

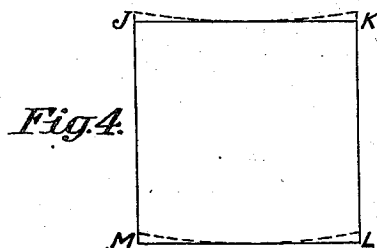
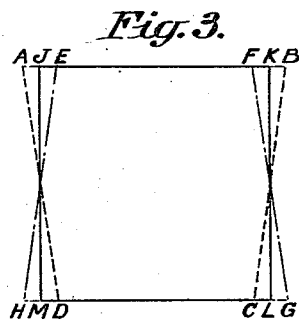
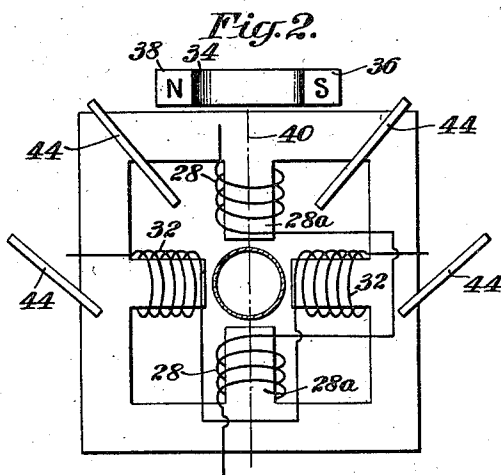
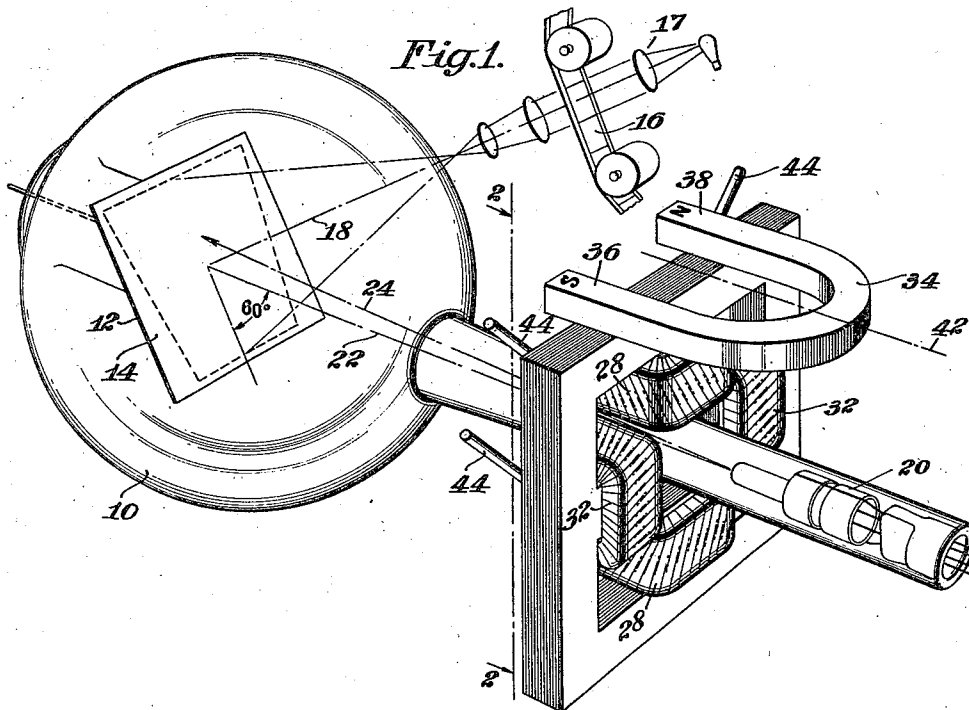
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TELEVISION SYSTEM

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TELEVISION SYSTEM

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9 Claims. (Cl. 178—6)

My invention relates to improvements in television systems.

In television systems embodying a cathode ray tube at the transmitting station, and in which the tube comprises a photosensitive mosaic screen on which an image of the object is projected, and which is scanned by a cathode ray, it has been found to be advantageous to project the image on the same side of the screen which is scanned by the ray. When this is done, the axis of the optical system for projecting the image is made perpendicular to the screen, but the axis of the gun for developing and directing the ray of electrons is, of necessity, disposed at an acute angle to the screen. On account of this arrangement, the outline of the area scanned by the ray has a keystone shape rather than the desired rectangular shape. This distortion of the scanned pattern is manifested by a substantial and corresponding distortion of the reproduced image at the receiving station, the reproduced image being also the shape of a keystone, with the vertical lines inclined to each other.

With the foregoing in mind, it is one of the objects of my invention to provide an improved television system of the character referred to wherein the keystone distortion is corrected.

Other objects and advantages will hereinafter appear.

In accordance with my invention, the cathode ray is caused to pass through a magnetic field of constant strength, the distribution of flux density and the direction of the lines of force of this field being such as to cause the ray to scan the screen structure over a substantially rectangular area.

More particularly, in accordance with my invention, magnet poles are disposed about the axis of the ray developing means to establish a fixed magnetic field, the arrangement being such that the keystone distortion which would otherwise occur is corrected for.

My invention resides in the improved method of operation and system 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 perspective view, partly diagrammatic, of television transmitting apparatus embodying my invention;

Fig. 2 is a simplified sectional view, the section being taken on the line 2—2 in Fig. 1; and

Figs. 3 and 4 are diagrammatic views illustrative of the principle of operation.

In Fig. 1, a transmitting tube 10 is provided with an electrode 12, having the usual photosensitive surface 14 comprised of a great number of minute metallic elements, such as silver globules, each insulated from the electrode 12 and from each other, and each provided with a coating of photosensitive material. In operation, an image of the object, shown as being in the form of a moving picture film 16, is projected upon the photosensitive surface by a suitable optical system 17, the axis 18 of the optical system being perpendicular to the surface or screen 14.

A gun 20 of any suitable construction operates to develop and direct a ray 24 of electrons at the photosensitive surface 14, the axis 22 of the gun being disposed at an acute angle, for example, 60°, to the photosensitive surface 14.

For the purpose of causing the ray 24 to scan the surface 14, a saw-tooth current wave, at a frequency of 24 cycles, is caused to flow through coils 28 wound on poles 28a. Also, for this purpose, a saw-tooth current wave, at a frequency of 4320 cycles, is caused to flow through deflecting coils 32. The coils 28 deflect the ray horizontally and the coils 32 deflect the ray vertically. The ray 24, therefore, is caused to scan the surface 14 twenty-four times a second, each scanning being along 180 horizontal lines.

In operation, the projection of the image on the photosensitive surface 14 causes discrete electrostatic charges to be stored up over the surface, each elemental charge being proportionate to the light intensity at the elemental area. As the ray 24 scans the surface 14, these charges are neutralized to develop picture signals.

In the system just described, the ray 24 would scan the surface 14 over an area ABCD, as shown in Fig. 3, and as further illustrated in Fig. 1. That is, the scanning pattern would be the shape of a keystone rather than the desired rectangle. This would cause, at the receiving station, the production of a distorted image on the fluorescent screen of the usual cathode ray tube, the vertical lines of the reproduced image being so inclined to each other that the entire image would have a generally keystone configuration.

For the purpose of compensating or correcting for the keystone distortion referred to, I propose to provide a fixed magnetic field through which the ray 24 passes during the scanning action. The distribution of the flux density and the direction of the lines of force in this field are such that the ray is caused to scan a reversed keystone area EFGH in a plane perpendicular to the axis 22. The ray, therefore, is ac-

usually caused to scan the surface 14 over the rectangular area JKLM.

The fixed magnetic field is provided by a U-shaped magnet 34 disposed with the poles 36 and 38 of opposite polarity directed at the screen 14 and disposed, respectively, on opposite sides of the axis 22. The poles 36 and 38 extend somewhere beyond the deflecting poles, so that the ray 24 passes first through the constantly changing deflecting field and then through the fixed keystone-correcting field.

The common axis 40 of the poles 28a is perpendicular to and intersects the axis 22. The axis 42 of the magnet 34 is substantially parallel to the axis 22 and is in the plane determined by the intersecting axes 22 and 40.

The poles 36 and 38 are parallel to the axis 22, and are disposed in a plane which is perpendicular to the plane determined by the intersecting axes 22 and 40.

The particular shape, strength, and exact location of the magnet 34 is determined by the trial-and-error method for each particular apparatus.

Obviously, an electromagnet may be substituted for the permanent magnet 34, to serve the same purpose as the latter. This provides the advantage of easier adjustment.

In some cases, it has been found that the area JKLM over which the ray 24 scans the surface 14 has distorted corners, as illustrated by the dash lines in Fig. 4. These distorted corners can be corrected or trimmed up by the use of auxiliary bar magnets 44 placed on opposite sides of the axis 22 in some such manner as is shown in Figs. 1 and 4. It will be understood that the exact position, strength and dimensions of these auxiliary magnets can best be determined, for any particular apparatus, by the trial-and-error method.

It will be understood that modifications are possible without departing from the spirit of my invention or the scope of the claims.

I claim as my invention:

1. In apparatus of the character described, screen structure, means for developing a scanning ray and directing the same at said structure, the axis of said ray-developing means being inclined at an acute angle to said structure, and means for causing the ray to scan a keystone area over a plane perpendicular to said axis whereby the ray is caused to scan the surface of said structure over a substantially rectangular area; said second-named means comprising means for deflecting said ray, and means for producing a magnetic field of varying strength which causes a deflection less than normal at one end of the screen and equal to or greater than normal at the other end of the screen.

2. In apparatus of the character described, screen structure, means for developing a scanning ray and directing the same at said structure, the axis of said ray-developing means being inclined at an acute angle to said structure, means for deflecting said ray to cause the same to scan said structure, and means for creating a fixed magnetic field through which said ray passes during the scanning action to cause the ray to scan a keystone area over a plane perpendicular to said axis whereby the ray is caused to scan the surface of said structure over a substantially rectangular area, said last-named means comprising magnet poles of opposite polarity disposed respectively on op-

posite sides of the axis of said ray-developing means.

3. In apparatus of the character described, screen structure, means for developing a scanning ray and directing the same at said structure, the axis of said ray-developing means being inclined at an acute angle to said structure, means for deflecting said ray to cause the same to scan said structure, and means for creating a fixed magnetic field through which said ray passes during the scanning action to cause the ray to scan a keystone area over a plane perpendicular to said axis whereby the ray is caused to scan the surface of said structure over a substantially rectangular area, said last-named means comprising a U-shape magnet disposed with its poles on opposite sides of the axis of said ray-developing means.

4. In apparatus of the character described, screen structure, means for developing a scanning ray and directing the same at said structure, the axis of said ray-developing means being inclined at an acute angle to said structure, means for deflecting said ray to cause the same to scan said structure, and means for creating a fixed magnetic field through which said ray passes during the scanning action to cause the ray to scan a keystone area over a plane perpendicular to said axis whereby the ray is caused to scan the surface of said structure over a substantially rectangular area, said last-named means comprising a U-shape magnet disposed with its axis in a plane with the axis of said ray-developing means and with its poles directed at said structure and disposed in a plane substantially perpendicular to said first-mentioned plane.

5. In apparatus of the character described, screen structure, means for developing a scanning ray and directing the same at said structure, the axis of said ray-developing means being inclined at an acute angle to said structure, and means for causing the ray to scan a keystone area over a plane perpendicular to said axis whereby the ray is caused to scan the surface of said structure over a substantially rectangular area; said second-named means comprising magnet poles disposed on opposite sides of said axis and having a common axis perpendicular to and intersecting said first-named axis, and magnet poles of opposite polarity disposed respectively on opposite sides of and substantially parallel to the plane determined by said intersecting axes.

6. In combination, an evacuated container in which is mounted screen structure as well as an electron gun for developing a stream of electrons and directing it toward said structure, the screen structure intersecting the path of the electron stream at an angle, means for deflecting the electron stream to cause it to "scan" the screen structure and means for creating a magnetic field through which said stream passes during the scanning operation, said last named means comprising magnet poles of opposite polarity disposed, respectively, at opposite sides of the electron path and auxiliary magnet poles disposed, respectively, at opposite sides of said path and on the screen side of the deflecting means whereby the tendency of the stream to scan a keystone shape area on the screen may be compensated.

7. The invention set forth in claim 6 characterized in that the surface of the screen on which the electron stream impinges is photo-sensitive.

8. The invention set forth in claim 6 characterized in that the angle at which the screen intersects the path of the electron stream is of the order of sixty degrees.

5 9. In combination, a cathode ray tube of the oscillographic type having a screen element as well as means for developing a cathode ray and directing it toward said element, said screen be-

ing inclined to the axis of the ray, means for deflecting the cathode ray to cause it to repeatedly scan the screen element and auxiliary means for supplying magnetic fields to influence the cathode ray independently of the deflecting 5 means whereby the boundaries of the scanned area may be corrected.

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