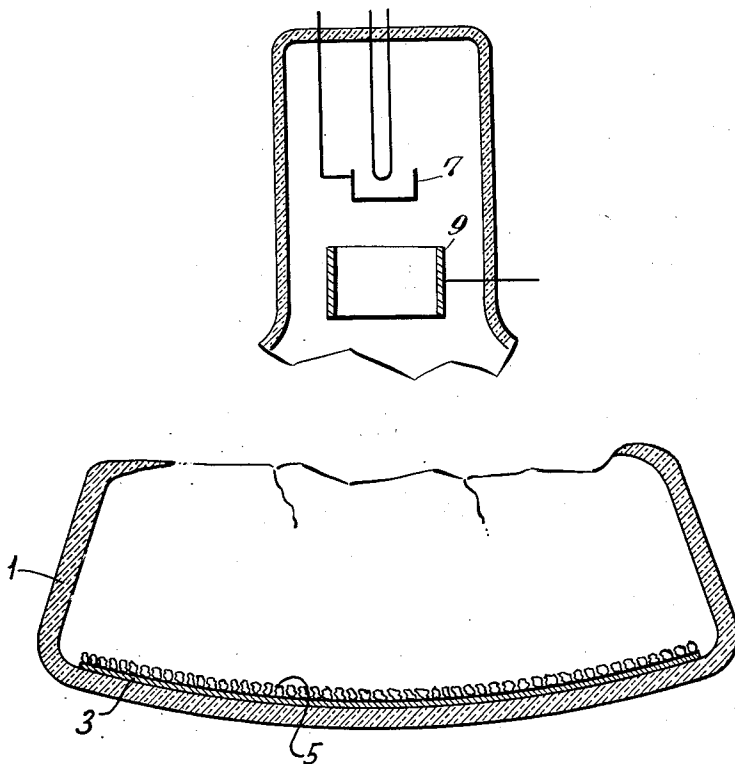


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ELECTRIC DISCHARGE TUBE

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ELECTRIC DISCHARGE TUBE

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6 Claims. (Cl. 250-164)

This invention relates to an electric discharge tube and more particularly, an electron discharge tube wherein is provided a luminescent screen adapted to be impacted by electrons. The luminescent material may be applied on to a conductive or insulating substratum which may be either provided as a separate member in the tube or form part of the wall. Well-known representatives of this kind of tubes are cathode ray tubes, tuning indicators and the like. The invention is more particularly concerned with electric discharge tubes comprising a fluorescent screen which consists of a material provided on a conductive substratum. In addition the invention relates to a method of making such tubes.

For these screens various materials have been proposed. The most preferred and used material is willemite which consists of a mixture of zinc silicate and manganese oxide. Although good results are often obtained with this material its use together with a conductive substratum may involve difficulties. For the provision and the use on a conductive substratum the fluorescent material, in order not to reduce too much the conductivity of such an electrode, must be applied in a very finely divided state and be very thin, which may be ensured by grounding the willemite for a long time until the required degree of fineness has been attained. It is now found that upon using such screens the luminous intensity as a function of time rapidly decreases and attains a comparatively constant value after some time which, however, is materially lower than the initial value.

I have found that upon using an electric discharge tube and a method according to the present invention a fluorescent screen is obtained whose luminous intensity decreases only slightly with time and in addition preserves a comparatively high value for a considerable time.

In part this desirable feature is provided by supplying a screen incorporating the same material used in an electron emissive cathode provided within the envelope along with the screen, since "poisoning" is thereby avoided.

Accordingly, the main object of the invention is to provide an electronic tube having an improved luminescent screen.

A further object of my invention is to provide method and means of improving luminescent screens by avoiding poisoning of the screen by products of cathode disintegration within an electric discharge tube.

Another object of my invention is to provide

a new and improved luminescent or fluorescent material.

A still further object of my invention is to provide a luminescent screen comprising my new luminescent material deposited upon a conductive layer.

Other objects and features of my invention will become apparent upon reading the following detailed description together with the drawing in which I have shown schematically the end wall of a cathode ray tube together with the conductive layer and the luminescent material deposited thereon.

Such a tube comprises a fluorescent screen, more particularly a screen furnished with fluorescent material 5 applied on to a conductive substratum 3 supported upon the end wall of a cathode ray tube 1. An electron gun, shown conventionally as comprising a cathode 7 and an anode 9, is mounted in the tube opposite the fluorescent screen to supply electrons from impacting the material to produce luminescence. This material essentially comprises one or more of the oxides of elements of the first series of group II of the periodic table, such as, barium, strontium or calcium to which a slight quantity of manganese dioxide has been added. This mixture wherein the manganese dioxide acts as an activator has a high and fairly constant luminous intensity for a considerable time. I have found that a mixture of 98% of strontium oxide and 2% of manganese dioxide gives excellent results.

We may preferably proceed as follows: A mixture of alkaline earth carbonates such as strontium carbonate containing 2% of manganese carbonate is precipitated, for instance, from a solution of the nitrates. If desired, this mixture is ground together with a small quantity of an organic binder till the required degree of fineness has been attained, whereupon it is sprayed to form a thin layer on a conducting surface such as a plate consisting of nickel or similar material. The electrode thus formed is subsequently located, together with the other electrodes of the tube, inside the bulb and finally, after exhaustion, which may be effected by high-frequency heating, the carbonate mixture is decomposed into oxide.

Instead of starting with a mixture of the carbonates it is also possible to use a mixture of alkaline earth carbonate and manganese oxide, and to work them in the same manner as has been set out for the carbonate mixture.

A tube according to the invention has the advantage that when upon using a normal oxide

cathode emitting material evaporates from the cathode towards the fluorescent screen this screen is not poisoned thereby, because the substance transmitted by vaporization is the same as that already present on the screen.

5 Having described my invention, what I claim is:

1. A luminescent screen comprising a supporting surface, a conductive layer deposited upon
10 said surface, and a fluorescent material formed from the reaction product resulting from a thermal treatment of a mixture only of manganese dioxide and an oxide of an element chosen from
15 the first series of the second group of the periodic table deposited upon said conductive layer.

2. An electron tube comprising an envelope having housed in one end thereof an electron gun having an electron emitting element formed from
20 at least one of the elements of the first series of group 2 of the periodic tables, a conductive layer deposited upon the inner surface of the tube wall removed from the electron gun and in substantial alignment therewith, and a fluorescent
25 material formed from the reaction product resulting from a thermal treatment only of a mixture of manganese dioxide and an oxide of an element chosen from the first series of the second group of the periodic tables deposited upon said
30 conducting layer, whereby disintegration of the electron emitting material of the electron gun becomes non-poisonous with respect to the fluorescent material.

3. A cathode ray tube comprising an envelope
35 having mounted upon one end thereof an electron emitting cathode formed from at least one of the elements of the first series of group II

of the periodic system, and a luminescent screen comprising a layer of nickel supporting luminescent material formed from the thermal treatment of a mixture only of manganese dioxide, and an oxide of an element chosen from the first series
5 of the second group of the periodic system, said luminescent screen being positioned normal to said cathode.

4. A cathode ray tube comprising an envelope having mounted upon one end thereof an electron
10 emitting cathode formed from at least one of the elements of the first series of group II of the periodic system, and a luminescent screen comprising a layer of nickel supporting luminescent material formed from the thermal treatment of
15 a mixture of 2% of manganese dioxide and 98% of strontium oxide, and an oxide of an element chosen from the first series of the second group of the periodic system, said luminescent screen
20 being positioned normal to said cathode.

5. A luminescent screen comprising a supporting surface, a conductive layer deposited upon
said surface, and a fluorescent material formed from the reaction product resulting from thermal treatment of a mixture on the order of 98%
25 of strontium oxide and on the order of 2% of manganese dioxide deposited upon said conductive layer.

6. A luminescent screen comprising a supporting surface and a fluorescent material formed
30 from the reaction product resulting from a thermal treatment of a mixture only of manganese dioxide and an oxide of an element chosen from the first series of the second group of the periodic table deposited upon said supporting
35 surface.

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