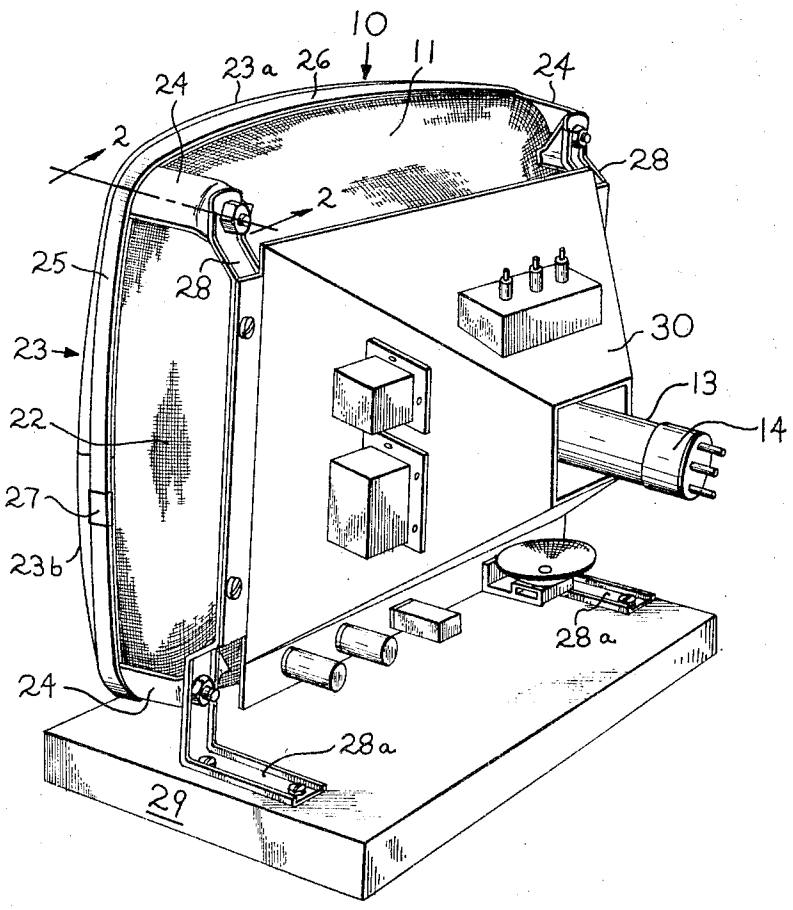
Sept. 6, 1966 D. A. DAMM 3,271,516

IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION

Filed Oct. 22, 1962 5 Sheets-Sheet 1

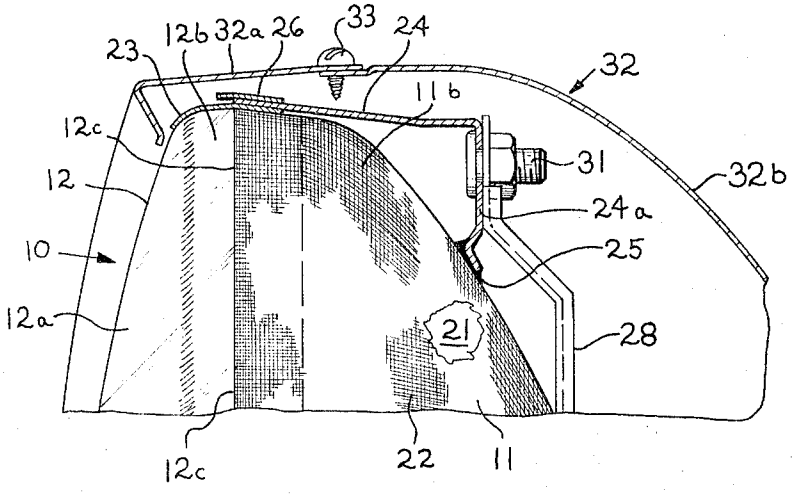
FIG 1



INVENTOR.
DANIEL A. DAMM
BY
E. J. HOLLER &
W. A. SCHAICH
ATTORNEYS

Sept. 6, 1966 D. A. DAMM 3,271,516
IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION
Filed Oct. 22, 1962 5 Sheets-Sheet 2

FIG 2



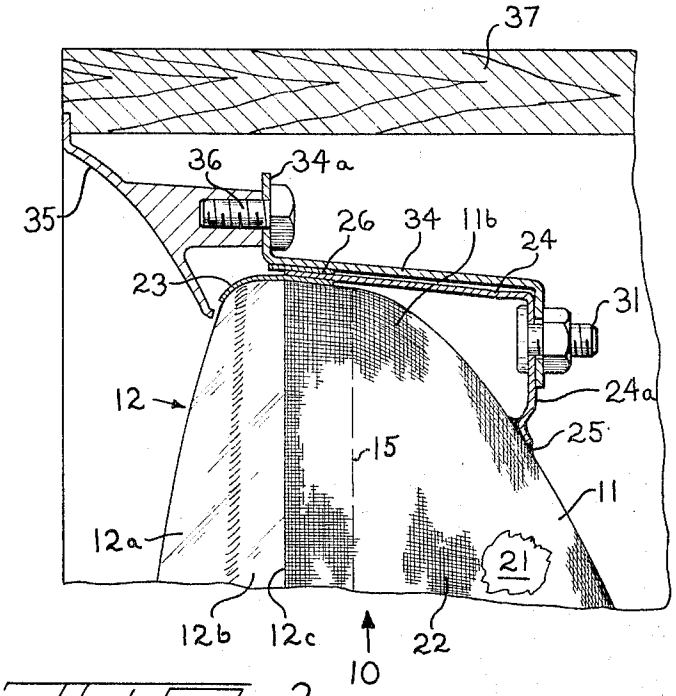


FIG 3

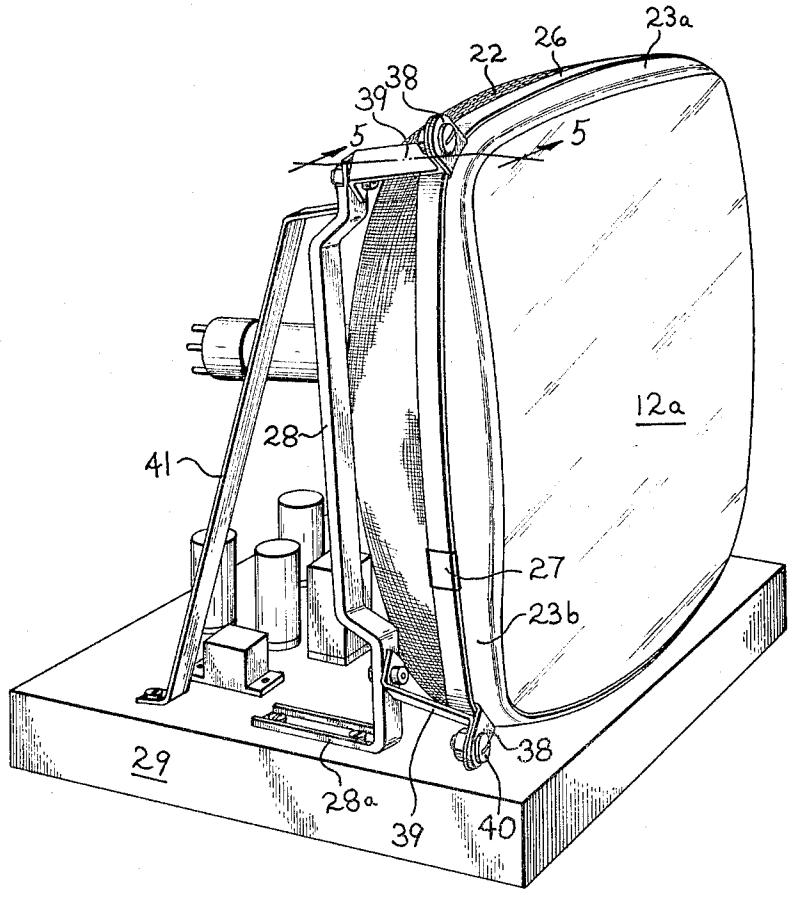
INVENTOR.
DANIEL A. DAMM
BY
E. J. HOLLER &
W. A. SCHAICH
ATTORNEYS

Sept. 6, 1966 D. A. DAMM 3,271,516

IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION

Filed Oct. 22, 1962 5 Sheets-Sheet 3

FIG 4



INVENTOR.
DANIEL A. DAMM
BY
E. J. HOLLER &
W. A. SCHAICH
ATTORNEYS

Sept. 6, 1966 D. A. DAMM 3,271,516

IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION

Filed Oct. 22, 1962 5 Sheets-Sheet 4

FIG 5

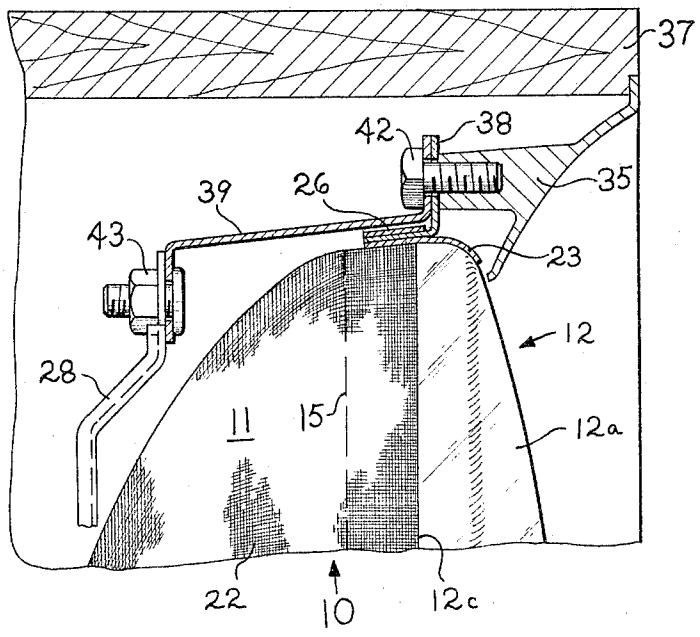


FIG 6

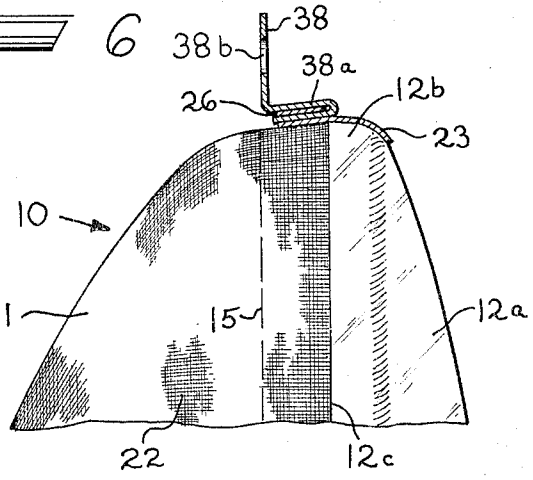
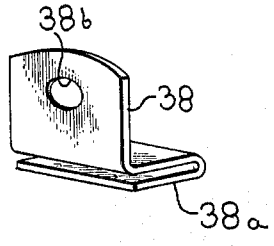


FIG 7



INVENTOR.
DANIEL A. DAMM
BY
E. S. HOLLER &
W. A. SCHAICH
ATTORNEYS

Sept. 6, 1966 D. A. DAMM 3,271,516

IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION

Filed Oct. 22, 1962 5 Sheets-Sheet 5

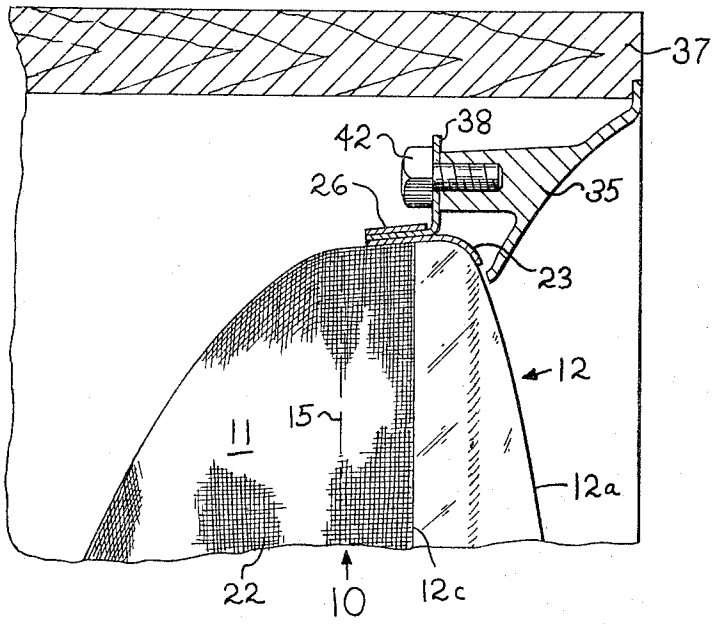


FIG. 8

INVENTOR.
DANIEL A. DAMM
BY
E. J. HOLLER &
W. A. SCHAICH
ATTORNEYS

United States Patent Office

3,271,516

Patented Sept. 6, 1966

3,271,516

IMPLOSION RESISTANT CATHODE RAY TUBE WITH INTEGRAL MOUNTING ELEMENTS TO FACILITATE INSTALLATION

Daniel A. Damm, Toledo, Ohio, assignor, by mesne assignments, to Owens-Illinois, Inc., a corporation of Ohio

Filed Oct. 22, 1962, Ser. No. 231,887
18 Claims. (Cl. 178—7.8)

This invention relates to improvements in television receivers and more specifically to improved mounting and protection elements by which the picture tube will be securely and safely retained and supported both while in the receiver cabinet and while being handled separately therefrom. While the invention has utility in a wide range of applications, it is particularly useful in the support and control of sudden devacuation of an essentially all-glass picture tube envelope within a conventional television receiver.

As known in the art most conventional types of television receivers include a chassis which houses and supports the receiver components. Normally the image-reproducing picture tube is not mounted on the chassis but on the cabinet, with its axis in horizontally disposed relation. The receiver cabinet is provided with a light-transmitting viewing window or aperture through which the screen of the picture tube may be viewed.

It has long been a problem in the television receiver art to provide a satisfactory support for the image-reproducing tube of a television receiver which will fulfill all requirements of adequate support of the tube and at the same time facilitate its easy removability from the cabinet for replacement purposes. Mounting of cathode-ray image tubes on the receiver chassis has previously been found to be cumbersome, impractical, and costly due to the peculiar shapes of the tube and the complexity and expense of complicated supporting structures. Further the picture tube has previously required mounting a separate or bonded implosion panel fully coextensive with the tube viewing screen. The implosion panel usually consists of a flat tempered glass panel or contoured implosion plate bonded to the tube face to resist implosion-explosion effects on breakage of the vacuumized tube envelope. The implosion panel serves to restrain and prevent glass fragmentation in a forward direction as well as to absorb front impacts delivered to the tube viewing area. However, in all cases either the separate or integral implosion plate adds substantially to the cost of the tube per se or its mounting in a receiver cabinet. Further, the implosion plate having substantial dimensions and wall thickness adds to the overall weight and dimensions of the receiver and in combination with the tube face plate must provide proper light-transmitting characteristics while protecting viewing areas of the tube against implosion-explosion effects. The present invention obviates the need for the implosion panel and matching of light-transmitting characteristics of the tube face plate and implosion panel of the conventional twin-panel system.

Accordingly, it is an object of the present invention to provide a direct-viewing cathode-ray television picture tube which is resistant both to fracture and sudden devacuation without serious fragmentation under widely varying conditions, the tube having chassis-supporting elements surrounding a non-viewing portion of a cathode-ray tube permitting its direct mounting in a receiver, thus permitting their easy assembly in a minimum of space.

Another object of this invention is to provide a cathode-ray image tube having envelope reinforcing and load-carrying elements surrounding the periphery of its viewing area, the tube being capable of functioning in its normal manner.

Another object of this invention is to provide a television receiver cabinet with its cathode-ray image tube having reinforcing components extending around non-viewing frontal exterior surfaces of the tube envelope for controlling tube devacuation and providing interconnecting engagement of the tube envelope, the receiver cabinet and the receiver chassis.

Another object of this invention is to provide an improved vacuum tube envelope having resistance to fracture and control over its sudden devacuation however and wherever caused, the completed tube being reinforced at the periphery of its viewing area with reinforcing elements having load-carrying members disposed in an annular pattern therearound for carrying the receiver chassis and cabinet in unitary relation.

A further object of the present invention is to provide an improved structure for mounting a cathode-ray tube in operative direct-viewing arrangement within a receiver cabinet, the non-viewing frontal periphery of the tube viewing portion having broad encircling elements adhered thereto for distributing the supporting pressure of the chassis and receiver components over a comparatively large area of the tube surface and for controlling implosive-explosive effects on breakage of the tube envelope.

A further object of the present invention is to provide an improved structure for mounting and controlling the devacuation of a cathode-ray tube disposed within a television receiver cabinet which mounting provides relatively rigid support of the various receiver components around a rearward portion of the tube envelope.

It is still another object of the present invention to provide an improved structure for protecting a cathode-ray tube against destructive implosion and for mounting the same in direct-viewing operative relation within a receiver cabinet which may be easily assembled and disassembled.

It is still another object of this invention to provide an improved type of direct-viewing cathode-ray image tube wherein at least one broad circumferential band of high-tensile strength material is adhered to non-viewing external surfaces of the tube perimetrical region closely surrounding its viewing area, such circumferential band being bonded to the exterior surface therebeneath to provide an integral reinforced region to maintain the contiguous envelope sidewalls therebeneath substantially intact on breakage of the envelope, said circumferential band having an attached series of supporting brackets projecting exteriorly therefrom for supporting the tube envelope in operative relation.

The specific nature of this invention, as well as other objects and advantages will become apparent to those skilled in the art from the following detailed description taken in conjunction with the annexed sheets of drawings on which, by way of preferred example only, are illustrated the preferred embodiments of the invention.

On the accompanying drawings:

FIG. 1 is a perspective view of a cathode-ray television picture tube fabricated and supported on a receiver chassis in accordance with one embodiment of the present invention;

FIG. 2 is an enlarged fragmentary vertical sectional view of one portion of the tube and chassis including a receiver cabinet taken along the line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 2 illustrating a modification of the invention shown in FIGS. 1 and 2;

FIG. 4 is a perspective view illustrating another embodiment of the invention;

FIG. 5 is an enlarged fragmentary vertical sectional view of one portion of the tube and chassis including a receiver cabinet taken along the line 5—5 of FIG. 4;

FIG. 6 is a view similar to FIG. 5 showing one form of tube reinforcing and supporting elements of the invention;

FIG. 7 is a perspective view of an individual supporting element as shown in FIG. 6; and

FIG. 8 is a view similar to FIG. 5 showing another embodiment of the invention.

The present invention is described hereinbelow as specifically applied to the manufacture of a television receiver utilizing a cathode-ray image tube having an essentially all-glass envelope. However, it will be apparent to those skilled in the art that the invention is equally applicable to the manufacture of many different types of vacuum tubes having glass envelopes particularly those having substantial dimensions which are subject to implosion and concurrent explosion on sudden devacuation.

The term "devacuation as used herein is intended to mean the converse of evacuation as in the case where a vacuumized vessel or tube envelope experiences an internal pressure change toward atmospheric pressure upon loss of vacuum. The rate of change may occur rapidly or over a prolonged period of time.

The present invention provides an implosion-resistant system which is capable of being incorporated into existing types and shapes of conventional cathode-ray picture tubes without serious alteration or modification of present tube fabricating procedures. The invention may be incorporated in any selected type of tube envelope to provide a required level of reinforcement to control its devacuation with concomitant mounting means for the tube envelope using materials and methods which are fully capable of supplementing normal tube production.

The co-pending continuation-in-part patent application of Daryl E. Powell and Burton W. Spear, Serial No. 225,448, filed September 24, 1962, now Patent Number 3,220,593 entitled "Cathode-Ray and Other Vacuumized Tubes Resistant to Fracture and Capable of Controlled Devacuation" is pertinent to the subject invention. This application is assigned to the same assignee as the present application. The referenced patent application discloses the utilization of reinforcing elements including at least one broad annular band firmly adhered to the non-viewing perimetrical region of the tube face plate surrounding its exterior surfaces of substantially maximum cross-sectional dimensions. An encircling band is applied at a region closely adjacent the periphery of the viewing panel and substantially forward of the seal line which joins the envelope face plate and funnel member. Either a single annular band or a plurality of annular bands is placed around the tube envelope surrounding and encompassing the aforesaid perimetrical region with the prescribed bands mounted substantially forward of the envelope seal line. An annular layer of bonding material composed of organic or inorganic adhesive material (not shown) fills the space intermediate at least the next adjacent annular band and exterior glass surfaces therebeneath. One or two annular bands which are preferably comprised of metal are disposed around the perimetrical region, each having proper physical characteristics such as high-tensile strength and a contoured configuration to provide sufficient yield strength to maintain the encircled perimetrical region of said glass sidewalls substantially intact upon breakage of remaining sidewalls of the envelope. A single circumferential annular band can be employed to perform the functions of the several individual bands as desired or required. The exterior band is preferably mounted in continuous tension. Also an enveloping covering of high-tensile strength rupture-resistant material such as glass fiber cloth is adhered to major non-viewing external surfaces of the tube body portion extending substantially between its larger and smaller ends in a virtually continuous annular pattern. Further description of the prescribed envelope reinforcing components is set forth in detail in the referenced patent application of Powell and Spear.

In one embodiment of the present invention as shown in FIGS. 1 and 2, a glass cathode-ray picture tube envelope designated by the numeral **10** is normally comprised of a funnel member **11**, face plate **12** and neck tubulation **13** which are joined to form a unitary hollow glass article. Such hollow glass article is normally referred to as a bulb prior to the introduction of various screen and conductive coatings applied interiorly of the envelope and the installation of one or more electron-beam-emitting guns sealed to the extremity of neck **13** by an end cap member **14**. Body or funnel member **11** is usually funnel-shaped being either frusto-conical or frusto-pyramidal in contour with its smaller end sealed to neck **13** and its larger end sealed to face plate **12** at a transverse seal line **15**. Electron-beam deflecting coils (not shown) are normally mounted exteriorly at the yoke area where neck **13** and the small end of funnel **11** are joined to provide proper electron beam deflection for scanning of the tube screen as known in the art.

As shown in FIGS. 2 and 4, face plate **12** consists of a concavo-convex or curvilinear viewing portion **12*a*** surrounded by a depending perimetrical side panel or flange **12*b***. Face plate flange **12*b*** and the large end **11*b*** of the funnel member comprise annular sidewalls of the envelope extending generally parallel to the tube axis and both terminate in annular sealing surfaces of generally planar complemental contour as shown in FIG. 2. The sealing surfaces are joined at transverse seal line **15** either by direct fusion of the glass or by an interposed annular layer of solidified glass sealing composition which is selected as being compatible with the thermal and physical characteristics of the parent glass parts. The basic shape of face plate viewing area **12*a*** may be either circular or rectangular in plan as conventionally known in the art. The present invention is particularly applicable to all conventional types of cathode-ray tube envelopes regardless of their contours and dimensions having sufficient strength and durability to permit retention of a high-level vacuum of the order of 10^{-5} mm. of mercury.

Selected reinforcing elements are applied to exterior non-viewing surfaces of the tube envelope either after the tube is fully fabricated or prior to subjecting the tube envelope or bulb to a tube fabricating tube process. In the former instance the tube is fully completed and assembled with all its internal and external electrical working components properly installed in operative alignment and after its subjection to bake-out temperatures and devacuation. In the latter case the tube envelope consisting of a so-called glass bulb has none of its internal electrical working components installed. The envelope or bulb is subjected to the application of required elements in accordance with this invention with ambient conditions existing both internally and externally thereof. The bulb after being fabricated into a form where its devacuation is controllable is then subjected to a tube fabricating process. However, in this case the components of the present implosion-resistant system must be capable of withstanding required bake-out cycling temperatures and pressures of the tube making process.

Completed cathode-ray picture tube **10** capable of reproducing transmitted electronic images is reinforced as shown in FIGS. 1, 2 and 3, and as more fully described in the referred-to co-pending application Serial No. 225,448.

An enveloping coating **21** consisting of synthetic resinous material such as epoxy resin or polyester resin is applied to envelope funnel portion **11**. A piece of glass fiber cloth **22** having a central opening to fit around the tube neck portion is placed over funnel member **11** extending forwardly of seal line **15**. Glass fiber cloth **22** is thus adhered to the major non-viewing exterior sur-

faces of the envelope body portion by the intermediate resinous coating. The synthetic resin is utilized to impregnate and fill the openings between individual strands and bundles of glass fibers of the woven cloth. The forward extremity of the glass fiber cloth preferably extends forwardly to terminate coincidentally with mold match line **12***c* of face plate flange **12***b*. The synthetic resin-glass fiber coating applied to the tube funnel is either permitted to cure in air or passed through a heating chamber to cure the synthetic resin bonding material at an accelerated rate.

The non-viewing annular skirt region **12***b* of face plate **12** is coated over a major portion of its non-viewing exterior rim surfaces **12***b* closely adjacent viewing panel **12***a* with a continuous annular layer of bonding material (not shown). This bonding material preferably consists of synthetic resinous material such as epoxy resin, polyester resin or other suitable material.

An encircling annular band **23** is mounted around the annular layer of bonding material and face plate rim or flange **12***b* disposed either entirely or substantially forward of envelope seal line **15** and parallel thereto. Band **23** is contoured to surround a region of substantially maximum exterior dimensions of the envelope with it medial region coincidental with the mold match line **12***c* of face plate flange **12***b*. Band **23** is preferably comprised of two similar U-shaped metallic half-sections **23***a* and **23***b* having internal surfaces which are closely complemental to the geometry of the external corner surfaces where face plate flange **12***b* and the periphery of viewing panel **12***a* intersect. Annular rim band **23** is comprised of either one endless band which may be sweated onto the tube exterior surfaces, or a pair of symmetrical half-sections as indicated, each being applicable to peripherally surrounding one-half of the face plate annular corner area. The pair of similar half-sections have their juxtaposed edges disposed in near or interlocking relation on opposing sides of a rectangular face plate such as on its short axis sides as shown by the medial line in FIGS. 1 and 4.

A series of preferably four spaced-apart mounting or bracket members **24** is attached to rim band **23** in rectangular array preferably at the corners of the picture tube. Each bracket member extends rearwardly substantially tangential to the exterior surfaces of the tube corner region and is attached to rim band **23** by spot welding or any other suitable means: It is contemplated that the rim band may also have rearwardly extending tabs (not shown) to which each bracket member **24** is attached. Each bracket has a generally L-shaped configuration with its shorter leg projecting inwardly to contact or be disposed adjacent glass fiber cloth **22** covering the tube funnel portion. As shown in FIGS. 2 and 3, each bracket **24** has an opening in its transversely-disposed short leg portion **24***a* extending normal to the envelope axis. Also leg **24***a* has a foot portion which is cemented to glass fiber cloth **22** by an intermediate layer **25** of bonding material such as epoxy resin.

With the series of bracket members **24** attached to rim band **23**, encircling annular band **26** is mounted over a forward portion of each bracket **24** and a rearward portion of rim band **23** in at least partially overlapping relation. Band **26** encircles a region of essentially maximum exterior cross-sectional dimensions of the tube envelope being disposed in parallel alignment with mold match line **12***c* and the rearward edge of band **23**. Encircling band **26** is placed in tension or simply drawn tight to encompass the elements therebeneath as desired or required. Band **26** is preferably comprised of metallic material such as annealed steel strapping. The ends of band **26** are drawn together and preferably retained in continuous tension by a clip member **27** disposed on the short axis side of the tube envelope, as shown in FIG. 1. Band **26** has an essentially uniform cross-sectional contour and is sufficiently broad to encompass both a rearward portion of rim band **23** and forward portions of brackets **24**.

As shown in FIGS. 1 and 2, a pair of rigid upright support members **28** interconnect the series of bracket members **24** and the base portion **29** of the receiver. Each support member **28** has an essentially L-shaped configuration and is vertically disposed to engage a pair of bracket members **24** on one side of the tube envelope. The bottom leg portion **28***a* of the support member extends horizontally and is attached to the receiver base **29** by a series of screws, bolts or other suitable fasteners. A four-sided frusto-pyramidal chassis **30** having various electrical components of the receiver mounted thereon is attached to the pair of upright support members **28**. The chassis has an opening at its smaller end through which envelope neck tubulation **13** projects. Components of the receiver are mounted either on chassis **30**, base **29** or both as desired or required.

As shown in FIG. 2, bolts **31** are utilized to interconnect brackets **24** and upright support members **28** at corner regions of the tube envelope. A receiver cabinet **32** having forward and rearward portions **32***a* and **32***b* respectively joined at an annular region by a series of screws **33** is disposed exteriorly of the tube envelope, its supporting and reinforcing elements and other components of the receiver to enclose the same.

In the construction shown in FIG. 3, additional bracket members **34** are attached to brackets **24** by machine bolts **31** and project forwardly to adjacent band **26**. Brackets **34** extend forwardly in alignment with brackets **24** and have exteriorly-projecting flanges **34***a*. Flanges **34***a* physically contact and engage an envelope bezel member **35** and are attached thereto by bolts **36**. Bezel member **35** is mounted within a conventional reeciver cabinet **37** with the tube viewing area **12***a* in direct-viewing relation.

In the embodiment of the invention shown in FIG. 4, a series of four exteriorly-projecting clip or mounting members **38** are disposed beneath annular band **26** projecting radially from a forward edge thereof. The series of four brackets **39** serve to interconnect mounting members **38** and upright support members **28** and the corner regions of the tube envelope immediately rearwardly thereof. A horizontally-extending bottom leg portion **28***a* of support member **28** is attached to base **29** as described hereinabove. A second support member **41** interconnects an upper region of upright member **28** and a rearward portion of base **29**. The various electrical components of the receiver chassis are disposed on base **29**.

As shown in FIG. 5, clip or mounting members **38** are disposed with one leg intermediate annular band **26** and rim band **23**. A bolt **42** serves to interconnect bracket **39**, mounting clip **38** and bezel **35** of the receiver which is disposed within an aperture of receiver cabinet **37**. Bracket **39** is connected to upright support member **28** by a nut and bolt assembly **43** which is spaced apart rearwardly from the envelope funnel member and its exterior glass fiber cloth covering **22**.

As shown in FIG. 6 and 7, clip or mounting member **38** has a U-shaped base portion **38***a* which is adapted to be fitted around exterior band **26** with one portion intermediate annular bands **26** and **23**. When band **26** is tightened around an exterior portion of the tube envelope, clip members **38** are retained in positive relation with their projecting portions residing in a common plane normal to the envelope axis for supporting the tube envelope **10**. Each clip member **38** has an opening **38***b* in its projecting portion to receive a nut and bolt assembly.

As shown in FIG. 8, each clip member **38** mounted on the envelope exterior is directly attached to bezel **35** by bolt **42** which engages a threaded recess therein. Thus, with the tube **10** retained by the plurality of clip members **38** and bolts **42** engaging the bezel, the remaining electrical components of the receiver are mounted within the cabinet **37** on a conventional chassis. The tube is then

firmly held in rigid relation protected against implosion-explosion effects by its reinforcing elements.

It will be appreciated that because my present image tube supporting structure is capable of combination with envelope reinforcing elements, a television receiver or other device incorporating a vacuumized image tube of substantial dimensions is less expensive to fabricate than known constructions and simpler, cheaper, lighter-weight receiving equipment can be provided.

Various modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. The combination comprising a television receiver cabinet, a cathode-ray tube having an essentially all-glass envelope, reinforcing means adhered to and extending over non-viewing frontal exterior surface portions of said tube envelope surrounding its viewing area, a rigid frame member disposed adjacent a rearward portion of said tube envelope to support the receiver components, and a series of spaced-apart mounting elements integrally attached to said reinforcing means and disengageably attached to, said rigid frame member and said cabinet at a frontal region of said tube.

2. The combination in accordance with claim **1**, wherein said reinforcing means comprises at least one annular band of metallic material disposed in surrounding relation at a frontal region of substantially maximum exterior cross-sectional dimensions of said tube envelope and an intermediate layer of solidified bonding material adhered to said annular band and exterior surfaces of said tube envelope therebeneath.

3. The combination in accordance with claim **1**, wherein said rigid frame member comprises a frusto-pyramidal structure disposed in spaced relation rearwardly of the envelope funnel portion substantially normal to the tube axis.

4. The combination comprising a television receiver cabinet, a cathode-ray image tube having a frusto-pyramidal shaped body portion and a rectangular shaped light-transmitting viewing portion enclosing its larger end, envelope reinforcing means comprising at least one annular band of high-tensile strength material and an intermediate layer of solidified resinous bonding material surrounding the exterior surfaces of said tube envelope adjacent its viewing portion, a rigid frame member disposed in spaced relation around the body portion of said tube envelope to support a receiver, component, and a series of spaced-apart mounting members integrally attached to said annular band and disengageably attached to said rigid frame member and said reeciver cabinet at a frontal region of said tube.

5. The combiation in accordance with claim **4**, wherein said series of spaced-apart mounting members comprise four outwardly-projecting rigid elements disposed in rectangular array at the corner areas of said tube viewing portion, said mounting members being attached to said annular band of said reinforcing means.

6. The combination in accordance with claim **4**, wherein said rigid support member has a central opening adapted to surround the tube neck portion and is disposed transversely of the tube axis.

7. The combination in accordance with claim **4**, wherein said reinforcing means comprises two annular metallic bands disposed in at least partially overlapping parallel relation, the forward band having a cross-sectional contour complemental to the peripheral corner region of the tube viewing portion, the rearward band being disposed exteriorly of the former around the region of substantially maximum cross-sectional exterior dimensions of said tube envelope, both bands being disposed substantially forward of the seal line joining said envelope viewing and body portions, said intermediate layer of solidified bonding material extending at least fully co-extensive with said forward band.

8. In combination, a television receiver cabinet, a cathode-ray image tube having an essentially all-glass envelope consisting of a frusto-pyramidal shaped body portion with a rectangular-shaped viewing portion enclosing its larger end and a neck tubulation enclosing its smaller end, said body and viewing portions being joined at a transverse seal line, envelope reinforcing means comprising at least one annular band of high-tensile strength material and an intermediate layer of solidified bonding material surrounding the exterior surfaces of said tube envelope closely adjacent its viewing portion, said annular band being disposed generally forward of said seal line at a region of substantially maximum exterior cross-sectional dimensions, an enveloping coating adhered to extensive non-viewing exterior surfaces of the envelope body portion, a rigid frame member disposed in spaced relation around the body portion of said tube envelope, a receiver chassis surrounding the envelope neck tubulation supported by said frame member, and a series of spaced-apart mounting members providing interconnecting engagement between said annular band, said rigid frame member and said receiver cabinet at a frontal region of said tube envelope.

9. A support for a television picture tube on a receiver chassis comprising, in combination, tube reinforcing and supporting means including at least one annular band of high-tensile strength material adhered to and extending peripherally around the tube envelope at a frontal region of substantially maximum exterior cross-sectional dimensions, a series of bracket members attached to said annular band projecting exteriorly therefrom, lower support means on said chassis providing a base on which the tube rests, and a frame member surrounding a forward portion of said tube interconnecting said series of bracket members and said lower support means on said chassis.

10. A support for a cathode-ray picture tube on a television receiver chassis comprising, in combination, tube reinforcing and supporting means including a pair of broad annular bands of metallic material disposed peripherally around the outer surfaces of the tube envelope at a non-viewing frontal region normal to the tube axis, an intermediate annular layer of bonding material interposed between at least one of said annular bands and the outer surfaces of said envelope therebeneath, at least one of said bands being placed in continuous tension, a plurality of bracket means having contact surfaces disposed in engagement with at least one of said annular bands and extending rearwardly substantially tangential to the outer surfaces of said tube envelope, lower support means on said chassis providing a base on which the tube and other electrical components rest, and frame members surrounding a rearward portion of said tube interconnecting said series of bracket members and said lower support means on said chassis.

11. A television picture tube having combined supporting and reinforcing elements for its mounting in a receiver cabinet and controlling its devacuation on breakage comprising at least one broad encircling band composed of high-tensile strength material embracing the periphery of the tube envelope closely adjacent its viewing portion, means for securing said encircling band around the tube including an intermediate layer of bonding material adhered to said broad encircling band and the extreior surface of said tube envelope therebeneath, and a series of four spaced-apart mounting brackets having one end thereof integrally attached to said encircling band and having the other end adapted for disengageable attachment of said tube in a receiver cabinet.

12. A television picture tube in accordance with claim **11** wherein said series of spaced-apart brackets comprises four mounting elements disposed in rectangular array extending rearwardly substantially tangential to the periphery of said tube envelope.

13. A television picture tube in accordance with claim **11** including an enveloping coating of high-tensile strength material adhered to extensive non-viewing exterior surfaces of the envelope body portion.

14. A television picture tube in accordance with claim 11 including a pair of metallic encircling bands disposed in at least partially overlapping relation, the forward band having a cross-sectional contour complemental to the peripheral corner region of the tube viewing portion, the rearward band being disposed exteriorly of the former around the region of substantially maximum cross-sectional exterior dimensions of said tube envelope, both bands being disposed substantially forward of the seal line joining said envelope viewing and body portions, said intermediate layer of solidified bonding material extending at least fully coextensive with said forward band.

15. The method of supporting a television picture tube in a receiver cabinet comprising the steps of disposing an annular layer of bonding material around a non-viewing exterior frontal region of the tube envelope, mounting at least one broad encircling band of high-tensile strength material around the tube envelope at a region of substantially maximum cross-sectional dimensions with said annular layer of bonding material therebeneath in envelope reinforcing relation, providing a plurality of mounting brackets integrally attached at one end to said encircling band in spaced-apart alignment, and interconnecting said mounting brackets in a disengageable manner with rigid components of the receiver cabinet for positive retention of said tube within an aperture thereof.

16. The method in accordance with claim 15 including the step of adhering an enveloping layer of fibrous material over extensive non-viewing exterior surfaces of the envelope body portion.

17. The method in accordance with claim 15 including the step of mounting a pair of annular metallic bands in parallel relation around a frontal non-viewing region of the envelope face plate substantially forward of the envelope seal line, the forwardmost band having a cross-sectional contour complemental to the envelope exterior surfaces.

18. The method in accordance with claim 15 including the step of attaching four bracket members to said encircling band, said bracket members having supporting surfaces residing in a plane transverse to said envelope axis at corner regions of the envelope frontal region disposed in rectangular array.

References Cited by the Examiner

UNITED STATES PATENTS

2,896,200	7/1959	Aeschliman	178—7.8
2,917,735	12/1959	Travis et al.	178—7.8
2,922,997	1/1960	Solheim	178—7.8
3,139,485	6/1964	Gray et al.	178—7.8
3,146,305	8/1964	Monaco et al.	178—7.82
3,206,056	9/1965	Stel	178—7.82

DAVID G. REDINBAUGH, *Primary Examiner.*

J. A. O'BRIEN, R. L. RICHARDSON,
Assistant Examiner.