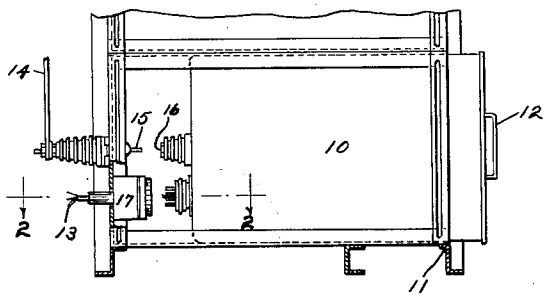
Dec. 30, 1952 C. W. SAVITZ 2,623,917

MOISTURE-PROOF PLUG CONNECTION

Filed April 8, 1949

FIG. 1



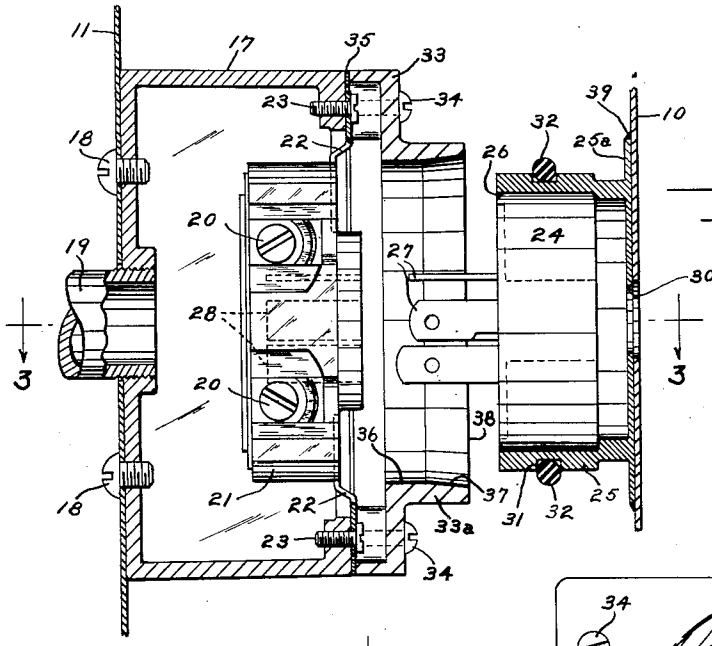


FIG. 2

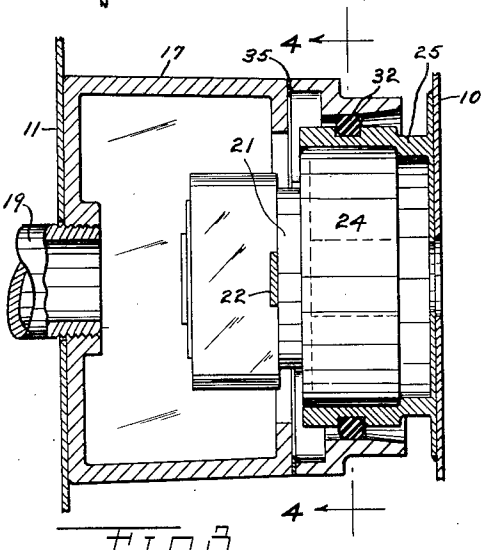


FIG. 3

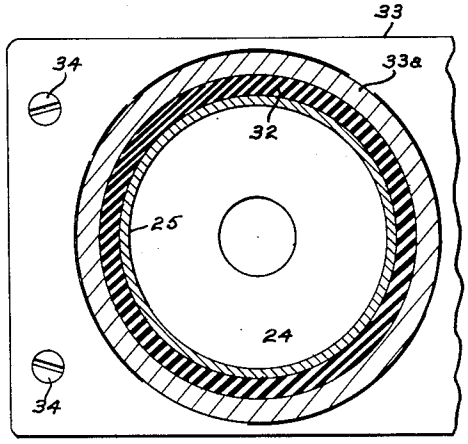


FIG. 4

INVENTOR.
CHRISTIAN W. SAVITZ

BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

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MOISTUREPROOF PLUG CONNECTION

Christian W. Savitz, South Euclid, Ohio, assignor to Air-Maze Corporation, Cleveland, Ohio, a corporation of Delaware

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2 Claims. (Cl. 173—330)

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This invention relates to improvements in a moistureproof plug for making electrical connections.

One of the objects of the present invention is to provide a separable electrical connection which is moistureproof but which is simple in both construction and operation.

Another object of the present invention is to provide a novel O-ring seal in a connection of the type described wherein the O-ring aids in the sealing and at the same time aids in maintaining the plug in electrical contact position.

Other objects and advantages of the present invention will be apparent from the drawings and specifications and the essential features will be set forth in the appended claims.

In the drawings,

Fig. 1 is a side elevational view of a power pack equipped with my new and improved plug;

Fig. 2 is a fragmental sectional view greatly enlarged taken along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2 but showing the parts in a different position; while

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3.

The present invention relates to an electrical plug for making connections and maintaining the same in moistureproof condition. While it may be used in many places, I have chosen to illustrate the same as applied to an electrostatic filter such as is more fully shown and described in my copending application, Serial No. 64,642, filed December 10, 1948. In their copending application, there is disclosed the use of a power pack 10 which is adapted to be moved in and out of a holding frame 11 after the manner of the drawer of a desk or the like. A handle 12 is shown at the front of the power pack for this purpose and the power pack 10 is shown slightly out of its frame in the position of Fig. 1. Such a power pack takes low tension electrical current from a source 13 and transforms it into high tension rectified current which is delivered at the bus bar 14. The high tension connection comprises a contact 15 in the form of a banana plug which engages a female contact 16 when the power pack 10 is pushed fully into the frame. All of these parts have nothing to do with the present invention except to show one use for the same.

The invention of the present application is shown as utilized to connect the low tension alternating current from the source 13 to the power pack 10. This involves an outlet box 17 which is secured to the frame 11 as by means of the screws 18. A conduit 19 serves for the introduction of electrical wires (not shown) which would be connected to suitable conductors 20 on an insulated receptacle 21. This receptacle is mounted by means of metal bands 22 and screws 23 on the outlet box 17 in a well known manner.

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For coaction with the receptacle, I provide a plug 24 of insulating material which is held in place in a hollow cap 25 by any suitable means. In one form of my invention, the plug 24 has a metallic covering which is welded as indicated at 26 to the sleeve 25 to hold it in place. Suitable male contacts 27 are provided on the plug 24 and are adapted to engage in suitable female contacts 28 in the receptacle 21. It will be understood that the contacts 28 are electrically connected with a plurality of binding posts 20 while the electrical prongs 27 are connected by means (not shown) to binding posts and then to wires which pass out through the opening 30 through the cap 25a of the plug into the power pack 10. Those familiar with this art will appreciate that the electrical contacts 27 and 28 are of such shape and position that the plug may be placed into electrical contact with the receptacle only in the proper position of these electrical contacts so that the proper lines are connected together electrically. Since the outlet box 17 is fixed on the frame 11 and since the power pack 10 may be moved into the frame 11 only in one position, there is no problem about the proper positioning of the mutually engaging electrical contacts.

This invention concerns itself primarily with the sealing of the plug and the electrical contacts against the entrance of moisture. To this end, the cap 28 has an annular groove 31 extending around its circumference and spaced from the inner end of the plug 24. In this annular groove is placed an O-ring 32 which is of resilient rubber-like material and is substantially unstressed in the positions shown in Fig. 2. In other words, the O-ring 32 fits snugly in the groove 31 without much stretching. Fastened to the face of the outlet box 17 on the side toward the plug 24, is a casting 33 which is secured to the outlet box by means of the screws 34. The joint between the casting 33 and the outlet box 17 is sealed in a moistureproof manner by means of a gasket 35. The casting 33 has a central circular opening 36 of slightly less diameter than the outside diameter of the O-ring 32 in its unstressed condition. This opening 36 is in register with the receptacle 21. A flange 33a extends from the casting 33 around the opening 36 in a direction away from the receptacle 21. The walls

of the flange 33 on the inside are sloped in a manner to diverge outwardly away from the cylindrical opening 36 as indicated at 37. The walls 37 are of frusto-conical form. Preferably, the diameter at the plane 38 of the mouth of the frusto-conical portion of the casting 33 is of slightly greater diameter than the outside diameter of the O-ring 32 in its unstressed condition.

The operation of my device should now be apparent. The closed end of the cap 25*a* is secured as by welding at 39 to the power pack 10. With the parts in the position of Figs. 1 and 2, the operator grasps the handle 12 and moves the power pack 10 toward the left as viewed in Fig. 1. The parts of Fig. 2 then move toward each other while the electrical contacts 27 enter the electrical contacts 28. The parts then move to the position of Fig. 3. As the O-ring 32 is carried into the frusto-conical portion 37 of the casting 33, the O-ring is cammed radially inwardly by the sloping sides indicated at 37. As the parts move into the position of Fig. 3, the O-ring 32 has been compressed radially inwardly so as to cause a tight seal against the casting 33 and against the cap 25. In particular, the O-ring is squeezed into the annular groove 31 so that it engages the parallel side walls of the groove 32 also. It will be noticed in Fig. 3, that the cylindrical portion 36 of the casting 33 extends a sufficient distance away from the face of the receptacle 21 so that the O-ring 32 reaches the cylindrical portion 36 when the receptacle 21 and the plug 24 are in face-to-face engagement. It results from this construction, that the O-ring 32 in the compressed position of Fig. 3, not only makes a moistureproof seal but it also tends to hold the plug 24 and the cap 25 in the position of Fig. 3, thus preventing the accidental dislocation of the parts.

It should be understood that the only openings in the outlet box 17 are the one at the rear closed by the conduit 19 and the one at the front which is closed in a moistureproof manner by the casting 33 and the cap 25 in the closed position of Fig. 3. It is thus possible to use the electrostatic filter of the above mentioned copending application in a moisture filled atmosphere or to wash the dust collecting plates thereof with the power pack 10 in place without any possibility of moisture getting to the electrical connections 27 and 28.

What I claim is:

1. An electrical connection comprising a moistureproof outlet box having only one open face, said box having a cover for said face having a central circular opening, an annular flange about said opening extending away from said box and flaring radially outwardly, a cap having a sleeve portion of less outside diameter than the inside diameter of said flange, said sleeve portion entering said flange coaxially, an annular groove around said sleeve portion and coaxial therewith, an O-ring of resilient material in said groove, said O-ring having an external diameter when unstressed greater than the inside diameter of said flange nearer said box, sets of coacting registering electrical contacts, one set secured to said box and the other set secured to said cap, said O-ring being the only part connected with said cap engaging said flange when said contacts are cooperating, said cap sleeve portion and said flange being disengageable manually without damage to said O-ring, and the sole means for holding said cap on said box being the frictional engagement of said O-ring between said flange and said sleeve portion.

2. An electrical connection comprising a moistureproof outlet box having only one open face, said box having a cover for said face having a central circular opening, an annular flange about said opening extending away from said box, said flange having a cylindrical portion nearer said box and having a portion away from said box flaring radially outwardly from said cylindrical portion, a cup-shape cap opening toward said box and having a sleeve portion of less outside diameter than the inside diameter of said cylindrical portion of said flange, said sleeve portion entering said flange cylindrical portion coaxially, an O-ring of resilient material in said groove, said O-ring having an external diameter when unstressed greater than the inside diameter of said flange, sets of coacting registering male and female sliding electrical contacts, one set secured to said box and the other set secured to said cap, said sets having mutually engaging relatively slidable surfaces parallel to the axis of said sleeve portion and said flange cylindrical portion, said sets of contacts being engaged by entering movement of said sleeve portion into said flange cylindrical portion, said O-ring being the only part connected with said cap engaging said cylindrical portion of said flange when said sets of contacts are fully engaged whereby to make a moistureproof seal there, and the compression of said O-ring being the sole means holding said contacts engaged, and said cap sleeve portion and said flange being disengageable manually without damage to said O-ring.

CHRISTIAN W. SAVITZ.

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