Sept. 7, 1965 E. A. STEINGROEVER 3,205,414

CORRECTION MAGNETS FOR CATHODE-RAY TUBES
AND METHODS FOR MAGNETIZING SAME
Filed July 3, 1961

Fig. 1

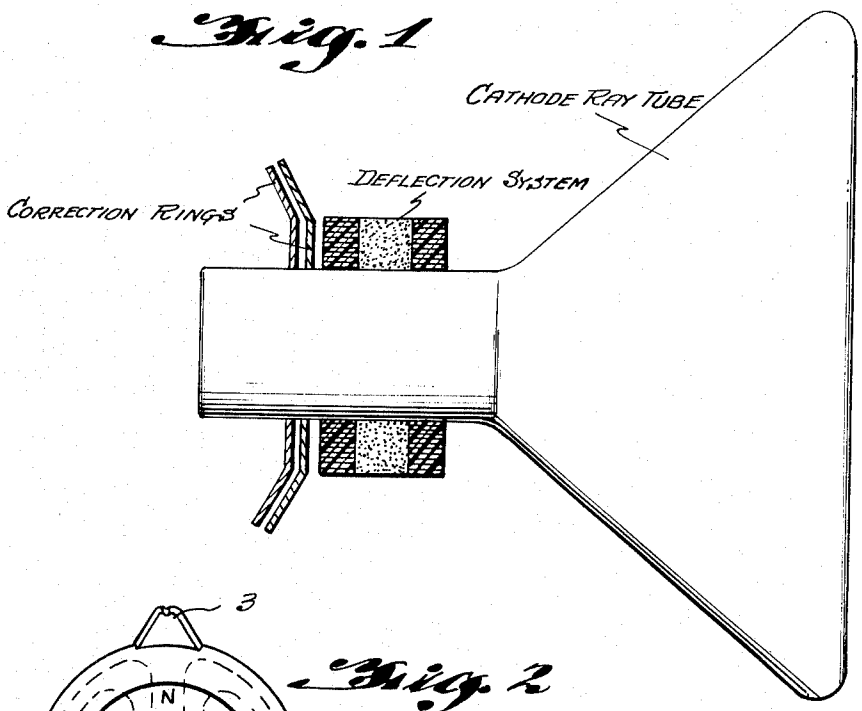


Fig. 2

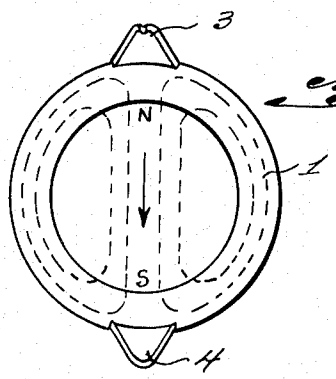
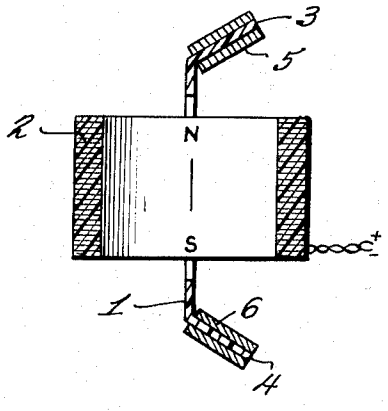


Fig. 3



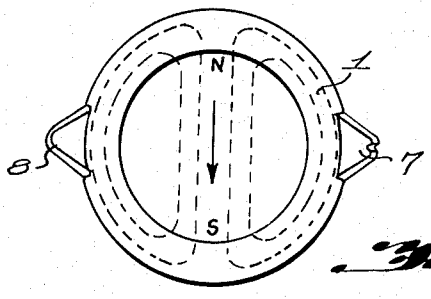


Fig. 4

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3,205,414

CORRECTION MAGNETS FOR CATHODE-RAY TUBES AND METHODS FOR MAGNETIZING SAME

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Claims priority, application Germany, July 6, 1960, M 45,842
8 Claims. (Cl. 317—200)

The invention relates to a magnetic focussing device for the electron beam of a cathode ray tube and is particularly suitable for such tubes in television receivers.

It is known to use permanent ring magnets which are positioned around the cathode ray tube neck and produce a magnetic field of several oersted transversely of the direction of the electron beam. By turning such so-called correction rings, the influence of external fields and of the magnetic earth field on the position of the image can be corrected. For manipulation, the rings are provided with handles projecting into the plane of the structure.

The known correction rings may consist of a plastic base in which an annular wire of permanent magnetic material is embedded.

Heretofore, it has not been possible to produce such correction rings in a simple procedure only from a magnetic powder and binder as integral structures where also the handles consist of magnetic material. The reason was that, on magnetizing, also said handles became magnetic and produced a distortion of the magnetic field in the center of the ring.

The invention eliminates said drawback and makes it possible to manufacture correction rings of the type described by an injection or compression molding process as single integral units. In accordance with the invention, only the annular part of the correction rings is magnetized while the manipulating handles are not magnetized or only so little as not to interfere with the correcting field.

In a preferred embodiment of the invention, the operating handles are arranged in the neutral zone of the correction rings. Such arrangement makes the magnetic stray field, with respect to the center of the ring, very small; in addition, it may eliminate the need of a specific shield during magnetization, or a demagnetization of the handles.

The invention will be described with reference to the accompanying drawings, in which

FIG. 1 shows, diagrammatically, an axial sectional view of magnetic correction rings around the neck of a cathode ray tube;

FIG. 2 shows a view of a magnetic correction ring according to the invention;

FIG. 3 shows the arrangement for magnetizing the rings, and

FIG. 4 is a view of a modification of the ring shown in FIG. 2.

As it will be seen from FIG. 1 preferably two coaxial spaced correction rings are used which can be rotatably displaced with respect to each other to adjust the strength and direction of the correction field.

Each correction ring **1** is prepared from a mixture of a magnetic powder and a thermoplastic binder, for instance in a die casting procedure. The ring is magnetized by means of a magnetizing coil **2** from the inside so as to form a magnetic field in direction of the arrow N—S, which field runs in the ring approximately along the broken lines. During magnetization, the two manipulating handles **3** and **4** are surrounded by the sheet iron sleeves **5** and **6**, so that they remain substantially unmagnetic and do not interfere with the correction field. Said sleeves are removed after magnetization.

Instead of using sheet iron sleeves **5** and **6**, the manipulating handles or other projections extending beyond the circular periphery of the ring may be protected, during magnetization, by means of sleeves made of a good electrically conducting material, for instance of copper or aluminum. It is also possible to prevent magnetizing of said projections during the magnetizing operations by means of additional coils; preferably, such additional coils are arranged in series with the main magnetizing coil and compensate the magnetizing field at the projections.

It is also possible to magnetize the correction rings without special precautions. In such a case, the interfering projections or manipulating handles may be subsequently demagnetized.

In another embodiment of the invention, interference of the manipulating handles with the correction field is minimized by arranging said handles (**7**, **8** in FIG. 4) in the neutral zone of the correction rings. In this arrangement, the magnetic stray field of the projections with relation to the center of the ring becomes so weak that a special shielding during magnetizing, or demagnetization, can be omitted.

I prefer to make the manipulating handles of the two rings of different size or form to facilitate distinguishing the one ring from the other.

Any magnetic material may be employed for the correction rings. I prefer to make the rings by injection molding of a permanent magnetic powder as disclosed in my copending application Ser. No. 92,912, filed March 2, 1961, for a "Magnetic Composition." Said permanent magnetic materials are mixtures of a non-magnetic thermoplastic binder with particles of the type

$$BaO \cdot 6Fe_2O_3$$

and alloys known under the names Alni and Alnico, which have the following composition:

	Alni, percent	Alnico, percent
Al	10–13	5–15
Ni	20–30	10–30
Co	0–20	10–40
Cu	0–5	0–10
Ti		0–10
Fe	Balance	Balance

Instead of $Ba \cdot 6Fe_2O_3$, similar ferrites like $SrO \cdot 6Fe_2O_3$ or $PbO \cdot 6Fe_2O_3$, may be used.

As non-magnetic binders, any thermoplastic resin such as homopolymers or copolymers of vinyl chloride, polyamides, cellulose acetate, also natural or synthetic rubbers, may be used. I prefer to employ a polyalkylene like polyethylene.

I claim:

1. A permanent magnetic device for a cathode-ray tube neck comprising a correction ring having a magnetized annular portion adapted to surround said neck and a manipulating handle projecting from the outer periphery of said annular portion, said annular portion and handle forming a unitary structure made of the same magnetic composition, said manipulating handle having a magnetic characteristic causing substantially no interference with the magnetic field of said annular portion.

2. A magnetic device as claimed in claim **1** wherein said handle is arranged in the magnetically neutral zone of the ring.

3. A magnetic device as claimed in claim **1** wherein said annular portion and handle consist essentially of a

mixture of a non-magnetic thermoplastic resin binder with a member of the group consisting of nickel-aluminum-iron alloys and ferrites $MO \cdot 6Fe_2O_3$, wherein M is a member of the group consisting of Ba, Sr, and Pb.

4. A magnetic correction device for a cathode ray tube comprising a pair of coaxially spaced magnetized correction rings to surround the neck of said tube and supported for rotatable displacement of one ring to the other, each of said rings having a manipulating handle projecting from the outer periphery thereof, the annular portions of said rings and said handles forming a unitary structure made of the same magnetic composition, and said manipulating handles each having a magnetic characteristic causing substantially no interference with the magnetic field of said annular portions.

5. A device as claimed in claim 4 wherein the handles of said rings have different size.

6. A device as claimed in claim 4 wherein the handles of said rings have different form.

7. The method of magnetizing magnetic correction rings for cathode ray tubes, which rings are provided with integral projecting handles of the same material as said rings, comprising the steps of shielding said handles from magnetic effects and magnetizing the annular portion of said ring while said handle is shielded.

8. The method of magnetizing magnetic correction rings for cathode ray tubes, which rings are provided with integral projecting handles of the same material as said rings, comprising the steps of magnetizing the ring and handle together and subsequently subjecting the handle only to additional magnetization for minimizing the distortion of the diametral magnetic field.

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