Nov. 18, 1947. R. O'LARTE ET AL 2,431,137

CATHODE ASSEMBLY

Filed April 13, 1945

Fig. 1

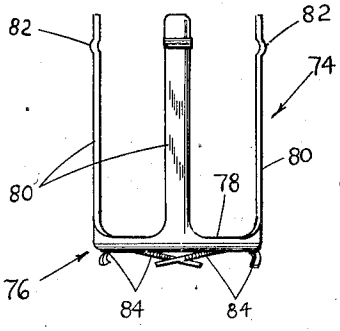


Fig. 2

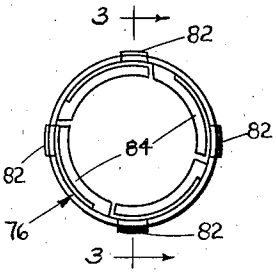


Fig. 3

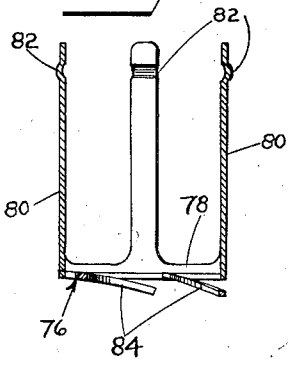


Fig. 5

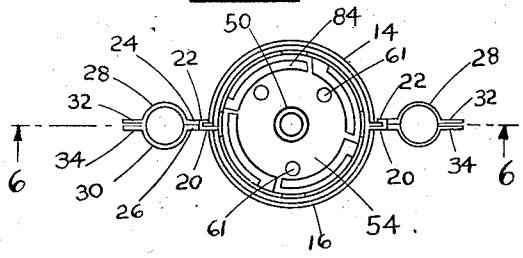


Fig. 6

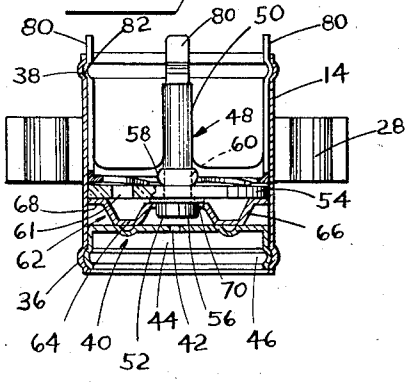


Fig. 4

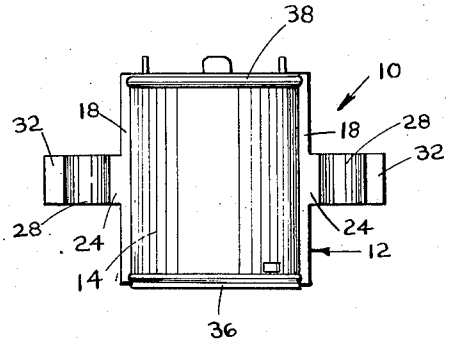
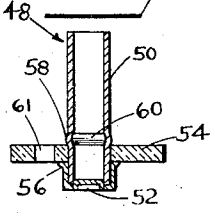


Fig. 7



INVENTOR.
RUDOLPH O'LARTE
KURT SPECK
BY Edwin Leisola
ATTORNEY

Patented Nov. 18, 1947

2,431,137

UNITED STATES PATENT OFFICE

2,431,137

CATHODE ASSEMBLY

Rudolph O'Larte, Rego Park, N. Y., and Kurt Speck, Palisade Park, N. J., assignors to Jacques Kreisler Manufacturing Corporation, North Bergen, N. J., a corporation of New Jersey

Application April 13, 1945, Serial No. 588,230

10 Claims. (Cl. 250—162)

1

This invention relates to a cathode assembly for a cathode-ray tube or the like.

One object of the present invention is the provision in a cathode assembly which comprises an insulation disc which carries a cathode with improved means including resilient means for holding the disc in position in the tube which is provided with the electron-aperture.

Another object of the invention is to provide a cathode assembly construction wherein the cathode may be removably secured in position so that it can be replaced in the event that it is defective.

The above and other objects, features, and advantages will be fully understood from the following description, reference being had to the accompanying illustrative drawings.

In the drawings:

Fig. 1 is an enlarged side view of retaining means embodying the present invention;

Fig. 2 is an end view thereof;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged side view of a cathode assembly embodying the present invention;

Fig. 5 is an end view thereof;

Fig. 6 is a view on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view of the cathode unit.

Referring now to the drawings in detail, the cathode assembly 10 which is intended for use in a cathode-ray tube comprises a tubular member 12 formed of sheet metal in two parts 14 and 16 which are fixedly secured to each other in tube-defining relation. As here shown, tube-forming parts 14 and 16 are provided at their longitudinal edges with flanges 18 and 20, respectively, for the full lengths thereof. Said flanges are in abutting relation and are secured to each other by inturned edge portions 22 of flanges 20 which are bent over adjacent portions of flanges 18. Flanges 18 and 20 are provided with lateral extensions having flat abutting portions 24 and 26 complementary semi-cylindrical portions 28 and 30, which define small tubular parts for mounting the cathode assembly on insulation rods in the electron gun mount in the cathode-ray tube, and flat abutting end portions 32 and 34. The flat abutting portions 24, 26 and 32, 34 are spot welded to each other.

Tubular member 12 is provided with outwardly pressed peripheral ribs 36 and 38 near the opposite ends thereof, respectively, forming corresponding internal peripheral grooves in said tubular member. A disc 40 is mounted in tubular member 18 at the front end thereof and is provided with a central electron aperture 42.

2

Said disc has a peripheral flange 44 provided with an outwardly pressed rib 46 which is received in the peripheral groove formed by the outwardly pressed rib 36 of tubular member 12. It will be understood that disc 40 is formed in one piece and is secured in position between tubular parts 14 and 16 at the time the latter are assembled and secured to each other.

In accordance with the present invention, provision is made for mounting the cathode 48 with the forward or electron-emissive end thereof in proper relation to the electron aperture 42. As here shown, said cathode is of the indirectly heated heated type and comprises a sheet metal tube 50 in which the usual electric filament or heating element (not shown) is positioned. Said tube 50 is closed at its front end by a cap 52 which carries the electron-emissive material, said cap being fixed to the adjacent end portion of said tube. A circular rigid disc 54 formed of ceramic or other insulation material is secured to tube 50 near the forward end thereof and is held against movement longitudinally of said tube by a flange 56 provided on cap 52 and by a collar 58 which as shown in Fig. 6 is constituted by an outwardly pressed peripheral rib or bead with which tube 50 is provided. It will be understood that in assembling insulation disc 54 with tube 50 and cap 52, tube 50 is projected through the central circular opening 60 of disc 54 before cap 52 is secured in position and that after said disc is mounted on said tube, cap 52 is mounted on the forward end portion of said tube and is secured thereto in any suitable way preferably by welding. Disc 54 is provided with a plurality of openings 61 therethrough.

A spacing member 62 is positioned between grid disc 40 and insulation member 54 for predetermining the position of cathode 48 and more particularly the electron-emissive part 52 thereof in relation to the electron-aperture 42 of disc 40. Spacing member 62, which is formed of sheet metal has a forward flat annular part 64, an outer peripheral rim 66 provided with a peripherally continuous flange 68, and an inner peripherally continuous skirt portion defining a central opening 70 in spacing member 62 and surrounding cap 52 of cathode 48 in spaced relation thereto. It will be understood that spacing member 62 and insulation disc 54 are in engagement at the peripheral edges thereof respectively with the inner peripheral surfaces of tubular member 12 whereby the opening 72 of said spacing member is in axial alignment with electron-aperture

42 and whereby cathode tube 50 is in axial alignment with said electron aperture.

Provision is made for holding the cathode 48 in position in tubular member 12. For this purpose the retaining means comprising holding member 74 (Figs. 1 to 3) is provided. Said holding member is formed of resilient sheet metal and comprises a forward annular portion 76 having a peripheral flange 78 and a plurality of resilient arms 80 which extend longitudinally of tubular member 12 in engagement with the inner surface thereof when holding member 74 is positioned therein. Each of said arms 80 is provided with an outwardly pressed transverse rib 82 near the outer end thereof in position to engage tubular member 12 in the internal peripheral groove thereof formed by rib 38. In this connection it will be understood that ribs 82 are located in arms 80 so that when annular part 76 engages the adjacent surface of insulation disc 54, ribs 82 project into the peripheral groove of tubular member 12. In accordance with the present invention annular part 76 of retaining member 74 is provided with a plurality of integral struck out spring elements or fingers 84 which resiliently engage the adjacent surface of insulation disc 54 and press the latter against spacing member 62. Thus spring means is interposed between disc 54 and the retaining member 74 for biasing said disc and the cathode 48 carried thereby toward the electron-aperture 42. It will be understood that when ribs 82 of arms 80 of the retaining member are in the groove provided by rib 38, spring elements 84 resiliently engage disc 54 and hold the latter against spacing member 68. In the non-stressed condition of said spring elements 84, they project from the plane of one side of annular part 76 in a direction opposite to the direction of projection of arms 82 which extend substantially parallel to the longitudinal axis of said annular part. Spring elements 84 are flexible toward the adjacent side of annular part 76 and are normally at least partly flexed toward said annular part when the retaining member 74 is in position in tube 12. It will be understood that spring elements 84 are thus automatically flexed when the ribs 82 of arms 80 are sprung into the groove of rib 38.

In the assembly operation for producing the cathode assembly of the present invention, after the tubular member 12 with the grid disc 40 mounted therein is produced, and after the cathode unit 48 comprising the tube 50, its cap 52 and the disc 54 is produced, the spacing member 62 is placed in the tubular member 12 with the annular flat face 64 thereof abutting grid disc 40, then the cathode 48 is positioned in the tubular member 12 with insulation disc 54 abutting flange 68 of spacing member 62, and finally the holding member 74 is positioned in tubular member 12 with the spring elements 84 of annular part 76 of said holding member resiliently abutting the adjacent surface of insulation disc 54 at the marginal edge portion thereof and with ribs 82 resiliently engaging said tubular member 12 in the peripheral groove formed by rib 38. It will be understood that in the case of a defective cathode or if for some other reason it is desired to remove a cathode from the assembly, this can be easily accomplished by withdrawing cathode unit 48 from tubular member 12 after first removing holding member 74 from tubular member 12, said holding member being easily removable from said tubular member by pressing arms 80 readily inwardly to disengage the ribs 82 from peripheral groove of the tubular member, thus allowing said holding member to be removed through the adjacent open end of the tubular member 12. The cathode-ray assembly 10 may be mounted in a cathode-ray tube in any suitable way but preferably is incorporated in the electron gun mount which we have shown and described in application Serial No. 499,356, filed August 20, 1943.

Thus it is seen that the cathode-ray assembly construction as herein shown and described is well adapted to accomplish the several objects of the present invention. It will be understood, however, that various changes in the details of construction and in the arrangement of parts may be made without departing from the underlying principles of this invention as embodied in the subject matter of the claims.

This application is a continuation-in-part of our application, Ser. No. 518,684, filed January 18, 1944, for cathode assembly.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a cathode assembly which comprises a tube provided with an electron aperture, a cathode positioned in said tube and means including an insulation disc in said tube for holding said cathode in registry with said aperture in spaced relation thereto; means for holding said disc against movement axially of said tube in a direction away from said aperture comprising spring means biasing said disc toward said aperture and means engageable with said tube for holding said spring means in said disc-biasing relation.

2. In a cathode assembly which comprises a tube provided with an electron aperture, a cathode positioned in said tube and means including an insulation disc in said tube for holding said cathode in registry with said aperture in spaced relation thereto; means for holding said disc against movement axially of said tube in a direction away from said aperture comprising spring means biasing said disc toward said aperture and means carrying said spring means and engageable with said tube for holding said spring means in said disc-biasing relation.

3. In a cathode assembly which comprises a tube provided with an electron aperture, a cathode positioned in said tube and means including an insulation disc in said tube for holding said cathode in registry with said aperture in spaced relation thereto; means for holding said disc against movement axially of said tube in a direction away from said aperture comprising a member having an annular part provided with spring elements biasing said disc toward said aperture and flexible arms integral with said annular portion and engageable with said tube for holding said spring elements in said disc-biasing relation.

4. In a cathode assembly which comprises a tube provided with an electron aperture, a cathode positioned in said tube and means including an insulation disc in said tube for holding said cathode in registry with said aperture in spaced relation thereto; means for holding said disc against movement axially of said tube in a direction away from said aperture comprising a member having an annular part provided with spring elements struck out therefrom and engaging said disc on the face thereof remote from said aperture for resiliently biasing said disc toward said aperture and means for holding said annular part

in position axially of said tube with said spring elements in said disc-biasing relation.

5. In a cathode assembly for a cathode-ray tube, said assembly comprising a tubular member provided with an electron-aperture and a cathode disposed within said tubular member; an insulation disc slidably fitting in said tubular member and provided with an opening in which said cathode is mounted for holding said cathode in axial alignment with said aperture of said tubular member, a member disposed between the apertured end of said tubular member and the adjacent side of said insulation disc for spacing said cathode from said aperture axially thereof, said tubular member having an end opening through which said spacing member and said insulation disc with the cathode mounted therein are insertable into said tubular member, and means for holidng said disc in position adjacent said spacing member, said last mentioned means comprising a member having a part positioned adjacent said other side of said disc in radially spaced relation to said cathode and parts extending longitudinally of said tubular member toward said open end thereof, releasable interengaging means on said tubular member and said longitudinally extending parts for releasably securing said disc-holding means in position in said tubular member, and spring means interposed under compression between said disc and said first mentioned part of said holding member for resiliently pressing said first mentioned part of said holding member against said disc.

6. A retaining member of the character described comprising an annular end part, a plurality of laterally flexible arms carried by said annular part at its peripheral edge and projecting from one side of said annular part in a direction substantially parallel to the axis of said annular part, and spring means carried by said annular part at its opposite side and flexible toward said opposite side of the annular part.

7. A retaining member of the character described comprising an annular end part, a plurality of laterally flexible arms carried by said annular part at its peripheral edge and projecting from one side of said annular part in a direction substantially parallel to the axis of said annular part, and spring fingers struck out from said annular part and projecting therefrom at its opposite side, said spring fingers being flexible toward said opposite side of the annular part.

8. In a cathode assembly for a cathode-ray tube, said assembly comprising a tubular member provided with an electron-aperture and a cathode disposed within said tubular member; an insulation disc slidably fitting in said tubular member and provided with an opening in which said cathode is mounted for holding said cathode in axial alignment with said aperture of said tubular member, a member disposed between the apertured end of said tubular member and the adjacent side of said insulation disc for spacing said cathode from said aperture axially thereof, said tubular member having an end opening through which said spacing member and said insulation disc with the cathode mounted therein are insertable into said tubular member, and means for holding said disc in position adjacent said spacing member, said last mentioned means comprising a member having a part positioned adjacent said other side of said disc in radially spaced relation

to said cathode and parts extending longitudinally of said tubular member toward said open end thereof, said tubular member having a recessed portion in its inner surface and at least one of said longitudinally extending parts having a lateral projection releasably engageable with said tubular member in said recessed portion for releasably securing said disc-holding means in position in said tubular member, and spring means interposed under compression between said disc and said first mentioned part of said holding member for resiliently pressing said first mentioned part of said holding member against said disc.

9. In a cathode assembly which comprises a tube provided with an electron-aperture at one end thereof and which is provided with an internal peripheral groove near its opposite end, an insulation disc positioned in said tube in engagement with the inner surface thereof and carrying a cathode in registry with said aperture, spacing means in said tube between said first mentioned end thereof and the adjacent face of the disc for holding the latter and the cathode against movement toward said aperture, spring means biasing on the opposite face of the disc for resiliently pressing the latter against said spacing means, and means integral with said spring means and having a flexible part engageable in said groove for holding said spring means in position for pressing said disc against said spacing means whereby to hold said cathode against movement away from said aperture.

10. In a cathode assembly which comprises a tube provided with an electron-aperture at one end thereof and which is provided with an internal peripheral groove near its opposite end, an insulation disc positioned in said tube in engagement with the inner surface thereof and carrying a cathode in registry with said aperture, spacing means in said tube between said first mentioned end thereof and the adjacent face of the disc for holding the latter and the cathode against movement toward said aperture, and a member having an annular part positioned adjacent said opposite face of the disc and provided with spring elements engaging the opposite face of said disc for resiliently pressing the latter against said spacing means, said annular part having an integral part engageable in said groove for holding said annular part against movement away from said disc.

RUDOLPH O'LARTE.
KURT SPECK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,174,853	Bowie	Oct. 3, 1939
2,222,942	George	Nov. 26, 1940
2,244,358	Ewald	June 3, 1941
2,386,790	Gaun et al.	Oct. 16, 1945
2,391,780	Hillier	Dec. 25, 1945
2,393,057	O'Larte et al.	Jan. 15, 1946

FOREIGN PATENTS

Number	Country	Date
107,623	Australia	June 2, 1939