CATHODE-RAY TUBE MOUNTING STRUCTURES

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The present invention relates generally to structures for mounting cathode-ray tubes and the like, and more particularly it relates to an improved structure for mounting a cathode-ray tube, or similar device having a viewing screen, behind a viewing window. It has particular utility as means for mounting a cathode-ray type picture tube behind the viewing window in the face panel of a television receiver cabinet.

It is a generally accepted practice to mount television picture tubes behind and in close proximity to the viewing window of a television receiver face panel or cabinet wall, or the like, in such a manner that the wall portions adjacent the picture tube viewing screen serve to mask the edges of the viewing screen, thereby defining the viewing format of the screen. Frequently, the window area is further defined by a separate viewing mask of plastic, rubber, or metal, for example, that is interposed between the cabinet wall and the picture tube.

It is readily apparent that in such installations it is desirable to provide means for mounting the picture tube firmly and securely in position in such a manner that neither the vibration nor shock impulses encountered in shipping mounted tubes from their place of assembly to the consumer, nor those attendant upon ordinary use, and other handling of such assemblies will displace the tube from its position or cause it to fracture.

One difficulty encountered in the mass production assembly of cathode-ray tubes in television receiver cabinets is that there is often a noticeable variation in the dimensions of individual cathode-ray tubes having a common viewing screen size.

Accordingly, it is an object of the present invention, to provide an improved, adjustable structure for clamping a cathode-ray tube in position behind a viewing window and which is adaptable for clamping tubes of various dimensions.

It is another object of the present invention to provide an improved clamping structure for clamping cathode-ray tubes behind a viewing window and which is simple and inexpensive to produce and which itself is readily adaptable to mass production fabrication.

It is still another object of the present invention to provide an improved structure for clamping a cathode-ray tube behind a viewing window and which provides a firm, positive supporting pressure to the cathode-ray tube that is distributed over a comparatively large area of the tube surface.

It is still another object of the present invention to provide an improved structure for mounting a cathode-ray tube behind a viewing window and which may be easily assembled and disassembled.

It is an even further object of the present invention to provide an improved structure for mounting a cathode-ray tube in a television receiver cabinet which provides a relatively shock-proof mounting for safely transporting the assembled receiver.

Briefly stated, in accordance with one aspect of the present invention there is provided a mounting cradle formed of a plurality of flat, flexible, unstretchable straps which rest upon the flared bowl portion of a cathode-ray tube to be held in position. The ends of each of the straps are affixed to clamping plate members and the straps are tensioned against the tube by non-extensible screw tensioning draw bars arranged to engage the clamping plates and corresponding brackets mounted on the face panel of the television cabinet. The holding force is exerted against the bowl portion of the tube and is evenly distributed over the flared bowl portion so that the strap lies flat along the contour of the tube bowl, thereby holding the tube securely behind the viewing window.

For additional objects and advantages, and for a better understanding of the invention, attention is now directed to the following description and accompanying drawings. The features of the invention which are believed to be novel are particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a plan view, partly in cross section, of a portion of a television receiver including a cathode-ray tube held in place by means of a mounting structure constructed in accordance with the teachings of the present invention; Fig. 2 is a side, elevational view of the structure shown in Fig. 1;

Fig. 3 is an exploded, perspective view of a portion of the mounting structure shown in Figs. 1 and 2;

Fig. 4 is an enlarged, cross-sectional view of a portion of the mounting structure shown in Fig. 2 taken along the lines 4—4 of that figure;

Fig. 5 is a cross-sectional view of the structure shown in Fig. 2 taken along the lines 5—5 of that figure; and

Fig. 6 is a plan view, partly in cross section, of a portion of a television receiver including a modified version of the cathode-ray tube mounting arrangement shown in Fig. 1.

In the various figures, similar elements bear the same numerical designations.

Referring now to Fig. 1, there is shown a cathode-ray tube generally at 1, mounted in a television receiver cabinet that is indicated generally at 2, and which may be constructed of wood, plastic or other familiar cabinet material. The front portion, or face panel 3 of the cabinet 2 is provided with an aperture defining a viewing window 4 through which the cathode-ray tube may be viewed. Adjacent the inner periphery of the cabinet aperture or window 4 there is provided a mask 5 which may be of any suitable material, such as rubber, plastic, or in some cases, metal, and which is provided to the viewing aperture which more precisely defines the viewing area of the cathode-ray tube 1. The mask 5 may also serve to provide a further degree of shock-proof mounting between the face panel 3 and the tube 1, particularly where it is formed of rubber, as shown.

Although it is understood that it is common practice to mount a safety glass panel in front of the viewing screen of cathode-ray tubes mounted in television receivers in order to guard the viewer against the hazards of implosion of the tube, for purposes of simplicity, none is shown in the present illustration.

In accordance with the invention, the cathode-ray tube 1 is supported from the front portion of the cabinet 2. To this end, the tube 1 is held firmly behind the aperture 4 as defined by the cabinet face panel 3 and the mask 5, by means of a cradle structure comprising a pair of flexible straps 6 having sufficient tensile strength to secure the tube 1 firmly in place, and which may preferably be steel or light metal which will not stretch appreciably either in transit or during normal use, nor be adversely affected by the operating temperatures of the television receiver. The ends of the flexible cradle straps 6 are affixed to a common pair of supporting assemblies 7.

Referring now to Fig. 2, it may be seen that each of the supporting assemblies 7 comprises a clamping plate
member 8, a draw bar 9, and a supporting lug 10. The clamping plate 8 is adapted and arranged to receive the draw bar 9 for engaging the cabinet wall 3 adjacent the viewing area. The draw bar 9 is shown as preferably having a hooked portion 11 for removably engaging the corresponding supporting bracket or lug 10 which is affixed to the back of the cabinet wall 3 adjacent the viewing area. Each of the supporting lugs 10 preferably includes a metal plate or strap portion 12 which may be affixed to the cabinet face panel and held in parallel relation thereto by means of a pair of screws (not shown) or the like, and carrying a transverse portion 13 that is drilled to receive the draw bar hook 11. It is believed apparent that where the mask portion of the viewing window is composed of metal or similar structurally rigid material, it is entirely within the scope of the invention to affix the draw bar supporting member 10 to this portion for additional rigidity. In such case, it may nevertheless be considered that the supporting member is affixed to the face panel. The draw bar 9 is preferably fastened to the clamping plate member 8 by inserting it through an aperture 14 therein, thence seating a lock washer 15 thereon, and drawing the assembly tightly into position by means of a suitable nut 16.

As illustrated more clearly in Fig. 3, the clamping member 8 preferably comprises a flanged, channel-shaped member which may be readily formed from a unitary piece of sheet metal. The channel or re-entrant portion 17 of the clamping member 8 is of sufficient cross-section, and adapted and arranged to receive the draw bar 9 for tensioning the assembled mounting structure against the cathode-ray tube 1 which, in turn, is held firmly against the periphery of the viewing window 4. One of the ends of each of the two flexible straps 6 is fastened to the flange portion 18 of each of the clamping members 8 in conventional manner as by a pair of rivets 19, as shown more clearly in Fig. 4. Although in certain insulations it may be desirable to employ rivets having flat heads and to counter-sink them in order to provide a flush surface facing the cathode-ray tube 1, in other cases, a resilient pad 20 of foam rubber or the like, as shown, may advantageously be secured to the inner-flange surface of the clamping member 8 in order to provide an even, shock-proof contact between the clamping member 20 and the glass wall portion 21 of a cathode-ray tube to be held in position. In the latter case it is unnecessary to provide an otherwise flush surface and the rivet edge may protrude a small amount beyond the inner surface of the clamping member 8. Such a construction has the advantage of requiring less critical tolerances and workmanship in manufacturing and assembling the structure.

As shown best in Fig. 2, each of the straps 6 preferably is affixed to the plate member 8 at an acute angle a with respect to the tensioning axis of the draw bar 9 that is preferably of the order of 30°-60° in order to provide holding components that tend to stabilize the tube 1 against movement transverse to the tensioning axis as well as against movement along this axis relative to the face panel 3. In a preferred embodiment the angle a was found to be approximately 45°. Preferably, the straps 6 should be applied to its appropriate plate member 8 at approximately the same angle in order to equalize the holding forces transverse to the tensioning axis. Thus, in the preferred embodiment referred to above, the angle 2a between each of the straps 6 affixed to the same plate member 8 was found to be approximately 90°.

An Fig. 5, when the mounting structure is assembled and tensioned against the cathode-ray tube, the strap portions 6 follow closely along the contour of the wall portion 21 of the cathode-ray tube to be held in position. Thus, a smooth, even pressure may be applied to the surface of the cathode-ray tube for mounting it before a viewing window, which nevertheless provides a comparatively large holding force distributed evenly over the surface of the tube and having force components in many directions, thereby securing the tube from either lateral, vertical, or longitudinal movement during shipment or otherwise. Referring now to Fig. 6, there is shown a portion of a television receiver cabinet including a face panel shown generally at 2 having an opening therein defining a viewing window 4, behind which is mounted a cathode-ray tube 1. A safety glass panel 25 is mounted in the viewing window 4 and preferably is held in position by a frame panel 2 and a generally annular metal mask shown generally at 26. More precisely, the mask 26 includes a somewhat frustrum-conical portion 27, having an outer area that corresponds generally to the area of the aperture 4 in the face panel 2 and tapering inwardly to provide an inner area whose dimensions correspond to the desired viewing format of the picture tube 1. The mask 26 is preferably provided with a flanged portion 28 to insure evenly distributed contact between the mask 26 and the perimeter of the glass panel 25. In order further to insure that even contact is maintained between the glass panel 25 and both the face panel 2 and the mask 26 the perimeter of the glass panel 25 is preferably provided with a gasket member 29 of rubber or the like, as shown. The mask 26 preferably includes a generally cylindrical portion 30 having a circumferential configuration similar to that of the tube 1 and affixed to the flanged portion 27 in conventional manner, as by spot welding as shown. Another gasket member 31 is preferably interposed between the tube 1 and the cylindrical portion 30 of the mask 26. The second gasket 31 may either take the form of a continuous strip of rubber or the like or it may comprise, in certain installations, a series of rubber grommets which may be affixed to the cylindrical portion 30 either by a suitable adhesive or by insertion in suitable holes provided therein.

In the assembled state, the tube 1 is held in position behind the window 4 by means of the flexible straps 6 and the supporting assemblies 7, as illustrated in Figs. 1 and 2. By drawing the nuts 16 on the draw bar 9 which are affixed to the supporting lug 10 the tube 1 is drawn into position behind the window 4 thus sandwiching the safety glass panel 25 and the mask 26 therebetween. The generally cylindrical portion 30 serves to prevent lateral movement of the tube 1 with respect to the window 4 while the mask 26, in addition to serving the same function as the mask 5 shown in the preceding figures, also serves to provide a convenient means for holding the tube firmly and securing it in the correct position before the viewing area of the tube 1. While specific embodiments have been shown and described, it will of course be understood that various modifications may be made without departing from the principles of the invention. The appended claims are therefore intended to cover any such modifications within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A mounting structure for a cathode-ray tube behind a face panel having thereon in which the tube is adapted to seat comprising first and second clamping plate members, each of said clamping plate members having a centrally located channel and flanges on each side of said channel, first and second brackets adapted to be fastened to said face panel on diametrically opposite sides of the aperture, each of said brackets having a transverse portion having holes therein, first and second drawbars, each of said drawbars having a hook at one end and a threaded portion at the other end, said first drawbar having its hooked end inserted in the hole in the transverse portion of said first bracket, its threaded end inserted through said channel in said first clamping plate member, a first nut threaded in said threaded end of said first drawbar, said second drawbar having its
hooked end inserted in the hole in the transverse portion of said second bracket, its threaded end inserted through said channel in said second clamping plate member and a nut threaded onto the threaded end of said second drawbar, a first flexible substantially unstretchable strap, means for non-pivotingly securing one end of said strap to one of said flanges on one side of the channel of said first clamping plate member, means for securing the other end of said first flexible substantially unstretchable strap to the flange on the same side of the channel of said second clamping plate member, a second flexible substantially unstretchable strap, means for non-pivotingly securing one end of said second flexible substantially unstretchable strap to the other flange of said first clamping plate member, and means for non-pivotingly securing said other end of said second flexible substantially unstretchable strap to the other flange of said second clamping plate member, said first and second straps being affixed to said plate members at substantially right angles relative to each other.

2. A cathode-ray tube assembly comprising a face panel having an opening therein, a cathode-ray tube having a large cup-shaped end, a relatively narrow neck portion and a flared bulbous portion connecting said large end and said neck portion, first and second brackets secured to opposite sides of the opening on the inner face of said face panel, first and second clamping plates, a first adjustable member connected to said first bracket for securing said first clamping plate member to said panel and for adjusting the distance between said first clamping plate member and said first bracket, said first adjustable member being adjusted so that said first clamping plate member rests on the side of said large cup-shaped end of said cathode-ray tube, a second adjustable member connected to said second bracket for securing said second clamping plate member to said panel and for adjusting the distance between said second clamping plate member and said second bracket, said second adjustable member being adjusted so that said second clamping plate member rests on the side of said large cup-shaped end of said cathode-ray tube, a first flexible substantially unstretchable strap, means for securing one end of said strap to one end portion of said first clamping plate member, means for securing the other end of said first strap to the same end portion of said second clamping plate member, a second flexible substantially unstretchable strap, means for securing one end of said second strap to the other end portion of said first clamping plate member, means for securing the other end of said second strap to the other end portion of said second clamping plate member, said straps being affixed to said plate members at substantially right angles relative to each other, said first and second straps being in contact with the flared bulbous portion of said cathode-ray tube substantially throughout their lengths whereby adjusting said means connecting said brackets and said clamping plate members may cause said first and second straps to force the large end of said cathode-ray tube against said face panel.

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