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H. A. IAMS

2,120,099

MOSAIC SCREEN STRUCTURE

Original Filed March 30, 1933

Fig. 1.

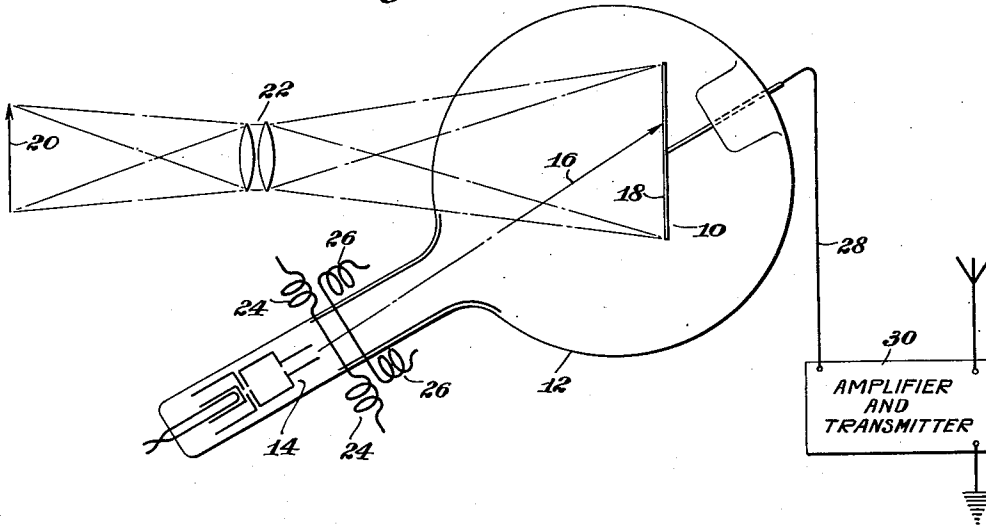


Fig. 2.

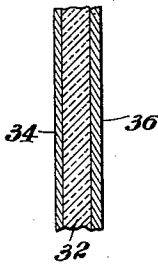


Fig. 3.

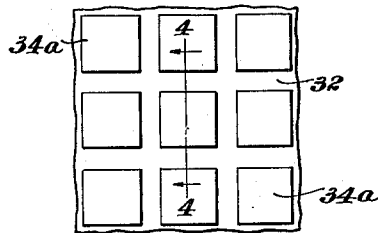
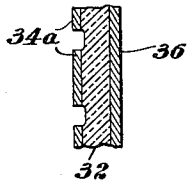


Fig. 4.



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MOSAIC SCREEN STRUCTURE

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10 Claims. (Cl. 250—27.5)

My invention relates to improvements in methods of making mosaic screen structure, and particularly to such structure for embodiment in a cathode ray tube for television transmission.

One form of cathode ray tube for television transmission comprises screen structure made of a sheet of insulating material over one surface of which is disposed a great number of individual elements of electrically-conductive material, such as silver. These elements are spaced with respect to each other, and each is photosensitized. In operation, a light image of the object is projected onto the photosensitive, mosaic surface to develop an electrical image of the object in the form of individual electrostatic charges on the respective elements which correspond in magnitude to the respective and corresponding values of light intensity at the elemental areas over the object. The tube is provided with means for developing a cathode ray and directing it onto the photosensitive, mosaic surface, which ray is deflected in a predetermined manner for scanning. During the scanning action, the electrostatic charges referred to are successively neutralized to develop picture signals for transmission.

With regard to the construction of satisfactory mosaic screen structure for the above purpose, the requirements are such as to give rise to difficult problems. For example, if sufficient detail of the transmitted object is to be reproduced at the receiving points, the number of the individual elements over the screen surface should be of the order of 10,000 per square inch, and the size and spacing should be such that the correct capacities will be obtained to handle the electrostatic charges referred to. Furthermore, the construction must be such that practically no leakage can take place between adjacent elements. Otherwise, the electrostatic charges accumulated will leak away, at least partially, before being scanned and discharged by the ray. This undesirable leakage action interferes with fidelity of picture reproduction at the receiving points.

Another important consideration in the construction of the mosaic screen resides in the nature of the steps for making the tube. For example, one of these steps consists in the baking of the tube at a relatively high temperature. The temperature is so high that there is a limitation on the construction and materials used for making the screen structure. Otherwise, this structure would be destroyed during

the final steps in the making of the tube. Many different types of screen structure have been proposed, but each of these has been found to have at least one disadvantage to prevent it from meeting all of the requirements referred to.

With the foregoing in mind, it is one of the objects of my invention to provide an improved method of making mosaic structure of the character referred to whereby all the requirements for satisfactory operation and manufacture are met.

In accordance with my invention, a substantially continuous layer of electrically-conductive material is applied to one side of a sheet of insulating material. This layer is then ruled with a sharp-edged instrument along two sets of parallel lines, the lines of one set being disposed at any desirable angle to those of the other set. In this way, minute parallelograms are engraved on the surface and constitute the individual elements required.

My invention resides in the improved method of the character hereinafter described and claimed.

For the purpose of illustrating my invention, an embodiment thereof is shown in the drawing, wherein

Figure 1 is a simplified elevational view, partly diagrammatic, of apparatus embodying my invention;

Fig. 2 is an enlarged sectional view, illustrating one step in my improved method;

Fig. 3 is an enlarged fragmentary view, illustrating another step in my improved method; and

Fig. 4 is a sectional view, the section being taken on the line 4—4 in Fig. 3.

With reference to Fig. 1, the numeral 10 designates my improved screen structure embodied in a cathode ray tube 12. The tube is provided with suitable means 14, in the form of a gun, for developing a ray 16 of electrons which is directed at the photosensitive, mosaic surface 18 of the screen 10. In operation, an image of the object 20 is projected by a suitable lens system 22 onto the surface 18.

The ray 16 is caused to scan the surface 18 by coils 24 which operate to deflect the ray horizontally, and by coils 26 which operate to deflect the ray vertically. The picture signals developed in the output line 28 from the tube are amplified and transmitted by suitable apparatus 30.

With reference to Figs. 2, 3 and 4, my improved screen structure is made by taking a mica sheet 32 and applying to one surface there-

of a thin and continuous layer 34 of silver. A continuous coating 36 of platinum is applied to the other side of the mica sheet. In operation, the connection 28 is made to the layer 36.

5 Satisfactory screen structure has been made by using a mica sheet about 1/1000" thick, and by making the thickness of the silver layer 34 of the order of 1/10,000" thick. These values are not critical in any strict sense of the word, 10 and may be varied over a relatively wide range to suit particular requirements.

The silver layer 34 is then ruled with a suitable sharp-edged instrument along two sets of parallel, evenly-spaced lines, wherein the lines of one set 15 are preferably, though not necessarily perpendicular to those of the other set. This makes the square silver elements 34a, as shown in Fig. 3, each of which is later photosensitized. In the ruling operation, the edge of the instrument is 20 made to cut entirely through the silver layer 34 and slightly into the mica sheet 32, so that there is assurance that the insulating material will be laid bare between the elements 34a. Another advantage of this method is that the leakage path 25 between the adjacent elements 34a, measured along the surface of the mica, is greater than the distance between the adjacent elements. With regard to the ruling step, satisfactory results have been obtained by making the number of 30 lines in each set equal to 100 per inch.

From the foregoing, it will be seen that I have provided an improved method of making a mosaic screen structure wherein the individual elements of electrically-conductive material are formed by 35 first applying a layer of this material to one surface of an insulating sheet, and then by removing some of the electrically-conductive material to lay bare the insulating material between the respective elements and thereby form the latter.

40 I claim as my invention:

1. A light sensitive screen structure comprising a sheet of insulating material provided on a surface thereof with a mosaic in the form of a plurality of individual light sensitive elements of 45 electrically-conductive material each insulated and spaced from each other, the leakage path between the respective adjacent elements measured along the intervening insulating surface being greater than the distance between such 50 elements.

2. A screen structure comprising a sheet of insulating material provided on a surface thereof with a layer of electrically-conductive light sensitive material having intersecting grooves there- 55 through forming over said surface a mosaic comprising a plurality of individual elements of the electrically-conductive material each insulated from the others by the insulating material of said sheet, said sheet being provided on the other 60 surface thereof with a layer of electrically-conductive material insulated from each of said elements by the insulating material of said sheet and providing an operating electrode common with respect to said elements and which constitutes, with each of said elements and the inter- 65 vening insulating material of said sheet, a condenser.

3. Screen structure comprising a sheet of insulating material provided on a surface thereof 70 with electrically-conductive material having intersecting grooves therethrough to form over said surface a mosaic comprising a plurality of individual elements of the electrically-conductive material each insulated from the others by the 75 insulating material of said sheet, said elements

being photosensitive, said sheet being provided on the other side thereof with a layer of electrically-conductive material insulated from each of said elements by the insulating material of said sheet and providing an operating electrode 5 common with respect to said elements and which constitutes, with each of said elements and the intervening insulating material of said sheet, a condenser.

4. Screen structure comprising a sheet of in- 10 sulating material provided on a surface thereof with a layer of electrically-conductive material having therethrough two sets of parallel grooves intersecting to form over said surface a mosaic 15 comprising a plurality of individual elements of the electrically-conductive material each insulated from the others by the insulating material of said sheet and being in number at least of the order of ten thousand to the square inch, said 20 sheet being provided on the other side thereof with a layer of electrically-conductive material insulated from each of said elements by the insulating material of said sheet and providing an operating electrode common with respect to 25 said elements and which constitutes, with each of said elements and the intervening insulating material of said sheet, a condenser.

5. Screen structure comprising a sheet of insulating material whose thickness is of the order of one one-thousandth of an inch and which is 30 provided on a surface thereof with a layer of electrically-conductive material whose thickness is of the order of one ten-thousandth of an inch and which has therethrough two sets of parallel grooves intersecting to form over said surface a 35 mosaic comprising a plurality of individual elements of the electrically-conductive material each insulated from the others by the insulating material of said sheet and being in number at least of the order of ten thousand to the square inch, 40 the leakage path between the respective adjacent elements measured along the intervening insulating surface being greater than the distance between such elements, said sheet being provided on the other side thereof with a layer of electrically-conductive material insulated from each of 45 said elements by the insulating material of said sheet and providing an operating electrode common with respect to said elements and which constitutes with each of said elements and the in- 50 tervening insulating material of said sheet, a condenser.

6. The method of preparing a mosaic electrode which comprises coating one side of a non-con- 55 ducting base with a continuous film of conducting material, scoring the conducting material along a plurality of predetermined intersecting paths to remove completely from the insulating base the scored conducting material and to provide thereby a mosaic structure of minute-size 60 conducting areas supported in an electrically isolated manner upon the non-conducting base, and coating the opposite side of the non-conducting base with a continuous film of conducting material. 65

7. The method of preparing a mosaic electrode which comprises coating one side of a non-con- 70 ducting base with a continuous film of conducting material, scoring the conducting material along a plurality of predetermined intersecting paths to remove completely from the insulating base the scored conducting material and to provide thereby a mosaic structure of minute-size 75 conducting areas supported in an electrically isolated manner upon the non-conducting base, 75

coating the opposite side of the non-conducting base with a continuous film of conducting material, positioning the formed mosaic structure within a tube blank, evacuating the tube blank, oxidizing the isolated conducting areas formed on one side of the non-conducting support member, and photosensitizing the oxidized isolated conducting areas only.

8. The method of preparing a mosaic electrode which comprises coating one side of a non-conducting base with a continuous film of conducting material, simultaneously scoring the conducting material and the insulating base to a predetermined depth along a plurality of predetermined intersecting paths to remove completely from the insulating base the scored conducting material and to provide thereby a mosaic structure of minute-size conducting areas supported in an electrically isolated manner upon the non-conducting base, and coating the opposite side of the non-conducting base with a continuous film of conducting material.

9. The method of preparing a mosaic electrode which comprises coating one side of a non-conducting base with a continuous film of conduct-

ing material, simultaneously scoring the conducting material and the insulating base to a predetermined depth along a plurality of predetermined intersecting paths to remove completely from the insulating base the scored conducting material and to provide thereby a mosaic structure of minute-size conducting areas supported in an electrically isolated manner upon the non-conducting base, coating the opposite side of the non-conducting base with a continuous film of conducting material, positioning the formed mosaic structure within a tube blank, evacuating the tube blank, oxidizing the isolated conducting areas formed on the non-conducting support member, and photosensitizing only the isolated conducting areas.

10. The method of preparing a mosaic electrode which comprises coating one side of a non-conducting base with a continuous film of conducting material, producing isolated discrete oxidized metallic particles according to a predetermined pattern on the opposite side of the non-conducting base, and subsequently photosensitizing said oxidized particles.

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