

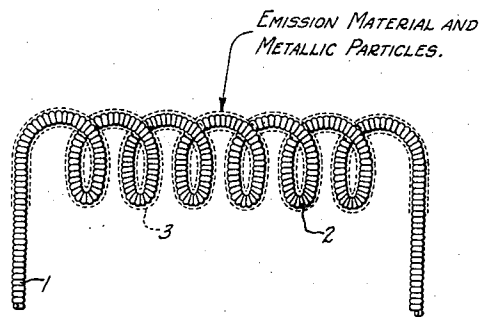
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CATHODE FOR DISCHARGE TUBES

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CATHODE FOR DISCHARGE TUBES

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1 Claim. (Cl. 250—27.5)

My invention relates to gaseous discharge devices and more particularly to an improved cathode construction whereby radio interference created by such devices is materially decreased.

The use of gaseous discharge lamps, especially those of the low-pressure type, while being satisfactory in general, has been accompanied by an objectionable tendency to create disturbances interfering with radios in their vicinity. These disturbances are particularly prevalent in lamps of the alternating current type which is, of course, the type most widely used. While the nature of the phenomenon has not yet been fully explained, it is known that it centers around the cathode. It may be the result of some sort of random movement of the arc on the cathode surface, or erratic behaviour of the particles of the cathode coating under the influence of the various electric and magnetic fields to which they are subjected. There is also good evidence to indicate that the disturbance may arise from the alternate charging and discharging of oxide particles which may become wholly or partially insulated from the main cathode body. Such oxide particles may arise from the oxidation of the tungsten core either by water vapor in the tube, or by oxygen from the oxides in the coating used as the electron-emitting material. They may even be formed directly of the oxides of the coating. Particles of this nature may behave as minute condensers and the process of discharging them when once charged may, of course, create radio frequency currents in the well-known manner. On the other hand, it may be that in their charged condition they sufficiently disturb the electrical field in the vicinity of the cathode to induce erratic variations in the arc current. Oscillographic records indicate that the disturbances generally occur at the beginning and end of each half cycle of alternating current, i. e., when the current strength is low.

I have found that the disturbances can be largely eliminated by adding to the cathode a coating of finely divided powder of metal or other conducting material. This may be added either by mixture with the regular activating coating, or as a separate coating with a suitable binder. Apparently such conducting particles provide a good conducting surface over the whole cathode, which conducting surface operates to prevent the formation of charges on the insulated particles already mentioned.

It is accordingly an object of my invention to provide a gaseous discharge lamp which is rela-

tively free of the disturbances causing radio interference.

It is a further object of the invention to provide an improved cathode for discharge lamps whereby radio interference from said lamps is largely eliminated.

It is still another object of the invention to provide a cathode for the aforementioned purpose which is relatively simple in construction and economical in manufacture.

Further objects and advantages of the invention will be apparent from a consideration of the following detailed description, and the accompanying drawing which shows a cathode constructed in accordance with my invention.

In preparing my improved cathode, I add to any of the conventional activating mixtures, as for example barium carbonate or oxide, a quantity of finely divided conducting material such as carbon or one of the metals iron, platinum, tungsten, palladium, molybdenum and tantalum. These are added in relatively large quantities, in some cases as much as 50 to 75% by weight of the solid content of the emission material. For lighter materials the percentage may be much smaller. Thus, in the case of iron, 25% by weight will produce workable results. In the case of platinum, good results were obtained with relative proportions of $\frac{1}{4}$ of a milligram of platinum to $3\frac{3}{4}$ milligrams of the activating material.

The mixture may be applied by the simple process of dipping the bare cathode coil into the aforementioned mixture, a suitable binder, as nitrocellulose, being used to insure adherence to the coil. Good results have also been obtained by applying the conducting mixture as a separate coating after the application of the emitting material. It may also be applied in the form of a compound which is conducting in itself, or which breaks down under the influence of heat or other conditions to give the free metal or other conducting material. Thus, platinum has been satisfactorily applied in the form of platinum chloride, which breaks down under the influence of heat to give a coating of free platinum on the cathode surface or mixed with the activating material.

I have found that the best results have been obtained by using a non-oxidizable or difficultly oxidizable material. Particles which are oxidizable apparently may become in time non-conducting through oxidation by water vapor in the tube, or by the oxygen from the oxides of the coating itself. If this occurs their effectiveness is generally destroyed. Thus far, the best results

have been obtained by the use of platinum as the conducting material. The cost of this is by no means prohibitive.

The single figure of the accompanying drawing will illustrate a cathode constructed in accordance with the invention. The base material of the cathode comprises the wire 1 wound into a coiled coil 2. It may be formed of tungsten or any of the other materials common in the art. As shown, the coil 2 is coated with the quantity 3 of activating material and conducting particles already described.

The improved cathode may be used to advantage in any of the discharge lamps now common in the art, such as those incorporating a gaseous atmosphere comprising a metallic vapor at pressures of the order of 10 microns and up to several millimeters of a starting gas within an elongated envelope having an activated electrode at each end. Such lamps are described in the United States Patent 2,182,732 to Meyer et al. It is, of course, understood that in such lamps the activated electrode at each end of the tube acts alternately as cathode and anode. By means of the described processes, I have been able to construct discharge lamps of this type having a very substantial, useful life, which is free of disturbances creating radio interference. In one case, the radio interference was reduced to $\frac{1}{60}$ of its usual value. My method is obviously very simple and economical. It requires

no substantial changes in the manufacturing methods; the lamp ruggedness is not affected and it is not necessary to make any changes in the auxiliary equipment of the lamp.

5 It will be understood that my invention is not to be limited by any theory of operation hereinbefore recited. Further, it will be understood that many modifications in the relative percentages of the conducting materials and in the manner of applying them to the cathode surface will occur to those skilled in the art to which it appertains. All such modifications I aim to include within the scope of the appended claim.

10 What I claim as new and desire to secure by Letters Patent of the United States is:

15 In an alternating current low pressure gaseous electric arc discharge device of the type containing an electrode which serves alternately as cathode and anode and comprises a coiled wire filament having an appreciable voltage drop between its ends and an electron emissive coating of alkaline earth oxide thereon and which, during operation, normally creates disturbances interfering with radios in its vicinity, means for materially suppressing the radio interference comprising particles of free metal selected from the group consisting of platinum and palladium distributed throughout the emissive coating and providing a good conducting surface over the electrode.

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