United States Patent

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[54] **BLUE LATERAL MAGNET STRUCTURE**
8 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **335/212,** 74/10.7
[51] **Int. Cl.** **H01f 3/02**
[50] **Field of Search** 335/212; 313/76, 77; 74/10.7, 89.2, 37

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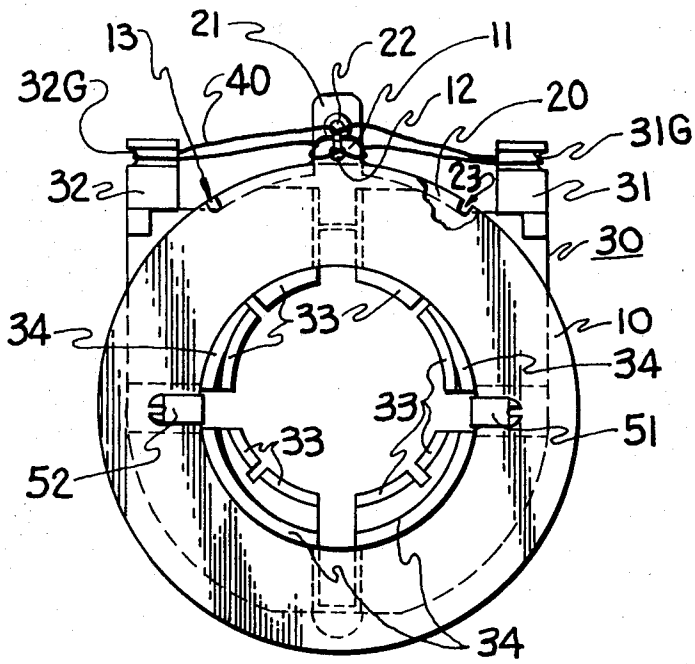
ABSTRACT: "Blue lateral" correction of beam positions in color kinescope is provided by structure having a pair of rotatable six-pole magnet rings eccentrically disposed about kinescope neck. Equal-and-opposite rotations of the rings provide lateral shift of blue beam and opposing lateral shifts of red and green beams, of an adjustable magnitude and sense. Magnet rings have peripheral tabs, and are oriented on a mount with the tabs positioned between the locations of a pair of posts projecting from mount surface. Drive cord, secured to each tab, is looped about the projecting posts. When either ring is rotated, drive cord causes other ring to undergo equal-and-opposite rotation.



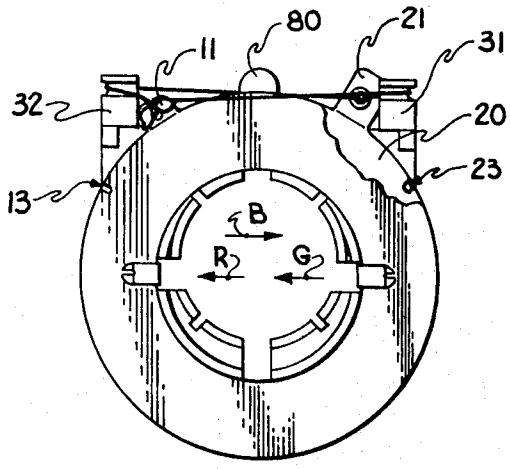


Fig - 3.

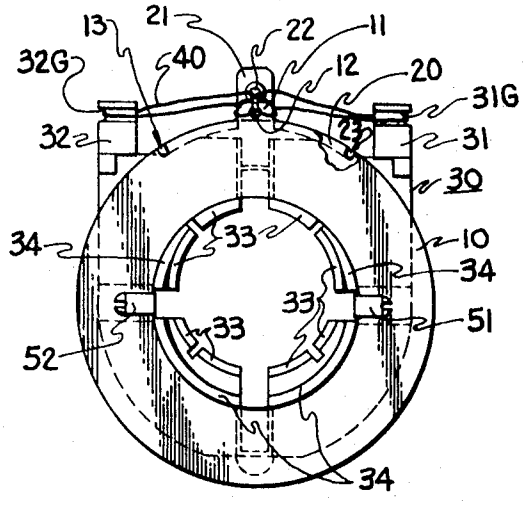


Fig - 1.

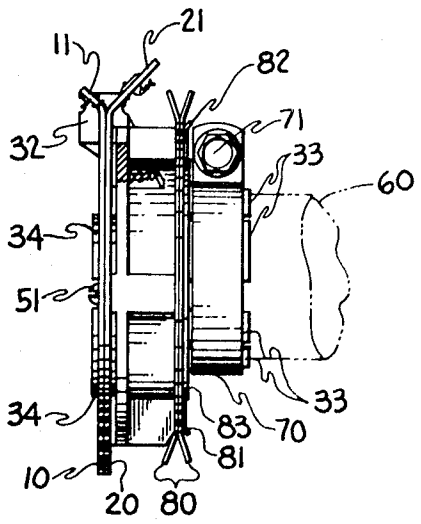


Fig - 2.

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BLUE LATERAL MAGNET STRUCTURE

This invention relates generally to beam controlling device, and, particularly, to devices suitable for providing so-called "-blue lateral" correction effects to aid in the converging of the multiple beams of a multigun color image reproducing device.

To achieve center-of-the-screen static beam convergence in a trigun, shadow-mask color kinescope, it has proved convenient to provide individual adjustment magnets for each beam, each magnet being subject to manual adjustment to vary the position of the associated beam in a radial direction with respect to the kinescope axis. The guns of the conventional trigun, shadow-mask color kinescope are disposed in a triangular configuration within the kinescope neck; the triangle is conventionally oriented in such a manner that the blue phosphor exciting gun is positioned along a radius which extends from the axis vertically (in terms of the normal display position of the phosphor screen). With such a positioning of the blue gun, adjustment of the blue beam position along a radius from the tube axis corresponds to adjustment of the blue beam in a vertical direction.

In order to provide ability to correct for all possible misconvergence errors, it is necessary to supplement the three individual beam adjustments in respective radial directions with a fourth adjustment parameter. It can readily be shown that if individual beam adjustments along respective radii are supplemented by beam adjustments in a direction at right angles to the radial direction of adjustment for a beam, all patterns of misconvergence at the center of the screen are amenable to correction.

It is convenient, and has become customary, to associate the required fourth beam position adjustment parameter with beam motion in a direction perpendicular to the radial adjustment direction of the blue beam; i.e., beam motion in a lateral or horizontal direction. While it is possible to limit the lateral adjustments to the blue beam only, a more efficient correcting system is provided where lateral adjustments of the blue beam position are accompanied by opposing lateral movements of the red and green beams. Reduction of the range of motion required of any one beam to achieve correction is advantageous in minimizing the introduction of beam distortion, or spot size growth, in the position correcting operation.

In U.S. Pat. No. 3,290,534, issued to Jerrold K. Kratz, an advantageous blue lateral adjusting scheme is disclosed employing a pair of rotatable six-pole magnet rings eccentrically disposed about the color kinescope. Equal-and-opposite rotations of the rings provide a lateral shift of the blue beam and opposing lateral shifts of the red and green beams.

The present invention is directed to a compact, readily fabricated blue lateral structure of the aforementioned six-pole magnet ring type employing a simple but reliable arrangement for ensuring that rotation of either ring is accompanied by an equal-and-opposite rotation of the other ring (to preclude relative positioning of the rings in a manner introducing a vertical component of beam motion).

In accordance with an embodiment of the present invention, there is provided, integral with the mount supporting the rotatable rings, a parallel pair of projecting posts. The rings have peripheral tabs, and are oriented on the mount with the tabs positioned between the projecting posts. A drive cord, looped around the posts is secured to each tab, whereby rotation of either ring causes, via travel of the drive cord, an equal-and-opposite rotation of the other ring. The correct entrained motion of the respective magnets is thus automatically obtained with a simple, inexpensive arrangement, involving only one moving part (the drive cord) in addition to the magnets themselves.

An object of the present invention, accordingly, is to provide a compact blue lateral magnet structure with a simple but reliable arrangement for automatically correlating the motions of a plurality of magnets.

Other objects and advantages of the present invention will be readily recognized by those skilled in the art upon a reading of the following detailed description and an inspection of the accompanying drawing in which:

FIG. 1 illustrates an end view of blue lateral magnet structure in accordance with an embodiment of the present invention;

FIG. 2 illustrates a side view (partially broken away) of the structure of FIG. 1; and

FIG. 3 illustrates another end view of the structure of FIG. 1, with the magnets rotated to one extreme of adjustment (as contrasted with a reference position of the magnets in FIG. 1).

Referring first to FIGS. 1 and 2, a pair of magnet rings **10** and **20** are shown mounted for rotation on a support structure **30**. Each magnet ring is provided with a peripheral tab projecting outwardly and bent at an angle relative to the flat surface of the rings. Tab **11** of ring **10** is pierced by a keyhole-shaped notch **12**, while tab **21** is pierced by a circular aperture **22**.

The support structure **30** includes a plurality of rearwardly extending (in the FIG. 1 view), arcuate fingers **33** defining an inner aperture of cylindrical configuration, dimensioned to snugly receive the neck **60** of a color kinescope (shown partially in phantom, broken away in FIG. 2). The support structure also includes a plurality of forwardly extending (in the FIG. 1 view), arcuate fingers **34** having outer surfaces defining a cylindrical surface dimensioned to receive, for rotation thereon, the magnet rings. The ring-receiving surface is eccentrically disposed with respect to the neck-receiving aperture, the axis of the former being shifted away from the axis of the latter (in a downwardly direction, in the FIG. 1 view).

Projecting from the support structure (upwardly) in a direction opposite to said axis shift are a pair of posts **31**, **32**, each having a rounded groove (**31G** and **32G**, respectively) near the end thereof. A drive cord **40** is looped around the posts **31** and **32** and retained in the respective grooves. The drive cord **40** is secured to the tabs **11** and **21** of the magnet rings (for example, by looping around the bifurcations of the notched tab **11**, and by knotting free ends of the cord after insertion through aperture **22** of tab **21**).

Retaining clips **51**, **52** lightly hold the mounted rings **10**, **20** to the support **30**, permitting manual ring rotation while retaining the rings on the surface of fingers **34** in an adjustment position.

Support structure **30** may additionally conveniently serve as a mount for rotational support of color purity adjustment rings **80** on a cylindrical surface **83** (concentric with the neck-receiving aperture) to the rear of posts **31**, **32**. An additional pair of retaining clips **82**, **81** perform a similar holding function for the purity rings. A split ring clamp **70** encircling the rear fingers **33** may be tightened by means of a threaded bolt **71** and nut (not shown) to fix the position of the support structure **30** on the kinescope neck **60**.

The rotational positions of the rings **10** and **20** in FIG. 1 (with the tabs juxtaposed at a position midway between the posts **31** and **32**) desirably is the reference position for which zero lateral shift is produced. To assure this relationship, illustratively, each ring is provided with an indexing notch (**13**, **23**) positioned 30° away from the tab axis, and each tab is bent such that the notch is to the left when viewing the ring with the tab projecting toward the viewer. Each ring is then magnetized with a pole of the same polarity (illustratively, north) aligned with the notch, and with additional poles of alternating polarity disposed at 60° intervals around the ring circumference.

Assuming rings **10** and **20** in the drawing have been notched, bent and magnetized in accordance with the foregoing pattern, it will be seen that the FIG. 1 adjustment position places the north pole at notch **13** of ring **10** in alignment with a south pole of ring **20**, the north pole at notch **23** of ring **20** in alignment with a south pole of ring **10**, etc., with the result of no stray field in the neck aperture.

FIG. 3 illustrates the result of rotating tab **21** clockwise relative to its FIG. 1 position over a 30° arc. This rotation, by virtue of movement of the drive cord **40**, has caused counterclockwise rotation of tab **11**. In the FIG. 3 position, like poles of both rings are aligned, with the poling such that south poles are aligned at the 12 o'clock position, with resultant maximum

shift of the beams in the sense illustrated by the arrows R, B and G. In contrast, if tab 21 were rotated counterclockwise from its FIG. 1 position over a 30° arc, the equal-and-opposite ring rotations would align the (north pole) notches 13 and 23 in the 12 o'clock position, with resultant maximum shift of the beams in the opposite sense.

What is claimed is:

1. A blue lateral magnet structure for use with a color kinescope comprising, in combination:

a pair of magnet rings, each having six poles disposed symmetrically with alternating polarity about the ring circumference;

a support receiving said magnet rings in eccentric disposition with respect to a kinescope neck-receiving aperture extending through said support, and permitting adjacent rotation of said rings about an axis shifted from the axis of said aperture;

a pair of parallel posts projecting from said support in a direction opposite to the direction of shift of said axis of rotation; and

means, including a drive cord forming a single-turn loop around said posts and secured at points on opposite loop sides to the respective rings, for entraining the motion of said rings in such manner as to ensure equal-and-opposite rotations of said rings when their rotational positions are adjusted.

2. In combination,

a color kinescope having a neck portion through which a trio of electron beam paths extend, disposed in a triangular configuration about the axis of said neck;

a pair of magnet rings, each having six poles disposed symmetrically with alternating polarity about the ring circumference;

a support structure having an aperture through which said neck portion extends, said rings being mounted on said support for eccentric rotation about an axis shifted from the axis of said neck in a direction diametrically away from the off-axis position of one of said beam paths;

and means translating rotational motion of either of said rings into a correlated rotation of the other of said rings of equal magnitude and opposite sense, said means comprising a drive cord loop established around portions of said support structure, each of said rings being secured to said cord at opposite sides of said loop by a respective securing facility located on the ring periphery substantially midway between a pair of adjacent poles.

3. A beam position correcting device comprising, in combination:

a pair of magnet rings, each having six poles disposed symmetrically with alternating polarity about the ring circumference and each having an outwardly projecting tab positioned substantially midway between a pair of adjacent poles;

a support structure upon which said rings are adjacently rotatably positioned;

a pair of posts projecting in parallel directions from said support structure, said rings being oriented on said support structure in positions locating said tabs between said projecting posts;

a drive cord looped about said posts, and secured at points on opposite loopsides to the respective tabs of said pair of magnet rings.

4. In a blue lateral magnet structure of the type employing a pair of rotatable six-pole magnet rings, the improvement comprising, in combination:

a support for said rings having integral therewith a pair of parallel posts extending in the same direction from separated locations on said support; and

means, including a drive cord forming a single-turn loop around said posts and secured at points on opposite loop sides to the respective rings, for entraining the motion of said rings in such manner as to ensure equal-and-opposite rotational movements of said rings on said support when either ring is rotated;

the separation between said post locations being dimensioned to permit substantially 60° arcuate motion of each ring.

5. Apparatus in accordance with claim 1 wherein each of said rings includes a drive cord securing facility positioned on its periphery at a location symmetrically intermediate a pair of adjacent ones of said poles, said drive cord being secured to said securing facilities.

6. Apparatus in accordance with claim 5 wherein said rings are received by said support with such relative axial orientation that rotational alignment of said drive cord securing facilities results in the rotational alignment of each pole of one of said rings with a respective pole of the other of said rings of opposite polarity.

7. Apparatus in accordance with claim 6 wherein the securing of said drive cord to said securing facilities is such as to establish rotational alignment of said drive cord securing facilities when said facilities are substantially midway between said posts.

8. Apparatus in accordance with claim 7 wherein said pair of parallel posts are separated by a distance dimensioned to permit ring rotation over an arc of substantially 60°.

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