

United States Patent

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[56]

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Primary Examiner—G. Harris

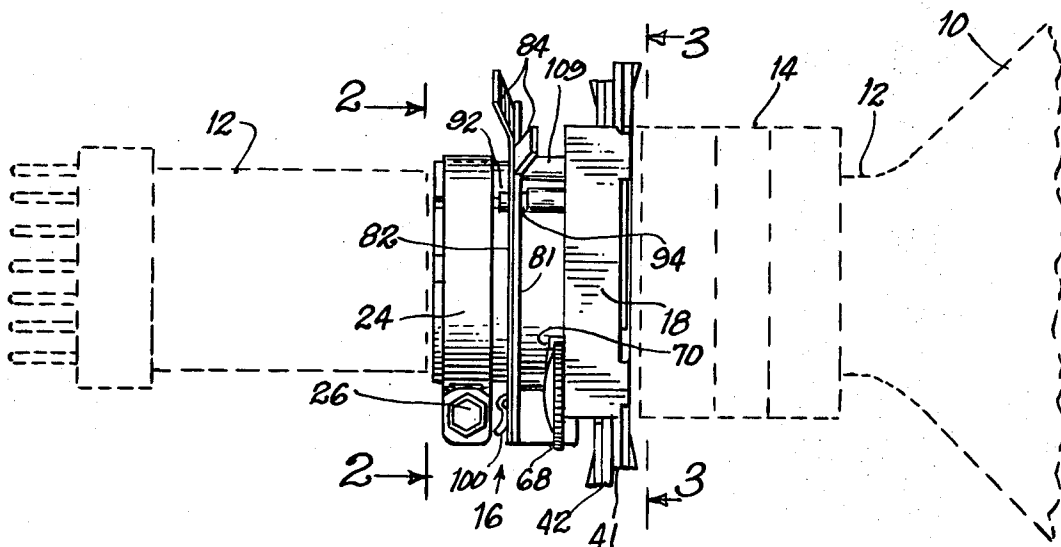
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[54] **CONVERGENCE- AND PURITY-ADJUSTING
 DEVICE FOR COLOR TELEVISION PICTURE
 TUBE**

18 Claims, 8 Drawing Figs.

[52] U.S. Cl. 335/212,
 313/75, 313/77
 [51] Int. Cl. H01f 1/00
 [50] Field of Search 335/212;
 313/75, 76, 77, 69, 70

ABSTRACT: The convergence- and purity-adjusting device has a body adapted to be mounted around the neck of a color television picture tube. First and second slides are mounted on the body for movement in a direction perpendicular to the axis of the picture tube. Each slide carries three permanent magnets. The magnets on the two slides are mounted in corresponding positions, but are oppositely polarized. A drive is provided to move the slides in opposite directions. Such drive comprises a pinion rotatably mounted on the body. Racks are provided on the slides and are arranged to engage opposite sides of the pinion. A control knob is connected to the pinion. The purity-adjusting rings are mounted on posts, projecting from the body.



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FIG. 1

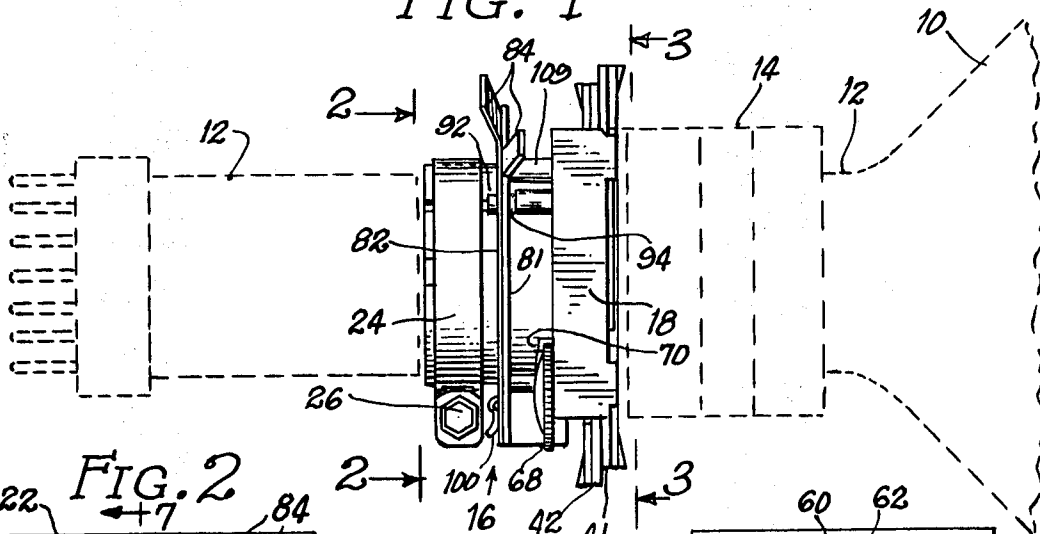


FIG. 2

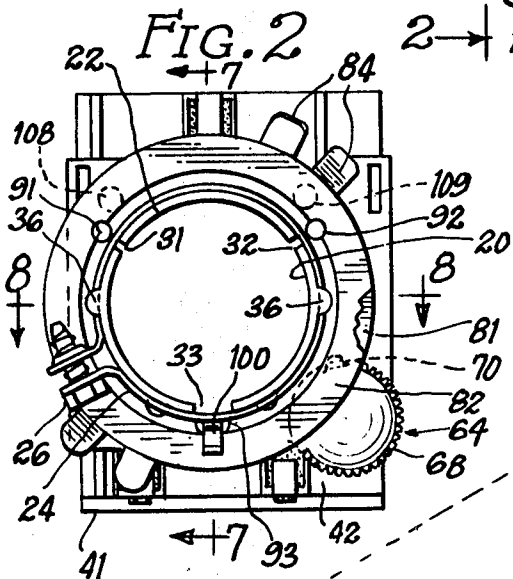


FIG. 3

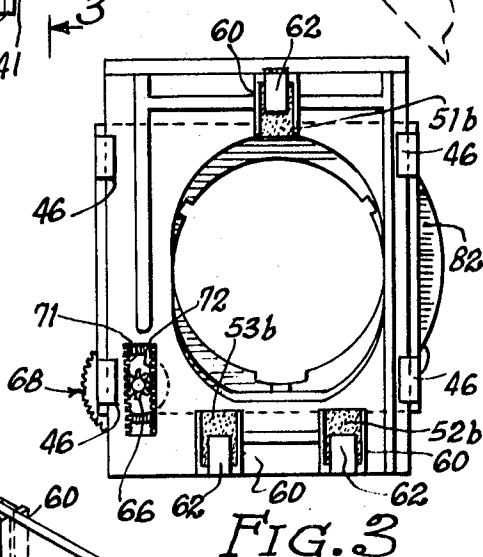
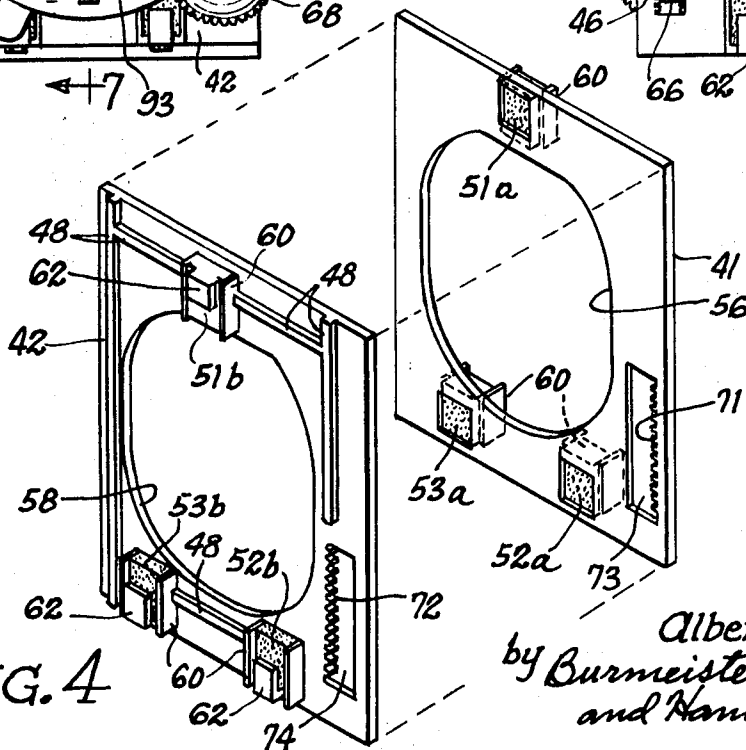
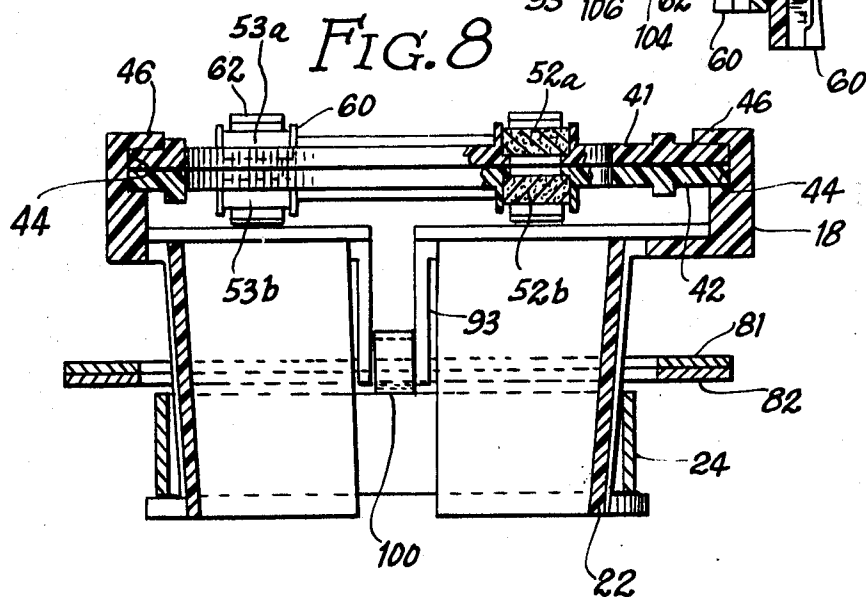
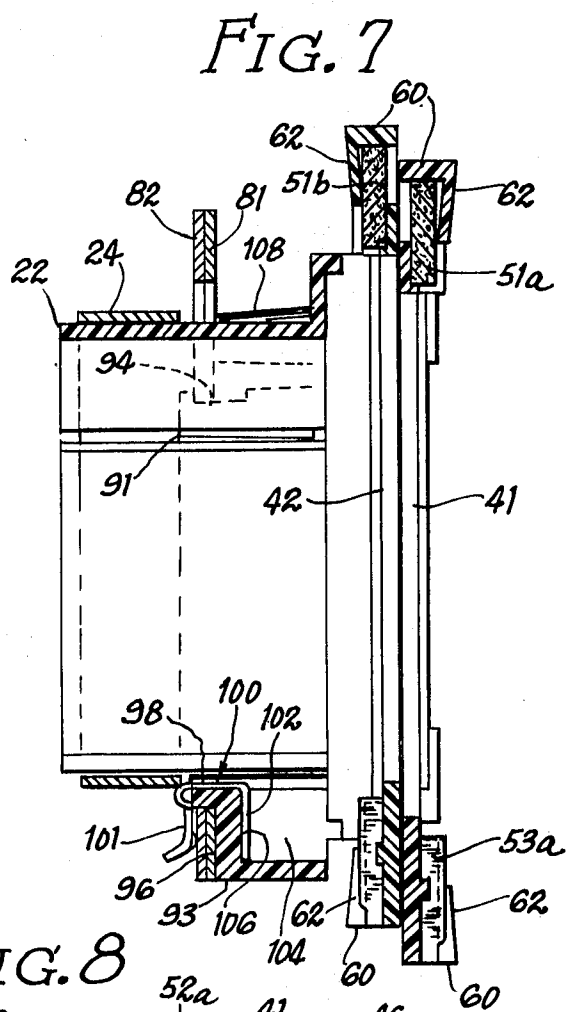
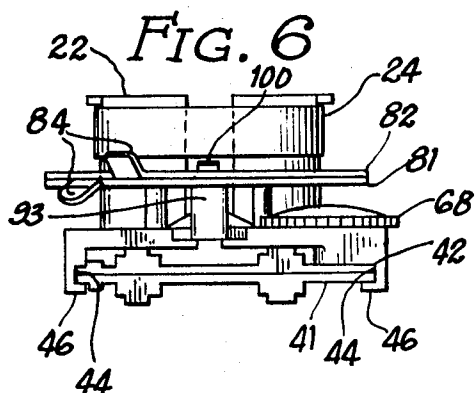
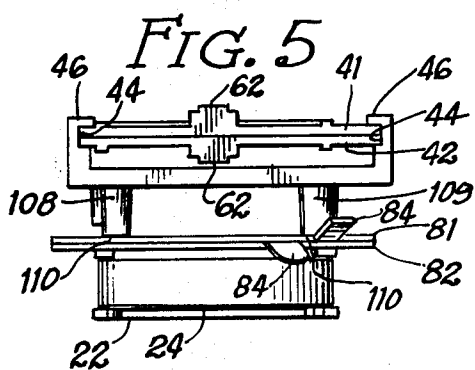


FIG. 4



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CONVERGENCE- AND PURITY-ADJUSTING DEVICE FOR COLOR TELEVISION PICTURE TUBE

This invention relates to a device for adjusting convergence and purity in connection with a color television tube.

The object of the present invention is to provide a convergence-adjusting device which is extremely easy to operate and whereby both the magnetic field strength and polarity can be adjusted to achieve lateral convergence.

A further object is to provide a convergence-adjusting device having separate sets of magnets for adjusting the blue lateral convergence and the red and green convergence.

Another object is to provide a new and improved device for accomplishing the purity adjustment.

Accordingly, the present invention preferably comprises a convergence-adjusting device comprising a body adapted to be mounted around the neck of a color television picture tube. First and second slides are mounted on the body for movement transversely to the axis of the picture tube. At least one permanent magnet is mounted on each slide. Preferably, there are three magnets on each slide. The magnets on the first and second slides are mounted in corresponding positions, but the corresponding magnets are oppositely polarized. A drive is provided for moving the slides in opposite directions. The drive preferably comprises a pinion, rotatably mounted on the body. First and second racks are formed on the first and second slides and are arranged to engage opposite sides of the pinion, so that rotation of the pinion will cause movement of the slides in opposite directions.

It is preferably to provide an improved purity-adjusting device comprising a pair of purity-adjusting rings, mounted on the body for rotary adjustment. The body preferably comprises three posts projecting therefrom, parallel to the axis of the picture tube. Slots are formed in two of the posts to receive the rings. A removable slip is mounted on the third post to retain the rings. Preferably, there are two additional posts having end surfaces engageable with the purity rings.

Other objectives, advantages and features of the present invention will appear from the following description, taken with the accompanying drawings, in which:

FIG. 1 is a side elevational view of convergence- and purity-adjusting device, to be described as an illustrative embodiment of the present invention, the device being shown in its position of use mounted around the neck of a television picture tube.

FIGS. 2 and 3 are elevational views showing opposite ends of the adjusting device, the view being taken generally indicated by the lines 2—2 and 3—3 in FIG. 1.

FIG. 4 is a perspective view showing the two convergence-adjusting slides, in separated positions, for clarity of illustration.

FIGS. 5 and 6 are top and bottom views of the adjusting device.

FIG. 7 is an enlarged vertical section, taken along the line 7—7 in FIG. 2.

FIG. 8 is an enlarged horizontal section taken along the line 8—8 in FIG. 2.

Referring more specifically to the drawings, it will be seen that FIG. 1 shows a color television picture tube 10, having a neck portion 12. A deflection yoke 14 is mounted around the neck 12 in the usual manner.

The picture tube 10 is provided with a convergence- and purity-adjusting device 16, also mounted around the neck portion 12. Typically, the adjusting device 16 is positioned behind the deflection yoke 14.

The convergence and purity-adjusting device 16 preferably comprises a body or housing 18, adapted to be mounted around the neck 12 of the picture tube 10. Thus, as shown in FIG. 2, the body 18 is formed with an opening 20, adapted to receive the neck 12 of the picture tube 10.

The body 18 may be clamped or otherwise secured to the neck 12 of the picture tube 10. For this purpose, the body 18 is preferably formed with a sleeve portion 22 adapted to

receive a clamping band 24, which may be tightened by means of a screw 26, or the like. The rear portion of the sleeve 22 is formed by one or more longitudinal slots whereby the sleeve may readily be compressed against the neck of the picture tube 10. As illustrated in FIG. 2, there are three such slots 31, 32 and 33.

Outwardly projecting tabs 36 are preferably formed on the rear portion of the sleeve 22 to retain the clamping band 24 on the sleeve. To provide for adjustment of the convergence of the three electron beams in the color television tube 10, the device 16 is provided with two slides 41 and 42, as shown most clearly in FIG. 4. In this case, the slides 41 and 42 are mounted on the body 18 for vertical sliding movement.

As shown in FIG. 8, the vertical edge portions of slide 41 and 42 are slidably received in a pair of inwardly facing grooves or channels 44, formed in the body 18. Flanges 46 are formed on the front portion of the body 18 to retain the slides. It will be seen from FIG. 4 that the slides 41 and 42 are formed with a series of reinforcing or stiffening ribs 48.

Each slide carries one or more permanent magnets for adjusting the lateral convergence of the electron beams in the color television picture tube 10. In this case, there are three permanent magnets on each slide, so as to provide a magnet for each of the three electron beams. Thus the front slide 41 has three magnets 51a, 52a and 53a, while the rear slide 42 carries magnets 51b, 52b and 53b. The corresponding magnets are preferably of equal strength, but of opposite polarities. Thus, for example, all of the magnets 51a, 52a and 53a on the front slide 41 may be oriented with their north poles directed upwardly and their south poles directed downwardly. The three magnets 51b, 52b and 53b on the rear slide 42 may be oppositely oriented, with their south poles directed upwardly and their north poles directed downwardly.

The illustrated slides 41 and 42 are platelike in form. Oval-shaped openings 56 and 58 are formed in the slides 41 and 42, to receive the neck 12 of the picture for the movement of the slides.

Each of the six magnets 51a-52b is preferably in the form of a bar of magnetic material. The slides 41 and 42 are formed with three-sided seats or housings for receiving the magnets 51a-53. The illustrated housings 60 are rectangular and boxlike in form. Clips 62 are formed on the slides 41 and 42 in connection with magnet housings 60 to retain the magnets therein. The magnet housings 60 and clips 62 are preferably formed integrally with the slides 41 and 42, which are preferably molded from a suitable plastic material. A drive 64 is preferably provided to move the slides 41 and 42 in opposite directions so that the magnets can be moved toward and away from the neck 12 of the picture tube 10.

The illustrated drive 64 is of the rack and pinion type. Thus, as shown in FIG. 3, a pinion 66 is rotatably mounted on the body 18. A knob 68 is provided to rotate the pinion 66. The knob 68 is retained on the body 18 by a small overhanging flange 70, molded integrally therewith. The flange 70 normally overlaps an edge portion of the knob 68, but can be sprung away from the knob to provide for the assembly of the knob with the body 18. The body 18 preferably is molded from a suitable resinous plastic material.

It will be seen from FIG. 3 that the pinion 66 meshes with racks 71 and 72 on the slides 41 and 42. The racks 71 and 72 engage opposite sides of the pinion 66. As shown to best advantage in FIG. 4, the slides 41 and 42 are formed with slots 73 and 74 to receive the pinion 66. The racks 71 and 72 are formed along opposite longitudinal edges of the slots 73 and 74.

When the slides 41 and 42 are in their midpositions, as shown in FIG. 3, the oppositely polarized magnets 51a and 51b are directly opposite each other and at the same distance from the neck 12 of the picture tube 10. Thus, the magnets 51a and 51b neutralize each other so that a minimum effect is produced upon the uppermost electron beam, which is usually the blue beam in the picture tube 10.

Similarly, the oppositely polarized magnets 52a and 52b are directly opposite each other, as are the magnets 53a and 53b. Thus, all of the magnets have a minimum effect upon the three electron beams.

When the knob 68 and the pinion 66 are rotated, in one direction, the slide 41 is moved downwardly while the slide 42 is moved upwardly. Thus, the magnet 51a is moved closer to the neck 12 of the picture tube 10, while the magnet 51b is moved farther away. Accordingly, the magnetic field of the magnet 51a predominates over that of the magnet 51b, so that the adjacent blue electron beam is shifted laterally in one direction.

At the same time, the magnets 52b and 53b are moved closer to the neck 12 of the tube 10, while the magnets 52a and 53a are moved farther away. Accordingly, the magnetic fields of magnets 52b and 53b predominate over those of the magnets 52a and 53a, so that the adjacent red and green beams are displaced laterally in the opposite direction relative to the displacement of the blue beam.

When the knob 68 and the pinion 66 are rotated in the opposite direction, the slide 41 is moved upwardly while the slide 42 is moved downwardly. Accordingly, the magnetic field of the magnet 51b predominates over that of the magnet 51a, so that the adjacent blue beam is shifted laterally in the opposite direction, relative to the previous displacement. The magnets 52a and 53a predominate over the magnets 52b and 53b so that the red and green beams are shifted in the opposite lateral direction, relative to the displacement of the blue beam. It will be evident that the beam-shifting device makes it easy to adjust the lateral convergence of the electron beam.

It will be seen from FIGS. 1 and 2 that the adjusting device 16 also comprises a pair of purity rings 81 and 82 which are magnetized with diametrically opposite magnetic poles. The rings 81 and 82 can be rotated to regulate the strength and the orientation of the magnetic field produced by the rings. It will be seen that the rings 81 and 82 have tabs 84 bent angularly to serve as handles for adjusting the rings.

The rings 81 and 82 are mounted on the body 18 in such a manner that the rings are supported independently of the clamping sleeve 22. The rings 81 and 82 are disposed around the sleeve 22, but are spaced outwardly therefrom so that the mounting of the rings is not affected by the tightening and loosening of the sleeve.

To provide such independent support for the rings 81 and 82, the body 18 is formed with a plurality of posts, projecting rearwardly therefrom, and spaced outwardly from the sleeve 22. Three such posts, 91, 92 and 93 are provided in the illustrated construction as shown to best advantage in FIG. 2. The posts 91-93 are spaced at approximately equal angular intervals. It will be seen that the posts 91 and 92 are the same in construction. Each of these posts is formed with an outwardly facing groove or recess 94, adapted to receive and retain the circular inner edges of the rings 81 and 82 (FIG. 1). The post 93, as shown to best advantage in FIG. 7, has an end surface or shoulder 96 along which the front ring 81 is slidable. A flange 98 project rearwardly from the surface 96 so as to extend past the inner edges of the rings 81 and 82.

The rings 81 and 82 are retained on the post 93 by means of a generally "U"-shaped clip 100 which presses the rings against the end surface 96. The U-shaped clip 100 has a rear leg 101 which engages the rear side of the ring 82, and a front leg 102, adapted to extend into a cavity or recess 104 in the post 93. The front leg 102 engages a wall 106 at the rear end of the recess 104. The clip 100 is preferably made of a spring material so that it exerts spring pressure against the ring 82.

The body is preferably formed with two additional posts 108 and 109, disposed near the posts 91 and 92, as shown in FIG. 2. The posts 108 and 109 are of the same construction. Each of the posts 108 and 109 is formed with an end surface 110 which engages the front side of the ring 81.

The rings 81 and 82 are installed by inserting them into the grooves 94 in the posts 91 and 92, while bringing the ring 81 into engagement with the end surfaces 110 on the posts 108

and 109. The rings 81 and 82 are then engaged with the post 93. To complete the assembly, the clip 100 is mounted on the post 93, as shown in FIG. 7.

The clamping sleeve 22 is flexed inwardly against the neck 12 of the tube 10 by the clamping band 24. However, this clamping movement of the sleeve 22 does not affect the posts 91-93 to any appreciable extent. The posts 108 and 109 are also unaffected. In addition to retaining the rings 81 and 82 on the post 93, the clip 100 provides frictional resistance to the rotation of the rings, such that they will stay in any position to which they may be adjusted.

It will be apparent that the illustrated device 16 provides for easy and precise adjustment of the convergence and purity factors. The purity is adjusted by turning the rings 81 and 82 so that they move relative to the supporting posts 91-92, 108 and 109.

The lateral convergence is adjusted by turning the knob 68 so as to rotate the pinion 66. The racks 71 and 72 cause movement of the slides 41 and 42 in opposite directions. Upward movement of the slide 41 is accompanied by downward movement of the slide 42. Such movement causes the magnetic field of the magnet 51b to predominate over the field of magnet 51a. Thus, the blue beam is shifted laterally in one direction. At the same time the magnetic fields of the magnets 52a and 53a predominate over the fields of the magnets 52b and 53b, so that the red and green beams are shifted laterally in the opposite direction. These results are reversed if the slides 41 and 42 are moved in the opposite directions. Thus, the blue beam can be shifted laterally in either direction relative to the red and green beams.

Various other modifications, alternative constructions and equivalents may be employed, as will be understood by those skilled in the art.

I claim:

1. A convergence device for a color television picture tube, said device comprising a body adapted to be mounted around the neck of a color television picture tube, said body having an opening therein for receiving the neck of the tube, first and second slides mounted on said body for movement in a direction transverse to the axis of the picture tube, each of said slides having at least one permanent magnet thereon, said magnet on said first slide and said magnet on said second slide being mounted in corresponding positions but being oppositely polarized, and drive means for moving said slides in opposite directions, so that the magnet on either of said slides can be moved closer to the neck of the picture tube.
2. A convergence device, according to claim 1, including a plurality of permanent magnets mounted on each of said slides in corresponding positions.
3. A convergence device, according to claim 1, including three permanent magnets mounted on each of said slides in corresponding positions, each magnet on one slide being oppositely polarized with respect to the corresponding magnet on the other slide.
4. A convergence device, according to claim 1, said drive means including a movable control member mounted on said body, and means operable by said control member for moving said slides in opposite directions.
5. A convergence device, according to claim 1, said drive means including a pinion rotatably mounted on said body, a control member for rotating said pinion, and first and second racks on said first and second slides for engaging opposite sides of said pinion, whereby rotation of said pinion causes movement of said slides in opposite directions.
6. A convergence device, according to claim 5, in which each of said slides is formed with a longitudinal slot which is elongated in the direction of movement of said slide,

said pinion extending through said slots in said slides, said first and second racks being formed along opposite sides of said slots in said first and second slides.

7. A convergence device, according to claim 1, in which each magnet in said slides is positioned with its poles oriented along a line parallel to the direction of movement of said slides. 5

8. A convergence device, according to claim 1, in which each magnet is in the form of a bar, having magnetic poles oriented along a line parallel to the direction of movement of said slides. 10

9. A convergence device according to claim 1, in which each of said slides is formed with an opening for receiving the neck of the picture tube.

10. A convergence device according to claim 1, in which each of said slides is provided with three of said magnets in corresponding positions, each magnet being in the form of a bar having magnetic poles extending generally along a line parallel to the direction of movement of said slides, each magnet being oppositely polarized relative to the corresponding magnet on the other slide. 15 20

11. A convergence device according to claim 10, said drive means comprising a pinion rotatably mounted on said body, control means for rotating said pinion, and racks on said slides for engaging opposite sides of said pinion, whereby rotation of said pinion causes movement of said slides in opposite directions. 25 30

12. A convergence device according to claim 1, in which each magnet is in the form of a bar, each slide being formed with a clip for holding said bar thereon. 35

13. A convergence device according to claim 12, in which each clip is formed integrally with the corresponding slide.

14. A convergence device according to claim 12, in which each of said slides is made of molded plastic material, each clip being molded integrally with the corresponding slide. 40 45

15. A convergence device according to claim 1, including a pair of purity-adjusting rings mounted on said body for rotary adjustment.

16. A convergence device according to claim 1, including a pair of purity-adjusting rings mounted on said body for rotary adjustment, said body having first, second and third posts projecting therefrom at spaced intervals, said first and second posts having outwardly facing grooves therein for receiving said rings, said third post having a clip removably mounted thereon for retaining said rings.

17. A convergence device according to claim 16, including at least one additional post projecting from said body and having an end surface engaging the side on one of said purity rings.

18. A purity-adjusting device for a television picture tube, said device comprising a body adapted to be mounted around the neck of the television picture tube, said body having an axial opening therein for receiving the neck of the tube, a pair of purity-adjusting rings mounted on said body for rotary adjustment, said body having first, second and third angularly spaced posts projecting therefrom generally parallel to the axis of said body for receiving said rings, said first and second posts having outwardly facing recesses therein for receiving and guiding said rings, said third post having an end face for slidably engaging one of said rings, a generally U-shaped spring clip removably mounted on said third post for slidably clamping said rings against said end face, said third post having an opening therein for receiving a portion of said clip, and two additional posts formed on said body adjacent to said first and second posts and having end surfaces engaging one of said rings, said recesses having end walls engaging the other of said rings, said rings being slidable between said end surfaces and said end walls. 50 55 60 65 70 75

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,605,053 Dated September 14, 1971

Inventor(s) Albert M. Anthony

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, numbered line 31, change "preferably" to "preferable"

Column 2, numbered line 38 (actual line 36), after "picture" insert "tube 10 with sufficient clearances to provide"

Column 2, numbered line 43 (actual line 41), change "53" to "53b"

Signed and sealed this 21st day of March 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents