

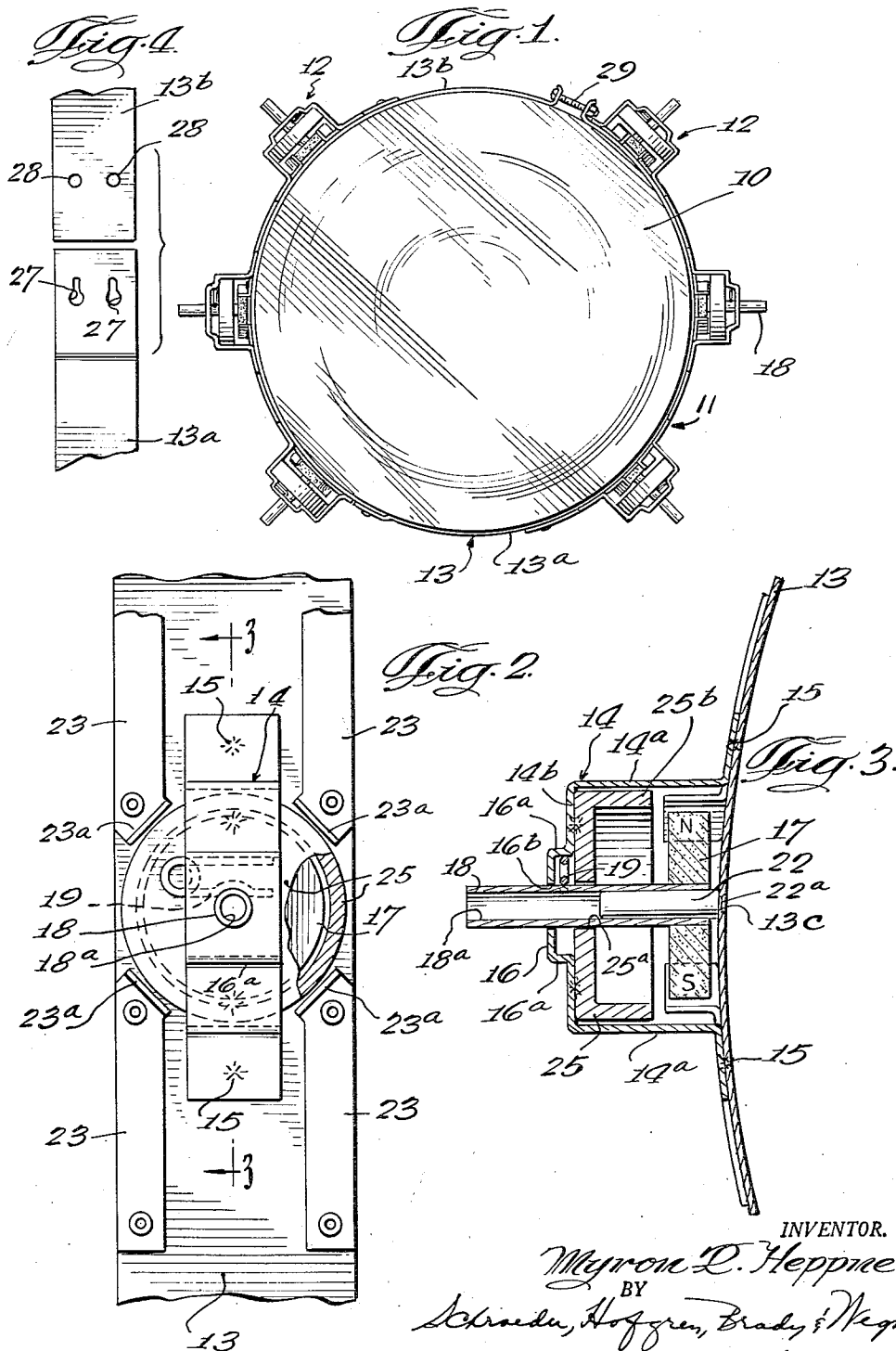
March 4, 1958

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2,825,835

BEAM POSITIONING DEVICE

Filed Aug. 24, 1955



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BEAM POSITIONING DEVICE

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Application August 24, 1955, Serial No. 530,330

9 Claims. (Cl. 313-77)

This invention is concerned with a beam positioning device for a cathode-ray tube and more particularly with such a device intended for use with a picture tube of a color television receiver.

The electron beam of the picture tube in a color television receiver is quite sensitive to external magnetic fields and unless these external fields are properly compensated for the three primary color images used to form the resulting picture will not register properly. The tubes presently used are so sensitive to this interference that the earth's magnetic field has a substantial effect on the picture. Accordingly, some means for compensating for this effect, i. e. for counteracting the earth's magnetic field, must be provided. This means must further be made readily adjustable as the earth's field varies substantially, both in magnitude and direction, in different areas. In fact, it is sometimes necessary to readjust color television receivers when they are moved from one side of a room to another.

Devices previously used for this purpose required expensive magnets and have complicated mechanical structures. I have devised, and disclose and claim herein a novel beam positioning device which has a magnetic circuit that permits the use of inexpensive magnets and which has a greatly simplified mechanical structure.

One feature of the invention is the provision in a beam positioning device for use with a cathode-ray tube and including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube, having at least one magnet mounted thereon and movable toward and away from the band, of a magnetic circuit including a strip of magnetic material carried by the band and having an end portion extending outwardly away from the band, adjacent the magnet. Another feature is that the magnet is circular and that the plane of the end portion of the strip is generally at right angles to the extension of a radius of the magnet through the end portion. A further feature is that the magnetic circuit includes a shunt for the magnet and spaced from the band with the magnet intermediate the shunt and the band, and the end portion of the strip of magnetic material extends outwardly from the band outside the area of the shunt and terminates short of the shunt.

Still another feature is that the magnetic arrangement includes an upstanding bracket mounted on the band, a magnet, a tubular operating member extending through and carried by the bracket and extending through the magnet, and a guide member of nonmagnetic material secured to the band and extending outwardly therefrom into the bore of the tubular operating member.

Other and further objects and features of the invention will be readily apparent from the following description and drawings, in which:

Figure 1 is an elevational view of the face of the cathode-ray tube with the device of the present invention in place thereon;

Figure 2 is an enlarged fragmentary elevational view,

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partially broken away, of a magnet assembly and the associated magnetic circuit;

Figure 3 is a sectional view taken substantially along line 3-3 of Figure 2; and

5 Figure 4 is a reduced fragmentary detail of the end connection for the portions of the band.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail one specific embodiment with the understanding that the present disclosure is to be considered as an exemplification of the principle of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

15 Turning now to Figure 1 of the drawings, a cathode-ray tube 10 is shown having a beam positioning device indicated generally as 11 secured around the periphery of the face thereof. Six magnet assemblies 12 are carried on a band 13, of nonmagnetic material as aluminum, in the desired spaced relationship about the periphery of the face of the cathode-ray tube. The six magnets may be adjusted to provide the necessary field conditions to counteract the earth's magnetic field and prevent distortion of the picture displayed on the screen. The magnets may have some effect on localized magnetic fields, but these are usually best compensated for by shielding.

Referring to Figures 2 and 3, it will be seen that a U-shaped bracket 14 of nonmagnetic material, is secured to band 13 as by spot welding at 15. The bracket includes leg portions 14a which extend outwardly from band 13 and an intermediate portion 14b joining the legs. There is an outwardly formed section 16 centrally located in the intermediate portion 14b of the bracket and having side portions 16a.

35 A disk-shaped magnet 17 is carried on a tubular operating member 18, which may be of a composition material, and which extends outwardly through a hole 16b in the outwardly formed section 16 of the bracket. A U-shaped spring 19 is inserted between tube 18 and the side portion 16a of the outwardly formed section of the bracket to hold the operating member and magnet in any desired position.

40 A guide member 22 of nonmagnetic material, as brass, is secured to band 13 and extends outwardly therefrom into the bore 18a of tubular operating member 18 to keep the magnet 17 properly aligned at all times. The guide member 22 has a boss 22a formed at the end thereof which extends through an opening 13c provided in band 13 and is then riveted over to provide a smooth inner surface for the band.

50 The magnetic circuit includes four pole pieces or strips 23 of magnetic material which are riveted to the edges of band 13 and extend longitudinally therealong on either side of the magnet. The pole pieces 23 each have an end portion 23a bent upwardly adjacent the magnet. These end portions are so formed that they lie in a plane generally at right angles to an extension of the radius of the magnet passing through the end portion. These upwardly bent end portions on the pole pieces provide an efficient magnetic circuit with only a relatively small air gap and permit the use of ferrite magnets rather than more expensive magnets which were previously necessary.

60 A cup-shaped shunt 25 is provided for magnet 17 and is carried between the legs 14a of the bracket, the shunt being provided with an opening 25a through which operating member 18 extends. It will be noted that the end portions 23a of the pole pieces extend upwardly outside the area of circular shunt 25 and terminate at a point short of the annular flange 25b of the shunt.

70 The magnitude of the effect of the magnet 17 may be varied by adjusting the position of the magnet with respect to the band 13 and pole pieces 23, the shunt 25 substan-

tially completely shorting the magnetic field when the magnet is completely retracted. In addition, the polarity of the magnetic field, and to an extent the magnitude thereof, may be varied by rotating the magnet. The guide member 22 extends a substantial distance up into the shunt cup 25 so that it provides an effective guide regardless of the position of the magnet. In addition, guide 22 serves as a bearing when the magnet is rotated. Spring 19 of course maintains the magnet in any desired position to which it may be adjusted.

The mounting band 13 is made up of two portions 13a and 13b, each having three of the magnet assemblies 12 mounted thereon. One end of band portion 13a is provided with keyhole-shaped slots 27 adapted for mating engagement with pins 28 provided at the adjacent end of band portion 13b. The opposite ends of each band portion are turned upwardly and provided with holes through which a bolt 29 is secured to tighten the band on the cathode-ray tube. This split construction enables the relatively simple mass production of the bands, which is not possible when a circular band is formed of a single piece; while the keyhole slot of the pin connection provides for very simple assembly.

I claim:

1. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube and having at least one magnet mounted thereon, movable toward and away from said band, a magnetic circuit including a strip of magnetic material carried by said band and having an end portion extending outwardly away from said band, adjacent said magnet.

2. A magnetic circuit for a beam positioning device as described in claim 1, wherein said magnet is circular and the plane of said end portion is generally at right angles to the extension of a radius of said magnet through said end portion.

3. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube and having at least one magnet mounted thereon, movable toward and away from said band, a magnetic circuit including four strips of magnetic material one along either edge of said band on either side of said magnet, each strip having end portions extending outwardly from said band adjacent said magnet.

4. A beam positioning device for a cathode-ray tube as described in claim 3, wherein said magnet is circular, said end portions are equally spaced around said magnet and the plane of each end portion is generally at right angles to the extension of a radius of the magnet through said end portion.

5. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube and having at least one magnet mounted thereon, movable toward and away from said band, a magnetic circuit including a shunt for said magnet spaced from said band with said magnet intermediate the shunt and the band, and a strip of magnetic material carried by the band and having an end portion extending outwardly from the band outside the area of said shunt and terminating short of the shunt.

6. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube, a magnetic arrangement of the character described, comprising an upstanding bracket carried by said band, a magnet, a rod-like operating member carrying said magnet and extending through a portion of said bracket, and a spring bearing against said operating member to retain said magnet in a set position while permitting reciprocation of the operating member to position the magnet as desired.

7. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube, a magnetic arrangement of the character described, comprising an upstanding bracket, a magnet, a tubular operating member extending through and carried by said bracket and extending through said magnet, and a guide member of nonmagnetic material secured to said band and extending outwardly therefrom into the bore of said tubular operating member.

8. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube, a magnetic arrangement of the character described, comprising a U-shaped bracket carried on said band and having a pair of leg portions and an intermediate portion joining the legs, there being an outwardly formed section centrally located in said intermediate portion, said outwardly formed section having side portions and having a hole therethrough, a magnet having a hole therethrough, a tubular operating member secured in the hole in said magnet and extending through the hole in said outwardly formed section, a spring between one of the side portions of said outwardly formed section and said tube for retaining said magnet in a set position while permitting reciprocation of the operating member to position the magnet, a nonmagnetic guide member secured to said band and extending outwardly therefrom into said tubular operating member, and a shunt for said magnet carried between the leg portions of said bracket.

9. In a beam positioning device for use with a cathode-ray tube, including a band of nonmagnetic material adapted to encircle the periphery of the screen portion of the cathode-ray tube, a magnetic arrangement of the character described, comprising an upstanding bracket, a magnet, a tubular operating member extending through and carried by said bracket and extending through said magnet, a guide member of nonmagnetic material secured to said band and extending outwardly into said tubular operating member, and a magnetic circuit including four strips of magnetic material, one along either edge of said band and on either side of said magnet, each strip having end portions extending outwardly away from said band, adjacent said magnet.

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