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W. HINSCH
CATHODE RAY TUBE
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Fig. 1

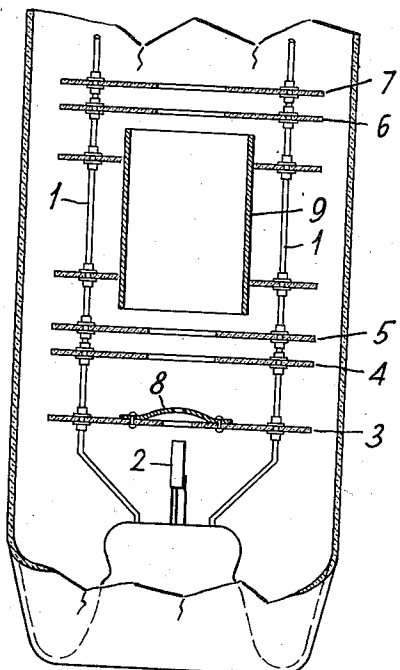


Fig. 5

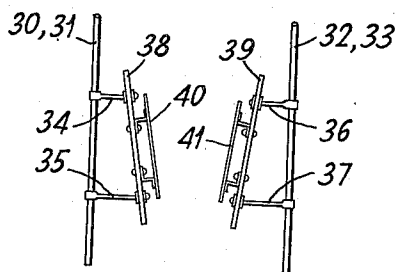


Fig. 6

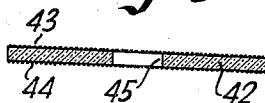


Fig. 7

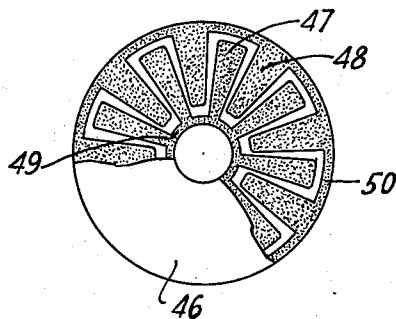


Fig. 2

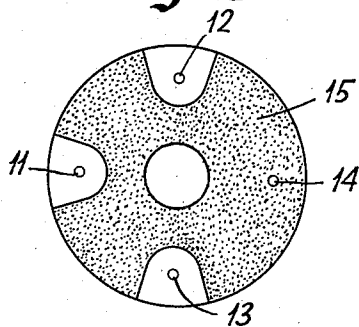


Fig. 3

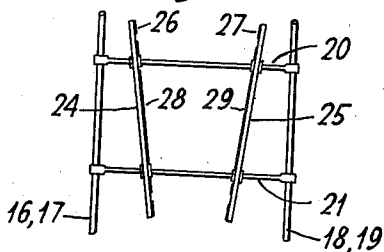
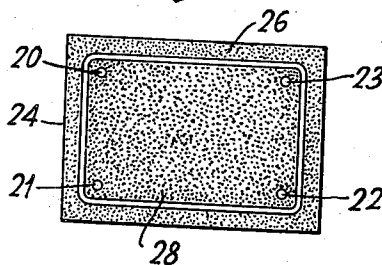


Fig. 4



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CATHODE RAY TUBE

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2 Claims. (Cl. 250—155)

The electrodes for Braun or cathode-ray tubes in the prior art have, as a rule, been made of metal, that is to say, the diaphragms or stops were bent or punched from metal to assume the desired shape. Quite apart from certain difficulties attendant upon manufacture, metallic electrodes of the said sort involve the drawback that they are liable to deform or warp as a result of the thermal treatment they have to undergo during degassing, and that they are liable to result in the production of eddy-currents especially in the operation with high frequencies of external magnetic deflector fields, and this involves a chance of causing changes in the frequency curve of deflection or the deflection voltage generator in an undesirable manner. Moreover, the construction of such tubes is rendered more difficult because of the fact that the metallic electrodes must be insulated from the supports thereof whenever the latter serve jointly for a plurality of electrodes, by the provision of distinct interposed insulating pieces or parts.

Now, the present invention is concerned with an embodiment of electrodes for Braun or cathode-ray tubes in which the said drawbacks are avoided. According to the invention, the said electrodes consist preferably of mica laminations with conductive coats consisting most suitably of graphite. Electrodes of this kind possess several advantages. In the first place, they are of very low weight, and this is a feature which becomes especially valuable in the case of such elongated systems or assemblies as are frequently required in Braun tubes. In the second place, the said enous coat or film possesses a high electric resistance with the result that eddy-currents have but little chance of being set up therein. This circumstance would seem to make the use of such electrodes of practical advantage and utility especially where high-frequency deflection or time-bases are concerned. Moreover, the electrodes contain no magnetizable material if, for instance, the conductive coat or film deposited upon the mica discs consists of graphite or "Aquadag." As regards the manufacturing and the technological viewpoint of manufacture of these electrodes, they offer the advantage that deformation or warping of the electrodes as a result of heat treatment is obviated and that in spite of low weight a very stable system may be realized in a simple manner.

In the drawing,

Figure 1 shows the manner of assembling electrodes constructed in accordance with this invention,

Figure 2 shows in detail one of the electrodes, Figures 3 and 5 show different manners of supporting deflecting electrodes constructed in accordance with this invention, and

Figures 4, 6 and 7 show various modified forms of electrodes.

Referring to Figure 1, elements 1, 1 are two of four metallic supporter rods. Attached to the latter by the aid of hollow rivets are several mica laminations or discs upon which are placed the conducting coats acting as electrodes. At the cathode 2 is disposed a mica plate 3 with a coat or film of graphite or "Aquadag." This mica plate serves as the control electrode. Next there is the pre-focusing lens comprising the two plates 4 and 5. The accelerator lens consists of two plates 6 and 7. Next there are mounted the deflector plates; these may be of the special embodiments shown in more detail in some of the following figures. Figure 1 also shows that in some instances in which some of the electrodes are called upon to carry particularly large loads, either in the course of their manufacture or during normal operation of the system, it is of advantage to secure also metallic diaphragms on the graphite plates or discs. For instance, over the cathode a metallic diaphragm or stop 8 is mounted, the same being secured to the plate 3 by means of rivets and being called upon to take up the powerful electron emission current during the formation or activation of the cathode. There is moreover a metallic screen or shield 9 so mounted as to surround the electron beam, so that the latter will be shielded thereby from the supporter rods which serve at the same time as the current-supply leads. The field set up by these rods, therefore, will be unable to exercise any influence upon the shape or path of the rays or the pencil of electrons.

Figure 2 shows a top or plan view of one of the electrodes. In this exemplified embodiment the mica disc 10 is supported by four supporting rods 11, 12, 13, 14, and it has a graphite or "Aquadag" coating 15 which is omitted in the neighborhood of the supporter rods 11, 12 and 13. In other words, there is an electrically conducting connection only between this electrode and rod 14. In this manner, a number of insulation elements are dispensed with which would be indispensable where metallic electrode systems are concerned.

Exemplified embodiments of the ways and means for the securing of the deflector plates and also the shape of the latter are shown in Figures 3 and 4.

The supporting rods 16, 17, 18 and 19 support four transversal rods 20, 21, 22 and 23. Secured to these cross bars (which may be connected with the supporter rods, for example, by welding) are the two mica plates or discs 24 and 25. Each of the two plates carries two conducting coats, that is, a coat 26, 27 at the edge of the disc, and another coat 28, 29 about the center of the disc and spaced apart and separated from the former. These latter coats 28 and 29 have distinct current supply leads and they serve to cause deflection of the electron pencil or beam. The coats 26 and 27 embracing the marginal portions of the discs are maintained at cathode potential and they shield the central coats of the discs with respect to the outside or ambient. It can be easily seen that in this particular embodiment all of the four supporting rods will be at plate or anode potential. In other words, the other electrodes, in this instance, will have to be furnished with distinct current-supply leads. If this necessity is to be dispensed with, as illustrated in Figure 5, intermediate discs of mica 38 and 39 could be disposed on the supporter rods 30, 31 and 32, 33, respectively, by the aid of metallic intermediate elements 34, 35, and 36, 37, respectively, and to these said intermediate mica discs 38 and 39 the electrode discs 40 and 41 could be attached in some suitable manner and which, in turn, bear the shielding coat kept at plate or anode potential and presenting a break only at the points where the supporting rods are attached.

The pre-focusing lens shown in Figure 1 consists just like the accelerator lens or gun of two parallel plates. As a general rule, each of these plates or discs is covered upon both faces with a coherent or connecting conductive film or coat. Instead of using two plates or discs, as shown in Figure 6, it would also be possible to employ a single plate 42 which is covered with two coats 43 and 44. The portion indicated at 45 is uncoated. The effect of such a plate is the same as that of two plates according to Figure 1. Moreover, it is occasionally desirable to so form one electrode for the insurance of a definite fall of potential in that it presents surface parts of different potential. This idea is also realizable in

an especially desirable way in electrodes as here disclosed. A mica disc 46 is covered with sector-shaped coats 47 and 48, each alternate sector being at the same potential, in other words, so that sequential sectors are at dissimilar potentials. The coats 47, as shown in Figure 7, are interconnected by the aid of a ring 49, and the coats 48 by means of a ring 50, and according to the configuration or pattern of the field they are connected with definite potentials which as a general rule are different from one another. Electrodes of this kind are made by the aid of the method hereinbefore disclosed more easily than is true of metallic electrodes.

I claim:

1. In a cathode ray tube wherein an electron gun structure is provided for producing a cathode ray beam, said gun structure including an accelerating electrode comprising a flat insulating member, a central perforation in said member and a plurality of perforations adjacent the periphery thereof, a conducting coating of graphite on one surface of said member covering the entire surface of the member except for the area immediately surrounding some of the peripheral perforations, and conducting support rods extending through the peripheral perforations for supporting the member and for establishing electrical contact with the coating surrounding the remaining peripheral perforations.

2. In a cathode ray tube wherein an electron gun structure is provided for producing a cathode ray beam, said gun structure including an accelerating electrode comprising an annular insulating member of predetermined thickness, a plurality of perforations adjacent the periphery thereof, a conducting coating of graphite on each surface of said annular member covering the entire surface of the member except for the area immediately surrounding some of the peripheral perforations, and conducting support rods extending through the peripheral perforations for supporting the member and for establishing electrical contact with the coatings surrounding the remaining peripheral perforations.

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