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ELECTRON DISCHARGE APPARATUS

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FIG. 1.

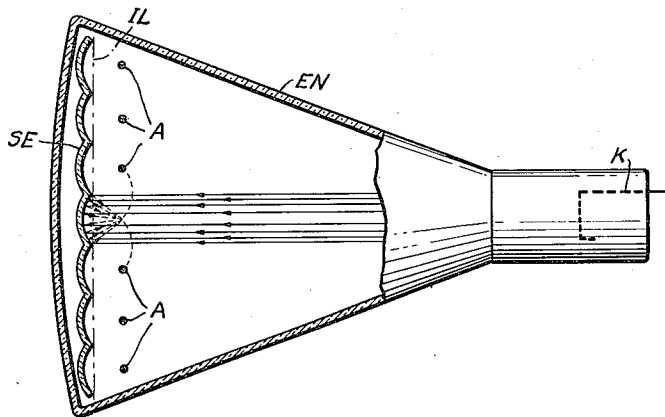
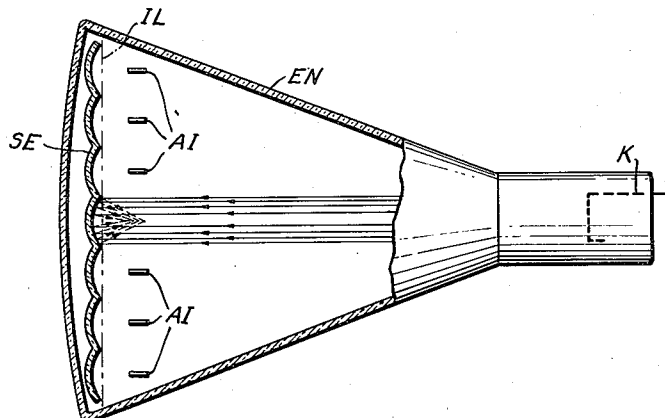


FIG. 2.



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ELECTRON DISCHARGE APPARATUS

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2 Claims. (Cl. 313-68)

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In certain electron discharge devices employing the principle of secondary emission, it is necessary to provide close to the secondary emission electrode and within the primary electron stream another electrode to collect the secondary electrons. This electrode is normally the output electrode (i. e. the anode). As this electrode also provides the electric field to draw the secondary electrons away from the secondary emission electrode, it is necessary for it to cover the whole active surface. On the other hand, it must produce as small an obstruction as possible to the primary current stream.

For these reasons it is usual to make the anode at least partly in the form of a grid in front of and close to the secondary emission electrode. It has now been found that this method of construction has bad effects on the performance of the valve, particularly at high frequencies, due to the oscillation of the secondary electrons about the anode wires prior to collection.

Fig. 1 illustrates one embodiment of the invention wherein the collector electrode comprises grid-like wires;

Fig. 2 illustrates a modification wherein the grid wires of Fig. 1 are replaced by strip members.

It is now proposed so to shape the secondary emitting electrode that the emitted electrons are focussed upon the linear elements of the collecting electrode. In one embodiment shown in Fig. 1 of the accompanying drawing the secondary emission electrode SE, instead of presenting a flat surface is fluted or otherwise shaped to form a number of parallel channels, each channel being part of a circular cylinder. On the centre line of each channel section, but not necessarily at the centre of curvature, is positioned a wire A extending along the channel. The wires A are connected together to form the collecting electrode. It has been found that such a structure focuses the secondary electrons on to the wire if the dimensions are suitably chosen. Furthermore, if the electrode field beyond the collector wires from the emissive surface is suitably adjusted, those electrons which are not immediately collected can be focussed on to the next wire along the anode-grid. This effect becomes operative due to the fact that the secondary electrons are withdrawn

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at various angles from the general plane of the emissive plate instead of normally therefrom so that they have a substantial lateral velocity component. Referring now to Figs. 1 and 2 in which the electron discharge device is shown in fragmentary and schematic form so as to emphasize the invention herein, an envelope EN is provided within which a source of a stream of electrons such as for example a cathode K is arranged towards one end of the envelope and provides a primary stream of electrons. In the drawing the primary electron paths are represented by full lines and the secondary electron paths by dash lines. The secondary emissive electrode SE is spaced from said source K and has a secondary emissive surface facing said source in the shape of a continuous curve which likewise faces said source. The shape of this surface is such as to focus the secondary electrons at a predetermined point and the collectors A and A' are mounted in the path of said secondary electrons at said predetermined point. It will be seen that said concave surface forms one wall of a recess and the imaginary plane IL (Fig. 1) across the open end of said surface forms the other wall of said recess. The collector electrode is mounted outside said recess. The construction illustrated makes it possible to use fewer wires on the anode-grid and thus decrease the number of primary electrons which are collected by the anode. This number may be still further reduced if the wires are replaced by strips A' as shown in Fig. 2 of the drawing, these strips being disposed with their width dimension preferably normal to the general plane of the emissive plate, and parallel to the assumed direction of the incident primary electrons.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. An electron discharge device comprising a source of electrons, a secondary emissive electrode spaced from said source and having a secondary emissive surface facing said source in the shape of a continuous curve whereby secondary electrons emitted by said electrode are focussed at a predetermined point and a col-

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lector electrode mounted in the path of said secondary electrons at said predetermined point.

2. An electron discharge device comprising a source of electrons, a secondary emissive electrode spaced from said source and having a concave secondary emissive surface in the shape of a continuous curve facing said source whereby secondary electrons emitted by said electrode are focussed at a predetermined point, said concave surface forming one wall of a recess and an imaginary plane across the open end of said surface forming the other wall of said recess, and a collector electrode mounted in the path of said secondary electrons at a point outside of said recess.

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