

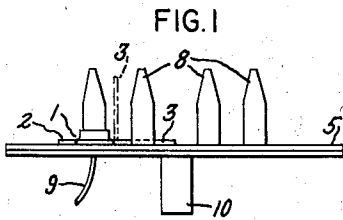
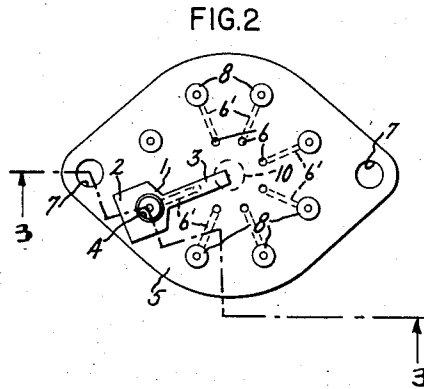
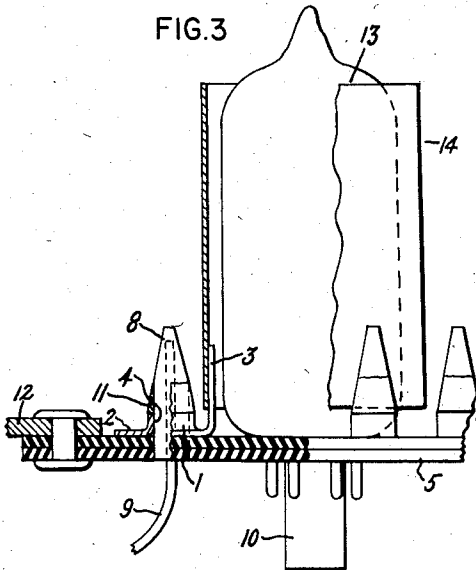
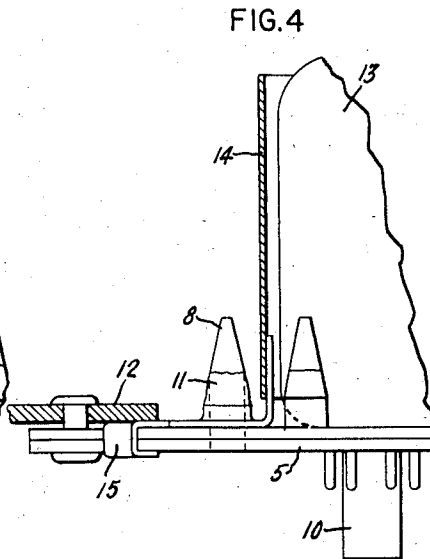
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2,884,611

TUBE SHIELD GROUND STRAP

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2,884,611

TUBE SHIELD GROUND STRAP

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2 Claims. (Cl. 339—143)

This invention relates to the art of shielding electron tubes from the electrostatic and alternating magnetic fields present in equipment operating in high frequency ranges of alternating electrical energy. More specifically, is is concerned with the problem of adequately grounding the metallic cylinder commonly used to surround the tube for shielding purposes.

It is a common practice to shield electrical devices such as electron tubes operating in the presence of electrical fields such as electrostatic and alternating magnetic fields from the effects of those fields in order to prevent such fields from having a harmful effect on the output of the tube. Such effects may include loss of stability and efficiency and interference. In order to have complete shielding, the cylinder used for this purpose, which is formed from an electrical conductor, should be grounded so that no electrical potential exists between the shield and the ground thereby possibly creating another disturbing field. This grounding has been accomplished when a tube is inserted into a socket, wherein the part of the socket exposed through or above the equipment chassis is of less diameter than the desired shield diameter, by making the shield long enough to contact the chassis when it is placed over the tube. However, types of sockets formed from an insulating material are in use which are greater than the tube diameter for a number of reasons. One of the reasons for the use of such a socket is that one form has been found convenient in the mass production of radio and television receivers. Such a socket, provided with a plurality of pins extending from the socket, can have the wires coupling the tube elements to the rest of the circuit connected to the pins by the use of the "dip soldering" technique. The pins are coupled to the socket elements contacting the tube prongs and the circuit connecting wires are placed in or on the pins. Then the entire assembly is dipped into a solder bath to permanently make the desired connections. When the tube shield is placed over a tube in such a socket, no ground connection can be established as the insulating material forming the socket surrounds and extends beyond the limits of both the tube and the shield. To make the base of the shield larger so as to engage the chassis is not advantageous as greater space is consumed and the cost of material and fabrication is increased. The previous method of grounding a shield in such a situation has been to hand solder a strap extending from the shield to the chassis. This method, of course, is time consuming and does not lend itself to mass production techniques. Further, it has the disadvantage of establishing a semi-permanent connection between the shield and the chassis making its removal for tube replacement difficult and requiring a new connection each time the shield is removed, or excessive strap length to permit shield removal. Such a connection has a tendency to break as a consequence of continuous flexing.

Therefore, it is an object of this invention to provide a means for completely shielding an electron tube subject to interference from electrical fields such as electrostatic

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and alternating magnetic fields by providing a tube socket, shield and ground strap assembly capable of quick assembly and providing secure connections.

It is another object of this invention to provide a ground strap for electron tube shields which can be assembled to the shield and socket using mass production techniques and which does not hinder or render laborious and expensive the removal of the shield in order to permit access to the tube.

The objects of my invention can be achieved by providing an elongated strap over one of the pins to which the circuit wires are to be connected. An aperture in the strap surrounds the pin and is of a diameter slightly less than the pin diameter so that a force fit holds it in place until solder is applied to permanently hold it and establish a good electrical contact. A portion of the strap extends toward the center of the socket and is bent upwardly to engage the shield when it is placed in position over the tube. It is contemplated that the strap may either engage the chassis or the pin which it overlies may constitute a ground connection for one of the tube elements such as the filament and/or cathode.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, both as to its structure and method of assembly, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawing in which:

Figure 1 is a side view of a ground strap assembled on one kind of a socket with which it may be used;

Figure 2 is a plan view of a strap and socket of Figure 1;

Figure 3 is a view of a tube shield socket and strap in assembled position on a chassis wherein a section is taken along lines 3—3 of Figure 2; and

Figure 4 is a view similar to Figure 3 illustrating another form my invention may take.

Referring now to Figures 1 and 2 of the drawing, I have shown one form of my invention. This form comprises a strap designated generally by reference numeral 1. This strap is formed from a suitable electrically conducting material and comprises an enlarged end portion 2 and an elongated end portion 3. Formed in the end portion 2 is an aperture 4 for a purpose to be brought out hereinafter.

The strap 1 is assembled on a socket such as is illustrated in the drawing. It is to be understood that the particular socket shown is for purpose of illustration only. It is obvious that the strap may be utilized in conjunction with any socket wherein there is a need for such a device due to the fact that the insulating material from which the socket is formed extends beyond the tube diameter so that a shield of a reasonable size placed thereon cannot contact a grounded surface. The socket shown in the drawing comprises a base 5. In this instance the socket base is formed from two insulating wafers banded together. Formed in the center of the base 5 are a plurality of apertures 6 to receive the prongs of a tube to be inserted in the socket. At the extremities of the socket there are formed a pair of larger apertures 7 which are suitable for the purpose of securing the socket to the chassis. Extending upwardly from the base 5 are a series of pins 8. These pins are formed as hollow members into which wires connecting the tube elements to the circuit components are to be soldered. Electrical conductors 6' shown in dotted lines in Figure 2 extend between the wafers forming the base and connect contacts (not shown) in the apertures 6 to the pins 8.

In assembling the socket, the circuit connecting wires are inserted into the pins 8 and the strap is placed over a grounded pin. The entire assembly is then dipped into

a hot solder bath so that a permanent connection can be established. This step is usually carried out after the socket is mounted on the chassis. A wire for the grounding purpose described above is shown at 9 inserted into one of the pins 8. This wire may be one of those connecting a tube element to a ground connection and it is connected to a pin on which the strap 1 may be placed by means of the aperture 4 formed in the strap. If desired a projection (or shield) may be provided on the socket and is coupled to the chassis to insure adequate grounding in some instances.

Figure 3 of the drawing shows a completely shielded tube in its assembled position. Reference numeral 11 designates the solder which has been deposited on the pin 8, after the strap 1 has been placed thereover, to hold the strap and the wire grounding the pin and the elements connected thereto. The tube is designated by reference numeral 13 and has been inserted into the apertures 6 formed in the socket. A tube shield 14 placed thereover completely surrounds the tube.

The spacing of the shield 14 from the tube 13 has been exaggerated for purposes of clarity in the drawing. In actual practice however, the shield is generally formed to be of a diameter so that it is held in position by its frictional contact with the tube. Alternatively, it may be desired to provide struck-in lugs or detents on the shield engaging it at spaced points to provide the support for holding the shield. If the latter type of engagement is used the space shown between the bottom of the shield 14 and socket base 5 will be available for a cooling air passage. This permits taking advantage of the chimney effect caused by hot air rising between the tube and the tube shield. Prior to inserting the tube in the socket, the elongated extension 3 of the strap has been bent at substantially a right angle to the enlarged portion 2 and extends upwardly alongside of the tube. After the tube is in position in the socket and the shield 14 surrounds it, the extension 3 now extends between the tube and the shield and is bent in such a manner as to contact the inner surface of the shield. The extension 3 extending between the shield 14 and tube 13 will be pressed into engagement with the inner shield surface when the shield fits the tube closely. If desired, however, the extension 3 could be bent at less than a right angle to the portion 2 and when the shield is placed thereover and the resiliency of the metal forming the strap will urge it against the inner shield surface to maintain the desired electrical contact. A chassis portion 12 receives the socket which is attached thereto by means of rivets or other suitable securing means passed through the apertures 7 and the chassis.

In the form of the invention described above, the grounding is achieved by means of a wire soldered to a pin at the same time as is the strap. However, it may be desired to ground the shield by contact with the chassis directly. Figure 4 of the drawing illustrates an embodi-

ment of my invention suitable for this kind of grounding. Formed at the enlarged end 2 of strap 1 in this form of this invention is a tab 15 which may be bent over the edge of the socket when in position on the chassis. This end or tab 15 contacts the chassis and establishes a good electrical contact therewith, when the fastening means are passed through the chassis and apertures 7 in the base and pull the base 5 tight against the chassis 12. The tab serves the additional purpose of holding the strap on the pin prior to the dip soldering operating for handling purposes.

It can be seen that the above described forms permit easy removal of the tube shield and access thereby to the tube without in any way destroying the grounding connection of the shield. Further, there is no excessive strap length extending between the shield and the ground connection so that no additional undesired fields will be thereby created.

While I have shown and described particular embodiments of my invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from my invention in its broader aspects and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination an electron tube, a socket provided with apertures for receiving the pins of said electron tube, a shield surrounding said electron tube, a plurality of pins spaced from said apertures and extending upward from said socket and constituting electrical connectors, a strap, said strap having an aperture therein formed on an intermediate portion thereof, said strap being positioned on said socket so that the aperture thereof overlies one of said pins extending from said socket and the strap makes electrical contact therewith, one end portion of said strap being bent at substantially a right angle to said intermediate portion to engage the inside surface of said shield when said electron tube is inserted in said socket.

2. The structure defined in claim 1 wherein the other end portion of said strap is bent at right angles to the intermediate portion and in a direction opposite to the first mentioned end portion and being adapted to contact an outer portion of said socket.

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