

Sept. 7, 1965

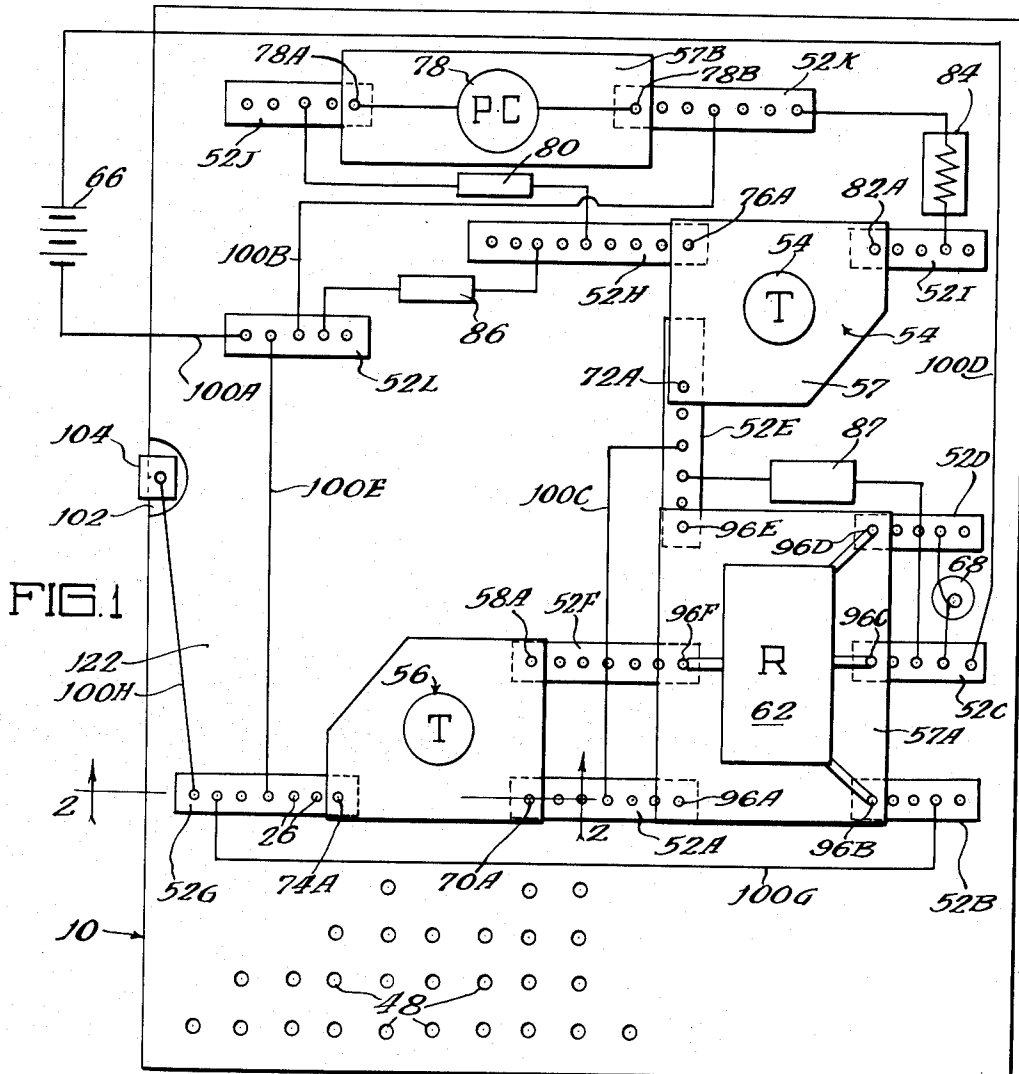
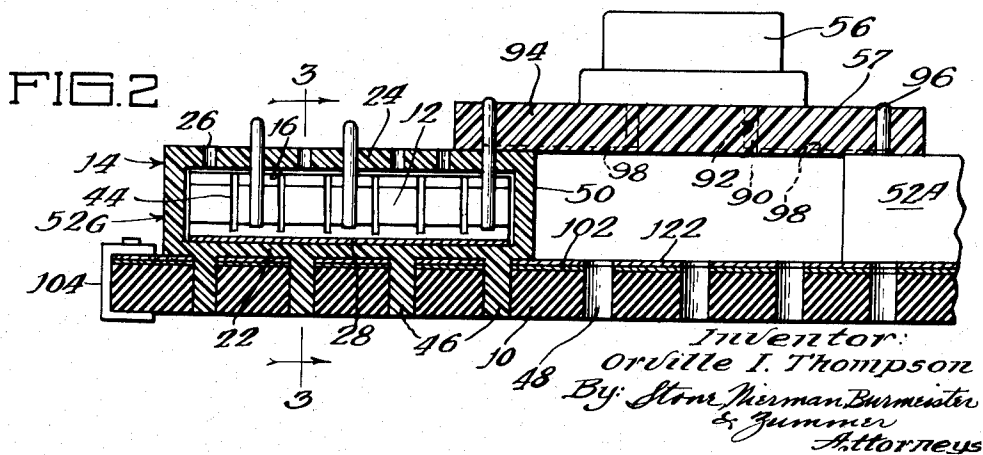
O. I. THOMPSON

3,205,407

DEVICE FOR CONSTRUCTING ELECTRICAL APPARATUS

Filed March 5, 1962

3 Sheets-Sheet 1



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DEVICE FOR CONSTRUCTING ELECTRICAL APPARATUS

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FIG. 3

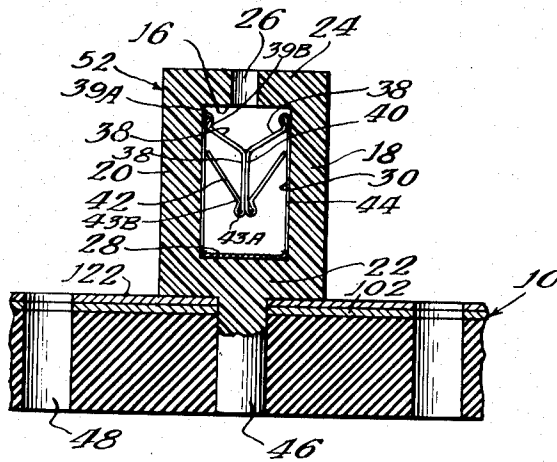


FIG. 4

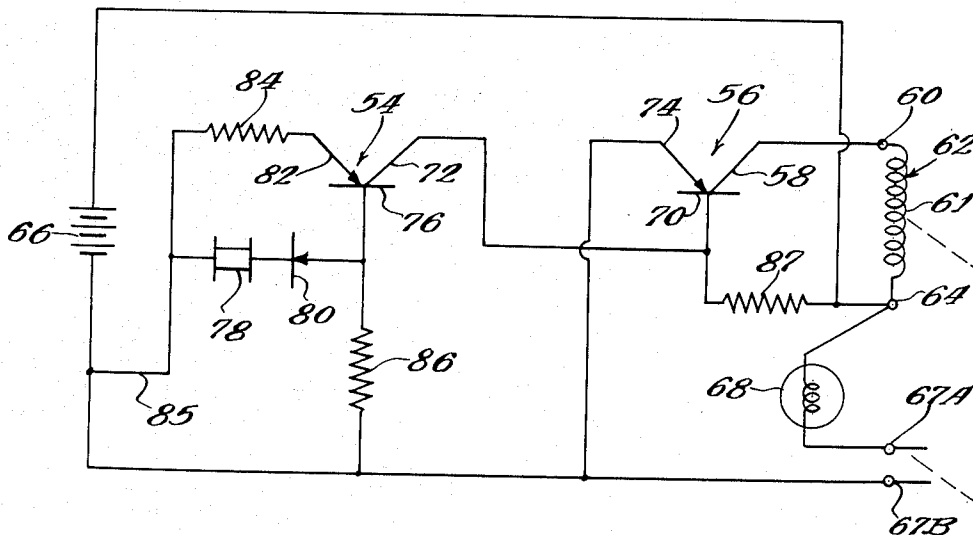
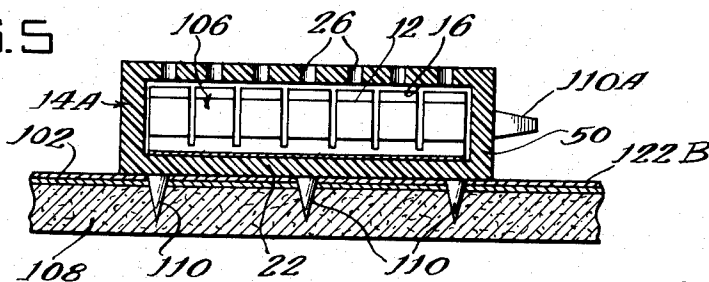


FIG. 5



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FIG. 6

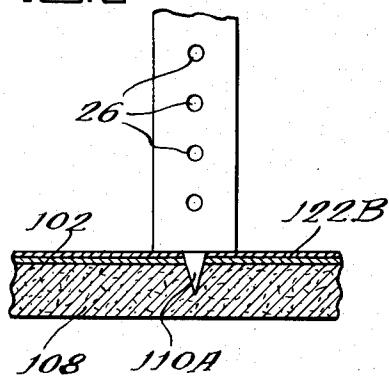


FIG. 8

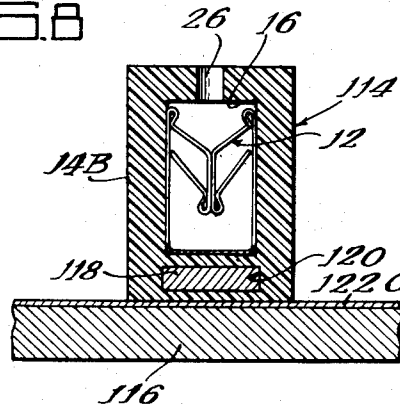


FIG. 7

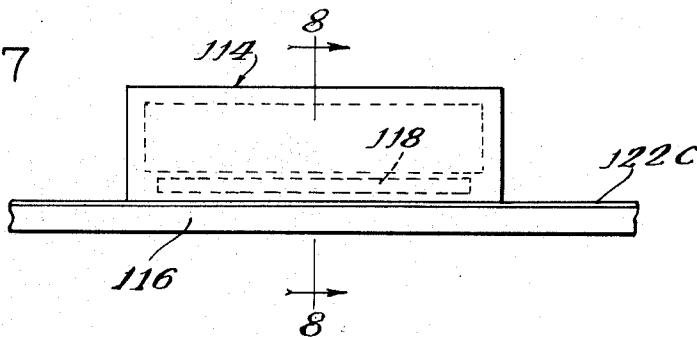
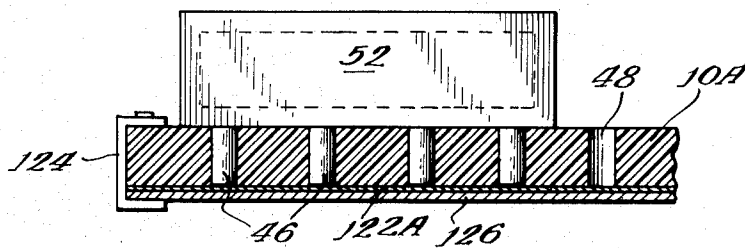


FIG. 9



Inventor:
Orville I. Thompson
By: Stone, Newman, Barnister
& Gummer
Attorneys

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DEVICE FOR CONSTRUCTING ELECTRICAL APPARATUS

Orville I. Thompson, Deerfield, Ill., assignor to De Vry Technical Institute, Inc., Chicago, Ill., a corporation of Illinois

Filed Mar. 5, 1962, Ser. No. 177,391

18 Claims. (Cl. 317-101)

The present invention relates generally to devices for facilitating construction of electrical equipment, and particularly to devices facilitating construction of electrical apparatus for instruction of students of electronics.

Patent No. 2,983,892 to Williams et al. entitled "Mounting Assemblage For Electrical Circuits" discloses a perforated board and plug-in connector for assembling electrical circuits. This construction facilitates mounting of pig tailed components between plug-in electrical clips, but is not adapted to mounting heavier electrical components. Also, the external surfaces of the plug-in clips are themselves electrically conducting giving rise to the possibility of short circuits.

Patent application Serial No. 41,290, now Patent No. 3,085,177, of the present inventor, filed July 7, 1960, entitled "Device for Constructing Electrical Apparatus" discloses a board of electrically insulating material which is provided with a plurality of spaced cavities which contain elongated jaw type contact members, and this device is not subject to the objections of the Williams device. Electrical contact may be achieved between two or more conductors by inserting the conductors through openings into one cavity and engaging a common contact member. Components are mounted on the board by the electrical terminals of the component in the form of prongs or pins mounted on the components, and these prongs also are permitted to enter the cavities of the board and engage the contact members. The cavities are spaced so that each of the prongs of a component enters a different cavity, thereby providing a separate contact member for electrical connection to each of the prongs of the component.

It is an object of the present invention to provide a board and contact member assembly for constructing electrical apparatus which has greater flexibility than the devices previously known to the art.

It is a further object of the present invention to provide an electrical contact device which is suitable for use with standard and conventional boards to provide a device for constructing electrical apparatus.

It is also an object of the present invention to provide a board and two or more contact members which may be mounted on the board at any desired distance from each other so that components may be directly mounted on the contact members by means of pins on the components spaced at any distance.

Further, it is an object of the present invention to provide a device for constructing electrical circuits which comprises a board and a plurality of contact members and which is provided with an electrostatic shield.

Additionally, it is an object of the present invention to provide devices for constructing electrical circuits which utilize conventional boards and contact members mountable thereon and which are provided with means for mounting an electrical circuit diagram on the board to facilitate construction of an electrical device.

These and further objects of the present invention will become readily apparent to those skilled in the art from a further consideration of the present disclosure, particularly when viewed in the light of the drawings, in which:

FIGURE 1 is a plan view of an electrical device constructed by means of a board and contact members in

accordance with the teachings of the present invention;

FIGURE 2 is a fragmentary sectional view taken along the line 2-2 of FIGURE 1;

FIGURE 3 is a sectional view taken along the line 3-3 of FIGURE 2;

FIGURE 4 is a schematic electrical circuit diagram of the electrical device illustrated in FIGURE 1;

FIGURE 5 is a fragmentary sectional view of a modified form of the contact member and board assembly;

FIGURE 6 is a fragmentary sectional view illustrating another application of the contact member and board assembly illustrated in FIGURE 5;

FIGURE 7 is a fragmentary elevational view of still another embodiment of the present invention illustrating a different board and contact member assembly;

FIGURE 8 is a sectional view taken along the line 8-8 of FIGURE 7; and

FIGURE 9 is a fragmentary sectional view of still another embodiment of the present invention.

The embodiment of the invention illustrated in FIGURES 1, 2 and 3 employs a perforated board of electrical insulating material of the type generally referred to as a pegboard, designated 10. The board 10 is a commercially available board and may be obtained in a wide range of sizes and shapes. A plurality of contact members 12 are mounted on this board 10 by means of a casing 14 which surrounds each contact member 12.

The casing 14 is best illustrated in FIGURES 2 and 3, and is constructed of electrically insulating material, such as polyethylene plastic. The casing 14 is in the form of an elongated quadrangular bar with an elongated quadrangular cavity 16 disposed therein. The casing 14 has a pair of parallel side walls 18 and 20, a bottom wall 22, and a top wall 24. The walls 18 and 20, 22 and 24 form the cavity 16, which is rectangular in shape. The top wall 24 has a plurality of apertures 26 arranged in a line confronting the axis of elongation of the casing 14.

The contact member 12 is disposed within the cavity 16 of the casing and is adapted to receive pins or prongs and contact wires inserted into the cavity through the aperture 26. The contact member 12 is preferably of the type disclosed in patent application Serial No. 41,290 entitled "Device For Constructing Electrical Apparatus" and patent application Serial No. 106,225 entitled "Electrical Contact Device" of the present inventor, now Patent No. 3,085,177. Other types of contact members, such as that disclosed by Hoberg in Patent No. 2,922,135 are also suitable.

As illustrated in FIGURES 2 and 3, the contact member 12 is constructed of resilient electrically conducting material, such as copper coated spring steel, and is fabricated from a flat sheet of this material. The contact member 12 has a flat base 28 which is disposed on the surface of the bottom wall 22 of the casing 14. A pair of walls 30 and 32 extend from the base 28 of the contact member 12 and are spring biased outwardly to engage the parallel side walls 18 and 20 of the casing 14. The edge of the walls 30 and 32 of the contact member 12 opposite the base 28 thereof connect with a leaf portion 38 by means of 180 degree bends 39A into the cavity and reverse bends 39B of less than 90 degrees. The leaf, or face portions of the contact member extend toward the center of the cavity 16, and at approximately the center thereof are bent at a right angle to the flat base 28 and extend toward the base 28, this section of the leaf portion being designated 40. The leaf portion 38 attached on the wall 30 and the leaf portion 38 attached on the wall 32 abut each other in the sections 40 thereof, referred to as flat strip portions, and a terminating support portion 42 extends from the end of the flat strip portions 40 confronting the base 28 to abut the wall 30 or 32 in

order to aid in spring biasing the flat strip portions 40 toward each other. The support portions 42 are connected to the flat strip portions 40 by a bend 43A of approximately 180 degrees and a bend 43B of less than 90 degrees.

The contact member 12 has a longitudinal axis slightly less than the axis of elongation of the cavity 16, and is provided with slots 44 (FIGURE 2) which extend through the walls 30 and 32 and the portions 38, 40 and 42 so that the portions 40 which abut each other are essentially independently sprung jaws. The slots 44 are disposed between the apertures 26 confronting the cavity 16 so that each aperture immediately confronts one pair of abutting portions 40 of the contact member 12, or one pair of jaws.

Each casing 14 has at least one peg 46 extending normally from the bottom wall 22 on the side thereof opposite the contact member 12. These pegs 46 removably but snugly engage the perforations 48 in the pegboard 10. In conventional pegboards, the perforations 48 are disposed along normally intersecting lines at equal distances from each other, as illustrated in FIGURE 1. Accordingly, the pegs 46 of a given casing 14 are disposed on a common line and spaced from each other by the same distance as the spacing between perforations of the board 10. As illustrated, the casing 14 is provided with four pegs 46 which extend normally from the wall 22 thereof at equal distances in a common line, although it is to be understood that the casing 14 may contain more or fewer pegs 46, and may even contain pegs oriented along lines disposed normal to each other or two or more parallel lines. Further, the casing 14 is provided with pegs extending normally only from the bottom wall 22, and pegs may also be provided to extend normally from the side walls 18 or 20, or from the ends thereof, designated 50.

The contact member 12 and its associated casing 14 may be referred to as a contact unit, designated 52, and a plurality of contact units are employed with a pegboard 10 and circuit components and connecting links to form an electrical device. FIGURE 1 illustrates such a device, and is merely exemplary of what can be accomplished by means of pegboards 10 and contact units 52. In FIGURE 1, eleven contact units are mounted on a conventional pegboard 10, and by means of connecting links, components, and adaptors, form a photocell excited transistor switching circuit. It is to be understood that the present invention may be practiced with other electrical circuits in order to assemble and construct virtually any type of electrical device, such as a receiver, amplifier, oscillator, trigger circuit, battery charger, power supply, and the like.

The schematic electrical circuit diagram of FIGURE 4 illustrates the circuit of the photocell switching device shown in FIGURE 1. The circuit uses two transistors 54 and 56 connected in an amplifier and a grounded emitter switching circuit, respectively. The transistor 56 of the switching circuit has a collector 58 connected to one terminal 60 of the coil 61 of a relay 62. The other terminal 64 of the coil 61 is connected to the positive terminal of a power source 66. The relay 62 has a pair of switch contacts 67A and 67B, and one of the switch contacts 67A is connected to the terminal 64 of the coil 61 through a lamp 68. The other contact 67B is connected to the negative terminal of the power source 66.

The transistor 56 also has a base 70 which is connected to the collector 72 of the transistor 54. The transistor 56 has an emitter 74 which is connected to the negative terminal of the power source 66.

Transistors 54 serves as an amplifier and has a base 76 which is connected to a photocell 78 through a diode 80. The photocell 78 is connected in series with the emitter 82 of the transistor 54 through a resistor 84 and is also connected to the negative terminal of the power source 66. A resistor 86 is connected between the negative

terminal of the power source 66 and the base 76 of the transistor 54. A resistor 87 is connected between the collector 72 and the terminal 64 of the relay 62.

In the physical construction of the photocell switching circuit illustrated in FIGURES 1 and 2, each of the transistors 54 and 56 is mounted on an adaptor. The transistors are provided with depending lugs 90 which extend through apertures 92 in a thin board 94 of electrically insulating material, such as fiberboard or Bakelite. Pins 96 are anchored within the board 94 and extend normally therefrom. Each of the pins 96 is connected to one of the lugs 90 of the transistor by an electrically conducting strip 98. The pins 96 are illustrated as positioned adjacent to the corners of the board 94, although due to the versatility of the apparatus of the present invention it is not necessary that the pins be so located. It is also to be understood that the transistors 54 and 56 may be mounted in sockets which are affixed to the board 94, so that the transistor may be replaced. FIGURES 4 and 6 of the application Serial No. 41,290 of the present inventor disclose such a construction. Further, it is to be recognized that other components in addition to transistors may be mounted on adaptor boards of the type here disclosed, such components including coils, relays, vacuum tubes, and other elements which are not provided with pigtailed or which possess excessive weight for adequate support by the provided pigtailed.

FIGURE 1 illustrates a relay mounted on an adaptor board designated 57A. This board is provided with six contact units designated 52A, 52B, 52C, 52D, 52E and 52F which support the relay 62 and provide the means for electrical contact with the coil 61 and contacts 67A and 67B. The coil 61 is electrically connected to a pin 96C which is mounted on contact unit 52C. The coil 61 is also connected electrically to the pin 96F which is mounted on the contact unit 52F. The contact 67B is electrically connected to the pin 96B which is mounted on the contact unit 52B. The contact 67A is electrically connected to the pin 96B which is mounted on the contact unit 52D.

Each of the contact units 52A, 52B, 52C, 52D, 52E, and 52F have their pegs 46 securely disposed within perforations 48 in the pegboard 10, thereby providing adequate support for the relay. Further, the contact units 52A and 52F are utilized in mounting the transistor 56. The collector 58 of the transistor 56 is connected to a pin 96A which is mounted on the contact unit 52F, and the base 70 of the transistor 56 is electrically connected to a pin 96A which is mounted on the contact unit 52A. The third element of the transistor 56 is the emitter 74 which is connected to a pin 96A, and the pin 96A is mounted on a contact unit 52G.

In addition to the contact unit 52E, described above, the transistor 54 is mounted on two contact units 52H and 52I. The base 76 of the transistor 54 is electrically connected to a pin 96A which is mounted on the contact unit 52H, while the emitter 82 of the transistor 54 is connected to a pin 96A which is mounted on the contact unit 52I.

Two contact units 52J and 52K are utilized to mount the photocell 78. The photocell 78 is mounted on an adaptor plate 57B which contains two pins 96A and 96B, and the pin 96A is mounted on the contact unit 52J while the pin 96B is mounted on the contact unit 52K. There is an additional contact unit 52L which is utilized for mounting electrical conductors and the pigtailed of the resistor 86.

It will be seen from comparing FIGURES 1 and 4, that the apparatus illustrated in FIGURE 1 employs the circuit schematically illustrated in FIGURE 4. The negative terminal of the power source, or battery 66, is connected to the contact unit 52L by an electrical conductor 100A and the resistor 86 extends from the contact unit 52L to the contact unit 52H, thereby making electrical contact to the base 76 of the transistor 54. One pigtail of the diode 80 is mounted on the contact unit 52H, and the other

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pigtail of the diode 80 is mounted on the contact unit 52J, thereby connecting the diode 80 in series with the photocell 78. The pin 78B, which is mounted on the contact unit 52K and connected to the photocell 78, is connected to the negative terminal of the battery 66 by means of a conductor 100B which extends between the contact units 52K and 52L. The resistor 84 is also connected to the contact unit 52K and to the contact unit 52I, thereby connecting the resistor 84 between the negative terminal of the power source and the emitter of the transistor 54. The collector 72 of the transistor 54 is connected to the base 70 of the transistor 56 by an electrical conductor 100C which extends between the contact unit 52E and the contact unit 52A. It is to be noted that both of these contact units provide support for the relay 62, but pins 96A and 96E of the relay 62 are not connected to electrical elements of the relay. The collector 72 of the transistor 54 is also connected to the positive terminal of the power source by means of the resistor 87 mounted between the contact unit 52E and the contact unit 52C, an electrical conductor 100D connecting the positive terminal of the power source 66 to the contact unit 52C.

The collector 58 of the transistor 56 is directly connected to one end of the coil 61 of the relay 62 by the contact unit 52F. The emitter 74 of the transistor 56 is connected to the negative terminal of the power source 66 by an electrical conductor 100E which extends between the contact unit 52L and the contact unit 52G. An electrical conductor 100G extends between the contact unit 52G and the contact unit 52B to connect the negative terminal of the power source to one of the contacts 67B of the relay 62. The lamp 68 is directly mounted between the contact units 52C and 52D.

A coating 102 of electrically conducting material is disposed on the board 10 to form an electrostatic shield, as shown in FIGURE 2. This coating 102 is preferably in the form of a silver film which will not materially change the diameter of the perforations 48 of the board 10. The coating 102 may also be provided by an electrically conducting foil, such as copper, which is cemented or otherwise secured to the surface of the board 10. This foil is preferably connected to a fixed potential in the circuit, such as the negative terminal of the battery 66. For this purpose, a clip 104 is mounted about the perimeter of the board, an electrical conductor 100H extends between the clip 104 and the contact unit 52G. Because of the fact that the only contact of the electrical components to the board 10 is through the casing 14 of the contact units, the electrically conducting layer 102 will not complicate the wiring of the electrical circuit.

FIGURE 5 illustrates a modified form of contact unit and board, the contact unit of FIGURE 5 being designated 106 and the board 108. The contact unit 106 is similar to the contact unit 52 in that it contains a rectangular casing 14A which has a cavity therein which is identical to the cavity 16 of the contact units 52, and is so designated. Likewise, a contact member is disposed within the cavity 16 which is identical to the contact member of the contact units 52, and has likewise been designated by the reference numeral 12. The contact unit 106, however, differs from the contact units 52 in that hard metal pointed pins 110 extend from the bottom wall 22 of the unit rather than the cylindrical pegs of the contact units 52. These pointed pins 110 pierce the board 108 which is constructed of a relatively soft material, such as Celotex or other fibrous material. As illustrated, three such pins 110 are provided extending perpendicular from the bottom wall 22 of the casing 14A in a line, although it is to be understood that the pins 110 may be placed in any configuration desired, such as the corners of a triangle.

Further, FIGURES 5 and 6 illustrate a pin 110A mounted on one of the ends 50 of the casing 14A. This pin 110A is designed to mount the elongated casing 14A with its axis of elongation perpendicular to the board 108. In order to prevent rotation of the casing 14A relative to

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the board 108, the pin 110A is pointed in one plane, but relatively wide in the other plane.

The board 108 is also provided with an electrically conducting foil layer 102 on its surface confronting the casing 14A. It is to be understood that the contact units 106 and board 108 may be used as a full substitute for the contact units 52 and board 10 of the embodiment of FIGURES 1 through 3. The photocell switching circuit constructed in FIGURE 1 may be constructed by replacing the contact units 52 there illustrated and the board 10 there illustrated with the contact units 106 and board 108 illustrated in FIGURES 5 and 6.

FIGURES 7 and 8 illustrate still another contact unit 114 which is utilized with a board 116. The contact unit 114 and board 116 again may be substituted for the contact units 52 and board 10 illustrated in FIGURES 1 through 3. In this embodiment of the invention, the board 116 is fabricated of ferromagnetic material, such as sheet steel, and the contact member 114 is provided with a magnet 118 for securing the contact unit 114 in a fixed position relative to the ferromagnetic board 116.

As illustrated in FIGURE 8, the contact unit 114 has a casing 14B which is provided with an upper cavity 16 which is identical to the cavity 16 of the contact units 52 and 106 described hereinbefore. Likewise, a contact member 12 is disposed within the cavity 16 confronting a plurality of apertures 26. The casing 14B is constructed of electrically insulating material, and also non-magnetic material. A lower cavity 120 is disposed beneath the upper cavity 16, and the magnet 118 is mounted within this lower cavity 120.

It is often desirable to provide circuit diagrams, either of the schematic type illustrated in FIGURE 4, or of a symbolic type which may appear substantially identical to that shown in FIGURE 1, to aid the technician constructing the electrical device. This is particularly true if the technician is a student undertaking a course of training in electrical circuits and the like. FIGURES 1 through 3 illustrate such a diagram plate 122 mounted between the metal coating 102 and the casings 14 of the contact units to extend into the perforations 48 of the board 10, the diagram 122 must also be perforated. By perforating the diagram 122 only in the proper locations, the diagram will be maintained in its proper position on the board 10, and the student will be required to mount the contact units 52 in the proper locations. It is of course to be understood that it is not necessary to employ a metal layer 102, and the diagram 122 may be disposed in immediate contact with the perforated board 10.

FIGURE 9 illustrates a construction in which the circuit diagram, which may be either schematic or symbolic, is positioned beneath the board and viewed through the board. In the construction of FIGURE 9, the board 10A is transparent, but otherwise identical to the board 10 illustrated in FIGURES 1 through 3. The board may be constructed of transparent plastic, such as polyethylene, and contains the same perforations 48 illustrated in FIGURE 1. Also, the same contact units illustrated in FIGURES 1 through 3 are employed in the embodiment of FIGURE 9, the pegs 46 extending into the pegboard 10A, but not beyond the surface of the board remote from the casing 14 of the contact units 52. The diagram, which is identical to the diagram disclosed in the embodiment of FIGURES 1 through 3 except it is not perforated, carries the reference numeral 122A and is positioned in abutment with the surface of the board 10A opposite the contact units 52. The diagram may be of sufficient stiffness to be maintained in position by a plurality of U-shaped clamps 124 positioned at intervals about the perimeter of the board 10A, or may be provided with a backing board 126 which provides the desired structural strength. The backing board 126 is of identical size and shape as the perforated board 10A and the diagram 122, and is positioned on the side of the diagram 122 remote from the board 10A. The backing board 126 is preferably constructed

of electrically conducting material, since the metal foil or layer positioned between the board and the contact units 52 cannot be used in this construction due to the fact that such foils are opaque. When the backing board 126 is constructed of electrically conducting material, the U-shaped clamps 124 should also be constructed of electrically conducting material, and at least one of the clamps should form the function of the clamp 104 disclosed in FIGURE 1, that is, provide an electrically conducting link to a fixed potential point in the circuit to provide an effective ground.

In the embodiment of FIGURES 5 and 6, a diagram, either schematic or symbolic, may be positioned on the side of the electrically conducting foil 102 remote from the board 108, this diagram being designated 122B in FIGURES 5 and 6. The same construction may be employed in the embodiment of FIGURES 7 and 8, that is, a diagram 122C may be placed between the ferromagnetic board 116 and the contact units 114.

Those skilled in the art will readily devise many applications for the present invention not specifically set forth herein. Further, those skilled in the art will readily modify the present invention to bring it within the purview of other surroundings. It is therefore intended that the scope of the present invention be not limited by the foregoing disclosure, but rather only by the appended claims.

I claim:

1. A mounting assemblage to facilitate construction of an electrical device from a plurality of electrical components with wire-shaped terminals electrically interconnected at a plurality of electrical junctions comprising a flat board having two transverse axes passing through a point located on the board, a plurality of contact units disposed on the surface of the board and distributed on said surface about the point of the board, each of said contact units being adapted to form one of the electrical junctions of the electrical device and each of said contact units having a casing of electrically insulating material with a flat base and two transverse axes small compared to the transverse axes of the board, each of said contact units containing means cooperative with the board for maintaining the base of said contact unit in abutment with said surface of the board in any one of a plurality of positions on said surface of the board, said positions being distributed over the surface of the board and said maintaining means permitting manual movement of each of said contact units between positions on said board, each unit having a cavity therein and orifice means extending from the cavity to the exterior thereof adapted to receive the wire-shaped terminals of the components, an electrical contact disposed in the cavity of each unit having two confronting jaws of electrically conducting material, said electrical contact being adapted to engage a plurality of wire-shaped terminals and thereby electrically interconnect said plurality of terminals, whereby a junction of the electrical device may be made by inserting only the wire-shaped terminals to be interconnected at said junction between the jaws of a single electrical contact unit.

2. A mounting assemblage for electrical devices comprising the combination of claim 1 wherein the board is constructed of fibrous material, and the means for securing each casing to the board comprises at least one pin extending from the casing and provided with a pointed surface for penetrating the board.

3. A mounting assemblage for an electrical device comprising the combination of claim 1 wherein the board is constructed of ferromagnetic material, and the means for removably securing each casing on the surface of the board comprises a permanent magnet mounted on said casing.

4. A mounting assemblage to facilitate construction of an electrical device from a plurality of electrical components with wire-shaped terminals electrically interconnected at a plurality of electrical junctions comprising the combination of claim 1 wherein the means for mount-

ing the casing on the surface of a board comprises a plurality of pointed pins protruding from the base of the casing and adapted to penetrate a fiber board.

5. A mounting assemblage to facilitate construction of an electrical device from a plurality of electrical components with wire-shaped terminals electrically interconnected at a plurality of electrical junctions comprising the combination of claim 1 wherein the means for mounting the casing comprises a magnet mounted on the casing adjacent to the base.

6. An electrical device comprising the combination of claim 1 in combination with an adapter having a flat board and at least two electrically conducting pins extending from the board, each of said pins entering the cavity of a different contact unit through the orifice means thereof and engaging the electrical contact therein, and an electrical component mounted on the board of the adapter having terminals electrically connected to the pins.

7. A mounting assemblage to facilitate construction of an electrical device from a plurality of electrical components with wire-shaped terminals electrically interconnected at a plurality of electrical junctions comprising the combination of claim 1 wherein a contact unit comprises a six walled elongated quadrangular casing of electrically insulating material provided with an elongated quadrangular cavity therein with surfaces parallel to the walls of the casing, said casing having a plurality of equally spaced apertures disposed along the central axis of one wall thereof, each of said apertures being adapted to receive an electrically conducting pin, a single electrical contact disposed in the cavity comprising a sheet of electrically conducting resilient material having a flat base disposed in abutment with the surface of the cavity opposite the apertured wall thereof, said sheet having a pair of flat walls extending normally from the edges of the base parallel to the axis of elongation of the casing and disposed in abutment with the confronting surfaces of the cavity normal to the orificed wall of the casing, said sheet having an approximately 180 degree bend toward the axis of the casing of the edge of each wall opposite the face and a bend in the opposite direction of less than 90 degrees disposed immediately adjacent to each of the 180 degree bends, said 180 degree bends and 90 degree bends forming two flat faces extending from the bends into the cavity of the casing, the interior edge of each of said flat faces terminating in an obtuse angle forming a strip portion disposed parallel to the wall of the sheet, the two strip portions being disposed in abutment with each other and terminating at the ends opposite the obtuse angle in a 180 degree bend toward the walls of the sheet, said sheet having bends in the reverse direction of less than 90 degrees immediately adjacent to each of the latter 180 degree bends forming support strips which extend into abutment with the walls of the sheet.

8. A mounting assemblage to facilitate construction of an electrical device comprising the combination of claim 7 wherein the means for mounting the casing on the surface of a board comprises a plurality of pointed pins protruding from the wall of the casing opposite the apertured wall thereof.

9. A mounting assemblage to facilitate construction of an electrical device comprising the combination of claim 7 wherein the casing is provided with a second cavity on the side of the first cavity remote from the apertured wall, and the means for mounting the casing comprises a permanent magnet disposed within the second cavity, the casing being constructed of non-magnetic material.

10. An electrical device comprising the combination of claim 7 and an adaptor having a flat board and at least two electrically conducting pins extending from the board, each of said pins entering the cavity of a different contact unit through an aperture thereof and engaging the

electrical contact therein, and an electrical component mounted on the board of the adapter having terminals electrically connected to the pins.

11. A mounting assemblage for electrical devices comprising, in combination: a board of ferromagnetic material having a generally flat surface; a plurality of contact units, each unit having a casing of electrically insulating material provided with a flat side and a cavity therein, each contact unit having a plurality of spaced orifices extending from a portion of the exterior thereof remote from the flat side into the cavity adapted to permit a wire to be inserted into the cavity, an electrically conducting member disposed within the cavity of each casing having a plurality of pairs of jaws, one pair of jaws confronting each orifice and being adapted to engage a wire inserted through that orifice, and the casing of each of said contact units having a permanent magnet structure adjacent to the flat surface thereof, said magnet structure mounting the flat surface of the casings on the flat surface of the board and retaining the contact units in position, whereby wire terminals of electrical components may be inserted into the orifices of the contact units to mount the components on the contact units and the wire terminals of a plurality of components may be inserted in a common contact unit to electrically interconnect said components.

12. A mounting assemblage for electrical devices comprising, in combination: a board of ferromagnetic material having a generally flat surface; a plurality of contact units, each unit having a six walled elongated quadrangular casing of electrically insulating non-magnetic material provided with an elongated quadrangular cavity therein with surfaces parallel to the walls of the casing, said casing having a plurality of orifices disposed along the longitudinal axis of one of the walls of the casing, each orifice being adapted to receive a pin for insertion into the cavity, a single electrical contact disposed in the cavity comprising a sheet of electrically conducting resilient material having a flat base disposed in abutment with the surface of the cavity opposite the wall of the casing having the orifice means, said sheet having a pair of flat walls extending normally from the edges of the base in abutment with the confronting surfaces of the cavity normal to the orificed wall of the casing, said sheet having a flat face extending from the end of each of the flat walls adjacent to the orificed wall and disposed at an acute angle to a wall thereof, said member having a pair of confronting strip portions normal to the base portion and extending from the two face portions confronting each of the orifices, said strip portions forming a pair of jaws confronting each of the orifices, and a permanent magnet structure disposed within the casing between the cavity and the surface of the wall opposite the orificed wall.

13. A mounting assemblage for an electrical device having a plurality of electrical components with wire-shaped terminals electrically interconnected to form a plurality of electrical junctions comprising, a flat board having a center and two transverse axes passing through the center of the board, a plurality of contact units equal to the number of junctions of the electrical circuit disposed on the same surface of the board and distributed on said surface about the center of the board, each of said contact units having a casing of electrically insulating material with a flat base and two transverse axes small compared to the transverse axes of the board, each of said contact units containing means cooperative with the board for maintaining the base of said contact unit in abutment with said surface of the board in any one of a plurality of positions on said surface of the board, said positions being distributed over the entire surface of the board and said maintaining means permitting manual movement of each of said contact units between positions on said board, each unit having a cavity therein and orifice means extending from the cavity to the exterior

thereof adapted to receive the wire-shaped terminals of the components, electrical contact means disposed in the cavity of each unit having a plurality of pairs of confronting jaws of electrically conducting material, the pairs of jaws being electrically interconnected, whereby each junction may be formed by inserting only the wire-shaped terminals to be interconnected at said junction between the jaws of a single contact unit, and all junctions of the electrical circuit may be formed in this manner to complete the electronic device.

14. A mounting assemblage for an electrical device having a plurality of electrical components with wire-shaped terminals electrically interconnected to form a plurality of electrical junctions comprising, the combination of claim 13 wherein the contact units may be mounted at an infinite number of positions on the board and the means for maintaining the base of the contact units adjacent to the board comprise a permanent magnet disposed within each contact unit and ferromagnetic material disposed within the board.

15. A mounting assemblage for an electrical device having a plurality of electrical components with wire-shaped terminals electrically interconnected to form a plurality of electrical junctions comprising the combination of claim 13 wherein the board is provided with a plurality of parallel rows of cylindrical perforations of the same size extending normally through the board, said perforations in each row being spaced by a common distance and the rows being spaced from each other by the same distance, the perforations in each row being disposed upon axes normal to the rows, and each of the contact units having a plurality of cylindrical pegs disposed in a common plane extending normally from the base of said unit, said pegs being spaced from each other by the same distance as the spacing between rows of the board and having a diameter slightly smaller than the diameter of the perforations in the board.

16. A mounting assemblage for an electrical device having a plurality of electrical components provided with wire-shaped terminals electrically interconnected to form a plurality of junctions comprising, in combination, a flat board having two transverse axes, and means for forming a plurality of the junctions of the electronic device and mounting the components forming said junctions on the board consisting of a contact unit for each junction having a six walled elongated quadrangular casing of electrically insulating material, said casing having cross-sectional dimensions substantially smaller than the transverse axes of the board and being provided with an elongated quadrangular cavity therein with surfaces parallel to the walls of the casing, said casing having a plurality of orifices disposed along the longitudinal axis of one of the walls of the casing, each orifice being adapted to receive a single wire-shaped terminal of a component for insertion into the cavity, a single electrical contact disposed in the cavity comprising a sheet of electrically conducting resilient material having a pair of confronting jaws confronting each of the orifices in the one wall and adapted to engage a wire-shaped terminal inserted into the cavity through said orifice, said sheet electrically interconnecting the pairs of jaws thereof to electrically interconnect terminals inserted through the orifices thereof and form a junction, and means mounted on the casing for retaining the casing on the surface of the board with the wall of the casing opposite the orificed wall being in abutment with the board, whereby those components whose wire-shaped terminals are disposed between the jaws of the contact member are electrically interconnected and supported by the board.

17. A mounting assemblage for an electrical device having a plurality of electrical components provided with wire-shaped terminals electrically interconnected to form a plurality of junctions comprising the combination set forth in claim 16 wherein the means for retaining the

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casing on the surface of the board yields to manual force for removing the casing from the board, and the jaws of the contact release the wire-shaped terminal members responsive to a manual force.

13. A mounting assemblage to facilitate construction of an electrical device from a plurality of electrical components with wire-shaped terminals electrically interconnected at a plurality of electrical junctions comprising the combination of claim 1 wherein the means for maintaining the base of the contact units in abutment with the surface of the board comprises a plurality of equally spaced pegs extending from the base of the contact unit parallel to each other in a common plane, and the board having a plurality of apertures adapted to accommodate the pegs and disposed at spacings equal to the spacing between pegs in a plurality of parallel rows.

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JOSEPH D. SEERS, *Primary Examiner.*

THOMAS J. HICKEY, *Examiners.*