RADIO FREQUENCY SHIELDED CONTAINER FOR ELECTRONIC DEVICES

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RADIO FREQUENCY SHIELDED CONTAINER FOR ELECTRONIC DEVICES

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The present invention relates to improvements in tubular containers and, more particularly, to an improved container for electronic devices that are extremely sensitive to radio frequency energy.

Devices of the type referred to in the art as crystal or diode rectifiers generally employ a semi-conductor material such as germanium or silicon which have very sensitive rectification properties. Such devices may be found in radar receiving apparatus to detect low power reflected radio frequency signals. Due to the inherent sensitivity of these devices, they may be damaged by exposure to radio frequency energy in excess of the limit of the device. This phenomenon is referred to as "burn-out." It is, therefore, necessary to provide such devices with some form of radio frequency shielding during shipment or in storage.

The desired protection has been afforded in the electronics industry by means of a lead capsule or a non-magnetic electrically conductive material completely enclosing the device with further standard paper board outer packaging. Such protection requires not only additional expense in the cost of materials, but increases assembly labor costs since the operator must be certain that the device is completely shielded. Further, if the packaged article must be removed for testing during storage, it is difficult to re-package in the original container because the metallic material is readily deformable and subject to cracking, splitting or tearing after several foldings. It is sometimes more convenient to employ a new container, rather than have the article inadequately protected.

It is an object of the present invention to provide means for packaging sensitive electronic devices with radio frequency radiation protection incorporated in a unitary structure.

A further object is to provide a simple and inexpensive container for packaging semi-conductor rectifiers which will adequately shield said articles from radio frequency energy during transit and storage.

A feature of the invention resides in the construction of a tubular container comprising two spirally wound inner layers of a paper backed metallic foil material with the foil in face to face relationship. An outer layer of a kraft or other similar paper board is spirally wound around the foil layers to complete the tube. The embodiment of my invention provides within itself safe protection from exposure to radio frequency energy. Because of the simplicity of the construction the shielded tube may be manufactured on standard paper tube machinery.

Other objects, features and advantages will be more readily appreciated after consideration of the following detailed specification and accompanying drawings, in which:

Figure 1 is a perspective view of the illustrative embodiment with the components partially broken away to disclose underlying structure;

Figure 2 is an end view in detail of the complete container;

Figure 3 is a detailed vertical cross sectional view of the embodiment with the exposed packaged article in perspective; and

Figure 4 is a detailed vertical cross sectional view of an alternative embodiment.

As shown in Figure 1 the illustrative embodiment comprises an inner tubular sleeve formed by a spirally wound layer of a thin paper backed metallic foil material having foil face 3 extending outwardly. Spirally wound on this layer is a similar material 4 with the foil 5 in face to face relationship with underlying foil layer 3. This layer is wound in such a manner that the butt joint 6 of the underlying layer is overlapped. Any suitable adhesive bonds the two paper backed foil layers together.

In the illustrative embodiment an aluminum foil material having a foil thickness of approximately one thousandth of an inch was employed. Another sleeve of a kraft or similar fibrous material 7 having a thickness approximately equal to that of the inner two layer sleeve is spirally and adhesively wound on said inner sleeve to complete the container. This layer may also be formed so as to overlap the butt joint 8 of layer 4.

As shown in Figure 3 the sensitive electronic device 9 of tubular construction when supported in my improved container will be safely protected from radio frequency energy even with the ends of said container open. If desired, the container 1 may be modified as shown in Figure 4 to provide a complete enclosure. A disc shaped end member 10 having a foil face disposed inwardly may be provided at one end with an outer body member 11 friction-fitted over the tubular container 1. A similar disc member 12 is disposed at the other end followed by a friction-fitted cap 13 having a foil lining 14. Said caps nest against outer body member 11 as at 15.

Various other modifications will occur to those skilled in the art. It is, therefore, my intention to cover in the appended claims such modifications or variations as fall within the spirit and scope of the invention.

What is claimed is:

1. A radio frequency shielded tubular container for electronic devices comprising a spirally wound inner layer of a thin metallic foil material having a fibrous material backing with said foil material extending outwardly, the adjacent edges of said inner layer forming a butt joint, an intermediate layer of a similar material spirally wound on and adhesively secured to said inner layer with said foil material in face to face relationship and the spiral windings of said intermediate layer overlapping the butt joints of said inner layer, and an outer layer of a fibrous material spirally wound on and adhesively secured to the fibrous material of said intermediate foil layer.

2. A radio frequency shielded tubular container for electronic devices comprising a spirally wound inner layer of a thin metallic foil material having a fibrous material backing with said foil material positioned in face to face relationship, the inner layer of said inner sleeve having adjacent edges forming a butt joint, the outer layer of said inner sleeve overlapping the butt joint of adjacent edges of the underlying inner layer and an outer sleeve of a fibrous material surrounding said inner sleeve.

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