Oct. 13, 1959 R. E. KNEPSHIELD ET AL 2,908,850

ELECTRICAL COMPONENT MOUNTING ARRANGEMENT AND METHOD

Filed July 7, 1958

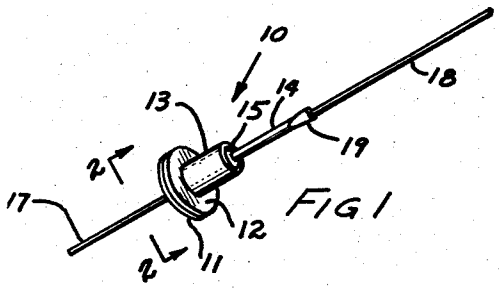

FIG 1

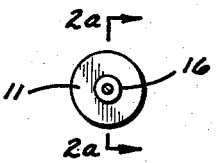

FIG 2

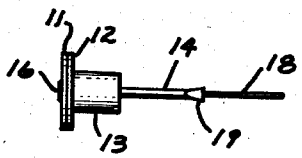

FIG 3

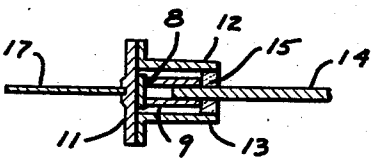

FIG 2a

FIG 4

FIG 4a

FIG 5b

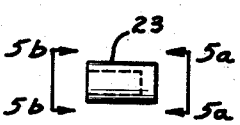

FIG 5

FIG 5a

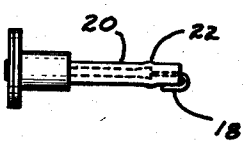

FIG 6

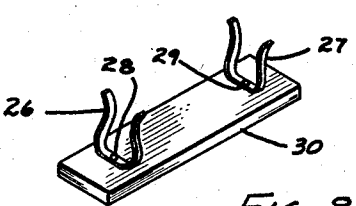

FIG 8

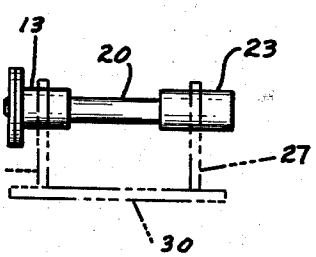

FIG 7

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ELECTRICAL COMPONENT MOUNTING ARRANGEMENT AND METHOD

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Application July 7, 1958, Serial No. 746,694

8 Claims. (Cl. 317—234)

This invention relates to electrical components, and more particularly to arrangements for mounting electrical components within spring clip mountings, and has for its principal object to enable such a component to be mounted in the general manner of fuse clips.

Electrical components including diodes such as the well-known silicon and germanium P–N junction type, are commonly provided with terminal leads in the form of metallic pigtails by which they are fastened in their place to terminal posts on a panel or the like. This is commonly done by soldering the pigtails to their respective terminal posts or lugs; and it provides a permanent installation inasmuch as removal of the component from its place ordinarily requires melting of the solder.

It is sometimes desirable to install the components in place in a temporary manner, which permits ready installation and removal of the component, as for example, by the use of spring terminal clips such as fuse clips.

In accordance with the present invention, means is provided which adapt such components, especially diodes, to use with terminal clips. The invention is carried out by use of a tube of insulating material placed over a terminal lead or pigtail which is brought out from within the housing of the component. The lead extends through the tube and is crimped over the outer end of the tube after which a contact cap is snugly fitted over this outer end of the tube and the crimped pigtail in spaced relation to the base of the component so that the base and the cap are in proper spaced relationship to be used in a fuse clip type of holder.

The foregoing and other features of the invention will be better understood from the following detailed description and the accompanying drawing of which:

Fig. 1 is an isometric view of a known type of diode rectifier provided with pigtail terminal leads;

Fig. 2 is an end view of the diode taken at line **2**—**2** of Fig. 1;

Fig. 2*a* is a cross-section view taken at line 2*a*—2*a* of Fig. 2;

Fig. 3 is a side view of the diode of Fig. 1 after one of its pigtail leads has been removed and the other has been shortened;

Fig. 4 is a side view of an insulating tubing used in the practice of the invention;

Fig. 4*a* is an end view of the tubing of Fig. 4;

Fig. 5 is a side view of a cap used in the assembly of the invention;

Fig. 5*a* is an end view of the cap of Fig. 5 taken at line 5*a*—5*a* of Fig. 5;

Fig. 5*b* is an end view taken at line 5*b*—5*b* of Fig. 5;

Fig. 6 is a side view of the diode of Fig. 3, showing the insulating tube over one of its pigtails and the pigtail crimped around the end of the tube;

Fig. 7 is a side view of the diode having the insulating tube and a terminal cap mounted in accordance with this invention; and

Fig. 8 shows a spring-clip type terminal mounting on which the diode is mounted.

Referring to Figs. 1 and 2 of the drawing there is illustrated a well-known form of diode **10**, for example a crystal junction type. It comprises a metallic base plate **11**, ordinarily circular as shown. Mounted on the base plate **11**, as by soldering, is a metallic flange **12**, formed on a cylindrical collar **13**. The crystal junction can be mounted in a well-known manner on the base plate within the collar so that one terminal of the junction is the base plate itself including the metal collar **13** in contact with the base plate, and the other terminal of the junction is a conductive lead **14** in contact with the junction and extending axially through the collar as shown. The lead **14** is held in its central position out of contact with the base and collar **13** by a suitable insulating compound **15** which fills the space between the lead and the collar. The outer surface of the base **11** is provided with a centrally located boss **16** to which is fastened a terminal lead or pigtail **17** as by welding or crimping. Somewhat similarly, another pigtail **18** is fastened to the lead **14** by welding, and in accordance with a common practice, the outer end of the lead **14** is flattened at **19** which has the effect of giving it a width at the flattened portion somewhat greater than the diameter of the main part of the lead.

The exterior arrangement shown in Fig. 1 is a common form of diode. While the interior of the diode and the particular kind of crystal junction used in it are of no particular consequence in the present invention, details of a suitable junction arrangement are shown in Fig. 2*a*. In Fig. 2*a*, a wafer **8** of a crystal, for example silicon, is attached to the base plate as by solder at a central position within the collar **13** and a tube **9** of a metal such as aluminum is fused or welded to the silicon wafer as shown. With an N-type silicon wafer this will create a P–N junction in a well known manner. The lead **14** is inserted within the tube **9** where it may be soldered. The insulating compound **15** which may be a glass, is then placed in the space between the collar **13** and lead **14**, and allowed to solidify. It will be understood that the junction itself may be made in any of a variety of forms and materials, and that the particular internal construction of the junction is not critical to the invention.

The diode arrangement of Fig. 1 is useful where it is desired to mount the diode by soldering its pigtail leads **17** and **18** to suitable fixed terminals. To do this, the pigtails **17** and **18** are cut to the appropriate length to fit the distance between the terminals. It is desirable, however, in many applications to mount such a diode in terminal clips such as fuse clips, instead of by soldering pigtail leads. While the cylindrical collar **13**, at one terminal of the diode is suitable for mounting in a spring clip, it is apparent that neither the lead **14** nor its pigtail **18** is suitable for such spring clip mounting.

In accordance with the present invention, means is provided for adapting the diode arrangement of Fig. 1 to such spring clip mounting. This means comprises the steps and arrangements shown in Figs. 3 to 7. In Fig. 3, the pigtail **17** is shown cut off flush with the boss **16**, since it will not now be needed. The other pigtail **18** is likewise shortened by cutting so that the length of elements **14** and **18** will now be only about a fraction of an inch longer than the length of a tubing **20** of insulating material. This tubing may be of nylon or other suitable plastic or insulating material of similar texture, which is pliable and compliant, and its central opening **21** is of the proper diameter so that it will fit over the elements **14** and **18**. Preferably this fit is such as to bulge the tubing somewhat at **22** (Fig. 6), this bulge being caused by the enlargement **19** which will serve to hold the tubing in place.

After the tubing is brought up flush against the end of collar **13** and the insulating material **15**, the outer end of pigtail **18** is bent around the outer end of the tubing and

crimped against the outside of the tubing as shown in Fig. 6. A metallic cap **23**, closed at one end **24** and having a hole or opening **25** into the other end, is then placed over the outer end of the tubing **20** and the crimped conductor **18**, as shown in Fig. 7. The diameter of hole **25** is such as to create a tight snug fit which can be forced on by hand without bending up the tube and its internal conductor, but which will nevertheless leave the cap securely in place and in firm contact with conductor **18**. The outer diameter of cap **23** is cylindrical and will ordinarily be of the same diameter as that of collar **13**.

Fig. 8 shows a holder for the diode of Fig. 7, providing spring clips **26** and **27** mounted by suitable fasteners **28** and **29** on an insulating block **30**. This spring clip arrangement is in the general form of ordinary fuse clips, and the clips **26** and **27** are formed in the general shape of U-shaped spring arms to receive the respective ends **13** and **23** of the diode as shown in dotted lines in Fig. 7.

While the fuse clips shown in Fig. 8 are of a very general form, it will be understood that a diode constructed according to this invention can be placed in any such clips as will accommodate the dimensions of the diode. There are many specific forms of fuse or terminal clips available, and the only limitations on use of diodes according to the present invention, with them, are those of physical dimensions.

It will be recognized that by my invention there is provided a simple yet effective terminal mounting arrangement for an electrical component. While the invention has been described in reference to a crystal junction diode to which it is especially applicable, it should be understood that other components, such as, for example, condenser devices could as well be installed in the mounting arrangement. The invention is not limited except in accordance with the scope of the appended claims.

We claim:

1. An electrical component assembly comprising an electric element having two terminals, an electrically conductive housing surrounding said element and having an outer cylindrical portion connected to one of said terminals, an electrically conducting lead connected to the other of said terminals and protruding from and insulated from the cylinder, an insulating tubing mounted over the lead, said lead having a portion crimped around the end of said tubing which is remote from the cylinder, and a cylindrical cap having a central hole mounted over said end of the tubing and in contact with the crimped lead.

2. Apparatus according to claim 1 in which the tubing is a compliant plastic.

3. Apparatus according to claim 1 in which the tubing is nylon.

4. An electrical component assembly comprising an electric element having two terminals, an electrically conductive housing surrounding said element and having an outer cylindrical portion connected to one of said terminals, an electrically conducting stem connected to the other of said terminals and protruding from an end of said cylinder, said stem having an enlarged portion of a greater width than the remainder of said stem, an electrical lead connected to said enlarged portion, a filling of insulating material within said cylinder between the stem and the interior of the cylinder, a tubing of compliant insulating material mounted over the stem and in abutment with said end of said cylinder, a length of said lead protruding from the end of said tubing remote from said cylinder and crimped around said remote end, and a cylindrical cap having a central opening in one end which is mounted snugly over said remote end of said tubing and over said crimped lead, the end of said cap remote from said cylinder being closed.

5. Apparatus according to claim 4 in which said electric element is a diode.

6. Apparatus according to claim 4 in which said electric element is a crystal junction diode.

7. The method of converting an electrical component assembly of the type having a cylindrical outer housing and a pair of terminal leads protruding from the housing in substantial coaxial alignment with each other wherein the first of said leads is electrically connected to the housing and the second of said leads is electrically insulated from the housing, said method comprising placing an insulating tubing over said second lead in abutment with said housing, and leaving a length of said second lead protruding from the end of said tubing remote from the housing, crimping said protruding end around said remote end of the tubing, and forcing a metallic cap over said remote end and the crimped end, whereby the component may be held in a spring-clip mounting.

8. The method according to claim 7 in which the first lead is cut off at the housing.

References Cited in the file of this patent

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COMPLETE MOUNTING INSTRUCTIONS

FOR THE

SD500 KIT

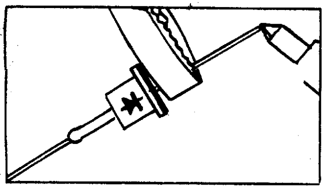
A WORLD OF DIFFERENCE THROUGH RESEARCH

APPLICATION NOTES

1) When replacing a selenium rectifier or a tube-type rectifier with the SD-500, a suitable limiting resistor should be added to the circuit to limit the B+ voltage to its original value.

2) On all wire-in installations, make certain that the SD-500 is free from contact with other units. The metal case of the diode is at cathode potential, and should not touch the chassis or any other conductor.

3) When soldering the SD-500 into a chassis, a heat sink is to be used between lead and diode case, as illustrated at right, to dissipate heat of soldering iron. Excessive heat of iron may seriously damage diode junction.



TYPICAL CIRCUITS USING THE SD500

Note polarity of the SD-500 in the diagrams below. The rectifier symbol on the case points to the cathode (positive) lead.

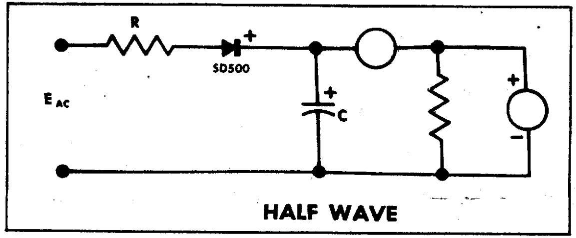
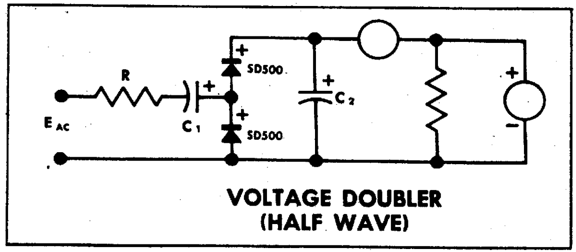


FIG. 1) HALF-WAVE CIRCUIT

FIG. 2) HALF-WAVE DOUBLER



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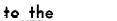
REPLACEMENT INSTRUCTIONS

"WIRES IN..."

The efficiency of any radio or TV set with used or defective metallic rectifiers rated to 500 ma, 130 volts ac may be improved when replaced by the SD-500. The unit may also be used to advantage in replacing vacuum tube rectifiers in ac-dc radios.

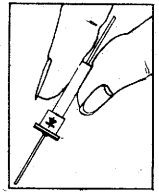
TV RECTIFIER REPLACEMENT: After removing the used rectifier, connect the SD-500 to the same leads, making certain that the polarity is the same as that of the replaced rectifier. The rectifier symbol on the case of the SD-500  points to the cathode (positive) lead.

RADIO VACUUM TUBE REPLACEMENT: To improve performance in ac-dc radios, connect the positive lead of the SD-500 to the cathode, and the negative lead to the rectifier tube plate terminal. There is no need to remove the tube unless the tube filament is burned out, or there is internal plate to cathode leakage. If the tube is removed, its filament (in sets having tube filaments in series) should be replaced by a suitable dropping resistor. For 25 volt filaments, an 85 ohm, 10 watt resistor is needed. For 35 volt filaments, a 240 ohm, 10 watt resistor, and for 50 volt filaments a 340 ohm, 10 watt resistor is called for.

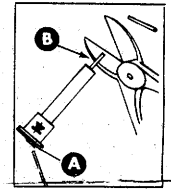
"CLIPS IN..."

To replace a fuse-clip plug-in type diode, only four simple steps convert the SD-500 to a plug-in style with all the necessary protection to assure correct polarity. (The fuse clip should always be checked before installation of SD-500 for positive positioning in polarization.)

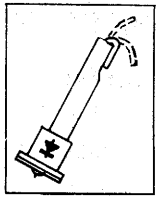
Slide the nylon tube onto the ANODE lead of the SD-500 until it is flush against glass seal of diode case.



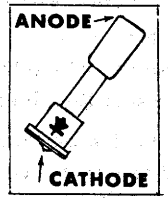
Cut away wire leads at points A and B, leaving about ¼" of lead extending beyond nylon tube at point B.



Bend the ¼" lead extension tightly over end of nylon tube and back flat along the tube as shown.

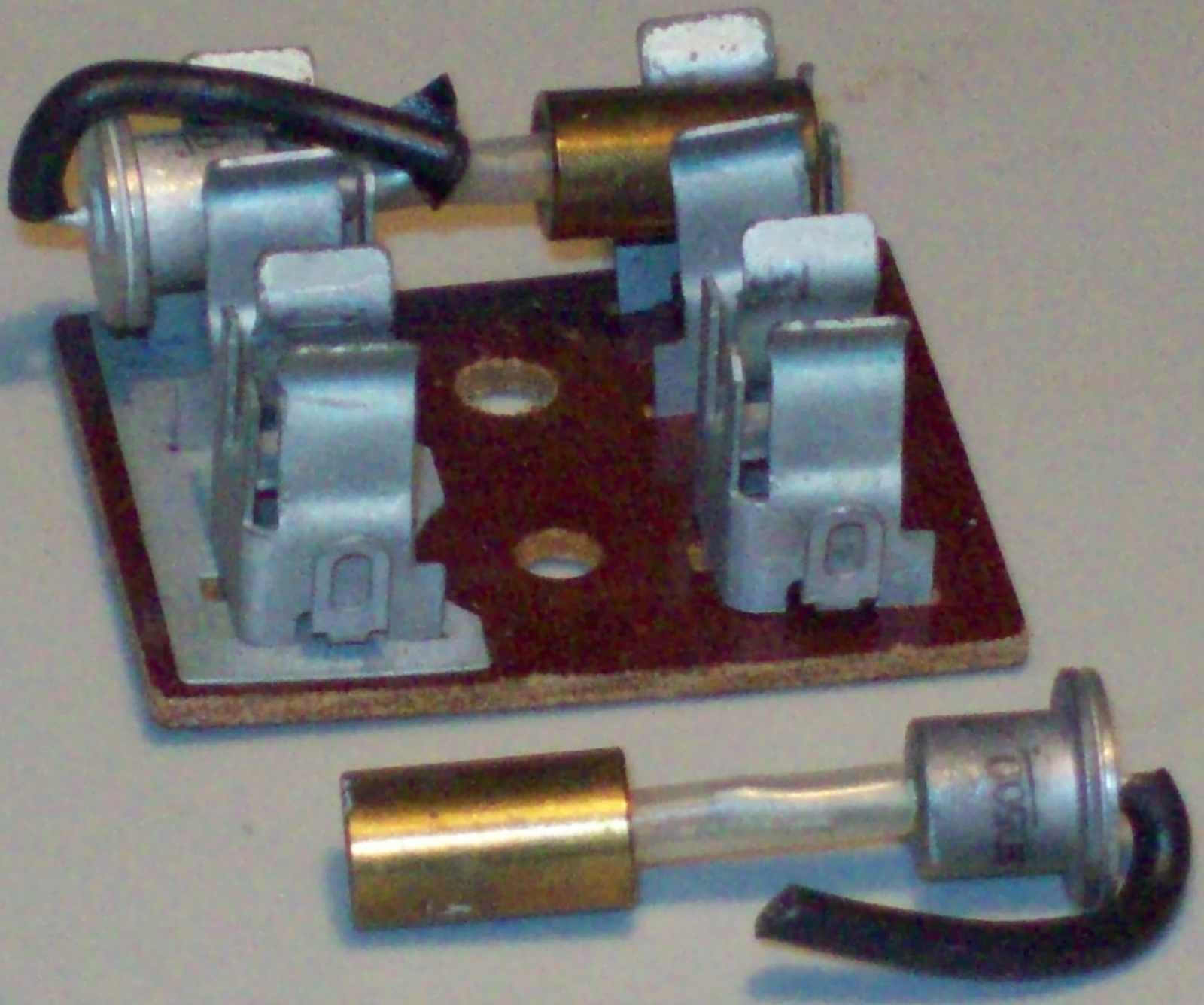


Now force the metal contact cap over the lead and tube, using only light finger pressure. Driving tools are not required. Be sure that cap is seated well down onto the nylon tube.



PATENT NO. 2908850

Unit Is Now Converted For Use In "Fuse Clip Holders"

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