Oct. 16, 1962 R. JOHNSON 3,059,204

MULTIRECEPTACLE ELECTRIC SYSTEM WITH COMPOUND GROUND

Filed Feb. 10, 1959

Fig. 1

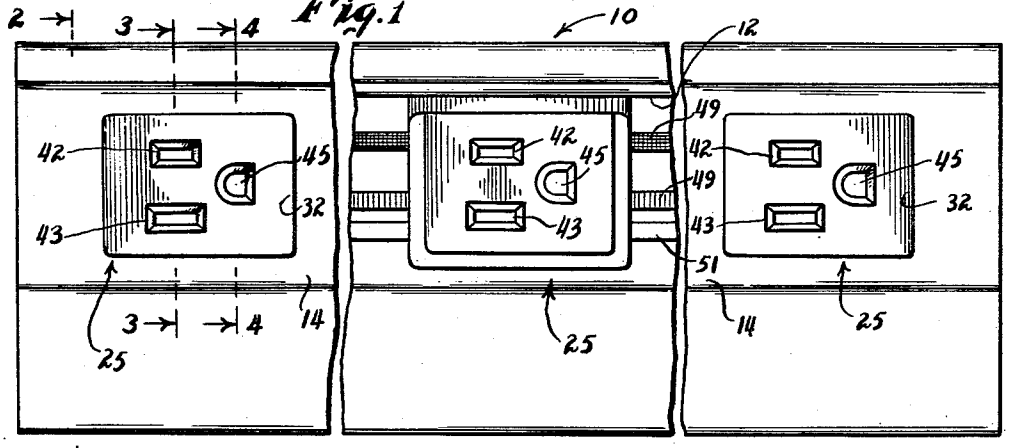


Fig. 2

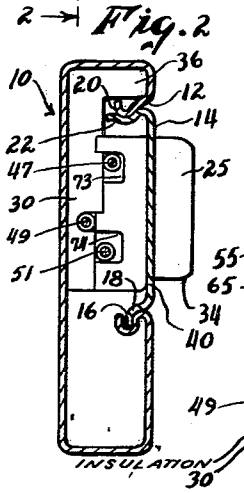


Fig. 3

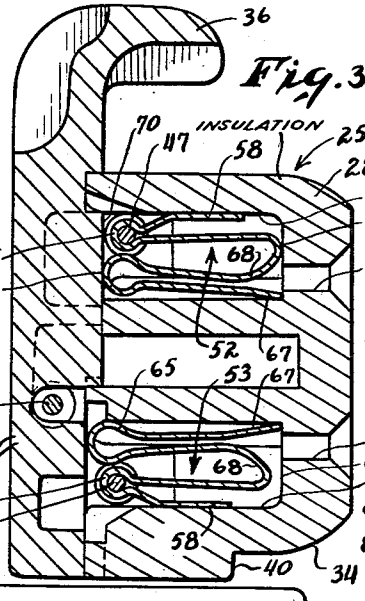


Fig. 4

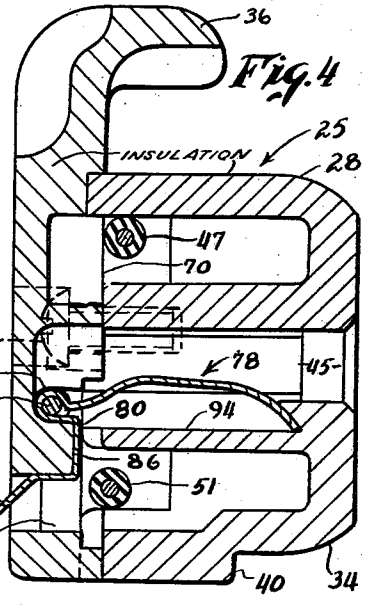
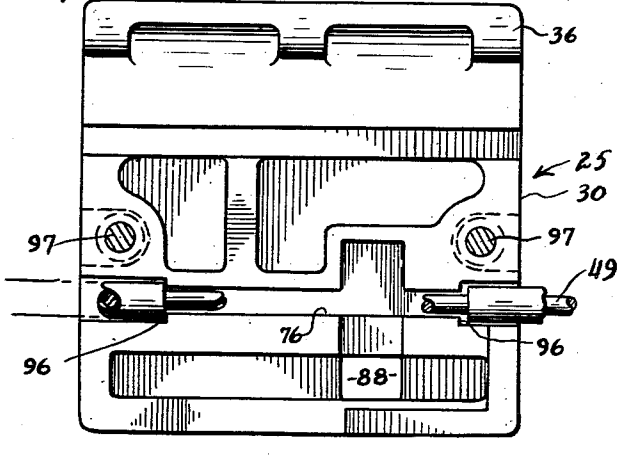


Fig. 5



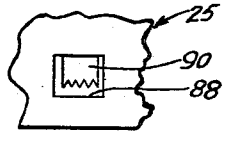


Fig. 6.

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MULTIRECEPTACLE ELECTRIC SYSTEM WITH COMPOUND GROUND

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4 Claims. (Cl. 339—14)

This invention relates to multiple outlet electrical systems such as are located along a baseboard in a room or along the back of a work bench.

These systems have metal housings which are assembled from modular sections connected together for circuit continuity. It is a requirement of the fire underwriters that the receptacles in such systems be grounded on the metal housing.

In some installations, the connections between modular sections of the housing are defective; and when the continuity is originally complete, it may not remain so. It is an object of this invention to provide greater safety for base duct systems by providing an additional access to ground, and to do so without changing the grounding of the receptacles on the duct, as required by the underwriters.

In addition to the safety provisions of such grounding connections for the equipment, it is particularly advantageous to ground certain types of electronic laboratory circuits so that stray currents in one piece of equipment can not affect the operation of circuits in adjacent equipment. While outlets with grounding connections are common in the prior art, the present invention provides an improved construction and combination for obtaining grounding of equipment through the receptacles and in combination with a grounded housing.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIGURE 1 is a fragmentary front elevation, partly broken away, of a multiple receptacle outlet system made in accordance with this invention;

FIGURE 2 is an enlarged sectional view taken on the line 2—2 of FIGURE 1;

FIGURES 3 and 4 are greatly enlarged sectional views taken on the lines 3—3 and 4—4, respectively, of FIGURE 1;

FIGURE 5 is a front elevation of the rearward portion of one of the receptacles, with the front portion removed, and

FIGURE 6 is a fragmentary detail view showing the teeth on the grounding projection shown in FIGURE 4.

FIGURES 1 and 2 show a housing 10 with a longitudinally extending front opening 12 closed by a cover 14. Along the lower edge of the opening 12, the housing 10 is folded to provide a recess 16 for receiving a tongue 18 of the front cover 14.

Along the upper edge of the opening 12, the housing 10 is provided with a bead 20 which engages in a recess of an inwardly extending lip 22 along the top of the cover 14. The front cover 14 is placed in the housing 10 by first engaging the tongue 18 in the recess 16 and then swinging the cover counterclockwise in FIGURE 2, and snapping the lip 22 into engagement with the bead 20.

In order to remove the cover 14, a screwdriver or other tool is inserted into a clearance between the top of the cover 14 and the confronting surface of the housing 20. The tool is then moved to pry the lip 22 past the bead 20, and the cover is thus disengaged from the housing and swung outwardly so that it can be removed from the recess 16.

Within the housing 10, at spaced regions along the length of the housing, there are receptacles 25. These receptacles are preferably made of plastic or other electrical insulating material, and each receptacle includes a forward portion 28 and a rearward portion 30. The forward portion 28 extends through an opening 32 in the cover 14. There is some clearance between the receptacle 25 and the opening 32; and this clearance, combined with curved surfaces 34 of the receptacle, permits the cover 14 to swing outwardly clear of each receptacle 25.

The rearward portion 30 of each receptacle 25 extends upwardly into the part of the housing 10 above the bead 20, and there is a forwardly extending hook 36 at the top of each receptacle for engaging with the surface of the housing 10 above the bead 20. This hook 36 supports the receptacles 25 in the housing 10, but the receptacles can be rocked counterclockwise, in FIGURE 2, to disengage the hook 36 and to remove a receptacle from the housing when the cover 14 is not in place.

There is a shoulder 40 on each receptacle 25; and the cover 14 bears against this shoulder 40 and holds the receptacle 25 against the back wall of the housing 10 when the cover 14 is in its intended assembled relation with the housing 10, as shown in FIGURE 2.

Each receptacle 25 has three openings through the forward portion 28. These openings include upper and lower openings 42 and 43, respectively, for receiving the prongs of a drop cord which are at opposite sides of a load circuit. A third opening 45 is located to one side of the openings 42 and 43 and at an intermediate level of the receptacle 25.

In order to insure proper orientation of the plug connection of a drop cord, the openings 42 and 43 are of different size; and when used with a drop cord having prongs of corresponding size, the drop cord can be inserted in one direction only. The third opening 45 is preferably of a different shape from the other openings and is used for receiving a grounding prong of a drop cord fitting.

Within the housing 10, there is a wire 47 which connects with conductors in the openings 42 of the different receptacles 25 along the length of the housing 10. An intermediate wire 49 connects with conductors at the openings 45 of the respective receptacles and is grounded at a point remote from the receptacle; and a lower wire 51 connects with conductors at the openings 43 of the receptacles.

Each of the wires 47, 49 and 51 is preferably insulated along most of its length but has the insulation removed at spaced intervals where the wire passes through the different receptacles 25.

FIGURE 3 is a sectional view through one of the receptacles 25 at the openings 42 and 43. There is a contact 52 within the receptacle 25 behind the opening 42 and there is a similar contact 53 within the receptacle behind the opening 43. These contacts 52 and 53 are preferably of similar construction but they are oriented in different directions. The contacts 52 and 53 are preferably made of copper or Phosphor bronze or other resilient material of good electrical conducting properties. The contacts 52 and 53 are shaped with folds 55 which snap over bare portions of the wires 47 and 51 to provide a connection which can be assembled quickly in the manufacture of the invention.

Beyond the fold 55, each of the contacts 52 and 53 has an end portion 58 shaped to bear against a wall of a recess 60 in the front portion 28 of the receptacle 25. On the other side of the fold 55, each of the contacts 52 and 53 extends forwardly and has a bend 62 which contacts with the front of the recess 60. The contacts 52 and 53 extend rearwardly from the bend 62 and have another fold 65. Contact surfaces 67 and 68, extending forwardly from the fold 65, are in position to engage

the prongs of a drop cord inserted through the opening 42 for the contact 52, and through the opening 43 for the contact 53.

These surfaces 67 and 68 converge toward one another as they extend rearwardly and they are forced apart by the prongs of the drop cord fitting so as to insure a good electrical contact. The fold 65 contacts with a wall of the recess 60, and the end of the contact surface 67 is preferably located in contact with the front wall of this recess 60. In order to hold the contacts 52 and 53 in the recess 60, and in firm contact with the front wall of the recess, the rearward portion 30 of the receptacle has a front surface 70 which abuts against the folds 55 and 65.

Each of the contacts 52 and 53 is originally wider than the recess 60 so that the contact is squeezed to a narrower overall dimension when inserted into the recess 60. This puts the material under tension and causes the fold 55 to tightly grip the wire 47 or 51. There are channels 73 and 74 in the forward portion 28 of each receptacle for receiving the wires 47 and 51. These channels 73 and 74 (FIGURE 2), are wide enough to receive portions of the wires 47 and 51 which are covered with insulation.

The intermediate ground wire 49 passes through a channel 76 in the rearward portion 30 of each receptacle 25. There is a contact 78 (FIGURE 4), connected with the wire 49 within each of the receptacles. This contact 78 has a fold 80 which snaps over an uninsulated portion of the wire 49 within a recess 82 in the rearward portion 30 of the receptacle. Below the fold 80, the contact 78 has a straight portion 84 extending downwardly in a shallow recess 86 in the rearward portion 30 of the receptacle. This straight portion 84 is clamped in the recess 86 by the forward portion 28.

Below the flat portion 84 the contact 78 extends rearwardly through an opening 88 and there is a prong 90, on the end of the contact 78, extending beyond the back surface of the rearward portion 30. This prong 90 is preferably made with sharp teeth along its rearward edge for scratching through the lacquer on the back wall of the housing 10, as in Parks Patent 2,743,423. The prong 90 thus grounds the receptacle on the duct. The wire 49 provides an additional access to ground.

The contact 78, like the other contacts within each receptacle, is preferably made of resilient material; and the prong 90 bends forwardly and scratches its toothed edge along the back wall of the housing 10 as the receptacle 25 is pushed into contact with the back wall. The opening 88 is large enough to permit this bending of the prong 90.

The forward portion of the contact 78 extends into a recess 94 in the forward portion 28 of the receptacle and this forwardly extending part of the contact 78 is bent to provide a sloping face for contact with a prong of an electrical connection plug inserted through the opening 45. This curved portion of the contact 78 extends close to the top of the recess 94 so that the prong of the electrical connection plug will bend the contact 78 and thus establish pressure for a good contact with the prong of the electrical connection plug.

The channel 76 is wide enough at both ends to receive portions of the wire 49 having insulating covering, as best shown in FIGURE 5. However, the channel 76 becomes narrower at two shoulders 96 and beyond these shoulders the channel is wide enough for the bare wire but not wide enough for the insulation on the wire. Thus, the shoulders 96 act as abutments for limiting any endwise movement of the receptacle 25 with respect to the wire 49 during the assembly of the invention.

The upper portion of the recess 82 is in line with the opening 45 (FIGURE 4) of the receptacle so that the ground prong of the electrical connection plug can be longer than the other prongs of the fitting and thus ground the electrical connection plug before contact is made with the live wires of the circuit.

The forward and rearward portions 28 and 30 of each receptacle are held together by suitable fastening means, shown in the drawing as screws 97.

The preferred construction of the invention has been illustrated and described, but changes and modifications can be made and some features can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. In an electrical system including a longitudinally extending metal housing having a partially open front with an inwardly extending bead at the top of the open front and spaced downward from the top of the housing to leave a space in the housing between the bead and the top of the housing,

a plurality of outlet receptacles made of insulating material spaced from one another along the length of the housing and connected to wires that are enclosed within the housing, the wires including at least two wires for connection with a power source,

each receptacle having a front wall with three openings therethrough for receiving the prongs of a three prong electrical extension fitting, and contacts within two of said openings connected to the respective power source wires of the system,

a conductor within the third opening and having a portion that projects beyond the back of the receptacle,

each receptacle having a forwardly extending hook at its upper end and of a size to fit into the space above the bead and by which the receptacle is supported from the bead of the housing and on which bead the receptacle swings rearwardly into assembled relation with the housing, the back of the receptacle moving into position adjacent the back of the housing as the receptacle moves into final assembled relation with the housing,

the contact that connects with the third wire being of one-piece construction and its projecting end portion having teeth thereon which contact with and scratch across the inside surface of the back of the housing as the hook of said receptacle swings on said bead to bring the receptacle into said final assembled relation with the housing.

2. The electrical system described in claim 1, and in which there are recesses in the forward portion of the receptacle for holding the contact that connects with the power source wires, and there is a deeper recess for holding the contact that connects with the third wire, the deeper recess being partly in the forward portion and partly in the rearward portion of the receptacle whereby a longer prong of an electrical extension plug can be inserted into the deeper recess.

3. The electrical system described in claim 1, and in which each of the receptacles has several channels including a different channel for each of the wires, and at least one of the channels has a width greater than the diameter of the bare wire which it receives but the wire has insulation thereon between successive receptacles and the width of the channel is less than the diameter of the insulation on the wire whereby said insulation limits endwise movement of the receptacles on the wire prior to insertion of the wires and receptacles into the housing.

4. In an electrical distribution system that includes a longitudinally extending metal housing with openings at spaced locations along its length, and individual outlet receptacles at the respective openings, each of the receptacles having openings, with contacts therein, for receiving the prongs of a three prong electrical connection plug, and the three wires in the housing connecting the different receptacles, there being a different wire connecting the different corresponding contacts of each of the three openings in the different receptacles,

the improvement which comprises

an extension on the back of the contact in the third opening of each receptacle projecting through an opening in the back of the receptacle and into con-

tact with the metal of the housing to ground the third contact on the housing,

each of said third contacts having a fold of arcuate curvature of substantially more than 180° and embracing in the fold the wire that connects it with the corresponding contacts of the other receptacles,

said third contact at said fold holding the wire of contact with the receptacle but having its own outer surface in contact with a surface of the receptacle,

abutment surfaces on each receptacle holding the third contact of that receptacle against turning,

the fold of the third contact extending in directions to grip the embraced wire tighter upon displacement

of the third contact by either the housing or the prong of the electrical connection plug.

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