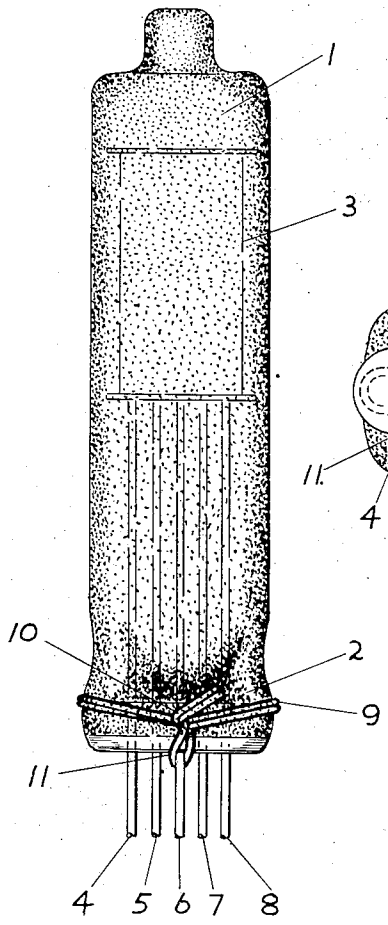
March 15, 1949. A. H. SPENCER 2,464,270

SHIELD CONNECTION FOR EXTERNAL PRESS TYPE ELECTRON DISCHARGE TUBES

Filed March 15, 1946

FIG. 1



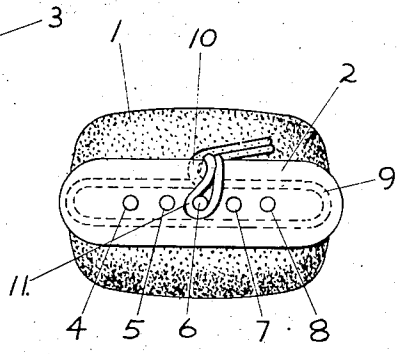
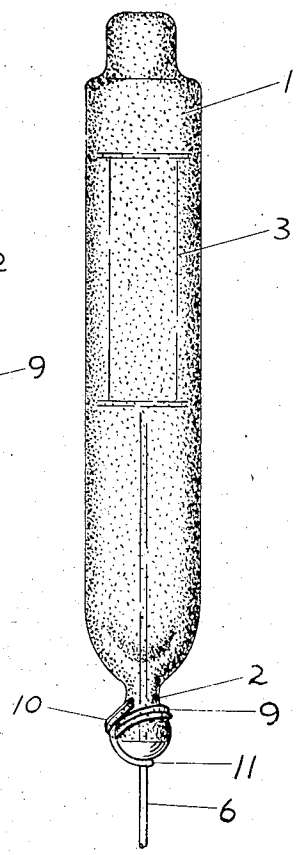


FIG. 2

FIG. 3



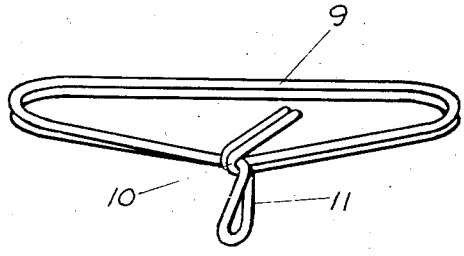


FIG. 4

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2,464,270

SHIELD CONNECTION FOR EXTERNAL PRESS TYPE ELECTRON DISCHARGE TUBES

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3 Claims. (Cl. 250—27.5)

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This invention relates to electron discharge tubes, and more particularly to those of the flat bulb type, such as the small space discharge tubes used in hearing aids, pocket radios or other portable devices intended to be carried on the person.

In these small tubes, the various elements are of necessity close together, which tends to increase the capacity between these elements. Also, in such portable devices, mounting space for the tubes is very often at a premium.

An object of the present invention is to reduce the capacitance between certain tube elements, such as that between the grid and plate.

Another object is to shield the tube from other circuit elements.

A further object is to provide means for shielding the tube elements, together with means for grounding the shielding means.

A still further object is to provide an external shield grounding means for tubes of the type above mentioned which does not add to the minor outside diameter of the tube.

Another object is to devise an exterior grounding wire for a conducting shield of a tube which will be held firmly in place on said tube.

Another object is to devise a means for accomplishing the above objects in an inexpensive yet effective manner.

The foregoing and other objects of the invention will be best understood from the following description of an exemplification thereof, reference being had to the accompanying drawing, wherein:

Fig. 1 is a front elevation, on an enlarged scale, of a tube incorporating one illustrative embodiment of the present invention;

Fig. 2 is a bottom plan view of the tube shown in Fig. 1;

Fig. 3 is a side elevation of the tube shown in Fig. 1; and

Fig. 4 is an enlarged perspective view of the grounding wire of the present invention as it would appear when in use, but disassociated from the tube envelope.

The drawing shows a small space discharge tube of the general type above referred to having a relatively flat bulb 1 hermetically sealed and terminating at its base in a relatively flat press 2. Said bulb 1 contains a conventional electrode assembly 3 schematically indicated in dotted lines in Figs. 1 and 3. The lead-in conductors for the electrode assembly are indicated at 4, 5, 6, 7, and 8. Although five lead-in conductors are shown, there may be any other number of them, depending upon the number of elements in the tube.

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One of these lead-in conductors 6, for example, the lead-in for the negative side of the filament, is normally maintained at ground or zero reference potential.

In the manufacture of the space discharge tube of this invention, the electrode assembly 3 is sealed into the bulb 1 by means of the flat press 2 in the usual way, with the lead-in conductors 4—8 extending outside the bulb as shown. The tube is evacuated and sealed, also in the conventional manner. A portion of rather stiff electrically-conductive wire 9 is bent in the center thereof and its two ends brought up parallel to and touching each other and even with each other so as to form a straight piece of wire having a loop at one end. The looped end of this wire is slipped over the free end of the conductor 6, which is to be maintained at ground potential, and is slid therealong in the direction of bulb 1 until the flat press 2 is reached. This piece of wire 9, by manipulation of its two free and adjacent ends, is then wound or wrapped substantially in a horizontal plane around the flat press 2 under considerable tension. When one turn around the press has been made, so that the free ends of piece 9 are adjacent conductor 6, said free ends are looped under and back up over the right-angled turn of said piece made at the beginning of the turn of said piece around press 2, as shown at 10. Due to the stiffness of wire 9, and to the tension maintained on said wire while it is wound around press 2, knot 10 will be very tight and will effectively help to maintain said wire in position during the life of the tube. Also, as will be apparent from an examination of Fig. 3, the wire 9 is wound around the constricted portion of press 2, and as a result, said wire will also be prevented from slipping downwardly by the enlarged or bulbed-out portion of the press at the very bottom end of the bulb.

The looped end 11 of wire 9 is next soldered to lead-in conductor 6 at a point contiguous to press 2, to which point said wire has previously been slid. Thus, electrical connection is provided between wire 9 and lead-in conductor 6.

After wire 9 has been put into place and has been soldered to conductor 6, an electrically-conductive metallic coating or shield is applied to the outer surface of bulb 1, to the said wire thereon, and to the lateral surface of the press 2, leaving the narrow end surface of the press from which the lead-in wires 4—8 issue free of said shield so as not to short-circuit said lead-in wires. The application of the material for the shield may be made in any suitable way, for

example, by dipping, spraying, or brushing. The conductive coating, since it is applied directly over wire 9 and the bulb 1 after the former is in place, helps to affix said wire in position. The coating is applied to the bulb 1 and wire 9 at the same time, so that the coating will be in intimate engagement with both the bulb and the wire, and said wire will be electrically connected to said coating. Since wire 9 is also electrically connected to grounded conductor 6, the coating and said wire together provide a grounded shield entirely around the tube elements which will act to electrostatically shield the tube from other circuit elements. Also, such a grounded shield will reduce the interelectrode capacitances (particularly the grid-plate capacitance) of the tube.

Wire 9, as will be appreciated, serves as a means for grounding the shield or coating. Since wire 9 is wound around the flat press 2, it does not add to the smaller (or minor) outside diameter of the tube, as will be apparent from an examination of Fig. 2, because the wire is of much smaller diameter than the relative amount of displacement of the bulb in the pressed portion 2.

Of course, it is to be understood that this invention is not limited to the particular details as described above, as many equivalents will suggest themselves to those skilled in the art. For example, other lead-in conductors than the one shown may be utilized as the grounded lead. Various other variations will suggest themselves. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of this invention within the art.

What is claimed is:

1. An electron discharge tube comprising a bulb having an exterior flat press through which extend a plurality of lead-in conductors, said press having an upper constricted portion and a lower enlarged portion, an electrically-conductive coating covering said bulb and said flat press, a length of wire having a looped end and free ends, means for electrically connecting said looped end to one of said conductors, said wire being wound tightly around said constricted portion of said press and being electrically connected to said coating.

2. An electron discharge tube comprising a bulb having an exterior flat press through which extend a plurality of lead-in conductors, said press having an upper constricted portion and a lower enlarged portion, an electrically-conductive coating covering said bulb and said flat press, and conductive means wound tightly around said constricted portion, said means being electrically connected to one of said conductors and being in firm mechanical and electrical engagement with said coating.

3. An electron discharge tube comprising a bulb having an exterior flat press through which extend a plurality of lead-in conductors, said press having an upper constricted portion and a lower enlarged portion, an electrically-conductive coating covering said bulb and said flat press, a length of wire having a looped end and free ends, means for mechanically and electrically connecting said looped end to one of said conductors, said wire being wound tightly around said constricted portion and having its free ends securely interlocked with its wound part to hold it in place on said portion, said wire being in firm mechanical and electrical engagement with said coating.

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