United States Patent

Fuse

[15] **3,639,796**

[45] **Feb. 1, 1972**

[54] COLOR CONVERGENCE SYSTEM HAVING ELONGATED MAGNETS PERPENDICULAR TO PLANE OF PLURAL BEAMS

[72] Inventor: **Yuzo Fuse**, Tokyo, Japan

[73] Assignee: **Sony Corporation**, Tokyo, Japan

[22] Filed: **Mar. 7, 1969**

[21] Appl. No.: **805,340**

[30] **Foreign Application Priority Data**

Mar. 11, 1968 Japan.....44/15348
Mar. 11, 1968 Japan.....44/15349

[52] **U.S. Cl.**.....**313/77**, 313/78, 313/69
[51] **Int. Cl.**.....**H01j 29/72**, H01j 31/20
[58] **Field of Search**.....313/77, 75; 335/210, 211, 212

[56] **References Cited**

UNITED STATES PATENTS

2,923,844	2/1960	Gundert	313/77 X
2,975,325	3/1961	Gundert et al.	313/77 X
3,081,420	3/1963	Marley	313/77 X
3,363,128	1/1968	De France et al.	313/77
3,290,533	12/1966	Ammerman	313/77
3,448,316	6/1969	Yoshida et al.	313/69
3,330,979	7/1967	Constantine	313/75
2,849,647	8/1958	Francken	313/70 C

Primary Examiner—Robert Segal
Attorney—Albert C. Johnston, Robert E. Isner, Lewis H. Eslinger and Alvin Sinderbrand

[57] **ABSTRACT**

In a color picture tube, particularly of the single-gun, plural-beam-type, in which a central beam and two side beams lying in a common plane are focused on the color phosphor screen, the side beams are angled with respect to the central beam to converge with the latter at a common point on the beam-selecting grid or mask, and the beams are simultaneously deflected to scan the screen; misconvergence of the beams is corrected by permanent or electromagnets arranged at opposite sides of the central beam and producing respective magnetic fields having lines of magnetic flux extending generally perpendicular to the common plane of the beams and in opposed directions, and the effects of such magnetic fields on the adjacent side beams and on the central beam are varied either by independent displacement of the magnets toward and away from the central beam or by controlling the strengths of the fields.

3 Claims, 13 Drawing Figures

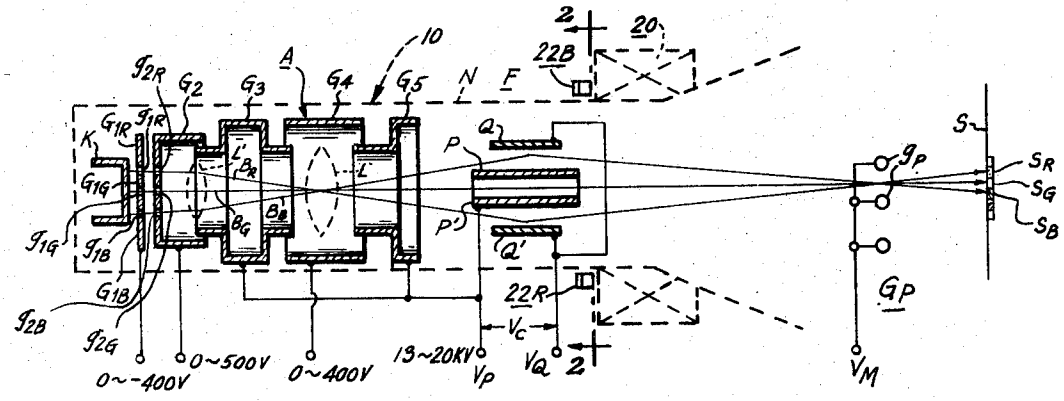


FIG. 1.

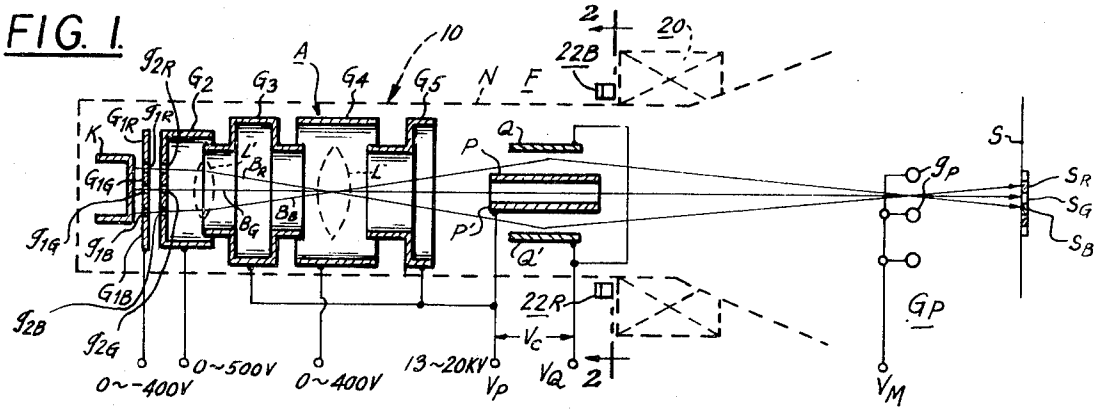


FIG. 2A.

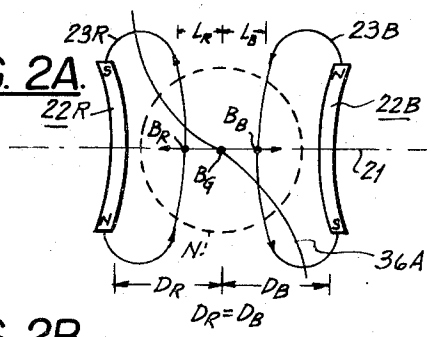
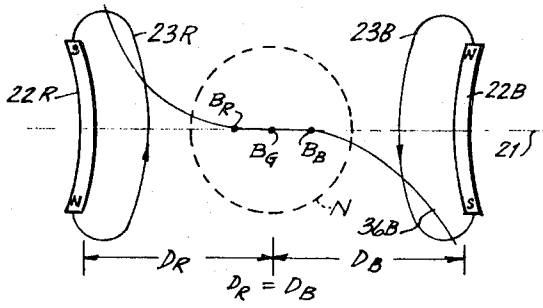


FIG. 2B.



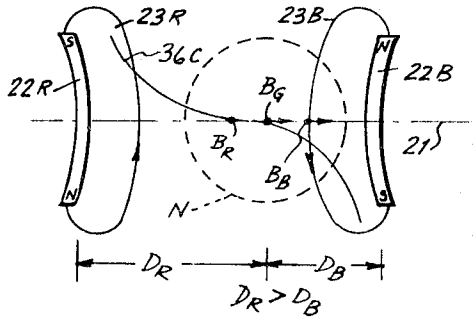
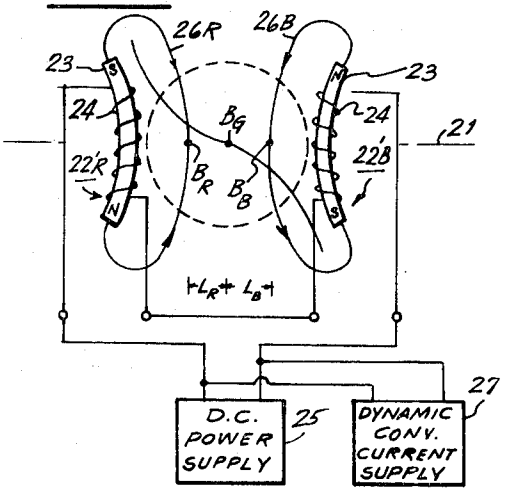


FIG. 2C.

FIG. 5.



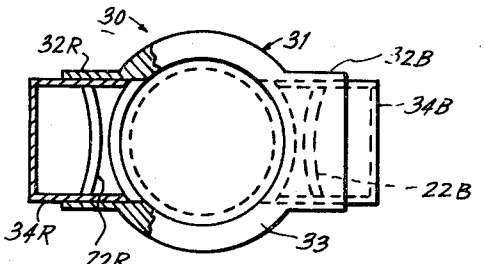
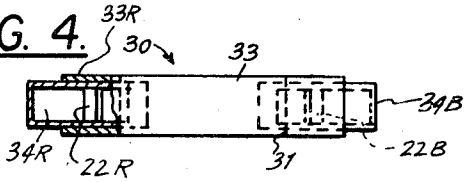


FIG. 3.

FIG. 4.

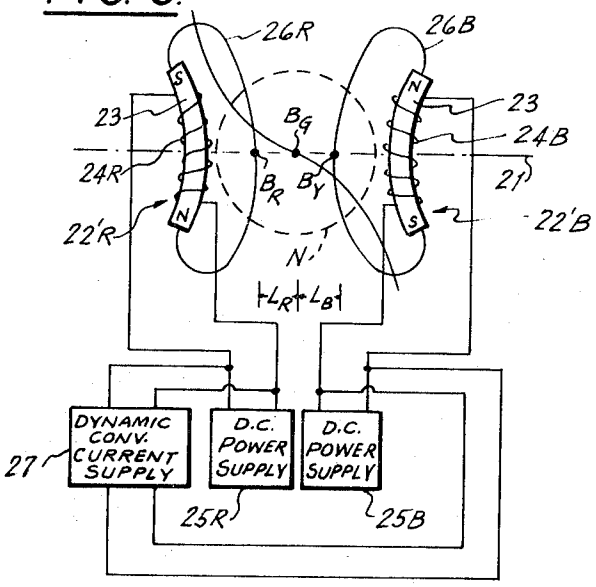


INVENTOR.
YUZO FUSE

BY Louis H. Bolig Jr.

ATTORNEY

FIG. 6.



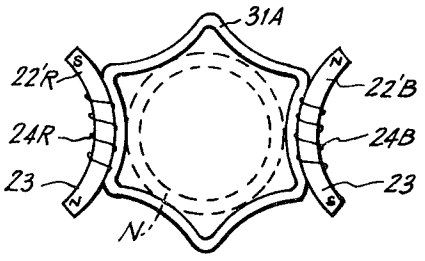


FIG. 7.

FIG. 8A.

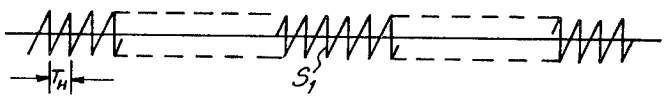


FIG. 8B.

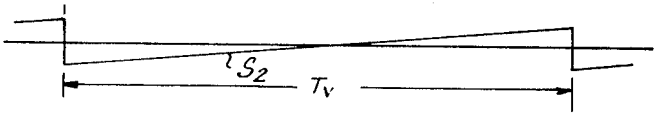


FIG. 8C.

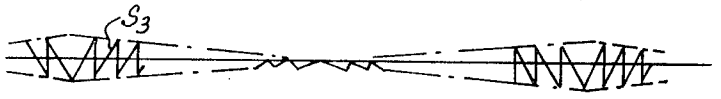
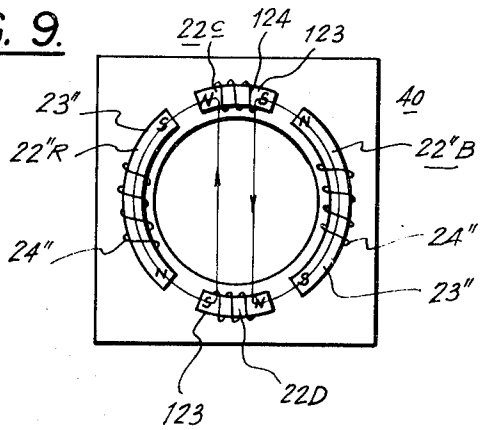


FIG. 9.



INVENTOR.
YUZO FUSE
BY Lewis H. Eckhoff
ATTORNEY

COLOR CONVERGENCE SYSTEM HAVING ELONGATED MAGNETS PERPENDICULAR TO PLANE OF PLURAL BEAMS

This invention relates generally to plural-beam color picture tubes and particularly to color picture tubes of single-gun, plural-beam type in which the plural beams are passed through the optical center of a common electron lens by which the beams are focused on the color phosphor screen.

In single-gun, plural-beam color picture tubes of the described type, for example, as specifically disclosed in the copending U.S. application Ser. No. 697,414, filed Jan. 12, 1968 now U.S. Pat. No. 3,448,316, issued June 3, 1969, and having a common assignee herewith three laterally spaced electron beams are emitted by a beam generating or cathode assembly and directed in a common substantially horizontal plane with the central beam coinciding with the optical axis of the single-electron-focusing lens and the two outer beams being converged to cross the central beam at the optical center of the lens and thus emerge from the latter along paths that are divergent from the optical axis. Arranged along such divergent paths are pairs of convergence deflecting plates having voltages applied thereacross to laterally deflect the divergent beams in a substantially horizontal plane for causing all beams to converge at a point on the apertured beam selecting grid or shadow mask associated with the color screen.

If in the production of a color picture tube of the above-described single-gun, plural-beam type, unavoidable deviations occur in the dimensioning or relative locating of the parts of the electron gun or the convergence deflection plates, which deviations may even be within normal manufacturing tolerances, exact convergence of all of the beams at the beam selecting grid or shadow mask may not be attained, that is, misconvergence of the plural beams may result. A similar misconvergence of the beams will occur at certain positions in the raster, particularly when the beam is directed at corners of the screen during scanning thereof, by reason of spherical aberration of the deflection yoke by which the scanning is effected. Thus, it is desirable to provide color picture tube of the described type with means to correct or compensate for any misconvergence of the plural beams, as aforesaid. However, in a color picture tube of the single-gun, plural-beam type, the spacing between the beams is very small, so that it is difficult to effect the desired compensation or correction for misconvergence by means of magnetic or electrostatic fields that are individual to the plural beams.

Accordingly, it is generally an object of this invention to avoid the above-mentioned problems encountered in color picture tubes of the described type.

More specifically, it is an object of this invention to correct or compensate for any misconvergence of the beams in a color picture tube of the described type that results from unavoidable errors in the manufacturing and assembling of the various parts of the tube.

Another specific object is to dynamically compensate for the misconvergence of the beams that results, particularly at the corners of the screen, from spherical aberration of the deflection yoke for causing the beams to scan the screen.

Still another object is to provide a device for correcting or compensating for any misconvergence of the beams, as aforesaid, and which has a simple structure and is easily controlled.

In accordance with an aspect of the invention, in a color picture tube, particularly of the single-gun, plural-beam type, in which a central beam and two side beams lying in a common plane are focused on the color phosphor screen with the side beams being angled to converge with the central beam at the beam selecting grid or mask, and the beams are simultaneously deflected to scan the screen; misconvergence of the beams is compensated or corrected by a pair of permanent or electromagnets arranged at opposite sides of the central beam and producing respective magnetic fields having lines of magnetic flux extending in opposite directions generally perpendicular to the common plane of the beams, and the effects of such magnetic fields on the adjacent side beams and the central beam are varied either by independent displacement of the magnets toward and away from the central beam, that is, parallel to the common plane, or by individually controlling the strengths of the fields.

In the case where the above-mentioned magnetic fields for compensation or correction of misconvergence are produced by electromagnets, the latter may be supplied with suitable DC currents and also with dynamic convergence currents which vary with the scanning deflections of the beams, thereby to also correct any misconvergence that might otherwise arise due to spherical aberration of the deflection yoke for effecting the scanning.

The above, and other objects, features and advantages of the invention, will be apparent in the following detailed description of illustrative embodiments thereof which is to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a schematic sectional view, in a horizontal plane passing through the axis of a single-gun, plural-beam color picture tube of a type to which this invention is desirably applied;

FIGS. 2A, 2B and 2C are similar schematic transverse sectional views of the tube taken along the line 2—2 on FIG. 1, and showing a convergence correcting device according to one embodiment of the invention, with its parts in various adjusted positions thereof;

FIG. 3 is a view similar to that of FIG. 2, but showing, partly broken away and in section, a practical device incorporating the embodiment of FIG. 2;

FIG. 4 is a top plan view of the device of FIG. 3;

FIG. 5 is a view similar to that of FIG. 2, but showing another embodiment of the invention;

FIG. 6 is a view similar to that of FIG. 2, but showing still another embodiment;

FIG. 7 illustrates a holder by which parts of the embodiment of FIG. 6 may be supported on the tube;

FIGS. 8A, 8B and 8C are graphic representations of sawtooth wave signals that may be supplied to the electromagnets of FIG. 6 to also compensate for misconvergence of the beams due to spherical aberration of the deflection yoke for causing scanning of the screen; and

FIG. 9 is a view similar to that of FIG. 6, but showing still another embodiment of the invention.

Referring to the drawings in detail, and initially to FIG. 1 thereof, it will be seen that the invention is there shown applied to a single-gun, plural-beam color picture tube 10 comprising a glass envelope (indicated in broken lines) having a neck N and a cone extending from the neck to a color screen S provided with the usual arrays of color phosphors S_R, S_G and S_B and with an apertured beam selecting grid or shadow mask G_p. Disposed within neck N is an electron gun A having a cathode K constituting a beam-generating source with the beam-generating surface thereof disposed as shown in a plane which is substantially perpendicular to the axis of the electron gun A. First grids G_{1R}, G_{1G} and G_{1B} are spaced from the beam-generating surface of cathode K and have apertures g_{1R}, g_{1G} and g_{1B} which are arranged in a straight line so beams B_R, B_G and B_B emitted from cathode K through the respective apertures of the first grids are directed in a substantially horizontal plane containing the axis of the gun, with the central beam B_G being coincident with such axis. A common grid G_2 is spaced from the first grids G_{1R}, G_{1G} and G_{1B} and has apertures g_{2R}, g_{2G} and g_{2B} formed therein in alignment with the respective apertures of the first grids. Successively arranged in the axial direction away from the common grid G_2 are open-ended, tubular grids or electrodes G_3, G_4 and G_5, respectively, with cathode K, grids G_{1R}, G_{1G} and G_{1B} and grid G_2, and electrodes G_3, G_4 and G_5 being maintained in the depicted, assembled positions thereof, by suitable, nonillustrated support means of an insulating material.

For operation of the electron gun A of FIG. 1, appropriate voltages are applied to the grids G_{1R}, G_{1G} and G_{1B}, grid G_2 and to the electrodes G_3, G_4 and G_5. Thus, for example, a voltage of 0 to minus 400 v. is applied to the grids G_{1R}, G_{1G} and G_{1B}, a

voltage of 0 to 500 v. is applied to the grid G_2, a voltage of 13 to 20 kv. is applied to the electrodes G_3 and G_5, and a voltage of 0 to 400 v. is applied to the electrode G_4, with all of these voltages being based upon the cathode voltage as a reference. As a result, the voltage distributions between the respective electrodes and cathodes, and the respective lengths and diameters thereof, may be substantially identical with those of a unipotential single-beam type electron gun which is constituted by a single cathode and first and second, single-apertured grids.

With the applied voltage distribution as described hereinabove, an electron lens field will be established between grid G_2 and the electrode G_3 to form an auxiliary lens L' as indicated in dashed lines, and an electron lens field will be established around the axis of electrode G_4, by the electrodes G_3, G_4 and G_5, to form a main lens L, again as indicated in dashed lines. In a typical use of electron gun A, bias voltages of 100 v., 0 v., 300 v., 20 kv., 200 v. and 20 v. may be applied respectively to the cathode K, the first G_{1R}, G_{1G} and G_{1B}, second grid G_2 and the electrodes G_3, G_4 and G_5.

Further included in the electron gun A of FIG. 1 are electron beam convergence deflecting means F which comprise shielding plates P and P' disposed in the depicted spaced, relationship at opposite sides of the gun axis, and axially extending, deflector plates Q and Q' which are disposed, as shown, in outwardly spaced, opposed relationship to shielding plates P and P', respectively. Although depicted as substantially straight, it is to be understood that the deflector plates Q and Q' may, alternatively, be somewhat curved or outwardly bowed, as is well known in the art.

The shielding plates P and P' are equally charged and disposed so that the central electron beam B_G will pass substantially undeflected between the shielding plates P and P', while the deflector plates Q and Q' have negative charges with respect to the plates P and P' so that respective electron beams B_B and B_R will be convergently deflected as shown by the respective passages thereof between the plates P' and Q'. More specifically, a voltage V_P which is equal to the voltage applied to the electrode G_5, may be applied to both shielding plates P and P', and a voltage V_Q, which is some 200 to 300 v. lower than the voltage V_P, is applied to the respective deflector plates Q and Q' to result in the respective shielding plates P and P' being at the same potential, and to result in the application of a deflecting voltage difference or convergence deflecting voltages V_C between the respective plates P' and Q' and P and Q and it is, of course, this convergence deflecting voltage V_C which will impart the requisite convergent deflection to the respective electron beams B_B and B_R.

In operation, the respective electron beams B_R, B_G and B_B which emanate from the beam generating surface of cathode K will pass through the respective grid apertures g_{1R}, g_{1G} and g_{1B}, to be intensity modulated with what may be termed the "red," "green" and "blue" intensity modulation signals applied between the said cathode and the respective first grids G_{1R}, G_{1G} and G_{1B}. The respective electron beams will then pass through the common auxiliary lens L' to cross each other at the center of the main lens L. Thereafter, the central electron beam B_G will pass substantially undeflected between shielding plates P and P' since the latter are at the same potential. Passage of the electron beam B_B between the plates P' and Q' and of the electron beam B_R between the plates P and Q will, however, result in the convergent deflections thereof as a result of the convergence deflecting voltage V_C applied therebetween, and the system of FIG. 1 is so arranged that the electron beams B_B, B_G and B_R will desirably converge or cross each other at a common spot centered in an aperture between adjacent grid wires g_p of the beam selecting grid or mask G_P so as to diverge therefrom to strike the respective color phosphors of a corresponding array thereof on screen S. More specifically, it may be noted that the color phosphor screen S is composed of a large plurality of sets or arrays of vertically extending "red," "green" and "blue" phosphor stripes or dots S_R, S_G and S_B with each of the arrays or sets of color phosphors forming a color picture element as in a chromatron-type color picture tube. Thus, it will be understood that the common spot of beam convergence corresponds to one of the thusly formed color picture elements.

The voltage V_P may also be applied to the lens electrodes G_3 and G_5 and to the screen S as an anode voltage in conventional manner through a nonillustrated graphite layer which is provided on the inner surface of the cone of the tube envelope. The grid wires of screen grid G_P may have a post-focusing voltage V_M ranging, for example, from 6 to 7 kv. applied thereto as indicated. Thus, to summarize the operation of the depicted color picture tube of FIG. 1, the respective electron beams B_B, B_G and B_R will be converged at screen grid G_P and will diverge therefrom in such manner that electron beam B_B will strike the "blue" phosphor S_B, electron beam B_G will strike the "green" phosphor S_G and electron beam B_R will strike the "red" phosphor S_R of the array or set corresponding to the grid aperture at which the beams converge. Electron-beam-scanning of the face of the color phosphor screen is effected in conventional manner, for example, by horizontal and vertical deflection yoke means indicated in broken lines at **20** and which receives horizontal and vertical sweep signals whereby a color picture will be provided on the color screen. Since, with this arrangement, the respective electron beams are each passed, for focusing through the center of the main lens L of the electron gun A, the beam spots formed by impingement of the beams on the color phosphor screen S will be substantially free from the effects of coma and/or astigmatism of the said main lens, whereby improved color picture resolution will be provided.

It is to be noted that the plane **21** (FIG. 2A) in which beams B_R, B_G and B_B are emitted is intended to coincide with the horizontal plane in which beams B_R and B_B are deflected laterally by convergence deflecting means F. It will be apparent that the desired convergence of beams B_B, B_G and B_R at a common spot on the beam selecting grid or mask G_P will be disturbed by even unavoidable errors in the dimensioning and relative positioning of the parts of gun A and convergence deflecting means F.

In accordance with this invention, misconvergence of the beams in a color picture tube of the type described above may be compensated or corrected by means **22R** and **22B** (FIGS. 1 and 2) arranged at opposite sides of neck N, and hence at opposite sides of central beam B_G, at a location therealong where the side beams B_R and B_B are spaced from central beam B_G, for example, at a location between the beam generating means of gun A and yoke **20** and preferably between convergence deflecting means F of the gun and yoke **20**. Such means **22R** and **22B** according to this invention are operative to produce respective magnetic fields **23R** and **23B** having lines of magnetic flux extending in opposite directions generally perpendicular to the common plane **21** of the beams (FIG. 2A), and the effects of the fields **23R** and **23B** on the adjacent side beams B_R and B_B, respectively, and on the central beam B_G are varied independently so as to correspondingly vary the resulting displacements of the beams in directions parallel to plane **21**.

In the embodiment of the invention shown on FIGS. 2A, 2B and 2C, the means **22R** and **22B** to produce the fields **23R** and **23B**, respectively, are in the form of elongated permanent magnets extending generally perpendicular to plane **21** at opposite sides of neck N and having opposite polarities at their ends, with the polarities of magnet **22R** being reversed with respect to the polarities of magnet **22B**. Further, magnets **22R** and **22B** are mounted, as hereinafter described, so as to be independently movable in directions toward and away from central beam B_G, that is, parallel to plane **21**.

When the distances D_R and D_B from magnets **22R** and **22B** to the tube axis are equal and relatively small, as shown on FIG. 2A, the distribution and direction of the resulting magnetic flux are as shown by the curve **36A**, that is, the fields **23R** and **23B** cancel each other at the location of central beam B_G which is undeflected thereby, whereas beams B_R and B_B are

equally and oppositely deflected parallel to plane 21 in directions away from central beam B_G. If magnets 22R and 22B are displaced outwardly from tube neck N, for example, to the positions shown on FIG. 2B where distances D_R and D_B are equal but large, the curve 36B indicating the resulting flux distribution and direction shows that, in the regions of the beams B_R, B_G and B_B, the fields are so weak as to leave the side beams B_R and B_B undeflected as well as the central beam B_G.

Further, as shown on FIG. 2C, if magnet 22R is positioned at a relatively large distance D_R from the tube axis and magnet 22B is positioned at a relatively small distance D_B from the tube axis, the curve 36C representing the resulting flux distribution and direction shows that beam B_B, and also beam B_G but to a lesser extent, are deflected by field 23B in the direction toward magnet 22B, whereas beam B_R is undeflected by the field 23R of magnet 22R. Thus, by suitably adjusting the positions of magnets 22R and 22B relative to the tube axis it is possible to independently vary the distances L_R and L_B from the central beam B_G to the side beams B_R and B_B, respectively, and thereby restore the desired convergence of the beams at a common spot on grid or mask G_P.

Since the upper ends of magnets 22R and 22B are of opposite polarity and the lower ends of the magnets are also of opposite polarity, magnetic fields may be produced between the upper ends and between the lower ends, respectively, of the magnets, with the lines of magnetic flux of such magnetic fields extending generally parallel to plane 21 and hence tending to deflect beams B_R, B_G and B_B in directions perpendicular to plane 21. In order to avoid such deflection of the beams, magnets 22R and 22B may be bent or curved, as shown, so as to be convex toward each other and thereby provide relatively large distances between their upper ends and between their lower ends for substantially weakening the fields therebetween.

Referring now to FIGS. 3 and 4, it will be seen that a convergence correction device 30 according to this invention which is a practical or structural realization of the embodiment described above with respect to schematic FIGS. 2A, 2B and 2C comprises a nonmagnetic casing 31, for example, of a suitable plastic, having an annular body 33 that is diametrically dimensioned to fit on neck N of the tube envelope, and diametrically opposed extensions 32R and 32B extending outwardly from body 33 and defining passages therethrough which slidably receive nonmagnetic holders 34R and 34B, respectively, in which the magnets 22R and 22B are suitably fixed. Thus, with body 33 mounted on neck N, lateral movements of slidable holders 34R and 34B will be effective to vary the distances from the respective magnets to the tube axis and thereby cause correction of any misconvergence of the beams, as described above.

It will be apparent, of course, that the permanent magnets 22R and 22B of the above-described embodiment can be simply replaced by electromagnets, for example, as at 22'R and 22'B on FIG. 5. As shown, each of electromagnets 22'R and 22'B may include a core 23 with a winding 24 thereon through which a suitable DC current is passed, as from a DC power supply 25, so that the electromagnets 22'R and 22'B produce magnetic fields 26R and 26B having lines of magnetic flux extending in opposite directions generally perpendicular to the common plane 21 of the beams. When the DC current passed through coils or windings 24 has a constant value, adjustment of the deflections of the beams effected by fields 26R and 26B, and hence correction of any misconvergence of the beams, is again effected by individual displacements of magnets 22'R and 22'B toward and away from the tube axis, for which purpose the electromagnets of FIG. 5 can be mounted in the holders 34R and 34B which are slidable in the casing 31, as described with respect to FIGS. 3 and 4.

Of course, in the case where electromagnets are employed, the effects of the respective magnetic fields on the adjacent side beams B_R and B_B and on the central beam B_G can be varied for correcting misconvergence of the beams merely by independently varying the values of the DC currents passed through the respective windings. For example, as shown on FIG. 6, the windings 24R and 24B of electromagnets 22'R and 22'B may be provided with individual DC power supplies 25R and 25B that are independently variable to vary the values of the DC currents flowing in the respective windings and hence to vary the strengths of the respective fields 26R and 26B for more or less deflecting beams B_R and B_B laterally toward magnets 22'R and 22'B, respectively, and for more or less deflecting central beam B_G toward one or the other of the magnets.

In the cases where electromagnets are employed in the device for correcting misconvergence in accordance with the invention, it is further possible to use the fields of such electromagnets for correcting the misconvergence of the beams that results from spherical aberration of the deflection yoke 20 particularly when the beams are deflected by yoke 20 toward the corners of the color phosphor screen during scanning of the latter. In order to achieve the foregoing, there may be passed through the windings of the electromagnets 22'R and 22'B, in addition to the previously mentioned DC currents for correcting misconvergence resulting from deviations in the dimensions or relative assembled positions of the parts, a dynamic convergence correcting current which is varied in synchronism with the scanning of the screen. The dynamic convergence correcting current, which is superimposed on the DC current, may be provided by a source or supply 27 (FIGS. 5 and 6) in which there are generated a first sawtooth wave signal S_1 (FIG. 8A) synchronized with the horizontal sweep signal and having the same period T_H, and a second sawtooth wave signal S_2 (FIG. 8B) synchronized with the vertical sweep signal and having the same period T_V, with the signal S_2 being used to modulate the signal S_1 by means of a balanced modulator, whereby the output signal S_3 fed to the windings of electromagnets 22'R and 22'B has the waveform indicated on FIG. 8C. It will be apparent that the magnetic fields produced by signal S_3 change from maximum intensity in one direction to maximum intensity in the other direction during each horizontal sweep period, and that the magnitudes of the maximum intensities of the fields are decreased and then increased during each vertical sweep period. Thus, the extent of the displacements of beams B_R and B_B that result from signal S_3 is maximum when the beams are directed at corners of the screen and decreases to zero at the center of the screen.

When the DC currents passing through electromagnets 22'R and 22'B are independently varied, as in the embodiment of FIG. 6, such electromagnets may be mounted at fixed positions adjacent the opposite sides of tube neck N, for example, by means of a nonmagnetic holder 31A (FIG. 7) which fits on the tube neck and to which the electromagnets are suitably secured.

In the embodiments where electromagnets are employed (FIGS. 5 and 6), it is also desirable to avoid the production of magnetic fields having lines of magnetic flux extending parallel to the common plane 21 between the upper ends of cores 23 and between the lower ends of the cores. As in the case of the permanent magnets 22R and 22B, the production of such undesirable fields may be substantially avoided by bending or curving cores 23 of the electromagnets, as shown, so as to be convex toward each other and thereby provide relatively large lateral distances between their upper ends and their lower ends for substantially weakening the fields therebetween.

Another means to avoid deflections of the beams perpendicular to their common plane by reason of magnetic fields between the upper ends, and between the lower ends of cores 23'' of electromagnets 22''R and 22''B is shown in the device 40 of FIG. 9. In the device 40, relatively weak magnets 22C and 22D are extended laterally between the upper end and between the lower end, respectively, of cores 23'', and such relatively weak magnets 22C and 22D are arranged so that the polarities at their ends are opposite to the polarities at the adjacent ends of cores 23'' of the main electromagnets. The effect of weak magnets 22C and 22D is to block any fields extending between the upper ends and between the lower ends

of cores 23'', and to ensure that only fields extending between the upper and lower ends of cores 23'' are produced.

In the embodiment shown on FIG. 9, the magnets 22C and 22D are electromagnets having windings 124 on cores 123 and such windings receive relatively small DC currents to provide the desired weak magnetism. Of course, the electromagnets 22C and 22D of FIG. 9 could be replaced by similarly weak permanent magnets, and such arrangement could also be employed in the embodiment of FIGS. 2A, 2B and 2C in place of the outward bending of the permanent magnets 22R and 22B therein.

Although illustrative embodiments of the invention have been described herein, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.

What is claimed is:

1. In a single-gun, plural-beam color picture tube which includes a color screen having arrays of color phosphors and beam selecting means provided with apertures corresponding to said arrays, beam-generating means for directing a central electron beam and first and second side electron beams in a common plane toward said color screen for impingement on respective phosphors of each array through the corresponding aperture, lens means for focusing said electron beams on said color screen and having an optical center through which said beams are all passed with said central beam being coincident with the optical axis of said lens means and said side beams being oppositely angled with respect to said optical axis to enter said lens means along paths that are convergent to said optical axis from opposite sides of the latter and to emerge from said lens means along paths divergent to said axis at opposite sides of the latter, electron-beam-convergence-deflecting means interposed between said lens means and said beam selecting means and being operative to deflect said side beams emerging along said divergent paths for convergence of said side beams with said central beam at said beam selecting means, and deflection yoke means located between said convergence deflecting means and said beams selecting means and receiving horizontal and vertical sweep signals to cause said beams to scan said screen; the improvement comprising first and second elongated permanent magnets each having ends of opposite polarities, said first and second magnets extending generally perpendicular to said common plane at the outer sides of said first and second side beams, respectively, at a location therealong between said lens means and said beam selecting means and being disposed with said polarities of said first magnet reversed with respect to said polarities of said second magnet to produce respective magnetic fields having lines of magnetic flux extending generally perpendicular to said common plane and in opposed directions, and mounting means for said first and second magnets permitting the individual displacement of each magnet in directions toward and away from the adjacent one of said side beams, whereby to vary the effect, in the direction of said common plane, of each of said magnetic fields on the adjacent side beam and on said central beam for correcting any misconvergence of said beams.

2. A single-gun, plural-beam color picture tube according to claim 1, in which said location of the magnets to produce said magnetic fields is between said convergence deflecting means and said deflection yoke means.

3. A single-gun, plural-beam color picture tube according to claim 1, in which said magnets are convex toward each other so as to provide relatively increased distances from each end of one of said magnets to the end of the other magnet which is of opposed polarity thereto, whereby to diminish the effect of magnetic lines of flux therebetween.

* * * * *