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H. G. BUSIGNIES
INDICATING TUBE SYSTEM

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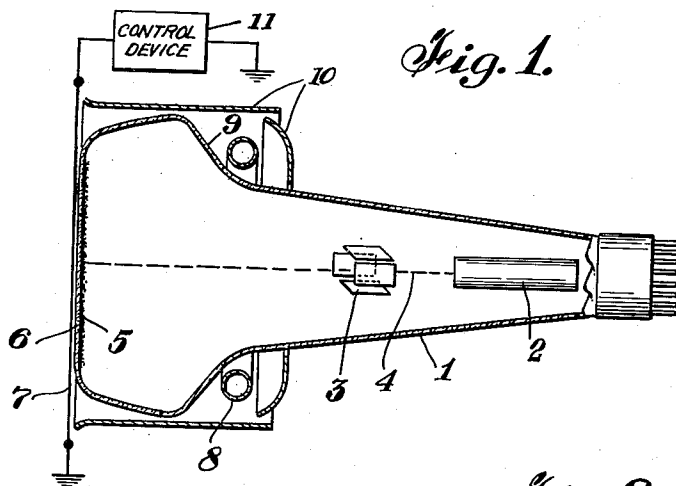


Fig. 2.

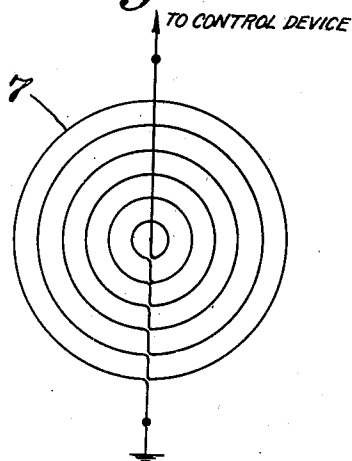


Fig. 4.

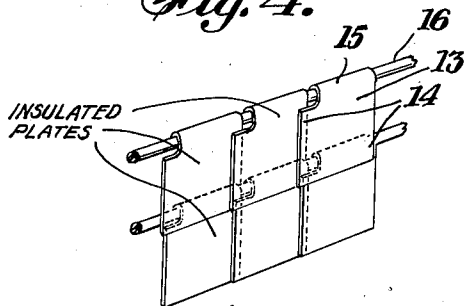
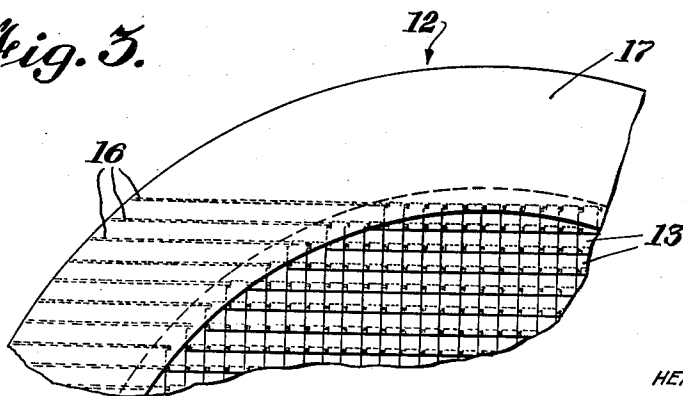


Fig. 5.



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INDICATING TUBE SYSTEM

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4 Claims. (Cl. 250-164)

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This invention relates to cathode ray tubes which are used for indicating purposes.

In certain systems employing cathode ray oscillograph tubes, such as for example, direction finders and radar systems, the time base of the tube is rotated at a relatively low speed, such as for example, one turn per second to one turn every three or four seconds. While the direct light on the screen of the cathode ray tube as the beam strikes the screen is often observable in a fairly brightly illuminated room, the after-glow cannot be seen except in relatively dark rooms. Because of the slow speed of rotation of the beam, visual persistence does not retain the image of the direct beam long enough to make a complete pattern of its path. These effects render such indicators unsatisfactory in airplanes and other places where observation is made in a fairly brightly illuminated zone.

An object of the present invention is the provision of an improved cathode ray tube for indicating purposes.

Another object of the present invention is the provision of a cathode ray tube in which the indication on the screen persists for a relatively longer time and at a relatively greater intensity, as compared with the indication of the conventional cathode ray tube heretofore employed.

Other and further objects of the present invention will become apparent and the invention will be best understood from the following description of embodiments thereof, reference being had to the accompanying drawings, in which:

Fig. 1 is a schematic side sectional view of a cathode ray tube embodying my invention;

Fig. 2 is a plan view of a magnetic field generator used in connection with the embodiment of Fig. 1;

Fig. 3 is a partial elevational schematic view of a modified form of screen embodying my invention; and

Fig. 4 is a fragmentary, greatly enlarged, detail view of part of the screen illustrated in Fig. 3.

Referring now to the embodiment illustrated in Fig. 1, the cathode ray tube includes an envelope 1 having a conventional type of electron gun 2 arranged toward one end thereof and provided with any suitable deflecting means, such as deflecting plates 3, for deflecting the beam of electrons 4 emitted from electron gun 2. The beam 4 impinges upon a layer 5 of very fine particles of magnetic material such as, for example, a layer of iron powder, of the type for example, used in the manufacture of radio dust cores, which layer 5 is held on the inside of a preferably

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flat portion of glass 6 forming one end of the envelope 1. The layer is maintained on the glass surface 6 by any suitable means as for example, a magnetic field produced by an electromagnet magnetic field generator 7. The layer of iron dust is preferably so thick that normally no light would pass through the screen or through said layer 5. The effect of the electron beam on this layer, however, is to charge the particles thereof and cause said particles to move and be redistributed in accordance with the pattern of the beam projected on said layer. Therefore, this pattern would be formed on the dust leaving thinner and thicker areas, lines, or spots being sufficiently transparent to permit the light from a powerful source of light, such as for example, a round lamp 8 arranged on one side of the screen or layer 5, to pass through said layer and thus show the pattern suitably illuminated.

The lamp 8 may be a round lamp such as for example, of a gaseous type, arranged behind an enlarged portion 9 of the envelope 1 with a light screen and reflector 10 adjacent lamp 8 to direct its rays inwardly toward the iron layer 5.

The magnetic field generator may be of the type illustrated in Fig. 2 which consists of a flat spiral of wire to which electrical energy is supplied from a given source 11. This may be employed to hold the layer in place and by suitably controlling the energy from control source 11 and thereby the resultant magnetic field, the iron powder may be redistributed after a given selected interval.

In place of the iron layer 5 and the magnetic field generator 7, a screen 12, such as illustrated in Fig. 3 and shown in greater detail in Fig. 4, may be arranged within the tube 1 or may form part of said tube, replacing wall 6. The screen 12 is comprised of a plurality of small metallic plates 13 overlapping each other as indicated at 14 and electrically insulated from each other as for example, by providing them with an oxide coating or a coating of varnish at adjacent portions. The plates 13 which normally are suspended in a vertical position, are adapted to swing freely and for this purpose may be bent over, as shown at 15, a wire rod 16, a plurality of such wire rods being used for the large number of plates required. The plates are preferably very small, it being understood that the detailed showing of Fig. 4 is greatly enlarged. These plates 13 are like condenser plates and when hit by the beam 4, become charged, causing these little elements or plates to stand perpendicularly, or approximately so, to the screen and thus providing openings in the solid

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surface of plates normally presented. Through these openings, the light from lamp 8 passes, thus producing an illumination of the pattern traced by the beam.

The plates 13 may be suspended in front of a transparent material 17 which may be glazed and which may form one end of the envelope 1 of the cathode ray oscillograph tube. The plates may be adapted to discharge their charge by any suitable means. One way this may be accomplished is by allowing the charge to leak across the suspension rods or wires 16 to ground, or other suitable means for causing the charges to leak off may be employed.

While I have described the details of two embodiments of my invention, it will be apparent that numerous changes may be made in these details without departing from the teachings of my invention. For example, while I have described the plates 13 as being normally in closed position to present an opaque surface to the light source 8, it will be apparent that the plates may normally be in open position and the electron beam used to cause selected plates, impinged on by said beam to close, thus producing a dark line on the bright end surface of the tube 1. Obviously, other forms of light sources than light source 8 may be employed. Therefore while I have described above the principles of my invention in connection with specific apparatus, and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as defined in the accompanying claims.

I claim:

1. A cathode ray tube comprising means producing an electron beam, beam-deflecting means,

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a transparent surface in the path of said beam, a layer of magnetic particles distributed on said surface normally rendering said surface opaque, and a source of light behind said surface, said particles being conditioned to move in response to the impingement of the beam upon said layer to permit said layer to allow the transmission of light through selected portions of said layer.

2. A cathode ray tube according to claim 1 wherein said magnetic particles are made of iron in the form of a fine powder.

3. A cathode ray tube according to claim 1 further including means producing an electro-magnetic field for maintaining said particles on said surface.

4. A cathode ray tube comprising means producing an electron beam, beam-deflecting means, a layer of magnetic particles arranged in the path of said beam, said layer being normally opaque, said particles being conditioned to be charged by the impingement of the beam thereon, said particles being further conditioned to move away from each other under the effects of such charge to thin the layer at the areas upon which said beam impinges.

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