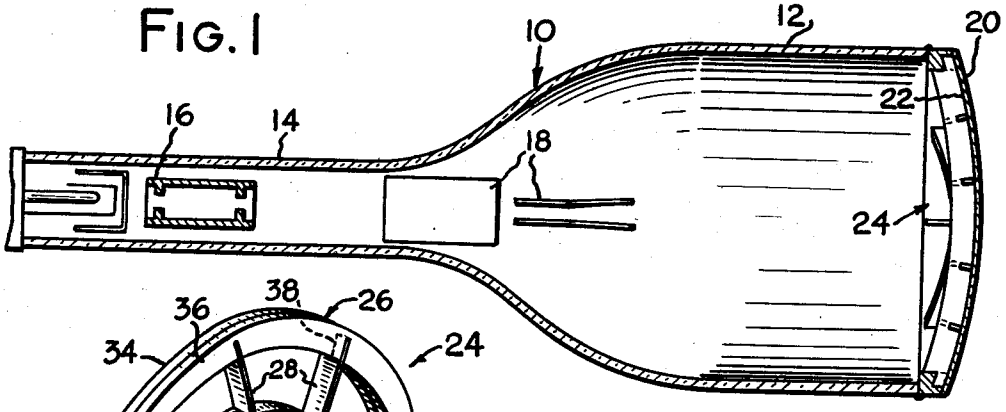
Oct. 8, 1963 G. J. SHELDON 3,106,660

FACE PLATE SUPPORT STRUCTURE FOR HIGH RESOLUTION CATHODE RAY TUBE

Filed Dec. 14, 1959

FIG. 1



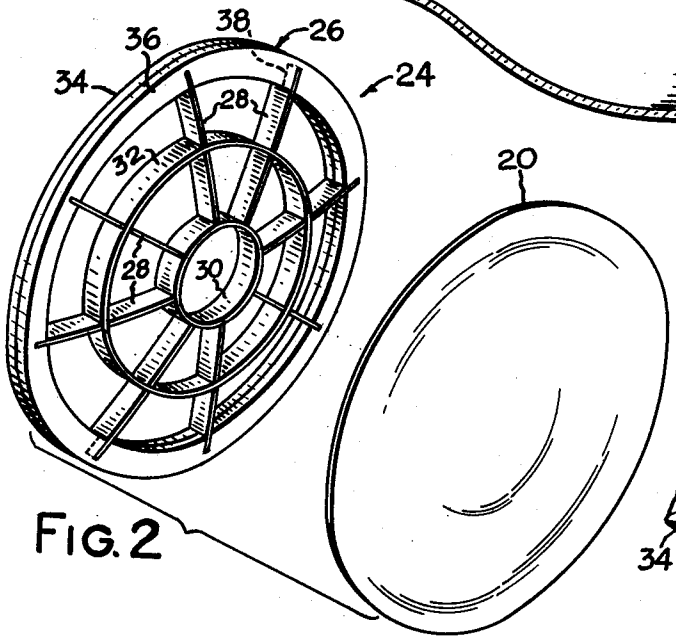
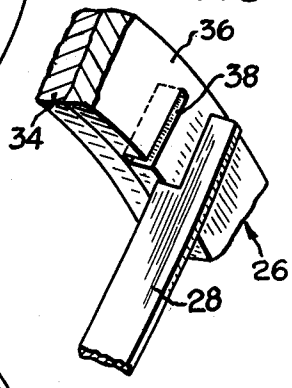


FIG. 2

FIG. 5



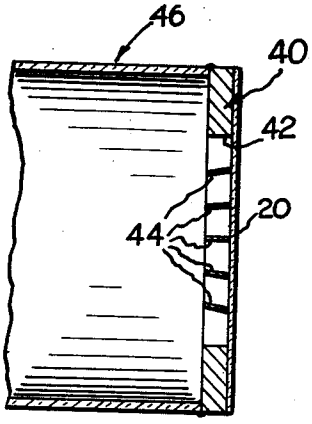


FIG. 3

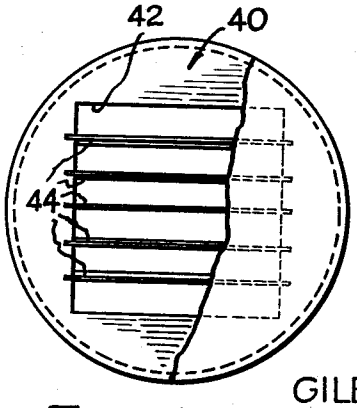


FIG. 4

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FACE PLATE SUPPORT STRUCTURE FOR HIGH RESOLUTION CATHODE RAY TUBE

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4 Claims. (Cl. 313—92)

This invention relates to an improved cathode ray tube construction, and more particularly to an improved face plate construction which permits the use of an extremely thin transparent sheet material for holding the phosphor thereby minimizing the scatter of the phosphor produced light and maximizing the achievable resolution of the tube.

In many special purpose cathode ray tubes such as are used in scientific instrumentation, it is desired to achieve maximum resolution, and to reduce as much as possible the size of the spot of light generated by the electron beam as observed from the front of the face plate. A relatively high degree of beam resolution may be achieved by proper tube construction and operation, and halation effects can be substantially completely eliminated so as to produce an almost infinitesimal spot of relatively high intensive light on the inner surface of the face plate. Scatter and diffusion of the light as it passes through the face plate appears at present to be the principal limiting factor in achieving the desired fine resolution. Scatter and diffusion can be minimized by reducing the thickness of the face plate but progress in this direction has heretofore been limited by the necessity to make the face plate strong enough to support the atmospheric pressure.

Accordingly, one important object of the present invention is to provide an improved face plate construction for a cathode ray tube capable of achieving a relatively high degree of resolution, while at the same time permitting use of a relatively large area display.

Another object is to provide an improved cathode ray tube face plate construction including a relatively thin, transparent phosphor bearing sheet, and a relatively heavy and strong grid-like structure for supporting it.

The foregoing and other objects and advantages of the invention will become apparent in the following detailed description of representative embodiments thereof, taken in conjunction with the drawing, wherein:

FIG. 1 is a longitudinal sectional view of a cathode ray tube including a face plate construction according to a first embodiment of the invention;

FIG. 2 is an exploded view of the face plate construction shown in FIG. 1;

FIG. 3 is a fragmentary, longitudinal sectional view of a cathode ray tube including a face plate construction according to a second embodiment of the invention;

FIG. 4 is a front elevational view, with parts broken away of the cathode ray tube shown in FIG. 4; and,

FIG. 5 is a fragmentary, perspective view showing the assembly of a face plate construction of the cathode ray tube shown in FIGS. 1 and 2.

In accordance with the invention, a cathode ray tube is provided with an ultra thin face plate, or screen to minimize scatter and diffusion of the phosphor produced light, thereby to improve the resolution obtainable from the tube. The screen is preferably much thinner than would be required to support the atmosphere over the entire front end of the tube, and it is therefore supported on a grid-like structure, which is sealed between it and the tube cone. The grid structure includes ribbon-like members, or slats, which span the usable area of the screen, and which are oriented for maximum strength and minimum interference with the electron beam.

Referring now to the drawing, the cathode ray tube **10** illustrated in FIG. 1 thereof includes a cone **12**, a neck portion **14**, an electron gun **16** within the neck portion, and two pairs of electrostatic deflection plates **18**. All of these parts may be of entirely conventional or other desired construction.

The screen **20**, which covers the open end of the cone **12** is made of a relatively thin, transparent material such as glass and carries a coating of phosphor **22** upon its inner surface. The screen **20** may be made about .004 inch thick, or thinner if desired. In order to achieve the desired fine resolution, the screen **20** must be much thinner than the thickness required to support the atmosphere over the front end of the cone **12**.

The screen **20** rests upon and is supported by a grid-like structure **24**, which may be made of any desired material such as steel, brass, glass or the like having sufficient strength to support the atmospheric pressure over the entire area of the screen **20**. The grid structure **24** includes a peripheral ring **26**, which is sealed to the front end of the cone **12**, and which supports a plurality of radially inwardly extending slats **28**. The slats **28** are joined at their inner ends to a central ring **30**, and may be reinforced intermediate their ends by an auxiliary ring **32**. The slats **28** and the rings **30** and **32** are preferably arranged as shown in FIG. 1 with their width dimensions aligned with the center of deflection of the cathode ray in order to minimize interference with the operation of the tube.

If the grid construction **24** is made of metal, the ring **26** is preferably made in two pieces **34** and **36** in order to facilitate the cutting of notches **38** in the one piece **36** to receive the outer end portions (not separately designated) of the slats **28**. The two ring portions **34** and **36** are then preferably brazed together to insure an adequate seal for the tube.

The ring **26** is sealed to the cone **12**, and the screen **20** is sealed around its periphery to the ring **26** thereby providing an air tight closure at the end of the cone **12**.

The practice of the invention is not limited to any particular design or configuration of the grid structure **24**. One alternative configuration is illustrated in FIGS. 3 and 4, wherein the ring **24** is replaced by a disc **40** having a central rectangular, or square aperture **42**, which is spanned by a "Venetian blind" array of slats **44**. The slats **44** are tilted so that they all lie in planes passing through the center of deflection of the cathode ray tube **46**. This arrangement may be desired for use in cathode ray tubes wherein it is desired to produce a continuous display having a relatively long length in one direction. It will be appreciated that many other different supporting rib configurations may be used and are contemplated within the scope of the present invention depending upon the particular use and the particular type of display desired. The use of ribbon-like supporting ribs, or slats such as the radial slats **28** or the "Venetian blind" slats **44** provides maximum supporting strength for the screen **20** with minimum interference with the electron beam and minimum sacrifice of the usable area of the screen.

What is claimed is:

1. A cathode ray tube face plate construction comprising a relatively thin light transparent sheet, a phosphor disposed on one surface of said sheet, and a relatively thick supporting structure for supporting said sheet, said structure including a peripheral portion for disposition upon the front end of the cone portion of the tube, and a central grid-like portion fixed to said peripheral portion and defining in conjunction therewith a support surface for said sheet, said central portion being composed of ribbon-like members set with their width dimensions

generally on lines passing through the center of deflection of the cathode ray.

2. A cathode ray tube face plate construction comprising a relatively thin light transparent sheet, a phosphor disposed on one surface of said sheet, and a relatively thick supporting structure for supporting said sheet, said structure including a peripheral portion for disposition upon the front end of the cone portion of the tube, and a central grid-like portion fixed to said peripheral portion and defining in conjunction therewith a support surface for said sheet, said central portion being composed of ribbon-like members set with their width dimensions generally on lines passing through the center of deflection of the cathode ray, said ribbon-like members being arranged in a spider web pattern and in which selected ones of said members are straight and extend radially and other ones of said members are circular and serve to secure said radial members in position.

3. A cathode ray tube face plate construction comprising a relatively thin light transparent sheet, a phosphor disposed on one surface of said sheet, and a relatively thick supporting structure for supporting said sheet, said structure including a peripheral portion for disposition upon the front end of the cone portion of the tube, and a central grid-like portion fixed to said peripheral portion and defining in conjunction therewith a support surface for said sheet, said central portion being composed of ribbon-like members set with their width dimensions generally on lines passing through the center of deflection of the cathode ray, said members being arranged in a regular array with their edges parallel and lying on a common surface.

4. A cathode ray tube face plate construction comprising a thin light transparent sheet, a fluorescent screen disposed on said transparent sheet, a supporting structure for supporting said sheet, said supporting structure including a peripheral mounting means disposed on the front end of the tube, a central grid-like portion fixed to said peripheral mounting means, an engaging surface defined by said grid-like portion engaging and reinforcing said sheet, said central portion being composed of members having their width dimensions generally on lines passing through the center of deflection of the cathode ray tube.

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