

March 31, 1959

F. E. MAXWELL

2,880,403

SELF GROUNDING ELECTRICAL CONNECTOR

Original Filed Dec. 20, 1954

3 Sheets-Sheet 1

Fig. 1.

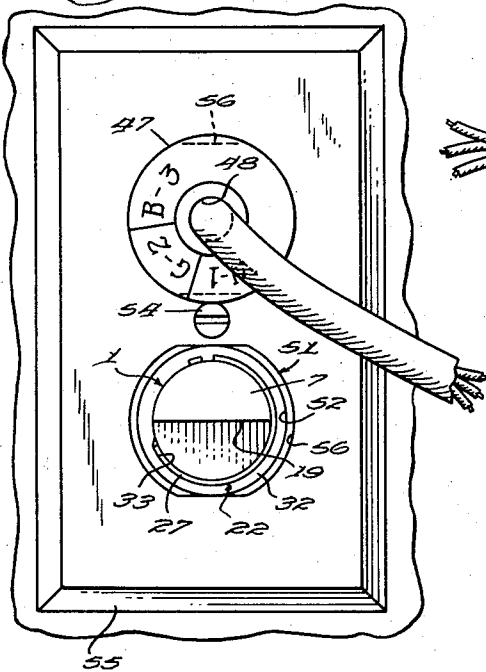


Fig. 2.

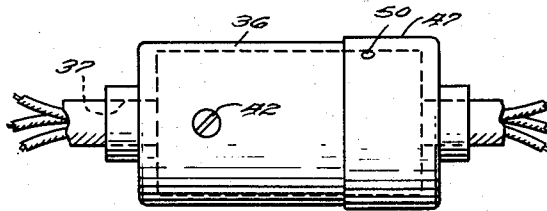


Fig. 3.

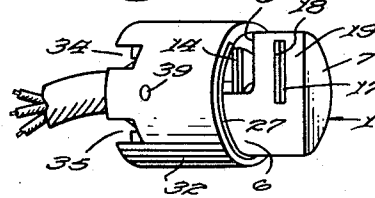


Fig. 4.

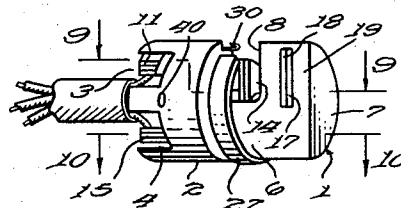


Fig. 5.

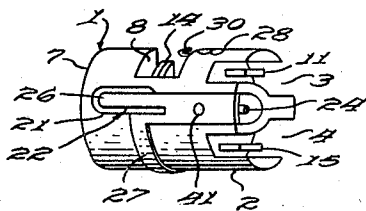
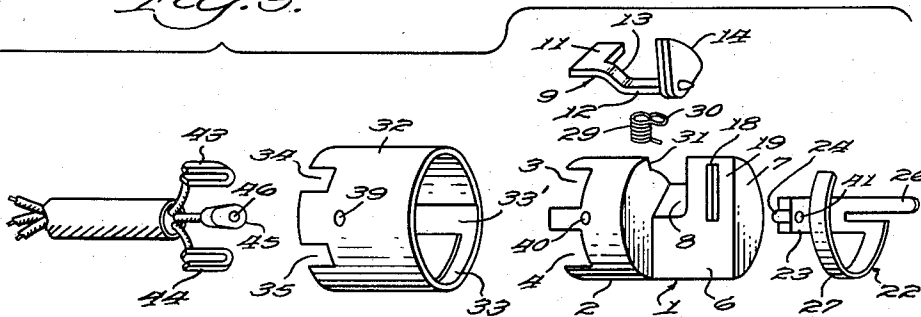


Fig. 6.

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3 Sheets-Sheet 2

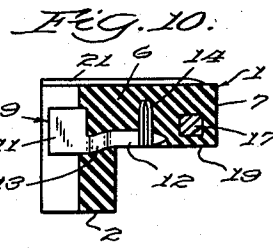
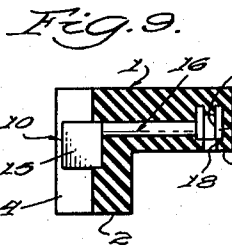
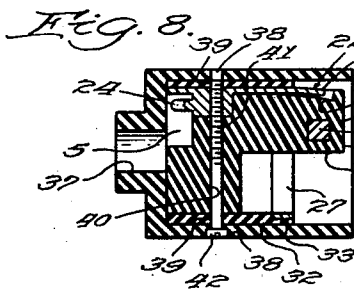
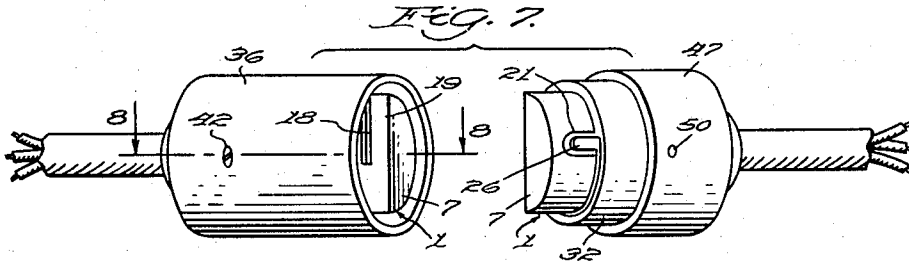
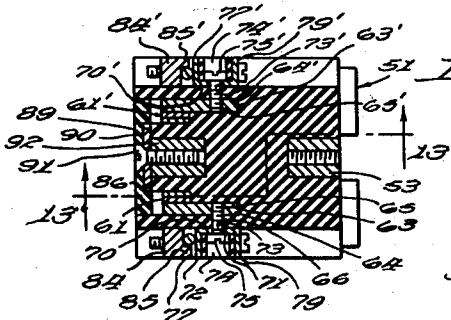
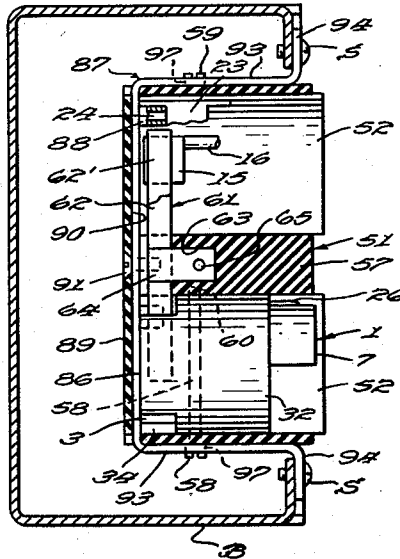
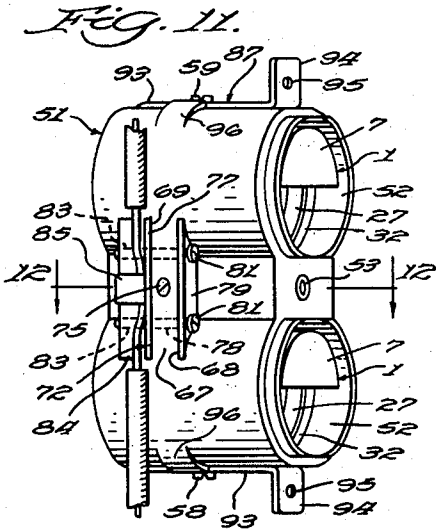


FIG. 13.



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SELF GROUNDING ELECTRICAL CONNECTOR

Original Filed Dec. 20, 1954

3 Sheets-Sheet 3

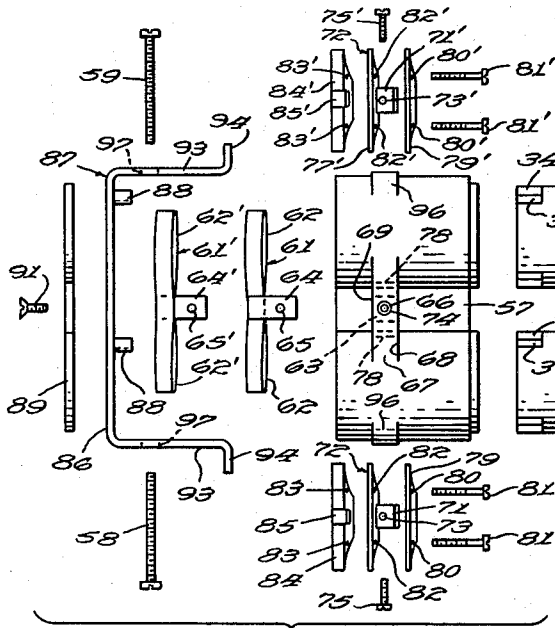


Fig. 14.

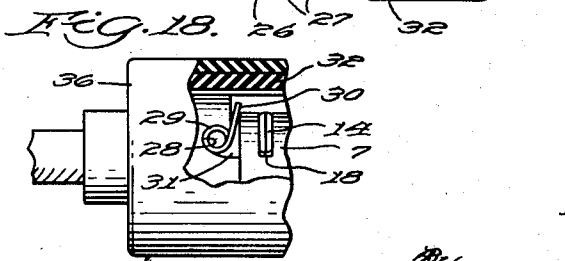
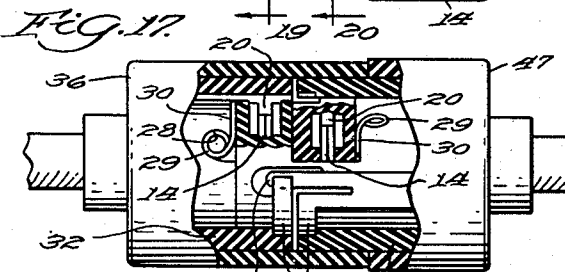
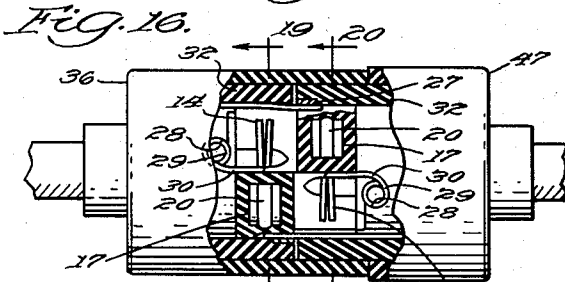


Fig. 15.

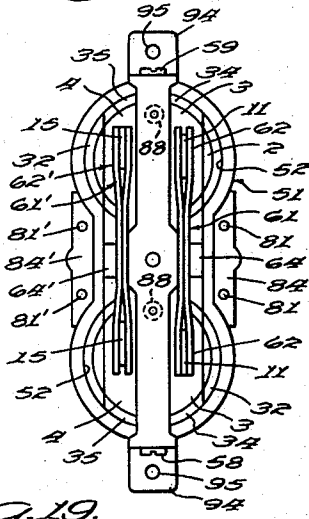


Fig. 19.

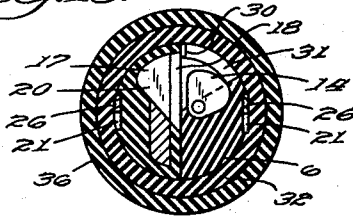


Fig. 20.

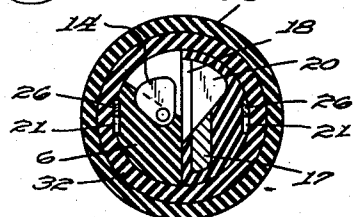
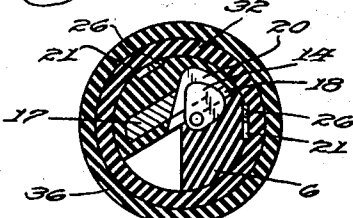


Fig. 21.



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2,880,403

SELF GROUNDING ELECTRICAL CONNECTOR

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Substituted for abandoned application Serial No. 476,443,
December 20, 1954. This application March 17, 1958,
Serial No. 721,939

20 Claims. (Cl. 339—14)

This invention relates to so-called socket connectors for electrical conductors and more particularly to a form thereof constituting an improvement over the connector forming the subject matter of Patent No. 2,637,764, granted May 3, 1953, to Fletcher E. Maxwell, deceased, in whose name the instant application is filed as a substitute of the prior application, Serial No. 476,443, filed by the late Fletcher E. Maxwell on December 20, 1954, and which lapsed upon the demise of the said Fletcher E. Maxwell.

The principal objects of the present invention are to provide an interlocking electrical connector means of the general type shown in the said prior patent characterized by simplification of structure, adaptation to a grounded circuit or so-called "three wire" system, and means for effecting a snap type action in the separation of the contact points and consequent elimination of the liability of a "sizzling" contact, together with the retention of all of the desirable advantages described and claimed in the said prior patent.

With the foregoing objects in view, together with such additional objects and advantages as may subsequently appear, the invention resided in the parts, and in the construction, combination and arrangement of parts described, by way of example, in the following specification of a presently preferred mode of execution of the invention, reference being had to the accompanying drawings which form a part of said specification and in which drawings:

Fig. 1 is a front elevation of a wall socket embodying the invention; one of the sockets being shown occupied by a complementary plug component,

Fig. 2 is a side elevation of connected plug and socket components embodying the invention as employed to interconnect cord type conductors,

Fig. 3 is a perspective view of the base assembly unit of the invention with its associated shell,

Fig. 4 is a similar view to Fig. 3 with the shell omitted,

Fig. 5 is an exploded view of the component parts of the base assembly unit and its shell; the parts thereof which are molded in place being shown separately for clearness of illustration,

Fig. 6 is a perspective view of the base assembly unit as viewed from the end opposite that shown in Fig. 4,

Fig. 7 is a perspective view of the separated component parts constituting the cord connecting embodiment of the invention shown in Fig. 2,

Fig. 8 is a medial sectional view taken on the line 8—8 of Fig. 7,

Figs. 9 and 10 are, respectively, sectional views taken on the line 9—9 and 10—10 of Fig. 4,

Fig. 11 is a perspective view of the wall socket component of the invention,

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11,

Fig. 13 is a sectional view of the component shown in Fig. 11; the view being taken on the staggered line 13—

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13 of Fig. 12, including the mounting thereof in a junction box,

Fig. 14 is an exploded view of the component parts of the wall socket component,

Fig. 15 is a rear elevation of the assembled wall socket component,

Fig. 16 is an elevational view of a plug and socket connector such as shown in Fig. 2 with portions thereof being broken away to show the relative positions of the parts at the completion of the insertion of the plug into the socket and before contact is made by relative rotation of the components,

Fig. 17 is a view similar to Fig. 18 but showing the positions of the parts upon being subjected to relative rotation and consequent engagement of the contacts,

Fig. 18 is a partial view similar to Figs. 16 and 17 and showing the spring by which the components are forced apart to prevent sizzling contacts between the conductor contacts,

Fig. 19 is a sectional view taken on the line 19—19 of Fig. 16 and showing the relative positions of one set of contacts at the position shown in Fig. 16; Fig. 16 being treated as a top plan view,

Fig. 20 is a transverse view like Fig. 19, but is taken on the line 20—20 of Fig. 16 to show the positions of the other set of contacts at the same time, and

Fig. 21 is a view similar to Fig. 19, but showing the relative positions of the parts when moved to the position shown in Fig. 17.

Referring first to Figs. 2 through 10 of the drawings, the base assembly unit of the invention comprises a body 1 including a short cylindrical base portion 2 provided at one end thereof with parallel slots 3 and 4 into which certain terminals, to be later described, protrude, and a recess 5 (see Fig. 8) for a ground connection also to be later described. At its other end, the body 2 carries a short shank 6 of sectoral cross section and this shank carries at its outer end a semicircular head 7 generated about the axial line of the body 1; the axial length of the head being slightly less than the length of the shank 6 and a portion of the flat side of said head being parallel to one face of said shank and the other portion thereof overhanging said shank with resultant provisions of a sectoral recess 8 into which the overhanging portion of the head of an identical body of another base assembly may enter into relative rotation of the two base assemblies on a common axial line with resultant interlocking thereof as will later be referred to in more detail.

The body 1 is preferably molded from suitable non-conducting material and in the molding process the current conducting elements are molded in place within the body. These elements comprise an inner conductor 9 and an outer conductor 10. The inner conductor 9 includes a terminal portion 11 disposed in the slot 3 and having flat faces parallel to said slot, a shank extending from the flange 11 through the body; said shank having an offset 13 formed therein for clearance of a spring to be later described, and terminating in a contact element 14 extending at right angles to the axial line of the body and disposed at the center of the recess 8. The outer conductor 10 includes a flat terminal portion 15 disposed in and parallel to the sides of the slot 4, a shank 16 extending through the body 2, the shank 6 and terminating within the head 7 in a bifurcated contact element 17 disposed in line with a slot 18 in the flat side face 19 of that portion of the head 7 which overhangs the recess 8. Preferably, the contact element 14 is formed of parallel spring leaves which spring together when inserted in the slot 20 in the contact element 17 to insure good contact engagement.

The body 1 is provided with a shallow slot 21 extending from the recess 5 along the outer surface of the shank

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6 and head 7 and terminating short of the outer end of the head 7. A ground contact member 22 includes a nut portion 23 located in the recess 5 including a cylindrical terminal 24 for connection to the ground wire of the circuit as will presently be explained. The ground contact member further includes a second contact member comprising a resilient strap portion 27 extending along the slot 21 to the point of beginning of the shank 6 and thence extending circumferentially of the body 1 and terminating a short distance short of the plane of the face 19 of the head 7 as best shown in Fig. 1. Between the slot 21 and the point of termination of the strap portion 27, the base 2 is provided with a short, substantially radially extending hole 28 in which is located a helical torsion spring 29 having one end thereof engaged in an abutment within the hole and having its other end 30 extending tangentially of the spring and disposed in a recess 31 extending between the hole 28 and the surface of the body 2 forming a side of the recess 8. Normally the end 30 of the spring extends substantially longitudinally of the body 2 and as will be later explained serves first to provide frictional engagement between connected components and second, upon disconnection of the components, it serves to move them apart.

Each base assembly unit includes a thin cylindrical shell 32 of non-conducting material having an inner diameter closely fitting the external diameter of the body 1 and at its outer end having a partially circumferential recess 33 to accommodate the contact member 27 as well as a longitudinally extending recess 33' which complements the groove 21 in the body member to accommodate the ground contact member 22 and having a length extending from the terminal end of the body member 1 to the remote edge of the contact member 27. At its inner end, the sleeve 32 is provided with transversely extending slots 34 and 35 which register with the slots 3 and 4, respectively and which provide clearance for connecting members when the base assembly unit is incorporated in a wall socket assembly as will later be described.

The base assembly including the sleeve 32 are employed as a unit in all uses of the invention. For plug and socket connections of conductors (see Figs. 2 and 7) the base assembly which is to serve as the socket or receptacle is inserted within a cylindrical housing 36 within which the sleeve 32 fits closely and which has a length equal to the length of the base assembly so that the end of the head 7 of the base assembly unit is flush with the end of the housing. The opposite end of the housing is closed except for an axially disposed opening 37 through which the conductor extends for attachment to the terminals of the base assembly unit. The housing, sleeve, and base portion 2 of the body portion 1 are provided with mating, diametrically opposite holes indicated at 38 and 39 and the base 2 is provided with a corresponding hole 40; said holes being in alignment with a threaded hole 41 in the nut portion 23 of the ground contact member 22.

A screw 42 extending through one of the holes 38 in the housing at one side thereof thence through one of the holes 39 in the sleeve 32, thence through the hole 40 in the body member 1, thence threadedly engaging and extending through the nut and thence passing through the remaining holes 39 and 38 in the sleeve and housing serves to hold the entire unit assembled. The conductor is provided with a pair of flat metal, U-shaped clips 43 and 44 attached to the two current carrying members thereof, which are yieldingly engaged over the terminals 11 and 15, while the ground conductor is provided with a terminal element 45 having a hole 46 for engagement with the terminal 24 of the ground contact member 22. In connecting the wires to the terminals, the "hot" wire is connected to the terminal 15 so that the "live" contact at the opposite end of the base assembly is the member

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17 which, except for the access slot 18, is completely housed within the head 7 making accidental contact therewith a practical impossibility since the base assembly unit is completely housed within the housing 36.

The base assembly unit and its sleeve for the plug component of the device which comprises the form of the invention shown in Fig. 2 is disposed in a housing 47 having a closed end provided with an opening 48 for the conductor and which is of slightly greater outer diameter than the housing 36 and of a length sufficient to allow the sleeve 32 associated therewith to enter the housing 36 and occupy a position closely adjacent to the end of the corresponding sleeve 32 mounted within the housing 36 (see Fig. 16). A screw 50 secures the assembled parts in fixed relation in the same manner as the screw 42. At this position, the overhanging portions of the heads 7 of each base assembly are opposite the recesses 8 of the other base assembly and the contact points 26 of each ground contact member are in engagement with the circular strap portions 27 of the other ground contact member. Thus upon inserting the plug component into the socket component, the ground connection is established. At the same time the face portions 19 of each base assembly engage the sides of the arms 30 of the springs 29 (see Fig. 16) and upon relative rotation of the two components, the said head portions 7 will move into the recesses 8 of the base assembly units with incident interengagement of the respective contacts 14 and 17 in the manner shown in Fig. 21. Incident to this relative rotation, the contact points 26 each slide along the contact elements 27 preserving the ground connection and the ends 30 of the springs are bent down parallel to the ends of the heads of the opposite base assembly unit as shown in Fig. 17 in which position they act to urge the components apart in an axial direction thus creating frictional resistance to accidental displacement. When the components are to be disconnected, upon the first portion of reverse relative rotation, the spring ends 30 begin to swing upwardly and before the contacts 14 and 17 are disengaged, the spring ends are in position (see Fig. 18) to forcibly complete the said reverse rotation to a point at which the contacts are disengaged. Thus there is no chance that the contacts will be partially engaged with the resultant "sizzling" contact between them. Further the ground circuit is the first to be made and the last to be broken since it is established by the axial movement of the components. It will be obvious that in place of the housing 47, the holding means for the base assembly unit for the plug component need not be of the cylindrical external form shown where, for example, the invention is applied to electrical appliances, since in such case the internal diameter and depth would be the same as shown but externally the housing would be provided with flanges or other means for connecting it to the appliance. Also, in connection with the housing members 36 and 47, it is preferred to provide the external end surface with suitable indicia as shown in Fig. 1 to insure the correct attachment of the conductors to the terminal clips and the correct connection of the clips to the component terminals. It will be understood that while in the socket connection, the "hot" wire is connected to the terminal 15, in the plug component this arrangement is reversed to preserve the polarity of the circuit and that the housing members would be marked accordingly. By the use of countersunk head fastening screws and provision at one side of the housing member for the head, the proper positioning of the housing member relative to the indicia and the terminals within the housing member is preserved. The closed end of the housing member and the engagement thereof with the end of the base assembly unit serves to prevent the terminal clips from becoming disengaged from the contact terminals.

Referring finally to the form of the invention shown in Figs. 1, 11, 12, 13, 14 and 15 there is shown the

application of the above described base assembly units to a double receptacle wall socket arrangement. In this form of the invention the heretofore described, housing member 36 is replaced by a member 51 molded out of non-conducting material and having a pair of parallel cylindrical bores 52, 52 extending therethrough of the same internal diameter as the housing member 36; said bores being spaced apart sufficiently to provide clearance for an internally threaded thimble 53 at the front face thereof adapted for engagement by a screw 54 by which a cover plate 55 is secured to the front face of the member 51 and the junction box B in which it is mounted; said cover plate having openings 56, 56 therein through which access is had for connection of plug components of the type above described to the base assembly units disposed in the bores 52, 52. For convenience, the portion of the member 51 between the bores 52, 52 will be referred to as a central web portion 57. As shown in Fig. 1, the base assembly units and their sleeves are positioned in the member 51 with the flat side face of the heads 7 thereof facing downwardly to further guard against the accidental contact with the "hot" contact of the device as by playing children. A screw 58 extends upwardly from the lower side of the member 51 diametrically across the sleeve and base assembly unit in the lower bore and threadedly engages the nut portion 23 of the ground contact member 221 associated with that base assembly unit in the same manner as the previously described screws 42 and 50. A second screw 59 similarly extends downwardly from the upper side of the member 51 in the same manner except that it first passes through the outer wall of the member 51 and sleeve 32, thence threadedly engages and extends through the nut portion 23 of the ground contact member associated with the base assembly member in the upper bore 52 and thence extends diametrically across and through that base member and sleeve. To eliminate special parts, identical screws are preferably used for all of the fastening of the base assembly units into the various housing members and the like, said screws being threaded for their entire length to permit the last described use thereof where necessary. Since the screws are of a length equal to the outer diameter of the housing member 47, the sides of the web portion 57 in the axial line of the screws 58 and 59 are provided with appropriate clearance recesses as shown at 60 in Fig. 13.

In Fig. 11 it will be noted that the base assembly units are positioned in the member 51 with the flat side faces thereof at the under side, and in Figs. 9 and 10 it will be noted that the terminals 11 and 15 are disposed with their side faces at right angles to the flat side faces of the heads 7 of the base assembly units. Thus, referring to Fig. 15 the terminals 11, 11 of the base assembly units are positioned in alignment with each other at one side of the longitudinal line of the member 51 while the terminals are disposed in alignment with each other at the opposite side of said center line. The terminals 11, 11 are interconnected by a bus bar element 61 comprising a pair of parallel resilient metal strips secured together at their mid-length and slightly spaced apart at each end to form jaw portions 62, 62 which yieldingly straddle and engage the terminals 11, 11; the slots 3, 3 in the body portions 2, 2 and the slots 34, 34 in the sleeves 32, 32 providing the necessary clearance therefor. Closely adjacent the side thereof, the rear face of the web portion 57 is provided with a narrow rectangular slot 63 into which a metal tongue element 64 having one end thereof fixed to the mid-length of the bus bar element 61 extends; the free end of said tongue being provided with a transversely extending threaded hole 65 in axial alignment with the hole 66 extending from the exterior of the member 51 into the slot 63. It will be noted that the web portion 57 is somewhat narrower than the width of the member at the bores 52, 52 thereof except for a rib portion 67 which extends between the rounded outer surfaces in the region

of the bores 52, 52; said rib being disposed substantially laterally opposite the tongue portion 64 of the bus bar element 61; said rib portion having flat parallel front and rear faces 68 and 69 disposed in planes normal to the axial line of the bores 52, 52. Adjacent the juncture of the rear face 69 of the rib portion 67 with the side face of the web portion 57 it is provided with a rectangular slot 70 into which the tongue 71 of a line clamp member 72 extends; said tongue element having a hole 73 there-through positioned in axial alignment with the holes 65 and 66. The side face of the rib portion 67 is provided with a hole 74 in axial alignment with the holes 65, 66 and 73 sufficiently large to receive the head of a screw 75 which is provided with a body portion extending through the holes 73 and 66 and threadedly engaging the hole 65 with the head thereof engaging the side of the tongue 71 and thus electrically connecting the bus bar element 61 with the line clamp member 72 and simultaneously clamping the bus bar element and the line clamp member to the opposite sides of the wall portion 76 of the member 51 which extends between the slots 63 and 70.

The line clamp member includes a line contact portion 77 which lies against the face 69 of the rib portion 67. The rib portion is provided with spaced holes 78, 78 adjacent each end thereof extending parallel to the axes of the bores 52 and a washer plate 79 having holes 80, 80 disposed in alignment with the holes 78, 78 is carried by the face 68 of the rib portion. A pair of screws 81, 81 extend through the aligned holes 78 and 80 and thence through aligned holes 82, 82 in the line contact portion 77 and threadedly engage the threaded holes 83, 83 in a second line clamp member 84 and are effective to draw said member toward the portion 77 with resultant clamping of an electrical conductor therebetween as best shown in Fig. 11; said second line clamp member having a forwardly projecting tongue portion 85 at about its mid-length effective to retain a clamped conductor against lateral movement from between the clamping members. Thus, effective electrical conduction is provided from a line to the same side and contact elements of the associated base assemblies.

An identical arrangement of parts is provided for the interconnection of the terminals 15, 15 with a line and therefore, the foregoing description is not deemed necessary, and the parts involved have been identified by the same numerals with the addition of the exponent "2".

The member 51 at the opposite ends of the rear face thereof is provided with a wide, shallow groove extending diametrically across both bores 52 and mounted in this groove is the center portion 86 of a mounting and grounding strap 87; said strap being provided with socket elements 88, 88 engaging the grounding terminals 24 of the base assembly units. A cover element of non-conducting material 89 overlies this portion of the strap and is provided with a groove 90 in which the strap is located (see Fig. 12). The outer edges of the cover element is shaped to fit the contour of the bores 52, 52 as connected by the wall portions 76, 76 and a screw 91 extending through the cover element and strap 87 and threadedly engaging a threaded thimble 92 molded in place in the rear face of the portion 57 serves to hold the cover element and strap assembled as best shown in Fig. 12. Beyond the ends of the member 51 each end of the strap 87 extends in a run, 93 along the end of the element 51 toward the front face thereof and slightly rearwardly of said front face, each of said ends terminates in a run 94 extending laterally away from the element 51; said terminal runs providing mounting ledge portions and being provided with openings 95, 95 for reception of screws S by which the assembly may be attached to the face of a junction box B as shown in Fig. 13. Since the strap 87 is connected to the grounding terminals 24, this mounting serves also to ground the circuit to the conduit system and that system, in turn, is required to

be grounded directly to the earth. The ends of the member 51 are provided with peripherally extending ribs 96 which are slotted to receive the runs 93 of the strap 87 and these runs are provided with openings 97 for reception of the heads of the screws 58 and 59 so that when required, a base unit assembly may be removed and replaced without the necessity of removing the grounding strap from the assembled unit.

By the foregoing principles of construction, the present invention achieves all of the desired objectives. The construction is simplified in the interchangeable base unit assembly which may be installed in any supporting means therefor and the various parts are better adapted to quantity production. Further, the basic principles of the interlocking of the interconnecting assemblies are retained without change and with the added protection of a circuit that is grounded at all times when the current carrying contacts are engaged. Still further, when the interconnected units are started toward disconnection, spring means is provided to quickly force them apart with resultant prevention of the creation of sizzling contacts. Additionally the terminals of the units are so arranged that the polarity of the circuit may be maintained so that the shielded contact is at all times connected to the "hot" wire of the circuit.

While the foregoing specification describes a presently preferred mode of execution of the invention, it is appreciated that in the light of the foregoing disclosure, changes and modifications will suggest themselves to others skilled in the art. Accordingly, the invention is not to be deemed to be limited to the exact form thereof above disclosed by way of example, and it will be understood that the invention embraces all such changes and modifications of the parts and of the construction, combination and arrangement of parts as shall come within the purview of the appended claims.

I claim:

1. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank portion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in co-planar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess, a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end, with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, and grounding contact means extending from said third terminal of each of said assemblies between said sleeve and said body and each including contact portions disposed to be initially interengaged incident to said endwise movement of said assemblies and to remain in contact during said relative rotary movement of said assemblies.

2. Connecting means for electrical conductors as claimed in claim 1 including separate supporting means for each of said assemblies; each of said supporting means including a non-conductive member having a cylindrical portion in which the assembly is received, and means for securing said assembly and supporting means in fixed position; said securing means comprising a screw extending from an external surface of the supporting means diametrically through said sleeve and base portions of the assembly and threadedly engaging a portion of the grounding contact means of the assembly; said portion of said ground contact means serving as a nut for said screw.

3. Connecting means for electrical conductors as claimed in claim 1 in which said grounding contact means includes curved sliding contact areas generated about the axial lines of said connecting means effective to maintain grounding contact therebetween during said relative rotary movements of said assemblies.

4. Connecting means for electrical conductors as claimed in claim 1 in which said ground contact means for each of said assemblies comprises a metallic element extending from said third terminal between said sleeve and said body and having a first contact point disposed in a recess in the curved side face of said head portion and a second contact point extending circularly along the inner wall of said sleeve and around the semicircular portion of said socket adjacent the end face of said base portion from which said shank portion projects.

5. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank portion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in co-planar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess; a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end, with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, and spring means disposed in each of said base portions of said assemblies effective to be disabled by said relative rotary movement incident to interengaging said assemblies and effective upon the start of reverse rotary movement to forcibly complete said reverse rotary movement with resultant disengagement of said conductor contact elements.

6. Connector means for electrical conductors as claimed in claim 5 in which each of said spring means comprises a helical torsion spring disposed in a cylindrical recess in said base adjacent the face thereof from which said shank portion extends and disposed in a line extending substantially radially of the axis of said base; said spring having an end thereof normally extending parallel to the axis of said base portion and disposed

substantially in line with the end of said head which overhangs said base member; said end portion being bent parallel to the plane of said end face of said base portion by the head of the opposite assembly incident to interengaging relative movement between the assemblies and upon the start of said reverse rotation being effective by engagement with the flat face of the opposite head portion to forcibly complete said reverse rotation.

7. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank portion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in co-planar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess, a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end, with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, spring means disposed in each of said base portions of said assemblies effective to be disabled by said relative rotary movement incident to interengaging said assemblies and effective upon the start of reverse rotary movement to forcibly complete said reverse rotary movement with resultant disengagement of said conductor contact elements; and grounding contact means extending from said third terminal of each of said assemblies between said sleeve and said body and including contact portions disposed to be interengaged incident to said endwise movement of said assemblies prior to said relative rotary movement thereof.

8. Connecting means for electrical conductors as claimed in claim 7 including separate supporting means for each of said assemblies; each of said supporting means including a non-conductive member having a cylindrical portion in which the assembly is received, and means for securing said assembly and supporting means in fixed position; said securing means comprising a screw extending from an external surface of the supporting means diametrically through said sleeve and base portions of the assembly and threadedly engaging a portion of the grounding contact means of the assembly.

9. Connecting means for electrical conductors as claimed in claim 7 in which said grounding contact means includes sliding contact areas effective to maintain grounding contact therebetween during said relative rotary movements of said assemblies.

10. Connecting means for electrical conductors as claimed in claim 7 in which said ground contact means for each of said assemblies comprises a metallic element extending from said third terminal between said sleeve and said body and having a first contact point disposed in a recess in the curved side face of said head portion and a second contact point extending circularly along the inner wall of said sleeve and around the semi-circular por-

tion of said socket adjacent the end face of said base portion from which said shank portion projects.

11. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank portion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in co-planar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess, a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, and supporting means for one of said assemblies comprising a non-conductive member mounted in a junction box; said member having a hole extending therethrough in which said assembly is mounted, screw threaded means securing said assembly in said member, means carried by said member conductively engaging said pair of terminals on said assembly, other means carried by said member conductively engaging said terminal engaging means and affording connection with electrical conductors, and a mounting strap carried by said member affording means for mounting said member within a junction box; said strap having electrically conductive engagement with said third terminal of said assembly with resultant grounding of the circuit to the protective conduit means of the system.

12. Connector means for electrical conductors as claimed in claim 11 in which said supporting member is provided with supporting holes for a plurality of said assemblies and in which said terminal engaging means comprises bus bar elements engaging like terminals of each of said assemblies and in which said other means includes screw operated clamp means engageable optionally with the end or an intermediate portion of a conductor.

13. Connector means for electrical conductors as claimed in claim 12 in which the mounting strap is electrically conductively connected with the grounding terminals of each of said assemblies mounted in said member.

14. Connector means for electrical conductors as claimed in claim 12 in which said bus bar elements include resilient bifurcated end portions yieldingly gripping the respective like terminals of said assemblies and in which said other means is connected to said bus bar elements at the mid-length of said elements.

15. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank por-

tion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in coplanar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess, a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, grounding contact means extending from said third terminal of each of said assemblies between said sleeve and said body and including contact portions disposed to be interengaged incident to said endwise movement of said assemblies prior to said relative rotary movement thereof, and supporting means for one of said assemblies comprising a non-conductive member mounted in a junction box; said member having a hole extending therethrough in which said assembly is mounted, screw threaded means securing said assembly in said member, means carried by said member conductively engaging said pair of terminals on said assembly, other means carried by said member conductively engaging said terminal engaging means and affording connection with electrical conductors, and a mounting strap carried by said member affording means for mounting said member within a junction box; said strap having electrically conductive engagement with said third terminal of said assembly with resultant grounding of the circuit to the protective conduit means of the system.

16. Connector means for electrical conductors as claimed in claim 15 in which said supporting member is provided with supporting holes for a plurality of said assemblies and in which said terminal engaging means comprises bus bar elements engaging like terminals of each of said assemblies and in which said other means includes screw operated clamp means engageable optionally with the end or an intermediate portion of a conductor.

17. Connector means for electrical conductors as claimed in claim 16 in which the mounting strap is electrically conductively connected with the grounding terminals of each of said assemblies mounted in said member.

18. Connector means for electrical conductors as claimed in claim 16 in which said bus bar elements include resilient bifurcated end portions yieldingly gripping the respective like terminals of said assemblies and in which said other means is connected to said bus bar elements at the mid-length of said elements.

19. Connecting means for electrical conductors comprising identical interengaging assemblies each having a pair of terminals adapted for attachment to the current carrying components of a conductor means and a third

terminal adapted to be connected to a grounding line; each of said assemblies including a non-conductive body including a cylindrical base portion, a sectoral shank portion of less than semicircular configuration projecting from one side face of said base and a head of semicircular configuration carried by said shank with one flat side face of said shank portion being disposed in coplanar relation with the flat side face of said head portion; the space between the adjacent side faces of said head and said base forming a recess, a first conductor element extending from one of said pair of terminals through said base and terminating in a contact member disposed in said recess, a second conductor element extending from the other of said pair of terminals through said base and said shank and terminating in a contact element disposed within said head, a slot in the flat face of said head affording access to said last named contact element, a sleeve surrounding said body and combining with the flat faces of said shank and said head to form a socket portion having a semicircular entrance end and a sectoral space of greater than semicircular extent beyond said entrant end with resultant capacity of said assemblies to be interengaged by endwise movement of the head of each into the socket of the other and then subjected to relative rotary movement to effect interengagement of the first named contact element of each assembly with the second named contact element of the other assembly, spring means disposed in each of said base portions of said assemblies effective to be disabled by said relative rotary movement incident to interengaging said assemblies and effective upon the start of reverse rotary movement to forcibly complete said reverse rotary movement with resultant disengagement of said conductor contact elements, and supporting means for one of said assemblies comprising a non-conductive member mounted in a junction box; said member having a hole extending therethrough in which said assembly is mounted, screw threaded means securing said assembly in said member, means carried by said member conductively engaging said pair of terminals on said assembly, other means carried by said member conductively engaging said pair of terminals on said assembly, other means carried by said member conductively engaging said terminal engaging means and affording connection with electrical conductors, and a mounting strap carried by said member affording means for mounting said member within a junction box; said strap having electrically conductive engagement with said third terminal of said assembly with resultant grounding of the circuit to the protective conduit means of the system.

20. Connector means for electrical conductors as claimed in claim 19 in which each of said spring means comprises a helical torsion spring disposed in a cylindrical recess in said base adjacent the face thereof from which said shank portion extends and disposed in a line extending substantially radially of the axis of said base; said spring having an end thereof normally extending parallel to the axis of the base portion and disposed substantially in line with the end of said head which overhangs said base member; said end portion being bent parallel to the plane of said end face of said base portion by the head of the opposite assembly incident to interengaging relative movement between the assemblies and upon the start of said reverse rotation being effective by engagement with the flat face of the opposite head portion to forcibly complete said reverse rotation.

No references cited.