Jan. 10, 1950 O. J. HOLMES 2,493,919

MOUNTING FOR PHOTOELECTRIC CELLS

Filed March 26, 1948

Fig. 1.

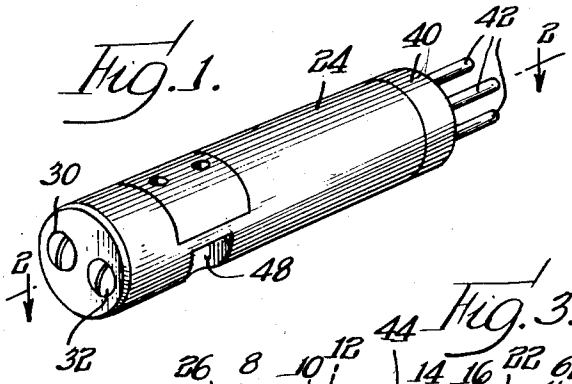


Fig. 2.

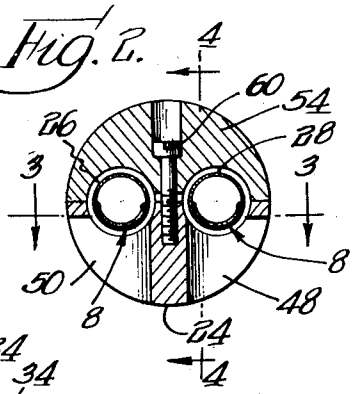


Fig. 3.

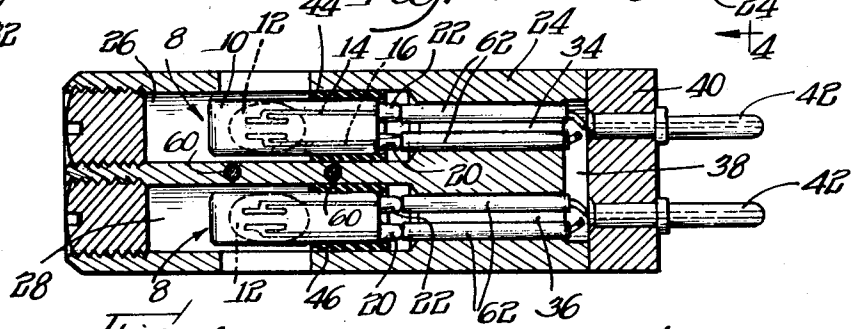


Fig. 4

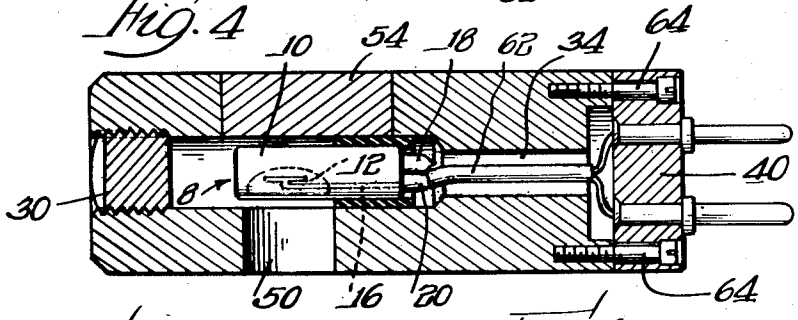


Fig. 5.

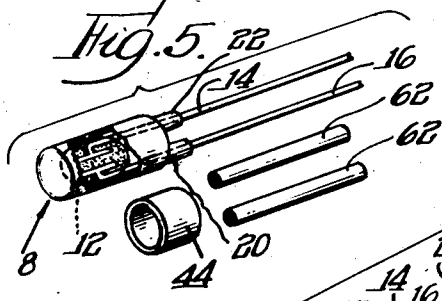


Fig. 6.

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MOUNTING FOR PHOTOELECTRIC CELLS

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4 Claims. (Cl. 201—63)

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This invention relates to a photo-sensitive cell, preferably of the photo-conductive type, and more particularly to a push-pull photo-sensitive cell unit.

Photo-conductive cells using such materials as thallous sulphide, or lead sulphide, galena, and the like, are very sensitive and are manufactured by vaporizing the material within the envelope to form a photo-conductive layer upon the surface of the envelope. This manufacturing procedure requires the use of very special and expensive glass as the material of the envelope and the cells are, relatively, quite small and fragile. It is difficult if not impossible to mount such cells on a pronged base of the standard size by structures and procedures heretofore employed in the manufacture and mounting of photo-electric cells or tubes of the emissive type.

It is accordingly an object of the present invention to overcome such difficulties in respect to the manufacture and mounting of photo-conductive cells or tubes, and, more specifically, to provide a mounting structure for the glass envelope and external leads of a photo-conductive cell or tube by means of which the envelope is firmly supported against vibration, shifting or varying and secured to or mounted upon the standard sized pronged base.

Photo-conductive cells or tubes cannot be secured to or mounted in a terminal base or mounting plug by the cement process commonly employed in securing the glass envelopes and lead terminals of a photo-emissive type cell to its terminal base or plug. It is difficult, if not impossible, in carrying out that cementing process to maintain the envelope of a photo-conductive cell properly oriented with respect to the terminal prongs of its base to assure proper alignment of the sensitized area or surface of the envelope with respect to the source of light or light-transmitting aperture when the terminal prongs of its base are inserted in its receiving socket. The cementing process also has a very deleterious effect on the sensitivity of the cell.

It is accordingly a further object of the invention to provide a mounting structure for the glass envelope and lead terminals of a photo-conductive cell by means of which maintenance of proper orientation of the sensitized surface of the envelope with respect to the terminal prongs may be assured and the deleterious effects of the cementing process avoided.

Photo-conductive cells are highly sensitive and their sensitivity readily affected by external disturbances, particularly by high frequency currents, which tending to shunt the cell, materially lower the sensitivity thereof.

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It is therefore a further object of the invention to provide a photo-conductive cell or mounting for the glass envelope and lead terminals which shall provide an effective shield to high frequency currents.

Other and further objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawing wherein:

Fig. 1 is a view in perspective of a photo cell embodying the present invention;

Fig. 2 is an enlarged view in vertical section taken along the line 2—2 of Fig. 1;

Fig. 3 is a view in horizontal section taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a view in vertical section taken substantially along the line 4—4 of Fig. 2; and

Figs. 5 and 6 are exploded views in perspective of the several parts of the cell and mounting structure shown in Figs. 1 to 4.

A preferred embodiment of a photo-sensitive cell constructed in accordance with the present invention comprises a pair of photo-conductive units 8, each consisting of a small glass envelope 10 generally cylindrical in form and provided with a sensitized area 12 formed by vaporization in the envelope of material such as lead sulphide, thallous sulphide, galena, and the like. Each unit is also provided within its envelope 10 with electrically conductive terminals 14 and 16 in electrically conducting relation to the photo-conductive coating on the sensitized area 12. Each glass envelope 10 is also formed with a depending tubular portion 18 by means of which the envelope is evacuated in the process of manufacture and which, when the desired vacuum has been achieved, is sealed off in the usual manner. Each glass envelope is also formed with dependent tubular portions 20 and 22 through which the terminal wires or electrodes 14 and 16 extend and from which they project and to which they are sealed in the usual manner.

A housing 24, preferably in the form of a cylinder of steel or other suitable material to act as a high frequency shield, receives the photo-conductive units 8 in parallel bores 26 and 28. The bores 26 and 28 are threaded at one end of the housing to receive externally threaded caps or closure members 30 and 32. At their other ends the bores 26 and 28 communicate with bores 34 and 36 of reduced diameter and which extend from the bores 26 and 28 longitudinally of the housing to an enlarged opening or recess 38.

The recess 38 is closed by a disk 40, carrying four hollow terminal prongs 42 of standard size and spacing for insertion in the standard base socket heretofore provided for electron emissive photo-tubes.

The bores 26 and 28 of the cylinder 24 are somewhat larger in diameter than the photo-sensitive units 8, but the units are resiliently and yet firmly supported within the bores against vibration by a pair of rubber sleeves 44 and 46 of such external diameters as to snugly fit the bores, and of such internal diameters as to snugly fit the glass envelopes 10. Preferably, the sleeves in external diameters are slightly greater than the diameters of the bores, and the internal diameters of the sleeves are slightly less than the external diameters of the glass envelopes so that the sleeves resiliently grip the glass envelopes, and being compressed by insertion in the bores of the housing, firmly hold the photo-sensitive units in position against inadvertent shifting.

The housing 24 is provided on one side with light-transmitting windows or apertures 48 and 50 which are preferably 90° in angular extent, as seen in Figure 2.

The opposite side of the housing is formed with a transverse cut-out portion or recess 52 opposite the light-transmitting windows or apertures 48 and 50. The recess 52 is adapted to receive a detachable cap or closure member 54 of semi-circular outline in external configuration and having a pair of generally semi-circular grooves 56 and 58. Closure member 54 is detachably secured to the body of the housing in any convenient manner, as by bolts 60 threaded into the housing between the internal bores 26 and 28. It should be noted that, as best shown in Figure 4, the closure member 54 may be removed to expose the photo-conductive units 8 so as to permit the units to be turned in their mounting sleeves 44 and 46, properly to align the photo-sensitized areas 12 of the units with the light-transmitting openings 48 and 50.

The terminals or electrodes 14 and 16 of the photo-conductive units extend through the smaller bores 34 and 36 and are encased within mounting and insulating sleeves 62, preferably of rubber, the sleeves 62 extending from the tubulations 20 and 22 of each unit to the circular recess 38 in the base of the housing. Within the recess 38 the terminals are bent so as to have their outer end portions aligned with and inserted in the terminal prongs 42 to which they are attached or soldered in the usual manner.

In the assembly of the cell, the photo-conductive units are first provided with the rubber sleeves 44, 46 and 62 and then inserted in the bores 26 and 28 from the open, outer end of the bores. The closure member 54 being removed, the cells are exposed within the recess 52, and within that recess are turned so as to align the photo-sensitized areas 12 with the light-transmitting windows or apertures. The ends of the terminals 14 and 16 of the units extend below the housing, for the base 40 has not yet been positioned. The terminal ends are then inserted in the proper terminal prongs 42 and base 40 secured to the housing as by bolts 64. If, in the process of attaching the terminals to the prongs and securing the base to the housing, the units are shifted, it becomes a simple matter to readjust the cells longitudinally or angularly to realign them with respect to the light-transmitting windows or apertures 48 and 50. If desired, the grooves 56 and 58 in the closure member 54 may

be made of slightly smaller diameter than the bores 26 and 28, or of slightly less depth than the corresponding semi-circles of the bores 26 and 28, so that when the closure member is positioned and the bolt 60 tightened down, the sleeves 44 and 46 will be compressed to grip still more firmly the envelopes of the photo-conductive units and thereby cause those sleeves resiliently and yet positively to secure the photo-conductive units against vibration or shifting and in properly maintained alignment with respect to the light-transmitting windows or apertures of the housing and properly oriented with respect to the terminal prongs 42 so that when the photo-cell is inserted in its mounting socket, it will automatically be properly oriented with respect to the light beam.

It should be noted that although applicant has disclosed a photo-cell of the push-pull type, the invention is not to be regarded as so limited, but within the scope of the appended claims, the invention may be adapted to single unit photo-cells.

It will be apparent from the foregoing description that applicant has provided an invention to overcome difficulties in respect to the manufacture and mounting of photo-conductive cells or tubes. He has further provided a mounting structure for the glass envelope and lead terminals of a photo-conductive cell by means of which maintenance of proper orientation of the sensitized surface of the envelope with respect to the terminal prongs may be assured and the deleterious effects of the cementing process avoided, and a photo-conductive cell or mounting for the glass envelope and lead terminals which shall provide an effective shield to high frequency currents.

Changes may be made in the form, construction, and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

I claim:

1. A photo-sensitive cell comprising a photo-sensitive unit having a glass envelope and terminals extending therefrom, a housing having a bore therein complementary in shape to the external shape of the envelope and slightly larger than said envelope, a resilient sleeve snugly fitting said envelope in the wall of said bore, a light transmitting window in said housing, and a connector base for said housing having terminals connecting to the terminals of said photo-sensitive unit, said housing having an opening therein extending transverse to said bore and in communication therewith to permit turning of said unit in said housing to align the photo-sensitive element with the light-transmitting window of the housing, and a closure member for said opening.

2. A photo-sensitive cell comprising a photo-sensitive unit having a glass envelope and terminals extending therefrom, a housing having a bore therein complementary in shape to the external shape of the envelope and slightly larger than said envelope, a resilient sleeve snugly fitting said envelope in the wall of said bore, a light transmitting window in said housing, a connector base for said housing having terminals connecting to the terminals of said photo-sensitive unit, said housing having an opening therein extending transverse to said bore and in communication therewith to permit turning of said unit in

said housing to align the photo-sensitive element with the light-transmitting window of the housing, a closure member for said opening, said resilient sleeve projecting into said opening, and said closure member being constructed and arranged to compress said sleeve about said envelope when positioned to close said opening.

3. A mounting structure for a photo-conductive cell having a light transparent envelope, a photo-conductive coating on the internal surface of said envelope and terminals extending from said coating out of said envelope, said mounting structure comprising a housing having a bore therein open at one end to permit introduction of said cell into said bore from the open end thereof, a connector base secured to said housing at the opposite end thereof and having terminals connected to the terminals of the cell, said housing having a light-transmitting window transverse to the bore thereof, and an opening in said housing opposite said window and also transverse to said bore to permit manipulation of said cell to align the photo-conductive coating of the cell with the envelope, and closure members for said last mentioned opening in the open end of the bore of said housing.

4. A push-pull photo-conductive cell structure comprising a pair of photo-conductive cells having light transparent envelopes, photo-conductive coatings on the internal surface portions of said envelopes and a pair of terminals connected to the coating of said envelopes and extending therefrom and a housing having a pair of laterally spaced bores open at one end of said housing, said bores receiving said cells and the terminals of said cells, a connector base secured to the opposite end of said housing and having terminals connected within said housing to the terminals of the cells, said housing having in one side thereof a pair of light transmitting windows and in the opposite side thereof an opening extending transversely to said bores to permit turning of said cells to align the photo-conductive coatings with said windows, rubber sleeves snugly encircling the envelopes of said cells and snugly fitting the wall of said bores to resiliently support said cells in said housing, enclosure members for the ends of said bores and for the opening extending transversely of said bores.

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