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C. W. ABBOTT

2,112,752

ELECTRICAL CONNECTING DEVICE

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Fig. 1.

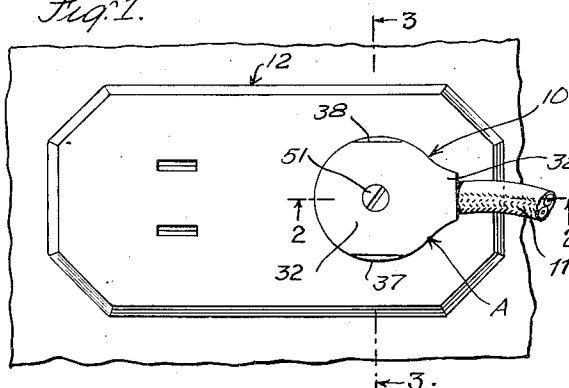


Fig. 3.

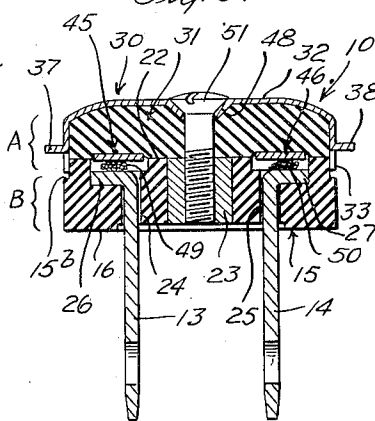


Fig. 2.

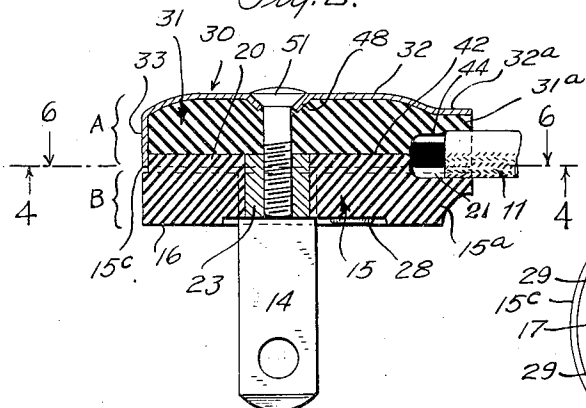


Fig. 6.

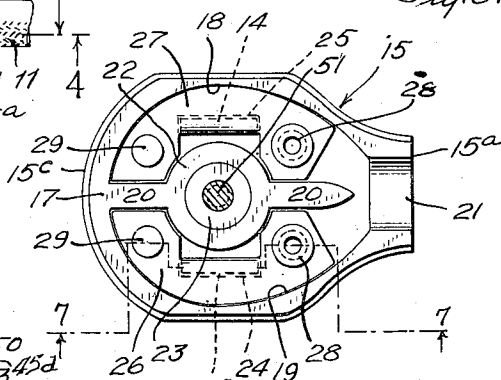


Fig. 4.

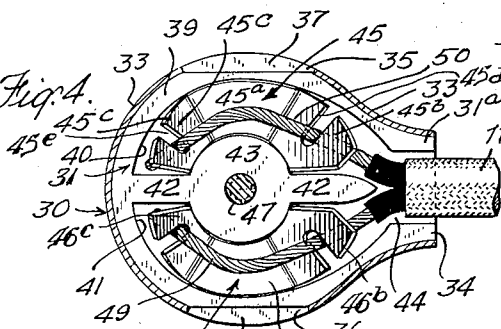


Fig. 7.

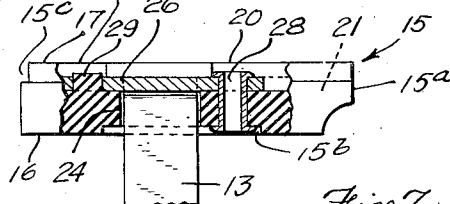
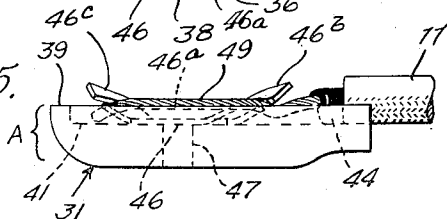


Fig. 5.



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2,112,752

ELECTRICAL CONNECTING DEVICE

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Application May 1, 1937, Serial No. 140,100

21 Claims. (Cl. 173—361)

This invention relates to improvements in making of mechanical and electrical connections of a conductor or conductors to electrical devices and with respect to certain more specific features of the invention the latter relates also to so-called plug type of connectors.

One of the objects of this invention is to provide inexpensive, compact and simple means for mechanically and electrically anchoring or connecting an electrical conductor. Another object is to provide conductor-connecting means that will be capable of ease, convenience and speed in making an installation or connection of an electrical conductor. Another object is to provide a dependable conductor-connecting device in which injury, abrasion or breakage of the metallic conductor, usually in the form of a stranded wire conductor, are dependably prevented. Another object is to provide a conductor-connecting means in which an electrical junction is achieved that is devoid of the possibility of giving rise to high resistance and its attendant hazards. Another object is to provide a simple and inexpensive conductor connection or anchorage capable of long lasting action. Another object is to provide a construction of the above-mentioned character that is compact, capable of embodiment in small dimensions, and capable also of embodiment in attractive and neat appearance. Another object is to provide a device of the above-mentioned character that will be strong and durable and well adapted to meet the varying conditions of practical use.

Another object is to provide a generally improved detachable connector device, such as a plug connector adapted for use in connection with so-called plug receptacles, as in interior or household extension circuits, that will be devoid of the many disadvantages of connector plugs as heretofore known or used, and generally to provide an improved and mechanically and electrically superior plug connector. Another object is to provide a connector plug construction that will be strong, durable, unobtrusive as to appearance and bulk, capable of convenient and easy handling even by unskilled persons, and constructed and arranged to minimize or eliminate the risks attendant upon injury or damage due to collision therewith of objects like furniture, or the like.

Another object is to provide constructions of the above-mentioned character capable of inexpensive manufacture and assembly, and capable of simple manipulation for installation.

Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is shown by way of illustration one of the various possible embodiments of my invention,

Figure 1 is an elevation of a device in the form of a connector plug embodying the various features of my invention, showing the device as it would appear in practical use;

Figure 2 is a central longitudinal sectional view, as seen along the line 2—2 of Figure 1, Figure 2 and the subsequent views being on an enlarged scale;

Figure 3 is a transverse central sectional view, as seen along the line 3—3 of Figure 1;

Figure 4 is an elevation, as seen along the line 4—4 of Figure 2;

Figure 5 is a front elevation of the structure shown in Figure 4;

Figure 6 is an elevation as seen along the line 6—6 of Figure 2, and

Figure 7 is an elevation partly in section, as seen along the line 7—7 of Figure 6.

Similar reference characters refer to similar parts throughout the several views in the drawing.

In carrying out the various above noted objects of my invention, the various features of the latter may be illustrated by reference to the connector plug shown in the drawing and generally indicated in Figure 1 by the reference character 10, where it is shown as having connected to it illustratively an insulated two-conductor flexible cord structure 11 and related to one of the two portions of a double plug receptacle generally indicated by the reference character 12, as, for example, might be the case where it is desired to connect a household electrical appliance, such as a lamp, or the like, to a wall plug receptacle associated with the household wiring circuit. The connector plug 10 has two contact prongs 13, 14 (Figure 3) which enter the usual slots or recesses in the plug receptacle 12 to engage appropriate and usual contact members related to the latter. In so far as certain broader features of my invention are concerned, and unless otherwise specifically set forth in the following claims, the contact prongs 13, 14, or either of them, may be considered as any electri-

cal device, appliance, or the like, or terminals thereof, to which an electrical circuit is to be extended or related and to which hence a conductor is to be electrically connected.

In embodying all of the features of my invention in the form of a connector plug, as earlier above noted, I prefer to construct the latter in two halves A and B (Figures 2 and 3). Half portion B comprises a member 15 made preferably of a suitable insulating material, preferably rigid, like Bakelite, and hence and preferably easily molded in the form and shape about to be described.

It has a substantially flat rear or bottom face 16 (Figures 3 and 7) but in its upper face 17 is formed to provide two arcuate open channels 18, 19 that leave therebetween a barrier 20 that extends centrally or diametrically thereof, the member 15 being of a general oval shape but with a lateral extension 15^a (Figures 6 and 7) in the direction of the extent of the barrier 20. Channels 18, 19 merge into a larger channel 21 in the upper face of the extension 15^a, being open at its right-hand end.

The barrier 20 has a central substantially cylindrical enlargement 22 and at its center and hence at substantially the center of the member 15 there is secured, in any suitable manner, a threaded metal bushing 23. For example, where the part 15 is of a moldable composition, like Bakelite, the bushing 23 may be molded in place, or it may be subsequently applied, as by forming it as a threaded eyelet. Adjacent to and on the two sides of the barrier portion 22, the member 15 has holes 24, 25 preferably rectangular in shape for the reception therethrough, respectively, of the contact prongs 13, 14. The latter are preferably integrally formed with contact and supporting plates 26 and 27, respectively, the latter being of arcuate shape to be received into the channels 18 and 19, respectively, in which they fit preferably relatively snugly. Each part 13—26 and 14—27 is made of a suitably heavy sheet metal, such as brass, and the shape will be seen to be one that is capable of inexpensive and economic production. The parts are preferably so proportioned that the upper faces of the contact plates 26 and 27 are slightly below the plane of the face 17 of the member 15, as better appears in Figure 7, and the plates are preferably secured to the member 15 in any suitable manner.

For example, and preferably, I provide eyelets 28 (Figures 6 and 7) adjacent the right-hand ends of the plates 26, 27 for securing them to the member 15, the under face of the latter being preferably countersunk, as at 15^b (Figure 7) to accommodate the spun-over portions of the eyelets.

Adjacent the left-hand ends the contact plates 26 and 27 are apertured to receive upstanding protrusions 29 formed as by molding in the channels 18 and 19. The parts are preferably so proportioned that the protrusions 29 project above the plane of the contact plates by substantially the same amount as the spun-over portions of the eyelets 28 project above these surfaces.

The half portion A preferably comprises two parts, an outer casing-like member 30 made of a rigid material, preferably sheet metal, and an inner member 31 made of a suitable insulating material but preferably an insulating material that is resilient or elastic, such as vulcanized rubber compounded to have a suitable elastic resiliency and flexibility.

Casing part 30 is preferably a sheet metal stamping and in configuration approximates or

matches the configuration of the part 15 of Figure 6; thus, it has a substantially flat central portion 32 (Figures 1, 2 and 3) with a lateral extension 32^a to match the extension 15^a of the part 15 (Figure 6); depending from the flat part 32 is a peripheral flange 33 (Figures 2, 3 and 5), flange 33 being interrupted at 34 where the extension 32^a is ultimately to overlap the extension 15^a of part 15, and being also interrupted at two opposed sides thereof, as at 35 and 36 (Figure 4) where the sheet metal is turned outwardly, as at 37 and 38 (Figures 4 and 3) to form laterally projecting handle-like parts.

Member 15 is peripherally rabbeted, as at 15^b (Figures 6 and 3), and the rabbet 15^b and the depending flange 33 are so proportioned that the latter may take into or telescope with the former.

Part 31, made as above noted, preferably of semi-hard and elastic rubber, is shaped to fit into the casing-like member 30 to the inner face of which it is preferably secured in any suitable manner as by way of a cement, thus leaving an exposed face 39 which is preferably flat, like the face 17 of the part 15. In that face 39 are formed, as by molding when the part is made of rubber, two channels 40 and 41. Preferably, the channels 18, 19 are given a shape, when seen as in Figure 4, to achieve certain coactions with said parts later described, and illustratively and conveniently they are arcuate, being in effect counterparts, respectively, of the channels 18 and 19 in the member 15, the shape of the channels 40 and 41 leaving therebetween a barrier 42 with a central cylindrical enlargement 43 that is a counterpart to the barrier 20—22 of part 15. Channels 40 and 41, preferably at their right-hand ends, as viewed in Figure 4, merge into a larger channel 44 which extends throughout a lateral extension 31^a (Figures 4 and 5) of the member 31 and which channel 44 is to overlap channel 21 in the extension 15^a (Figure 6) of the part 15.

Set into channel 40 is a conductor-engaging contact member 45 made preferably of sheet metal that is springy like phosphor bronze, and shaped to have a base portion 45^a and upwardly bent end portions 45^b and 45^c which are preferably slotted or hook-shaped, as shown in Figure 4. The sheet metal contact member 45 is shaped snugly to interfit with the curvatures of the walls of channel 40 and hence is dependably anchored against longitudinal movement along the channel. If desired, it may be secured in place by any suitable means, preferably by interposing a suitable cement between the base portion 45^a and the bottom of the channel 40.

In like manner, a similarly shaped contact member 46 is related to the channel 41, having also a base portion 46^a resting in the bottom of the channel 41 and having upwardly bent and preferably resilient or springy end parts 46^b and 46^c slotted or hook-shaped as shown.

The depth of channels 40 and 41 is preferably but slightly in excess of the thickness of the sheet metal of the contact members seated therein, and hence the end portions of the latter project upwardly beyond the plane of the face 39, as better appears in Figure 5.

Centrally of the barrier portion 43 and hence of the member 31 (Figure 4) is a hole 47 which registers with an externally countersunk hole 48 similarly positioned (see Figure 2) in the casing part 30.

When it is desired now to connect a circuit conductor electrically to each of the parts 13 and 14, and assuming that the cord conductor 11 is

to be used for that purpose, a suitable end portion of the latter has its insulation removed to expose the bare conductors 49 and 50 (Figure 4) which are respectively interleaved, by way of the slots, with the various portions of the conductor-engaging contact devices 46 and 45, respectively, more specifically in the manner clearly shown in Figures 4 and 5. Thus, an intermediate portion of each bare conductor overlies the base portion of each contact device and parts of the upstanding end portions, while end portions of each conductor underlie the extreme end parts of the upstanding ends of the contact members, the cord conductor part 11 resting in the channel 44.

The half portion or unit A, with the conductor or conductors thus related thereto, is now laid over the part B, bringing the face 39 of the former in contact with the face 17 of the latter and conductor-engaging contacts 46 and 45 becoming juxtaposed, respectively, to the contact plates 27 and 26 (Figure 3) of the part 15, the upwardly bent end portions of the members 45 and 46 yielding and being bent virtually back into their respective channels in the part 31 when the two half portions A and B are pressed toward one another. A screw 51 (Figures 1, 2 and 3) is now placed through the central opening in the unit A and threaded into the threaded bushing 23 in the part 15, thus drawing the rigid part 15 and the rigid casing part 30 toward each other, an action that is accompanied by a virtual straightening or flattening out, as above indicated, of the conductor-engaging contacts 45 and 46 against the contact plates 26 and 27, respectively, with the bare conductors interposed therebetween, as shown in Figure 3, and by a yielding or compression of the rubber part 31. It will thus be seen that preferably the flexibility or bendability of the upwardly bent end portions of the contact members 45 and 46 is preferably such that they yield or bend even though one of the parts, such as the part 31, that acts thereon is itself yielding. Preferably, the parts are so proportioned that the peripheral flange 33 of unit A enters the rabbet 15^b of unit B but falls short of bottoming in the latter to leave ample range of action of the screw 51 to insure sufficient clamping pressure upon the conductor or conductors between the juxtaposed contact parts and also a sufficient compression of the material of the part 31 to achieve a lasting tendency on the part of the latter to expand to normal and hence to maintain a continued stress on the parts. Thus, also, loosening up of the screw 51 is reliably precluded.

Thus, a unique electrical connection is achieved. The conductor or conductors are clamped between conductive parts and in a manner to avoid danger of shearing, cutting, or abrading, or otherwise injuring the wire or wires that make up each conductor, and by these and other factors the liability of giving rise to a high resistance junction is avoided. Also, where more than one conductor connection is made, illustratively two as above described, the clamping stresses or forces, due to the relative arrangement of the parts, are uniformly distributed to the various connections and where the part 31 is made of a yielding or resilient material, as in the preferred form, the action of such material tends also to compensate for possible irregularities and also to uniformly distribute the clamping pressures. Moreover, the yieldability of the part 31, as in the preferred form, permits the deformation, under clamping pressure, of the

channels which become closed by the assemblage of the units A and B and in a direction to dependably compact the closed channels about the metallic or conductive parts contained therein; the latter thus become snugly encased in the insulating material of the structure and the efficiency of resultant insulation effect of the structure is greatly increased.

It is also to be noted that a secure mechanical anchorage of the conductor or conductors is assured; for example, the bare conductor 50 of Figure 4, when it is first related to the upwardly projecting parts 45^c and 45^b finds the two slots 45^d and 45^e, into which it is laid, of a width well commensurate with the thickness of the wire 50, the latter being usually stranded, and that makes for ease of initial manual interrelation of the wire with the contact parts, but as the upwardly projecting portions 45^b and 45^c are flattened out or down, as above-described, the width of these slots, in the direction or line or axis of the conductor 50, progressively diminishes. There results a peculiar but mechanically very secure snubbing action, an action that is two-fold where two such bendable or yieldable members, as parts 45^b and 45^c, are employed. The anchorage, aside from the earlier above-mentioned clamping of the conductor between, for example, the parts 45 and 26, is with this preferred arrangement materially supplemented by the just described snubbing action, and can withstand very substantial strains or pulls on the conductor. This, of course, is advantageous from the viewpoint of maintaining safety.

Also, as in the preferred arrangement, the use of two such members as parts 45^b and 45^c spaced along the length of the wire insures nicety of division between the two of the snubbing action and insures also that the clamping action that takes place intermediate thereof and the snubbing action uniformly contribute to the anchorage. It will be noted that as the upwardly projecting parts 45^b and 45^c are gradually flattened out (see Figures 4 and 5) the slots 45^d and 45^e move farther and farther apart from each other but along the length of the wire. They may therefore act to give the portion of the wire intermediate of the slots a straightening out or tensioning action.

Furthermore, the structure may be embodied in compact and in fact diminutive form and by way of illustration the over-all thickness of the assembled units A and B, as viewed in Figure 2 or 3, may be made as small as seven-sixteenths of an inch, with other dimensions to that scale. When embodied in the form of a connector plug for use in connection with outlet receptacles, the device is small, unobtrusive, neat in appearance, and forms no unsightly or bulky projection with which furniture or the like may collide. Furthermore, the casing part 30, where made of sheet metal, acts as a dependable protection or armor.

The take-off in a lateral direction of the conductor 11, as viewed in Figures 1 and 2, according to the preferred form, contributes toward neatness of appearance and absence of bulkiness or protrusion of parts and contributes toward protecting the mechanical junction between the core conductor 11 and the device 10 in that thereby a protrusion outwardly from the wall or other part containing the outlet receptacle 12 of the conductor itself is avoided. Also, and preferably, the parts are so proportioned that the extension 31^a (Figure 2) is of sufficient thickness to cause a resilient or yielding clamping between

itself and the extension 15* of the cord conductor 11 bodily, thereby snugly holding and engaging the insulation material of the cord 11 and where the latter is covered with woven fabric this action avoids fraying of the covering and resultant structural breakdown of the cord conductor.

The outwardly turned flange portions or ears 37, 38 (Figures 1 and 3) become sufficiently spaced from the plane of the front face of the outlet receptacle 12, when the plug structure 10 is related thereto, to make possible ready and convenient withdrawal of the connector plug from the receptacle when desired either by using the parts 37, 38 as finger pieces for grasping the structure and removing it from the receptacle or, if desired, by interposing between one or both of them and the face of the receptacle a suitable means, implement, or the like, to pry, if necessary, the connector plug out of the receptacle; where the latter is positioned in the wall adjacent the floor, the laterally projecting parts of the sole of a shoe may be used for this latter purpose.

Should it be desired to replace the cord conductor 11 at any time, the screw 51 is removed and the unit A removed from the unit B, the springiness of the metal of the contacts 45 and 46 (where the metal of the latter has springiness as well as ease of bending) returning the end portions of the latter to upwardly projecting position, as shown in Figure 5, whence the old conductor may be readily disengaged therefrom and new conductor quickly related thereto and the parts again assembled.

Thus, it will be seen that there has been provided in this invention a construction in which the various objects hereinbefore noted are successfully achieved, together with many thoroughly practical advantages. It will also be seen that the construction is of a thoroughly practical nature and is well adapted to meet the requirements of inexpensiveness of manufacture, and of hard practical use.

Inasmuch as this application and my co-pending application Serial No. 140,099, filed May 1, 1937, disclose certain common subject matter, I make claim to such common subject matter in my present application.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. An electrical connection means comprising, in combination, a member of generally disk-like shape made of suitable insulating material, said member having on one of its flat faces thereof two spaced contact plates, each extending generally parallel to said face and one to each side of the center of said member, said member carrying two conductive elements that are in electrical connection respectively with said contact plates, a casing-like part generally disk-shaped and peripherally flanged having seated therein a disk-like member of yieldable insulating material, said yieldable member presenting a face exposed toward said plate-bearing face of said first-mentioned member and having two preformed channels in its exposed face spaced substantially as the spacing of said contact plates in said first member and said channels having seated therein contact plates which, when said first-mentioned member and said casing-like part with

said yieldable member therein are related to each other face to face, become respectively juxtaposed to said first-mentioned contact plates and to form two spaced pairs of opposed contact plates, said two channels and said two contact plates therein being shaped to interfit, the space between said two preformed channels being such as to provide in said yieldable member an intervening barrier-like portion separating said two channels, channel means for leading insulated conductor structure into the structure formed by said two members and being in connection with said two spaced channels, thereby to extend two bared conductors of said insulated conductor structure respectively into said spaced channels and between the two pairs of opposed contact plates, and means for holding said first-mentioned member and said casing-like part together with said second-mentioned member under sufficient compression to cause said two pairs of contact plates to clamp their respectively interposed conductors and to cause said compressed second-mentioned member to maintain clamping pressure upon said conductors.

2. A construction as claimed in claim 1 in which said first-mentioned member is shaped to have a portion thereof telescopically received within the flange of said casing-like part, said holding means comprising a screw threaded means positioned substantially at the center of said disk-like member and said casing-like part, said flange and the portion of said first-mentioned member that is received therein having coating means for preventing relative rotary movement between said contact plate-carrying members thereby to maintain the contacting plates of each pair in proper juxtaposition to each other.

3. A construction as claimed in claim 1 in which said casing-like part is of sheet metal and has opposed portions projecting laterally from the flange thereof and spaced from the plane of said other face of said first-mentioned member, said opposed portions forming handle-like engaging members.

4. A construction as claimed in claim 1 in which the contact plates that are related to one of said members are made of a bendable sheet material and have portions bent out of the plane thereof and constructed to have their respective bared conductors passed through the plane thereof, said portions being bendable under the yielding clamping pressure effected by said yieldable member as said holding means and its associated parts effect compression of said yieldable member.

5. A construction as claimed in claim 1 in which the barrier-like portion of said yieldable member intervening the two channels therein has portions projecting respectively into said two channels and the contact plates seated in the latter are shaped to receive said projecting portions of said barrier-like portion and are thereby anchored against movement relative to said channels.

6. A construction as claimed in claim 1 in which the contact plates associated with said yieldable member are provided with slots or recesses which are dimensioned to freely receive the bared conductor therein and are distributed lengthwise of the plates so that the bared conductors may be respectively interleaved with portions of their respective contact plates and become alternately exposed to said yielding member and to said opposed contact plates and free

from shearing action thereon when said interleaved conductors and contact plates are clamped respectively by said opposed contact plates and said yieldable member.

7. A construction as claimed in claim 1 in which said channel means comprises open complementary channels in the contiguous faces of said two members and closed by the assembly of the latter together, said complementary channels being open ended laterally of the respective members in which they are contained, the flange of said casing-like part having an interruption adjacent said open end of said channel means.

8. An electrical connection means comprising, in combination, a supporting member having a substantially plane face in which is a recess in the bottom of which is a conductive part to which an electrical connection is to be made, said conductive part having a face that is below the plane of the face of said supporting member, said conductive part having and exposing toward the open end of said recess a suitable surface area with which electrical contact may be made, a member of resilient non-conductive material having a face adapted to engage against the said face of said supporting member and substantially close over the recess of the latter and having related to it and exposed in said face thereof a conductive part that is juxtaposed to said first-mentioned conductive part when said resilient member and said supporting member are assembled in face to face relationship, said second-mentioned conductive part having a shape to fall within the outline formed by the walls of said recess and having means for engaging a conductor, and means for securing said supporting member and said resilient member together with said resilient member under sufficient compression to move and hold said second-mentioned conductive part inwardly of and within the walls of, the recess of said supporting member, thereby to cause the side walls of said recess to prevent withdrawal of said second-mentioned conductive part by movement lengthwise of the plane of face to face contact between said two members, said compression of said resilient member being also sufficient to cause said resilient member to press and maintain said second-mentioned conductive part in electrical contact with said first-mentioned conductive part.

9. An electrical connection means comprising, in combination, two members of insulating material having surfaces brought into face to face engagement upon assembly of said two members, at least one of said two insulating members being made of a resilient material and both of said members having in their said surfaces recess means which substantially register upon face to face engagement of said two members, thereby to form between said two members a substantially closed recess, channel means in the structure formed by said two members for leading to said recess a conductor, a conductor extending along said channel means and into said recess, a contact plate in said recess and engaging against the bottom of one of said recess means, a bendable contact plate in said recess and adapted to engage against the bottom of said other recess means, said bendable contact plate being constructed to permit said conductor to be passed therethrough so that a portion of said conductor is exposed on one side thereof and another portion on another side thereof and toward said first-mentioned contact plate, all within said recess, a casing-like part taking over said

two members when assembled in said face to face relation and substantially telescopically receiving one of said members, and means coacting with said casing-like part for holding the latter and said two members in assembled relation and with said resilient insulating member under sufficient compression to constrict said recess by constriction of the recess means in said resilient member and for elastically clamping said inter-related conductor and contact plate against said other contact plate and to conform them and the bottom of the recess in said resilient member to each other.

10. An electrical connection means comprising, in combination, a rigid part having related thereto and supporting a member of resilient insulating material, said member having in a face thereof a preformed channel and having seated in said channel a bendable sheet metal connector element shaped to have a conductor interleaved therewith so as to bring a portion of said conductor into engagement with that face of said connector element that is exposed outwardly of said channel and another portion of said conductor in engagement with the other face thereof that is exposed toward the bottom of said channel, means coacting with said rigid part and resting against the face of said member of resilient material and closing over said channel, the bendability of said sheet metal connector element and the yieldability of said resilient material being respectively such that, upon pressing of said resilient member against said connector element, said resilient member can yield while effecting bending of said connector element, said means having a conductive part juxtaposed to said connector element, and means for holding said rigid part and said means together with said member of resilient insulating material pressed toward said means and under compression and with said conductor snubbed by said interleaved relationship with said connector element and pressing and bending said interleaved conductor and sheet metal connector element into engagement with and against said conductive part.

11. A construction as claimed in claim 10 in which the walls of said channel and said connector element have interengaging portions to hold the latter against movement relative to the former.

12. An electrical connection means comprising, in combination, a rigid part having related thereto and backing up a member of resilient insulating material, said member having mounted in an exposed face thereof a bendable sheet metal connector element shaped to have a conductor interleaved therewith so as to bring a portion of said conductor into engagement with the exposed surface of said connector element and another portion of said conductor in engagement with that surface of said connector element that is exposed toward said face of said resilient insulating member, a member having a face adapted to engage against the said face of said resilient insulating member and substantially cover the latter and having therein a channel-like recess having at its bottom a conductive surface, said channel-like recess having an outline substantially matching that of said connector element and being substantially juxtaposed thereto when said two members are brought into face to face contact, and means holding said rigid part and said second-mentioned member together in said face to face contact, thereby substantially encompassing said connector element, and with said resilient

insulating member under compression and with at least certain portions of said interleaved conductor and bendable sheet metal connector element pressed by said resilient insulating material into the recess of said second-mentioned member.

13. An electrical connection means comprising, in combination, a cup-like sheet metal member having a substantially rigid insulating member received within the walls thereof and substantially closing the otherwise open end of said sheet metal member, there being within said closed cup-like member means for mechanically anchoring and electrically connecting a conductor, said means comprising a bendable sheet metal connector element having at least one portion bent out of the plane thereof and constructed to have a bared conductor passed through said connector element, whereby a portion of said conductor lies against one face of said connector element and another portion lies against the other face of said connector element, said connector element with said conductor thus related thereto and a resilient insulating member being interposed between said first-mentioned insulating member and the end wall of said sheet metal cup-like member, and means for holding said first-mentioned insulating member and said cup-like member in assembled relation and with said resilient insulating member under sufficient compression to bend and substantially flatten said interrelated conductor and connector element in the space between said insulating members and thereby clamp them therebetween.

14. An electrical connection means comprising, in combination, two members of insulating material having faces brought into face to face engagement upon assembly of said two members, there being a channel-like recess in the face of at least one of said members and said recess being closed over by the other of said members when said two members are assembled face to face, a bendable sheet metal connector element seated in said recess and constructed to have a conductor passed therethrough so as to bring a portion of said conductor into engagement with one side of said connector element and another portion thereof into engagement with the other side of said connector element, at least one of said two insulating members being made of a resilient material, the latter being of a yieldability with respect to the bendability of said connector element that, when pressed against said connector element, it can yield while effecting bending of said connector element, means for holding said two members in face to face assembled relation and with said resilient member pressed against said interrelated connector element and conductor and under sufficient compression to bend and thus substantially flatten out said connector element and said conductor and thereby bend them into substantial conformity with the bottom of said recess in said one member and the face of the other member and to exert a clamping pressure upon said connector element and conductor interrelated as aforesaid, and a conductive part carried by at least one of said two members and forming part of the circuit of said conductor and said connector element.

15. An electrical connection means comprising, in combination, a member of generally disk-like shape and made of insulating material, said member having an exposed face having therein two spaced channels and a barrier-like portion between said channels, one channel on each

side of the center of said member, and said two channels being substantially arcuate, thereby providing in said barrier-like portion of said member an enlargement substantially at the center of said member, said member having channel means therein communicating with said two channels at adjacent ends thereof, substantially arcuate bendable sheet metal connector elements, one for each of said arcuate channels, and each received within and substantially interfitted with the walls of one of said channels, said central enlargement being accommodated within the adjacent concavities of said two arcuate connector elements whereby movement of said connector elements lengthwise of their respective channels may be prevented, said connector elements having portions bent out of the plane thereof and formed to have a bared conductor related to each so that a portion of the conductor is brought into engagement with that face of the connector element that is exposed outwardly of said channel and another portion thereof is brought into engagement with the other face thereof that is exposed toward the bottom of its channel, an insulated two-conductor structure extending along said channel means and having its two conductors bared and respectively engaged with said connector elements as aforesaid, a member having a face which upon assembly of said two members is brought into engagement with said face of said first member and having therein conductive parts spaced commensurately with the spacing of said connector elements in said first member and brought into engagement therewith and with the respective conductors thereof, said second member closing over said two spaced channels in said first member and means operative through said central enlargement in said first member and operating on said second member to hold said two members together and to bend said bent portions substantially back into the plane of their respective connector elements and to clamp therebetween said respectively engaged connector elements and conductive parts and conductors, and thereby also holding said connector elements against movement out of their respective channels in a direction transverse to the plane of the face having said channels therein and thereby holding said connector elements related to said central enlargement as aforesaid, whereby movement of said connector elements lengthwise of their respective channels and under the pull of the conductors respectively related thereto is prevented.

16. An electrical connection means comprising, in combination, a member of generally disk-like shape and made of insulating material, said member having an exposed face having therein two spaced channels and a barrier-like portion between said channels, one channel on each side of the center of said member, and said two channels being substantially arcuate, thereby providing in said barrier-like portion of said member an enlargement substantially at the center of said member, said member having channel means therein communicating with said two channels at adjacent ends thereof, bendable sheet metal connector elements, one for each of said arcuate channels, and each received within one of said channels, said connector elements having portions bent out of the plane thereof and formed to have a bared conductor related to each so that a portion of the conductor is brought into engagement with that face of the connector element that is exposed outwardly of said chan-

nel and another portion thereof is brought into engagement with the other face thereof that is exposed toward the bottom of its channel, an insulated two-conductor structure extending along said channel means and having its two conductors bared and respectively engaged with said connector elements as aforesaid, a member having a face which upon assembly of said two members is brought into engagement with said face of said first member and having therein conductive parts spaced commensurately with the spacing of said connector elements in said first member and brought into engagement therewith and with the respective conductors thereof, at least one of said members being made of resilient insulating material, and means operative through said central enlargement in one of said members for holding said two members in assembled relation and with the resilient insulating material thereof under sufficient compression to bend said bent portions of said connector elements in a direction substantially back into the plane of their respective connector elements and thereby yieldingly clamping the respective connector elements and conductive parts and conductors together.

17. An electrical connection means comprising, in combination, two members shaped for assembly and having adjacent portions presenting faces that are brought into juxtaposition when said two members are assembled, said faces being of a length in the direction of a conductor interposed therebetween sufficient to accommodate a substantial length of conductor, one of said faces carrying a bendable sheet metal connector plate of substantially corresponding length, said plate having at least two parts which extend in different planes and at least one of said parts having a slot therein, a conductor extending along said connector plate and in the slot thereof whereby one length of said conductor is exposed on one side of said plate and another length on the other side of said plate and said two conductor lengths are exposed respectively to said two portions of said two members, and means for drawing and holding said two members together with a force suitable to bend said connector plate into substantially one plane, clamp the latter with the conductor between said faces of said two portions, and substantially conform said interrelated conductor and connector plate to the configuration of said faces of said two clamping portions of said members.

18. An electrical connection means comprising, in combination, two members shaped for assembly and having adjacent portions presenting faces

that are brought into juxtaposition when said two members are assembled, said faces being of a length in the direction of a conductor interposed therebetween sufficient to accommodate a substantial length of conductor, one of said faces carrying a bendable sheet metal connector plate of substantially corresponding length, said connector plate having two end portions that are bent out of the plane of an intermediate portion, said two end portions having slots therein for substantially freely receiving a conductor, a conductor extending along said connector plate and through said two slots and having thereby end lengths exposed to one face of said connector plate and at said end portions of the latter and an intermediate length exposed to the other face of said connector plate and at said intermediate portion thereof, and means for holding said two members together with a force sufficient to clamp said interrelated conductor and connector plate between said two faces and to bend said bent end portions substantially in the direction toward the plane of said intermediate portion of said connector plate and thereby to substantially conform said plate and interrelated conductor to the configuration of the faces of said two portions of said two members.

19. A construction as claimed in claim 18 in which said two faces of said two members are constructed to form between them a substantially completely enclosed recess dimensioned to accommodate said connector plate therein, and means forming a passage for leading said conductor into said recess and to said connector plate.

20. A construction as claimed in claim 18 in which the portion of at least one of said members is made of a resilient insulating material that is under compression under the action of said drawing and holding means and conforms itself to such irregularities as are presented by said interrelated conductor and connector plate.

21. A construction as claimed in claim 18 in which said two faces of said two members are constructed to form between them a substantially completely enclosed recess dimensioned to accommodate said connector plate therein, there being means forming a passage to lead said conductor into said recess and to said connector plate, one of said portions being made of resilient insulating material and being under compression by the action of said drawing and holding means and thereby constricting said recess and elastically clamping said interrelated conductor and connector plate therein.

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