

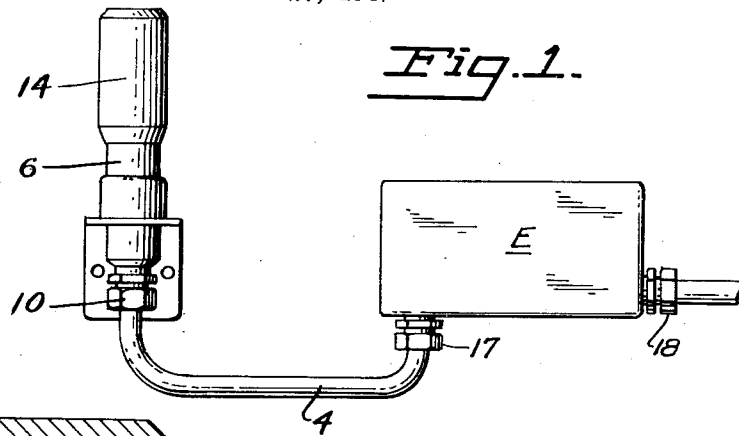
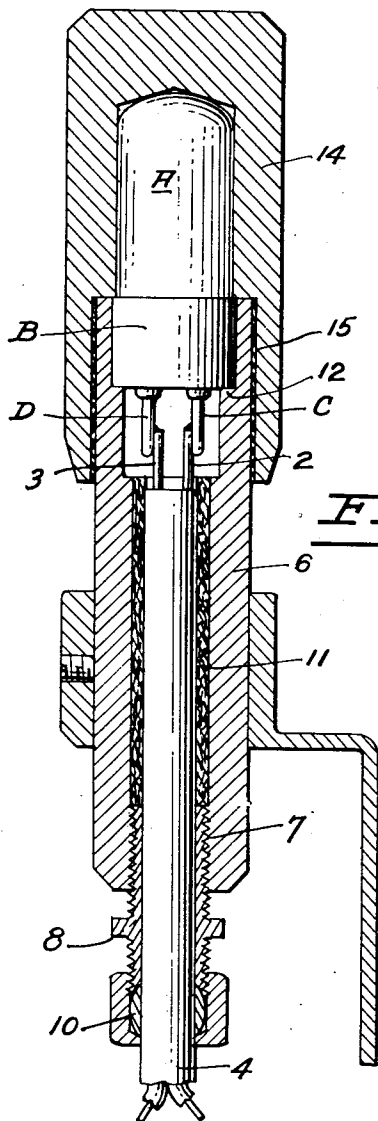
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PHOTOELECTRIC TUBE SHIELDING MEANS

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PHOTOELECTRIC TUBE SHIELDING MEANS

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1

This invention relates to a photo-electric tube or cell, and especially to means of shielding or protecting the tube against moisture and dust.

In the operation of certain types of photo-electric tubes or cells an electric current is imposed on the anode and cathode of a tube when it is in operation. This current is very feeble, usually about fifteen micro amperes, and if moisture or fine dust collects on the exterior surface of the tube, particularly on and between the terminals, a short-circuit or leakage path is formed exterior of the tube and the tube ceases to function.

Factories, plants or mills where trouble of this character is encountered are breweries, creameries and the like where the atmosphere is excessively damp due to the use of steam for heating, cleaning and sterilizing bottles, etc. A dust-laden atmosphere on the other hand is encountered in dry milk plants, flour mills, etc.

The object of the present invention is to insure continuous uninterrupted operation of photo-electric tubes or cells under conditions where they are intermittently or continuously exposed to moisture, dust and like matter which might tend to form a short-circuit or leakage path exterior of the tube, and especially to provide a method or means for shielding or enclosing a tube so that a substantially sealed housing is formed exterior of the tube and its base and terminals.

The manner in which a tube of this character may be shielded is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a diagrammatic view showing how the photo-electric tube is connected with the usual amplifying unit; and

Fig. 2 is an enlarged vertical longitudinal section of the housing which is provided for the purpose of shielding the photo-electric tube.

Referring to the drawing in detail, A indicates a standard form of photo-electric tube or cell having a base B and a pair of terminals C and D which connect with the anode and cathode of the tube. The terminals C and D are usually connected by soldering or otherwise with a pair of electric current conductors or wires 2 and 3 which are enclosed and carefully insulated in an armored cable 4. This cable leads to a box E containing the usual amplifying tubes and relay switches which control the mechanism to be actuated.

The current impressed on the anode and cathode of the tube A is usually very feeble and in the neighborhood of fifteen micro amperes more or less, and where the tube A is used in an installation where it is exposed to accumulation of moisture, dust and other matter which can form

2

a short-circuit or leakage path between the current carrying conductors or the terminals of the tube sufficient to render the tube inoperative, it is obvious that shielding particularly of the tube and its terminals C and D is essential.

In the present instance the tube A, the base B, the terminals C and D and a portion of the cable 4 are completely enclosed and shielded against entrance of moisture, dust, etc., by a housing, formed of a transparent methyl methacrylate polymeride such as the plastic material known by the trade-name of Lucite. To accomplish this a tubular sleeve 6 having a pair of concentric counterbores is provided. The lower end of the sleeve is internally threaded as at 7 to receive a nipple 8 on the lower end of which is formed a stuffing box 10. The cable 4 containing the current carrying conductors 2 and 3 is passed through the stuffing box, the nipple and the sleeve 6 and is then soldered or otherwise connected to the terminals C and D of the photo-electric tube. A filling of fine shavings or powdered Lucite is then introduced between the sleeve and the cable as indicated at 11, and this is mixed with a solvent which changes the shavings or powdered Lucite to a plastic form which will rapidly harden and set. However, before the material is set completely, the cable is pulled downwardly through the stuffing box 10, the base B of the tube enters the upper end of the sleeve 6 and seats against a shoulder or recess indicated at 12. In this position the plastic introduced at 11 is permitted to harden, thus together with the stuffing box 10 forming a seal about the cable and preventing moisture from entering through the threads 7 or through the stuffing box 10. A cap 14 also formed in Lucite is finally applied and a thinner or cement-like material is applied at the point 15 to retain the cap and to seal the connection between the cap and the sleeve 6.

The housing formed by the sleeve 6 and the cap 14 forms chambers completely enclosing the tube A, the base B, the terminals C and D, the exposed ends of the terminals 2 and 3, and one end of the cable 4 as moisture can obviously not enter through the sealed connection 15, nor through the stuffing box, nor the seal produced by the plastic material 11, and if the cable itself is heavily insulated and armored, it is obvious that neither moisture nor dust nor any other matter can enter through the same. The box E containing the amplifying tubes, the relay switches, etc., should also be sealed, and stuffing boxes should be provided as indicated at 17 and 18 where the cable 4 enters and leaves the box. In

this manner the tube is protected and the amplifying mechanism, the cable, etc., are protected and sealed against entrance of dust, moisture, etc., and the tube will function indefinitely.

Lucite, as is well-known is a transparent material and as such permits the light beam which actuates the tube A to pass through the cap 14 and through the window of the tube. Lucite is a preferred material for the reason that it is transparent, and also for the reason that it does not sweat. Sweating within the housing would obviously defeat the purpose of the invention, hence it is essential that the shielding or enclosing material be made of a material which will not sweat. I, however, wish it understood that while the sleeve 6 and the cap 14 has here been described as made of Lucite, they may be made from any other plastic material which does not sweat. Such plastic may be transparent or non-transparent as long as a window is left in the cap 14 to permit the light to enter and actuate the material, and while this and other features of the invention have been more or less specifically described and illustrated, it should be understood that changes may be resorted to within the scope of the appended claims and that the materials and finish of the several parts employed may be such as the experience or judgment of the manufacturer may dictate or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination of a tube of the character described having a base and a pair of projecting terminals, of an insulated cable having a pair of electric current carrying conductors connected with the terminals, a sleeve surrounding one end of the cable and the terminals, a recess in the sleeve to receive and support the base of the tube, a cap enclosing the tube and having a telescopic connection therewith, a seal formed between the cap and the sleeve, and a seal formed between the cable and the sleeve to prevent moisture or other matter from entering the sleeve and cap to form an electric current leakage path between the terminals or the conductors, said sleeve and cap being made of a moisture-proof material.

2. The combination of a tube of the character described having a base and a pair of projecting terminals, of an insulated cable having a pair of electric current carrying conductors connected with the terminals, a sleeve surrounding one end of the cable and the terminals, a recess in the sleeve to receive and support the base of the tube, a cap enclosing the tube and having a telescopic connection therewith, a seal formed between the cap and the sleeve, and a seal formed between the cable and the sleeve to prevent moisture or other matter from entering the sleeve and cap to form an electric current leakage path between the terminals or the conductors, said sleeve and cap being made of a transparent moisture-proof material.

3. The combination of a tube of the character described including a pair of projecting terminals, of an insulated cable having a pair of electric current carrying conductors connected with said terminals, a sleeve surrounding one end of said cable and said terminals, a recess in the sleeve to receive and support one end of said tube,

a cap enclosing the tube and having a telescopic connection with said sleeve, a seal formed between the cap and sleeve, and a seal formed between the cable and the sleeve, said seals acting to prevent moisture or other matter from entering the sleeve and cap to form an electric current leakage path between the terminals or the conductors, said sleeve and cap being made of moisture-proof material.

4. The combination of a tube of the character described including a pair of projecting terminals, of an insulated cable having a pair of electric current carrying conductors connected with said terminals, a sleeve surrounding one end of said cable and said terminals, a recess in the sleeve to receive and support one end of said tube, a cap enclosing the tube and having a telescopic connection with the sleeve, a seal formed between the cap and sleeve, and a seal formed between the cable and the sleeve, said seals acting to prevent moisture or other foreign matter from entering the sleeve and cap to form an electric current leakage path between the terminals or the conductors, said sleeve and cap being made of transparent moisture-proof material.

5. In a device of the character described for mounting and sealing a photo-electric cell, a cable enclosing sleeve, means in said sleeve for sealingly engaging a cable therein, a recess in one end of said sleeve for receiving one end of a photo-electric cell and its projecting terminals, and a cap sealingly engaging the recessed end of said sleeve to enclose a photo-electric cell and its terminals between said cap and sleeve at least one portion of said cap being transparent.

6. The device as set forth in claim 5 in which the cap is formed of methyl methacrylate.

7. The device as set forth in claim 5 in which the recess of the sleeve is formed by a pair of concentric counterbores defining a chamber for the tube terminals and the conductors of the cable in which the terminals and conductors are joined and a chamber for the reception of one end of the tube.

8. The device as set forth in claim 5 in which the sealing means between the sleeve and the cable comprises methyl methacrylate.

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