Dec. 10, 1940. V. W. BUSCH 2,224,287

TELEVISION APPARATUS

Filed March 10, 1939

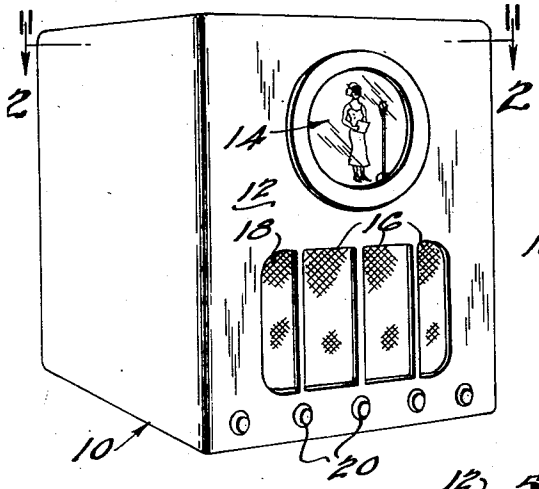


FIG. 1.

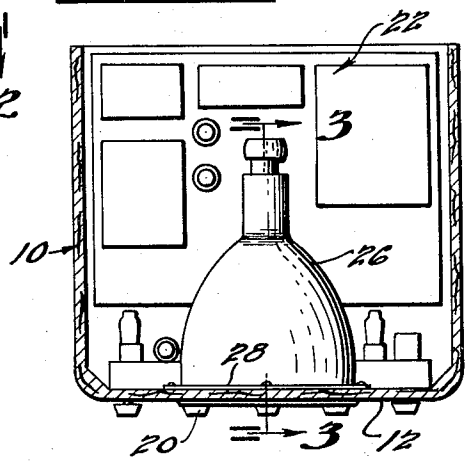


FIG. 2.

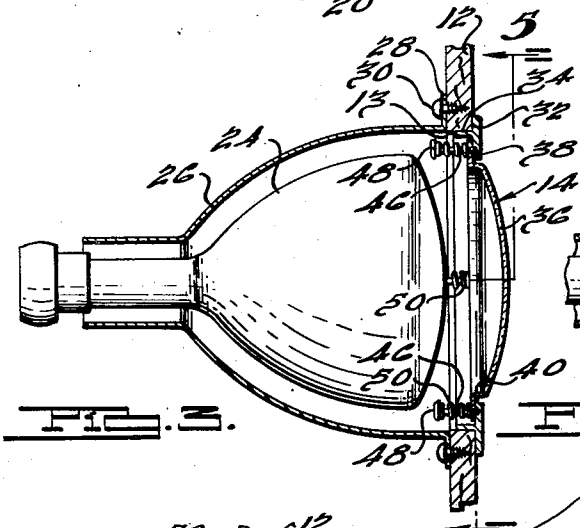


FIG. 3.

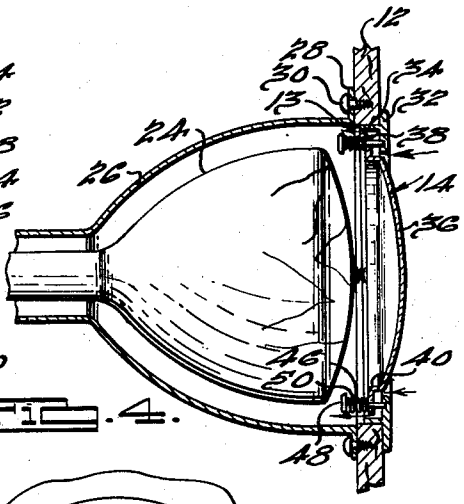


FIG. 4.

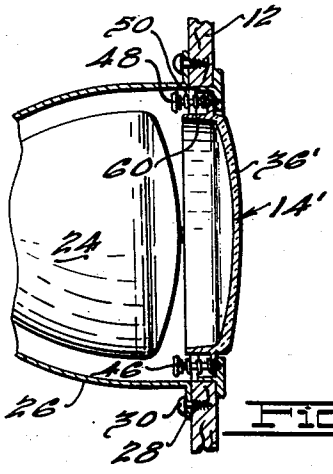


FIG. 6.

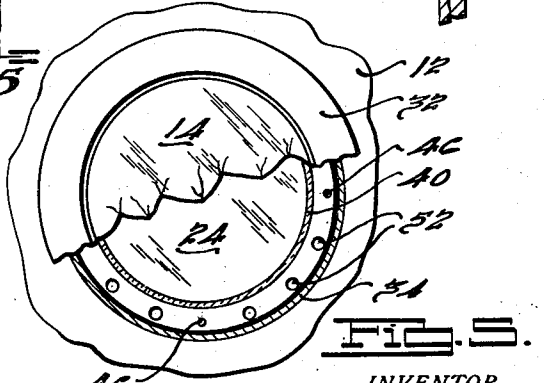


FIG. 5.

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TELEVISION APPARATUS

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6 Claims. (Cl. 178—7.5)

This invention relates to television apparatus and particularly to the cabinet therefor and its relation to the cathode ray tube thereof, the principal object being the provision of means for protecting the audience and the cabinet itself and parts contained therein from possible harm or damage upon implosion of the cathode ray tube.

Objects of the invention include the provision of television apparatus having non-shatterable means through which the audience may view the pictures on the end of the cathode ray tube; the provision of means of the type described that will be pleasing in appearance and readily adapt itself to changes in design enabling it to be readily blended into various design features of a television cabinet; the provision of a protective transparency for the large end of the cathode ray tube so constructed as to impart to it a maximum degree of inherent rigidity; the provision of a television cabinet having a protective transparency over the large end of the cathode ray tube so constructed and movably arranged with respect to the cabinet as to serve as a valve for introducing air directly to the cathode tube upon implosion thereof to thereby neutralize the effects of the implosion with a minimum disadvantage to both the audience and the television apparatus contained within the cabinet; the provision of a television apparatus including a cabinet and a protective transparency associated with the cabinet in superposed relation with respect to the large end of the cathode ray tube, the transparency being mounted for movement toward and away from the cathode ray tube and normally being maintained at one limit of its movement by resilient means; the provision of a television cabinet having a transparency through which the audience is adapted to view the large end of the cathode tube and formed of lens-like character whereby to at least partially correct the distortion of the image on the end of the cathode tube in the eyes of the audience due to the curvature of such end of the tube; the provision of a transparency in protective relation to the enlarged end of a cathode ray tube formed of a pressed plastic or like material; and the provision of a protective transparency for the end of a cathode ray tube formed of a molded synthetic resin having optical properties.

The above being among the objects of the present invention the same consists in certain novel features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing which illustrates suitable embodiments of the present invention and in which like numerals refer to like parts throughout the several different views,

Fig. 1 is a perspective view of a television cabinet particularly illustrating the front face thereof;

Fig. 2 is a transverse sectional view of the cabinet shown in Fig. 1 taken as on the line 2—2 thereof and particularly illustrating the mounting of the cathode ray tube therein;

Fig. 3 is an enlarged fragmentary vertical sectional view taken on the line 3—3 of Fig. 2 and illustrating the cathode ray tube and the protective transparency therefor, the protective transparency being illustrated in its normal position;

Fig. 4 is a view similar to Fig. 3 but illustrating the position which the protective transparency may assume upon an implosion of the cathode ray tube;

Fig. 5 is a partially broken, partially sectioned view taken on the line 5—5 of Fig. 3 and illustrating additional details of the structure shown; and,

Fig. 6 is a view similar to Fig. 3 but illustrating a modified form of construction.

As is well understood by those skilled in the art television receiving apparatus includes as one of its principal elements a cathode ray tube in which, by means of other apparatus employed, an electron beam plays across a fluorescent screen at the large or wide end of the tube. These electrical impulses are thereby converted into light and shadow forming the picture. The cabinet is provided with an opening through which the end of the tube and, therefore, the picture is visible to the audience. In some cabinet constructions the end of the tube is exposesd at the front face of the cabinet and is directly visible to the audience and in others the tube is exposed in an upwardly direction beneath a cover, and the cover is provided with a suitable angularly positioned mirror so that when the cover is opened and the apparatus is in operation the image on the end of the cathode ray tube is observed in the mirror by the audience.

These cathode ray tubes are highly evacuated and are of a relatively large size. At the present time they are usually made in sizes providing a five inch, nine inch, twelve inch and fourteen inch diameter wide or large end. Inasmuch as

the large or wide end of the tube determines the size of a picture produced by the television apparatus it will be appreciated that the trend of progress in television receiving sets is constantly towards cathode ray tubes having a larger wide end.

These cathode ray tubes are necessarily constructed almost entirely of glass and it will be appreciated that because of their relatively large size and, accordingly, large contained volume, and because of their high evacuation, any occurrence which causes a rupture of a wall of the tube creates a severe implosion the effects of which are more pronounced the larger the size of the tube. It is common practice, in order to protect the apparatus other than the cathode ray tube within the cabinet of a television apparatus against the deleterious effect of a possible implosion of the cathode ray tube, to provide a metallic casing or covering about substantially all parts of the cathode ray tube except the large or wide end thereof, but in spite of this it is frequently found that the receiving set is generally damaged upon implosion of a cathode ray tube.

It is also conventional practice to provide an intended protective transparency in the cabinet over the large or wide end of the cathode ray tube with the intended purpose of protecting the audience against possible injury from flying glass in event an implosion of the cathode ray tube occurs. These protective transparencies, which in the past have been commonly known as lenses, have been made of flat glass and rigidly mounted in the cabinet and it has been found that in spite of making these so-called lenses of relatively thick glass an implosion of the cathode ray tube will usually shatter this glass and shower the audience with fragments thereof. The present invention has for its object to overcome these disadvantages in connection with the protection of cathode ray tubes in television receiving apparatus and to do so in an economical manner that particularly lends itself to improving the appearance of the receiving apparatus.

In the broader aspects of the invention the audience is protected from the possibility of flying particles of shattered glass by constructing the protective transparency of suitable non-shatterable material such as Celluloid or any suitable type of transparent plastic material for instance such as is found available on the market in a number of different types of synthetic resins sold under a number of different trade-names, and forming the principal portion of such protective transparency to conform to the general curvature of the large or wide end of the cathode ray tube thereby to impart added strength and rigidity to the transparency as well as to render it of more pleasing appearance and enabling it to be blended into various features of cabinet design tending to increase the favorable appearance of the cabinet in general. In accordance with a more limited phase of the present invention this protective transparency is preferably so mounted in the cabinet as to enable it to move inwardly upon an implosion of the associated cathode ray tube and in thus moving inwardly to create a substantial passage for the in-flow of air into the cabinet through the opening covered thereby and particularly directly to the cathode ray tube and the protective covering for the sides thereof, thereby to neutralize the effect of the implosion to a great extent and particularly sufficiently to prevent possible damage to the remaining apparatus in the cabinet by reason of the effects of the implosion.

Referring now to the accompanying drawing and particularly to Figs. 1 to 5, inclusive, a television receiving set is indicated as included within a cabinet 10 having a front face 12. The front face 12 of the cabinet 10 in the upper portion thereof is provided with an opening 13 through which the large or wide end of the cathode ray tube is visible to the audience and this opening is provided with a protective transparency indicated generally at 14. An additional series of openings 16 are provided in the front wall 12 below the transparency 14 and behind which a conventional loud speaker (not shown) is mounted in a conventional manner for broadcasting a sound effect accompanying pictures viewed through the transparency 14. An open mesh cloth 18 or the like is employed in a conventional manner for blanking the view of the interior of the cabinet through the openings 16. The front face of the cabinet 10 is also provided with the usual control knobs 20.

Within the cabinet 10 is located the conventional television receiving apparatus indicated generally at 22 in Fig. 2 and which includes a cathode ray tube 24, as indicated in Figs. 3 and 4, positioned to the rear of and in alignment with the opening 13 with, of course, its large or wide end upon which the images are produced facing the opening 13 and positioned directly behind it. A conventional metal protective shield 26 shaped generally to conform to the contour of the side walls of the tube 24 and arranged in generally spaced relation with respect thereto is provided with an outwardly directed marginal flange 28 at its forward margin which lies against the rear face of the forward walls 12 of the cabinet 10 and is suitably fixed thereto by means of screws 30. A decorative frame or molding 32 is provided on the exterior face of the cabinet around the margins of the opening 13 for imparting a finished appearance thereto and may, if desired, include an inwardly extending flange or rib 34 serving to properly align it with the margins of the opening 13. The protective transparency 14 is, in the construction shown, supported by the frame 32.

As will be noted from the drawing the protective transparency 14 is of substantially equal thickness throughout and includes a curved main and central portion 36 of substantially the same diameter as the effective diameter of the wide or large end of the tube 24, arranged in forwardly spaced relation to such front end of the tube 24 and curved to substantially conform to such curvature so as to lie in generally parallel relation thereto, although in the broad sense it is not essential that the curvature of these two parts be identical. The outer marginal edge portion of the protective transparency is provided with a flat annular flange portion 38 which normally lies in flat contacting relationship with respect to the inner face of the frame 32. Preferably, in order to provide additional strength to the transparency 14, the flange 38 is joined to the central portion 36 through a forwardly directed annular offset portion 40.

As previously mentioned the transparency 14 is preferably of a single piece integral construction and formed of a suitable non-shatterable material such as Celluloid, or of some other transparent plastic material of any suitable type such, for instance, as any one of a number of transparent synthetic resins now obtainable on the

market. This material being non-shatterable in an ordinary sense of the word, it eliminates the possibility of fine particles of shattered glass from endangering the audience upon implosion of the tube 24 as may occur in prior constructions, and because of its curved central portion 36 and additionally because of the angular portion 40 where employed, it is of great rigidity as compared to its thickness and consequently is capable of withstanding the effects of implosions of the cathode ray tube to a much greater extent than the glass lenses heretofore employed. Additionally it will be observed that because of the curved conformation of the outer face of the transparency 14 it may be readily blended into the contour of the cabinet and it permits improved design treatment of the cabinet in general. Accordingly, it will be observed that this feature of the invention not only provides ample protection for the audience from implosions of the cathode ray tube but further lends itself to an improvement in the appearance of the cabinet generally.

In the broader aspects of the invention the transparency 14 may be supported on the frame 32 or other part of the cabinet in a fixed or in any other suitable manner. However, in accordance with a further phase of the present invention the means for supporting the transparency 14 is preferably such as to enable the transparency 14 to move inwardly upon an implosion of the cathode tube 24 and thus allow air to flow through the opening 13 to neutralize the effects of the implosion. One manner of accomplishing this effect is illustrated in the drawing and consists of a plurality of rearwardly directed pins 46 fixed at their front ends in the frame 32 and provided with heads 48 on their rear ends. The marginal flange portion 38 of the transparency 14 is provided with openings matching the pins 46 and in which the pins 46 are slidably received, the pins 46 thus serving to locate the transparency 14 laterally of the openings 13. A compression spring 50 is provided in surrounding relation with respect to each of the pins 46 and maintained under compression between the rear face of the flange 38 and the front face of the head 48 and, accordingly, these springs constantly urge the flange 38 of the transparency 14 against the rear face of the frame 32 in which position it is located during normal operation.

With the above described construction it will be appreciated that if a wall of the cathode ray tube 24 becomes fractured and an implosion of the tube occurs, the sudden drop in pressure within the protective covering 26 acting over the area of the transparency 14 will act to move the transparency 14 inwardly on the pins 46 against the force of the springs 50, and the outer marginal edges of the flange 38 being radially inwardly spaced from the flange 34 of the frame 32, the air may flow between the frame 32 and the flange 38 and over the outer ends of the flange 38 into the space within the protective covering 26 to relieve the drop in pressure caused by the implosion of the tube and, therefore, neutralize the effect thereof. If desired and as best illustrated in Fig. 5 the rapidity of flow of air through the frame 32 upon inward movement of the transparency 14 upon an implosion of the tube 24 may be facilitated by the provision of a plurality of holes such as 52 in the flange 38 of the transparency 14, these holes 52 providing a more direct route to the flow of air to the interior of the protective covering 26 when the transparency 14 moves inwardly upon an implosion of the tube 24.

It will be appreciated that by mounting the transparency 14 in the manner described, the transparency 14 additionally serves in the nature of a valve capable of opening quickly to provide a large passage for direct flow of air to the tube 24 and its protective covering 26 upon an implosion of this tube 24, thus dissipating the effects of the implosion in a quick and effective manner sufficient to guard against undue damage to the rest of the apparatus in the cabinet upon such an implosion. It also has the effect of reducing the differential of pressure which would otherwise act on the transparency 14 upon an implosion of the tube 24 and thus additionally serves to protect the transparency 14.

Because of the curved nature of the large or wide end of the cathode ray tube employed in television apparatus and necessitated by the extremely high evacuation of such tubes, the objects appearing upon the large or wide end of the tube and moving laterally across the screen appear distorted except when close to the center thereof. It is a further feature of the present invention to so form the protective transparency for the large or wide end of the cathode ray tube in television receiving apparatus to offset the degree of such distortion if not entirely eliminate it. This is accomplished in the manner illustrated in Fig. 6 wherein it will be noted that instead of the transparency 14 previously shown and described a transparency 14' is employed, this transparency being of the same general character as the transparency previously described except that the thickness of the central portion 36' thereof varies from the center thereof towards the outer edges, the difference in thickness providing in the central portion 36' a lens having the effect in the eyes of the audience of correcting the distortion due to the appearance of the images on the curved front face of the cathode ray tube 24. In other words the central portion 36' of the transparency 14' is preferably so constructed and arranged as to correct the lines of vision passing through the portion 36' to the face of the cathode tube 24. The transparency 14' in such case will necessarily be constructed of some suitable synthetic resin or the like having optical properties and by a molding operation. In this respect it may be noted that the transparency 14 previously described is preferably of constant thickness throughout and although it may also be formed by a molding operation, its conformation lends itself to manufacture by a pressing operation which, of course, is considerably more economical to employ than a molding operation.

Another difference of the transparency 14' illustrated in Fig. 6 is that it is provided with an inwardly directed flange portion 60 around the margins of the central portion 36'. The flange 60, which is preferably formed integrally with the rest of the transparency 14' is preferably opaque or at least translucent thereby acting as a shield or skirt to conceal the various pins 46 and springs 50 from the view of the audience, and at the same time it imparts an additional rigidity to the transparency 14' to better enable it to withstand the effects of an implosion of the tube 24. It will be appreciated that otherwise it includes all of the beneficial features of the transparency 14 previously described.

Formal changes may be made in the specific embodiments of the invention described with-

out departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In a television receiving apparatus including a cabinet having an opening in a wall thereof and a cathode ray tube positioned within said cabinet with the outwardly curved wide end thereof exposed to view through said opening, the combination of a transparency for protecting an audience from the effects of an implosion of said tube comprising a transparent, non-shatterable element of curved cross-sectional configuration arranged in closing relation with respect to said opening, and means supporting said transparency for bodily movement without rupture axially inwardly of said opening upon being subjected to the effects of an implosion of said tube, said last named means including means limiting such bodily movement.

2. In a television receiving apparatus including a cabinet having an opening in a wall thereof and a cathode ray tube positioned within said cabinet with the curved wide end thereof exposed to view through said opening, the combination of a transparency for protecting an audience from the effects of an implosion of said tube comprising a transparent, non-shatterable element of curved cross-sectional configuration arranged in closing relation with respect to said opening, means supporting said transparency for movement without rupture axially inwardly of said opening, and yieldable means constantly urging said transparency towards the axially outer limit of its movable position.

3. In a television receiving apparatus including a cabinet having an opening in a wall thereof and a cathode ray tube positioned within said cabinet with the outwardly curved wide end thereof exposed to view through said opening, the combination of means for protecting an audience from the effects of an implosion of said tube through said opening comprising a frame secured to said wall around the margins of said opening, a non-shatterable transparency closing said opening, means movably supporting said transparency from said frame for movement axially inwardly of said opening without rupture, and yieldable means constantly urging said transparency into contacting relation with respect to said frame.

4. In a television receiving apparatus including a cabinet having an opening in a wall thereof and cathode ray tube positioned within said cabinet with the curved wide end thereof exposed to view through said opening, the combination of means for protecting an audience from the effects of an implosion of the cathode ray tube through said opening comprising a non-shatterable transparency normally closing said opening, said transparency including a sectionally outwardly curved central portion, a plane annular marginal flange and an angular wall interconnecting the inner marginal portions of said flange with the outer marginal portions of said central portion, and resilient mounting means coacting between said flange and said wall for resiliently urging said transparency toward said wall.

5. In a television receiving apparatus including a cabinet having an opening in a wall thereof and a cathode ray tube positioned within said cabinet with the curved wide end thereof exposed to view through said opening, the combination of a transparency for protecting an audience from the effects of an implosion of said tube comprising a transparent, non-shatterable element arranged in closing relation with respect to said opening, means supporting said transparency for movement without rupture axially inwardly of said opening, and yieldable means constantly urging said transparency toward the axially outer limit of its movable position.

6. In a television receiving apparatus including an enclosure having an opening therein and a cathode ray tube positioned within said enclosure with the wide end thereof exposed through said opening, the combination of a transparency for protection against implosion of said tube comprising a transparent, non-shatterable element arranged in protective relationship with respect to said opening and said tube, means supporting said transparency for bodily movement without rupture axially toward said tube, and yieldable means constantly urging said transparency away from said tube.

VERN W. BUSCH.