

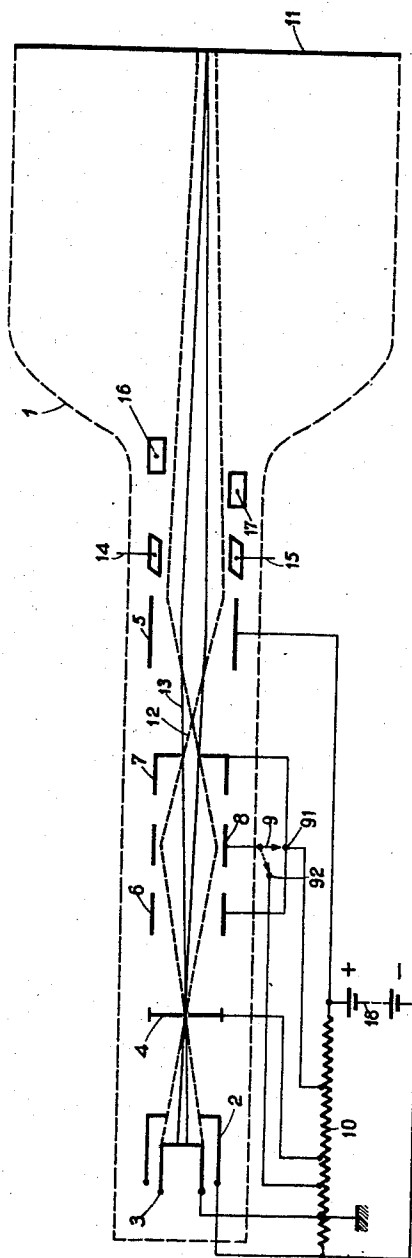
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STORAGE TUBES

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STORAGE TUBES

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3 Claims. (Cl. 315-12)

The present invention relates to storage tubes, and more particularly to guns adapted to be used in such tubes.

It is current practice to make use of an electron beam for "reading" information stored or "written" by any suitable process on the target of a storage tube. The reading of the information will usually cause only a partial erasure thereof. A fraction of information is still left, which normally has to be completely erased before proceeding to a new writing. This erasure is frequently effected by means of an additional scanning performed by the reading beam. However, the spot of this beam on the target is extremely fine and the time required for a complete erasure is considerable.

It is an object of the present invention to avoid this difficulty.

The storage tube according to the invention is of the type comprising in a vacuum tight envelope, at least one gun and one target. The gun comprises a cathode for emitting an electron beam and means for controlling this beam in order that the impact thereof on the target should produce, either a fine spot or on the contrary, a spot extending over a certain area in accordance to what is needed. The fine spot beam is used for normal reading, and the same beam, when providing a wider spot, is used for erasing.

The invention will be better understood from the ensuing description taken in connection with the appended drawing, diagrammatically representing, by way of example, a portion of a storage tube, showing the improvements according to the invention.

As shown, the storage tube of the invention comprises, inside an evacuated envelope 1, an electron gun having a cathode 3, a Wehnelt cylinder 2. The gun also comprises, in succession: a first accelerating anode 4, having the shape of a disc with a central opening; three focusing cylindrical electrodes 6, 8 and 7, aligned in succession but spaced from each other, the electrode 7 being farthest of the three from the cathode and including a disk portion having a central axial opening of smaller diameter than the cylindrical electrode portion; a second accelerating anode 5, having a cylindrical shape; and two pairs of deflection plates 14, 15 and 16, 17. The portion of the memory tube shown is limited by a target 11.

The above elements build up the reading and erasing gun of the tube. The writing gun is usually located on the other side of the target 11 and is not shown in the drawing. A battery 18 is connected to the terminals of a potentiometer 10 to supply the necessary voltages to the various electrodes.

According to the invention, a switch 9 having two contacts 91 and 92 enables two different voltages to be applied to the focussing electrode 8. Electrodes 6 and 7 are also connected to contact 91. For a better understanding of the invention, a numerical example will be given hereinafter.

The Wehnelt cylinder 2 is brought to a negative potential of about 10 volts with respect to cathode 3. The accelerating anodes 4 and 5 are respectively brought to

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positive voltages of 300 and 1,500 volts. The focusing electrodes 6 and 7 are brought to a positive voltage of 800 volts through contact 91. When switch 9 connects electrode 8 to contact 91, the voltage of electrode 8 is also 800 volts. The path of the beam projected by the cathode 3 is shown in full lines at 13 and its spot on the target 11 is extremely fine. The beam shown in full lines represents only a portion of the total electrons of the beam emitted from the cathode 3, this portion being that which traverses all of the focusing and accelerating electrodes. The beam represented by solid lines is unaffected and remains divergent in passing through the electrode 8 when switch 9 is connected to contact 91. When switch 9 connects electrode 8 to contact 92, the voltage of electrode 8 is 100 volts. Electrodes 6, 7, 8 then function as a composite electro-static lens and the path of the beam is then substantially as shown in dotted lines at 12, with the spot on target 11 wider than previously shown. The change in voltage applied to electrode 8 results in the divergent beam being made convergent so that substantially all of the electrons pass through the central opening of the focusing electrode 7. Thus the focusing system comprising electrodes 6, 8 and 7 controls the angular resolution of the beam which is more or less spread near and upon the target in accordance with the voltage applied to electrode 8. As explained above, the fine beam spot is used for reading information stored on screen 11, and the wide beam spot for erasing the information left on screen 11 after reading. In both of the foregoing reading and erasing modes of operation, the beam is guided in the tube under the influence of the same accelerating potentials, but the course of the beam electrons are determined by the potential of the electrode 8.

It is of course to be understood that the invention is not limited to the embodiment described, nor to the numerical values given, which are by way of example only.

What I claim is:

1. A storage tube including a target electrode, an electron gun adapted to emit an electron beam toward said target and comprising a cathode, a disc having a central opening disposed between said cathode and said target so that in one mode of operation only a part of the emitted beamed electrons traverse said opening and reach said target in a fine spot, electrically energized means between said cathode and said disc for converging said beam during another mode of operation so that substantially all of the emitted beamed electrons traverse said opening and impinge upon said target in a wide spot, and means for switching on and off said converging means in accordance with the respective modes of operation, said electron gun including accelerating electrode means for said beam providing substantially the same electron velocities of target impinging electrons during both modes of operation.

2. A storage tube comprising inside a vacuum tight enclosure, a target, an electron gun adapted to produce an electron beam directed toward said target, said gun including an electron emissive cathode, a control electrode, a first accelerating anode having the shape of a disc with a central opening, two cylindrical electrically interconnected focusing electrodes for controlling angular resolution of said beam, a second accelerating anode, an additional cylindrical focusing electrode positioned between said two focusing electrodes, and means for switching said additional focusing electrode from a first to a second potential with respect to said cathode, said first potential being so chosen to permit said beam to diverge in passing through the additional focusing electrode, whereby only part of the electrons of said beam traverse the focusing electrodes and said second accelerating anode to reach the target in a fine spot, said second potential

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being so chosen to produce a converging effect on the beam by the additional focusing electrode, whereby substantially all of the electrons of said beam traverse the focusing electrodes and said second accelerating anode and impinge upon said target in a wide spot.

3. A storage tube comprising inside a vacuum tight enclosure, a target, an electron gun adapted to produce an electron beam directed toward said target, said gun including an electron emissive cathode, a control electrode, a first accelerating anode having the shape of a disc with a central aperture through which said beam passes, two cylindrical electrically interconnected focusing electrodes, one of said focusing electrodes including a disc with a central opening, a second accelerating anode, an additional cylindrical focusing electrode positioned between said two focusing electrodes, and means for switching said additional focusing electrode from a first to a second potential with respect to said cathode, said first potential being so chosen as to leave said beam substantially unaffected by said additional electrode, whereby said beam passed through said aperture diverges toward said second accelerating electrode and only a part of the beam traverses said central opening and reaches said

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target in a fine spot, while said second potential is so chosen that a converging effect is produced on said beam by said additional electrode, whereby substantially all of the electrons of said beam passed through said aperture traverse said central opening and impinge upon said target in a wide spot.

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