April 19, 1955 G. F. LANDGRAF 2,706,743

CONNECTOR JACK ASSEMBLY

Filed Jan. 17, 1950

Fig. 1

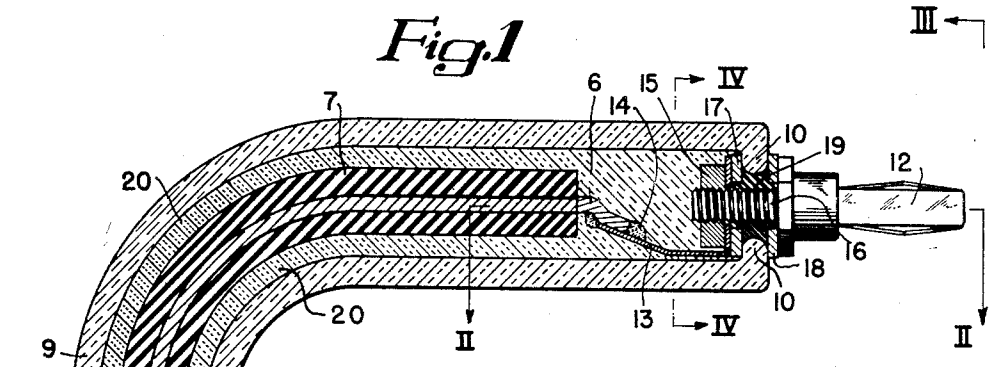
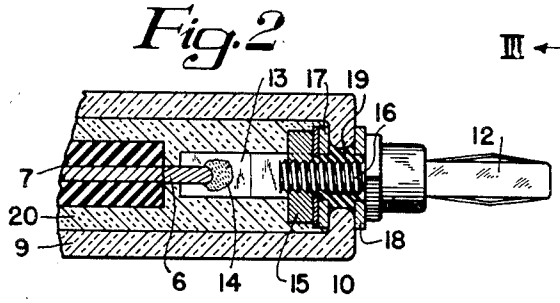
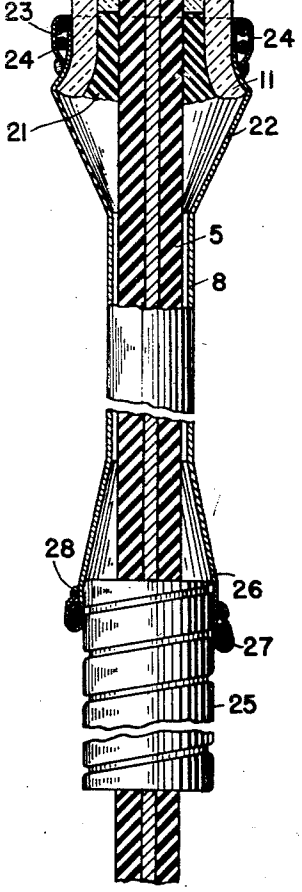


Fig. 2





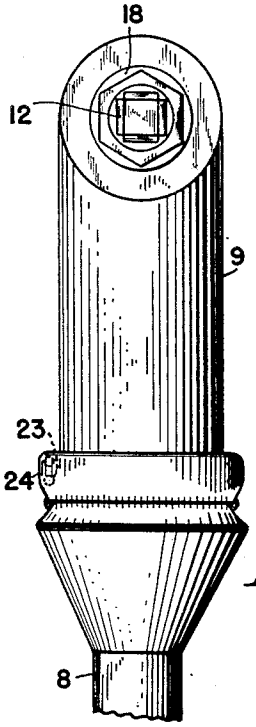


Fig. 3

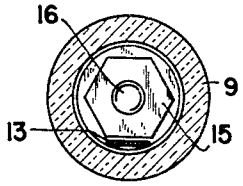


Fig. 4

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CONNECTOR JACK ASSEMBLY

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4 Claims. (Cl. 174—75)

This application relates to a connector plug assembly which is useful for connecting electrical appliances which operate on high voltages to a source of electrical power. I have found that it is particularly useful in electrostatic air filters having an ionizing unit and a collecting unit each of which can be removed from a housing for cleaning and repair and therefore it will be described with reference thereto, although it can be used in other electrical devices.

Broadly stated, the purpose of my invention is to provide a high voltage connector which can be readily disconnected from an electrical appliance and which at the same time meets the safety requirements for high voltage connectors of such institutions as the Underwriters Laboratory. The Underwriters Laboratory requires that conductors for high voltage electrical equipment shall be either rigidly held in position and spaced at least one inch from ground, or the conductor shall be in an insulated and metal sheathed cable in a grounded conduit which is substantially filled by the cable. Obviously, if use of the electrical appliance requires that the conductor be disconnected from the appliance at frequent intervals, a rigidly positioned conductor cannot be used. A relatively flexible metal sheathed conductor could be used but the metal sheath creates special problems when it is used in ionizing units because the metal sheath being grounded causes flash backs between the charged wires or plates and the grounded sheath. This problem is aggravated in the case of electrostatic air filters which utilize water sprays to clean the collecting plates. The connector plug assembly which I have invented solves this problem.

In the accompanying drawings I have illustrated a present preferred embodiment of my invention, in which—

Figure 1 is a longitudinal section of my connector plug assembly;

Figure 2 is a section along the lines II—II of Figure 1;

Figure 3 is an end view looking in the direction indicated by the arrows III—III of Figure 1; and

Figure 4 is a section along the lines IV—IV of Figure 1.

My connector plug assembly comprises a cable **5** having a conductor **6** surrounded by insulation **7**. The insulation is covered with a metal sheath **8** which is preferably in the form of the conventional metal braid. The connector also has a tube **9** of high dielectric material such as glass. This tube may be curved as shown in Figure 1 or it may be straight. The walls **10** adjacent one end of the tube are bent inwardly to partially close the tube. The walls of the tube adjacent its other end are flared outwardly as at **11** in Figure 1.

A portion of the cable but with the metal sheath removed extends through the tube from the flared end to a point adjacent the partially closed end of the tube. A connector plug **12** such as a standard "banana plug" is carried by the tube at its partially closed end and is electrically connected to the conductor **6** of the cable by means now to be described. A metal strip **13** is soldered to the conductor **6** as at **14** and is bent substantially at right angles as shown in Figure 1. A nut **15** is soldered to the strip **13** along the portion of the strip which has been bent at right angles to the conductor. The plug **12** has a threaded portion **16** which is threaded into the nut **15**.

The end of the tube **9** is sealed around the bolt portion **16** of the connector plug by two washers **17** and **18**

and by a filler **19** of thermosetting plastic material such as a silicone rubber. The flared end **11** of the tube is also sealed with a filler **21** of thermosetting plastic compound such as silicone rubber.

As shown in Figure 1 the cable does not completely fill the tube **9** and the space between the tube and the cable is filled with a pot head compound **20**. For my purposes I have found that a thermoplastic dielectric compound such as a polyamide makes a very satisfactory pot head compound. This compound has to be heated to make it sufficiently liquid to flow it into the tube around the cable and I have found the heat necessary for this purpose will also set the fillers **19** and **21**.

As stated above the metal sheath of the cable is removed from that portion of the cable which lies within the tube **9**. The portion **22** of the sheath which is adjacent to the end **11** of the tube is spread to fit it over the flared end of the tube. Copper wire **23** are then wrapped around the sheath and the tube as shown in Figure 1 to hold the sheath to the tube. Preferably, the copper wires and the sheath are so placed on the tube that a portion **24** of the sheath can be bent back over the copper wires as shown in Figure 1 and the end soldered to the sheath around the copper wires.

The cable sheath must be firmly anchored to the enclosure around the power supply, and since the braided sheath is too pliable for clamping, I secure to the end of the braid a short piece of flexible steel conduit **25** which can be clamped. The attachment of the braid to the conduit is shown in Figure 1. The braid is stretched to fit outside the conduit as shown at **26** in Figure 1. Copper wires **27** are then wrapped around the sheath and the conductor and the sheath is bent back over the wires and the end soldered to the main body of the sheath as at **28** in Figure 1.

From the foregoing description it will be apparent that my invention provides a connector plug assembly for high voltage appliances which may be disconnected when desired from the appliance. Nevertheless the connector plug assembly meets all safety requirements. The construction of my connector is relatively simple and inexpensive. The pot head compound used for filling the space between the tube and cable must be heated so that it can be poured into the tube and this heat will set the silicone rubber seals at each end of the tube. A separate processing step for setting these seals is, therefore, not required. I have also found that glass makes an excellent material for the tube when the connector plug assembly is used in an electrostatic air filter. Generally, these filters have water sprays for cleaning the collector plates and some of this water will inevitably fall on the connector. No serious problem arises, however, because water will not "wet" the glass in the sense that the glass absorbs the water. There is an initial flash back between the water and a charged ionizing wire or plate, but this flash back blows the water off the tube and the normal electrostatic fields in the precipitator are then restored.

My connector also relieves all strain on the actual electrical connection. The tube is supported by the side wall of the precipitator and the connector plug is mechanically supported by the tube.

While I have described a present preferred embodiment of my invention, it is to be understood that it may be otherwise embodied within the scope of the appended claims.

I claim:

1. A connector plug assembly for high voltage electrostatic precipitators comprising a glass tube which when the plug is connected to the precipitator is exposed to water or other conductive fluid having its walls adjacent one end bent inwardly to partially close that end of the tube, an electric cable comprising a conductor and insulation therefor extending through the tube to a point within the tube adjacent the partially closed end, a thermoplastic dieletric pothead compound filling the space between the tube and the cable, a nut secured to the end of the conductor within the tube, a connector plug having a threaded bolt portion extending through the partially closed end of the tube and threaded into said nut, and a

silicone rubber seal in the end of the tube between the plug and the nut.

2. A connector plug assembly for high voltage electrostatic precipitators comprising a glass tube which when the plug is connected to the precipitator is exposed to water or other conductive fluid, an electric cable comprising a conductor and insulation therefor extending through the tube to a point adjacent one end of the tube, a thermoplastic dielectric pothead compound filling the space between the tube and the cable, a connector plug positioned at one end of the tube and electrically connected within the tube to the conductor, the end of the tube away from the connector plug having an outward flare, a metallic sheath over the portion of the cable outside the tube, the sheath being pulled up over the flare and held to the tube beyond the flare.

3. A connector plug assembly for high voltage electrostatic precipitators comprising a glass tube which when the plug is connected to the precipitator is exposed to water or other conductive fluid having its walls adjacent one end bent inwardly to partially close that end of the tube, an electric cable comprising a conductor and insulation therefor extending through the tube to a point within the tube adjacent the partially closed end, a thermoplastic dielectric pothead compound filling the space between the tube and the cable, a nut secured to the end of the conductor within the tube, a washer between the nut and the inwardly bent walls of the tube, a connector plug having a threaded bolt portion extending through the partially closed end of the tube and threaded into said

nut, a washer between the inwardly bent walls of the tube and the connector plug, and a silicone rubber seal between said washers and the ends of the inwardly bent walls of the tube.

4. A connector plug assembly as described in claim 3 in which the electric cable has a flexible metallic sheath over the portion of the cable outside the tube, the glass tube is outwardly flared at its end away from the connector and the sheath is pulled up over the flare and held to the tube beyond the flare.

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