

No. 4,138,628, issued February 6, 1979, in the name of J. L. Smith and entitled "MAGNETIZING METHOD FOR USE WITH A CATHODE RAY TUBE".

If the electron gun assembly is improperly mounted in the cathode ray tube during assembly such that the electron beams are not aligned with the horizontal deflection axis, but are slightly rotated, the scanned electron beams will exhibit a form of misconvergence at the ends of the horizontal axis, commonly referred to as "blue bow". This misconvergence becomes more serious for high resolution cathode ray tubes or for tubes having large (e.g., 110°) deflection angles. Blue bow is not readily corrected by the previously described purity and static convergence arrangements, and additional means is required. Providing added magnetic rings or enlarging the magnetizable strip may be costly, and the added components or material may not be easily accommodated on the tube neck.

In accordance with the present invention, a color video display apparatus comprising cathode ray tube having an electron gun apparatus that produces a plurality of electron beams, which electron gun apparatus is subject to rotational alignment errors, further comprises a deflection yoke having horizontal and vertical deflection coils, a source of deflection signals applied to said deflection yoke for deflecting said electron beams along horizontal and vertical deflection axes, said rotational alignment errors causing distortion of said electron beam deflection, and means for effecting static convergence of said electron beams comprising a magnetizable strip of material disposed about and encircling the neck of said cathode ray tube near the rear of said deflection yoke, said strip of material magnetized to incorporate a plurality of discrete magnetized zones, said zones disposed about the longitudinal axis of said cathode ray tube and magnetized in a manner to effect static convergence and color purity of said electron beams. The strip of material comprises at least an additional

respectively, from a source of video signals (not shown), such as a computer. The video signal processor generates the red, green and blue color drive signals, that are applied to electron gun assembly 11 via conductors designated DS.

Horizontal and vertical deflection synchronizing (sync) signals, illustratively provided as part of the green video signal on input G, are applied to a sync separator circuit 20, which provides horizontal sync signals to horizontal deflection circuit 21, and vertical sync pulses to vertical deflection circuit 22. Horizontal deflection circuit 21 generates horizontal or line rate deflection current in horizontal deflection coils 14. Deflection circuit 21, illustratively of the flyback-type, also produces flyback pulses which are stepped up in voltage by a high voltage circuit 23 which produces the high voltage or ultor potential for cathode ray tube 10. Vertical deflection circuit 22 produces vertical or field rate deflection current in vertical deflection coils 15.

The electron gun assembly 11 is desirably mounted in the neck of cathode ray tube 10 so that the red, green and blue electron beams, designated RB, GB, BB, respectively, are aligned with the horizontal deflection axis, designated HA in FIGURE 2. Due to manufacturing and assembly alignment errors, however, the gun assembly 11 may be mounted in a rotated configuration within the tube neck, so that the beams are actually aligned with line BA. This misalignment of the electron beam axis results in a vertical separation or misconvergence of the horizontal scan lines at the ends of the horizontal axis, so called "blue bow" as shown in FIGURE 2. For the misalignment shown in FIGURE 2, in which the red beam RB is below the horizontal axis HA the blue beam BB is above the horizontal axis, the misconvergence that results is manifested as the red scan lines RL bowing up and the blue scan lines BL bowing down at the ends of the horizontal axis.

It is known that a four-pole magnetic field can be used to provide vertical movement of the outer, or red and

CLAIMS:

1. A color video display apparatus comprising a cathode ray tube having an electron gun assembly for producing a plurality of electron beams, said electron gun assembly subject to rotational alignment errors, a deflection yoke having horizontal and vertical deflection coils, a source of deflection signals applied to said deflection yoke for deflecting said electron beams along horizontal and vertical deflection axes, said rotational alignment errors causing distortion of said electron beam deflection, and means for effecting static convergence of said electron beams comprising a magnetizable strip of material disposed about and encircling the neck of said cathode ray tube near the rear of said deflection yoke, said strip of material magnetized to incorporate a plurality of discrete magnetized zones, said zones disposed about the longitudinal axis of said cathode ray tube and magnetized in a manner to effect static convergence and color purity of said electron beams, said strip of material comprising at least an additional magnetized zone, magnetized in a manner to correct said distortion of said electron beams caused by said rotational alignment errors of said electron gun assembly.

2. Apparatus according to Claim 1, wherein said strip of material comprises a two-pole, a first four-pole, and a six-pole magnetized zone and wherein said additional magnetized zone comprises a second four-pole zone.

3. Apparatus according to Claim 2, wherein said first and second four-pole zones are longitudinally separated by at least one other magnetized zone.

4. Video display apparatus provided with magnetic gun alignment distortion correction substantially as hereinbefore described with reference to Figs. 3 and 4 of the accompanying drawings.

