

April 19, 1966

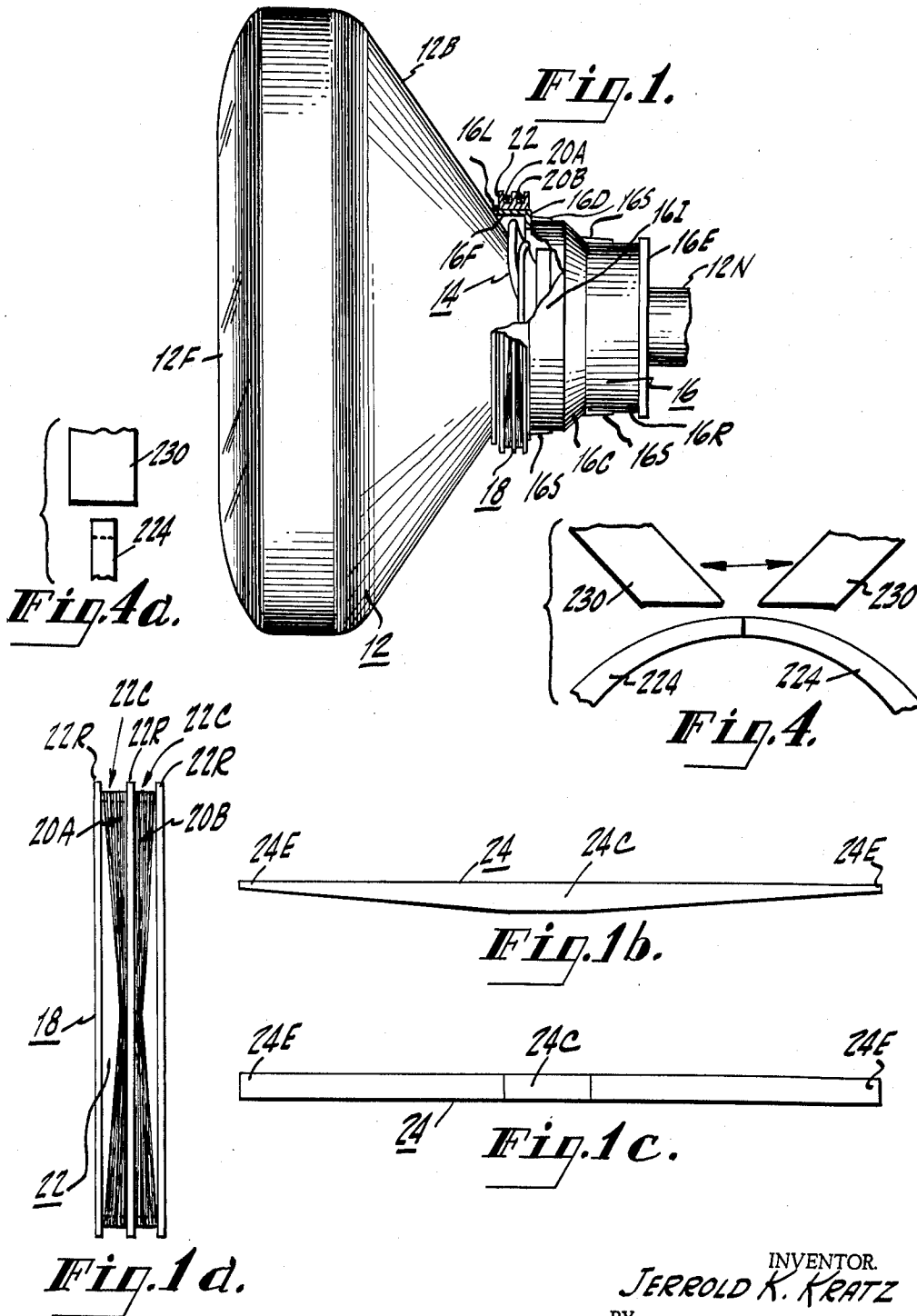
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POST-DEFLECTION COLOR PURITY CORRECTING MAGNET SYSTEM
FOR A COLOR TV CATHODE RAY TUBE

Filed July 9, 1962

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

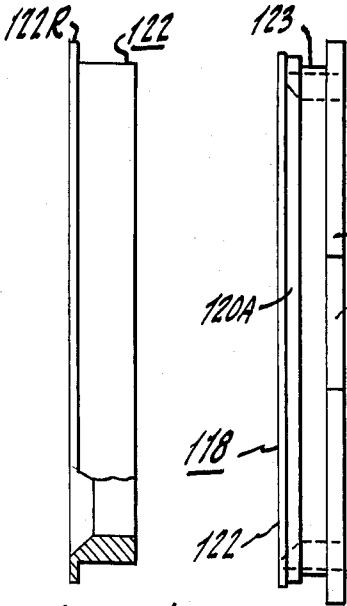


Fig. 2a. **Fig. 2b.**

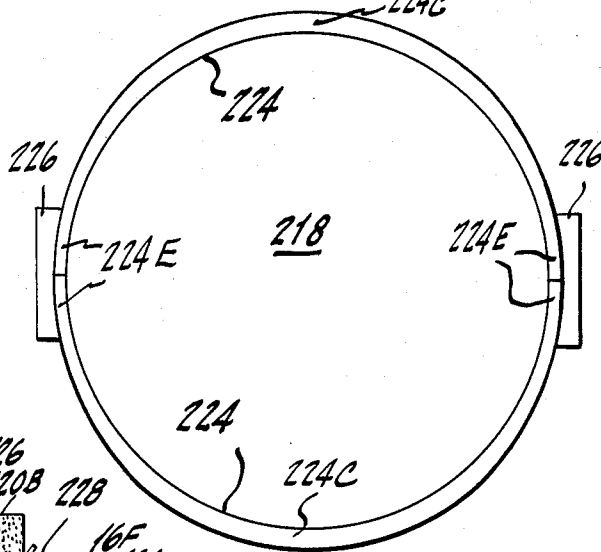
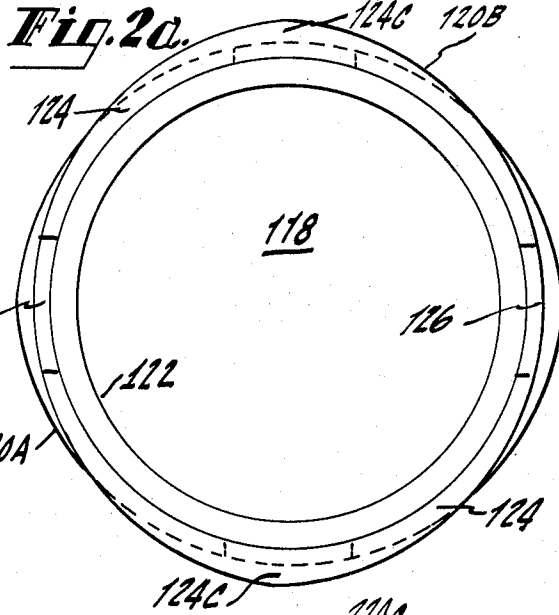


Fig. 3.

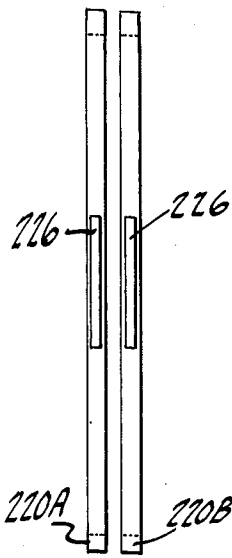


Fig. 3d.

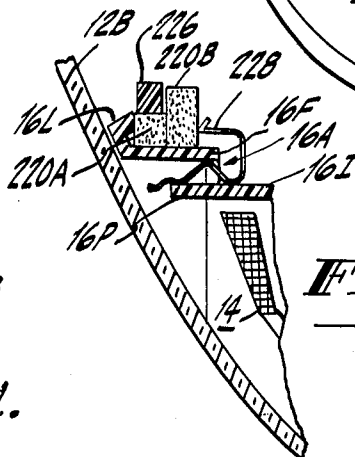


Fig. 3b.

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**POST-DEFLECTION COLOR PURITY CORRECTING
MAGNET SYSTEM FOR A COLOR TV CATHODE
RAY TUBE**

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Corporation of America, a corporation of Delaware
Filed July 9, 1962, Ser. No. 208,403
8 Claims. (Cl. 313-84)

The present invention relates generally to electron beam controlling apparatus, and more particularly, to apparatus for effecting color purity adjustments in multi-beam, shadow-mask type color kinescopes.

The provision for so-called "color purity" adjustments is a practical necessity in obtaining proper operation of a three-gun shadow-mask color kinescope. In United States Patent No. 2,950,407, entitled "Electric Beam Controlling Apparatus," and issued to William H. Barkow and Martin W. Schmutz on August 23, 1960, the problem of "color purification" and its causes are discussed at length, and apparatus for achieving color purity corrections is shown and described. While reference may be made to the foregoing patent for a detailed explanation, it should suffice for present purposes to describe color purity correction as a common adjustment of the position of all three beams of the color kinescope so that deflection of the beams is associated with the proper "color centers" whereby the approach of each beam to the shadow mask is at the proper angle to cause excitation of the phosphor dots of the appropriate color.

In the Barkow and Schmutz patent, an arrangement of a pair of ring-shaped permanent magnets, magnetized across a diameter, is shown surrounding the kinescope neck at a position preceding the kinescope's deflection yoke to provide a magnetic field transverse with respect to the tube neck axis for shifting the beam array as required for color purity correction. Each of the permanent magnet rings is rotatable about the tube neck whereby both the direction and magnitude of the transverse magnetic field may be selectively adjusted.

The present invention is directed to novel and improved apparatus for achieving color purity correction in shadow mask color kinescopes, and achieves such correction in operation upon the beams in a post-deflection region. The present invention has been found particularly appropriate for use in conjunction with shadow mask color kinescopes of a wide angle type wherein deflection angles of the magnitude of 90° are achieved. Such wide angle kinescopes differ from prior color kinescopes (where the deflection angle is of the order of 70°) in such physical characteristics as tube neck length, tube neck diameter, gun size, gun spacing, etc., with such physical dimensions being significantly reduced in the wide angle version. For a variety of reasons associated with the reduced dimensions of the wide-angle form of shadow-mask color kinescope, post-deflection color purity correction in accordance with the present invention has been found to be preferable and advantageous over pre-deflection correction arrangements.

In accordance with an embodiment of the present invention, a pair of permanent magnets of ring-like configuration are rotatably supported on a mount surrounding the kinescope deflection yoke, the ring providing a magnetic field transverse to the tube neck axis at a position adjacent the forward or screen end of the deflection yoke. In accordance with particular forms of the present invention the ring-like magnets are not uniform in dimensions throughout their circumference, but rather are given a tapered configuration in order to provide a magnetic field which is suitably distributed or "shaped" throughout the space enclosed by the magnetic ring so

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as to provide a uniform effect on beam landing over the entire area of the scanned raster. Field shaping throughout the enclosed space is particularly important since the device is operating in a post-deflection region, i.e., electron beams will be entering the magnetic field of the purity device at various positions and angles throughout a large portion of the space enclosed within the rings. A variety of configurations for the magnet structures are disclosed herein for achieving the desired field shaping. An alternative to non-uniformity of magnet shape in achieving the field shaping purpose is also recognized, such alternative involving non-uniformity of magnetization of the rings along their circumferences. In one particular form of the present invention, it is proposed to combine both non-uniformity of magnet dimensions and non-uniformity of effective magnetization to achieve the desired field shaping purpose.

Color purity correction apparatus in accordance with the present invention possesses a distinct advantage over pre-deflection purity correction devices in that there is less interference or interaction with convergence and focusing apparatus and adjustments. Because of its location, an adjustment of a pre-deflection purity correcting device may undesirably disturb convergence and focusing of the beams such that the purity adjustment requires subsequent readjustment of the various convergence controls, such readjustment requirement being particularly apparent in use with the diminished-dimension, wide-angle type color kinescope.

A primary object of the present invention is to provide novel and improved electron beam controlling apparatus for color kinescopes.

A particular object of the present invention is to provide a new and improved color purity correction device for shadow mask color kinescopes.

Other objects and advantages of the present invention will be apparent to those skilled in the art upon a reading of the following specification and an inspection of the accompanying drawings in which:

FIGURE 1 illustrates in a partially broken-away plan view color purity correction apparatus in accordance with one embodiment of the present invention, such apparatus being shown in its operating location with respect to a color kinescope envelope and associated deflection yoke and yoke support;

FIGURES 1a, 1b and 1c illustrate details of the color purity correction apparatus of FIGURE 1;

FIGURE 2 illustrates color purity correction apparatus in accordance with another embodiment of the present invention;

FIGURES 2a and 2b illustrate details of the color purity correction apparatus of FIGURE 2;

FIGURES 3, 3a and 3b illustrate color purity correction apparatus and details thereof in accordance with still another embodiment of the present invention; and

FIGURES 4 and 4a are illustrative, in respective partial plan and side views, of a partial demagnetizing step appropriate to the production of purity correction apparatus in accordance with the embodiment of FIGURES 3, 3a and 3b.

In FIGURE 1, there is shown a plan view of a color kinescope 12 with associated apparatus mounted thereon. The envelope of the color kinescope 12 comprises a flared bulb portion 12B and a cylindrical neck portion 12N (only partially shown). The forward end of the flared bulb portion 12B contains the screen of the color kinescope upon which color pictures are developed for viewing by the user through the transparent face 12F of the kinescope envelope.

Deflection of the kinescope beams to develop a display raster on the color kinescope screen is achieved through

the use of a deflection yoke 14, which surrounds the cylindrical neck portion 12N at its forward end and extends about the adjacent rearwardmost segment of the flared bulb portion 12B. A support structure for the yoke 14 is shown as including a generally cylindrical outer shell 16 surrounding the yoke. The outer shell 16 is preferably of unitary construction, and may, for example, be molded in the illustrated form from suitable plastic, non-magnetic material. The configuration of the shell 16 may be described as comprising three cylindrical sections, a forward cylindrical section 16F, an intermediate cylindrical section 16I, and a rearward cylindrical section 16R. The forward section 16F terminates at its forward end in a raised lip 16L and is joined to the lesser diameter intermediate section 16I by a disk-like section 16D. The intermediate section 16I is joined to the smaller diameter rearward section 16R by a conical section 16C. The rearward section 16R terminates in an end piece 16E.

It is not essential for present purposes to consider the structural details and adjustment advantages of the illustrated yoke support structure. It should be sufficient to generally note here that the yoke 14 rests in an inner halfshell (not shown) which is supported by the outer shell 16. Lug projections of the inner shell ride in longitudinal slots in the outer shell 16 permitting longitudinal adjustment of the position of the yoke 14 with respect to the outer shell. The ribbed edges 16S of several of the outer shell slots are partially visible in the FIGURE 1 view. The end piece 16E, preferably a separate element from the shell 16, provides contact with the outer surface of the kinescope neck 12N and establishes support for the outer shell 16 therefrom, and may also serve as a mount for the dynamic and static convergence elements associated in practice with the kinescope 12. For the sake of simplicity in the drawing, no showing has been made in FIGURE 1 of the convergence or neck-contacting structure so associated with the end-piece 16E.

The forward cylindrical section 16F of outer shell 16 provides a supporting surface for a color purity correction device 18, constructed and operating in accordance with an embodiment of the present invention. The purity correction device 18 includes a pair of generally ring-like magnets 20A and 20B mounted for individual rotation on a ribbed cylindrical magnet support 22.

The support 22 as shown in FIGURE 1a (which is an enlarged side view of the device 18 of FIGURE 1), is provided with three raised cylindrical ribs 22R, one at each edge and the third centrally positioned, to define two cylindrical channels 22C. The channels 22C receive the respective ring-like magnets 20A and 20B, and permit separate and individual rotation thereof.

As will be apparent from an inspection of FIGURES 1 and 1a, the respective rings 20A and 20B are not of uniform size throughout their circumference, but rather have tapered widths which vary smoothly from a maximum width (just slightly narrower than the width of a support channel 22C) at two diametrically opposed regions on the circumference to a minimum width (appreciably narrower than the support channel width) at a pair of diametrically opposed points on the circumference displaced 90° from the centers of the maximum width regions.

Each of the tapered width rings 20A and 20B is formed from the assembly of two magnetic elements 24, each of which assumes a semi-circular configuration as assembled. A preferred mode of assembly utilizes, for each of the two ring elements 24, a permanent magnet made of flexible magnetic material, such as commercially available flexible PM ferrite, of initial configuration as shown in the plan view of FIGURE 1b and the edge view of FIGURE 1c. The magnetic element 24 shown in FIGURES 1b and 1c is a straight piece of magnetic material having a central portion 24C of a constant width which

constitutes the maximum width of the element, and portions 24E of quite narrow width at each end of the straight element, with the portions of the element intermediate the constant width central portion 24C and the narrow end portions 24E having a width linearly tapering from the maximum width of the central portion to the narrow width of the end portions. As FIGURE 1c illustrates, the height of the element 24 is constant throughout its length.

In processing of elements of the form shown in FIGURES 1b and 1c before assembly to form the rings 20A and 20B of FIGURES 1 and 1a, each straight, rod-like ring element is first subjected to a thorough demagnetization. While a variety of apparatus is available for achieving this processing step, one suitable form for such demagnetizing apparatus comprises a core made up of an assemblage of generally E-shaped laminations mounted on a core base plate, with a multi-turn energizing winding surrounding the central legs of the assembled E-shaped core laminations. A square cross-section aperture is provided at a central location in the core extending down through the central leg of the laminated core in registry with a matching aperture in the core base plate. With the winding energized with suitable alternating current energy, the magnetic element 24 is inserted into and passed slowly through the aperture of the core and subjected to the demagnetizing effect of the alternating field developed by such winding energization.

After demagnetization, the element 24 is magnetized along its length. This magnetizing step may be achieved by inserting the magnetic element 24, in its initial straight configuration, into a closely fitting helical coil of corresponding length, and developing a field of adequate strength to saturate the element 24 in a direction along its long dimension by passing a large surge of current through the coil. This may be achieved by discharging a large capacitor therethrough.

After such magnetization, two of the rod-like elements 24 are formed into similar semi-circular configurations and then are secured together by suitable cementing or taping, etc., to form the desired ring in the channel 22C of the support 22. The orientation of the two elements in each assembled ring is such that the north pole ends of the elements abut each other and the south pole ends of each element abut each other.

Each of the assembled rings 20A and 20B is separately rotatable in its channel 22C. Rotation of one ring relative to the other alters both the direction and strength of the resultant magnetic field established in the enclosed space. Simultaneous rotation of both rings without disturbing their position relative to one another retains a given field magnitude and alters only the field direction. Equal but opposed rotation of the two rings achieves an alteration of field magnitude without alteration of field direction (except for a polarity change, if the equal but opposed rotations are sufficiently large).

Because of the post-deflection location of the purity device 18, the beams do not always enter the central region of the enclosed space, as is the case with a pre-deflection purity device. Depending upon the instant of the raster scanning cycle under consideration, the beams may be located at any position within a substantially large portion of the space enclosed by the cylindrical purity device 18. In order that the purity correction provided by the device may be substantially the same no matter where the entry points of the beams are, it is requisite that a suitably shaped field be established throughout this large portion of the enclosed space.

To achieve the proper field shaping, the magnetic elements 24 are given their previously discussed tapered configuration. As a consequence, the amount of magnetic material at the effective poles of each ring is at a minimum, while the amount of magnetic material at the points on the ring circumference most remote from the effective poles is at a maximum, with a substantially linear reduc-

tion region intermediate the noted extremes. The resultant field through the enclosed space (and hence through the tube neck region traversed by the beams as they leave the deflection area) possesses the desired shaping so that, for example, when the beams enter an edge region of the enclosed space enroute to their tracing of an edge of the display raster, they will be subject to the same position shift, i.e., purity correction, as when they enter the center of the enclosed space.

It will be appreciated that, when conditions require an adjustment of the positioning of rings 20A and 20B to alter the purity correction provided thereby, this alteration will have substantially no effect on convergence or focusing due to: (1) the remote location of the purity device with respect to the convergence and focusing field-producing elements; (2) the action of the purity device not affecting the alignment of the beams with respect to the convergence and focusing fields; and (3) the proper phasing of the field of the purity device itself. To insure that the purity device and its adjustment has no adverse effect on the deflection field provided by the yoke 14, it is preferable that the magnetic material employed in the rings 20A and 20B have a permeability substantially equal to unity. With such permeability value, the presence of this magnetic material near the front of the deflection yoke will not distort or disturb the yoke fields.

FIGURES 2, 2a and 2b are illustrative of another embodiment of the present invention. The purity correction device 118, shown in a side view in FIGURE 2 and in an end view in FIGURE 2a is like the correction device of FIGURES 1 and 1a in being intended for positioning in a post-deflection region, as by mounting upon the forward cylindrical section 16F of the shell 16 of FIGURE 1. Additional similarity resides in the use of a pair of generally ring-like magnets 120A and 120B mounted for independent rotation on a cylindrical magnet support 122.

The support 122 of FIGURES 2 and 2a (which is illustrated in more detail in the side view, partially broken away, of FIGURE 2b) particularly differs from the magnet support 22 of FIGURES 1 and 1a in having no central rib and only one edge rib 122R. The magnet rings 120A and 120B may be slipped over the rib-free end of the support 22 for mounting thereon. A cylindrical spacer 123 is also mounted upon the support 122 in a position intermediate the rings 120A and 120B, and effectively serves the magnet ring isolating function of the central rib 22R of the device of FIGURES 1 and 1a. When the rings and intermediate spacer are in position on the support 122, the support may be slipped over the cylindrical shell 16 of the yoke support for positioning on the forward cylindrical section 16F with its rib-free end abutting the lip 16L (which then effectively serves the magnet ring-retaining function of the forward edge rib 22R of the device of FIGURES 1 and 1a).

A further difference between the purity correction device 118 of FIGURES 2 and 2a and the purity correction device 18 of FIGURES 1 and 1a resides in the shape of the ring-like magnets. As was noted in the previous description, the dimensional non-uniformity associated with each of the rings (20A and 20B) of the purity correction device 18 was with respect to its width (i.e., its short dimension in directions parallel to its rotational axis, and parallel to the longitudinal axis of the kinescope when the device is mounted in an operating position). As will be appreciated from the side view of FIGURE 2, the width of each ring (120A and 120B) of the purity correction device 118 is constant along its circumference. However, as particularly shown in the end view of FIGURE 2a, each of the rings 120A and 120B is given a dimensional non-uniformity, along its circumference, with respect to its height (i.e., its short dimension in radial directions with respect to its rotational axis, and also with respect to the longitudinal axis of the kinescope when the device is mounted in operating position). In both cases (i.e., with non-uniformity of height or width) the effect

is to provide magnet rings with minimum cross-sectional area at their effective poles and maximum cross-sectional area intermediate the poles.

Each of the rings 120A and 120B is formed from the securing together of two ring elements 124 of roughly semi-circular configuration. In contrast with the ring elements 24 of FIGURES 1b and 1c (preferably formed by the shaping of essentially straight elements of flexible magnetic material), each element 124 is formed of rigid magnetic material. The material preferably has a permeability value near unity for previously discussed reasons. The element 124 is molded or otherwise shaped so as to have a relatively short height at each of its ends, and a relatively large height at its central portion 124C, with the height smoothly tapering from the relatively large central portion height to each relatively small end portion height.

After production in such a shape, each element 124 is thoroughly demagnetized, and then magnetized along its length. The magnetization may be achieved in a manner similar to that described for the elements 24, but with provision that the helical magnetizing coil into which the elements 124 is inserted be suitably flexible. To form each ring 120A and 120B, two of the magnetized elements 124 are secured together with respective end portions abutting or adjoining; the orientation should be such that the north pole ends of each element 124 abut or adjoin each other, and similarly, the south pole ends of each element 124 abut or adjoin each other. The securing elements 126 may simply comprise a segment of adhesive tape of suitable dimensions.

In the view of FIGURES 2 and 2a, the relative positioning of the rings 120A and 120B is such that the effective poles of one are displaced 90° from the corresponding poles of the other. The direction and magnitude of the purity correcting field thereby provided may be altered by a repositioning of the rings rotationally, just as described for the rings of the device of FIGURES 1 and 1a.

FIGURES 3, 3a and 3b are illustrative of a purity correction device 218 constituting another embodiment of the present invention. The device 218 is, in many respects, simplified relative to the previously described embodiments. As may be particularly appreciated from the end view of FIGURE 3 and the detail section view of FIGURE 3b, the device 218 does not include a separate magnet ring support as did the previously described embodiments. Rather, the pair of generally ring-like magnets 220A and 220B of the device 218 are directly mounted upon the forward cylindrical section 16F of the yoke support outer shell 16. The forwardmost ring 220A abuts the lip 16L of the shell 16. No spacer is provided between the rings. The rearwardmost ring 220B is retained on the element 16F through the use of a plurality of spring clips 228 associated with apertures 16A spaced about the circumference of the disc-like section 16D of the shell 16. The intermediate cylindrical section 16I of the shell provides a finger-like projection 16P in registry with each aperture 16A in the disc-like section 16D. Each spring clip 228 is shaped to engage the finger like projection 16P, the inner surface of the section 16F and the outer surface of the section 16I, as well as the rearward face of the magnet ring 220B, in such a manner as to retain the ring 220B in position on the element 16F and to urge the ring 220B forward into engagement with the ring 220A. The spring clips are provided with sufficient resiliency to permit the desired rotation of the rings.

As in the embodiment of FIGURES 2 and 2a, each of the rings 220A and 220B, while of constant width, is of non-uniform height circumferentially. Each of the rings is formed by the securing together of a pair of ring elements 224 of generally semi-circular configuration. Each element 224 is of maximum height at its central portion 224C, and tapers to a small height at each of its ends 224E. The magnetic material used for each element 224

may be similar to that previously described for the elements 124 of the FIGURE 2a embodiment.

Processing of each ring element 224 prior to assembly may be similar to that described for the elements 124 of FIGURES 2 and 2a, with one particular exception to be subsequently described. A pair of elements 224 are secured together to form a ring with end portions abutting; the orientation is again such that north pole ends of each assembled ring element abut, and south pole ends likewise abut.

Securing together of the ring elements 224 in the embodiment under consideration is achieved through the aid of handle members 226, two for each ring. Each handle 226, having an inner surface conforming to the curvature of the outer surface of the ring elements to be joined, overlies the abutting ends of the elements 224, and is secured to each of the elements 224 by use of glue or other adhesive material. The members 226 not only serve to secure the ring elements 224 together, but also provide handles for effecting desired rotational adjustment of each ring's position.

In FIGURE 3a, a side view is shown of the two rings 220A and 220B prior to mounting upon the element 16F. To place the rings in operating position, they are slipped over the cylindrical outer shell 16 and positioned on the element 16F. The spring clips 228 are then inserted in the apertures 16A to urge the rings into abutment as shown in FIGURE 3b. The relative rotational positioning of the rings 220A and 220B shown in FIGURE 3b is illustrative of a 90° displacement of the effective poles of one ring relative to the other. In FIGURES 3 and 3a the rings are shown in positions assumed when the effective poles of the two rings are in alignment. As with the previous embodiments, adjustment of the magnitude and direction of the purity correcting field is achieved by altering the rotational positions of the individual rings.

As noted previously, the device 218 is preferably subjected to a processing step not associated with the earlier described embodiments. FIGURE 4 is illustrative of a selective demagnetizing step to which the rings 220A and 220B are each subjected in the course of their assembly. Subsequent to the longitudinal magnetization of each ring element 224, and subsequent to their joinder in end-to-end abutting relationship, but prior to the securing of the handle members 226 over the joints, the area of the assembled ring surrounding each joint is subjected to a demagnetizing field. A demagnetizing coil, energized with suitable alternating current energy, is provided with a core having angled pole pieces 230. The demagnetizing pole pieces are placed close to the joint of the assembled ring elements 224, and then moved conjointly in a plane slightly displaced from but parallel to a plane tangent to the assembled ring at the joint. As shown in the side view in FIGURE 4a, the demagnetizing pole pieces are centered with respect to a plane bisecting the assembled ring and perpendicular to the ring axis. The direction of movement of the demagnetizing pole pieces is along the line formed by the intersection of this bisecting plane with the previously mentioned plane of movement (parallel to the tangential plane).

The effect of the selective demagnetization step described in connection with FIGURES 4 and 4a on the field traversing the enclosed space is similar to the effect that would be obtained were the tapering of the height of each element 224 to be such as to smoothly continue to a height of zero at the point of joinder with abutting element 224. A close approach to the ideal field shaping is achieved through use of the described selective demagnetizing step. To achieve such field shaping to a comparable degree by the described severe tapering in physical size is less desirable from the point of view of mechanical strength and servability of the resultant product.

A variety of embodiments of the post-deflection purity correcting device of the subject invention have been described. A variety of magnetic ring configurations have

been shown utilizing dimensional non-uniformity to achieve the field shaping requisite for uniform purity correction throughout the raster. In one embodiment, the attainment of the desired field shaping is achieved through combining dimensional non-uniformity with a non-uniformity of effective magnetization. It will be readily appreciated by those skilled in the art that the principles of the present invention may be embodied in still other forms of devices, utilizing the effects of dimensional non-uniformity or the effects of magnetization non-uniformity or combinations thereof to achieve the desired field shaping.

What is claimed is:

1. In a color television receiver including:

a color kinescope having a neck portion and a flared bulb portion,

said flared bulb portion enclosing a viewing screen at one end thereof remote from said neck portion, said color kinescope having associated therewith a deflection yoke encircling said neck portion,

color purity correction apparatus comprising the combination of:

a pair of generally ring-like permanent magnets, and supporting means for positioning said pair of ring-like magnets adjacent the end of said deflection yoke nearest to said viewing screen and encircling a segment of said flared bulb portion of said color kinescope,

said supporting means permitting individual rotation of each of said pair of ring-like magnets about the longitudinal axis of said color kinescope, each of said pair of ring-like magnets possessing a dimensional non-uniformity along its circumference.

2. In a color television receiver including:

a color kinescope having a neck portion and a flared bulb portion,

said flared bulb portion enclosing a viewing screen at one end thereof remote from said neck portion, said color kinescope having associated therewith a deflection yoke encircling said neck portion,

color purity correction apparatus comprising the combination of:

a pair of generally ring-like permanent magnets, and supporting means for positioning said pair of ring-like magnets adjacent the end of said deflection yoke nearest to said viewing screen and encircling a segment of said flared bulb portion of said color kinescope,

said supporting means permitting individual rotation of each of said pair of ring-like magnets about the longitudinal axis of said color kinescope, each of said pair of ring-like magnets possessing a dimensional non-uniformity along its circumference, said non-uniformity being with respect to the dimension of said ring in a direction parallel to the longitudinal axis of said color kinescope.

3. In a color television receiver including:

a color kinescope having a neck portion and a flared bulb portion,

said flared bulb portion enclosing a viewing screen at one end thereof remote from said neck portion, said color kinescope having associated therewith a deflection yoke encircling said neck portion,

color purity correction apparatus comprising the combination of:

a pair of generally ring-like permanent magnets, and supporting means for positioning said pair of ring-like magnets adjacent the end of said deflection yoke nearest to said viewing screen and encircling a segment of said flared bulb portion of said color kinescope,

said supporting means permitting individual rotation of each of said pair of ring-like magnets about the longitudinal axis of said color kinescope,

each of said pair of ring-like magnets possessing a dimensional non-uniformity along its circumference, said non-uniformity being with respect to the dimension of said ring in directions radial to the longitudinal axis of said color kinescope.

4. Beam controlling apparatus comprising the combination of:

a pair of permanent magnets, each of said magnets having a generally ring-like configuration,

the cross-sectional area of each of said ring-like magnets being non-uniform along the circumference thereof and varying from a minimum at a pair of diametrically opposed points on said circumference to a maximum at a pair of regions positioned on said circumference intermediate said minimum area points,

and means for supporting said ring-like magnets in registry with and proximity to each other, said supporting means permitting individual rotation of each ring-like magnet about a common axis of symmetry,

the width of each ring-like magnet along a dimension parallel to said axis of rotation being a minimum at said minimum area points and being a maximum at said maximum area regions.

5. A permanent magnet ring comprising the assembly of:

a pair of ring elements of magnetic material and of generally semi-circular configuration, each of said ring elements being magnetized along its long dimension,

the orientation of said ring elements in said assembly being such as to adjoin element ends of like polarity, said element ends having a smaller cross-sectional area than portions of said elements intermediate said ends, and means for securing said ring elements together.

6. A permanent magnet ring comprising the assembly of:

a pair of ring elements of magnetic material and of generally semi-circular configuration, each of said ring elements being magnetized along its long dimension,

the orientation of said ring elements in said assembly being such as to adjoin element ends of like polarity, said element ends having a smaller cross-sectional area than portions of said elements intermediate said ends,

the effective magnetization of said ring elements being non-uniform along said long dimension and a minimum at said ends,

and means for securing said ring elements together.

7. A permanent magnetic ring comprising the assembly of:

a pair of ring elements of magnetic material and of generally semi-circular configuration,

each of said ring elements being magnetized with the direction of magnetization being along its long dimension,

the orientation of said ring elements in said assembly being such as to adjoin element ends of like polarity, the effective magnetization of said ring elements being non-uniform along said long dimension and a minimum at said ends,

and means for securing said ring elements together.

8. In a color television receiver including:

a color kinescope having a neck and a flared bulb portion and having a viewing screen at one end thereof,

a deflection yoke surrounding a segment of said neck portion and a segment of said flared bulb portion remote from said screen,

and a support for said yoke including a shell having a cylindrical surface portion enclosing the end of said yoke nearest to said screen,

a color purity correction device including a pair of permanent magnet rings mounted on said cylindrical surface portion and separately rotatable thereon,

each of said rings having a cross-sectional area which is non-uniform along its circumference,

a handle member secured to each of said rings for aiding individual manual rotation thereof,

and spring means engaging said shell and one of said rings for retaining said rings on said cylindrical surface portion.

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