April 11, 1939. M. KNOLL 2,153,628

ELECTRON TUBE

Filed March 17, 1936

Fig. 1

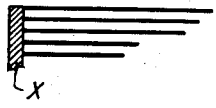
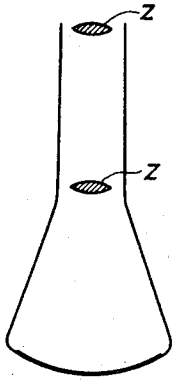


Fig. 2



Fig. 3



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ELECTRON TUBE

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1 Claim. (Cl. 250—27.5)

In the use of Braun tubes which are furnished with a fluorescent screen applied upon glass or upon mica of the kind used in television work, it has been found that the fluorescent screen does not sufficiently drain the electrical charges, with the result that the radiations impacting the screen have to overcome a retarding field so that they lose velocity. The consequence is that the luminous intensity produced by fluorescence is appreciably impaired.

In order to overcome this drawback, a metallic deposit or coat pervious to light or a metallic deposit in the form of parallel strips is to be brought upon the glass or mica (Fig. 1), or else a coat in the shape of intercrossing strips. A light-permeable metallic coat may advantageously be produced by cathode disintegration or spatter of gold which, when in tenuous films, permits of the transmission of green light. If a deposit or coat in the shape of strips is used, then the spacing apart of these strips, and the breadth of the strips themselves, or the space between crossing strips as well as the width thereof should be chosen less than the dimenions of a picture element or elementary area from which the television picture is re-created. Along the edge of the fluorescent screen, the parallel or crossing strips end in a wider metal-covered surface (marked at *x* in Fig. 1) which is connected with a seal.

A strip-shaped deposit or film, if properly dimensioned, may be able to carry off the charges still better, while at the same time it will absorb still less light seeing that the constituent strips can be chosen so thick that their resistance becomes vanishingly low, and yet so narrow that they will not absorb any appreciable quantity of fluorescent light.

To make these strip-shaped metallic films or coating, recourse may be had particularly to a daguerreotype method in which upon the glass or the mica, there is first produced by chemical ways and means or else by vaporization, a continuous uninterrupted metallic deposit. The latter is thereupon sensitized in iodine vapor, whereupon, by optical imaging of a suitable object exposure of the said coat is produced. Next the coat is developed in mercury vapor and fixed in sodium thiosulfate until, at the unexposed places, the iodized metal is removed.

A luminescent screen of the said sort may be made separately, whereupon by cementing with high fusion point glass enamel cement it may be united with the glass body or envelope. It would also be possible to treat the bottom end surface of a Braun tube of normal form in the manner as hereinbefore outlined, whereupon exposure is produced in the desired manner by way of lenses *z* fitted into the neck of the tube.

The present invention is adapted to ionic tubes just as readily as to cathode-ray tubes.

My invention will best be understood by reference to the accompanying drawing in which:

Fig. 1 shows a metallic deposit shape,

Fig. 2 shows a manner of cementing a separate screen into the cathode ray tube, and

Fig. 3 shows schematically an internal optical arrangement used in manufacture.

Referring to Fig. 1, the metallic deposit may be formed in the shape of parallel strips or a coat in the shape of intercrossing strips. These strips are shown as 10 and are joined to their extremity to a common conducting member *x* which may be sealed in the tube and by means of which a bias may be placed on each of the strips. This coating, as has hereinbefore been explained, is deposited on the wall of the cathode ray tube between the fluorescent screen and the glass wall itself.

If it be desired to embody in the tube a fluorescent screen which is separate from the end wall of the tube, the coating may be made on a high fusion point glass and this glass may be united by means of cementing joints, for instance, to openings *y* in the tube, as shown in Fig. 2.

Referring to Fig. 3, there is shown an arrangement by means of which the metallic deposit is deposited on the end wall of the tube. In a daguerreotype process, the metallic material is first deposited on a backing which, in this case, is the wall of the envelope of the tube. It is then combined with iodine vapor which forms an iodide of the metal. An optical image of the coating form is then projected by means of lenses ZZ on to the sensitized metallic iodide and, accordingly, the iodide is exposed. Mercury vapor is then admitted into the tube, and the mercury tends to condense on to portions of the metallic iodide which had been sensitized by the optical image. The coat is then fixed by means of sodium thiosulphate which fixing allows the envelope of the tube to retain the portion exposed to the optical image and the other portions pass off.

It should be noted that if gold is used, then the gold itself allows a passage therethrough of the usual green light associated with fluorescing materials.

What I claim is:

In a cathode ray tube in which is deposited a metallic coating of definite configuration on the inner wall of said tube, the method of forming said deposit comprising the steps of depositing an unbroken surface of the metal, subjecting said surface to the action of iodine vapor, projecting onto said iodized surface an optical image of the desired configuration, subjecting the exposed surface of the deposit to the action of mercury vapor, and then subjecting the deposit to the action of sodium thiosulfate.

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