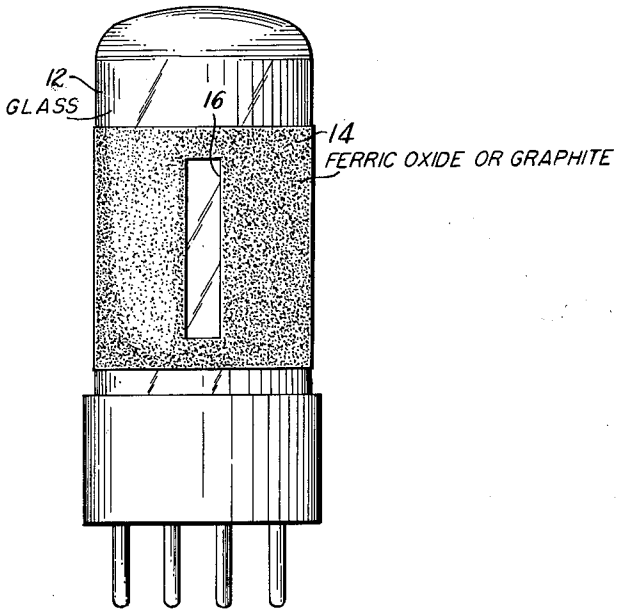
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FILM COATING FOR ELECTRON DEVICE ENVELOPES

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INVENTORS
William R. McKeirnan
Leonard D. Schwender
BY Michael Hertz,
ATTORNE

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FILM COATING FOR ELECTRON DEVICE ENVELOPES

William R. McKeirnan, Crosby, and Leonard D. Schwender, Emporium, Pa., assignors to Sylvania Electric Products Inc., a corporation of Delaware

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This invention relates to coatings on the exterior of electron tubes and in particular to opaque coatings on glass envelopes enclosing photo-diodes.

In the prior art, opaque coatings had been applied either by hand brushing the coating material on the envelope or by spraying the material thereon resulting in coatings which might not display the desired opacity because of thinness in spots or in unnecessary heavy coating resulting from the use of excessive material. Both methods are sloppy because of the use of fluid materials.

It is an object of this invention to provide a coating on the exterior of an object, the coating to be applied without mess and to be of uniform characteristics, including uniform opaqueness and thickness throughout. As an illustration of the invention, the object coated is the envelope of a photo-diode.

The figure in the accompanying drawing represents a photo-diode with the coating of the invention.

The objects of the invention are effected by manufacturing the coating in the form of a self supporting film of even texture and thickness throughout and which incorporates a pigment within a soluble binder, and then, by application of a solvent for the binder in the film onto the envelope and contact of the envelope with the film, causing the film to wrap itself about the envelope.

A film suitable for covering photo diode glass envelopes may be made from a wide variation of proportions of materials, such as expressed in the following formulation:

Toluene	milliliters	0 to 100
Ethyl alcohol	do	7 to 50
Butyl carbitol	do	0 to 10
Ethyl cellulose N–200	grams	1.5 to 15
Triethanolamine	milliliters	0.4 to 0.6
Graphite	grams	30

The designation N–200 of the ethyl cellulose refers to the range of viscosities of the ethyl cellulose as set forth on page 5 of the Hercules Powder Company publication entitled "Ethyl Cellulose, Properties and Uses," copyrighted 1949.

The toluene and ethyl alcohol serve as solvents for the solid binder, such as ethyl cellulose. The butyl carbitol serves as a temporary plasticizer. The triethanolamine serves as an anti-oxidant for the cellulose.

A preferred suspension is made in accordance with the following formulation:

Toluene	ml	100
Ethyl alcohol	ml	50
Butyl carbitol	ml	5
Ethyl cellulose N–200	gm	10
Triethanolamine	ml	0.5
Graphite	gm	30

This suspension is thoroughly stirred in a glass container, then milled for sixteen hours in a ball mill to reduce the solids to a fine and even consistency. The suspension is then cast through a gate on a traveling trough onto a flat polished surface, as glass, into the form of a thin sheet of even thickness.

Preferably the trough travels about the surface with a four inch wide gate and the gate is raised above the surface to give a thickness of .0013" to the film.

Heat lamps are placed above the cast film to dry the film which film is then dampened with water to release it from the glass, from which it is stripped off by a suitable doctor blade. The film is then allowed to dry again.

The dry film now four inches wide and .0013" thick is then cut to suitable size to form leaves for application to the exterior of the photo-diode. If desired a window may be stamped out of each leaf prior to application of the leaf to the envelope, with the window in proper light registration with the photo-diode cathode or the window may be formed after the leaf has been applied to the envelope. The envelope has then applied to it a suitable solvent for the binder in the film, for example a mixture of the following five acetates:

N-amyl acetate
2-methyl butyl acetate
3-methyl butyl acetate
4-methyl butyl acetate
3-ethyl propyl acetate

The binder solvent may be applied to the envelope by dipping of the envelope in the solvent, by spraying the solvent on the envelope or by sponging of the envelope with the solvent. The solvent is quickly evaporative, but before it evaporates the envelope is brought into contact with the leaf whereupon, the solvent acts on the binder in the leaf to cause the leaf to wrap itself about the envelope.

While graphite was selected as the preferred coating for photo-diodes, another suitable opaque substance is ferric oxide black (Fe_3O_4). In the above preferred formulation it was found that 24 grams of the ferric oxide could replace the 30 grams of graphite with equally good results.

In the drawing, the photo-diode is shown as having a glass envelope **12**, coated with the coating **14** of the invention, a window **16** being provided in the coating for admission of light to the cathode. The coating on this tube besides being applied without mess, is uniform in thickness, in opaqueness and is neat in appearance since the coating has sharp parallel edges at the top and bottom of the cylindrical portions of the tube. Moreover the leaf is preferably made of a size to just wrap itself around once about the envelope with the edges of the leaf in abutting relation.

What is claimed is:

1. The method of laminating a photo tube having a glass envelope with an opaque coating having a window therein, said method comprising manufacturing a self supporting thin opaque film with a window cut therein and comprised of an opaque pigmentation selected from the class of materials including graphite and ferric oxide black, said pigmentation being held in a soluble ethyl cellulose binder, wetting the exterior of the glass envelope with a solvent for the binder and bringing the envelope and self supporting film into contact whereby the film will wrap itself around the photo tube.

2. The method of laminating a photo tube having a glass envelope with a thin opaque film having a window cut out therein, said method comprising manufacturing a self supporting thin opaque film comprised of graphite held in a soluble ethyl cellulose binder, cutting a window in the film, wetting the surface of the photo tube with an organic solvent for the binder and contacting the film and tube, whereby the film wraps itself about the tube.

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