July 10, 1951 R. A. FISCH 2,560,336

SHIELD FOR TELEVISION TUBES

Filed March 9, 1950

FIG. 1.

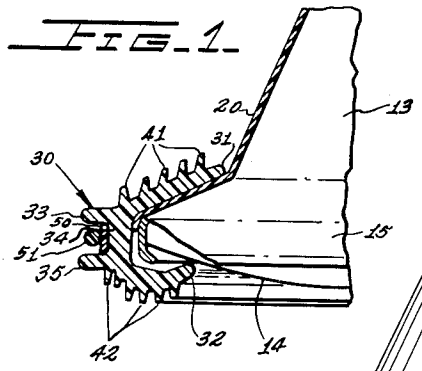


FIG. 2.

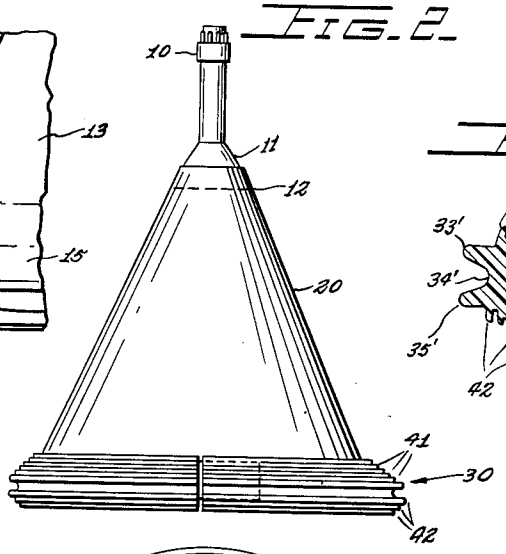


FIG. 3.

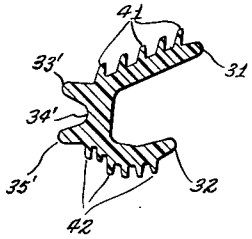


FIG. 4.

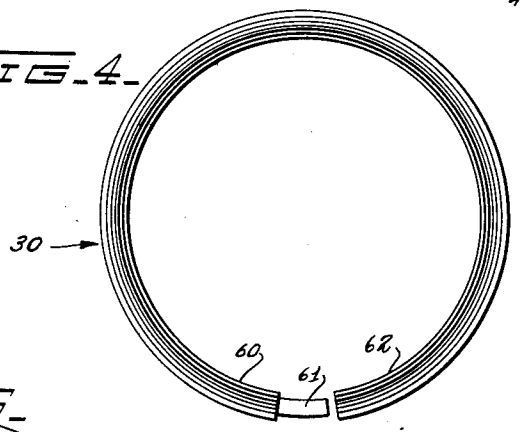


FIG. 5.

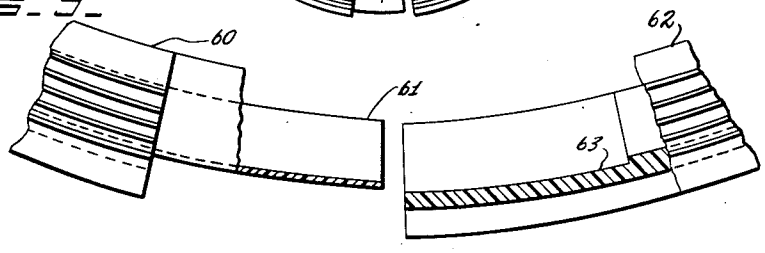
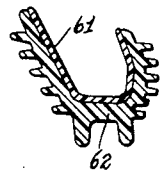


FIG. 7.



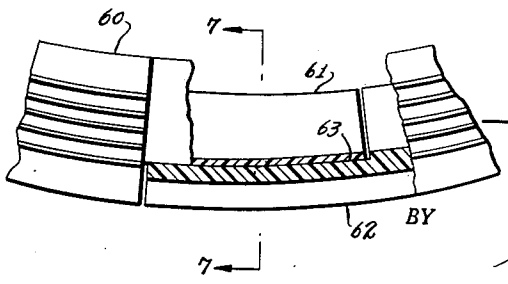


FIG. 6.

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SHIELD FOR TELEVISION TUBES

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3 Claims. (Cl. 177—318)

1

This invention relates to an improved and novel device for shielding and protecting metal backed television or cathode ray tubes, and more particularly it relates to novel and improved means for attaching an insulating shield to such tubes.

This application is a continuation-in-part of application No. 73,058 filed January 27, 1949, now Patent No. 2,503,813, dated April 11, 1950, and 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 important to have a shield which fits closely about the metal backing and which also fits over the flared portion of the tube since this flared portion is the part which is most likely to be contacted. When a conical shield is placed about the tube it has a tendency to slip backward, away from the flared end or lens containing end of the tube, especially if the conical shield is made large enough to fit about the flared end of the metal backing. The metal back of such a tube is ordinarily placed under a voltage of 14,000 to 19,000 volts by what is called the second anode connection.

In application No. 73,058 the idea of a two piece shield comprising a skirt and an open ring with an internal groove adapted to fit about the flange of the tube and hold the skirt adjacent the flange was first disclosed. The two ends of the ring formed by the opening or slit therein which enabled one to place the ring about the flange of the tube could not always be brought together so that sometimes the gap between the ends exposed a portion of the unprotected backing from which a spark could originate. Although a separate sleeve of insulating material could be placed under the gap, a much better means was disclosed in application No. 104,289 wherein an integral sleeve was formed on one of the ends which was adapted to fit under the other end.

With most metal backed tubes the edge of the flange into which the glass lens or screen is sealed

2

overhangs the latter so that it is sometimes possible for a spark to pass from the overhanging metal edge inside of the flanges of the ring when the ring is made according to said previous applications. It is an object of this invention to prevent this possibility of sparking.

An object of this invention, therefore, is to provide an improved and novel means for holding an insulating guard or shield in place for use on metal backed cathode ray tubes.

Another object of the invention is to provide an improved means for securing an insulating shield to a cathode ray or television tube.

Another object of this invention is to provide an improved ring of insulating material adapted to hold an insulating skirt in place on a cathode ray or television tube.

Another object of this invention is to provide an improved ring of insulating material adapted to provide a creepage path long enough to alternate or dissipate the voltage resulting from the contact of the ring with high voltage surfaces of metal backed cathode ray or television tubes.

These objects and others ancillary thereto are accomplished by providing a clamping member for securing the insulating shield or skirt to the outer surface of metal backed cathode ray tubes, and also providing creepage paths for the purpose of attenuating voltage on said metal backing and simultaneously preventing arcing from the overhanging flanges which are an integral part of the wider ends of such tubes.

For the purposes of this case it will be assumed that the skirt and clamping member to be discussed are made for a frustoconical tube with a circular cross-section. However, it is to be understood that the shape of these articles may be varied to conform to tubes of different cross-section and shape. For example, the front or lens portion of the tube may be more or less rectangular in shape or elliptical etc. At the same time the body portion may contain sections which vary from the strictly frustoconical shape. Preferably as in the previous applications the clamping member has the cross sectional shape of a distorted H and two of the legs of the H fit about the flange while the other two legs of the H extend away from the flanged edge and are adapted to hold an elastic member which in turn secures the clamping member tightly about the flanged edge of the tube. The outside groove of the clamping member which holds the elastic member also may be made deep enough to hold the edge of the cabinet which contains the opening for the television tube. In the improved

construction of this invention, however, the flange which extends adjacent the glass lens is curved inwardly so as to extend toward the glass lens of the television tube and close off any straight path between the overhanging metal flange and the exterior of the tube.

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 tubes vary considerably. Since the metal back is under such a high voltage 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.

The clamping member is preferably made from hydrocarbon polymeric materials such as polyethelene, polyisobutylene, polystyrene, polymers and copolymers of butadienes, polymers and copolymers of methyl substituted homologues of butadiene such as isoprene, etc. 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 device 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.

As Figures 5 and 6 indicate, the female or receiving member of the joint of the clamping ring is constructed with a countersunk channel **63** so as to better receive the male member and to provide for a secure joint.

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 operation, 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 cross sectional view of a cathode ray tube and the clamping member.

Figure 2 is an elevation view showing a cathode ray tube and clamping member.

Figure 3 is a cross sectional view showing a variation of the clamping member.

Figure 4 is a plan view of the clamping member in an open position showing the flap portion.

Figure 5 is a cross section view of the male and female elements of the joining portions of the clamping members in the open position.

Figure 6 is a cross section view of the male and female elements of the joining portion of the clamping member in the closed position.

Figure 7 is a cross section view of the clamping member taken across the closed joint at 7—7.

One type of television tube for which this invention is specially useful is shown in Figure 2 and comprises the socket **10**, the glass bulb section **11** containing the electrode, the conical section **13** with the flared end **15** containing the lens **14**. The glass bulb section is joined to the metal back of the tube at **12** and said metal back is covered by the insulating skirt **20**.

The method of holding the wide end of the skirt or shield **20** at the flared end **15** of the tube is best shown at Figure 1 wherein the clamping member **30** is shown securing the skirt or shield to the metal flange **15** of the tube. This clamping member has the general outline of a circle the size of which is about the same as the flanged or flared end of the television tube, and it has two interior or inwardly extending annular flanges **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, and the other of which (**32**) is adapted to extend over the edge portion of the lens **14** in front of the tube.

The clamping member **30** has at least three functions; (1) it holds the skirt **20** on the conical metal back **13**; (2) it insulates the flanged area **15**; and (3) it serves as a means for positively clamping the tube to the chassis of the set. The member **30** performs these three functions simultaneously without any coacting parts except the rubber band **50** which holds the ring tightly on the flange **15** and the elastic loop **51** the ends of which (not shown) are attached to the chassis and which loop serves to hold the clamping member **30** with the inserted tube, in proper position on the chassis.

The clamping member also includes two exterior or outwardly extending annular flanges **33** and **35** with a groove or channel **34** formed therebetween.

In Figure 3, annular flanges **33'** and **35'** and channel **34'** are varied in shape from flanges **33** and **35** and channel **34** respectively, as shown in Figure 1.

The annular flanges (**31** and **32** 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 Figure 1. The clamping member is held in place by any desired means such as an annular securing member or band (not shown) 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 4–7.

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 5 and 6. The end 62 contains a complementary hollowed out or indented portion 63 adapted to receive the sleeve 61.

A preferred method of making the ring of Figure 4 is to injection mold the whole structure in one operation.

A most important feature of the present invention, and one which constitutes a considerable improvement over applications No. 73,058 filed January 27, 1949 and No. 104,289 filed July 12, 1949 is the introduction onto the clamping member of a series of annular ribs 41 and 42. The said ribs are placed along the outside or external edges of the respective annular flanges 31 and 32 and are best shown in Figures 1–3.

It has been the practice, in order to improve reception, to place a charge on the metal back of the television tube, in addition to that charge which finds its way there by leakage. In spite of the fact that the flanges 31 and 32 are just of sufficient size to overlap the flange (about ¼ to ¾" in length), the annular ribs 41 and 42 provide a surface creepage path of over 2 inches for attenuation of this charge. It has been found that if the surface length on a plane perpendicular to the plane of the clamping ring, provided by the ribs 41 and 42 equals at least two inches on each side, the creepage path will be sufficient to attenuate the maximum charge presently used on the metal back of cathode ray or television tubes. It will be understood that it is immaterial how many ribs are used or how deep they are, provided that a creepage path of at least two inches is provided. By increasing the number and/or the depth of the ribs the path may be increased as desired. The path is measured from the area where the metal flange contacts the clamping member to the outside edge adjacent the external flanges of said clamping member where the said clamping member comes into contact with other parts of the set.

It is another important feature of the instant invention to improve the safety value of the clamping ring. Heretofore, that portion of the clamping ring designated 32 herein, has been constructed in such a manner as to come to an end substantially flush with the end of the metal flange 15 or flared portion of the tube 10. With that construction it can readily be seen how an arc might jump radially inwardly from the said flange to a human, an animal or any conductor brought close to the lens and into proximity with the highly charged flange. The instant invention eliminates this possibility by forming the annular flange 32 of sufficient length to overlap the metal flange 15, and by further forming said annular flange 32 so that at a point beyond the end of the metal flange 15, flange 32 bends inward toward the glass face 14 of the television tube 10. By reason of this improved construction no extraneous matter can come into contact with flange 15, nor is any straight open path provided from the exposed metal surface of the flange 15 to an outside object for an arc to jump from said flange 15 to any of said outside conductors.

It will be seen that this improved clamping ring not only provides a sure method of securing the conical skirt 20 to the metal back of the cathode ray or television tube, but that it also improves the safety factor and assists in the operation of the tube by attenuating the surface charge on the metal back of the tube.

I claim:

1. In an insulating device for insulating and mounting a cathode ray tube of the type having an electrode structure at one end, a lens at an opposite end, and an outer metal backing with dimensions which continuously increase from the part adjacent the electrode structure to the end containing the said lens which metal backing contains an outwardly extending peripheral flange adjacent the lens-containing end thereof, the improvement which comprises an insulating clamping member having the configuration of said peripheral flange but having a gap forming two abutting ends at one portion thereof, two inwardly-extending, continuous, peripheral flanges on said clamping member forming a channel adapted to straddle the flange of said tube, the first of said inwardly-extending flanges diverging from the body of said clamping member toward the electrode end of the tube and the second of said inwardly-extending flanges adapted to extend toward and overlap the outside edge of the said lens, said second flange diverging away from the body of the clamping member adjacent the said body but extending back towards the body at the innermost edge thereof so as to approach the surface of the lens and cut off any straight path between the metal backing of the said tube and the area in front of the said lens, two outwardly-extending, continuous, peripheral flanges on said clamping member forming a channel adapted to hold a rubber retaining band to hold said abutting ends of the gap together and tighten the clamping member about said flange and also adapted to hold a retaining loop.

2. The device as set forth in claim 1 in which one of the ends formed at the gap of said clamping member contains an integral sleeve adapted to fit under the internal flange of the other end and said other end contains a complementary section indented to receive the said sleeve.

3. In an insulating device for insulating and mounting a cathode ray tube of the type having an electrode structure at one end, a lens at an opposite end, and an outer metal backing with dimensions which continuously increase from the part adjacent the electrode structure to the end containing the said lens which metal backing contains an outwardly extending peripheral flange adjacent the lens-containing end thereof, the improvement which comprises an insulating clamping member having the configuration of said peripheral flange but having a gap forming two abutting ends at one portion thereof, two inwardly-extending, continuous, peripheral flanges on said clamping member forming a channel adapted to straddle the flange of said tube, the first of said inwardly-extending flanges diverging from the body of said clamping member toward the electrode end of the tube and the second of said inwardly extending flanges adapted to extend toward and overlap the outside edge of the said lens, said second flange diverging away from the body of the clamping member adjacent the said body but extending back towards the body at the innermost edge thereof so as to approach the surface of the lens and cut off any straight path between the metal backing of the said tube and the area in front of the said lens, two outwardly extending, continuous, peripheral flanges on said clamping member forming a channel adapted to hold a rubber retaining band to hold said abutting ends of the gap together and tighten the clamping

member about said flange and also adapted to hold a retaining loop, the said inwardly extending flanges extending inwardly for a distance of ¼" to ¾" but containing a series of ribs of sufficient size and number to increase the shortest surface creepage path between the area where the metal backing contacts the flanges and the area adjacent the outside portions of the outwardly extending flanges to a distance of at least two inches.

RICHARD A. FISCH.

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