

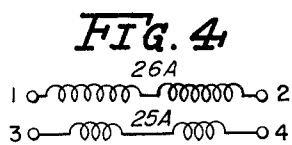
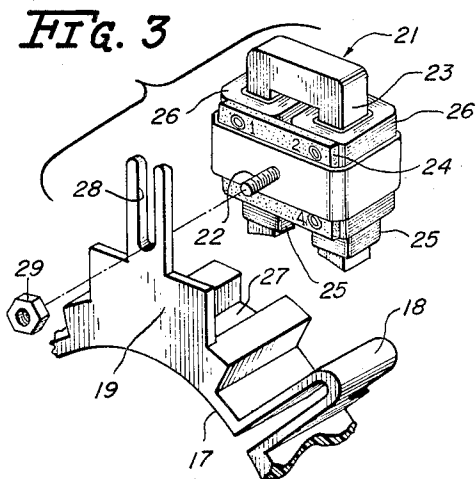
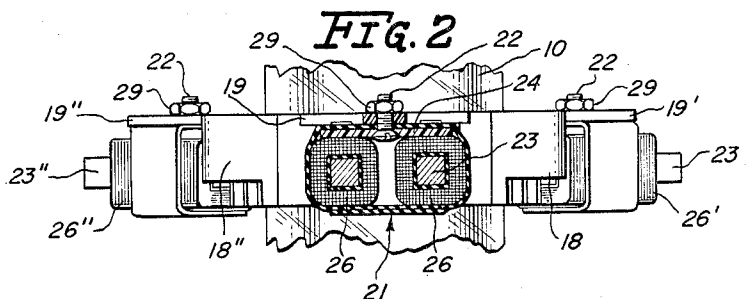
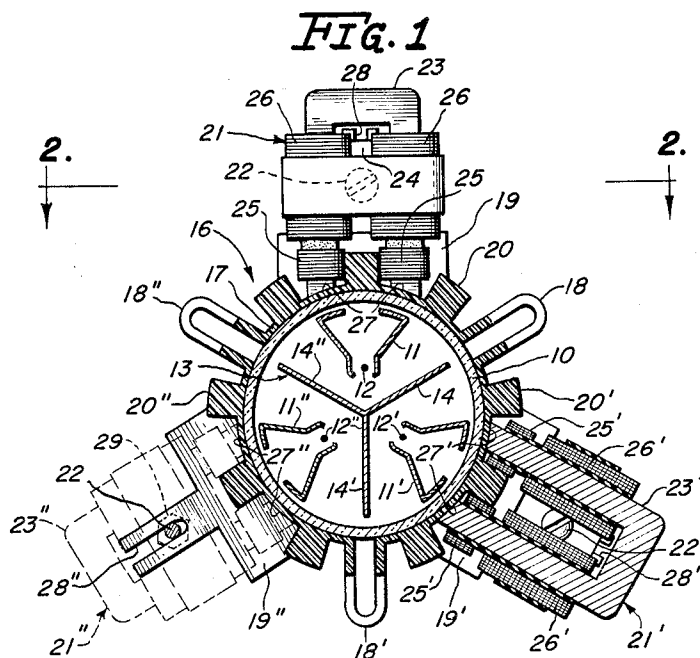
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COLOR CONVERGENCE ASSEMBLY

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The present invention relates to color television and more particularly to magnetic convergence devices for use with multi-beam color kinescopes.

In color television receivers and other systems using multi-beam cathode-ray tubes, proper operation requires that the several beams be constantly converged in the plane of the luminescent screen. This convergence is achieved through dynamic convergence fields which are conventionally established by electromagnets in cooperation with pole pieces internal to the color kinescope and are responsive to applied convergence signals which vary as a function of scanning deflection. The required magnets may be assembled to form a common convergence yoke which is adapted for both rotational and longitudinal adjustment on the neck of the color kinescope.

Typical of the prior convergence yoke assemblies is one comprising a plurality of interlocking peripheral sections held together by springs to permit the required longitudinal and rotational adjustment after fitting to the color kinescope neck. In order to provide for firm frictional retention on tube necks of varying diameters within the range of manufacturing tolerances, the construction of such devices has been undesirably complex.

The principal object of this invention is to provide a new and improved magnetic convergence device for use with a multi-beam cathode-ray tube.

Another object is to provide such a convergence device of greatly simplified construction.

It is still a further object of this invention to provide such a device with which both installation and adjustment are substantially facilitated.

In accordance with the invention a new and improved convergence device adapted for use with a multi-beam cathode-ray tube comprises a plurality of magnets and a unitary resilient support member having a plurality of collar segments and a corresponding plurality of intervening outwardly extending bight portions for resiliently urging the collar segments into frictional engagement with the neck of the tube. Furthermore, the convergence device includes means independent of the bight portions for retaining the magnets in predetermined mutually spaced relation about the neck of the tube.

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood, however, by reference to the following description taken in conjunction with the accompanying drawing, in the several figures of which like reference numerals identify like elements, and in which:

FIGURE 1 is an elevational view, partly in section, of a convergence yoke assembly embodying the invention, in position about the neck of a multi-beam cathode-ray tube;

FIGURE 2 is a cross sectional view taken across line 2-2 of FIGURE 1;

FIGURE 3 is a fragmentary exploded perspective view of a portion of the embodiment shown in FIGURE 1; and

FIGURE 4 is a schematic circuit diagram showing the electrical circuitry of the convergence coils of the embodiment shown in FIGURES 1-3.

Referring to FIGURE 1, a preferred embodiment of the invention is shown mounted on the neck 10 of a multi-beam cathode-ray tube such as a conventional tri-beam

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color kinescope. In cathode-ray tubes of this type, the cylindrical axis of the neck of the tube is generally coincident with the geometric axis of symmetry of the entire tube. Internal to the neck portion of the cathode-ray

5 tube, three pairs of metallic pole pieces 11, 11' and 11'' are spaced symmetrically about the aforementioned cylindrical axis. Electron beams 12, 12' and 12'' are emitted from respective electron guns (not shown) and are directed in such a manner so as to pass between the respective pairs of internal pole pieces 11, 11' and 11''. A magnetic shield 13 is employed to prevent interaction of the magnetic fields created in the respective pairs of pole pieces. Magnetic shield 13 is constructed of members 14, 14' and 14'' extending radially from the tube axis.

15 The embodiment of FIGURE 1 comprises a molded one-piece yoke or support member 16 comprising a collar 17 of three identical segments 20, 20' and 20'' each of a curvature conforming to neck 10 and symmetrically interspaced with resilient bight portions 18, 18' and 18''. 20 Integral with collar segments 20, 20' and 20'' are respective radial outwardly extending members 19, 19' and 19'' having guide channels 28, 28' and 28''. The unitary support member complete with collar, various guide channels, bight portions, and outwardly extending members is preferably molded of a suitable plastic material such as nylon.

An electromagnet 21 which forms a part of the convergence device is secured to the outwardly extending member 19 of the collar portion 20. Electromagnet 21 is 30 constructed of a U-shaped ferromagnetic core 23 on which is wound a set of horizontal dynamic convergence coils 25 and a set of vertical dynamic convergence coils 26.

As better shown in FIGURE 2, machine screw 22 and its associated nut 29 retain electromagnet 21 to the radially extending member 19 through the use of a terminal board 24 which is firmly taped to the electromagnet 21. Also shown are the remaining two electromagnets 21' and 21'' in their radially-spaced position about the neck of the tube 10.

40 As shown more clearly in FIGURE 3, pairs of indexing elements or guide channels 27 in collar segment 20 are used to position the electromagnet on the support member. These guide channels are of sufficient width so as to provide clearance for the horizontal dynamic convergence coils 25 which are wound around ferromagnetic core 23. The channel 28 which is used to facilitate the securing of the electromagnet 21 to the support member 19 can also be seen. Also more clearly shown in this figure is terminal board 24 which is firmly taped to the vertical dynamic convergence coils of electromagnet 21. This board provides terminals for electrically connecting the conductors carrying dynamic convergence signals to the dynamic convergence coils.

55 The schematic diagram of FIGURE 4 shows the manner in which the two vertical dynamic convergence coils and the two horizontal dynamic convergence coils are respectively connected to terminal board 24. As can be seen, the two vertical dynamic convergence coils 26A are connected in series between terminals 1 and 2 of terminal board 24 while the horizontal dynamic convergence coils 25A are connected in series between terminals 3 and 4.

60 Each of the electromagnet retaining and positioning portions of the support member are identical. Thus, corresponding parts are designated by the use of corresponding reference numerals which are singly and doubly primed respectively.

To assemble the convergence device, electromagnets 70 21, 21' and 21'' are merely slipped into channels 27, 27' and 27'' and bolted to the resilient support member. After the convergence device has been assembled, it may

be easily slid onto the picture tube neck; bight portions 18, 18' and 18'' provide sufficient resilience to allow the device to be slid over the tube base and to readily adapt to cathode-ray tube necks of varying diameters within the range of manufacturing tolerances. In use, the device is positioned both rotationally and longitudinally so that the ends of cores 23, 23' and 23'' of the electromagnets are in direct juxtaposition with the respective pairs of internal pole pieces 11, 11' and 11''.

The dynamic convergence coils which form a part of the electromagnets are used to provide dynamic convergence in a conventional manner. The two sets of coils 26 and 25 respond to applied dynamic convergence signals which vary as functions of the vertical and horizontal scanning signals respectively to establish an appropriate combined time-varying magnetic field in each set of internal pole pieces.

The invention is of course not limited to devices for use with either three-gun tubes or with cathode-ray tubes having internal pole pieces. The device may also be used to statically converge the beams in the plane of the luminescent screen by applying a direct-current component to the coils of each electromagnet or by providing suitable adjustably positioned permanent magnets in association with the electromagnets.

Thus the invention provides a magnetic convergence device of greatly simplified construction in which the number of components has been reduced to an absolute minimum. Furthermore, the device automatically compensates for size variations of the neck of picture tubes within the range of manufacturing tolerances and affords maximum simplicity of manufacture, installation and adjustment.

While a particular embodiment of the present invention has been shown and described, it is apparent that changes and modifications may be made therein without departing from the invention in its broader aspects. The aim of the appended claims, therefore, is to cover all such

changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. A magnetic convergence device adapted for mounting on the neck of a cathode-ray tube comprising: a plurality of magnets; a unitary support member having a plurality of collar segments and a corresponding plurality of intervening outwardly extending bight portions for resiliently urging said collar segments into frictional engagement with said neck; and means independent of said bight portions for retaining said magnets in predetermined mutually spaced relation about said neck of said cathode-ray tube.

2. A magnetic convergence device for use in conjunction with a multi-beam cathode-ray tube having a plurality of pairs of internal ferromagnetic pole pieces symmetrically positioned about the geometric axis of said tube and responsive to impressed magnetic potentials for establishing resultant magnetic fields individually directed generally perpendicularly to said axis, said device comprising: a unitary resilient collar including a plurality of collar segments and a corresponding plurality of intervening outwardly extending bight portions for resiliently urging said collar segments into adjustable frictional engagement with said cathode-ray tube; convergence means comprising a corresponding plurality of magnets for developing varying magnetic flux in said pole pieces; and means including a plurality of support members radially and integrally extending from said collar segments intermediate adjacent pairs of said bight portions for positioning and retaining said magnets in symmetrically spaced relation corresponding to that of said pole pieces.

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