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 112, 143, 193, 194

[56] References Cited
 UNITED STATES PATENTS
 3,227,910 1/1966 Pittman 339/193 X
 3,240,980 3/1966 Schuster 339/193 X
 3,251,016 5/1966 Manetti et al. 339/193 X
 3,377,612 4/1968 Klier et al. 339/143

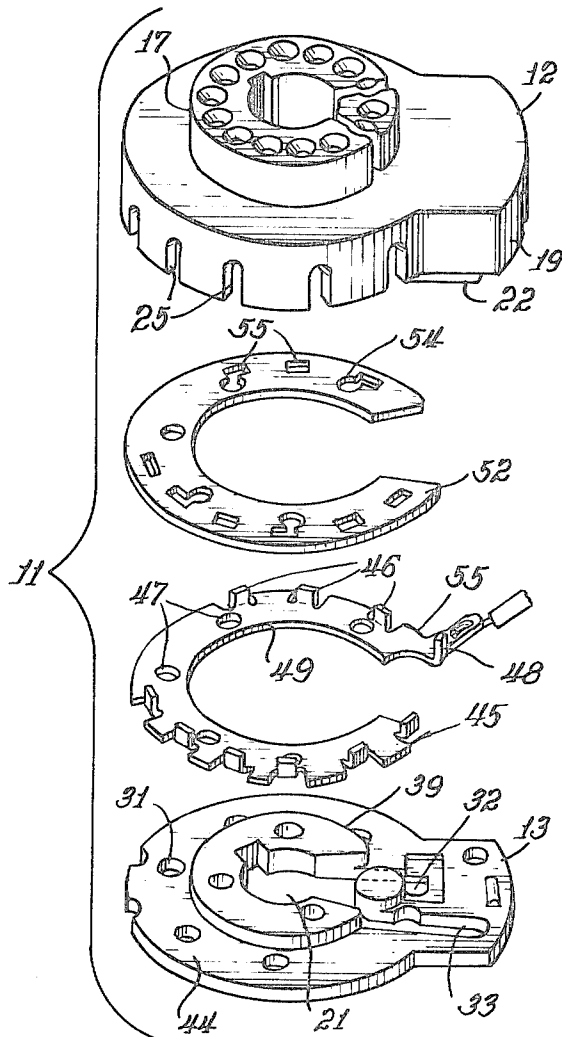
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[54] **ELECTRON TUBE ARC-OVER RING WITH**
VENTING MEANS
5 Claims, 5 Drawing Figs.

[52] U.S. Cl..... 339/143,
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[51] Int. Cl..... H01r 13/12

ABSTRACT: This invention discloses an electron tube sockets having an arc-over protective device comprising a conductor ring having prongs positioned adjacent selected lead terminals to form an arc gap therebetween to prevent arching between terminals, and further comprising means for venting the socket to enhance the protective function of the device.



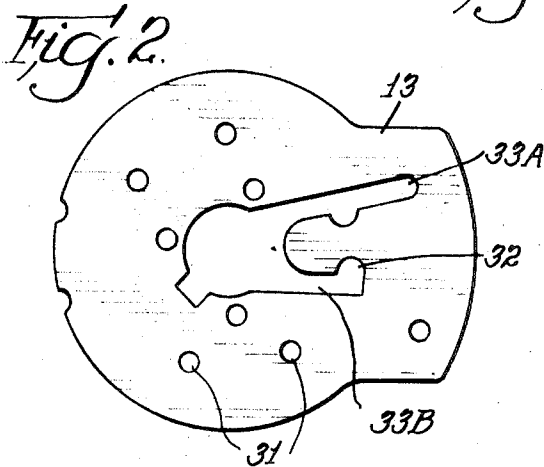
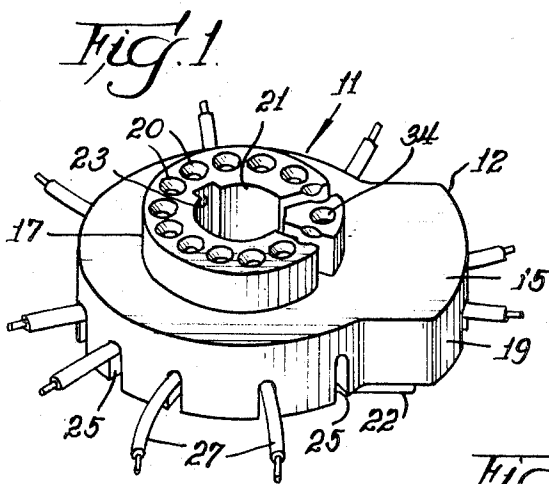
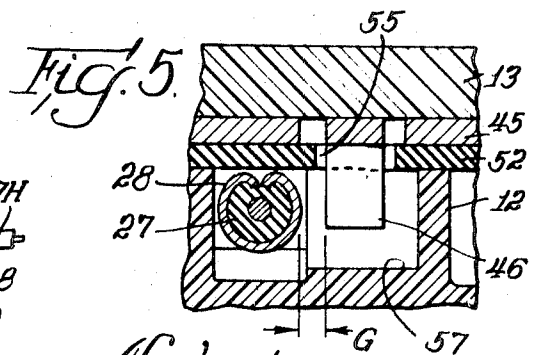
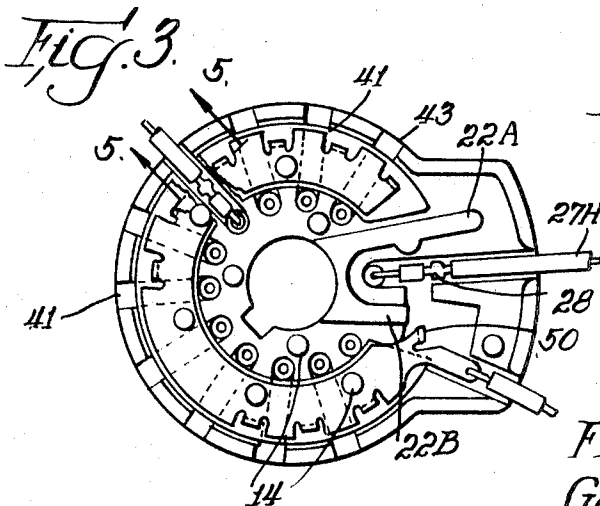
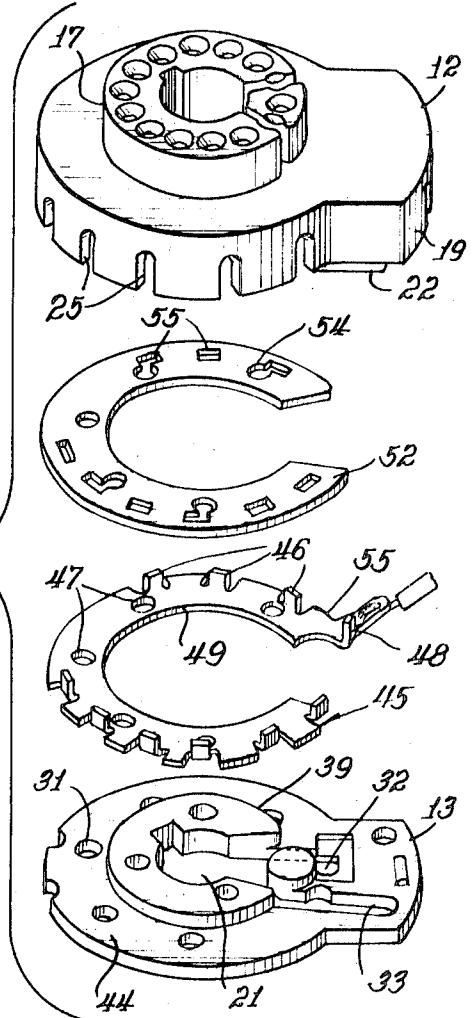


Fig. 4



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ELECTRON TUBE ARC-OVER RING WITH VENTING MEANS

Certain operating conditions within a television picture tube can cause occasional arcing across high voltage components within the tube. Also, picture tubes of the type having narrow neck portions have their circumferentially spaced terminal pins so closely arranged that this often results in arcing. The high voltage resulting from the arcing is then conducted through the tube pins, socket terminals and lead wires to other components in the television set which may cause immediate damage or damage of the type which will materially shorten the life of the components. Protection against such arcing has been provided by the arc-gap-type sockets such as disclosed in U.S. Pat. No. 3,251,016 to Manetti et al., and U.S. Pat. No. 3,377,612 to Klier et al., both of which patents are assigned to the same assignee as the present invention.

The present invention discloses an improvement to the aforesaid patents.

The socket of the present invention embodies an arc-over ring which includes prongs formed thereon which are positioned in close association with the socket terminals. The arc-over ring functions somewhat like an arrester to absorb the high voltage energy through arcing between the socket terminals and the associated prongs and convey the discharge to ground or other control for absorption. Further, the present invention discloses means for venting the socket to improve its arc-preventing function.

FIG. 1 is an approximately full-size perspective view of one embodiment of a tube socket embodying features of the invention;

FIG. 2 is a bottom view of cover for the socket of FIG. 1;

FIG. 3 is a bottom view of the socket with the cover removed showing the various wires and terminals in the socket and showing the arc-over protective device, in the form of a ring, in position in the socket;

FIG. 4 is an exploded view of the socket of FIG. 1; and,

FIG. 5 is a view partly in cross section showing the structure forming an arc gap.

Referring now to the exemplary disclosures in the accompanying drawings (see FIGS. 1 and 2), the socket, generally indicated at 11, is comprised of an enclosing member shown as two generally cylindrical sections such as body section 12 and cover or cap section 13. The socket shown herein is similar to the socket shown in the above-mentioned U.S. Pat. No. 3,377,612 and many of the features are identical. The socket 11 may be made of any thermosetting or thermoplastic material such as, for example, polyethylene or other material having the requisite shape retaining characteristics and dielectric properties such as ceramic, Bakelite, etc.

As shown in FIG. 1, the body section 12 includes a base portion 15 on which a tube pin terminal receiving or socket portion 17 is formed. The socket portion 17 includes a plurality of tube pin receiving holes 20, and a central aperture 21 which receives the base of an associated television picture tube. The aperture 21 is suitably keyed as at 23 to insure proper placement of the tube in the socket. A downwardly (as oriented in FIG. 1) depending sidewall 19 extends entirely around the base portion 15. The sidewall 19 includes a plurality of openings or slots 25 through which the circuit leads 27 pass into the interior of socket 11.

The body portion 12 includes a plurality of studs 14, (see FIG. 5 which is a view inverted with respect to that of FIG. 1, and with the cover 13 removed). The body portion 12 also includes a downwardly depending essentially U-shaped flange 22 having legs 22A and 22B with leg 22B being foreshortened for purposes to be described, see FIG. 3.

The cover section 13 (see FIG. 2) is essentially a flat piece of dielectric material which fits within the outline of the wall 19 of the body section 12. The cover section 13 includes suitable holes 31 through which the studs 14 pass, and a U-shaped aperture 33 comprising channels 33A and 33B which receive

the legs 22A and 22B of the U-shaped flange 22. The studs 14 and flange 22 enable the accurate positioning and attachment of cover 13 on body portion 12. The legs 22A and 22B also provide a high voltage barrier between the high voltage focus lead 27H (See FIG. 3) and the remaining leads 27 connected in the socket 11.

The cover section 13 may be secured to the body section 12 permanently as by inserting the flange 22 and studs 14 to extend through the channels 33A and 33B, and holes 31 in the cover section 13 and then riveted, fused, or otherwise secured thereto, as is well known in the art.

A feature of the invention is that the U-shaped aperture 33A, 33B includes a recess which forms an opening 32 through cover section 13 to the interior of the socket (see also FIG. 4). The opening 32, vents the interior of the socket 11 to permit gases caused or generated, such as by arcing, to pass outwardly and to thereby maintain a clean air dielectric atmosphere within the socket. It has been found that such gases have low dielectric properties and may cause additional arcing, or a reduction in the effective electrical spacing between conductive members. Also, the build up of pressures within the socket connected with the generation of the gases tends to cause any contaminants in the socket to cling to and build up on the walls of the sockets, and on the terminals to thereby further reduce the electrical spacing between conductive members. Thus the opening 32 cools the socket 11 since it permits hot gases generated in the socket to be vented outwardly, it prevents buildup of gas pressures within the socket, and it enables the relative cooler air external to the socket to pass into the interior of the socket.

The socket portion 17 and its tube pin receiving holes 20 are arranged circumferentially about the axis of the socket 11 to receive the corresponding number of contact pin terminals on the tube base. The number of terminal pins inserted into the holes 20 depends upon the electronic characteristics of the tube to be mounted in the socket.

The L-shaped conductive terminal contacts 28, one of which is shown in FIG. 3, are positioned in respective holes 20 and are connected to conductive leads or wires indicated generally as 27 in FIGS. 1 and 5. The wires 27 pass through the associated openings 25 and are connected to the terminals 28, such as by crimping, as shown in FIG. 4. The wires 27 and terminal contacts 28, are placed in position in the socket 11 prior to the assembly of the cover section 13 onto the body 12. The wires 27 and the terminal contacts 28 are positioned in radially extending channels 41 formed in body section 12 (see FIG. 3). A barrier wall 43 is formed between each of the channels 41 so as to minimize high voltage arcing between each of the terminal contacts 28 and the adjacent wires 27.

The cover 13 is formed to conform with, and nest snugly against, the peripheral rim or wall 19 of the body 12. The cover 13 includes a circular central shoulder portion 39 surrounding axial opening 21 and a peripheral flat circular base portion 44. The circular base portion 44 affords a seat upon which a conductor ring 45 is positioned. The conductor ring 45, includes a plurality of prongs 46 mutually spaced circumferentially, such as on the outside or peripheral edge of the ring 45. The prongs 46 are disposed perpendicular to the plane of said ring 45 and are of sufficient length to locate their terminal ends closely adjacent to each socket terminal contacts 28 with which they align, as will be explained hereinbelow. The spacing between the terminal end of each prong 46 and the associated terminal contacts 28 (see FIG. 5), constitutes a spark gap G which is considerably smaller than the spacing between the terminal contacts themselves. In practice, the conductor ring 45 may be connected to ground or to any other element of the installation capable of high voltage current absorption by connecting a wire 27, such as by crimping the wire, within the tab 48 formed on the ring 45.

The conductor ring 45 includes a plurality of holes 47 which correspond to the holes in cover 13 through which the studs 14 in body section 12 pass. The inner diameter 49 of the ring 45 corresponds to the outer diameter of shoulder 39. Thus,

the ring 45 is securely positioned between the cover 13 and the body portion 12. The ring 45 also includes a tip 50 which provides an arc-over gap between it and the tube terminal contact connected to the high voltage focus lead 27H, see FIG. 3.

At this point it should be noted that although a total of 11 prongs are indicated in FIG. 3; in practice, the ring 45 may be arranged to have more or less prongs as required. Thus, the arc-over gaps are formed only between selected wires and the associated prongs 46.

A flat insulating ring or insulator 52 is arranged to be superimposed over the ring 45. The ring is of a size to fit on base 44 of cover 13 and to completely electrically shield the ring 45 and space it from the terminals 28 positioned in the body portion 12. The insulator 52 includes holes 54 which correspond to the holes in cover 13 and ring 45 to receive the studs 14 from body portion 12 to thus securely position the insulator 52 within the socket 11. The insulator 53 further includes slots 55 through which the prongs 46 in the ring 45 can pass to a position adjacent the wires 27, as will be explained.

FIG. 5 is a view taken along lines 5-5 of FIG. 3 and shows the end of a wire 27 to which an L-shaped terminal contact 28 is attached. The cover 13 is superimposed on the ring 45 which is separated from the wire 27 by the insulator 52. A prong 46 on ring 45 passes through a slot 55 in insulator 52 into an associated recess 57 formed on the body portion 12. The terminal contact 28, which is crimped on, surrounds the end of the wire 27 positioned in the associated channel 41 in the body portion 12. A prong 46 on the ring 45 is thus positioned to lie alongside the lead 27, and the arc-over gap or spacing is effected between the side of the terminal contact 28 and wire 27 of the prong 46 as indicated by space G. Note that because of the rigid or tight positioning of the various portions relative to one another of the socket 11, the arc-over gap can be controlled quite closely to provide the exact gap width G to effect control of the arc gap requirements within close tolerances.

It should be readily evident that the spacing, and hence the arc-over gap between each terminal 28 and the associated prongs 46, can be accurately and closely controlled. Further, arc-over gaps of different spacing may be formed between the various terminals and the associated prongs 46, as required. Also, while the arc gaps disclosed herein related to airgaps, other types of materials may be employed to form the arc gaps.

Note also that the size of the venting opening 32 can be varied. However, in the embodiment shown, the opening is roughly one-sixteenth inch by one-eighth inch in dimension. This has been found to provide suitable venting for the socket shown in the drawings.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various

changes in form and details may be made therein without departing from the spirit and scope of the invention.

We claim:

1. An electron tube socket comprising a body portion and a cover portion, spaced pin receiving contact terminal and lead means mounted within said body portion to receive terminal pins of an electron tube; an electrical conductor ring positioned in said socket to be in spaced relation with said pin-receiving contact terminal and lead means; means on said ring for forming an arc gap with a respective pin-receiving contact terminal and lead means, whereby arc gaps having close tolerances relative to the specific voltage to be dissipated thereby may be formed between said ring and an associated pin-receiving contact terminal and lead means to prevent arching between the pin-receiving contact terminal and lead means; opening means formed in said cover portion to vent the interior of said socket to thereby permit any gases generated within said socket to pass outwardly, and to reduce pressure buildup within the socket, said body portion having extending flanges and said cover portion having channels for respectively receiving said extending flanges, and said opening means comprising an extension of one of said channels.
2. A socket as in claim 1 wherein one of said extending flanges is foreshortened to enable a portion of the channel to comprise said opening means.
3. A socket as in claim 1 wherein said opening means is formed adjacent a terminal lead means subject to arcing.
4. A socket as in claim 1 wherein said opening means is positioned to vent away from the associated electron tube.
5. An electron tube socket comprising a body portion and a cover portion, spaced pin-receiving contact terminal and lead means mounted within said body portion to receive terminal pins of an electron tube; a high voltage arc chamber within said body portion enclosing the high voltage focus terminal lead; an electrical conductor ring positioned in said socket to be in spaced relation with said pin-receiving terminal and lead means; means on said ring for forming an arc gap with a respective pin-receiving contact terminal and lead means, whereby arc gaps having close tolerances relative to the specific voltage to be dissipated thereby may be formed between said ring and an associated pin-receiving contact terminal and lead means to prevent arcing between adjacent pin-receiving terminal lead means; opening means formed in said cover portion in the area surrounding said high voltage arc chamber to vent the interior of said high voltage arc chamber to thereby permit any gases generated within said high voltage arc chamber to pass outwardly, and to reduce pressure buildup within the socket, said body portion having extending flanges and said cover portion having channels for respectively receiving said extending flanges, and said opening means comprising an extension of one of said channels in the area surrounding high voltage arc chamber.

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