Dec. 29, 1959 W. TSCHAKERT 2,919,361

LIGHT TUBES AND WALLS WITH RADIOACTIVE COLD CATHODES

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Fig. 1

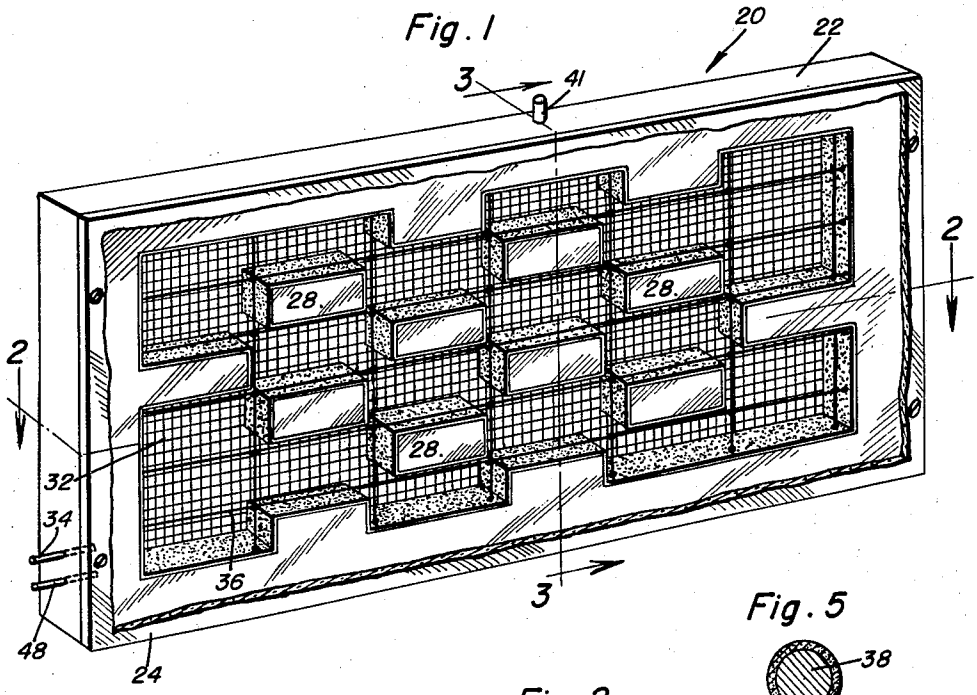


Fig. 5

Fig. 2

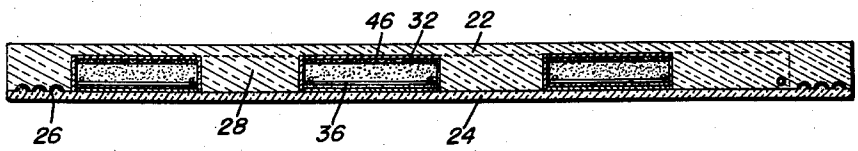


Fig. 3

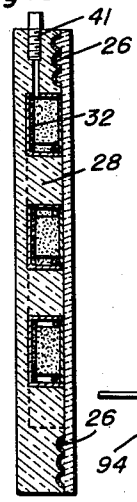


Fig. 4

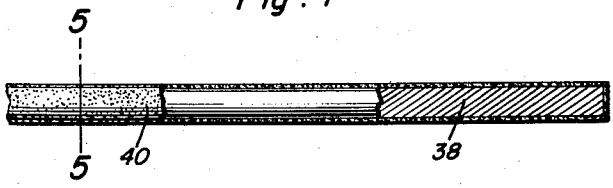
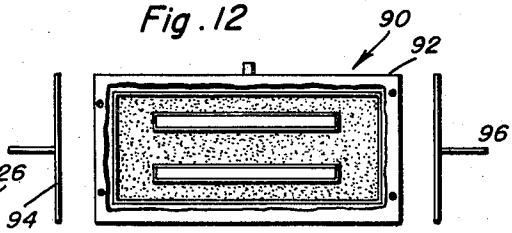


Fig. 12



Wilfried Tschakert
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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Fig. 7

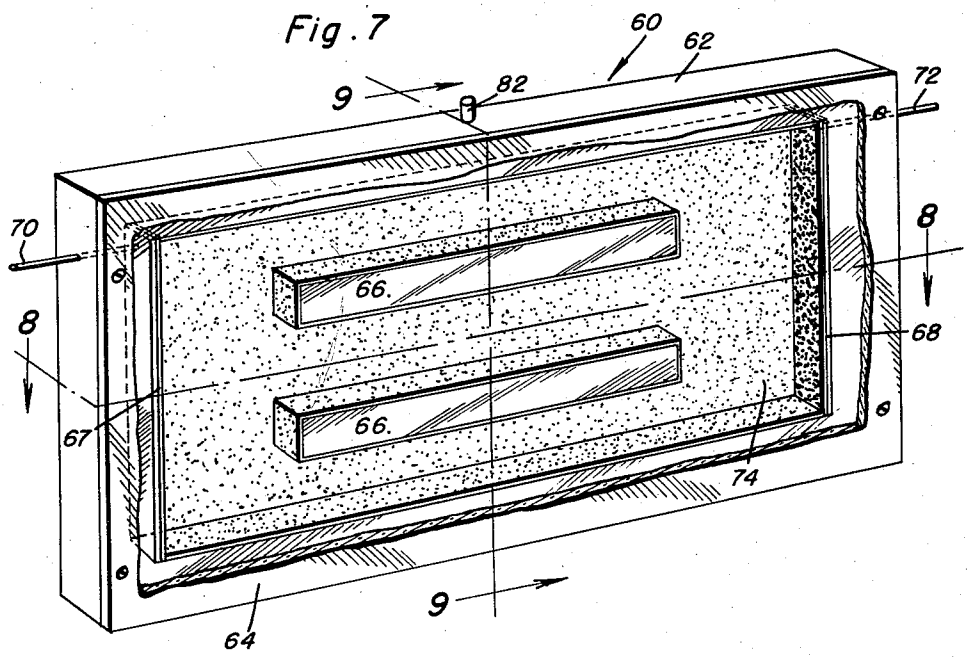


Fig. 8

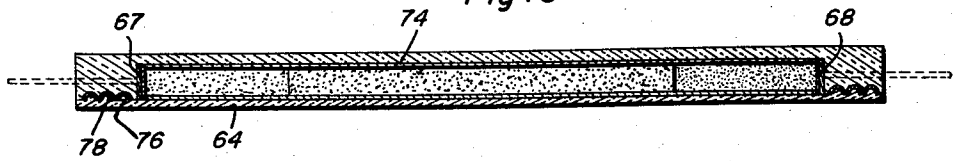


Fig. 9

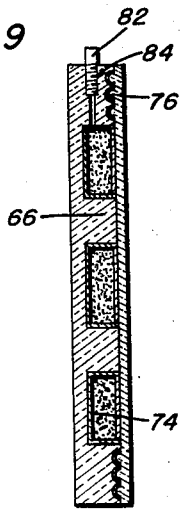
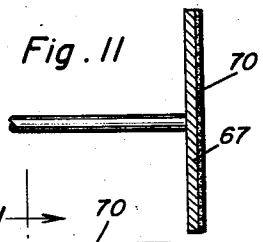


Fig. 11



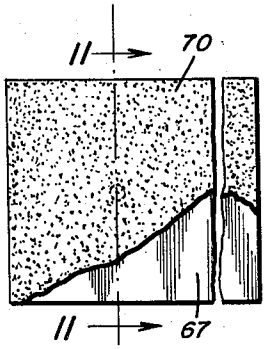
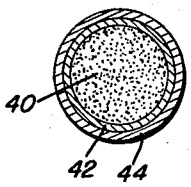


Fig. 10

Fig. 6



Wilfried Tschakert
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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2,919,361

LIGHT TUBES AND WALLS WITH RADIOACTIVE COLD CATHODES

Wilfried Tschakert, Dusseldorf, Germany, assignor of one-sixth to Annita T. Spolter and one-sixth to Arthur J. Spolter, both of Miami Beach, Fla.

Application April 11, 1957, Serial No. 652,145

2 Claims. (Cl. 313—54)

This invention relates to a new and improved fluorescent lamp construction adapted to be constructed in the shape of a wall panel or the like employing a new and improved cold cathode.

The primary object of the present invention resides in the provision of a structural illuminating panel designed to operate with a low voltage and needing only a low voltage for starting.

A further object of the invention resides in the provision of illuminating means in the form of a structural panel whereby illumination is provided from an enlarged area so as to provide better and more comfortable illumination for the area served by the structural illuminating panel.

The construction of this invention features the utilization of a hollow body having a cathode and an anode mounted therein in spaced relationship with the interior of the body being provided with a coating of a phosphor, such as a phosphor sensitive to 2537A. The cathode may have a coating or be constructed of a suitable radioactive material having a further coating of an electronic emitting material such as an alkaline earth metal. Utilization of the phosphor, together with the gas filled hollow body, and the radioactive material covered by an electron producing material such as the alkaline earth metal results in an illuminating structure capable of operating under relatively low voltages so as to provide the desired amount of illumination.

Still further objects and features of this invention reside in the provision of the novel illuminating structures comprising the present invention which are simple in construction, inexpensive to produce, and attractive in appearance.

These, together with the various ancillary objects and features of the invention which will become apparent as the following description proceeds, are attained by these illuminating structures, preferred embodiments of which have been illustrated in the accompanying drawings, by way of example only, wherein.

Figure 1 is a perspective view of one form of the illuminating structure comprising the present invention;

Figure 2 is a horizontal sectional view as taken along the plane of line 2—2 in Figure 1;

Figure 3 is a vertical sectional view as taken along the plane of line 3—3 in Figure 1;

Figure 4 is a partial sectional detail view of one form of electrode material which can be utilized in conjunction with the invention;

Figure 5 is a greatly enlarged transverse sectional view as taken along the plane of line 5—5 in Figure 4;

Figure 6 is a sectional detail view in an enlarged scale of a modified form of electrode material;

Figure 7 is a perspective view with a portion being broken away and showing other portions in detail of a modified form of the illuminating structure;

Figure 8 is a horizontal sectional view as taken along the plane of line 8—8 in Figure 7;

Figure 9 is a vertical sectional view as taken along the plane of line 9—9 in Figure 7;

Figure 10 is a partial elevational view of an anode employing the concepts of the present invention;

Figure 11 is a sectional detail view as taken along the plane of line 11—11 in Figure 10; and

Figure 12 is an elevational view with portions being broken away and showing others in section of a further modified form of the invention employing electrodes to form the sides of the illuminating structure.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral 20 is used to generally designate illuminating structure comprising the present invention. This illuminating structure 20 is preferably formed of any suitable material such as a transparent or translucent material including synthetic plastics, milk glass or the like and includes a body 22 which is hollow.

The body 22 may be provided with a detachable face plate 24 held in place by suitable fasteners. The body 22 is adapted to be filled with a suitable gas such as krypton, argon, neon mercury vapor and the like and therefore a suitable labyrinthian seal as at 26 may be provided for making the juncture of the face plate and the rest of the body 22 gastight. Further, the body 22 has integrally formed therewith a plurality of spaces 28 against which the face plate 24 is adapted to abut. The face plate as well as the rest of the body 22 may be formed of any suitable preferably transparent or translucent material.

At least partially embedded within the body 22 is an anode 32 formed of a lattice of wires or a screen to which a conductor 34 is attached for connection to a suitable source of electrical power. The cathode 36 is held in spaced relationship with respect to the anode 32 and may be in the form of a network of rods or the like such as those shown at Figures 4 and 5 wherein a conductive rod 38 constructed of radioactive metal such as cobalt 60 or of metal which is covered with a radioactive material as at 40. Alternatively, and preferably the radioactive material 40 may be covered with any suitable electronic emitting material such as an alkaline earth metal for producing electrons, the alkaline earth metal being a suitable oxide such as the oxides of barium, calcium, strontium or the like and covering the inner surface.

As is shown in Figure 6, the electrodes can be formed like an envelope of metal such as cobalt 60 or of a suitable radioactive material or pile 40 covered with alkaline earth metals as at 42 and 44 for both rigidifying the construction and providing an electron producing substance.

The interior surfaces of the body 22 may be coated with a luminescent material generally known as a phosphor. The phosphor is generally indicated by reference numeral 46. The cathode 36 has a conductor 48 connected thereto for connection to a source of electrical power. The source of electrical power need not be a high voltage inasmuch as the radioactive cold cathode will produce in conjunction with the limited electric motor force sufficient voltage to cause activation of the gas in the tube and illumination of the phosphor.

In lieu of the arrangement as is shown in Figure 1, a structural element of the shape shown in Figure 7 can be employed which structural element is generally designated by reference numeral 60. In this form of the invention the body 62 is preferably formed of a suitable transparent or translucent material provided with a coating of a phosphor on the interior surfaces thereof and may be provided with a removable face plate 64. Suitable spaces as at 66 are provided for both rigidifying

the construction and holding the face plate in position.

Disposed at the sides of the body of the electrodes 67 and 68 which may be of the same or similar construction each being of a suitable radioactive material or of a conductive material provided with a coating of a radioactive substance and further provided with a coating of an alkaline earth metal. This coating indicated at 70 may be of any suitable material such as calcium, barium or strontium.

The anode and cathode have suitable conductors 71 and 72 connected thereto for connection to a suitable source of electrical energy. Further, the interior surfaces of the body 62 and 64 are provided with a coating of luminescent material as at 74 and there is provided a labyrinthian seal as at 76 for the face plate 64, it being noted that a suitable gasket as at 78 may be utilized. Filler means for filling the body 62 with gas after evacuation may be provided and a plug 82 is shown threaded into a threaded opening 84 forming the means for introducing suitable gas such as argon, krypton, neon mercury vapor or the like.

Upon subjecting the anode and cathode to a suitable potential therebetween, the radioactive material having already caused the electron producing coating thereon to cause activity within the body 62, there will be a further electrical disturbance causing the phenomena of illumination within the body 62.

In lieu of the form of the invention as is shown in Figure 7, the form of the invention as is shown in Figure 12 and generally designated by reference numeral 90 can be employed. In this form of the invention the body 92 is very similar to the body 62 but the sides are generally open and closed by elongated and preferably adjustable electrodes 94 and 96.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An illuminating structure comprising a gas tight hollow body, a first electrode constituting a cathode within said hollow body, a second electrode constituting an anode within said body, said electrodes being spaced from each other, means for impressing an electrical potential across said first and second electrodes, said first electrode including rods of radioactive material having an electron producing alkaline earth metal coating thereon, said second electrode being in the form of a wire screen partially embedded in said body, an interior surface in said hollow body, said interior surface being coated with phosphor.

2. An illuminating structure comprising a gas tight hollow body, a first electrode constituting a cathode within said body, said electrodes being spaced from each other, means for impressing an electrical potential across said first and second electrodes, said first electrode including rods of radioactive material having an electron producing alkaline earth metal coating thereon, said second electrode being in the form of a wire screen partially embedded in said body, an interior surface in said hollow body, said interior surface being coated with phosphor, said structure comprising an enlarged structural panel, said body including a detachable light transmitting face plate.

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