PUBLISHED
JUNE 8, 1943.
BY A. P. C.

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TELEVISION PICK-UP TUBE
Filed Oct. 9, 1941

Serial No.
414,298

FIG. 1

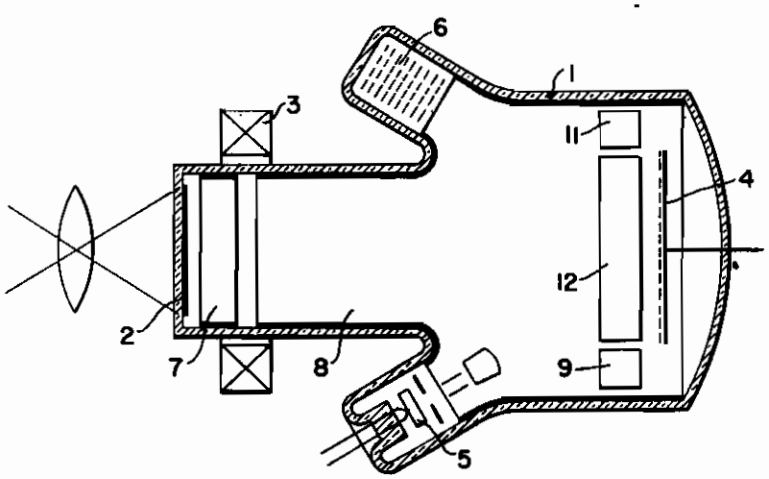
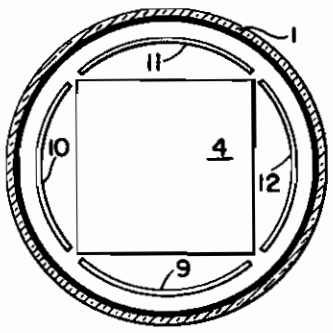


FIG. 2



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Published June 8, 1943 Serial No. 414,298

ALIEN PROPERTY CUSTODIAN

TELEVISION PICK-UP TUBE

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vested in the Alien Property Custodian

Application filed October 9, 1941

The invention relates to television transmission tubes and in particular to pick-up tubes of the charge storage type. The charge storage tubes operating with a scanning cathode ray have the drawback that the video signal is distorted by a signal producing an uneven distribution of the brightness over the picture area.

Usually the presence of the distortion signal is explained by the unsymmetrical distribution of the potentials of the charge storage elements in consequence of the unsymmetrical scanning operation. It is also explained by the fact that in many cases the plane of the screen is not vertical to the central position of the scanning ray. It has also been found that the distortion signal is influenced by the unsymmetrical distribution of light in the image so that the distortion signal depends upon the content of the transmitted pictures.

It is an object of the present invention to provide a cathode ray scanning tube which is free from a distortion signal. It is a further object to improve the compensating means which have been hitherto employed in order to suppress the distortion component of the image signals. It is another object to improve the type of tubes in which additional electrodes are arranged in front of the mosaic electrode in order to produce a more uniform field for drawing away the electrons. A further object is to provide a cathode ray scanning tube including a secondary emission multiplier for immediately multiplying the electrons which are liberated from the storage electrodes by the scanning action. A particular object of the invention is to provide a new and improved input system for the secondary emission multiplier arranged in a cathode ray scanning tube.

According to the invention a tube is employed in which the storage electrode is not illuminated directly but in which the charges are produced by electrons emitted by a separately arranged photoelectric cathode. A tube of this type is combined with a secondary emission multiplier. The first stage of the multiplier is formed by a number of electrodes surrounding the path of the photoelectrons completely or at least partly and consisting of surfaces forming in their combination a frame or ring. The individual electrode elements are insulated from one another. This input electrode has at the same time the function of producing a suitable field distribution by applying different potentials to the individual elements of the complete frame electrode. It has the further effect that the electrons emitted by the storage electrode during the scanning action are multiplied to a larger or smaller degree in dependency upon the potential of the individual electrode element. The following electrodes of the multiplier are arranged laterally to the path of the photoelectrons and of the scanning ray preferably in an extension of the tube having a similar situation as the extension containing the electron gun system. The unsymmetrical field distribution produced by this extension can be easily equalized or neutralized by a suitable choice of the potentials of the individual electrode elements.

Experiments have shown that very good results have been obtained by an arrangement of this type. The arrangement has also the advantage that it is simple in construction and that the first secondary emissive electrode can be easily activated and sensitized.

Other aspects of our invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but we do not limit ourselves to the embodiment of the invention herein described, as various forms may be adopted within the scope of the claims.

Referring to the drawing

Fig. 1 shows a longitudinal section through a tube according to the invention and Fig. 2 a cross section through the tube of Fig. 1 in a plane near the storage electrode.

The cathode ray tube 1 contains a photoelectric cathode 2 and a storage electrode 4. The electron image produced by the photoelectric cathode is sharply reproduced by a magnetic lens 3 upon the storage electrode. The storage electrode may for instance consist of an insulating surface. An electron gun system 5 is arranged in a lateral extension of tube 1. A similar extension on the opposite side of the tube contains a system of secondary emissive grids 6 arranged one behind the other. The tube contains wall coatings 7 and 8 forming an electrostatic lens. The tube contains furthermore in accordance with the invention a number of electrodes 9, 10, 11, 12, forming together a ring-like structure. These electrodes are preferably made of the same material and are sensitized in a similar manner as the secondary emissive electrodes of the multiplier 6. The electrode elements 9, 10, 11, 12 have two effects, namely to produce the desired field distribution and to produce a multiplication of electrons liberated at the storage electrode by the scanning action. In this manner it is possible not only to draw away the electrons from the charge storage surface on predetermined paths but it is also possible to in-

fluence the degree of multiplication in accordance with the spot of the screen from which the electrons are coming so that the differences in signal amplitudes can be easily equalized.

The potential applied to electrodes 9, 10, 11 and 12 varies for instance between 0 and 100 V against the potential of the wall coating or anode 8. It is however not necessary in all cases to vary the potential over this entire range. It is furthermore not necessary in all cases to operate with a secondary emission factor higher than 1, but it may be preferable to operate with lower values. It is, however, essential that this factor is changed by adjusting the potential of the electrodes.

The electrode arrangement may also be formed in such a manner that it surrounds the space in front of the storage electrode only partly. One or the other of the electrodes may for instance be omitted.

The drawings show the electrodes in the form of curved metal strips. Other forms of electrodes may be employed instead thereof. The metal strips may be arranged under an angle to the axis of the tube so that they form a part of a cone- or pyramid-like surface opening or widening in the direction to the photoelectric cathode. The angle may be different for different electrodes. The electrodes may also extend further into the direction of the photoelectric cathode or they may consist of narrow strips extending only slightly beyond the surface of the storage electrode.

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