

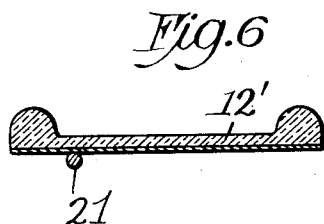
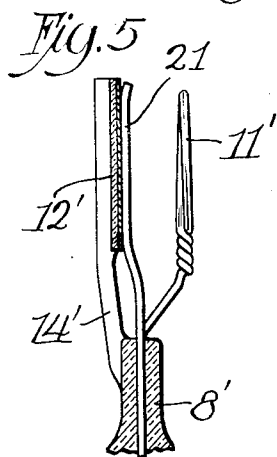
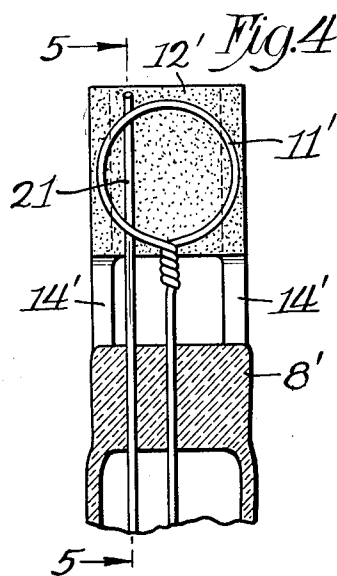
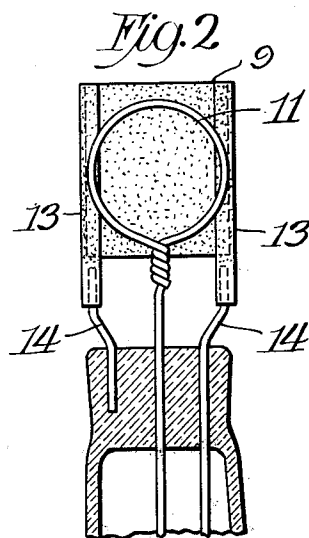
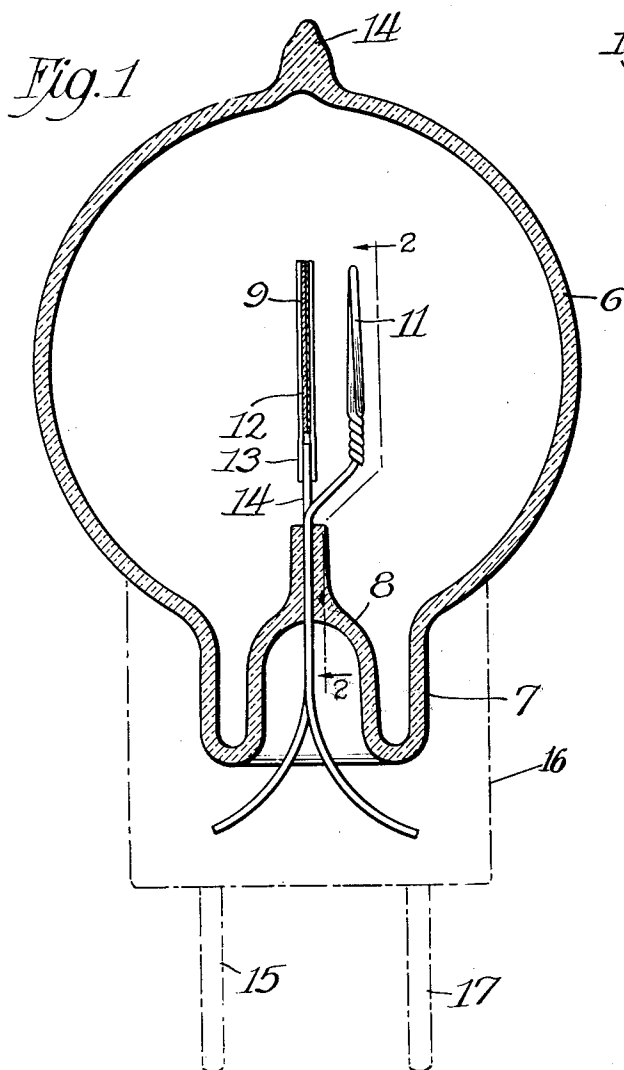
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A. J. McMASTER

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PHOTO ELECTRIC TUBE

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Inventor:
 Archie J. McMaster
 By George E. Mueller atty.

UNITED STATES PATENT OFFICE

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PHOTO-ELECTRIC TUBE

Archie J. McMaster, Chicago, Ill., assignor to
G-M Laboratories, Inc., Chicago, Ill.

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2 Claims. (Cl. 250—27.5)

My invention relates to photoelectric tubes and more particularly to photoelectric tubes of the electron emission type.

Photoelectric tubes usually consist of an exhausted envelope which may or may not contain an inert gas to increase the sensitivity of the tube. It is customary to coat the interior surface of the envelope with an electron emissive substance such as an alkali metal to form the cathode of the tube. This method has certain disadvantages due to the fact that measures must be taken to insure contact with the cathode while the cathode is the last element formed and is formed after the remaining parts of the tube are in position and the tube is completely sealed except for the tip at the top of the bulb.

In accordance with the present invention the cathode and anode are formed outside of the bulb and mounted on the stem so that they can be inserted as a unit in the bulb by positioning the stem in place in the bulb. The stem is then fused into the bulb and the only operation performed through the tip of the tube is the exhaustion of the bulb and the introduction of an inert gas under low pressure where such a gas is used.

An object of the invention is to provide an improved photoelectric tube.

A further object is to provide a photoelectric tube of such a construction as to be simple to manufacture.

A further object is to provide a photoelectric tube of a rugged construction in which the electrodes are mounted on the stem of the envelope.

Other objects and advantages will appear as the description proceeds.

Another object is to make possible a uniform spacing and arrangement of electrodes.

Referring to the drawing—

Fig. 1 is a cross-sectional view of a tube embodying my invention;

Fig. 2 is a detailed view of the stem and electrodes of the tube taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section of the cathode of the device of Fig. 1;

Fig. 4 is a detail view of a modified form of cathode;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4; and

Fig. 6 is a horizontal section through the cathode of Fig. 4.

In the preferred form of my invention I provide a bulb or envelope for enclosing the electrodes of the photoelectric tube. The lower portion of the bulb has a neck 7 into which the stem or press 8 is fused as is well known in the art.

A cathode 9 and anode 11 are mounted directly on the stem so that the fusing of the stem into the bulb properly positions these elements within the tube.

Cathode 9 comprises a thin plate 12 of a non-conducting material such as glass, which is clamped along opposite edges by two strips of U-shaped conducting material 13. The lower ends of the strips are also clamped about conducting supports 14, one or both of which may pass through the stem to be connected to a prong 15 secured to base 16 of the tube.

The anode comprises a looped wire positioned in front of the cathode and also passing through the stem for connection to a prong 17, whereby the anode and cathode may be placed in an electrical circuit by making contact with these prongs. Only two prongs are required for a tube of the type described, although more may be provided for mechanical reasons and for supporting the tube in a standard socket.

After plate 12 has been mounted on the stem as described a layer of an alkali-metal such as potassium is deposited thereon by placing the cathode in an atmosphere of volatilized potassium and allowing the metal to condense thereon. When the plate is thus coated the coating will also extend over the strips 13 and thereby electrically interconnect the entire coating with the strips. In this manner an efficient and simple means is provided for placing the coating in an electrical circuit. When the plate has been coated with the alkali-metal it is placed in an atmosphere of hydrogen and the alkali-metal is converted into a hydride of the metal by a glow discharge between the cathode and the anode. The alkali-metal hydride is an efficient and sensitive electron emissive medium which is responsive to emit electrons in accordance with the intensity of light impinging thereon. The process of coating plate 12 and converting the surface into a hydride may be carried out in any suitable apparatus therefor.

The sensitized plate or cathode together with anode 11 are placed in the bulb with the stem 8, whereupon the stem is fused into the bulb. The bulb is then exhausted through tip 14 and an inert gas under low pressure may or may not be introduced. The tip is then sealed off, completing the tube.

In Figs. 4 to 6 a modified form of the invention is shown in which plate 12' is integrally supported on stem 8' by a pair of supports 14'. Plate 12' is coated and sensitized in the same manner as disclosed above, however, due to the fact

that supports 14' are made of non-conducting material a conductor 21 is lead into the tube through the stem and resiliently engages the cathode, making electrical contact therewith. In some cases I also coat the plate with some other conducting material such as magnesium first which thus allows me to use a very thin layer of sensitive material and still have conductivity. It is important to have proper conductivity and this feature may be resorted to with beneficial results under some circumstances. Anode 11' as well as the cathode is mounted on the stem and positioned with respect thereto prior to inserting and fusing the stem into the bulb. The tube of this invention has been found to be particularly well suited for uses in which a large cathode area is not essential and due to the simplicity of manufacture is an economical type of tube for certain applications of photoelectric tubes.

It will be understood that the embodiments of the invention illustrated and described are merely convenient and practical forms of the in-

vention and that many other modifications may be made without departing from the spirit and scope of the invention.

What I claim as new and desire to protect by United States Letters Patent is:—

1. A photoelectric tube comprising an envelope, a stem extending into said envelope, a non-conducting plate, a pair of conducting strips supporting said plate, an electron emissive substance forming a coating for said plate and making electrical conducting contact with said strips, a hydride surface on said coating forming a light sensitive cathode, and an anode for receiving electrons therefrom.

2. A photoelectric tube comprising an envelope, a non-conducting plate, a pair of conducting strips clamping opposite edges of said plate for supporting the plate in said envelope, an alkali-metal coating on said plate contacting with said strips, one of said strips leading from said cell for connection in an electrical circuit, and an anode supported in said envelope.

ARCHIE J. McMASTER.

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