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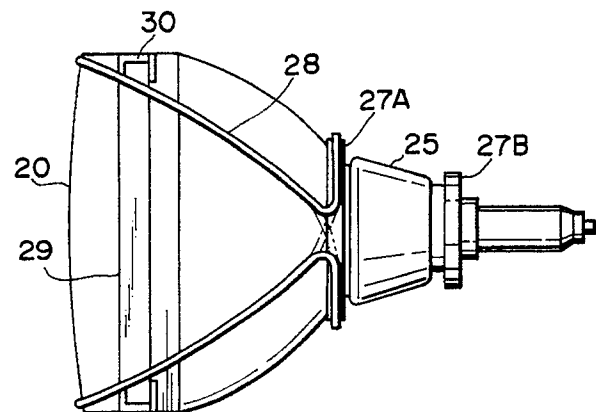
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54 **Cathode-ray tube apparatus having a reduced leak of magnetic fluxes.**

57 In a cathode-ray tube apparatus, a deflection yoke (25) is provided on a funnel of a tube (20) and a pair of closed loop coils are provided on a panel and the funnel of the tube at upper and lower sides, respectively. The deflection yoke (25) generates effective magnetic fluxes in the tube (20) and also generates ineffective magnetic fluxes as leakage magnetic fluxes outside of the tube (20). Some of the leakage magnetic fluxes pass through the coils (28) so that induced currents are produced in the coils (28) and induced magnetic fluxes are produced as compensating magnetic fluxes from the coils (28). Thus, the leakage magnetic fluxes passing through a space in front of the tube are reduced by the compensating magnetic fluxes from the coils (28).



F I G. 8B

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CATHODE-RAY TUBE APPARATUS HAVING A REDUCED LEAK OF MAGNETIC FLUXES

The present invention relates to a cathode-ray tube apparatus wherein the leakage magnetic fluxes extending from the deflection yoke can be reduced.

Unnecessary radiation, such as electronic waves, is controlled in accordance with the regulations such as VDE (Verband Deutscher Elektrotechniker). Generally, the leakage magnetic field of cathode-ray tubes are also controlled in accordance with VDE.

The recent trend is to limit leakage magnetic fields harmful to human being, particularly in the Northern European countries, in accordance with MPR (SSI) regulations. Subjected to these regulations are magnetic fields of frequencies ranging from 1 KHz to 400 KHz. In the case of cathode-ray tubes, it is required to reduce, to a considerably low level, the intensity of leakage magnetic fluxes which are some of the magnetic fluxes generated by the horizontal deflection coil of the deflection yoke and which do not serve to deflect the electron beams emitted from the electron gun assembly.

To control the leakage magnetic fluxes emanating from cathode-ray tube apparatuses, it is necessary to attenuate these fluxes in a predetermined. However, the leakage magnetic fluxes must not be attenuated in a manner that the effective magnetic fluxes are influenced to degrade the deflection characteristics of the deflection yoke, such as beam convergence and beam landing.

Fig. 1 is a perspective view showing a deflection yoke of popular type for use in a cathode-ray tube, such as a color cathode-ray tube. The deflection yoke comprises a molded member 1 and a pair of saddle-type main horizontal deflection coils 2 positioned in the member 1, symmetrically to each other with respect to the horizontal axis (i.e., X axis). Most of the magnetic fluxes generated by the coils 2, generally known as "effective magnetic fluxes," are confined in the deflection yoke, or within a hollow cylindrical core 3 which surrounds the molded member 1, and effectively serve to deflect electron beams in horizontal direction. The remaining magnetic fluxes, generally known as "leakage magnetic fluxes," radiate from the deflection yoke.

Fig. 2 is a diagram illustrating the distribution of the effective magnetic fluxes 6 and that of the leakage magnetic fluxes 7 and 10. As Fig. 2 shows, two reference leakage magnetic fluxes 8a and 8b emanate from the horizontal deflection coils 2 along lines defining an angle of 30 to 40°. As is evident from Fig. 2, the leakage magnetic fluxes 7, which extend from a flange portions 9 of the coils 2 substantially in parallel to the effective magnetic

fluxes 6, exist in the region between the reference leakage magnetic fluxes 8a and 8b, whereas the leakage magnetic fluxes 10, which extends in the direction opposite to that of the effective magnetic fluxes 6, exit outside said region.

Various methods of controlling the leakage magnetic fluxes emanating from the outer periphery of the cathode-ray tube have been devised, one of which is to enclose the entire deflection yoke within a metal case. This method does not suffice to reduce the leakage magnetic fluxes to a desired level. Further it is disadvantageous in two respects because of the use of the metal case covering the whole deflection yoke. First, a sufficient heat radiation is impossible. Secondly, the metal case is rather an expensive member and inevitably increases the manufacturing cost of the cathode-ray tube apparatus.

Published Unexamined Japanese Patent Application No. 62-64024 discloses a cathode-ray tube apparatus, in which as is shown in Fig. 3, a pair of auxiliary coils 11 having substantially the same shape as saddle-type main horizontal deflection coils 2 are located symmetrically to each other with respect to a core 3, opposing the main horizontal deflection coils, respectively. Part of the current flowing in either main horizontal deflection coil 2 is supplied to the corresponding auxiliary coil 11 in opposite phase, such that the auxiliary coils 11 generate magnetic fluxes (hereinafter referred to as "auxiliary magnetic fluxes") which extend opposite to the main magnetic fluxes emanating from the main coils 2 and which reduce the leakage magnetic fluxes also emanating from the main coils 2.

It is difficult, however, to control the auxiliary coils 11 accurately enough to reduce those of the leakage magnetic fluxes which exist in particular positions. Further, since the auxiliary coils 11 are located at the places where less leakage magnetic fluxes exist than other places, the leakage magnetic fluxes are reduced excessively at the rear of the deflection yoke, inevitably generating reverse leakage magnetic fluxes. The reverse leakage magnetic fluxes, thus generated in the vicinity of the yoke, are liable to influence the deflection characteristics of the deflection yoke.

As has been pointed out, the use of a metal case to reduce the leakage magnetic fluxes results in an inadequate heat radiation from the deflection yoke and also in an increase in the manufacturing cost of the cathode-ray tube apparatus, and the provision of auxiliary coils adversely influences the deflection characteristics of the cathode-ray tube apparatus.

The object of the present invention is to provide a cathode-ray tube apparatus, in which the leakage magnetic fluxes emanating from the saddle-type main horizontal deflection coils of the deflection yoke are greatly reduced without considerably influencing the deflection characteristics of the yoke, such as beam convergence and beam landing.

According to the present invention, there is provided a cathode-ray tube apparatus which comprises: electron beam emitting means for emitting an electron beam; light ray producing means for producing light rays when irradiated with the electron beam; an envelope having an axis and enclosing the electron beam emitting means and the light ray producing means; deflection magnetic field generating means located outside the envelope, for generating and applying effective magnetic fluxes into the envelope, thereby to deflect the electron beam in a horizontal direction, and also for generating leakage magnetic fluxes extending in a direction different from that of the effective magnetic fluxes; and control means located across the leakage magnetic fluxes, in which a current is induced, and which generates compensating magnetic fluxes from the current thus induced, thereby to control the leakage magnetic fluxes.

According to the present invention, there is also provided a cathode-ray tube apparatus comprising: an envelope having an axis and comprising a panel having a face plate and a skirt continuous to the face plate, a funnel connected to the skirt of the panel, and a neck extending from the funnel; an electron gun assembly located within the neck, for emitting electron beams; a screen formed on the face plate, for producing light rays when irradiated with the electron beams; horizontal deflection means mounted on the funnel, for generating deflection magnetic fields for deflecting the electron beams in a horizontal direction, along with leakage magnetic field outside the envelope; and loop-shaped conductor means extending along the skirt of the panel and also along the funnel toward the horizontal deflection means, and crossing the leakage magnetic fluxes, whereby a current is induced to generate compensating magnetic fluxes.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view showing a deflection yoke of popular type for use in color cathode-ray tubes;

Fig. 2 schematically represents the distribution of the magnetic fluxes generated by the horizontal deflection coils of the deflection yoke shown in Fig. 1;

Fig. 3 is a side view of a conventional deflection

yoke having auxiliary coils for reducing leakage magnetic fluxes;

Fig. 4 is a schematic perspective view showing a color cathode-ray tube apparatus according to one embodiment of the present invention;

Fig. 5 is a schematic plan view illustrating the apparatus shown in Fig. 4;

Fig. 6 is a diagram representing the distribution of magnetic fluxes, explaining the function of the closed compensating coils incorporated in the apparatus shown in Figs. 4 and 5;

Figs. 7A, 7B, and 7C are graphs demonstrating the reduction of leakage magnetic fluxes achieved by the closed compensating coils;

Figs. 8A and 8B are a plan view and a side view, respectively, schematically illustrating a color cathode-ray tube according to another embodiment of the present application;

Fig. 9 is a diagram explaining the function of the closed compensating coils used in the apparatus shown in Figs. 8A and 8B;

Figs. 10A and 10B, Figs. 11A and 11B, Figs. 12A and 12B, Figs. 13A and 13B, and Figs. 14A and 14B are plan views and side views illustrating color cathode-ray tube apparatuses according to other five embodiments of the invention;

Fig. 15 is a diagram representing the distribution of magnetic fluxes, explaining the function of the closed compensating coils incorporated in the embodiment shown in Figs. 13A and 13B; and

Figs. 16A and 16B, Figs. 17A and 17B, and Figs. 18A and 18B are plan views and side views showing color cathode-ray tube apparatuses according to still three other embodiments of the invention.

Figs. 4 and 5 schematically illustrate a color cathode-ray tube apparatus according to one embodiment of the present invention. The apparatus has an envelope 22 made of a substantially rectangular panel 20 and a funnel 21 formed integrally with the panel 20. The panel 20 has a face plate. A phosphor screen consisting of red, green, and blue phosphor layers is formed on the inner surface of the face plate. A shadow mask is provided within the funnel 21, opposing the phosphor screen. The funnel 21 comprises a neck portion 23 and a cone portion 24. In the neck portion 23, an electron gun assembly for emitting three electron beams is located. A deflection yoke 25 is wrapped around the junction of the portions 23 and 24 in order to deflect the three electron beams emitted from the electron gun assembly.

The deflection yoke 25 comprises a molded hollow cylinder 26, a rear flange 27A integrally formed with the cylinder 26, a front flange 27B also integrally formed with the cylinder 26, a pair of saddle-type main horizontal deflection coils (not shown), and a pair of troidle-type vertical deflection

coils (not shown, either). The main horizontal deflection coils are located within the hollow cylinder 26 and arranged symmetrically with respect to a horizontal plane including the axis of the cylinder 26. On the other hand, the vertical deflection coils are mounted on the cylinder 26 and arranged symmetrically with respect to said plane.

The color cathode-ray tube further comprises two loop-like closed compensating coils 28 mounted on the upper and lower sides of the cone portion 25, respectively. Either coil 28 consists of at least one turn of wire, and is positioned such that its rear end rests on the front flange 27A, and its front end surrounds a pair of lugs 30 attached to the left and right ends of the upper or lower side, along with an explosion-proof band 29.

The closed compensating coils 28 are located in the field of leakage magnetic fluxes emanating from the main horizontal deflection coils. More specifically, as is shown in Fig. 6, both coils 28 are located outside the region which lies between curves 8a and 8b. In this region, leakage magnetic fluxes 7 extend substantially parallel to the effective magnetic fluxes 6 generated by the main horizontal deflection coils. Outside the region, other leakage magnetic fluxes 10 extend from the front flange 27A in the direction opposite to the direction of the effective magnetic fluxes 6. Hence, a current is induced in either closed compensating coil 28, whereby the coil 28 generates magnetic fluxes 32. The magnetic fluxes 32 are generated as the leakage magnetic fluxes 7 in the region M near the coil 28. In the region N extending from point A on the axis of the envelope 22, farther away from the yoke 25 than the region M, the magnetic fluxes 32 cancel out the leakage magnetic fluxes 7 emanating from the periphery of the color cathode-ray tube apparatus. The point A is 10 to 20 cm in front of the outer surface of the panel 20, depending on the size of the envelope 22, the configuration of the yoke 25, and the intensity of the magnetic fluxes 32.

The magnetic fluxes 32 generated by the closed compensating coils 28 serve to reduce not only the leakage magnetic fluxes 7 extending in front of the color cathode-ray tube apparatus, but also the leakage magnetic fluxes 7 emanating from the periphery of the apparatus, as will be understood from Figs. 7A, 7B, and 7C showing the results of the experiment conducted by the inventors hereof.

In the experiment, the inventors tested a color cathode-ray tube apparatus of the type shown in Figs. 4 and 5 and also a color cathode-ray tube apparatus identical to the apparatus of Figs. 4 and 5, but having no closed compensating coils, and measured the density nT of the leakage magnetic fluxes on the surface of a hollow sphere having a

65-cm radius and enclosing the apparatus, as is specified in the MRP Standards. Fig. 7A represents the relationship between the density nT and the position on the sphere surface (in degree), observed in either apparatus when the tangents to curves 8a and 8b are at an elevation angle of 0° to the axis of the color cathode-ray tube apparatus. Fig. 7B illustrates the density-position relationship observed in either apparatus when the tangents to curves 8a and 8b are inclined at an elevation angle of 22.5° to the axis of the cathode-ray tube apparatus. Fig. 7C shows the density-position relationship observed in either apparatus when the tangents to curves 8a and 8b are inclined at an elevation angle of 45.0°. In these figures, the solid-line curve indicates the density-position relationship observed in the conventional color cathode-ray tube apparatus, and the broken-line curve presents the relationship observed in the color cathode-ray tube of the present invention.

As is evident from the experimental results shown in Figs. 7A, 7B, and 7C, the color cathode-ray tube apparatus of this invention, which has closed compensating coils, reduced leakage magnetic fluxes are reduced 50 to 60% more than the conventional color cathode-ray tube apparatus which has no closed compensating coils, and distributed leakage magnetic fluxes almost uniformly on the entire surface of the 65-cm radius sphere. In the apparatus of the invention, the leakage magnetic fluxes were reduced so much that the remaining leakage magnetic fluxes scarcely degraded the deflection characteristic such as beam convergence or the beam landing.

Another embodiment of the invention will now be described, with reference to Figs. 8A and 8B and Fig. 9, in which the same numerals as those found in Figs. 4, 5, and 6 are used, designating the same components and magnetic fluxes.

The color cathode-ray tube apparatus shown in Figs. 8A and 8B is characterized by the use of two loop-shaped, closed compensating coils 28, either having a rear portion extending along the front flange 27A of the corresponding main horizontal deflection coil of a deflection yoke 25. Since the closed compensating coils 28 are so arranged, the intensity of the leakage magnetic fluxes 10 emanating from the front flange 27A is inversely proportional to the distance between them and the wires 36 located in the front flange 27, as can be understood from Fig. 9. Obviously, the leakage magnetic fluxes 10 crossing the closed compensating coils 28 gain a maximum intensity. Hence, a great current is induced in the coils 28, and the coils 28 generates compensating magnetic fluxes which are intense enough to reduce the leakage magnetic fluxes 10 sufficiently.

As is shown in Figs. 8A and 8B, the front

portion of either closed compensating coil 28 extends on both the left and right sides of the panel 20, optimally balancing the intensities of the two compensating magnetic fields existing in front of, and at the back of, the color cathode-ray tube apparatus, respectively. The intensity of either magnetic field is adjusted by the length of that portion of either coil 28 which extends along the front flange 27A and/or the area defined by the closed compensating coil 28. These compensating magnetic fields function, reliably reducing the changes dB/dt in leakage magnetic fluxes, to 15 mT/s or less.

Figs. 10A and 10B illustrate another color cathode-ray tube apparatus according to the invention. As comparison of Figs. 8A and 8B, on the one hand, and Figs. 10A and 10B, on the other, may reveal, this apparatus is identical to the color cathode-ray tube apparatus shown in Figs. 8A and 8B, except that the rear portion of either closed compensating coil 28 is a double loop 38. According to the invention, the rear portion of the coil 28 can consist of more than two turns. Since the leakage magnetic fluxes emanating from the front flange 27A cross the double loop 38, a great current is induced in the large loop portion 39 of the coil 28. As a result of this, the coils 28 generate compensating magnetic fields which are more intense than those generated in the apparatus shown in Figs. 8A and 8B.

Figs. 11A and 11b illustrate still another color cathode-ray tube apparatus according to the present invention. This apparatus is identical to that one shown in Figs. 10A and 10B, except that either closed compensating coil 28 has two small loops 38 which are wound around the front flange 27A and the rear flange 27B, respectively. Since the leakage magnetic fluxes emanating from the front flange 27A cross the first small loop 30, and also those emanating from the rear flange 27B cross the second small loop 38, a greater current is induced in the large loop portion 39 of the coil 28 than in the apparatus illustrated in Figs. 10A and 10B. Hence, the coils 28 generate compensating magnetic fields which are more intense than those generated in the apparatus shown in Figs. 10A and 10B.

Figs. 12A and 12B also show a color cathode-ray tube apparatus according to the present invention. This apparatus is designed based on the fact that in general, closed compensating coils, if mounted on the cone portion of the funnel of a color cathode-ray tube apparatus, are likely to generate a compensating magnetic field which is less intense in front of the apparatus than at the back of the apparatus. As comparison of Figs. 8A and 8B, on the one hand, and Figs. 12A and 12B, on the other, may reveal, this color cathode-ray tube apparatus

is identical to the color cathode-ray tube apparatus shown in Figs. 8A and 8B, except that either closed compensating coil 28 have a small loop 38 located on the top (bottom) of the panel 20. Since both small loops 38 are near the front of the apparatus, the compensating magnetic field the coils 28 is as intense in front of the apparatus as at the back of the apparatus.

Figs. 13A and 13B illustrates another color cathode-ray tube apparatus according to the invention which has a pair of closed compensating coils 28. Either closed compensating coil 28 comprises two loops, the first loop mounted on the top (bottom) of a panel 20, and the second loop located in front of the front flange 27A of a deflection yoke 25. The coil 28 generates a compensating magnetic field which is intense, particularly in front of the apparatus.

Fig. 14A and 14B show still another color cathode-ray tube apparatus according to the present invention. As comparison of Figs. 8A and 8B, on the one hand, and Figs. 14A and 14B, on the other, may reveal, this color cathode-ray tube apparatus is identical to the cathode-ray tube apparatus shown in Figs. 8A and 8B, except that a pair or auxiliary coils 41A are mounted on the deflection yoke 25, and a horizontal-deflection signal is supplied to either auxiliary coil 41A from a horizontal deflection signal generator 50. This color cathode-ray tube apparatus is designed based on the two facts. First, the compensating magnetic field, which a closed compensating coil generates from the current induced in the coil from the leakage magnetic fluxes crossing the coil, has but a limited intensity even if the coil has a complex shape to extend across more leakage magnetic fluxes, just because the more complex the coil, the higher its resistance or inductance. Secondly, the more simple the coil, the better, in view of the manufacturing cost of the color cathode-ray tube apparatus.

Since the auxiliary coils 141A are located at the rear of the closed compensating coils 28 as is shown in Figs. 14A and 14B, they generate magnetic fluxes 42 which extend in the same direction as the main magnetic fluxes generated by the main horizontal deflection coils as is illustrated in Fig. 15. These magnetic fluxes 42 also extend in the same direction as the compensating magnetic fluxes 37 emanating from the coils 28 in front of, and at the back of, the apparatus, thus cooperating with the magnetic fluxes 37 to cancel out the leakage magnetic fluxes 7. Further, the magnetic fluxes 41 intensify the compensating magnetic fields generated by the coils 28 since they extend in the same direction as the leakage magnetic fluxes 7 and cross the closed compensating coils 28.

Fig. 16A and 16B show still another color

cathode-ray tube apparatus according to the present invention. As comparison of Figs. 8A and 8B, on the one hand, and Figs. 14A and 14B, on the other, may reveal, this cathode-ray tube apparatus is identical to the apparatus shown in Figs. 8A and 8B, except that a pair of auxiliary coils 41B are mounted on the top and bottom of the panel 20, respectively. This apparatus attains advantages similar to those of the apparatus shown in Figs. 14A and 14B.

Figs. 17A and 17B illustrates another color cathode-ray tube apparatus, which is a combination of the apparatus shown in Figs. 14A and 14B and the apparatus shown in Figs. 16A and 16B. In other words, a pair of rear auxiliary coils 41A are mounted on the deflection yoke 25, and a pair of front auxiliary coils 41B are mounted on the top and bottom of the panel 20. A horizontal deflection signal may be supplied from the signal generator 50 to the front auxiliary coils 41B, causing the coils 41B to generate compensating magnetic field for canceling the leakage magnetic fluxes. The inductive magnetic fluxes which the coils 28 generate, and the compensating magnetic fluxes which the coils 41A and 41B generate, work together, reliably reducing the leakage magnetic fluxes. For the functional details of the two pairs of auxiliary coils 41A and 41B, refer to U.S. Patent Application Serial No. (not yet assigned) filed June 8, 1990, for the invention entitled "Cathode Ray Tube Apparatus Intended to Reduce Magnetic Fluxes Leaked Outside the Apparatus"; inventors: Masahiro Yokota, Hideo Mori, and Kiyoshi Oyama (Attorney's Ref: DSL/M.76070/YOKOTA) [European Patent Application No. 90110822.5 filed June 7, 1990 for the invention entitled "Cathode Ray Tube Apparatus Intended to Reduce Magnetic Fluxes Leaked Outside the Apparatus"; inventors: Masahiro Yokota, Hideo Mori, and Kiyoshi Oyama].

Figs. 18A and 18B illustrates another color cathode-ray tube apparatus according to the present invention. As comparison of Figs. 14A and 14B, on the one hand, and Figs. 18A and 18B, on the other, may reveal, this color cathode-ray tube apparatus is identical to the apparatus shown in Figs. 14A and 14B, except that either closed compensating coil 28 extends rearward beyond the front flange 27A, and is wrapped around the corresponding auxiliary coil 41. The magnetic fluxes emanating from both auxiliary coils 41 extend in the direction opposite to that shown in Fig. 15, but intensify the compensating magnetic fields generated by the closed compensating coils 28. Hence, the auxiliary coils 41 not only intensify the compensating magnetic fluxes existing in front of the apparatus, but also diminish the over intensification of the compensating magnetic fluxes existing at the back of the apparatus.

The present is not limited to the embodiments described above, wherein the closed compensating coils are not electrically connected to each other, and spaced apart one above the other. Rather, the invention can be applied to, for example, a color cathode-ray tube apparatus in which a pair of closed compensating coils are electrically connected as is indicated by the broken lines in Figs. 8A and 8B, thus forming a single closed loop.

All embodiments described above are color cathode-ray tube apparatuses. Needless to say, the present invention can be applied to cathode-ray tubes of any other types.

As has been described, a cathode-ray tube apparatus according to the present invention has a pair of closed compensating coils located, such that either has its part located near the front of the corresponding main horizontal deflection coil of a saddle-type deflection yoke and in the region in which leakage magnetic fluxes emanating from the front flange of the main horizontal deflection coil in the direction opposite to that of the main magnetic fluxes emanating from the main horizontal deflection coil. Hence, a current is induced in either closed compensating coil, from the leakage magnetic fluxes, and the closed compensating coil generates compensating magnetic fluxes. The compensating magnetic fluxes reduces the leakage magnetic fluxes emanating from the periphery of the apparatus, uniformly in a space around the apparatus, without degrading the beam-deflecting characteristics of the cathode-ray tube apparatus.

Claims

1. A cathode-ray tube apparatus comprising:
 - electron beam emitting means for emitting an electron beam;
 - light ray producing means for producing light rays when irradiated with the electron beam;
 - an envelope (22) having an axis and enclosing said electron beam emitting means and said light ray producing means; and
 - deflection magnetic field generating means (25) located outside said envelope (22), for generating and applying effective magnetic fluxes into said envelope (22), thereby to deflect the electron beam in a horizontal direction, and also for generating leakage magnetic fluxes extending in a direction different from that of the effective magnetic fluxes; characterized by further comprising:
 - control means (28) located across the leakage magnetic fluxes, in which a current is induced, and which generates compensating magnetic fluxes from the current thus induced, thereby to control the leakage magnetic fluxes.
2. The apparatus according to claim 1, character-

ized in that said control means (28) includes a first closed current path and a second current path which are symmetrical with respect to the axis of said envelope.

3. The apparatus according to claim 2, characterized in that said first and second current paths are electrically isolated.

4. The apparatus according to claim 2, characterized in that said first and second current paths are electrically connected.

5. The apparatus according to claim 1, characterized in that said leakage magnetic fluxes include magnetic fluxes which extend in the opposite direction to said effective magnetic fluxes.

6. The apparatus according to claim 1, characterized by further comprising flux generating/applying means (41A, 41B) for generating magnetic fluxes and applying these magnetic fluxes to said control means (28).

7. The apparatus according to claim 6, characterized in that said flux generating/applying means (41A) generates magnetic fluxes which extend in a direction substantially identical to that of the leakage magnetic fluxes.

8. The apparatus according to claim 6, characterized in that said flux generating/applying means (41B) generates magnetic fluxes which extend in a direction substantially identical to the direction of the compensating magnetic magnetic fluxes generated by said control means (28).

9. A cathode-ray tube apparatus comprising:
an envelope (22) having an axis and comprising a panel (20) having a face plate and a skirt continuous to the face plate, a funnel (21) connected to the skirt of the panel (20), and a neck (23) extending from the funnel (21);

an electron gun assembly located within said neck (23), for emitting electron beams;

a screen formed on said face plate, for producing light rays when irradiated with the electron beams;
horizontal deflection means (25) mounted on said funnel (21), for generating deflection magnetic fields for deflecting the electron beams in a horizontal direction, along with leakage magnetic field outside said envelope (22);

characterized by further comprising:

loop-shaped conductor means (28) extending along the skirt of said panel (20) and also along said funnel (21) toward said horizontal deflection means (25), and crossing the leakage magnetic fluxes, whereby a current is induced to generate compensating magnetic fluxes.

10. The apparatus according to claim 9, characterized in that said conductor means (28) includes two conductive wire members (28) which form a first loop and a second loop, which are symmetrical with respect to the axis of said envelope (22).

11. The apparatus according to claim 10, char-

acterized in that said first and second conductive wire members (28) are electrically isolated.

12. The apparatus according to claim 10, characterized in that said first and second conductive wire members (28) are electrically connected.

13. The apparatus according to claim 10, characterized in that said horizontal deflection means (25) includes a flange section allowing passage of the leakage magnetic fluxes.

14. The apparatus according to claim 13, characterized in that said first and second conductive wire members (28) each has a section extending over said flange section.

15. The apparatus according to claim 10, characterized in that said first and second conductive wire members (28) include a third loop and a fourth loop, respectively.

16. The apparatus according to claim 15, characterized in that said third and fourth loops are mounted on said funnel (21).

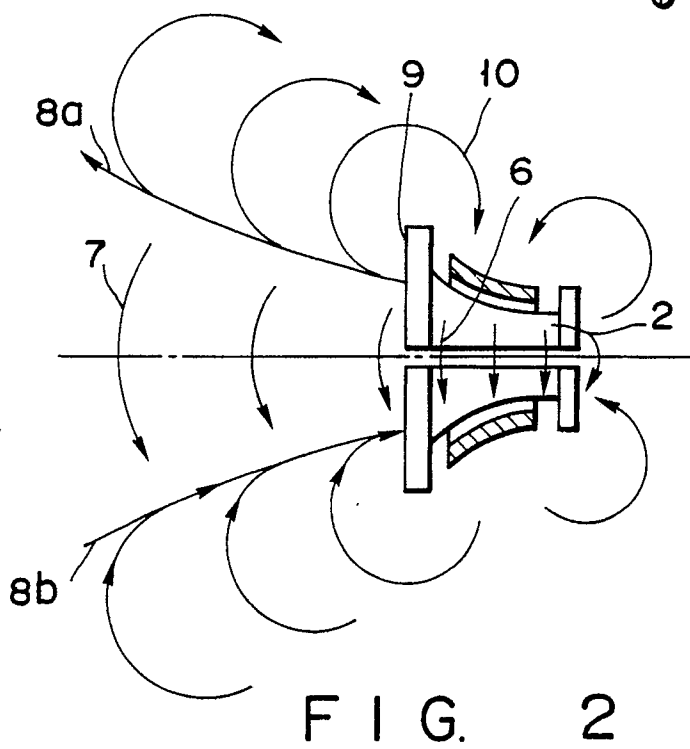
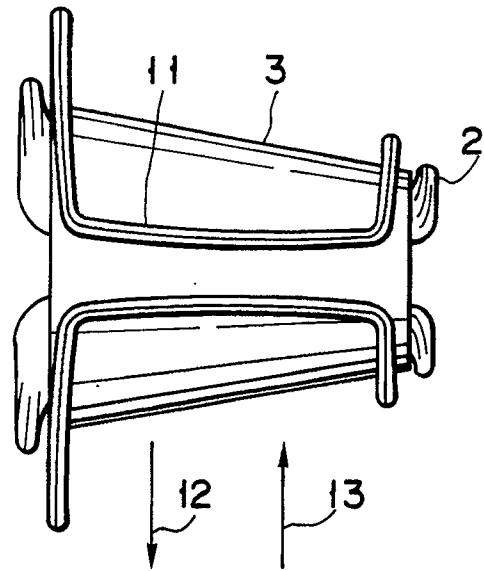
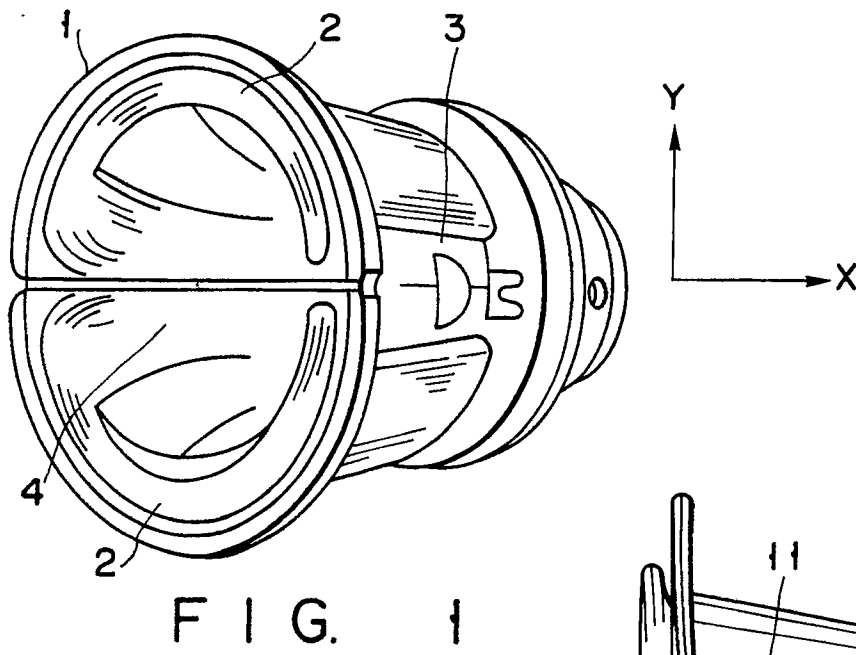
17. The apparatus according to claim 15, characterized in that said third and fourth loops are mounted on said skirt.

18. The apparatus according to claim 15, characterized in that said third and fourth loops are located close to said neck (23).

19. The apparatus according to claim 9, characterized by further comprising flux generating/applying means (41A, 41B) for generating and applying magnetic fluxes to said conductor means.

20. The apparatus according to claim 19, characterized in that said flux generating/applying means (41A) generates magnetic fluxes which extend in a direction substantially identical to that of the leakage magnetic fluxes.

21. The apparatus according to claim 19, characterized in that said flux generating/applying means (41B) generates magnetic fluxes which extend in a direction substantially identical to the direction of the compensating magnetic magnetic fluxes generated by said conductor means (28).



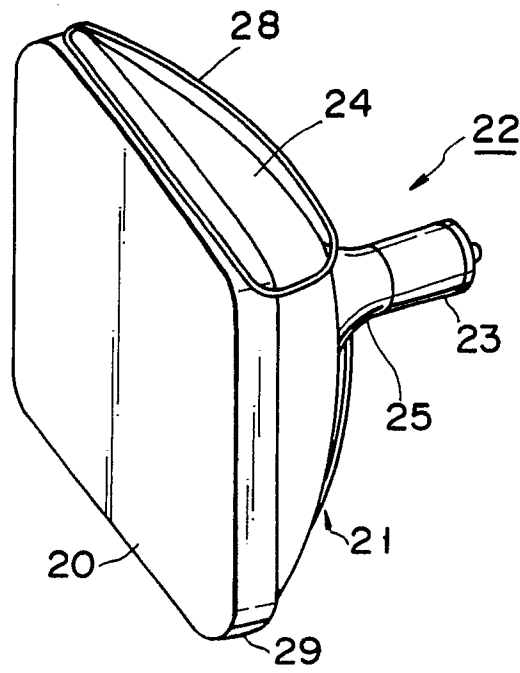


FIG. 4

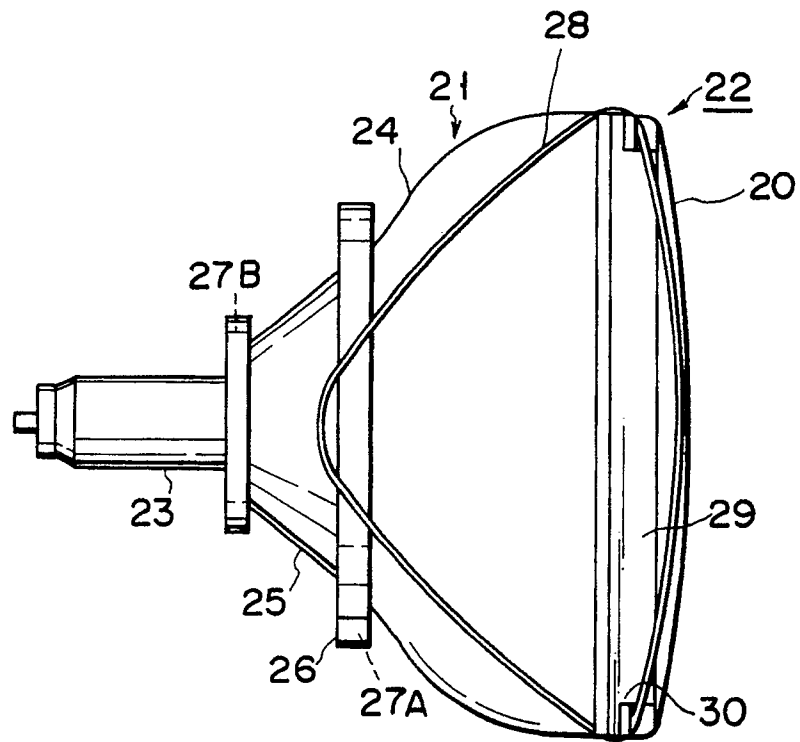


FIG. 5

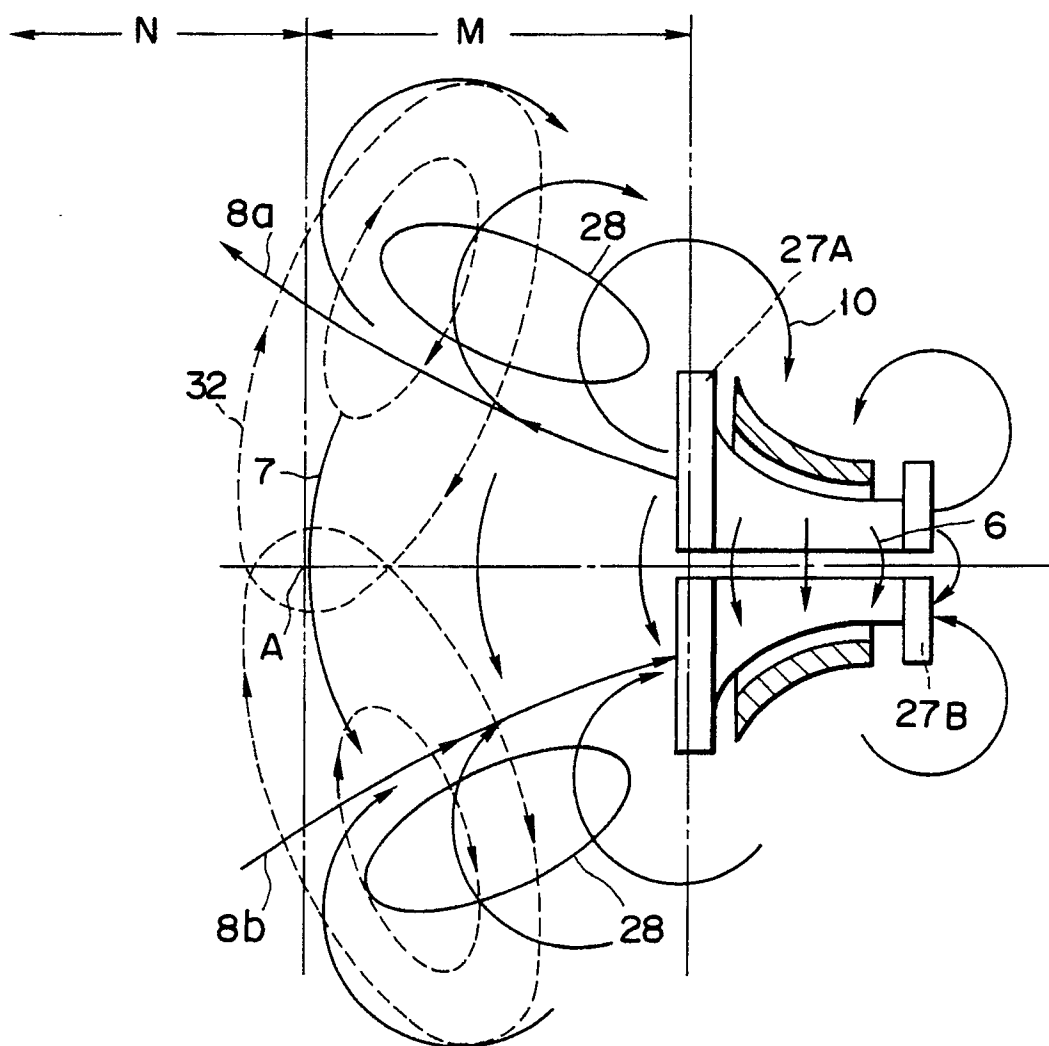


FIG. 6

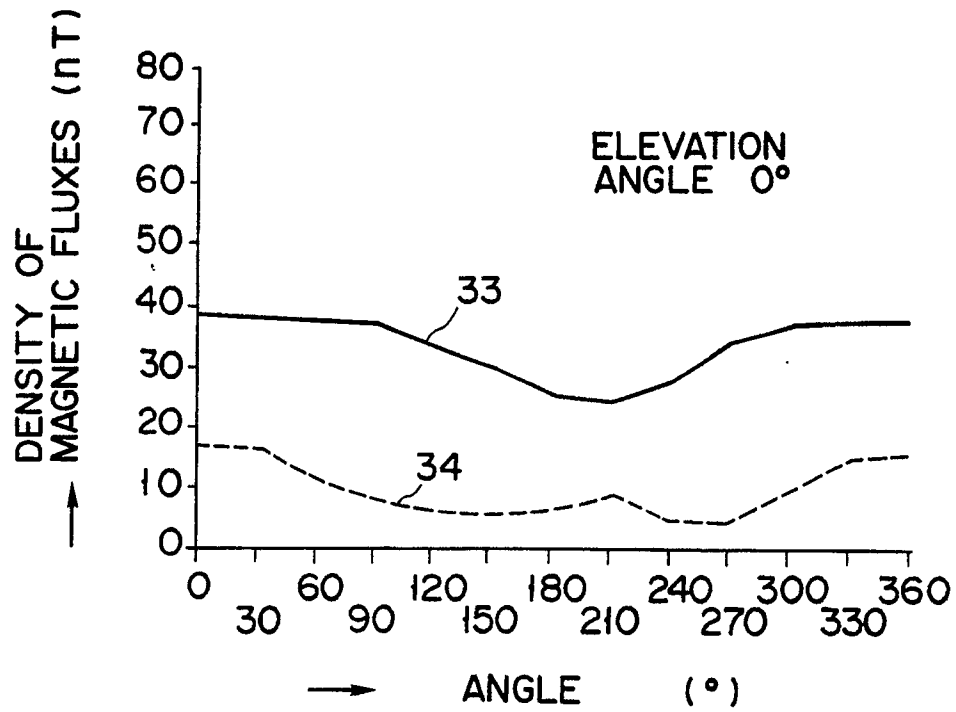


FIG. 7A

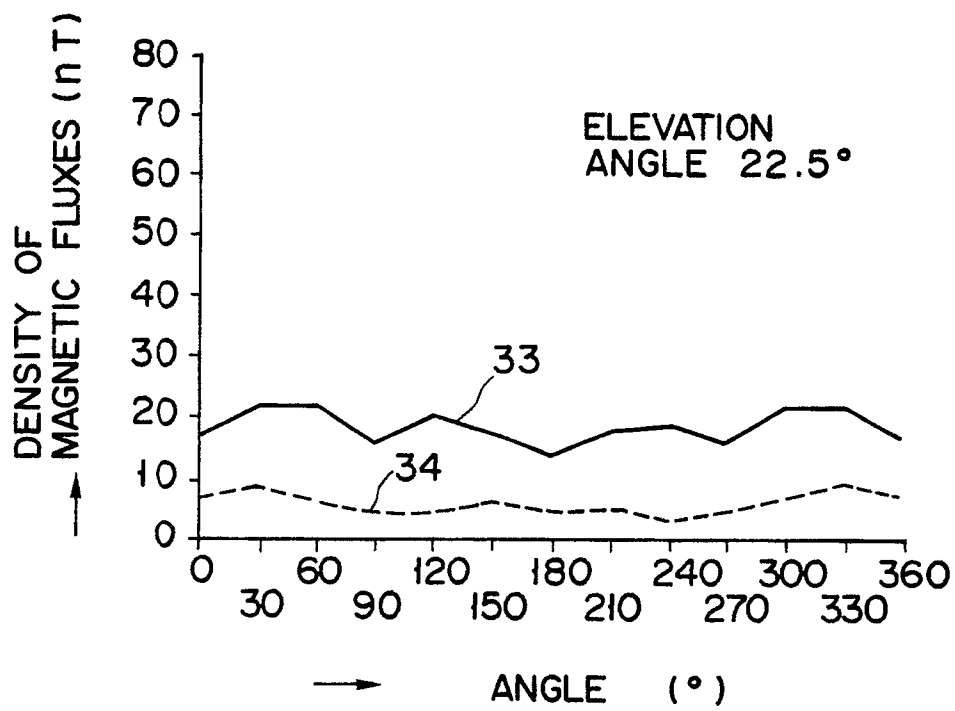
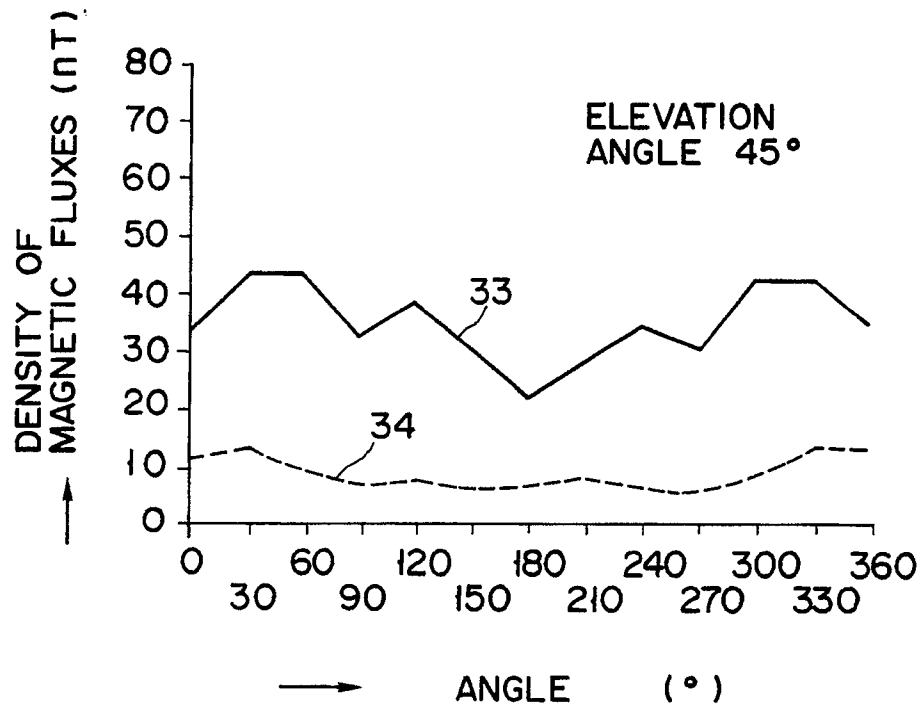


FIG. 7B



F I G. 7C

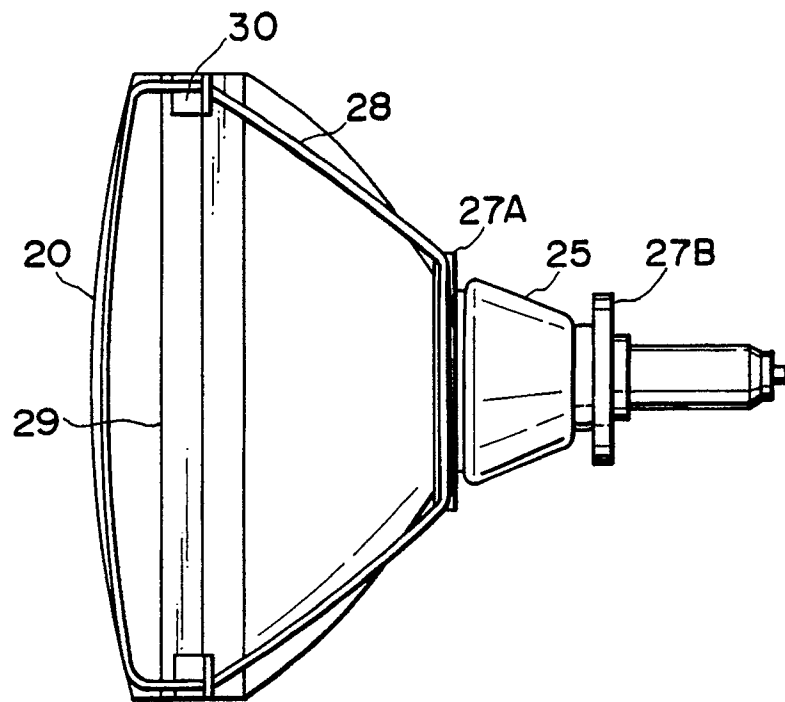


FIG. 8A

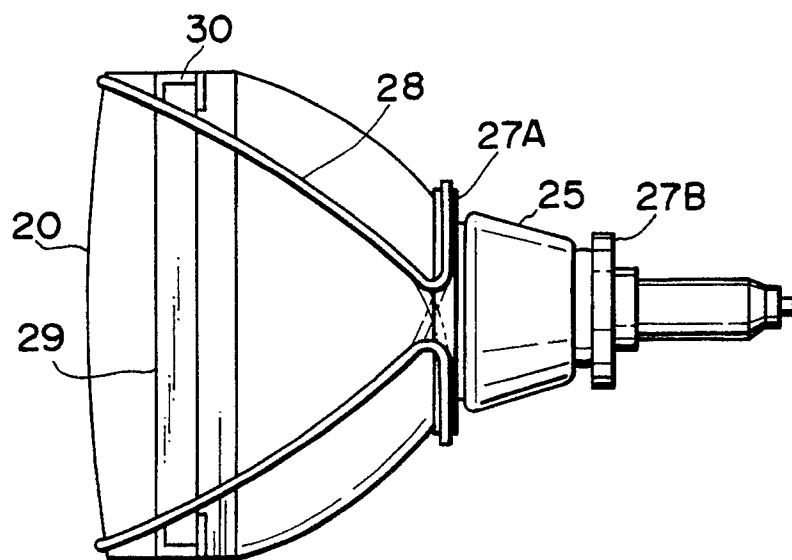


FIG. 8B

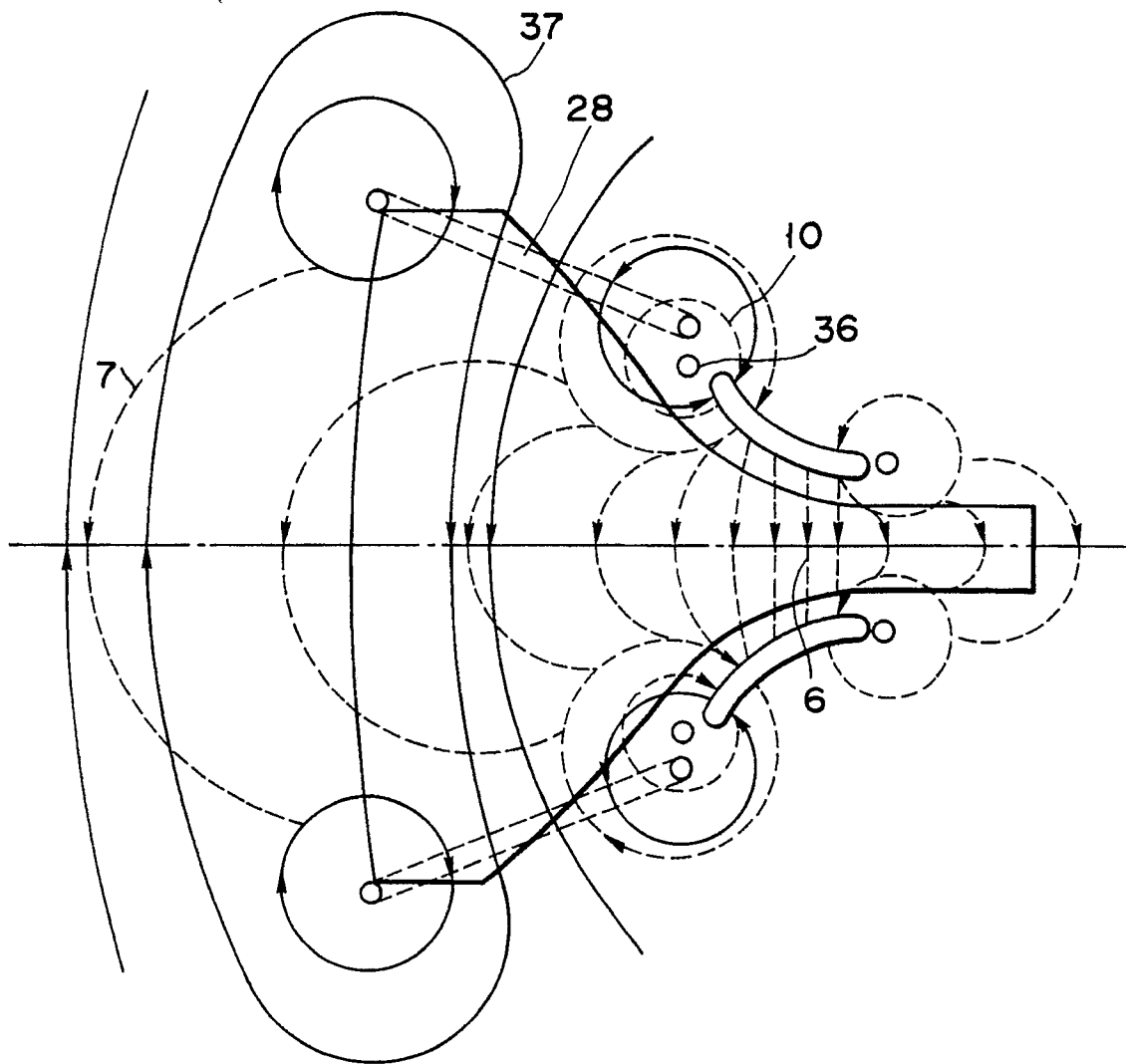


FIG. 9

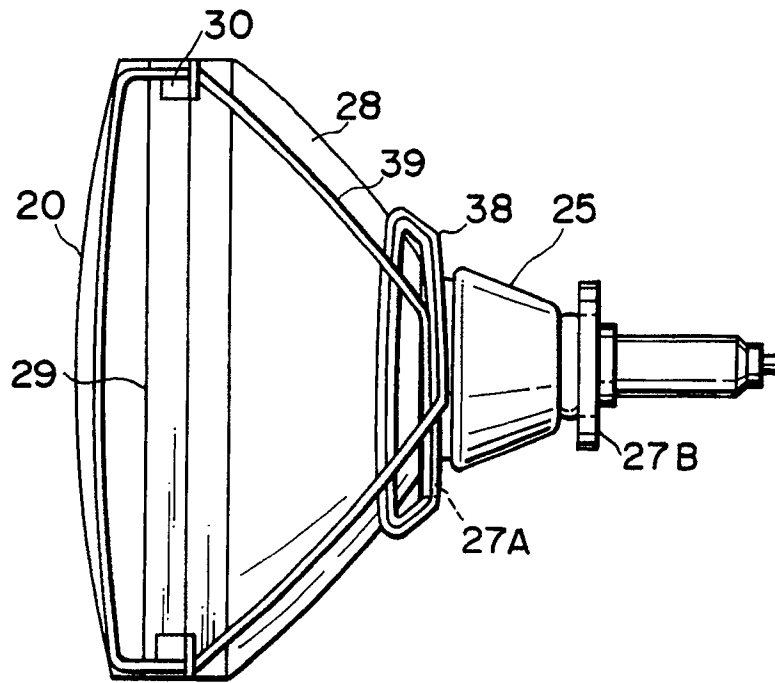


FIG. 10A

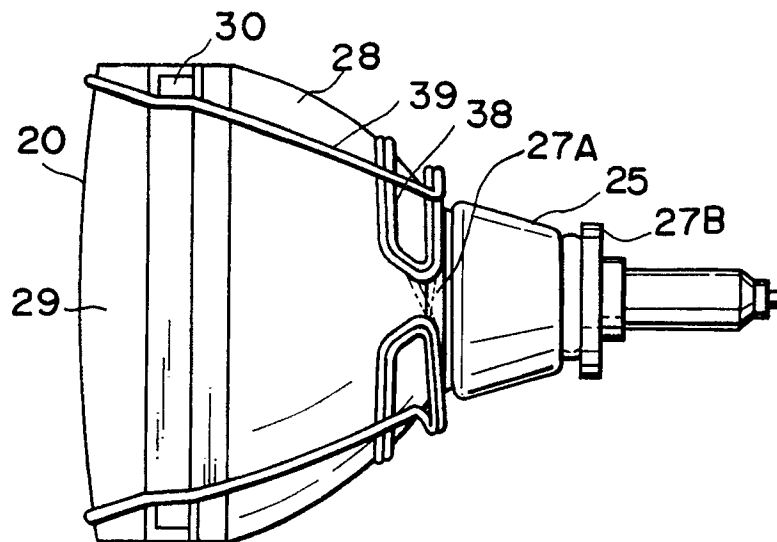


FIG. 10B

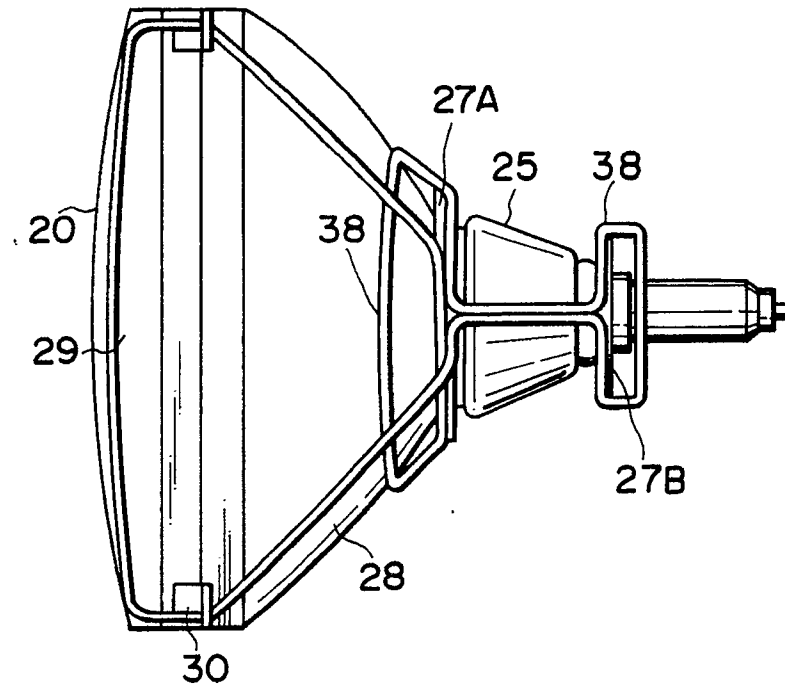


FIG. 11A

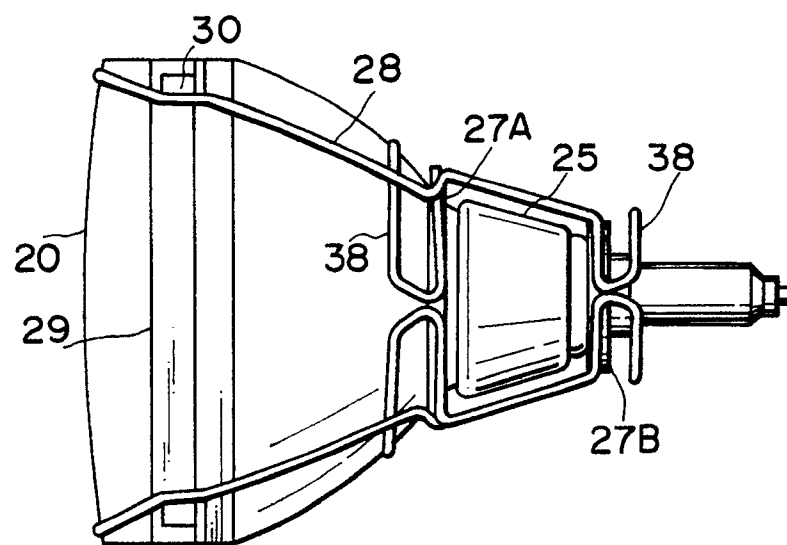


FIG. 11B

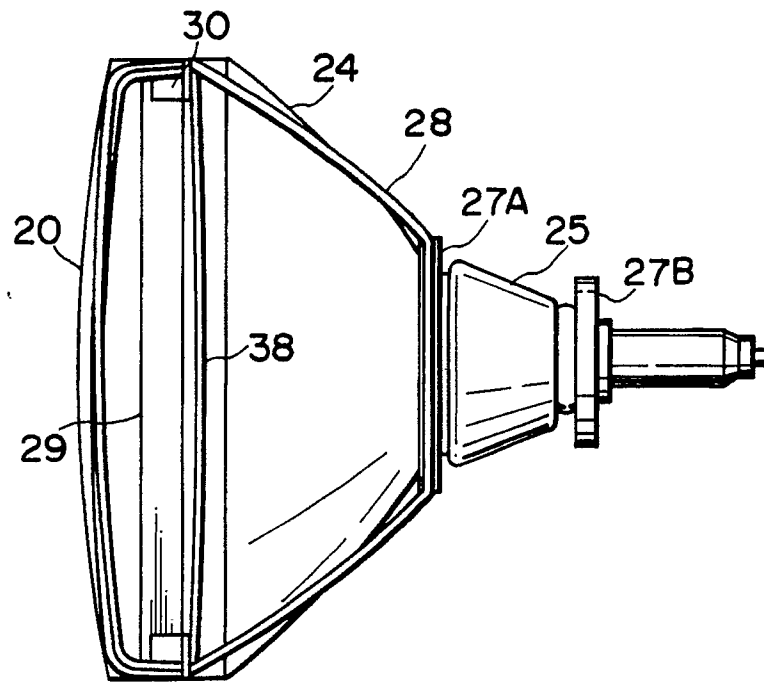


FIG. 12A

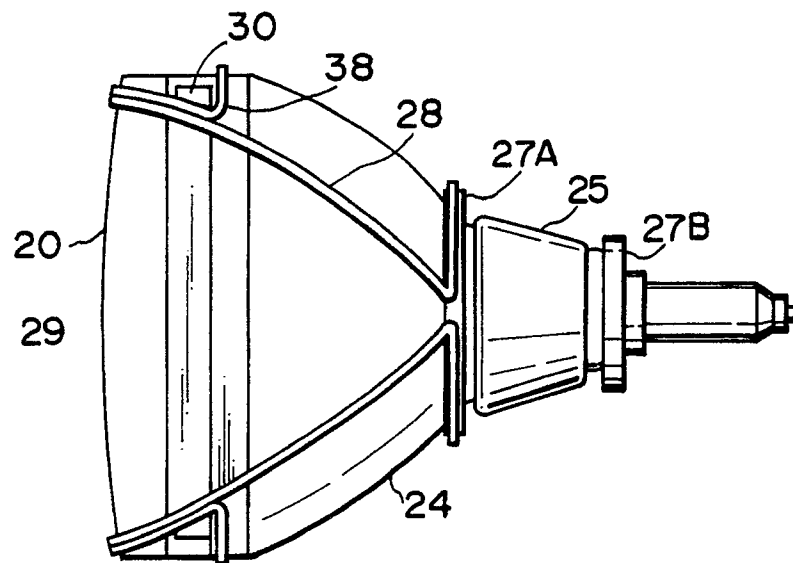


FIG. 12B

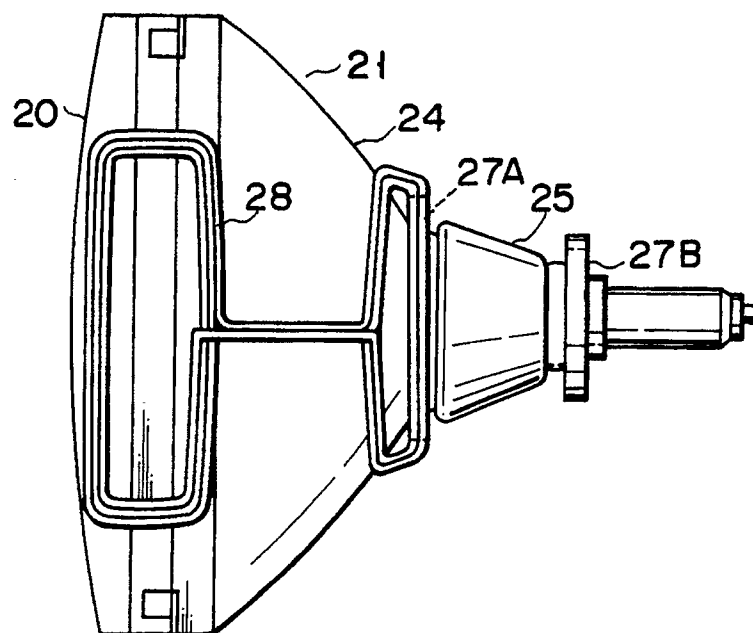


FIG. 13A

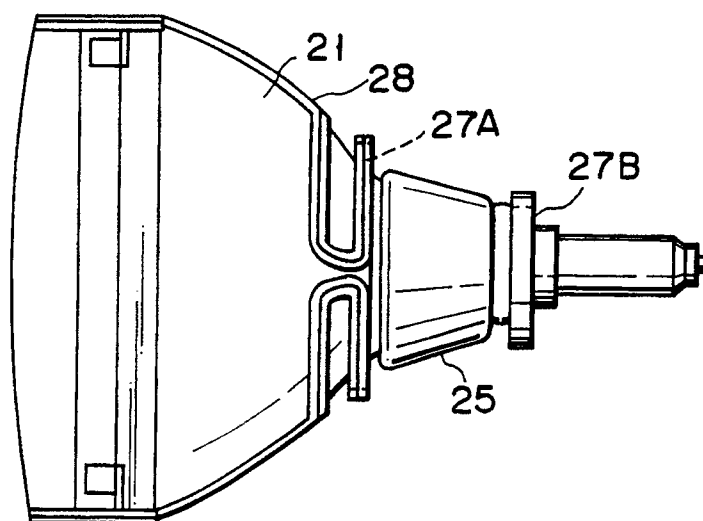


FIG. 13B

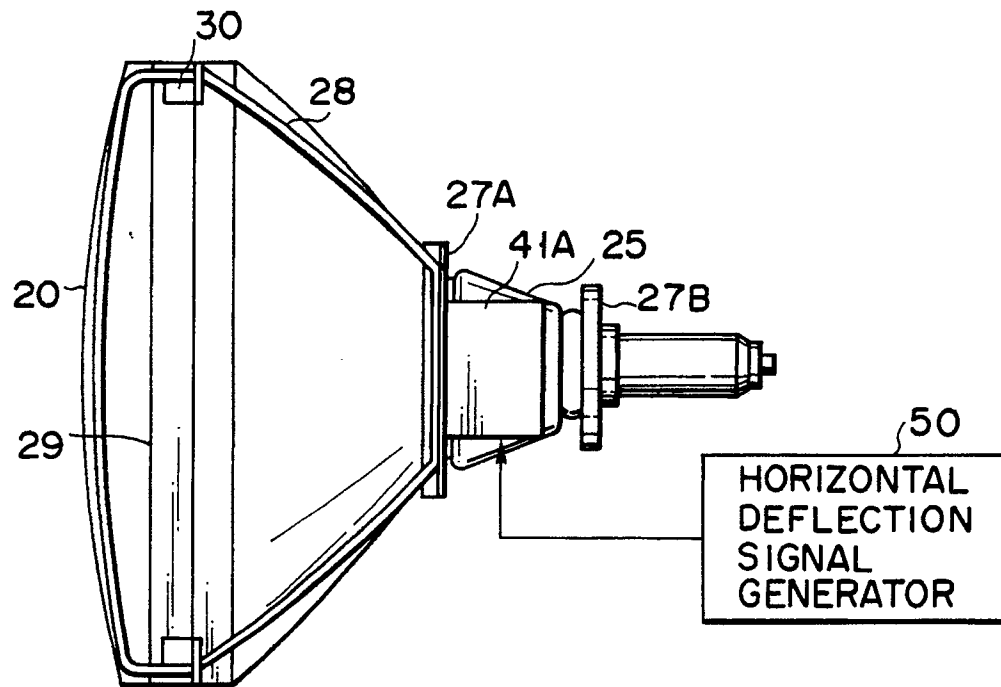


FIG. 14A

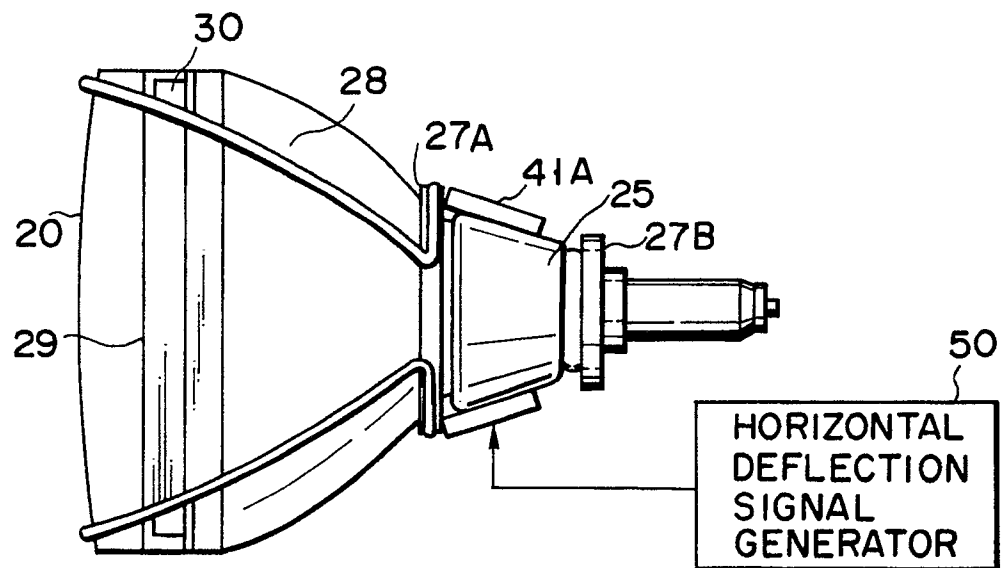


FIG. 14B

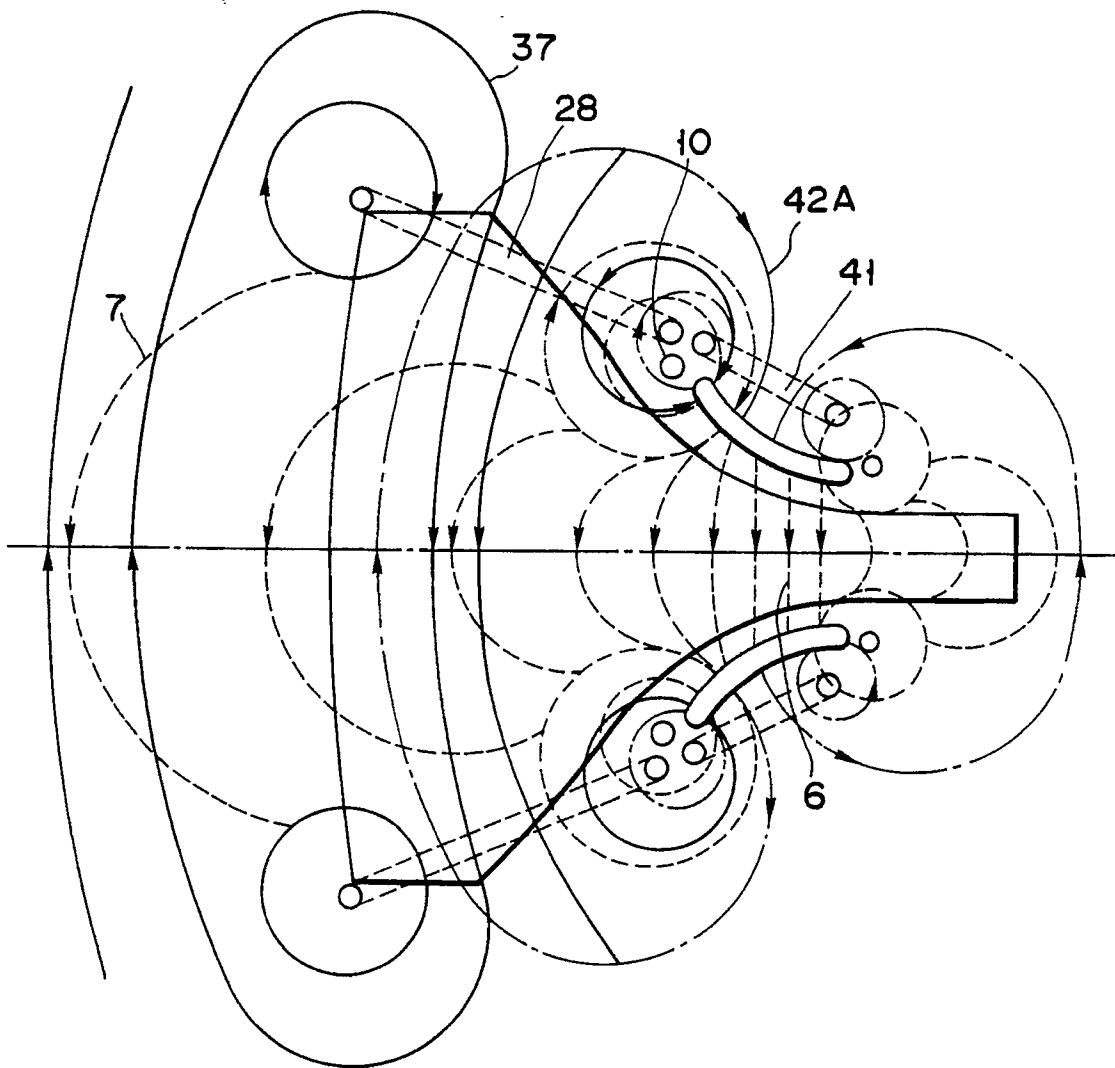


FIG. 15

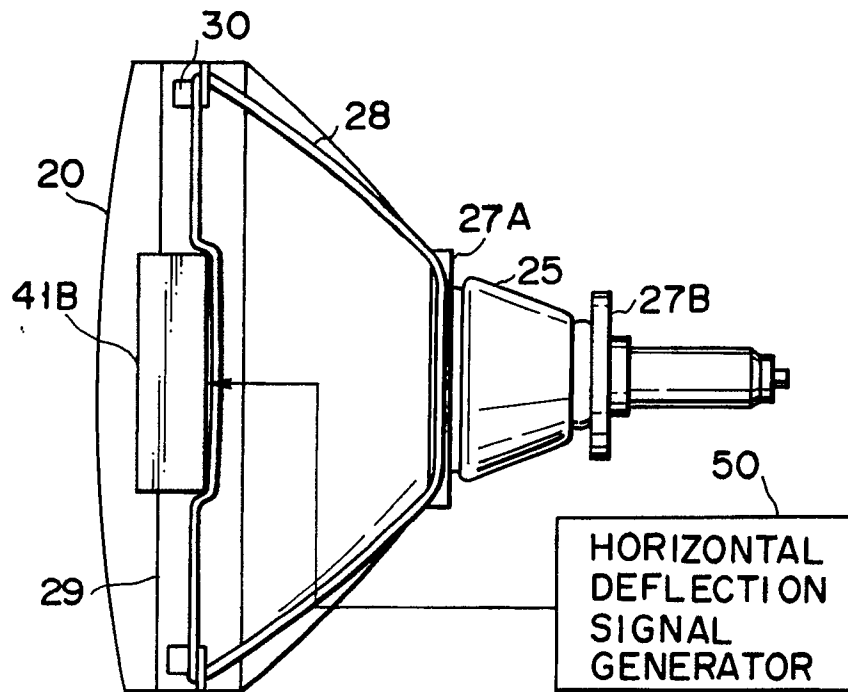


FIG. 16A

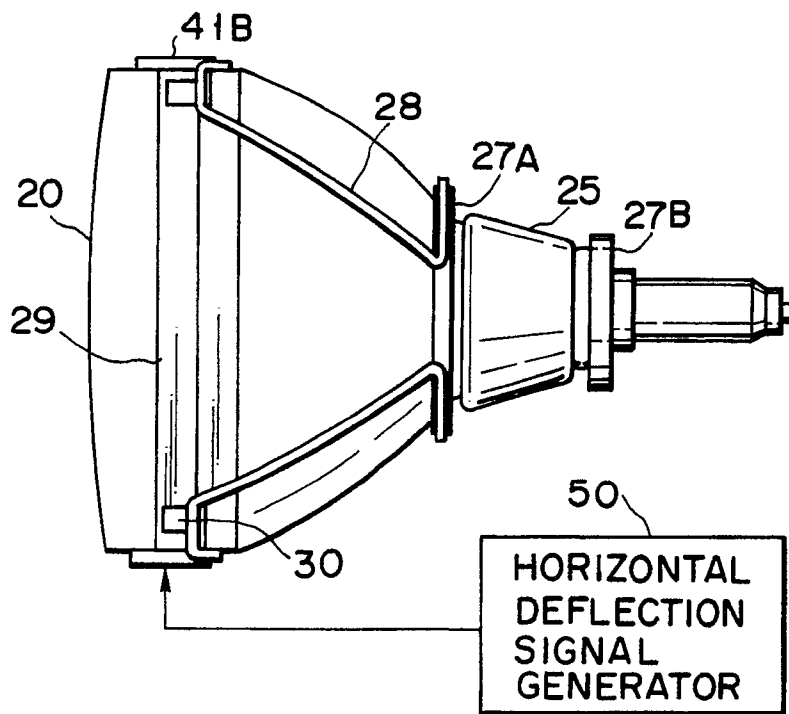


FIG. 16B

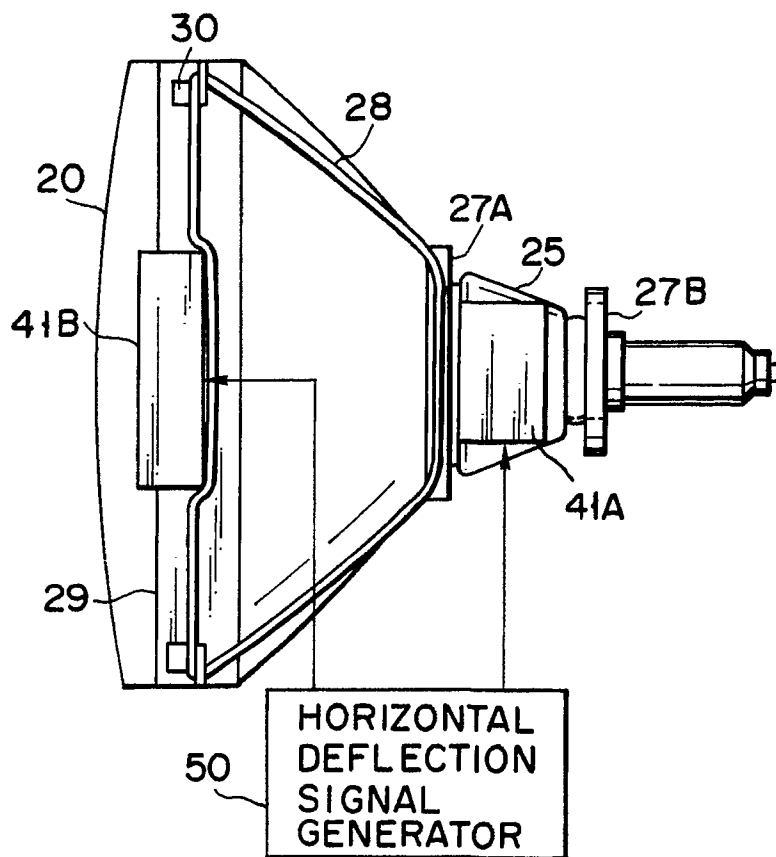


FIG. 17A

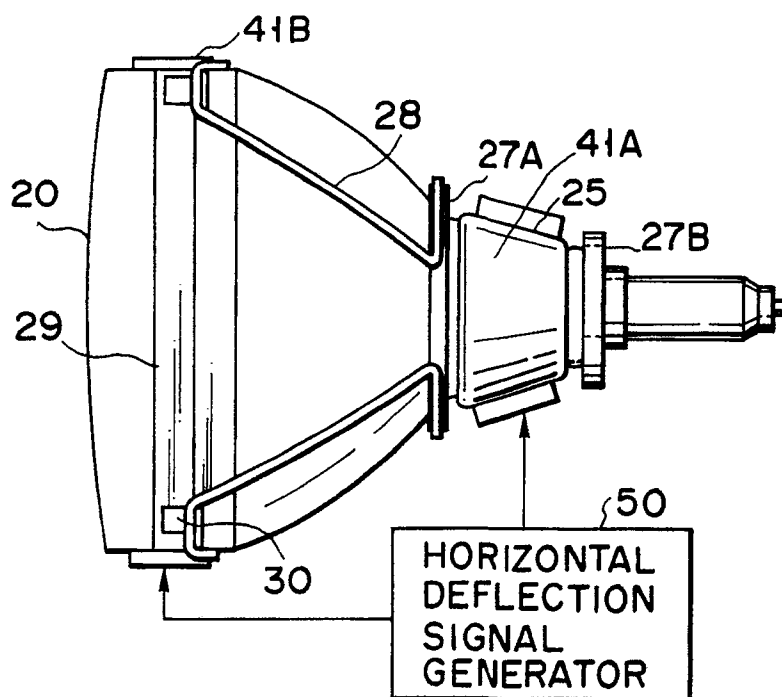


FIG. 17B

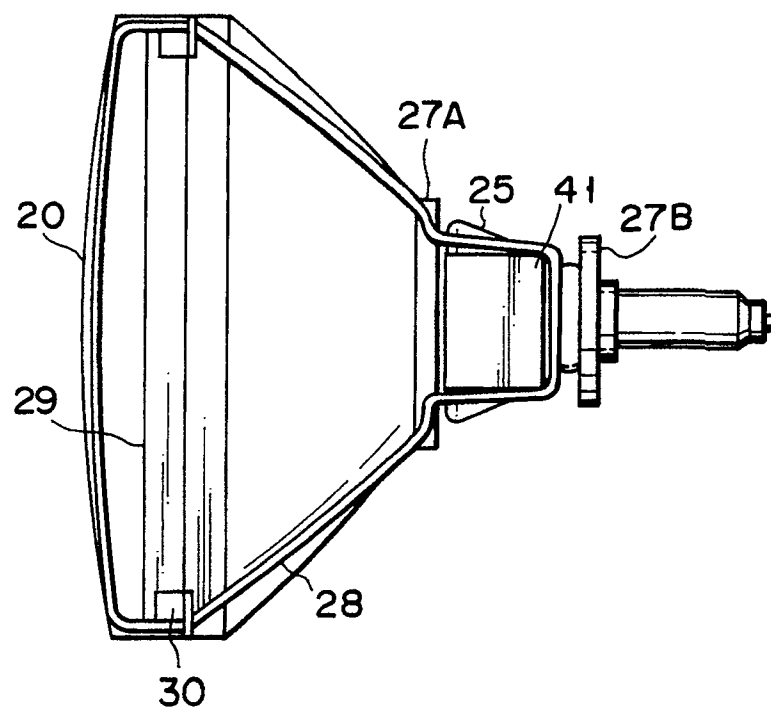


FIG. 18A

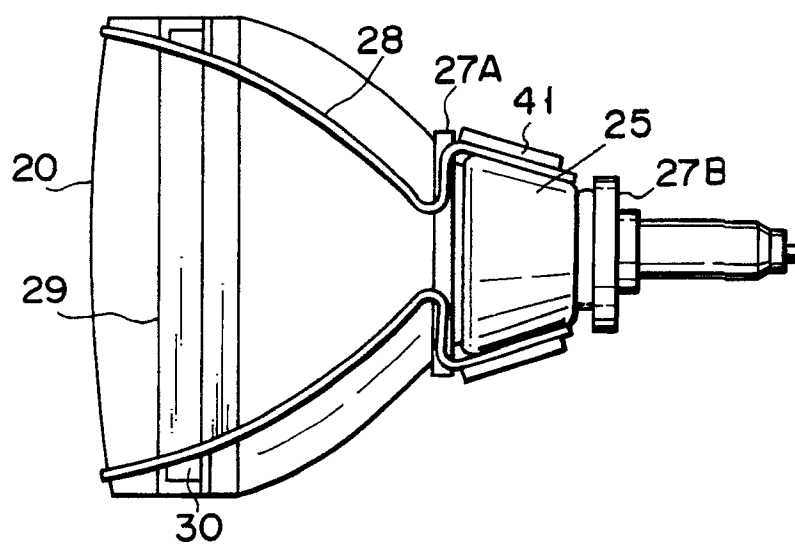


FIG. 18B



DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90112133.5
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	<u>WO - A1 - 88/04 469</u> (TELUB HOLDING AB) * Fig. 1,2,4,5; page 1, lines 1-11; claims 1-5 *	1,9	H 01 J 29/00 H 01 J 29/76 G 12 B 17/02
A	--	2,4, 10,12	
A	<u>WO - A1 - 87/06 054</u> (TELEFONAKTIEBOLAGET LM ERICSSON)		
P,X	<u>EP - A1 - 0 371 618</u> (VICTOR COMPANY OF JAPAN) * Claims 1-3 *	1,9	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H 01 J 29/00 G 12 B 17/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 05-12-1990	Examiner BRUNNER
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			