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INSULATING RING AND PROTECTIVE DEVICE FOR CATHODE-RAY TUBES

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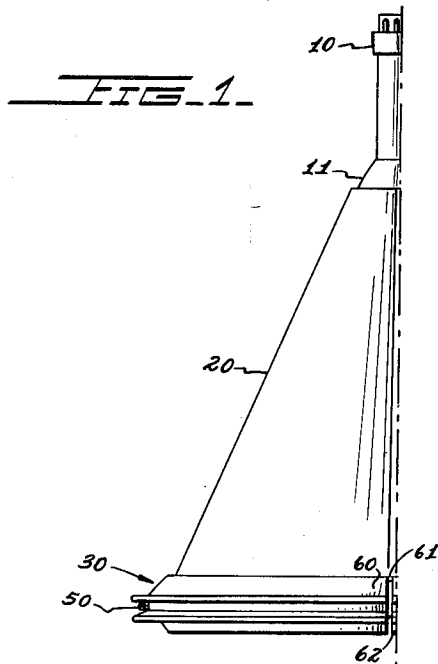
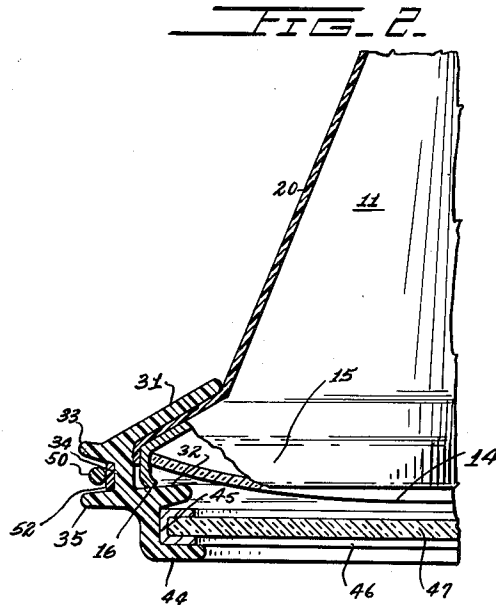
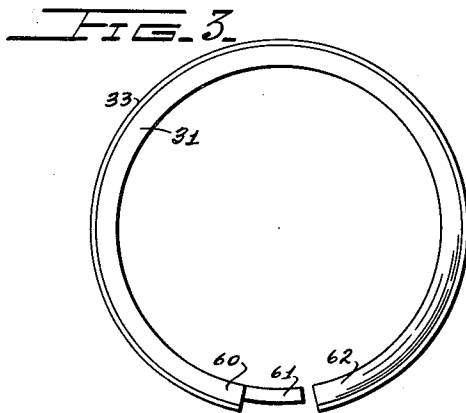
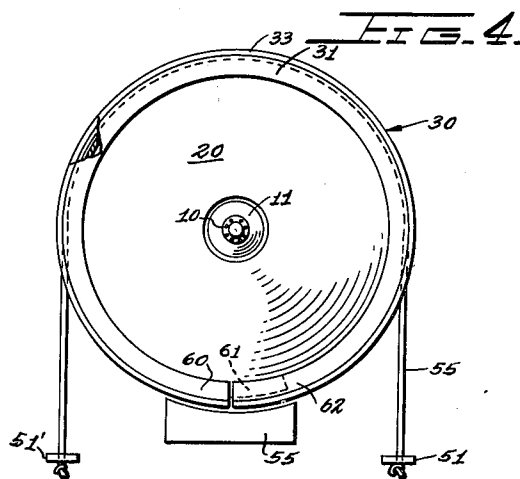
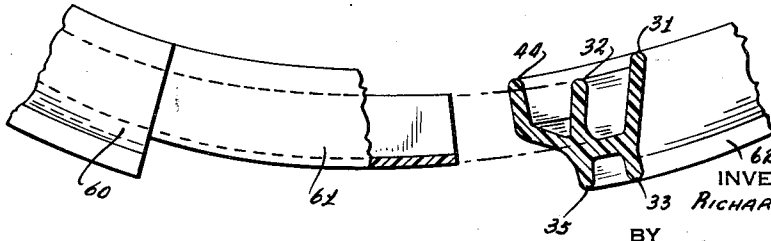


FIG. 5.



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INSULATING RING AND PROTECTIVE
DEVICE FOR CATHODE-RAY TUBES

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3 Claims. (Cl. 177-318)

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This invention relates to a novel device for shielding and protecting a metal backed television or cathode ray tube, more particularly it relates to a novel means for attaching an insulating shield to such a tube and for retaining a protective plate of glass in front of the viewing end of said tube.

This application is a continuation-in-part of applications Serial No. 73,058, filed January 27, 1949 (issued as Patent No. 2,503,813 dated April 11, 1950) and Serial No. 104,289, filed July 12, 1949.

The general idea of shielding electrical equipment having exposed parts is old and well known but the shielding of metal backed cathode ray or television tubes presents peculiar difficulties. The metal backed cathode ray or television tubes comprise a glass bulb containing the electrode structure, a metal tube section which has a varying diameter (usually frustoconical) the small end of which is united to the end of the glass bulb and a glass lens element which is united to the open or large end of the said metal tube. In order that a good seal can be obtained between the lens and the metal backing, the metal back or conical section is flared outwardly at the large end to form a seat for the round edge portion of the lens. It is desirable to have a shield which fits closely about the metal backing and it is essential to provide insulating means which fits over the flared portion of the tube since the flared rim adjacent the lens is the part which is most likely to be contacted when the set is mounted in a cabinet.

An object of this invention therefore is to provide an improved insulating guard or shield for a metal backed cathode ray tube together with a means for holding the shield in place about the tube.

Another object of the invention is to provide an improved insulating ring for the flared rim portion of a metal backed cathode ray or television tube provided with means for holding a protective lens in front of the sealed lens of the cathode ray tube.

Another object of the invention is to provide a novel means for securing an insulating shield to a cathode ray or television tube which also cooperates to securely mount the tube to the chassis of the set.

Another object of the invention is to provide a new ring of insulating material adapted to hold a shield in place on a television tube, adapted to aid in mounting the tube on the chassis and also adapted to hold a protective lens in front of the lens of the television tube.

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Another object of the invention is to provide a method and means for securing a conically shaped shield to a television tube and for attaching the combined shield and tube to a cabinet.

It is a further object of this invention to provide a combination of a television or cathode ray tube, an insulating and mounting ring and a protective glass plate.

These objects and others ancillary thereto are obtained by making a clamping ring member from flexible insulating material adapted to fit snugly about the flared portion of the tube. Preferably the clamping ring member has the cross sectional shape of a distorted H having, however, three legs on the inside thereof; two of the three of the legs of the H fit about or straddle the flange and the third leg cooperates with the center leg to hold the protective plate of glass which is to be fixed in front of the lens. The two outside legs of the H extend away from the flanged edge forming a groove therebetween adapted to hold a suitable elastic securing member which in turn holds the clamping member tightly about the flanged edge of the tube. The outside groove of the clamping member which holds the elastic member also is made deep enough to hold a heavy elastic cord the ends of which are secured to the body of the chassis so that said elastic cord is adapted to hold the end of the tube in position on the said chassis.

The ring must fit snugly about the flared end of the tube and therefore must be open at one area to permit the inside groove to straddle the flared flange of the tube. It is difficult to make the ring with such precision that it fits together at the cut portion after being inserted on the flange especially since the flanges of the tube vary considerably. Since the metal back is under such a high voltage that any small almost insignificant opening or break in the insulating ring is enough to permit a spark or static charge to seek a ground and severely shock any person or animal who approaches too close to the uninsulated area. Small pieces of insulating material may be placed inside of the opening in the ring but this expedient does not have the approval of the Underwriters Laboratories because such pieces are easily lost or misplaced when a television set is being repaired and there is no assurance that they would be replaced. The ring made according to this invention has an integral flap on one end of the open ring adapted to fit under the other end of the ring so that every portion of the flange of the television tube must always be covered by insulating material.

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In some cases a plate glass is placed in front of a television tube to prevent injury if the tube should explode. Since the lens of the tube also collects an electrical charge, this lens will ordinarily collect dust and it is difficult to clean the dust from between the plate glass and the lens. In application No. 73,058, filed January 27, 1949, I have already proposed to provide a dove tail groove in one of the outer edges of the clamping member and into the dove tail groove I insert an elastic projecting ring or gasket which seals off the space between the ring and the plate glass. According to the present invention the plate glass protecting member is held by the clamping member. The plate glass member may be coated at the edges to form a mask to cut out portions of the picture on the television tube lens.

In general any resinous plastic material which has insulating properties may be employed to make the insulating devices of the present invention. The hydrocarbon polymeric materials such as polyethylene, polyisobutylene, polystyrene, polymers and copolymers of butadienes, polymers and copolymers of methyl substituted homologues of butadiene such as isoprene, etc. are very suitable as the material for the insulating devices. Other polymeric materials having high insulating values which may be employed are the polymers and copolymers of vinylidene chloride and vinyl fluoride, polyvinyl carbazole, polyvinyl naphthalene, etc. Impregnated fabrics such as cellulose acetate impregnated with vinyl butyral and similar materials may also be employed.

The clamping member may be formed by an extrusion process, by an injection molding process or by any other molding process. When formed by extrusion it is necessary to mold the thin flap portion after the extruded strip is formed and cut to shape. The clamping member is shown as circular in outline but it can have any desired outline depending on the peripheral shape of the cathode ray tube. For example, it may be elliptical, rectangular or polygonal in outline.

It has been learned that the said skirt portion of the insulating device is not necessary but it is a desirable protective device from the point of view of servicemen or users of cathode ray tubes not connected with television such as in laboratories and the like.

The novel features characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operating, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings in which:

Figure 1 is a top plan view of a symmetrical half of a television tube with the shield and clamp of the present invention attached thereto.

Figure 2 is a cross-section detail view showing how the clamping member holds the protective plate glass and the protective shield in place with respect to the television tube.

Figure 3 is a rear plan view of the clamping ring made according to the invention.

Figure 4 is a rear view of the clamping ring, cathode ray tube, and mounting means showing how the ring may be employed to secure the cathode ray tube to the chassis of a television set.

Figure 5 is a detail view partly broken away of the separated ends of the ring.

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The television tube for which this invention is specially useful is shown in Figure 1 and comprises the socket 10, the glass bulb section 11 containing the electrode, the protective skirt or shield 20, the clamping ring 30 and a securing means 50. In Figure 1 the clamping ring 30 is shown in the closed portion.

In order to hold the wide end of the skirt or shield 20 at the flared end 15 of the television tube, a specially constructed clamping member 30 is provided. This member 30 is made of stiff flexible plastic material such as polyethylene. This clamping member has the general outline of a circle the size of which is about the same as that of the flange or flared end of the television tube, and the clamping member has three interior or inwardly extending annular flanges 44, 31, and 32, one of which (31) is slightly wider than the other and is adapted to press against the back of the flange or flared end 15 of the tube. Flange (32) is adapted to extend over the edge portion of the lens 14 in the front of the tube. The clamping member also includes two exterior or outwardly extending annular flanges 33 and 35 with a groove or channel 34 formed therebetween. The annular flanges (31, 32, and 44 especially) are made of sufficient thickness and extend at such an angle that they must be forced apart when the clamping member 30 is pressed tightly against the flanged or flared rim 15 of the tube so that when the clamping member 30 is held in place about said flared end 15 the annular flanges 31 and 32 are held tightly against and actually take the form of the flanged portion 15 of the tube as shown in the drawings. The clamping member 30 is held in place by any desired means such as an annular securing member or band (50) which is adapted to fit into the groove 34.

In order to make sure that the ring 30 covers every exposed area of the flared flange portion 15 of the tube one of the ends 60 is provided with an integral extension 61 of reduced thickness adapted to fit under the arms 31, 32 of the opposite end 62 as shown in Figures 3, 4 and 5.

This end portion 61 may be integrally formed on the end 60 in any desired way. For example the ring 30 may be cut with overlapping ends 60 and 62 and then the top portion of the overlapping part of the end 60 can be shaved or cut off to fit under the arms 31, 32 of the end 62. Also, a separate piece 61 may be heat sealed to the inside portion of the end 60. Or the end 61 may be molded from an excess end portion of the end 60 as illustrated in Figures 3 and 5.

A preferred method of making the ring of Figure 3 is to injection mold the whole structure in one operation.

An important feature of the instant invention is embodied in the combination of the channel 45 formed by flanges 44 and 32 and its use with the remaining features of the invention. If desired the channel 45 can be lined with a pad 46 of felt or any other suitable material, to prevent wear at the inner corners of channel 45. Since it has been found desirable to include a plate of glass 47 in front of the television tube to help keep dust off the tube, to protect the tube and to act as insulator between any metallic or human body which may come too close to the charged portion of the tube, which extends beyond lens 14 at 16, the channel 45 is provided to hold said plate glass 47 firmly in place. The plate glass 47 also acts to protect

persons from damage in case the tube should explode.

Figure 4 shows one method of securing the clamping ring 39 to the chassis. Elastic rope 50 is fitted into the channel 34, over the elastic band 52 or the like shown in Figure 2 which holds the ring closely about the flange of the tube and said rope 50 is anchored to suitable portions of the chassis 51, 51'. The ring 39 is supported by the support wall 55 attached to the chassis.

It will be seen that this invention provides a fool proof ring means for securing an insulating skirt to a metal backed television or cathode ray tube which ring completely covers the flange at the lens end of said tube and simultaneously holds a protective glass plate firmly in place.

I claim:

1. An improved device for the mounting onto the chassis of a television set of a metal backed cathode-ray tube, of the type which has an annular metal flange surrounding the metal back adjacent the lens holding end thereof, said device comprising an open annular strip of flexible insulating material, said strip comprising a body portion of such size and shape to fit closely about the annular flange of said cathode ray tube, three continuous interior flanges extending inwardly from said body portion forming two channels therebetween, the first and second of said interior flanges being adapted to straddle the metal flange of said cathode ray tube and thereby insulate the flanged area of the metal backed cathode-ray tube, the second and third of said interior flanges being adapted to hold a glass protective plate in front of the lens of the said cathode ray tube, a pair of substantially continuous exterior flanges extending from said body portion of said strip, said exterior flanges forming a channel opposite the channel formed by the first and second interior flanges, the said channel formed by said exterior flanges being adapted to hold a first retaining member for fixing the open annular strip upon said cathode ray tube and also being adapted to hold a second retaining member for fixing the strip and tube combination to a chassis, the opening in said annular strip forming two abutting ends, an integral channel-like extension on one of said abutting ends adapted to fit within the interior channel formed by the first and second interior flanges at the opposite abutting end to assure the complete insulation of said flanged area of the cathode ray tube.

2. A device for mounting on the chassis of a television receiver a metal backed cathode-ray tube, of the type which has an annular metal flange surrounding the metal back adjacent the lens holding end thereof, said device comprising an open annular strip of flexible insulating material, said strip comprising a body portion of such size and shape to fit closely about the annular flanges of said cathode ray tube, three continuous interior flanges extending inwardly from said body portion forming two channels there between, the first and second of said interior flanges straddling the metal flange of said

cathode ray tube and thereby insulating the flanged area of the metal backed cathode-ray tube, the second and third of said interior flanges holding a glass protective plate in front of the lens of the said cathode-ray tube, a pair of substantially continuous exterior flanges extending from said body portion of said strip, said exterior flanges forming a channel opposite the channel formed by the first and second interior flanges, the opening in said annular strip being formed by two abutting ends, an integral channel-like extension on one of said abutting ends fitting within the interior channel formed by the first and second interior flanges at the opposite abutting end to assure the complete insulation of said flanged area of the cathode-ray tube.

3. A structure for mounting a cathode-ray tube of the type having a projecting metal flange adjacent the lens thereof, and for supporting a protective transparent plate in front of the lens of the tube, said structure including an open gasket made of plastic insulating material, and tensioning means for said gasket, said gasket having a body portion with three continuous flanges extending inwardly therefrom, the first and second of said interior flanges forming a channel of such shape to fit about the metal flange of the cathode-ray tube, the second and third of said interior flanges forming a channel of such shape to fit about the edge of the protective transparent plate, said gasket being expansible for receiving the metal flange of the tube and the protective plate in said channels formed therein, said gasket having two abutting ends with an integral channel-like extension on one of the abutting ends and an interior channel formed in the other abutting end for receiving said channel-like extension, said body portion of said gasket having a pair of substantially continuous flanges extending outwardly therefrom forming an exterior channel thereabout, said tensioning means including a belt extending in said exterior channel for holding said gasket tightly against the metal flange of the tube and the protective plate, with said channel-like extension in said interior channel so that said gasket completely surrounds said metal flange and insulates the same.

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