

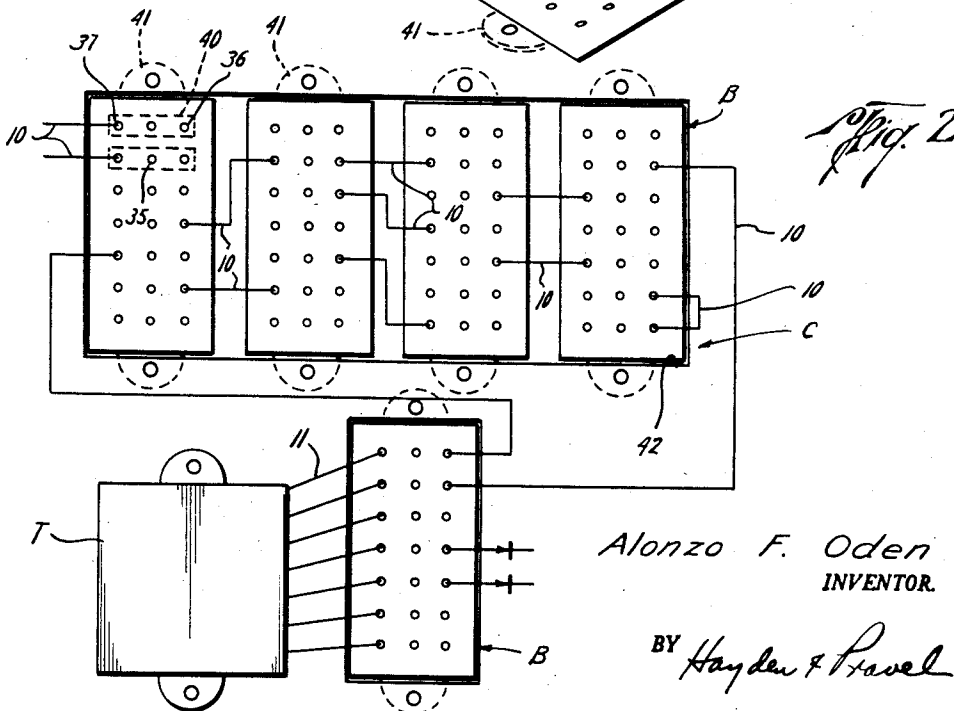
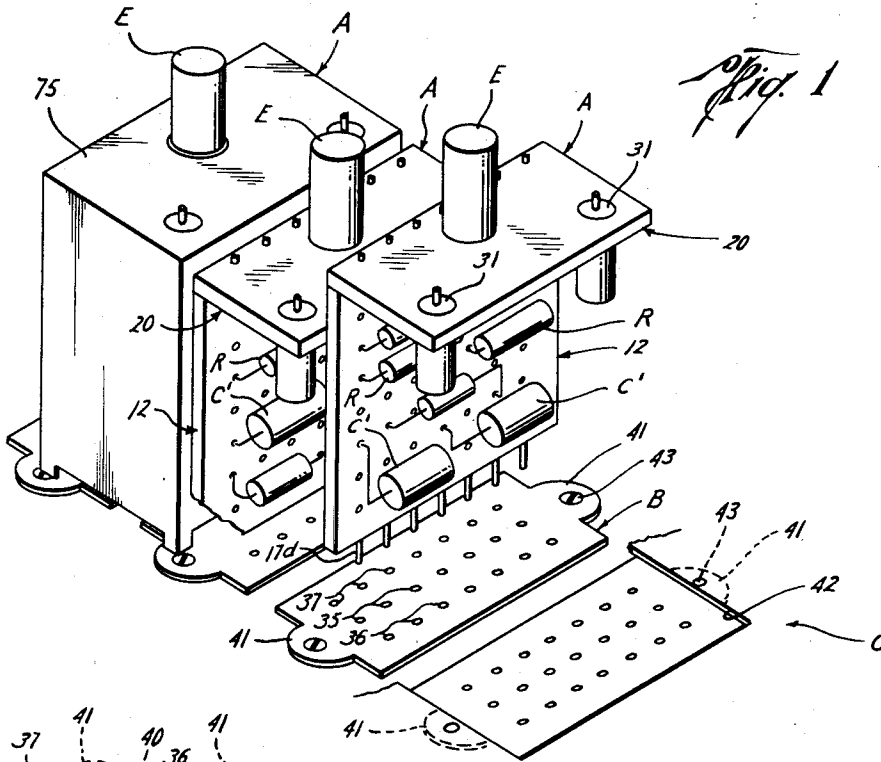
March 22, 1960

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MOUNTING STRUCTURES FOR ELECTRICAL ASSEMBLIES
AND METHODS OF FORMING SAME
1956

2,929,965

Filed July 2, 1956

4 Sheets-Sheet 1



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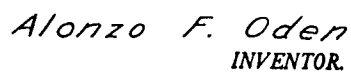
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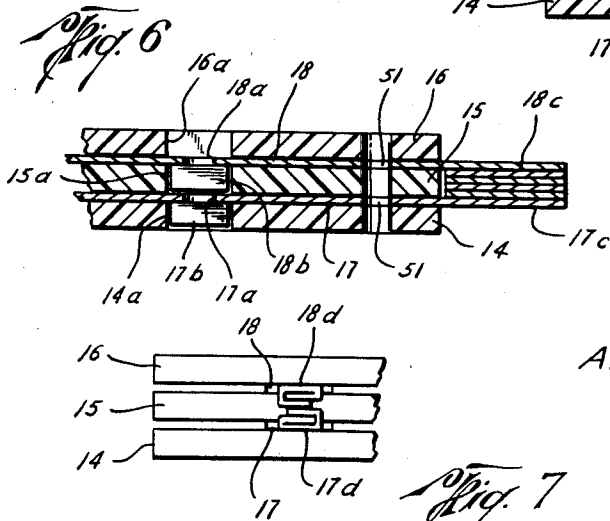
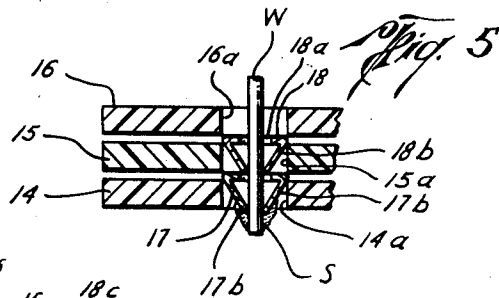
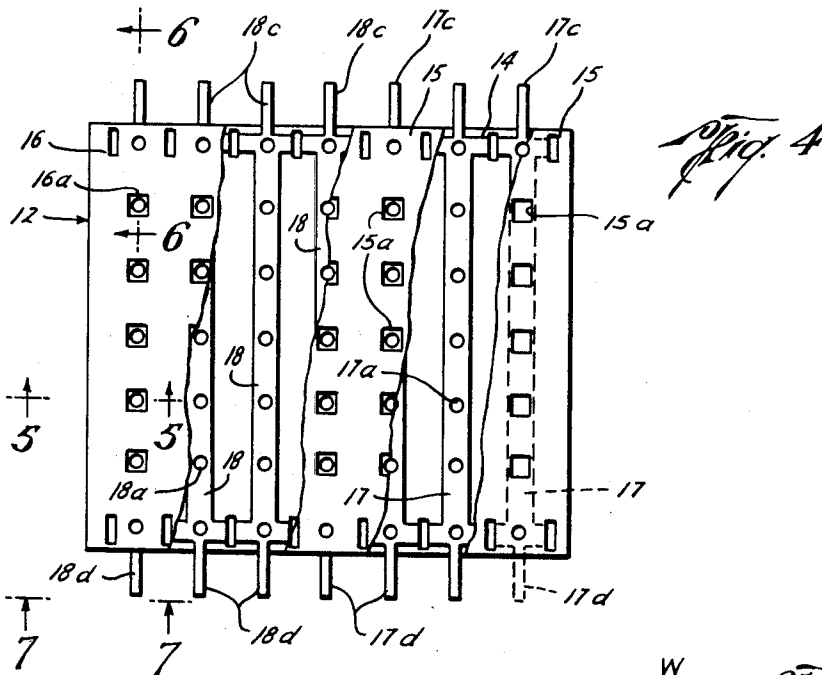
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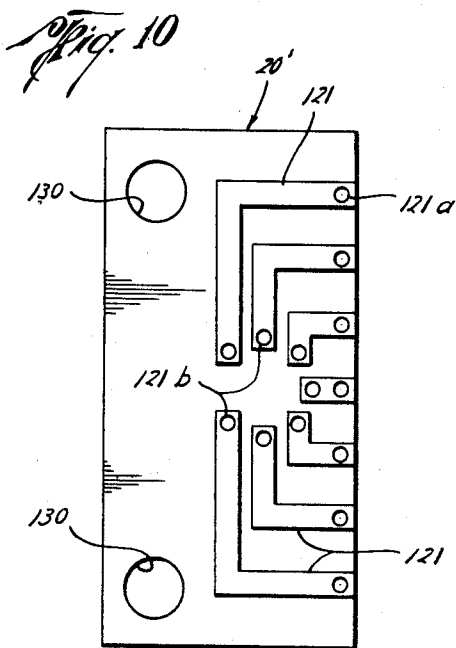
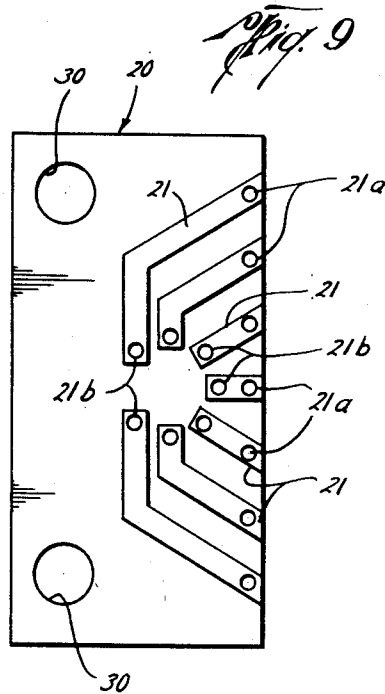
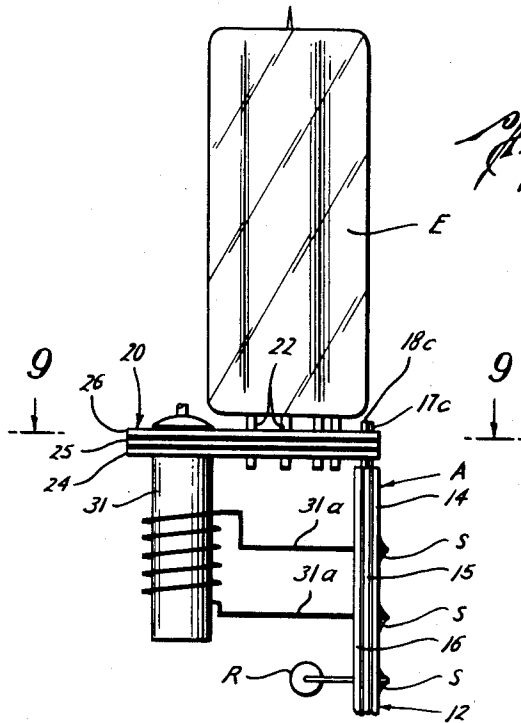
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MOUNTING STRUCTURES FOR ELECTRICAL ASSEMBLIES AND METHODS OF FORMING SAME

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8 Claims. (Cl. 317-101)

This invention relates to mounting structures for electrical assemblies and methods of forming same.

An object of this invention is to provide a new and improved mounting structure for electrical assemblies such as television assemblies, and methods of forming same, wherein said structure is particularly adapted for production by automation.

An important object of this invention is to provide a new and improved mounting structure for electrical assemblies and methods of forming same wherein such mounting structure has means for attaching electrical wires thereto and for electrically connecting same without requiring any twisting of the wires together or any soldering of same; but such wires being so attached that an entire assembly may be soldered as a unit by dipping or otherwise, if desired.

Another object of this invention is to provide a mounting structure for electrical assemblies and methods of forming same, wherein said structure has a new and improved socket for receiving and releasably retaining an electrical wire, an electron tube pin, or similar member.

Another object of this invention is to provide a mounting structure for electrical assemblies and methods of forming same, wherein said structure has a new and improved socket for receiving and releasably retaining an electrical wire, an electron tube pin, or similar member.

A further object of this invention is to provide a mounting structure for electrical assemblies which has a substantially vertical section for electrically mounting condensers, resistors and the like and which also has an upper substantially horizontal section for electrically mounting an electron tube and the like; each mounting structure functioning as a removable component unit of an electrical circuit.

Still another object of this invention is to provide a new and improved mounting structure for electrical assemblies wherein a plurality of such structures are adapted to be electrically mounted on a chassis having electrical connectors for electrically connecting said structures in a predetermined electrical circuit, each of said mounting structures being so constructed that they can be produced by automation or similar mass production.

A still further object of this invention is to provide a new and improved mounting structure which is adapted to be produced by automation or similar mass production but which can be readily modified with a drill or similar conventional tools to accommodate various electrical circuits.

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

Fig. 1 is an isometric view illustrating a portion of an

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electrical assembly having chassis socket plates and mounting structures of this invention.

Fig. 2 is a plan view illustrating a typical arrangement for the chassis socket plates and the connecting members or wires.

Fig. 3 is a plan view of a length of electrical conducting material shown in its successive stages of manufacture, with the dies for each operation being illustrated thereabove.

Fig. 3A is a sectional view taken on line 3A-3A and it illustrates the electrical conducting material of Fig. 3 at one stage of the operation for forming the connecting socket pins at each end of each strip formed by the process illustrated in Fig. 3.

Fig. 3B is a sectional view taken on line 3B-3B of Fig. 3 and illustrates the socket pins being formed in the stage subsequent to that illustrated in Fig. 3A.

Fig. 3C is a view taken on line 3C-3C of Fig. 3 and it illustrates the socket pins at the stage of manufacture subsequent to that illustrated in Fig. 3B.

Fig. 3D is a sectional view taken on the line 3D-3D of Fig. 3 and it illustrates the projections or wire engaging means in two of the strips being formed from the length of material shown in Fig. 3.

Fig. 4 is an elevation, with various layers shown partially, of the component mounting plate of this invention.

Fig. 5 is a sectional view taken on line 5-5 of Fig. 4, except that a wire has been added in Fig. 5 to illustrate the manner of assembly of same.

Fig. 6 is a sectional view taken on line 6-6 of Fig. 4.

Fig. 7 is a view taken on line 7-7 of Fig. 4 and illustrates the construction of the connecting socket pin at each end of the component mounting plate of Fig. 4.

Fig. 8 is a side view illustrating the mounting and connection of the component mounting plate with the tube mounting plate.

Fig. 9 is a view taken on line 9-9 and illustrating one form of the electrical conducting strips used in the top tube mounting plate.

Fig. 10 is similar to Fig. 9, except that it illustrates a modified construction of the electrical conducting strips in the top tube mounting plate.

In the drawings, the letter A (Figs. 1 and 8) designates generally the mounting structure of this invention for use in electrical assemblies such as television assemblies or sets. Briefly, the mounting structure A is so constructed that it is releasably attached and electrically connected to a chassis socket plate B (Figs. 1 and 2) which is connected to a chassis or body C. The chassis socket plates B are arranged in a selected manner in the chassis C for receiving a plurality of the mounting structures or units A. Each of the mounting structures or units A has a certain phase of the electrical circuit or assembly connected therewith, as will be explained in detail, and the related parts of the circuit are inter-connected by connection members or wires 10 as best seen in Fig. 2. The mounting structures or units A may be used in conjunction with conventional electrical parts such as the transformer T (Fig. 2) which has a plurality of wires 11 extending therefrom for connection with one of the chassis socket plates B. Thus, the mounting structures or units A are removably attached to the chassis socket plates B and are electrically connected with each other and with other conventional parts such as the transformer T in a predetermined electrical circuit.

Considering the invention in detail, the component mounting plate 12 of the mounting structure or unit A is shown in particular in Fig. 4. As shown therein, such plate 12 includes a lower plastic sheet 14, an intermediate plastic sheet 15, and an upper plastic sheet 16. Each of such sheets 14, 15 and 16 are formed of an electrical

insulation or non-conducting material such as the synthetic resins or plastics, but other materials may of course be used. Between the lower and the intermediate sheets, a group of metal conducting strips 17 are positioned parallel to each other. A second group of electrical conducting strips 18 is positioned between the intermediate plastic sheets 15 and the upper plastic sheet 16. The strips 17 and 18 are constructed identically and a detailed description as to the formation of such strips 17 and 18 will be set forth hereinafter.

Each of the sheets 14, 15 and 16 are formed with a plurality of rows of openings identified as 14a, 15a, and 16a, respectively. Such openings in the sheets 14, 15 and 16 are adapted to be aligned with socket openings 17a and 18a in the strips 17 and 18, respectively (Figs. 4-6). Each of the strips 17 has a pair of downwardly and inwardly inclined projections 17b for resiliently gripping a wire W from a condenser, resistor or similar electrical components, as will be more fully explained hereinafter. The strips 18 have similarly inclined wire engaging projections 18b for also resiliently engaging the wire W illustrated in Fig. 5. The lower sheet 14 and the intermediate sheet 15 are bonded to the metal electrical conducting strips 17 with a suitable adhesive, or by a fusion of the sheets 14 and 15 together under heat and pressure. The sheets 15 and 16 are similarly joined together. The sheets 14, 15 and 16 could also be connected together by rivets or a similar mechanical fastening means (not shown) as is well understood in the art.

Each of the strips 17 has a socket pin 17c formed at its upper end and similar socket pin 17d formed at its lower end. Similarly, the strips 18 have socket pins 18c and 18d. The manner of forming such socket pins 17c, 17d, 18c and 18d will be explained hereinafter in detail. It should be noted that with the construction shown in Figs. 4-7, the socket pins 18c and 17c of the strips 17 and 18 positioned above and below each other are preferably formed so as to lie adjacent to each other and therefore to form a single pin as best illustrated in Figs. 5 and 6.

The socket pins 17c and 18c are adapted to extend upwardly through socket openings 21a (Figs. 8 and 9) which are provided in the tube mounting plate 20. The tube mounting plate 20 includes a plurality of electrical conducting strips 21 formed of metal or other electrical conducting material and which are shaped or constructed so that socket openings 21a formed therein are disposed in a row near one corner of the plate 20 while other socket openings 21b are arranged in a circle for receiving the pins 22 of an electron tube E. Except for the shape of the strips 21, the mounting plate 20 is formed in a manner similar to that described above in connection with the component mounting plate 12. Thus, the tube mounting plate 20 has sheets 24, 25 and 26 which are formed of a synthetic resin or plastic or any other similar electrical insulation material. One group of electrical conductor strips 21 is positioned between the layers 24 and 25 and a second group of such conductors is positioned between the layers 25 and 26. The electrical conducting strips 21 are formed with the openings 21a and 21b, as previously explained, and also they are provided with depending inwardly bent projections for resiliently engaging the prongs 22 and the socket pins 17c and 18c.

The tube mounting plate 20 is also preferably provided with one or more coil openings 30 for holding a coil 31 or the like. The wires 31a from the coil 31 are extended through the socket openings and the wire retaining means of the component mounting plate 12 (Fig. 8) so as to be electrically connected to the strips 17 and 18 through which they are inserted.

Each of the component mounting plates 12 also has a predetermined number of condensers, resistors and similar electrical components releasably attached thereto by extending the tail wires of each of the components into the proper openings of the metal strips 17 and 18 to

establish electrical contact for forming a predetermined electrical circuit with the electron tube E and the rest of the components on the other mounting units A. Thus, in Fig. 1 a number of condensers C' and resistors R are shown as having their tail wires extending through some of the socket openings in the component mounting plates 12. All of such tail wires extend through the socket openings and the wire engaging projections 17b and 18b so that they all are extending from the plate 12 as shown in connection with the wire W in Fig. 5 and as shown in connection with the wires 31a and the wires from the resistor R in Fig. 8. The wires are preferably terminated close to the outer surface of the sheet 14 and, if desired, such wires may be dipped simultaneously into a solder bath, or the solder may be otherwise applied to the exposed ends of the wires so that the solder collects or bonds as indicated by the letter S in Figs. 5 and 8. It is thus believed evident that such construction eliminates the necessity for twisting any of the wires together and requires a very simple insertion of the tail wires through the socket openings. Then, if desired, soldering can be accomplished very readily all on one side of the component mounting plates 12 and, therefore, such soldering can be accomplished by mass-production.

The chassis socket plates B are each formed with a row of central socket pin openings 35 for receiving the lower socket pins 17d and 18d (Fig. 1).

Additional rows of socket pin openings for sockets 36 and 37 are provided on each side of the central row of sockets 35. Such openings 36 and 37 are for receiving electrical connector wires 10 (Fig. 2) as will be explained. Each of the chassis socket plates B is formed substantially as described above in connection with the component mounting plates 12. In other words, a plurality of electrical conducting strips are positioned in parallel between sheets of electrical insulation material. The electrical conducting strips are each provided with one central opening 35 and one side opening 36 and one side opening 37. Such electrical conducting strips are shown in dotted lines in Fig. 2 and are identified by the numeral 40. Each of the strips 40 is preferably provided with wire engaging projections, such as the projections 17b and 18b illustrated in Figs. 5 and 6 for the plate 12. Thus, any wires which are placed in the openings 35, 36 and 37 are held resiliently and releasably in electrical contact. Each of the chassis socket plates B has tabs 41 at each end which are positioned below the surface of the chassis C while the main body of the plate B extends into or within a chassis opening 42. Suitable screws or other connecting means 43 are preferably provided for connecting the plates B to the chassis C.

The adaptability and versatility of the construction for accommodating various electrical circuits is believed evident from the foregoing description. For example, the connector wires 10 may be arranged as shown in Fig. 2 so that electrical current is carried from one mounting structure or unit A to the other. By mounting the wires 10 in the proper openings 36 or 37 and by mounting the condensers, resistors and the like in proper openings in the mounting plate 12, a circuit can be varied as desired. Also, it should be pointed out that each of the electrical conducting strips 17 and 18 is capable of being severed or drilled by a drill or similar conventional equipment so as to terminate the electrical circuit through such strip as desired. Such drilling through or severing of the strips 17 and 18 does not affect the rest of the mounting plate 12.

Although the invention has been described above for a mounting plate 12 that has the two groups of strips 17 and 18 and three layers of non-conducting or insulating material 14, 15 and 16, it is believed evident that such mounting plate 12 may be formed with only one set of the strips such as the strips 17 and in that case, only the insulating sheets 14 and 15 would be utilized. The additional layer of metal conducting strips 18 facilitates the

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gripping action of the wire W and improves its holding power. The tube mounting plate 20 may be similarly modified and the chassis socket plate B may also be modified to provide only one layer or group of conductor strips 40.

In Fig. 10 a modified form of the invention is shown, wherein the top plate 20' is a duplicate of the tube mounting plate 20 of Figs. 8 and 9 except that the conductor strips 121 are formed at right angles rather than in the inclined shape illustrated in Fig. 9. The socket openings 121a are formed in a row in the same manner as the socket openings 21a and the pin openings 121b are formed in a circle for receiving the pins 22 of the electron tube E in the same manner as the openings 21b. Coil openings 130 are also provided in the same manner as the coil openings 30.

The method of forming the electrical conducting strips 17 is illustrated in Figs. 3-3D, inclusive, and such illustration and the following description is believed to suffice for all of the conducting strips since they are all formed in substantially the same manner. Thus, a sheet of electrical conducting material F such as metal is fed to the cutting and forming dies illustrated in Fig. 3. A plurality of openings 17a are first formed in a row by a die 50 in the shape of a circular punch as seen in Fig. 3. Guide and feed openings 51 are also formed with the punch or die 50 so as to be in line with the row of socket openings 17a. Such feed or guide openings 51 are used for receiving feed pins or projections used in moving the length or strip of material F through the various dies shown in Fig. 3 so that a mass-production or automation is obtained. The next phase of the operation shown in Fig. 3 involves the cutting or stamping of the length of material F to remove pieces therefrom so as to leave a body of the material from the length F in a strip which ultimately forms the strip 17 and which has lateral projections 17b extending therefrom which are still joined to the lateral projections on the adjacent strip 17. The pieces which are removed are preferably in the form of a square and are cut out with a die 53 shown in Fig. 3. The dies 53 at each end are preferably rectangular so as to cut out the end pieces for forming the flat sections from which the pins 17c and 17d are subsequently formed.

The socket pins 17c and 17d are formed by folding or bending the sections previously formed on itself and to facilitate such bending or forming, notches are preferably cut as indicated at 17e by a die shaped as shown at 54 in Fig. 3. Thereafter, the lateral projections 17b are separated from each other by a plurality of dies 55 as shown in Fig. 3.

Next, the lateral projections 17b are bent downwardly at substantially right angles with respect to the main part of the strip 17 and for accomplishing such bending, the dies 56 and 57 cooperate together. Also, the pins 17c are bent by similarly shaped dies to those identified by the numerals 56 and 57 so that they acquire the shape illustrated in Fig. 3A. Subsequently, the lateral projections 17b are bent inwardly towards each other so that they assume the shape and position illustrated in Figs. 5 and 6. Such bending is accomplished with cooperating dies 5 and 59 as will be evident. Also similar dies to the dies 58 and 59 are utilized at the same time for forming or bending the outer portions of the socket pins 17c and 17d downwardly and inwardly to the inclined position shown in Fig. 3B to facilitate subsequent bending, as will be explained. The final bending and flattening of the pins 17c and 17d is accomplished with the cooperating dies 60 and 61 so that the pins 17c and 17d are bent or shaped as shown in Fig. 3C. The final step in the formation of the strips 17 is in the cutting of the portions 17f at each end of the strips 17 with a cutting die 62 after a plurality of such strips 17 are laminated with the dielectric sheets or electric insulation sheets such as shown at 14, 15 and 16, so that the strips 17 are then

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separate from each other and each is as illustrated in Figs. 4-7.

The shape of the wire retaining projections 17b are shown in Fig. 3D as well as in Figs. 5 and 6. When the electrical conductor strips 18 are used with the strips 17 as shown in Figs. 4-7, such strips 18 are formed in the same manner as described above in connection with strips 17. The strips 21 and 121 of Figs. 8-10 could be formed in a very similar manner to that described above in connection with the conductor strips 17, but of course they would have to be specially stamped to obtain the shape illustrated in those figures of the drawings. The conductor strips 40 can readily be constructed by the same procedure described above in connection with the strips 17, except that the socket pins at each end are not necessary with the conductor strips 40 for the socket plate B. Similarly, the socket pins at each end of the strip are not necessary with the strips 21 and 121 of Figs. 8-10.

The operation or use of the apparatus of this invention and the carrying out of the method of this invention is believed evident from the foregoing description. With the apparatus of this invention, an electrical assembly such as a television assembly can be produced by automation or mass-production because the basic parts thereof are susceptible to such production. Thus, as explained above, the mounting plates such as the component mounting plate 12, the tube mounting plate 20 and the chassis socket plate B may all be constructed as described in connection with Fig. 3 so that individual hand manufacture is not necessary as in the present electrical assemblies. Furthermore, the condensers, resistors and the like may be readily mounted on the component mounting plates 12 without requiring any twisting of the wires leading therefrom and without requiring any soldering. However, if soldering is desired for a more permanent connection, the solder may be applied to the wires which are exposed all on one side and such solder may be applied by dipping or any other mass-production method. The strips 17 and 18 are formed of a material which can be readily drilled or severed so that the various circuit arrangements can be obtained with the basic component mounting plate 12. The tube mounting plate illustrated in the drawings is also versatile and of course may be readily modified to accommodate more than one electron tube E if required or desired. In any event, the mounting structure or unit A which is made up of the component mounting plate 12 and the tube mounting plate 20 form a unit which is removable for ready repair and replacement. Testing of the various parts is thereby facilitated because the component is removable to a place where access to the various parts can be obtained. It should also be pointed out that each of the mounting structures or units A is preferably enclosed in a shield or housing 75 (Fig. 1), and such shield 75 is removable also for access to each of the mounting structures or units A.

The chassis socket plates B are illustrated as an example of one method of interconnecting the various units A to form the desired electrical circuit for the television assembly or other electrical assembly. Actually, the chassis socket plates B are particularly desirable because they do provide for changing the circuit and for a wide variation in the circuits which can be accommodated. However, other types of connection such as printed circuits can be employed on the chassis C as is well known for connecting together electrical units. Thus, instead of employing the wires 10, such wires could be printed with electrical conducting material so as to establish the same electrical connections as required for the particular electrical assembly.

It is believed evident that with the construction of this invention, the vertical space in a television assembly or other electrical assembly is utilized to a greater extent because the condensers, resistors and other electrical

components are placed on the vertically extending component mounting plates 12. Therefore, the television assemblies or other electrical assemblies can be made much more compact and the vertical space can be utilized much more effectively. For example, with a television assembly the television tube itself requires vertical space and with the construction described, that vertical space can be utilized to a greater extent than with prior known constructions.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. A mounting structure for electrical assemblies comprising a component mounting plate adapted to be electrically connected to a chassis socket plate, said component mounting plate including a plurality of electrical conductor strips laterally spaced from each other in the same plane and all of which are disposed substantially parallel to each other, an electrical insulation sheet bonded to each side of said conductor strips, each of said strips having a plurality of wire receiving openings formed therein and wire retaining means formed below each of said openings, and each of said insulation sheets having openings aligned with said openings and wire retaining means in said strips, whereby an electrical wire may be releasably attached in such of the strip openings as desired to provide a selected electrical circuit.

2. The structure set forth in claim 1, wherein each of said strips has substantially straight sides which are substantially parallel to each other and to the sides of the adjacent strips, and wherein said wire retaining means includes a plurality of pairs of resilient projections formed on said sides of each of said strips adjacent to each opening in each of said strips and which projections are bent inwardly toward each other to provide a space therebetween less than the diameter of said electrical wire whereby said projections on each retaining means resiliently engage the electrical wire extending therebetween.

3. The structure set forth in claim 1, said electrical conductor strips being made of a material capable of being severed by drilling or the like whereby the lengths of the strips may be varied for providing various electrical circuit arrangements.

4. A method of forming a component mounting plate of a mounting structure for an electrical assembly, comprising the steps of, feeding a length of electrical conductor material to a plurality of successively operated

cutting and forming dies, cutting a row of socket openings in said material, then cutting pieces from said material to form a strip of material with the row of socket openings therein and with lateral projections extending from said strip on each side of each socket opening, cutting said lateral projections to separate same from the rest of said material, and then bending said lateral projections on the side of each opening downwardly and inwardly toward each other so as to leave a space between the ends thereof below each opening of a size less than the size of a wire adapted to be extended therethrough for releasably gripping such wires.

5. The method set forth in claim 4, including the step of initially forming feed and guide holes at each end of said row of socket openings for permitting said material to be moved automatically from one operation to the next.

6. The method set forth in claim 4, including the steps of cutting out additional pieces of said material to form flat socket pin sections, and thereafter folding each of said flat pin sections on itself to form a socket pin at each end of each of said strips.

7. The method set forth in claim 4, including the steps of cutting a plurality of rows of openings in sheets of electrical insulation corresponding with said rows of socket openings in said strips, and then bonding one of said sheets of electrical insulation on each side of a plurality of said strips with the openings in said sheets being aligned with said socket openings and said projections in each strip.

8. The method set forth in claim 7, including the steps of, positioning an additional group of said strips above one of said bonded sheets, and then bonding an additional one of said sheets to said additional group with the openings in all of said sheets being aligned with the socket openings and the projections in both groups of said strips.

References Cited in the file of this patent

UNITED STATES PATENTS

2,019,625	O'Brien	Nov. 5, 1935
2,226,745	Schrack	Dec. 31, 1940
2,244,009	Hiensch	June 3, 1941
2,474,988	Sargrove	July 5, 1949
2,492,235	Mitchell	Dec. 27, 1949
2,512,162	Lips	June 20, 1950
2,707,272	Blitz	Apr. 26, 1955
2,762,987	Mackey	Sept. 11, 1956
2,764,713	Alden	Sept. 25, 1956
2,816,252	Sanders	Dec. 10, 1957
2,823,360	Jones	Feb. 11, 1958