Nov. 21, 1950 C. F. VEENEMANS 2,530,743

SECONDARY EMISSIVE ELECTRIC DISCHARGE TUBE

Filed May 9, 1946

Fig. 1.

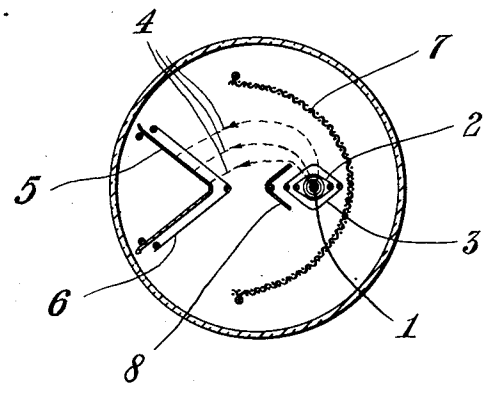
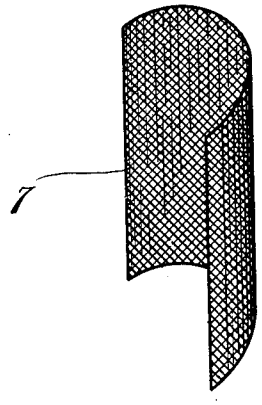


Fig. 2.



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SECONDARY EMISSIVE ELECTRIC DISCHARGE TUBE

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1 Claim. (Cl. 250—174)

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This invention relates to an electric discharge tube comprising one or more secondary emission electrodes, that is to say electrodes which are superficially provided with a material having the property of readily emitting secondary electrons on being struck by a primary electronic current. As is well-known, materials of this kind are in particular the alkali metal compounds, for example caesium oxide.

It is already known in such tubes comprising one or more secondary emission electrodes to build up the electrode system in such manner that a secondary emission electrode cannot be struck directly by material vaporising from the primary cathode. This may be achieved in a simple manner by placing one or more screens between the primary cathode and the secondary emission electrode so that a path along straight lines between these electrodes is no longer possible, and further with the aid of electrostatic and magnetic means by providing for the primary electrons to flow along curved paths from the cathode to this secondary emission electrode. According to one particular form of construction of the structure above referred to, for acting upon the electron paths use is made of an electrode of curved shape which encloses the space to be traversed by the electrons.

In the above described constructions, the drawback is encountered that the secondary emissive electrode acquires too high a temperature because of the heat which is radiated from the cathode and reflected to the secondary emissive electrode by the electrode which curves the paths of the electrons.

The difficulty involved may be obviated with the aid of a simple means when use is made of a discharge tube according to the invention, which tube comprises an electrode system having one or more secondary emission electrodes, the electrode system being so constructed that with the aid of an electrode having a definite shape the electrons are guided from the cathode to the secondary emission electrode along curved paths, said electrode being made from perforated material. For this purpose, this electrode is preferably made from wire or gauze, but it is also possible to obtain the apertures in another manner, for example by utilising a punched plate.

When using such a tube the stated drawback is obviated in a very simple manner whilst retaining the electrode construction substantially unmodified, so that the electrode acting upon the electronic paths may continue to fulfill completely its function and may also exhibit the

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shape most advantageous for this action. The advantages offered by this electrode structure are therefore completely retained.

As previously stated, the electrode system and in particular the electrode determing the paths of the electrons may be constructed in different manners. According to one particular enbodiment of the present invention, this electrode has the shape of a cyclindrical mirror having a parabolic or substantially parabolic section, the primary cathode being arranged in the focal line of this mirror. As has been found, this construction is very advantageous for obtaining satisfactory paths of the electrons and would on the other hand be extraordinarily disadvantageous for the thermal reflection if the said electrodes were manufactured from solid material. Consequently, in this case the use of a discharge tube according to the invention offers very great advantages.

The invention will be explained more fully with reference to the accompanying drawing, given by way of example, in which

Fig. 1 shows diagrammatically the structure of the electrode system of a tube according to the invention.

Fig. 2 shows a cylindrical mirror having a parabolic section.

Referring to Fig. 1, 1 designates a cathode surrounded by a control grid 2 and a screen grid 3. The electrons passing out of the cathode are guided along the curved paths 4 to the secondary emission electrode 5, the secondary electrons passing out of the latter being collected by an anode 6. These curved paths are obtained by the arrangement of an electrode 7 which, according to the invention, is not from solid material, but from gauze or wire. This electrode is preferably connected to a point of low potential.

A direct path between the cathode and the secondary emission electrode is prevented due to a screen 8 being provided between these electrodes. Fig. 2 shows more clearly the shape of the electrode 7. This electrode is of gauze and, as may be readily seen from the figure, exhibits the shape of a cylinder having a parabolic section. It is thus achieved that on the one hand the most advantageous conditions for the paths of the electrons are available and on the other hand the heat generated by the cathode is not reflected but may radiate freely through the meshes of the gauze.

I claim:

An electron discharge tube comprising a pri-

mary cylindrical cathode for generating electrons, a secondary electron, emissive electrode, electron and heat shielding means interposed in the direct paths between said cathode and the secondary emissive electrode, and electrodes for directing electrons from said cathode to the secondary emissive electrode along curved paths, said electrodes comprising an apertured wire gauze deflector having a cylindrical parabolic shape and having the focal line thereof substantially coincident with the axis of the cathode.

CORNELIS FREDERIK VEENEMANS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,042,951	Marden	June 2, 1936
2,095,337	Loppacker	Oct. 12, 1937
2,146,607	Overbeek	Feb. 7, 1939
2,223,001	Farnsworth	Nov. 26, 1940
2,340,631	Overbeek	Feb. 1, 1944

FOREIGN PATENTS

Number	Country	Date
852,078	France	Oct. 16, 1939