Oct. 6, 1970 EIJI SAWADA ET AL 3,533,031

BLUE BEAM CORRECTING DEVICES FOR COLOR TELEVISION RECEIVING TUBES

Filed July 1, 1968

FIG. 1

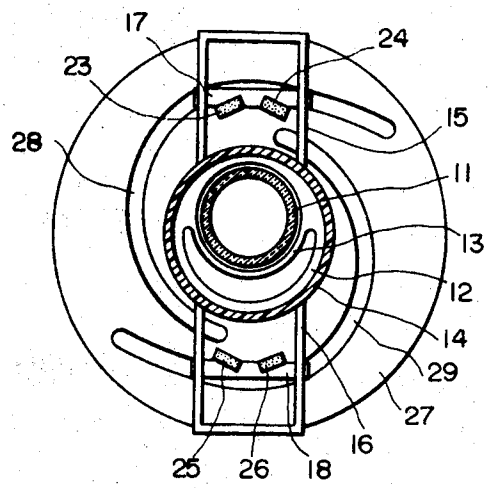


FIG. 2

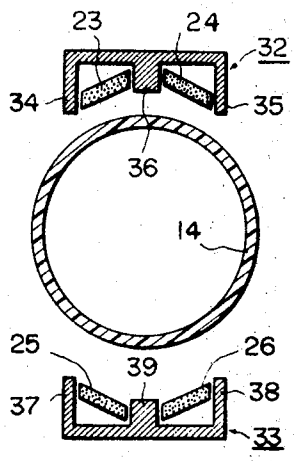


FIG. 3

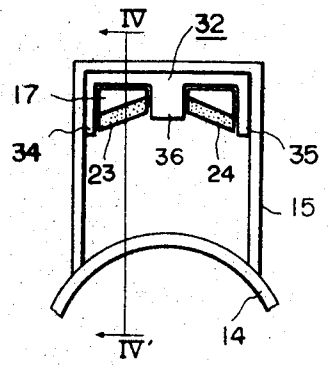


FIG. 4

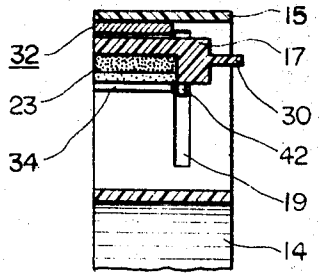


FIG. 5

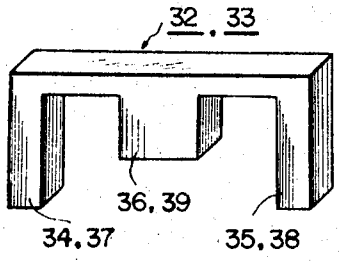
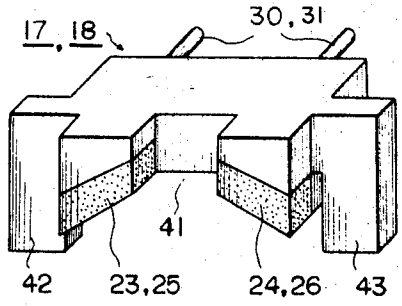


FIG. 6



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BLUE BEAM CORRECTING DEVICES FOR COLOR TELEVISION RECEIVING TUBES

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Int. Cl. H01f 1/00
U.S. Cl. 335—212 4 Claims

ABSTRACT OF THE DISCLOSURE

In a blue beam correcting device for a color television receiving tube wherein two pairs of magnets diametrically disposed with respect to the axis of the tube neck are adjusted to and from the neck to concentrate red, blue and green electron beams at the center of the screen, E-shaped magnetic bridging members are disposed at the limit of movement of the magnet pairs to magnetically short circuit these magnets so as to completely divert the magnetic flux away from the neck.

BACKGROUND OF THE INVENTION

This invention relates to a magnetic beam control device more particularly to a blue electron beam correcting device wherein the blue beam of a color television receiving tube is corrected and shifted to concentrate red, blue and green electron beams onto a set of fluorescent trio at the center of the screen.

In three electron gun type color television receivers, in case where three electron beams do not concentrate onto a set of fluorescent trio at the center of the screen due to manufacturing tolerance and the like of the receiving tubes it is usual to adjust thru electron beams by applying a DC field thereto by means of a static convergent, permanent magnet means.

However, there are some cases wherein it is impossible to concentrate three electron beams at the center of the screen even with the maximum adjustment of the DC magnetic field. More specifically, even when the red beam and green beam are caused to concentrate at the center of the screen by the adjustment of the permanent magnet, in some cases it is impossible to bring the blue beam to the point of concentration of red and green beams by the vertical adjustment of the blue beam. In such a case a correcting device or a so-called blue lateral device is utilized by means of which a DC magnetic field is applied to the blue beam in the vertical direction whereby to shift it in the lateral direction.

According to a prior arrangement a pair of permanent magnets symmetrically disposed with respect to the axis of a receiving tube are brought to and from a neck of the tube to vary the intensity of the DC field acting upon three electron beams. However, owing to the limited space around the neck and the physical dimension of the adjusting device it is desirable to make zero the DC field acting upon three electron beams at a definite distance from the neck of the reeciving tube or at a point near the limit of movement of the permanent magnets. One approach to this problem proposed by the applicant involves the provision of a metal piece of high permeability at a point near the limit of the movement of the permanent magnets so that when permanent magnets are moved away from the neck and reach said limit of movement the magnetic flux established by the permanent magnets also flows through the metal piece.

Such construction, however, requires a special configuration of the metal piece or magnetic short circuiting

member in order to make perfectly zero the DC field at the limit of movement.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved blue beam correcting device for a color television receiving tube which can reduce substantially to zero the DC field provided by permanent magnets at their limit of movement.

Another object of this invention is to increase the variation of the DC field in a limited space.

A further object of this invention is to provide a correcting device of simple construction and of cheap price.

According to this invention, in the blue beam correcting device of the type described, E-shaped magnetic members are provided at the limit of movements of the magnets to magnetically short circuit these magnets so as to completely divert the magnetic flux from the neck.

BRIEF DESCRIPTION OF THE DRAWING

Further objects and advantages of the present invention will become apparent and this invention will be better understood from the following description taken in connection with the accompanying drawing in which:

FIG. 1 is a diagrammatic plan view partly in section, of a typical blue beam correcting device for a color television receiving tube;

FIG. 2 is a simplified plan view helpful to explain the principle of the novel blue beam correcting device;

FIG. 3 is an enlarged front view of a portion of one embodiment of the blue beam correcting device;

FIG. 4 is a sectional view along a line IV—IV in FIG. 3 and viewed in the direction of arrows;

FIG. 5 is an enlarged perspective view of one example of a magnetic bridging member; and

FIG. 6 is an enlarged perspective view of one example of an elevating member including a pair of permanent magnets.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the accompanying drawing, FIG. 1 is a view to explain the operation of a typical blue beam correcting device of a color television receiving tube. As shown in this figure, a neck **11** of a receiving tube is mounted in an inner frame **13** disposed eccentrically with respect to an outer frame **12**. The outer frame **12** is disposed within a cylinder **14** to be rotatable therein, said cylinder **14** being provided with elevating frames **15** and **16** which are spaced apart 180° around the periphery of the cylinder **14**. Side walls of elevating frames **15** and **16** are formed with grooves **19**, best seen in FIG. 4, to guide elevating members along the frames **15** and **16**. Each one of elevating members **17** and **18** carry a pair of oppositely inclined permanent magnets **23**, **24** and **25**, **26**. These magnets are properly secured to elevating members with their poles of the same polarity opposing each other. Thus, for example, N poles of permanent magnets **23** and **24** secured to elevating member **17** face each other whereas S poles of permanent magnets **25** and **26** secured to elevating member **18** face each other. A rotatable circular disc **27** is mounted closely adjacent the cylinder **14** carrying elevating frames **15** and **16**. Disc **27** is provided with spiral grooves **28** and **29** to receive projections **30** and **31** of the elevating members **17** and **18** whereby as the disc **27** is rotated, elevating members **17** and **18** are caused to move along the elevating frames in the vertical direction. Consequently, when permanent magnets **23**, **24**, **25** and **26** are brought close to the tube neck **11** their DC field greatly influences upon the electron beams through neck **11** whereas as the magnets are moved away from the neck their influence is reduced.

Referring now to FIG. 2 which is useful to explain the principle of the blue beam correcting device of this invention, there are provided E-shaped magnetic bridging members **32** and **33** of a magnetic material which are positioned near the limit of movement of elevating members **17** and **18**. Accordingly, when elevating members **17** and **18** reach their limit of movement respective permanent magnets would assume positions shown in FIG. 2 so that magnetic flux established by permanent magnets **23**, **24**, **25** and **26** will be completely shunted around or diverted away from the neck **11** by outer legs **34**, **35**, **37** and **38** and central legs **36** and **39** of the magnetic bridging members. In other words, permanent magnets **23**, **24**, **25** and **26** will be perfectly short circuited magnetically by magnetic bridging members **32** and **33** so that any appreciable flux would not pass through the neck. Thus, when the elevating members **17** and **18** reach their limit of movement, the magnetic flux through neck **11** can be reduced to substantially zero.

FIGS. 3 to 6 illustrate practical constructions of the correcting device of this invention. FIGS. 3 and 4 illustrate a condition wherein elevating member **17** has reached its limit of movement. As mentioned hereinabove, the elevating member **17** is caused to slide along guide groove **19** on the side walls of elevating frame **15** by the rotary movement of disc **27**.

FIG. 5 illustrates one example of the construction of magnetic bridging members **32** and **33**, as shown it has generally a letter E shape, the length of outer legs **34**, **35**, **37** and **38** being longer than central legs. This is because the permanent magnets **23**, **24**, **25** and **26** are inclined. However it will be clear that these outer legs may have nearly equal length as center legs.

FIG. 6 illustrates one example of elevating members **17** and **18**. The elevating member shown in FIG. 6 has a central recess **41** and two sliding members **42** and **43** on both sides. Permanent magnets **23**, **24** (or **25**, **26**) are secured to walls on both sides of the central recess **41** so that when elevating members **17** and **18** reach their limit of movement central legs **36** and **39** of the magnetic bridging members **32** and **33** will be received in recesses **41** of elevating members **17** and **18** while outer legs **34**, **35** and **37**, **38** will slide along sliding members **42** and **43**. Although in this embodiment the magnetic bridging members are secured to the upper ends of the elevating frames they may be inserted in the elevating frames from the side thereof. The magnetic bridging members may be made of magnetic ceramics or iron, and when it is made of iron plates the plates may be suitably bent.

While the invention has been shown and described in terms of preferred embodiments thereof it should be understood that many alternations and modifications can be made within the scope of the invention as defined in the appended claims.

What is claimed is:

1. A blue beam correcting device for a color television receiving tube comprising a first pair of spaced apart magnets disposed at a first predetermined position on the outer periphery of the neck of said receiving tube, a second pair of spaced apart magnets disposed at a second predetermined position on the outer periphery of said neck diametrically opposite to said first pair, means to adjust in union said first and second pairs of magnets with respect to the axis of said tube neck, and magnetic bridging means including letter E shaped magnetic members positioned at the limit of movement of said magnet pairs to magnetically short them.

2. Apparatus according to claim **1** in which said pairs of magnets are mounted with opposed poles.

3. Apparatus according to claim **2** in which said magnets when positioned at said limit of movement are recessed between the legs of said E shaped magnetic members.

4. Apparatus according to claim **3** in which said pairs of magnets are inclined to be approximately tangent to said neck of said receiving tube and said E shaped magnetic members have outer legs longer than the center leg.

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GEORGE HARRIS, Primary Examiner

U.S. Cl. X.R.

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