July 20, 1954 R. A. FISCH 2,684,477

MOUNTING AND INSULATING RING FOR CATHODE-RAY AND TELEVISION TUBES

Filed May 21, 1951

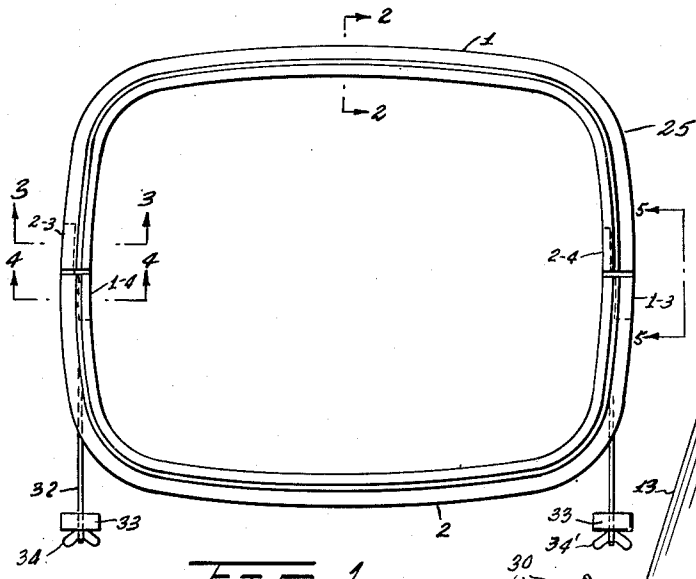


FIG. 1

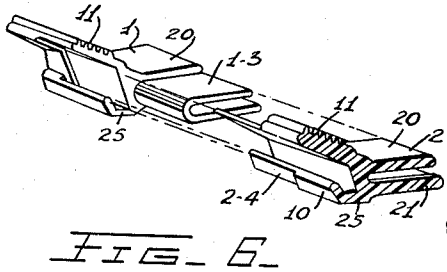


FIG. 6

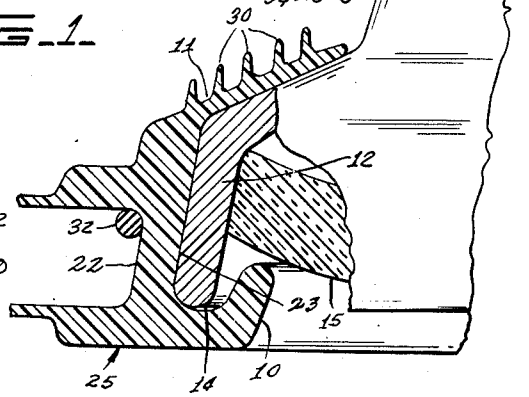


FIG. 2

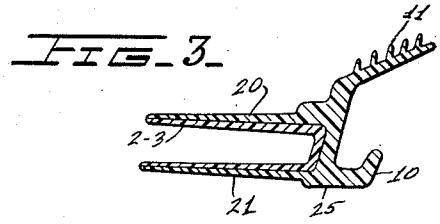


FIG. 3

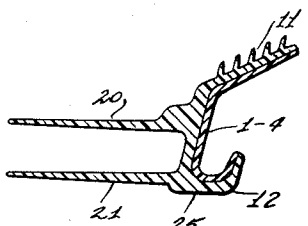


FIG. 4

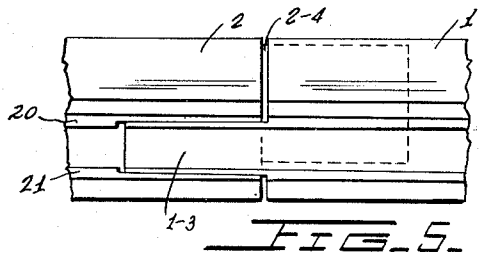


FIG. 5

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MOUNTING AND INSULATING RING FOR CATHODE-RAY AND TELEVISION TUBES

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3 Claims. (Cl. 340—367)

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This invention relates to improvements in mounting and insulating devices for television and cathode ray tubes, and more particularly it relates to improved means for mounting and insulating the metal backed lens end of such tubes.

This application is a continuation-in-part of application Serial Number 104,289, filed July 12, 1949, now Patent #2,602,112.

The general idea of mounting and insulating electrical equipment having exposed parts is old and well known, but the mounting and insulating of metal backed cathode ray or television tubes presents peculiar difficulties. 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 edge portion of the lens. The metal back of such a tube is ordinarily placed under a voltage of 14,000 to 19,000 volts by what is known as the second anode connection.

Patent #2,602,112, of which the instant application is a continuation-in-part, discloses an insulating mounting device for cathode ray or television tubes made from plastic material having a high insulating value which may be relatively stiff but is still bendable. The mounting device may be employed for holding a conical shield or skirt upon the metal section of the television tube and is formed so that it can be fitted about and held on the flanged portion of the tube. The clamping member has the cross sectional shape of a letter H and the lower legs of the H fit about the flange of the cathode ray tube while the other two legs of the H extend away from the flanged edge of the tube and are adapted to hold a suitable securing member which in turn holds the clamping member tightly about the flanged edge of the tube. The clamping member is open at one point but one end at the gap has an extension adapted to fit in the lower channel of the opposite end. The outside groove of the clamping member is adapted to position an endless elastic member to hold the clamping member in closed position and this outside groove also may be made deep enough to receive a cable for attaching the tube to the chassis of a television set.

Among the objects of the instant invention is the provision of an improved and more readily installed mounting and insulating device for metal backed cathode ray or television tubes.

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Another object of the invention is to provide an open or gapped clamping member with improved locking and interfitting ends.

Another object of the invention is to provide a two part clamping ring or member which does not need to be held in place by an endless elastic band.

Among the further objects of this invention is the provision of an improved mounting and insulating device capable of attenuating voltage from metal backed cathode ray or television tubes.

These objects and others ancillary thereto are obtained by forming a mounting and insulating ring of flexible insulating material so as to have a cross sectional shape of a distorted H, one of whose lower legs hooks sharply toward the other. The lower legs of the H fit snugly about the flange at the lens end of the tube while the two upper legs of the H extend away from the flanged edge and are adapted to contain a suitable securing member which in turn fastens the clamping member and the cathode ray tube to the chassis of a television set.

Because of the necessarily peculiar shape of the flange which curves around and extends beyond the lens and the consequent difficulty of installing a mounting and insulating device thereon, the present invention embodies a ring of two or more sections which when properly installed form suitable interlocking unions with each other at their extremities.

Since the metal back of the cathode ray or television tube 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 closely to the uninsulated area. Small pieces of insulating material may be placed inside of any openings 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 two integral flaps at each joint adapted to fit into the channels formed by the upper and lower legs of the H so that every portion of the flange of the television tube must always be covered by insulating material.

It will be understood that the lenses and configurations of the tubes at the lens end vary in shape in different television sets and that the clamping member of the present invention may

be made to conform to the contour of the lens section of any cathode ray tube.

In general any resinous plastic material which has insulating properties may be employed to make the ring 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. Other polymeric materials having high insulating values which may be employed are the polymers and copolymers of vinylidene chloride and vinyl fluoride, polyvinyl carbazol, polyvinyl naphthalene, etc. Impregnated, fabrics such as cellulose acetate impregnated with vinyl butyral and similar materials may also be employed. The ring may be formed by an extrusion process, by an injection molding process or by any other molding process.

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:

Fig. 1 is a front view of the mounting device.

Fig. 2 is a cross-sectional view taken along lines 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken along lines 3—3 of Fig. 1.

Fig. 4 is a cross-sectional view taken along lines 4—4 of Fig. 1.

Fig. 5 is a detail view showing one of the interlocking joints as seen from line 5—5 of Fig. 1.

Fig. 6 is an isometric, exploded view showing how the parts of the device, as shown in Fig. 5, interlock with each other.

As shown in Fig. 1 the mounting device is preferably made in two separate sections, whose extremities interlock to form a complete mounting and insulating ring about the metal flange at the lens end of the tube. As shown in Fig. 2 the mounting ring 25 has two interior or inwardly extending annular flanges 10 and 11, one of which (11) is adapted to press against the back of the flange or flared end 12 of tube 13, and the other of which (10) is adapted to curve about the forward edge 14 of flange 12, and to extend inwardly until it approaches contact with lens 15.

The ring 25 also includes two exterior or outwardly extending annular flanges 20 and 21 with a groove or channel 22 formed therebetween. The annular flanges 10 and 11 are made of sufficient thickness and extend at such an angle that they must be forced apart when the ring 25 is pressed tightly against flange 12 so that when the ring 25 is in place about flange 12, annular flanges 10 and 11 are held tightly against flange 12.

In order to make sure that ring 25 covers all of the exposed area of the flange 12, each of sections 1 and 2 of ring 25 are provided at one extremity with integral extensions 1—3 and 2—3 respectively of three sided channel 22 while the opposite extremity of each of sections 1 and 2 is provided with integral extensions 1—4 and 2—4 respectively of three-sided channel 23. The extensions are so disposed on the ends of sections 1, 2 that when sections 1 and 2 are mounted upon flange 12 the contacting extremities of sections 1, 2 contain extensions of channel 23 and channel 22 respectively, at one contact point and of channel 22 and 23 respectively at the other contact point as best shown in Fig. 1. Thus the complemental ends interlock with one another, as shown in Figs. 5 and 6, to form an insulating and stable joint. Without this interlocking structure it would be impractical to make the ring of two or more separate pieces. Also the ends fit together securely enough to obviate the necessity of applying a rubber band to hold the said clamping member in place.

These extensions 1—3, 2—3, 1—4 and 2—4 may be integrally formed on sections 1, 2 in any desired way. For example, the sections 1, 2 of ring 25 may be molded with extensions 1—3, 2—3, 1—4 and 2—4 or separate pieces may be heat sealed to the extremities of sections 1, 2.

Annular flange 11 is provided with a plurality of annular attenuating ridges 30 which provide a path for the voltage on the metal backed tube. The number or depth of the ridges 30 is not important so long as an overall path of at least two inches is provided.

It will be noted that in the construction of television tubes manufacturers allow a tolerance of up to ¾ inch in the circumference of the lens end of the tube. As the tubes increase in size the metal backs are placed under larger voltages. If too small a path is provided the voltage will jump to the metal rod or cable 32 which retains ring 25 on flange 12, and a corona effect may be produced. As a result of the large tolerance allowed in manufacturing the tubes, the ends of the sections 1, 2 of ring 25 may be slightly separated when mounted on flange 12. In previous mounting and insulating rings it was conceivable that the voltage could jump to the securing rod or cable at the point of separation. However, in the instant invention this possibility is eliminated by reason of the fact that even at the point of separation a path of at least 2¾ inches is provided by the above referred to integral extensions 1—3, 2—3, 1—4 and 2—4 which are always long enough to extend across any separation between sections 1, 2 of ring 25 and into the proper cooperating channel in the adjacent section. If only the extensions 1—4, 2—4 were provided the voltage would be able to creep along the back of the extension to rod 32 but with the double interlocking extensions of the instant invention, each extension at any one point of juncture provides a path the combined length of which is sufficient to eliminate the possibility of any corona effect.

To affix the cathode ray tube to a set, for example, the lower section 2 of the ring is placed on the chassis of the set in the groove or place provided therefore. The cathode ray tube is then placed in the chassis with the flange 12 resting in the interior groove 23 of member 2. The top section 1 of the clamping member is then applied and the extensions 1—3 and 1—4 of section 1 are fitted into channels 22 and 23 respectively of section 2. In like fashion, extensions 2—3 and 2—4 of section 2 are fitted snugly into channels 22 and 23 respectively, of section 1. This method of assembly can be employed not only because the clamping member is made in two sections but also because the security of the interlocking structure obviates the necessity of holding the clamping sections 1 and 2 together on the flange by means of an additional rubber band.

As shown in Fig. 1, when the ring 25 is mounted on flange 12 it is securely retained thereon by a

flexible cable or rod 32 which is seated in three quadrants of channel 22 and which is secured to the chassis at studs 33 by any suitable means such as wing nuts 34, 34'. Another feature of the invention relates to the structure of the flange 10. Due to the fact that the flange 12 on most television tubes flares outwardly from the major axis of the tube at an angle of about 5°, the cable 32, when being tightened will seek the smallest diameter and will therefore find its way to the rear corner of channel 22 formed in part by flange 20 as shown in Fig. 2. Ordinarily this is troublesome since an ordinary clamping member will be distorted and might even be pulled off the flange if the cable 32 is tightened too much. Cable 32, however exerts a pull upon ring 25 toward the rear of tube 13 which has the effect of keeping flange 10 securely against the forward edge 14 of flange 12. No amount of tightening tends to cause the flange 10 to pivot away from the lens 15 and the tighter the cable 32 is tightened the more securely does the flange 10 hold the edge 14 of the tube.

Various other modifications of the invention will suggest themselves to those skilled in the art. It is accordingly desired that in construing the breadth of the appended claims, they shall not be limited to the specific details shown and described in connection with the exemplifications of the invention.

I claim:

1. In a device for mounting and insulating a metal backed cathode ray tube which has a glass bulb section containing the electrode structure, a metal backing section of substantially frusto-conical shape having its smaller end sealed to the glass bulb and having an outwardly extending flange at its larger end and a lens seated and sealed in the said flange, the major axis of said flange forming an acute angle with the major axis of said tube, the improvement which comprises a clamping member with the general configuration of the lens end of the tube, said clamping member having two inwardly extending annular flanges forming a channel therebetween and adapted to straddle the outwardly extending flange of said cathode ray tube, and two outwardly extending flanges forming a channel therebetween adapted to receive a flexible cable for anchoring the cathode ray tube to a chassis, and said clamping member comprising at least two separable complementary portions whereby said portions may be separated to effect the straddling engagement of said inwardly extending flanges of said clamping member with the outwardly extending flange of said tube, a first end of each of said separable portions having an integral channel extension adapted to fit into the exterior channel of the second end of its complementary portion, and the second end of each of said portions having an integral channel extension adapted to fit within the interior channel of the first end of its complementary portion whereby said ends are interlocked when united.

2. The device as claimed in claim 1 wherein said clamping member comprises two pair of interlocking ends forming two separate sections.

3. In a device for mounting and insulating a metal backed cathode ray tube which has a glass bulb section containing the electrode structure, a metal backing section of substantially frusto-conical shape having its smaller end sealed to the glass bulb and having an outwardly extending flange at its larger end and a lens seated and sealed in the said flange, the major axis of said flange forming an acute angle with the major axis of said tube, the improvement which comprises a two part clamping member with the general configuration of the lens end of the tube, each of said clamping member parts having a pair of exterior flanges forming a channel therebetween adapted to receive an anchoring cable and a pair of interior flanges forming a groove therebetween into which groove the outwardly flared portion of said cathode ray tube can be fitted, the first of said flanges being adapted to extend toward the glass bulb section of said tube and the second of said flanges being adapted to extend toward the edge of the lens of said cathode ray tube, the second flange having a section that extends at substantially right angles to the axis of the tube and an inner edge section that extends sharply toward the lens of the tube so that the flange of said tube is gripped between the flanges of said clamping member, each of said clamping member parts being U -shaped and having corresponding ends which include interlocking means, each of said interlocking means comprising an extension on a first of said parts adapted to fit into the exterior channel of the second part and an extension on the second of said parts adapted to fit snugly into the interior channel of the first part.

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