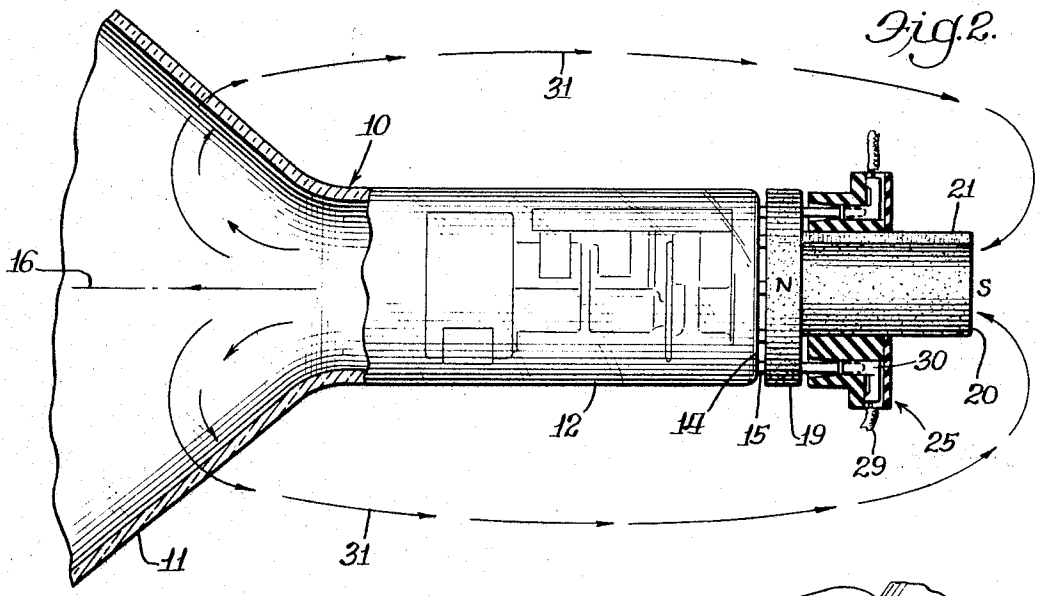
Aug. 25, 1970 L. JAVORIK 3,525,962

MAGNETIC CAP FOR COLOR KINESCOPE

Filed Oct. 22, 1968

Fig. 2.



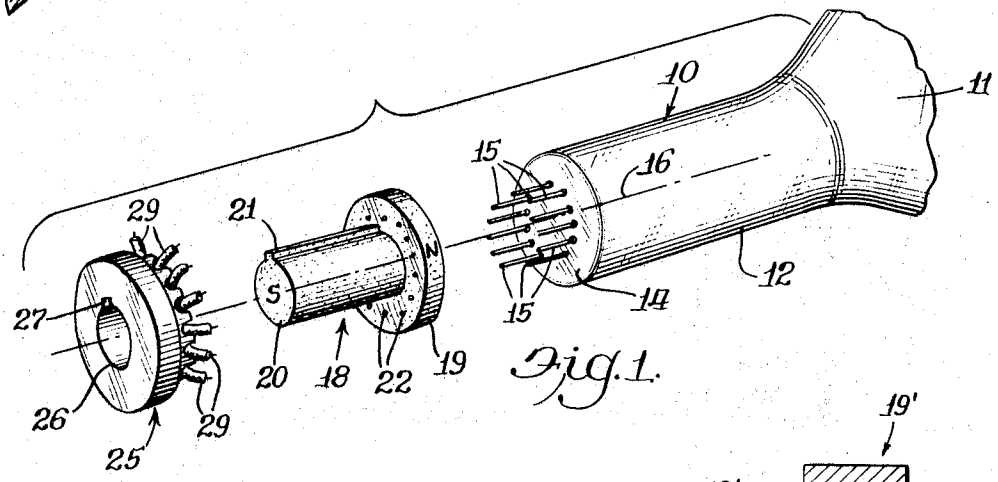


Fig. 1.

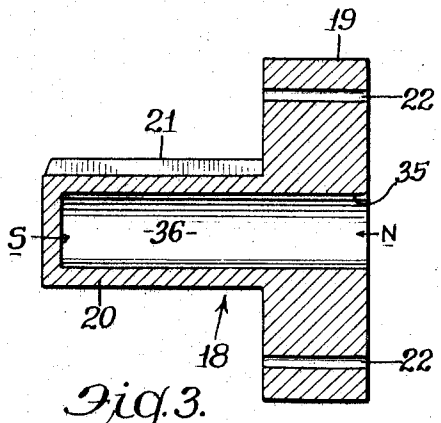


Fig. 3.

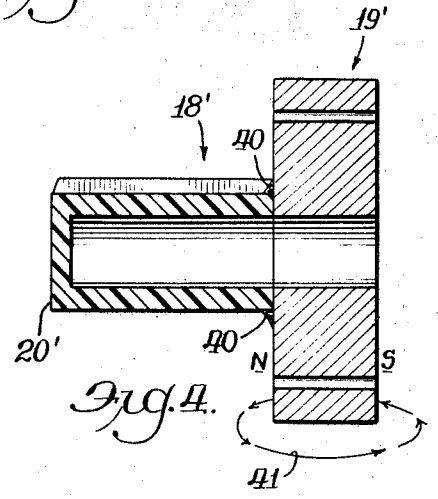


Fig. 4.

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MAGNETIC CAP FOR COLOR KINESCOPE

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U.S. Cl. 335—210 4 Claims

ABSTRACT OF THE DISCLOSURE

The cap at the base of the constricted neck of the envelope of a color kinescope is modified to incorporate a magnetic material which will generate a magnetic field to correct for displacement errors of beam landing as a result of rotation of the beams as is caused, for example, by the earth's magnetic field.

BACKGROUND AND SUMMARY

The present invention relates to multiple-beam color kinescopes; and more particularly, it relates to an improvement in a color kinescope for correcting for rotational errors in a tri-beam gun as might be caused by the horizontal component of the earth's magnetic field, or by gun rotation, as a result of gun sealing errors, etc.

Although the present invention is not so limited, a conventional color kinescope of the shadow mask type has a glass neck portion at one end, an enlarged viewing screen at the other, and a funnel-shaped portion joining the constricted neck portion with the faceplate panel which provides the viewing screen. Three electron beams are generated by a source mounted in the constricted neck portion of the tube; and the three beams are arranged in delta array—that is in cross section, the centers of the three beams define an equilateral triangle.

Each of the beams is modulated with a video signal representative of a different primary color in the image being reproduced. A mosaic of phosphor dots is located on the interior surface of the faceplate panel, and the phosphor pattern includes complete sets of three different color-producing phosphors, one for each of the three color components carried by the electron beam. An apertured shadow mask is mounted within the tube adjacent the viewing screen; and each aperture in the shadow mask is associated with a triad of the mosaic of color-producing phosphor dots on the faceplate panel. Each triad consists of a dot of a different one of the three color producing phosphors.

The electron beams are accelerated in the constricted neck portion of the tube and upon leaving the electron guns, the beams are converged by dynamic convergence forces to intersect at the apertures in the shadow mask as the beams are deflected through a raster.

After the beams intersect and as they pass through the apertures in the shadow mask, they cross so that each beam impinges only on that color-producing phosphor dot which corresponds to the color component carried by that beam.

It is known that the separation between the center of each beam and the axis of the tube (which is colinear with the axis of the constricted neck portion of the tube in which the beams are generated) as well as any lateral displacement of the faceplate panel, shadow mask or gun, and the vertical component of the earth's magnetic field produce a linear vectorial displacement of the beam landing. Conventionally, these are corrected to a great extent by a purity magnet that is adapted to translate the beams in any direction in a vertical plane to achieve a correction of about 0.005 in.

Although such corrections are well known for linearly displacing the three beams as a unit to correct for the above-described errors, the purity magnet does not correct for a rotation of the three beams about the center of the equilateral triangle defined by the beam or for rotation of the mosaic phosphor pattern or the faceplate panel relative to one another. Rotation of the beams may be caused by a horizontal component of the earth's magnetic field by rotation of the gun due to gun sealing errors, etc. and in some cases, the amount of rotation is not a constant, but is more pronounced at the side peripheral edges of the faceplate panel.

It will be appreciated that a horizontal component of the earth's magnetic field acts upon the electron beam (which is in fact an electric current) to produce a force which is perpendicular to the plane defined by the magnetic field and the current. This vectorial multiplication of field and current produces a rotational component in the beam trajectory which causes the beams to misregister with their associated phosphor dots after they pass through the shadow mask. Since the three dots forming a triad are tangent having limited guard band only, such rotation may produce color error in the reproduced image.

The horizontal component of an exterior magnetic field will produce a rotation of the three electron beams, which rotation may be clockwise or counter clockwise depending upon the direction of the horizontal component of field flux and the orientation of the tube. Thus, depending upon the orientation of a television set, the rotational effect on the three beams is not capable of being corrected by a manufacturer short of knowing the exact final location for the set. To correct for this situation, for example, by placing the tube in a completely homogeneous magnetic field is either impractical or too costly for consideration in the commercial color television market.

The present invention applies a permanent magnet at the end of the constricted neck portion of the tube to produce a semi-coaxial magnetic field to offset the horizontal component of the earth's magnetic field. Preferably, such permanent magnet forms an integral part of the plastic base or cap of the tube; and the base is removeable from the tube so that depending upon the location and orientation of the tube as it will be used, the polarity of the magnet may be changed by a serviceman. Color-coding of the bases indicates the direction of magnetization of the base to prevent error in final adjustment and tuning of the kinescope.

Furthermore, a magnetic base cap same as the size of the present one can be selected with proper polarity and can be permanently cemented on the tube to correct manufacturing errors such as result from gun rotation due to errors in gun sealing, etc.

Other features and advantages of the present invention will be apparent to persons skilled in the art from the following detailed description of a preferred embodiment together with modifications, accompanied by the attached drawing wherein identical reference numerals will refer to like parts in the various views.

THE DRAWING

FIG. 1 is an exploded view of a constricted neck of a color kinescope, together with its base and tube socket;

FIG. 2 is a side elevation view, partially cut away, of the neck portion of a tube and cap constructed according to the present invention; and

FIGS. 3–4 are vertical cross sectional views of tube bases constructed according to the present invention.

DETAILED DESCRIPTION

Referring now to FIGS. 1–2, the glass envelope for a color kinescope is generally designated **10**; and it includes an intermediate funnel-shaped portion. the base

of which is designated **11** which is formed integrally with a constricted neck portion **12**. The constricted neck portion **12** houses the electron guns which generate the three beams which pass generally axially of the cylindrical constricted neck portion **12**.

As already mentioned, in transverse cross section, the centers of the three beams define an equilateral triangle having its center located on the axis of the cylindrical neck **12** of the tube **10**. As is commonly known, each of the electron guns includes (proceeding from right to left in FIG. 2) a cathode for generating the electrons, a control grid, a screen grid, a focusing electrode, and the accelerating anode. A magnetic convergence cage is coupled to the anodes for converging the three beams so that they cross over at the shadow mask and strike their intended phosphor dots to the exclusion of adjacent dots after passing through the apertures in the shadow mask.

At the base of the neck **12** there is formed a wall of glass **14** through which a plurality of pins **15** extend. The pins **15** are connected to the various cathodes and grids and electrodes in the electron guns to supply the proper potentials thereto according to known technique. Each of the pins **15** is sealed with the wall **14** and supported thereby in circumferential relation relative to the axis **16** of the constricted neck **12**.

A base member or cap generally designated **18** in FIG. 1 and including a disc-shaped member **19** is received at the end of the neck **12** of the tube. The disc **19** is formed integrally with a cylindrical locating pin **20** having a key **21** formed parallel with its axis along its periphery. The disc **19** is provided with a plurality of apertures **22**, again formed axially of and spaced circumferentially about the cap **18** for receiving the pins **15** of the tube **10**, as seen in FIG. 2.

A socket, generally designated **25** in FIG. 1 defines a central circular aperture **26** which communicates with a key slot **27**. The aperture **26** receives the locating pin **20** with the key **21** of the cap **18** sliding through the key slot **27** of the socket **25**. A plurality of wires **29** extending radially of the socket **25** couples the various biasing potentials and heater voltages to the pins **15**, as seen in FIG. 2. In assembled condition (as best seen in FIG. 2), the disc **19** of the cap **18** fits over and receives the pins **15** in circumferentially spaced relation and lies adjacent the rear wall member **14** of the neck **12**. The socket **25**, after being properly oriented by aligning the key slot **27** with the key member **21** of the cap **18**, then fits over the cap **18** with the locating pin **20** received in the aperture **26** of the socket **25**. The wires **29** are connected to their associated pins by means of connectors **30** as seen in FIG. 2.

Turning now to the inventive cap **18**, the function of the base disclosed herein is to generate a magnetic field which extends generally coaxial with the constricted neck **12** of the tube. The idealized flux lines generated by the base are indicated by reference numeral **31** in FIG. 2 for a cap magnetized in the polarity shown with the north pole N being formed at the disc end of the base. For example, the cap **18**, as seen in FIG. 3 may define a central cavity **35** which extends through the disc **19** and within the cylindrical locating pin **20** and which receives a permanent magnet **36**. The magnet **36** may be permanently secured within the cap **18**; and it may be oriented in either direction of magnetization—the one shown in FIG. 3 having its north pole closest to the wall **14** of the neck **12** of the tube. With the magnetic field established as indicated by the flux lines **31** of FIG. 2, a component of the magnetic field established by the permanent magnet **36** within the cap **18** generates a horizontal component which offsets the corresponding horizontal component of the earth's magnetic field and thus corrects for the rotational force on the three electron beams which would otherwise be present and affect the beam landing.

Because there are many odd type of errors in beam landing, it will be appreciated that the advantageous orientation of the field might be obtained from other configurations and orientations of the magnet, for example the magnet might be such as to have a polar orientation in a vertical plane.

Further, the separate magnetic member **36** may be eliminated if the entire cap is made out of non-conducting magnetic material, or if either the disc-shaped pin holder or the cylindrical locating pin is made of electrically-insulating magnetic producing material for example, plastic filled with Alnico, or other permanent magnet type, ferromagnetic powder or with oxides thereof.

The cap **18'** shown in FIG. 4 includes a pin holder **19'** and a locating pin **20'** in the same structural configuration as described previously; however, the locating pin **20'** is made of a nonmagnetic plastic whereas the pin holder **19'** is made of a magnetic plastic as described above; and the two are secured together by an epoxy cement as at the joint **40**. The pin holder **19** is shown as having an opposite magnetic orientation than the previously-described pin holder; and will thereby produce flux lines having the general orientation indicated by the idealized line **41** in FIG. 4.

The strength of the magnetic field, as well as the configuration thereof will depend upon the size and design of the tube for which correction is sought; however, because of the different orientations in which the set may be placed for use, it will be appreciated that whichever design is employed, bases having both directions of magnetic field orientation should be stocked as well as a cap having no magnetic field. Color-coding or stamping could distinguish between the three different types of caps manufactured.

It will thus be appreciated that a simple, economical, yet reliable means has been described for correcting for the rotational effects on the three electron beams in a color kinescope of the shadow mask variety caused by a horizontal component of the earth's magnetic field or relative rotation between the guns, mask, or phosphor pattern as deposited on the faceplate panel. Such correction is easily attained by a serviceman after the set has been set up for use; and the different types of correction required may simply be handled by separate indicia for different magnetic fields produced by the caps. After correction is made, the cap may be secured to the tube by means of an epoxy glue or by other permanent or non-permanent kind of glues.

Having thus described in detail a preferred embodiment together with modifications that certain structural changes and material substitutions may be made while continuing to practice the invention; and it is, therefore, intended that all such substitutions and equivalents be covered as they are embraced within the spirit and scope of the appended claims.

What is claimed is:

1. In a color kinescope wherein color separation is achieved by a shadow mask mounted in said kinescope and said kinescope has a constricted neck portion for housing a plurality of multiple electron beams, the base of said neck supporting a plurality of pins for coupling electrical potential to said source of beams, the improvement comprising: a cap received on the base of said neck and defining a plurality of circumferentially-spaced apertures for receiving said pins, said cap providing a central locating pin extending away from said kinescope and parallel with said circumferential pins, and magnetic means integral with said cap for generating a magnetic field having a horizontal component to correct the rotational forces exerted on said beams.

2. The cap of claim **1** wherein said cap comprises a disc-shaped pin holder portion and integral locating pin, said disc and said pin defining an elongated central cavity, and a permanent magnet received in said cavity and electrically isolated from said pins to produce a generally coaxial magnetic correction field within said tube.

3. The cap of claim 1 wherein said cap further comprises a disc-shaped pin holder; and an elongated locating pin integral therewith, at least one of said portions of said cap being made of a magnetic material having the characteristic of being non-electrically conducting thereby to generate a magnetic correction field within said tube while electrically isolating said pins.

4. The cap of claim 1 wherein said magnetic field is generated by a permanent magnet having an axial orientation generally parallel to the axis of said constricted neck portion of said tube.

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GEORGE HARRIS, Primary Examiner

U.S. Cl. X.R.

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