April 30, 1946. U. C. WALK 2,399,408

ELECTRICAL CONVENIENCE OUTLET

Filed April 20, 1943 2 Sheets-Sheet 1

Fig. 1.

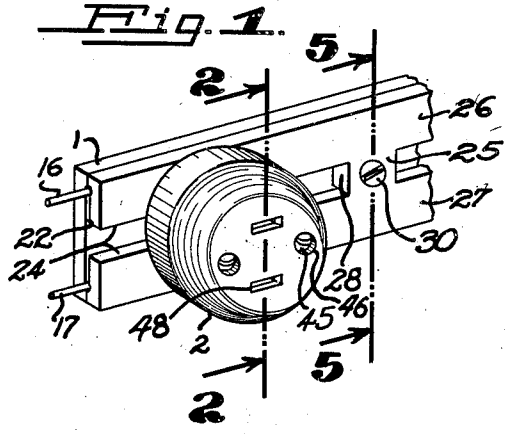


Fig. 3.

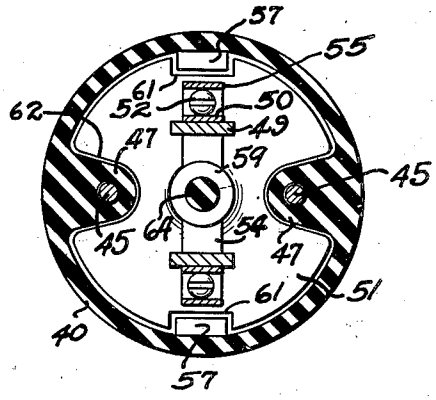


Fig. 2.

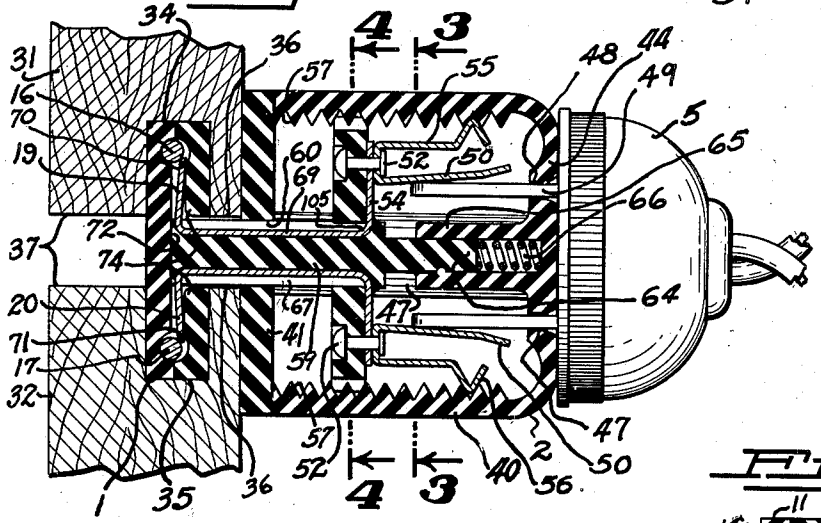


Fig. 5.

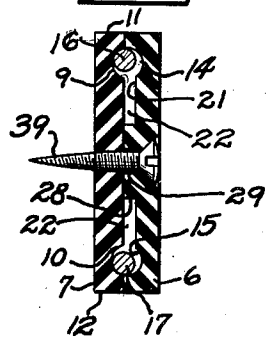
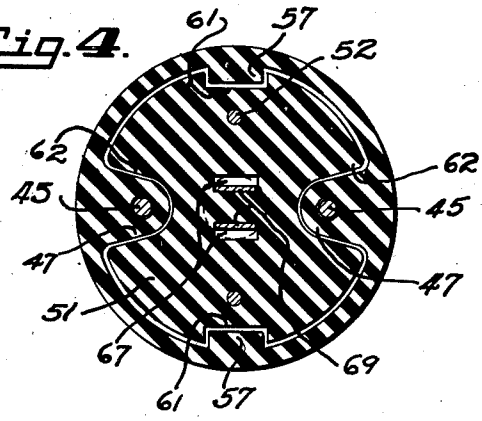


Fig. 4.



INVENTOR,
UDELL CLIFFORD WALK.
BY
F. Munro Redman
ATTORNEY.

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Fig. 6.

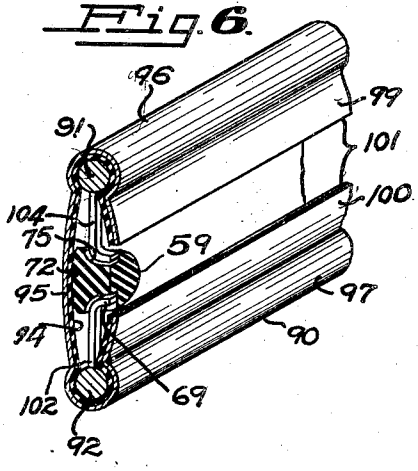


Fig. 7.

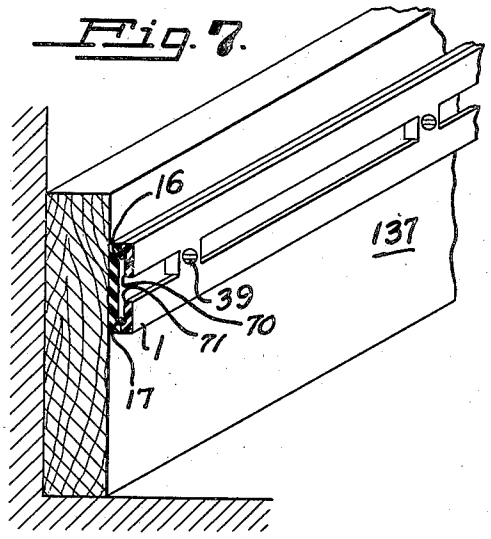


Fig. 8.

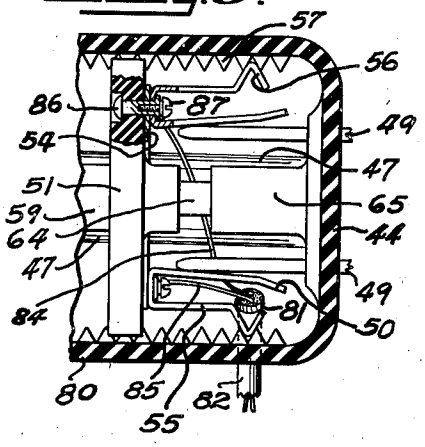


Fig. 9.

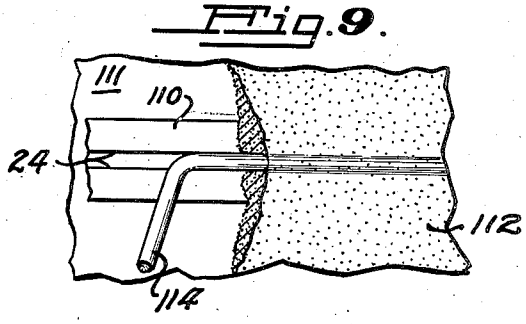


Fig. 10.

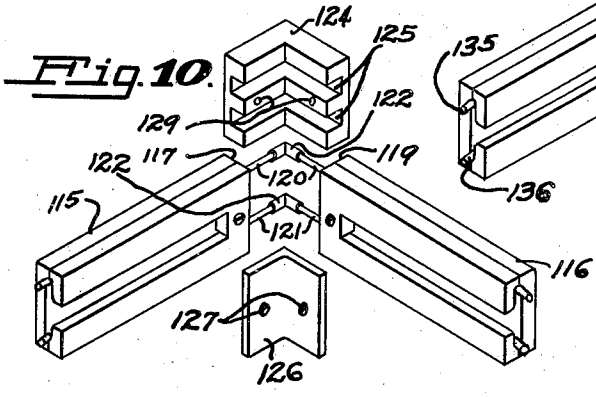
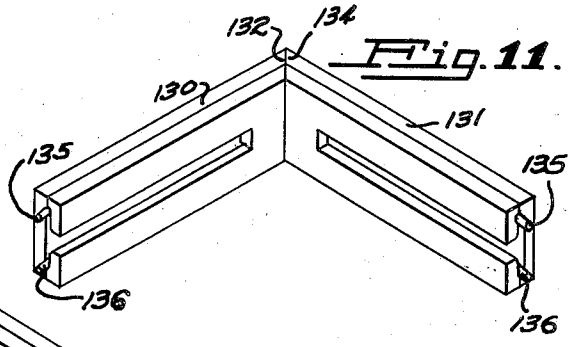


Fig. 11.



INVENTOR,
UDELL CLIFFORD WALK.
BY
F. Munro Redman
ATTORNEY.

Patented Apr. 30, 1946

2,399,408

UNITED STATES PATENT OFFICE

2,399,408

ELECTRICAL CONVENIENCE OUTLET

Udell Clifford Walk, Palo Alto, Calif.

Application April 20, 1943, Serial No. 483,770

4 Claims. (Cl. 173—343)

My invention relates to electrical wiring, and particularly to an improved form of outlet.

The electrical industry has long recognized the need for better distribution of outlets in the home, office, and factory. The constantly increasing number of electrical devices in general use has far surpassed the number of outlets available. This has led to the use of auxiliary two- and three-way plugs, double sockets, and extension cords, which are undesirable for several reasons.

The concentration of load on a single outlet into which a large number of current consuming devices are plugged may be so great as to exceed the safe carrying capacity of the wiring. This introduces a fire hazard from overheated wiring and charred insulation. It also causes a voltage drop in the line which may be large enough to interfere seriously with the efficient operation of the connected units.

The appearance of a room may be marred by the presence of numbers of unsightly extension and connection cords, while many of the former are of flimsy construction which deteriorates rapidly and may short circuit, again creating a fire hazard.

In newer home construction, greater heed is being given to providing adequate numbers of outlets. The standard types of wiring are, however, so expensive to install that sufficient and properly located outlets, with adequate sizes of wire to carry the prospective load, are still to be found only in the more expensive structures. A contributing factor is the difficulty in locating the outlets in the positions of maximum usefulness, since these positions will vary with the individual preferences of the householder in arranging the furnishings.

The present invention overcomes the difficulties inherent in prior type wiring and outlet connections, by providing an inexpensive wiring system extending throughout each room, and so arranged that appliances may be connected thereto at any desired point. It is thus not necessary to localize the points at which lights, radio sets, vacuum cleaners, clocks, or any of the numerous other electrical necessities of today, are attached to the electrical circuit.

In brief, my structure comprises a strip housing carrying two separated conductors and arranged to be set into the baseboard or wall of a room. A narrow slot extends substantially the full length of the housing, into which an intermediate plug may be inserted at any point. Connecting arms extend from the inserted intermediate plug to make contact with each of the conductors inside the strip. The intermediate plug is made to receive the conventional blade-type plug attached to the connecting cord of the appliance which is to be energized. The conductors may be made of wire heavy enough to carry any prospective load with perfect safety, and an intermediate plug may be inserted in the strip housing adjacent each electrical device. Further, my arrangement permits its use in structures already existing, as well as in those being newly constructed. The slot construction is very inconspicuous, but in certain locations it may be used effectively as a part of the decorative scheme of the room.

It will thus be seen that the objects of my invention are:

To provide an adequate outlet system of electrical wiring;

To eliminate fixed-position outlet boxes;

To remove the necessity for using two- and three-way plugs;

To make extension cords unnecessary;

To increase the convenience of location of electrical convenience connections;

To increase the flexibility of locations for household appliances;

To increase the efficiency of appliances by providing adequate voltage at the point of connection to the electric wiring;

To reduce the fire hazard attendant on overloaded wiring and poorly insulated auxiliary cords;

To provide an electrical outlet having a single opening extending around a room;

To provide a small and inconspicuous unit for connection of electrical attachments;

To provide an outlet device which may form a part of the decorative scheme of a room;

To reduce the cost of adequate electrical installations;

To improve the appearance of homes by a reduction in unsightly cords;

To make possible the modernization of existing installations at low cost; and

To permit the addition of any number of new appliances with safety and without unsightliness.

My invention possesses numerous other objects and features of advantage, some of which, together with the foregoing, will be set forth in the following description of specific embodiments. It is therefore to be understood that the principles of my invention are not limited to the exact forms shown, and I do not limit myself, in any way, thereto, as I may adopt various other embodiments utilizing the principles of my invention, within the scope of the appended claims.

The invention may be better understood by reference to the drawings and to the detailed description thereof set forth hereafter.

In the drawings:

Fig. 1 is a perspective view of the plug and conduit of my invention;

Fig. 2 is a sectional view of my device, taken in the direction indicated by the arrows 2—2 in Fig. 1, and illustrating the receptacle installed in a baseboard;

Fig. 3 is a sectional view of the plug portion of my invention, taken along line 3—3 in Fig. 2;

Fig. 4 is a sectional view of the plug portion of my invention, in the plane of line 4—4 in Fig. 2;

Fig. 5 is a sectional view of the receptacle portion of my invention, looking in the direction of arrows 5—5 in Fig. 1;

Fig. 6 is a fragmentary perspective view, partially in section, of a modified form of the conduit portion of my invention;

Fig. 7 is a fragmentary perspective view, partially in section, illustrating another method of attaching the conduit portion of my invention to a supporting surface;

Fig. 8 is a fragmentary sectional view of a modified form of the plug portion of my invention;

Fig. 9 is a fragmentary view, partially in section, illustrating another method of attaching the conduit of my invention to a supporting surface;

Fig. 10 illustrates a method of joining my strip conduit portions at angular corners; and

Fig. 11 shows another corner construction for my conduit.

In the showing of Fig. 1, I have illustrated the relation between my continuous strip wiring conduit 1 and the intermediate plug 2 schematically in perspective, while in Fig. 2 I have shown conduit 1 and plug 2 in a preferred relation to a baseboard 4, and with a parallel bladed-type appliance connection cap 5 of conventional design inserted in the intermediate plug 2, the section being taken along the plane 2—2 of Fig. 1.

The continuous strip wiring conduit 1, hereinafter referred to as the "conduit" 1, is formed of two portions, a front body member 6, and a rear body member 7, shown in Fig. 5 on roughly twice full scale. Rear body member 7 is an elongated slender strip, roughly rectangular in section, having a recessed upper wire groove 9 and a recessed lower wire groove 10 formed parallelly therein adjacent upper and lower edges 11 and 12, respectively.

Front body member 6 is an elongated, slender, roughly rectangular strip of the same size as rear member 9 and having upper and lower wire-receiving grooves 14 and 15 formed therein parallel to and in alinement with grooves 9 and 10 of rear member 7. When the front and rear members 6 and 7 are fixed together, by means described below, the corresponding upper and lower wire grooves form wire-receiving channels slightly larger than the conductors 16 and 17 which lie therein. This permits a slight accommodation to the entrance of contact arms 19 and 20 associated with the intermediate plug 2, hereinafter known simply as the "plug" 2.

Front member 6 is also recessed centrally throughout substantially all of its length at 21 to provide a channel 22 through which the plug contact arms 19 and 20 may operate. Front member 6 is also centrally slotted at 24, slot 24 extending longitudinally throughout all of member 6 except for periodic cross-members 25 which are required to hold upper portion 26 and lower portion 27 of member 6 together.

A rearwardly extending boss 28 is formed on cross-member 25 to engage rear member 7. Boss 28 is provided with a bore 29 to receive a bolt 30, adapted to cooperate threadably with a nut, not shown, to hold front and rear body members 6 and 7 together.

In the preferred form of my invention, I plan to mount conduit 1 in a baseboard, for example, by using an upper baseboard section 31 and a lower baseboard section 32 which have been milled to form upper and lower conduit-receiving channels 34 and 35 respectively. The two baseboard sections are joined about the conduit 1, and will be held as a unit by making the channels 34 and 35 a tight fit therewith. When the baseboard sections have been nailed in proper position, the assembly is as firm and solid as the ordinary single piece baseboard.

The channels 34 and 35 are made of such depth that when fitted about the conduit 1, a space is left between the upper and lower baseboard sections 31 and 32 equal in extent to the width of the conduit slot 24. This space is shown in Fig. 2 as front baseboard channel 36 and rear baseboard channel 37. The rear baseboard channel 37 provides access to the conductors from the concealed house wiring, while the front baseboard channel 36 affords access from the room to the conduit slot 24.

While I contemplate this method of mounting in the slotted baseboard as the preferred form it may in some cases be desirable to mount the conduit 1 on the surface of a solid baseboard 137, as shown in Fig. 7. In such case the nut and cooperating bolt 30 is replaced by a long screw 39, which holds the assembly together and supports the conduit 1 on the baseboard 137.

The plug 2 has a special form which permits it to be used with any thickness of the baseboard sections 31 and 32, or when the conduit is mounted on the surface of the board as in Fig. 7, and which allows it to be inserted in slot 24 at any point desired.

The plug 2 consists of a body member 40 and a base plate 41. Body member 40 is cup shaped, having a cylindrical wall portion closed by an end 44 formed integrally therewith. Opposite the end 44, the plug is closed by the base plate 41, which is secured thereto by bolts 45 set in recessed bores 46 in end 44 and extending through rounded bosses 47. Bosses 47 are formed integrally with the cylindrical wall portion 42, parallel to the axis thereof and diametrically opposite each other. End 44 is also pierced by slots 48 which permit entrance of contact arms 49 of the appliance connection cap 5.

Within body 40, the contact arms 49 engage spring contacts 50 mounted on a floating disc 51 by means of rivets 52, which also secure connecting members 54, to be described below, to the disc 51 and to contacts 50.

Formed integrally with spring contacts 50 and extending parallelly thereto away from disc 51 are spring ratchet arms 55, terminally formed into relatively sharp Vshaped engaging members 56 which are forced outward toward the sides of body member 40 by the resilience of the spring arms 55.

Two rack segments 57 are formed integrally with body member 40 and extending inwardly at diametrically opposite points and in position to cooperate with the V-shaped engaging members 56 supported by disc 51.

The strength of the spring arms 55 is such that disc 51 is fixed axially of body member 40 by the engagement of racks 57 and members 56 unless considerable force is applied to effect relative movement.

Centrally of disc 51 is fixed, or formed integrally therewith, a cylindrical shaft 59, coaxial with body 40 and extending through base plate 41, which is centrally apertured at 60 for that purpose. Disc 51 is circular, but is rectangularly recessed on opposite sides at 61 to clear racks 57, and has rounded recesses 62, diametrically opposed therein and displaced 90° from rectangular recesses 61. Rounded recesses 62 make a close sliding fit over the bosses 47 through which extend bolts 45 to maintain the end member 41 as a unit with body 40. Recesses 62 and bosses 47 thus cooperate to prevent plate 51 from turning axially relative to body 40.

One end 64 of shaft 59 is reduced in diameter and projects slidably into an annular guide sleeve 65 formed integrally with end 44 and extending axially therefrom into body member 40. Base plate aperture 60 and guide sleeve 65 maintain the alinement of shaft 59 axially within the body member 40 while permitting movement along the axis as far as permitted by base plate 41 in one direction and by a buffer spring 66 in the opposite direction. Spring 66 is conveniently formed in a coil and set in guide sleeve 65 where it is compressed between the shaft end 64 and end 44 of the body. This buffer spring 66 has the dual function of limiting the traverse of shaft 59 and of insuring the seating of the engaging members 56 firmly with the ratchets 57.

Channels 67 are cut into main shaft 59 diametrically opposite each other and extending substantially the full length thereof. The depth of the channels 67 is sufficient to allow conductor straps 69 to be set therein without projecting beyond the projected surface of the shaft 59. The conductor straps 69 are bent at right angles at each end. The end of each conductor strap adjacent disc 51 constitutes the connecting member 54 which is held securely to the disc and in engagement with the spring contact 50 by rivet 52, as described above. This rivet also constitutes the main attachment of strap 69 to shaft 59, since the latter is integral with or firmly fixed to the disc 51. The end portions of conductor straps 69 which are bent normally thereto at the end opposite connecting members 54 comprise the plug contact arms 19 and 20, referred to briefly above, which engage conductors 16 and 17 within the conduit 1.

When a particular spot has been selected for connection of an appliance to the line, the plug 2 is inserted to receive the appliance connection cap 5. First, the shaft 59 is pulled out of plug 2 as far as possible, the contact arms 19 and 20 are turned lengthwise of the conduit slot 24, and inserted as far as possible. The plug 2 is then turned 90° about its axis, which brings the contact arms 19 and 20 into engagement with the conductors 16 and 17. The tips of the contact arms 19 and 20 are rounded off and chamfered at 70 and 71 respectively. Hence, regardless of the position of the conductors 16 and 17 within channels formed by grooves 9, 10, 14, and 15, the rounded tips 70 and 71 will slide easily over the conductors and make a wiping contact therewith. The connection will be maintained by the resilience of contact arms 19 and 20, which have been shown in Fig. 2 as being bent somewhat beyond the normal to strap 69 by virtue of their engagement with the conductors.

The plug 2 is then forced axially inward toward the conduit until base plate 41 is pressed flush against the surface of baseboards 31 and 32, or against the conduit 1 itself in the case of surface mounting of the latter as shown in Fig. 7. The plug 2 is held in this position firmly by the rack and spring engagement described above, and will remain there until a substantial force is applied axially of plug 2 to separate the plug from contact with the baseboard after which it may again be rotated 90° to bring contact arms 19 and 20 parallel to the slot 24, permitting complete withdrawal.

When inserted as described, the plug may be used any number of times in any location without marring the finish of the baseboard, since the plug is turned only when the base 41 is out of contact therewith. The pressure of base 41 against the baseboard is sufficient to hold plug 2 firmly in position, but not sufficient to mar the surface. I have found that the pressure of the spring engaging member 56 against rack 57 within the plug 2 is adequate to maintain it in position while the appliance connecting device 5 is being inserted and removed. Obviously, it may be adjusted by deforming the spring arms 55.

Shaft 59 extends beyond the contact arms 19 and 20 for a short distance. This construction permits the end 72 of the shaft 59 to engage the rear body member 7 when the shaft is inserted into slot 24, and thus aline the contact arms 19 and 20 properly with the conduit channel 22 before the shaft is rotated to bring the contact arms into engagement with the conductors 16 and 17.

The inner edge 74 of the front conduit member 6 adjacent slot 24 is rounded to prevent the contact arms from catching if the plug 2 is turned before the shaft 59 has been inserted all the way into the conduit.

The recesses 67 are rounded terminally to fit the curvature of the bent ends of conductor straps 69, the end surfaces of the recesses extending at an angle to the conductor straps and helping to prevent movement thereof axially of shaft 59 if the contact arms 19 and 20 are pulled or pushed by accidental mishandling or when the plug 2 is being inserted or removed.

Fig. 8 shows a modified form of plug which is arranged for the permanent connection thereto of conducting leads, as well as to receive the usual bayonet type appliance connecting cap 5 shown in Fig. 2. In this embodiment, the body 80 is provided with an aperture 81 through which a cord 82 having conductors 84 and 85 may be inserted. The rivets 52 of Fig. 2 may be replaced by tubular rivets 86 internally threaded to receive set screws 87. The tubular internally threaded rivets 86 secure the spring and contact arms 50 and 55 to disc 51 and connecting members 54 in the same way as do rivets 52 of the embodiment shown in Fig. 2, while the set screws 87 clamp the conductors 84 and 85 securely in place. This form of plug 80 will find particular use in specialized locations.

The form of the conduit 1 is also susceptible of change. In its preferred form as described above, the front and rear body members 6 and 7 may be molded from any of the well known plastics or synthetic resins. The particular materials selected will vary with the use to which the conduit is to be put. It should, however, be of the insulating type, non-absorbent of moisture, and possess considerable rigidity. Where it is to be

mounted and concealed in the baseboard, as shown in Fig. 2, color is unimportant, but a smooth surface finish is desirable to permit easy insertion in the baseboard channels 34 and 35. When, however, it is desired to mount the conduit on the surface of the baseboard 37, as shown in Fig. 7, various colors may be utilized to harmonize with any desired decorative scheme. While the concealed mounting of Fig. 2 is preferred, it is obvious that the surface mounting of Fig. 7 is well adapted to installation in houses already constructed, and in cases where it is not convenient to channel the baseboards. Surface wiring installations have been hitherto available, consisting of flexible or rigid conduits combined with a plurality of plugs or receptacles of the conventional types, but it will be appreciated that these plugs are cumbersome in appearance and bulky, and that they interfere with the appearance of the room rather than being susceptible of aiding in the decorative scheme.

Other modifications may also be made in the form of the conduit. For example. I have shown in Fig. 6 an embodiment made of metal and fiber. A single metal strip 90 is formed to enclose and separate the two conductors 91 and 92 and an insulating strip 94 of fiber or similar material. The fiber and metal strips are crimped tightly around the conductors, forming a rear wall 95, and upper and lower conductor enclosing portions 96 and 97 and upper and lower front walls 99 and 100 which extend toward each other to define slot 101. The slot 101 should be of the same dimensions as the slot 24 in the molded conduit 1.

In the embodiment shown in Fig. 6, a fragmentary sectional portion is shown of the shaft 59 with the tip 72 engaging the rear fiber liner 94. It will be observed that the ends 102 of contact arms 104 are of square section in a plane normal to the axis of the conductor 91, although they may be rounded in a plane parallel to that axis. This difference in the shape of the tips of the contact arms is due to the fact that the conductors 91 and 92 are crimped firmly in the conduit 90, and the resilience necessary to good electrical conduct must therefore be supplied elsewhere than by flexing of the arms 19 and 20 relative to the connection straps 69.

This resilience I supply in the construction of Fig. 6 by bending the connection straps 69 at slightly more than 90° to the connecting members 54 at 105 (see Fig. 2). This spreads the tips 102 slightly more than the distance between conductors 91 and 92, so that when the plug 2 is twisted to turn the contact arms 104 into position, the accommodation must be supplied by the bends 105.

Obviously, this construction may be applied to the molded form of conduit as well as to that shown in Fig. 6.

An alternative method of mounting is shown in Fig. 9 which is particularly applicable to those cases where no baseboard is used, or where it is desired to set the conduit in a plaster or cement surfaced wall.

In Fig. 9, a section of conduit 110 is shown fixed to a base 111 onto which a surface 112 of plaster or similar composition is to be applied. A filling, such as a heavy cord 114, is set into the slot 115 to prevent entrance of the plaster 112. When the surface is dried, cord 114 is pulled out, and the conduit is ready for service.

When my conduit is to be applied along more than one wall of a room, the corner construction shown in Fig. 10 may be used. Conduit sections 115 and 116 are cut off squarely at 117 and 119 respectively; upper and lower conductors 120 and 121 respectively are allowed to project therebeyond, and are joined by nipple fittings 122, for example, or by any equivalent type of connection. The nipples 122 and the portions of conductors 120 and 121 leading thereto are enclosed by a right-angled corner unit comprising a rear fitting 124, consisting simply of a right-angled plate having grooves 125 spaced to receive conductors 120 and 121, and a front plate 126, which is simply a closure member. Front plate 126 may be secured to rear member 124 by screws 127 extending through bores 129 in rear member 124.

Another method of corner construction is found in Fig. 11. Here the conduit sections 130 and 131 are cut at a 45° angle at their end portions 132 and 134 respectively, and are butted against each other to form a right angle. Obviously, the conductors 135 and 136 may be joined in a fashion similar to that shown in Fig. 10.

The connection of the conductors within my conduit to the house circuit is a simple matter. A portion of the rear conduit body member 7 may be cut adjacent the housewiring leads, which may then be joined by conventional means to the conduit conductors.

It may be seen from the above description that I have invented a new form of convenience outlet possessing advantages hitherto unknown. The conduit portion thereof is small and inconspicuous, and may either be concealed within a wall or baseboard, or surface mounted, as desired. If desired, the slot may actually form a part of the decorative scheme.

The use of my plug permits connection to the conduit at any point, and thus allows the use of any number of electrical devices without the unsightly clutter of extension cords and multiple sockets previously necessary around convenience outlets.

Certain modifications in structure and design will be apparent to those skilled in the art, and it is intended that such variations may be made within the scope of the claims. The corner connection members, such as shown in Fig. 11, can obviously be shaped to fit any curve or angle in a room, so that the conduit may continue around such irregularities.

Summarizing, I have set forth a convenience outlet by means of which connection is available to the electrical circuit at any point around a room for any number of electrical devices, with safety and neatness, and in a form which may be manufactured and installed at substantially less cost than are the present types of convenience outlets and wiring therefor.

I claim:

1. An intermediate plug for use with strip conduit having separated conductors parallelly disposed therein and accessible through a slot, comprising a body, a floating disc disposed within said body, a shaft fixed to said disc axially slidable therein and projecting therefrom, resilient engaging members fixed to said disc, racks formed within said body and arranged to receive said resilient engaging members, bosses formed longitudinally of and within said body, recesses formed in said disc arranged to make a sliding fit with said bosses, apertures formed in said body arranged to receive appliance connecting cap blades, contact means fixed to said disc arranged to engage appliance connection cap blades inserted through said apertures, conductor means connected to said contact means and recessed axially

in said shaft, connecting portions terminally formed upon said conductor means normal thereto and projecting therefrom without said body by a distance slightly less than a separation between said conduit conductors.

2. An intermediate plug for use with strip conduit having separated conductors parallelly disposed therein and accessible through a slot, comprising a body, a floating disc disposed within such body, a shaft axially slidable within said body fixed to said disc and projecting from said body, racks formed within and extending axially of said body, connecting members associated with said disc and arranged to engage appliance connecting cap blades, connection straps formed integrally with said connecting members and recessed with said shaft axially thereof, contact members formed on said straps and extending normally to the axis of said shaft for a distance slightly less than the center to center spacing between said separated conduit conductors and resilient means fixed to said disc and arranged to engage said racks.

3. An intermediate plug for use with slotted strip conduit having separated conductors parallelly disposed therein and accessible through said slot, comprising a body having a cylindrical side wall and an end wall formed axially normal thereto, appliance connection cap blade-receiving apertures formed in said end wall, an annular guide member formed coaxially with said end wall and projecting inward therefrom, a resilient positioning member disposed within said annular guide member, a flat base plate fixed to said body opposite said end, a central bore formed in said base plate coaxial with said annular guide member, a shaft extending slidably through said aperture and projecting into said annular guide member, a disc fixed to said shaft, resilient positioning arms projecting from said disc, racks formed within said cylindrical body member in alinement with said resilient arms, rounded bosses formed upon and extending inwardly from said cylindrical body member parallel to the axis thereof, correspondingly rounded recesses formed in said floating disc, bores extending parallel to the axis of said cylindrical body member through said bosses, means extending through said bores for maintaining connection between said body member and said base plate, contact arms extending from said shaft and arranged for insertion in said slot and for engaging slidably with said conduit conductors, and means for preventing movement of said contact arms axially of said shaft.

4. An electrical outlet fitting comprising, in combination, an insulating hollow body member enclosing a slidable insulated shaft, electrical contacts attached to an element carried by the shaft and disposed within the body for engagement with a contact plug of an electric cord, the opposite end of the shaft projecting beyond and outside the body and carrying a pair of contacts in electrical circuit with the said electrical contacts carried by the shaft within the body, and means to hold the shaft at varying positions within the body.

UDELL CLIFFORD WALK.