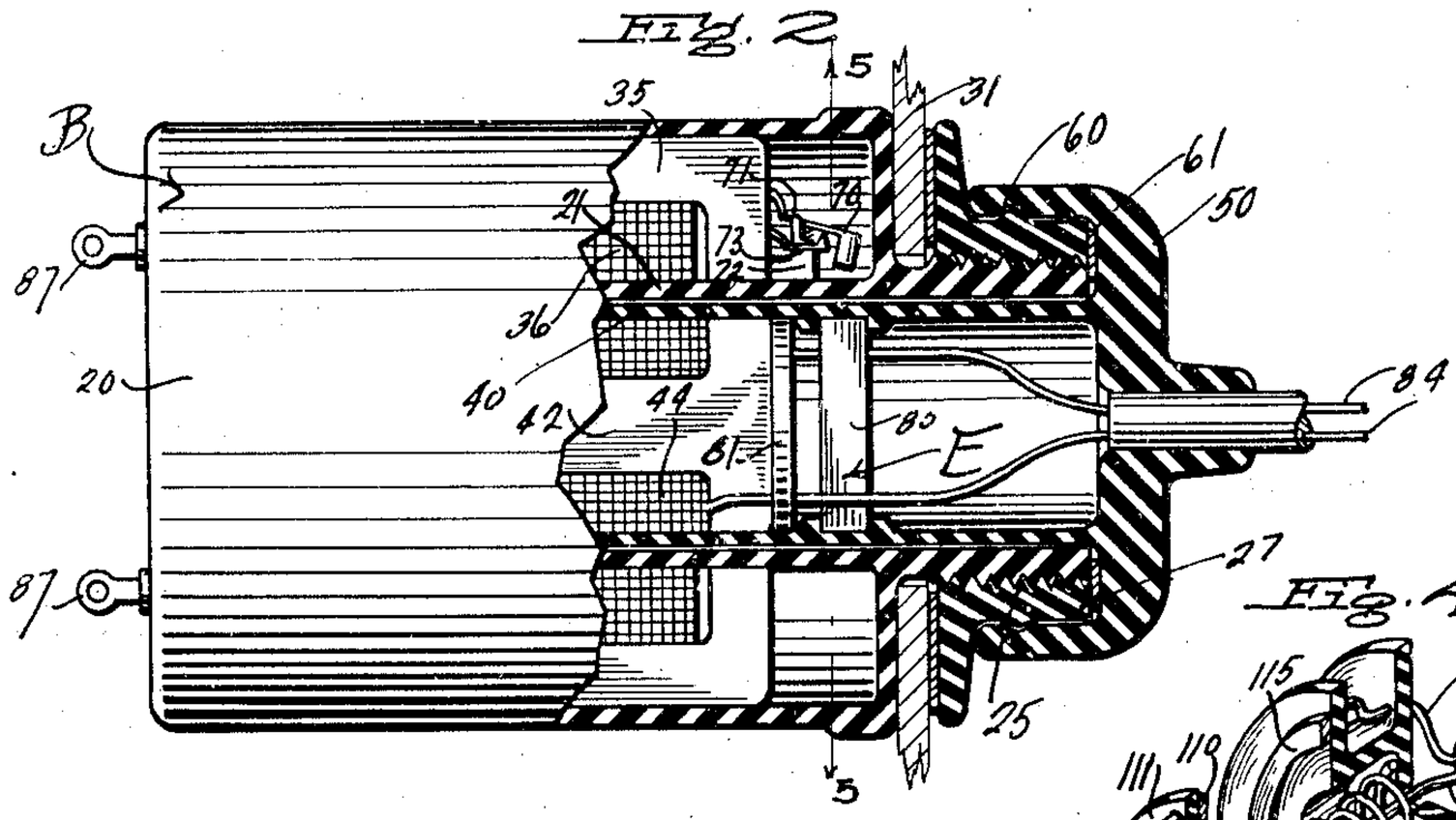

Fig. 4.

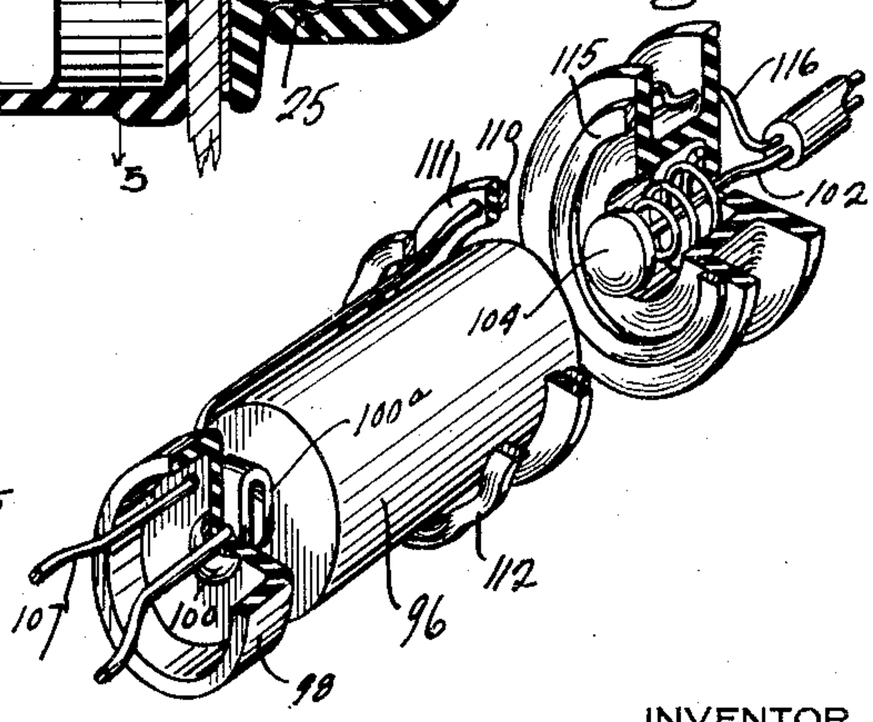

Fig. 3.

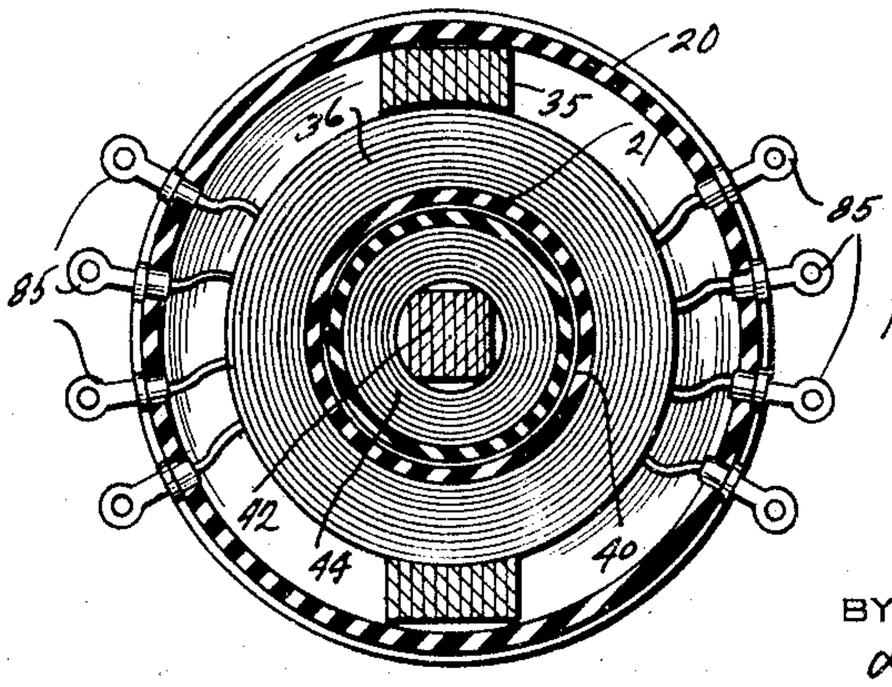

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Fig. 5.

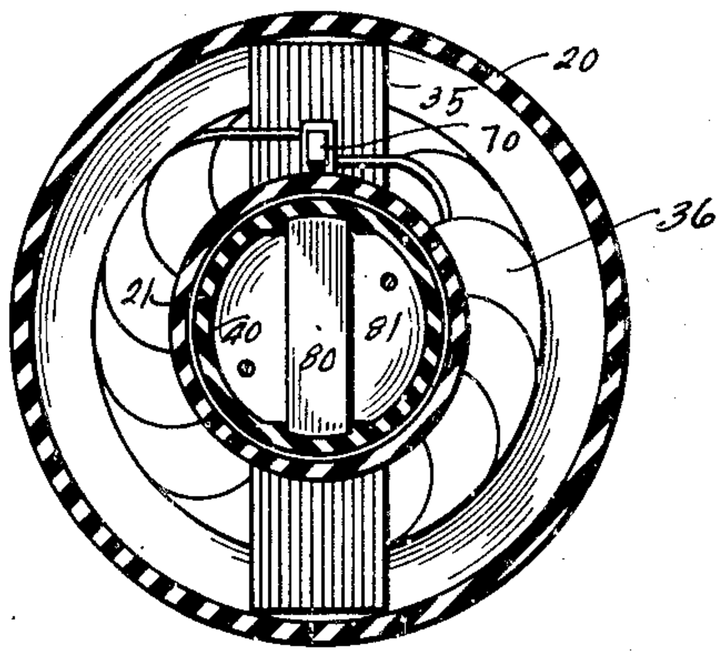


Fig. 6.

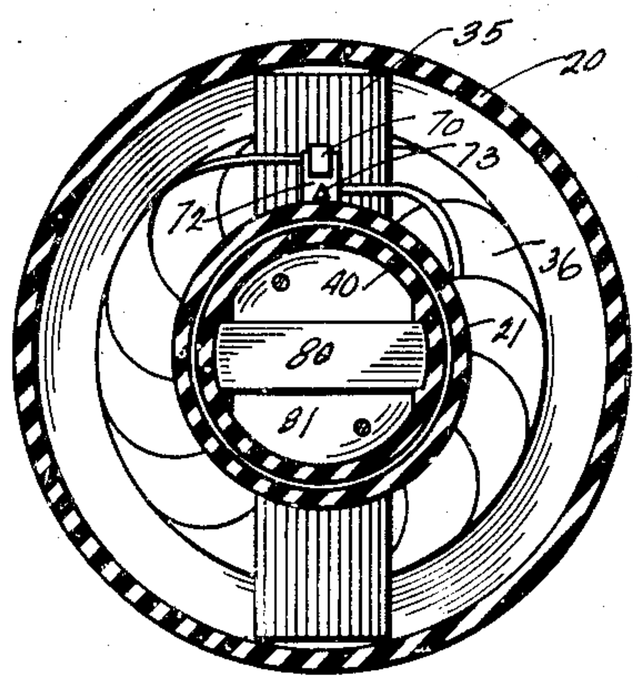


Fig. 7

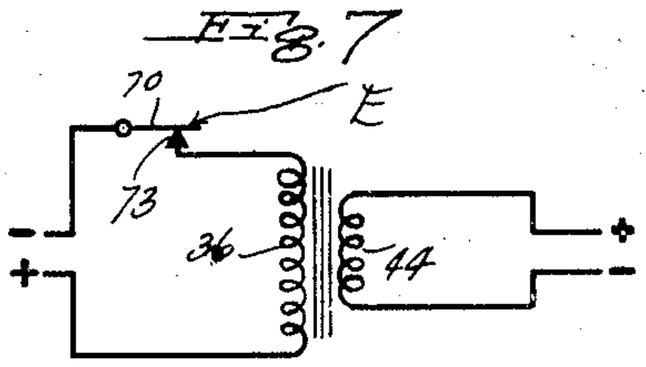


Fig. 8.

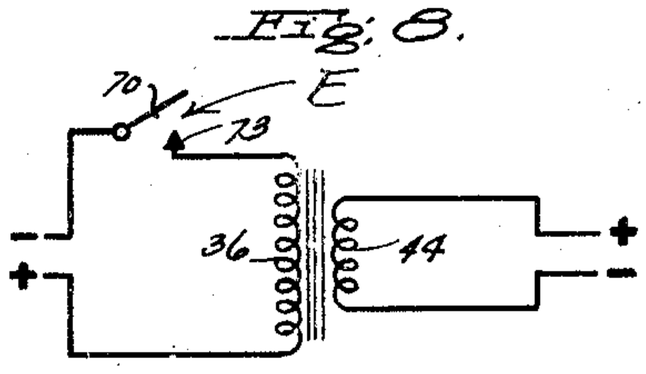


Fig. 9.

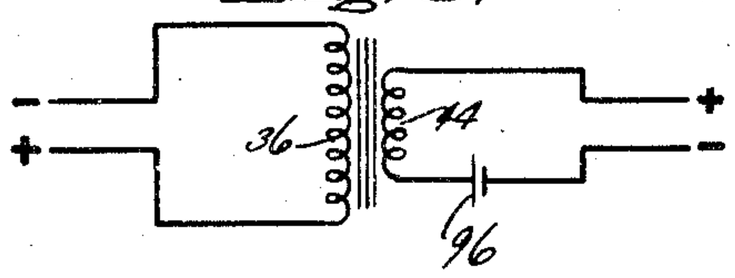


Fig. 10.

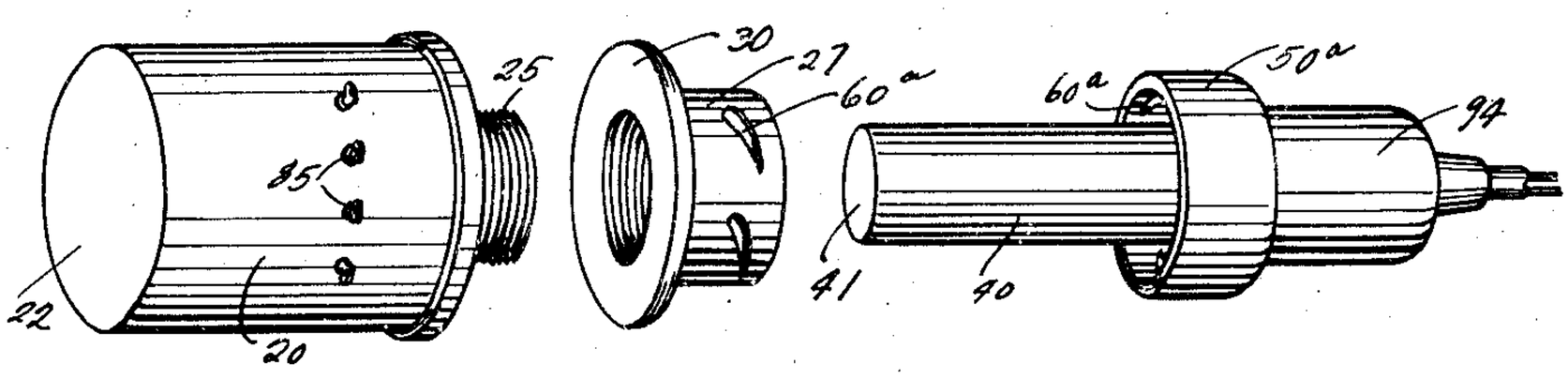
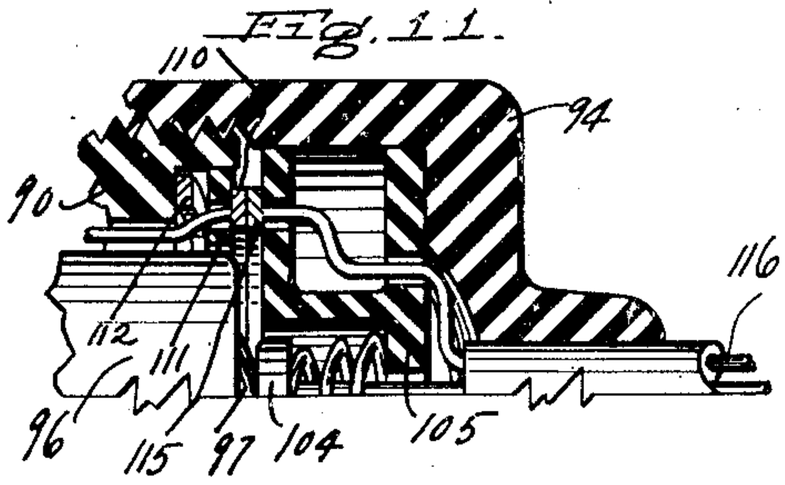


Fig. 11.



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ELECTRICAL PLUG AND JACK CONNECTION

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Application March 14, 1946, Serial No. 654,294

3 Claims. (Cl. 175—356)

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This invention relates to improvements in electrical plug and jack connections.

The primary object of this invention is the provision of an electrical connection of the plug and jack type adapted to be used in connection with microphones, headphones, permanent magnetic speakers, and as a stepdown transformer in conventional lighting circuits; the same consisting of a simple plug and jack unit which is sealed against moisture admission under varying conditions of pressure and temperature.

A further object of this invention is the provision of a connector unit of the above mentioned nature which consists of a transformer free of external corrodable parts connecting the various portions thereof.

A further object of this invention is the provision of a plug and jack type of transformer unit, the parts of which may be readily reached for cleaning purposes.

A further object of this invention is the provision of a flash-proof type of electrical connector of the transformer type.

A further object of this invention is the provision of an improved transformer construction having associated therewith a readily removable battery arrangement for rendering the assembly adaptable for microphone use.

A further object of this invention is the provision of an insulation moisture proof plastic enclosed plug and jack transformer connector.

Other objects and advantages of the invention will be apparent from the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a longitudinal sectional view showing the unit arranged for microphone use.

Figure 2 is a sectional view taken through the improved unit showing the same arranged for use in connection with headphones, loud speakers and a stepdown transformer in conventional lighting circuits.

Figure 3 is a transverse cross sectional view taken substantially on the line 3—3 of Figure 1.

Figure 4 is a fragmentary perspective view, partly in section, showing exploded positions of various parts of the connector as shown in Figure 1.

Figure 5 is a transverse cross sectional view taken substantially on the line 5—5 of Figure 2.

Figure 6 is a cross sectional view similar to that shown in Figure 5, but with the plug at an angle

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of 90° in the jack, for the purpose of inoperatively positioning the windings of the parts for circuit passage.

Figure 7 is a wiring diagram showing the use of the connector for headphone, loud speaker and stepdown transformer connection, with the circuit closed for current passageway and the parts arranged as shown in Figures 2 and 5.

Figure 8 is a wiring diagram similar to that shown in Figure 7 but with the circuit open as will be the case with the parts positioned as shown in Figure 6.

Figure 9 is a wiring diagram showing the circuit arrangement of parts with the connector details assembled as shown in Figure 1 for microphone use.

Figure 10 is an exploded view showing three of the relatively detachable parts of the connector.

Figure 11 is an enlarged fragmentary sectional view showing certain contact portions of the device arranged as shown in Figure 1.

In the drawings, wherein for the purpose of illustration are shown different adaptations of the invention, the latter A may generally designate the assemblage shown in Figure 1, and B the assemblage shown in Figure 2. In each of these assemblages is provided an improved jack or socket construction C and a detachable plug construction D. They are substantially identical, except for the provision of a magnetically operated switch used in the form of invention shown in Figure 2, and wherever possible similar reference characters have been given to these parts C and D. This magnetic switch arrangement used in connection with the form of invention B is generally designated at E in Figure 2 and elsewhere, and in the form of invention A a battery assemblage F is used when the improved transformer-connector is utilized as part of a microphone setup.

Referring to the jack C, the same includes a plastic case structure consisting of outer and inner cylindrical-shaped walls 20 and 21 respectively having inner end walls 22 and 23 integrally connected therewith. The walls 22 and 23 are spaced. An outer end wall 24 connects the end of the cylindrical walls 20 and 21 intermediate the ends of the latter; the said cylindrical-shaped wall structure 21 outwardly beyond the end wall 24 being externally screw threaded at 25 for receiving a ring-shaped clamping nut 27, preferably also of plastic material. This nut 27 is provided with an annular flange at its inner end, designated at 30, and is utilized for clamping the jack housing to a panel structure 31,

in the relation shown in Figure 1. If desired, some sealing composition **32** may be employed to seal the connection of the ring-shaped nut **27** with the panel. In other words, moisture cannot pass the panel through the connection of the jack therewith. If desired, the wall **24** may be detachably connected in a moisture sealed relation with the cylindrical body portions **20** and **21**, so access may be had to the core and windings in the jack unit. This is not shown and is a matter of mechanical expediency.

Within the compartment between the cylindrical walls **20** and **21** and the end walls **22** and **23** there is positioned a laminated substantially C-shaped core **35** receiving therein a winding **36**, ordinarily the primary winding, located between the inner edges of the laminations and around the cylindrical wall **21**, as shown in the drawings. This winding **36** is cylindrical-shaped, as shown, and well understood.

Referring now to the construction of the transformer assemblage as shown in Figure 2, which is adaptable for headphone, loud speaker and general housing wiring lighting circuits used, the plug unit D preferably consists of a cylindrical-shaped plastic case body **40** having an end wall **41** defining a compartment wherein is received a T-shaped core **42** having a cylindrically arranged secondary winding **44** thereon.

The core portions and windings of the plug and jack are, of course, complementary so far as transformer construction is concerned, and the T-shaped formation of the plug core is laminated also.

In connection with use of the assemblage with headphones, loud speakers and as a stepdown transformer in conventional lighting circuits, the casing structure **40** is extended through the external sleeve portion **25** of the jack casing and has a preferably integral cap **50** thereon; the cap having a socket adapted to receive the ring-shaped nut **27**; the external portion of the nut **27** and the inner periphery of the cap being provided with a thread connection **60** which will admit of full connection of these parts with a quarter turn or less. The arrangement may consist of interrupted screw threads if so desired, but it is intended that a firm connection of the cap upon the nut shall be effected with but a quarter degree turn.

A washer **61** may seal the connection of the cap with the portions **25** and **27**. While the cap is shown as integral with the cylinder extension of the plug casing, a sealed detachable connection could be provided if desired.

It is my intention to provide a single pole throw switch arrangement for energizing or de-energizing the coil. This consists of the assemblage E shown in Figure 2 and includes a switch arm **70** pivoted at **71** upon an insulation block **72** within the compartment of the jack forwardly of the winding. A stationary contact **73** is also mounted upon the block **72**. Normally the switch arm **70** is spring or otherwise actuated to open the circuit through the winding **36**, since these contacts have connection therewith.

Within the extension of the plug casing **40** there is positioned a permanent bar magnet **80** in the same plane as the armature of the switch E and when the cap **50** is in clamped position upon the nut **27** the bar magnet **80** is in line with the armature **70** and will, of course, draw the same into circuit closing position. When the cap **50** is given a quarter turn the switch arm will return to open the circuit. I prefer to provide a non-magnetic brass insert **81** between the bar magnet and the laminated core **42**.

The cap **50** carries the lead wires **84** which have connection with the secondary winding **44**.

With reference to Figure 3 it will be noted that various terminals **85** are provided for connection to suitable leads for the purpose of giving proper impedance to the plate current of audio amplifier output tube or grid circuit of an input stage.

Referring to the assemblage A as shown in Figure 1 where a battery assemblage F is used with the transformer plug and jack, as for microphone use, the cap **50a**, which corresponds to the cap **50** of the form of invention B, is integral with the extended casing portion **40** and has a connection **60a** admitting of the plug being connected to the nut **27** by a quarter turn movement. The casing portion **40** of the jack unit is, however, extended at **90**, as shown in Figure 1 and externally screw threaded at **92** for receiving a detachable plastic cap **94**. The compartment **95** provided in the outer end of the casing structure **40** receives a dry cell battery **96** having a central outer end contact **97**.

A plastic insulation cup-shaped insert **98** is located in the casing **40** immediately at the outer end of the coil **42** and it has a contact **100** connected to one of the wires leading to the winding **44**. This contact **100** has a spring arm **100a** which engages the casing of the battery **96** and grounds the battery in the circuit of the secondary winding. The central outer end contact **97** of the battery is connected in circuit with the lead wire **102** attached to the outer end of the cap **94** by means of a spring urged terminal contact **104** which is retained within an insulation disc-type insert **105** in the outer end of the cap **94**, as shown in Figure 1.

The other wire **107** leads from the secondary winding along the casing **40** in a secured relation and is attached to a contact ring **110** mounted upon an insulation washer **111** located in a countersunk seat within the outer end of the extension **90** of the plug casing. This washer is movable in the seat and normally urged outward by a resilient wavy type of compression ring **112**, best shown in Figure 4. The insulation ring or disc **105** has a contact ring **115** on the inner end thereof adapted to seat against the ring **110** to establish contact with the other lead wire **116** carried by the cap.

It will be apparent from the foregoing that a relatively simple type of seal plug and jack transformer assemblage has been provided which is water-proof, shock-proof and flash-proof and can be used for a large variety of purposes. For instance, its flash-proof ability will enable it to be used in mining installations or where explosive gases or chemicals are stored or utilized.

It is to be understood that all parts of the casing, as well as insert structures in the drawings will be fabricated of plastic or other approved insulation which has a low moisture absorption rate over a long period of time.

I wish it to be understood that the magnet switch arrangement shown in Figure 2 is not essential to operation of the device.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In a transformer type connecter the combination of complementary telescoping jack and

plug sections, means to detachably connect them upon a support against relative axial movement, and complementary interfitting laminated core and windings in each of said jack and plug sections completely insulated respectively therein against moisture access thereto.

2. In a transformer type connecter unit the combination of a pair of complementary telescoping casings of insulation material each defining a hermetically sealed compartment, complementary laminated core and windings hermetically sealed in each of said compartments, and means to detachably connect said casings with the cores and windings in operative relation to each other.

3. In a moisture, flash and shock-proof electrical connector unit, the combination of a jack casing of insulation material having a hermetically-sealed compartment, and providing an inner end wall, an outer end wall, a side wall joining said end walls and a socket-providing wall structure, including a third end wall, adjacent to and spaced from said inner end wall and substantially paralleling said inner end wall, and an inner side wall joining said third end wall and extending to said outer end wall, said third end wall and said inner side wall defining a socket opening at said outer end wall; a core and winding in said compartment and surrounding portion of said socket-providing wall structure; a plug casing of insulation material interfitting in said socket and having a sealed compartment; a core and winding structure in said sealed compartment of said plug casing, constructed and arranged for complementary association with said core and winding in the jack casing; and means upon said casings for detachably connecting said casings together against axial displacement.

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