

Sept. 16, 1969

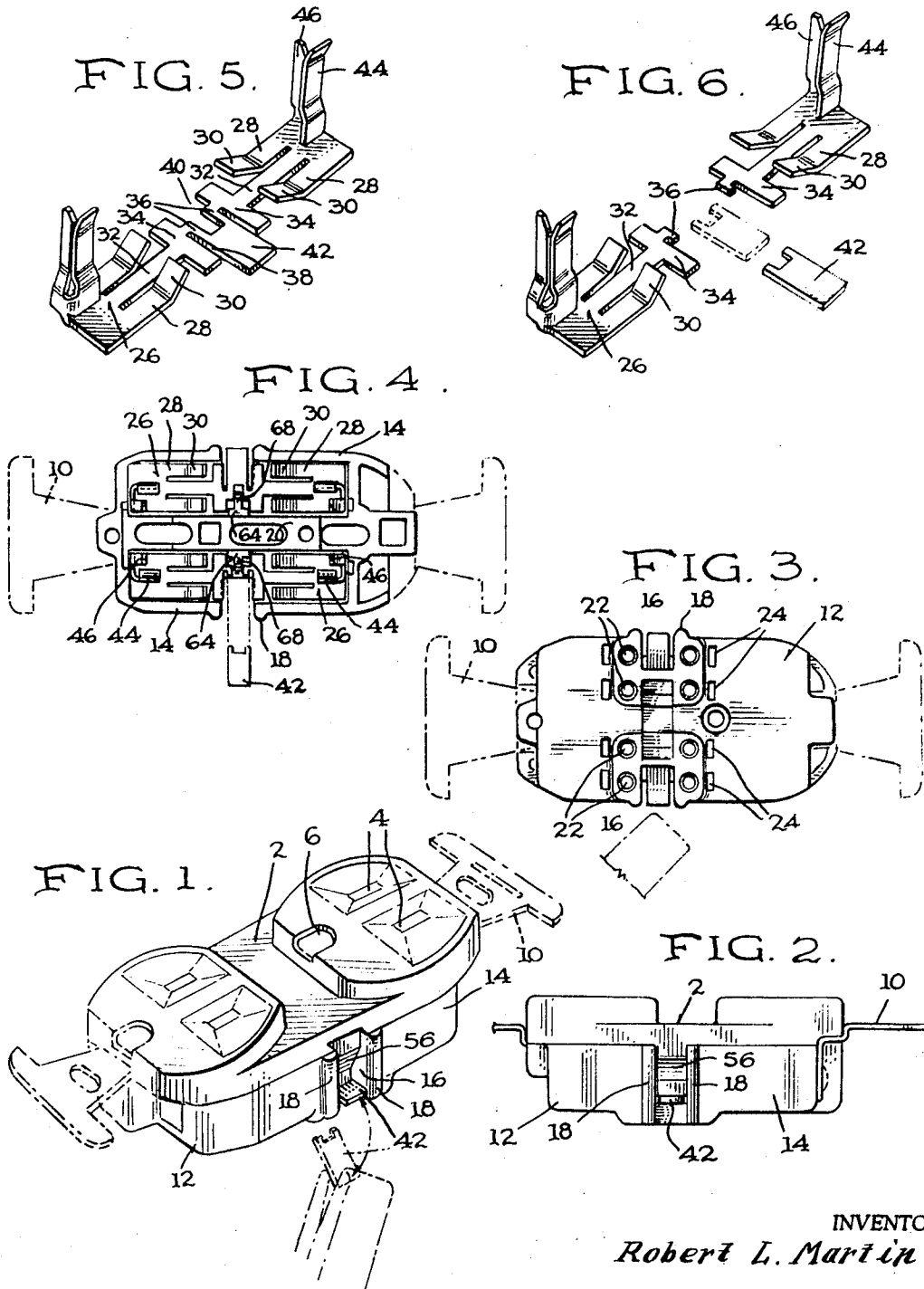
R. L. MARTIN

3,467,941

DUPLEX SOCKET CONTACT WITH BREAKOFF TAB

Filed Nov. 3, 1966

3 Sheets-Sheet 1



INVENTOR

Robert L. Martin

BY *Paul E. Rockford*

ATTORNEY

Sept. 16, 1969

R. L. MARTIN

3,467,941

DUPLEX SOCKET CONTACT WITH BREAKOFF TAB

Filed Nov. 3, 1966

3 Sheets-Sheet 2

FIG. 7.

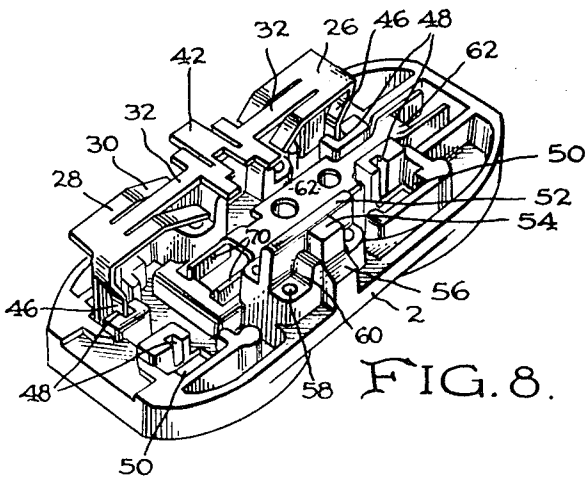
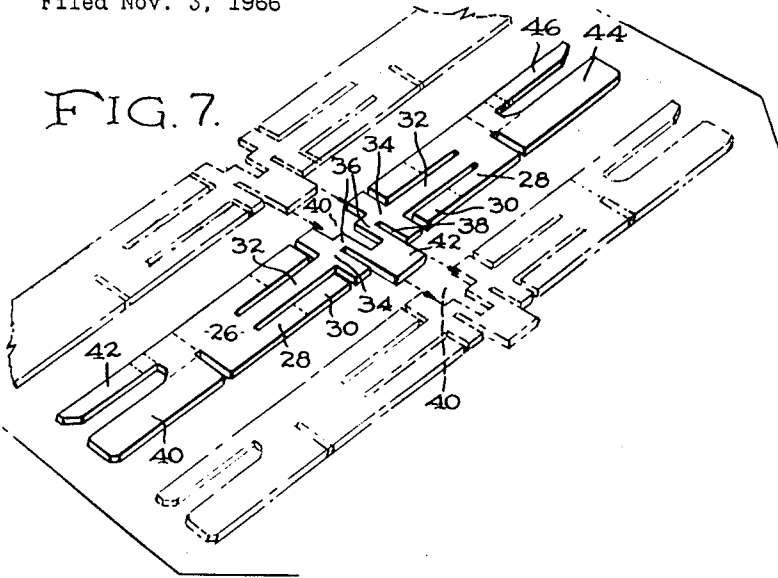


FIG. 8.

FIG. 9.

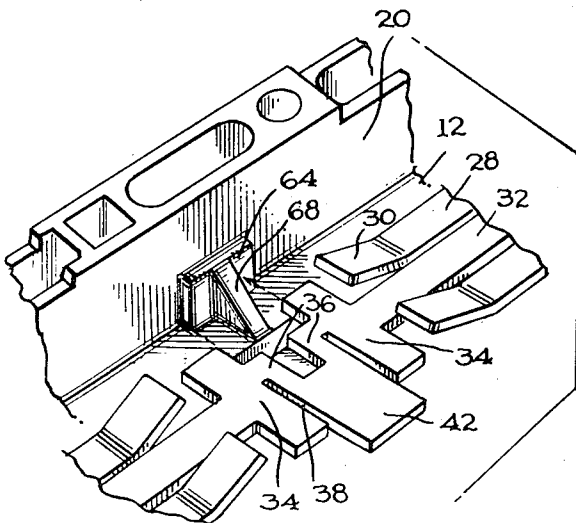
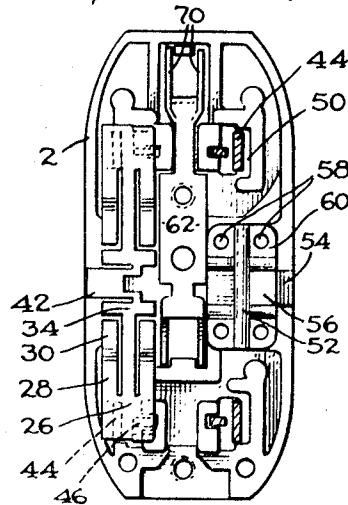


FIG. 10

INVENTOR

Robert L. Martin

BY

Paul E. Rochford

ATTORNEY

Sept. 16, 1969

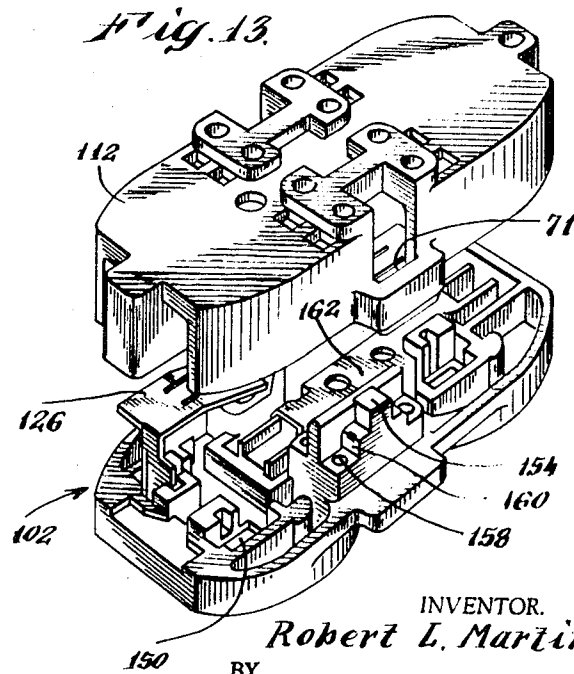
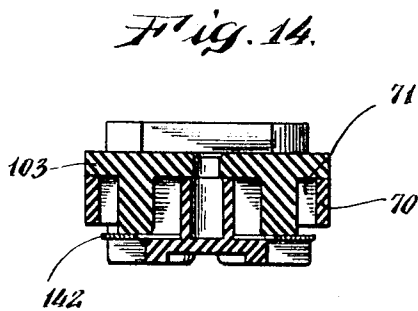
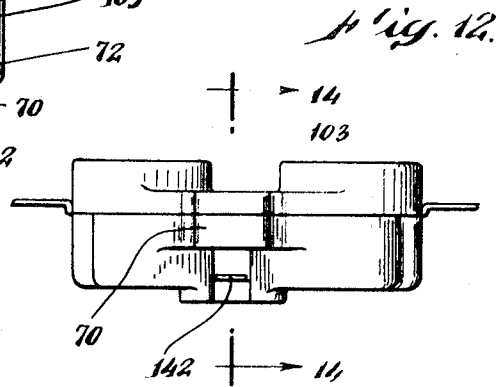
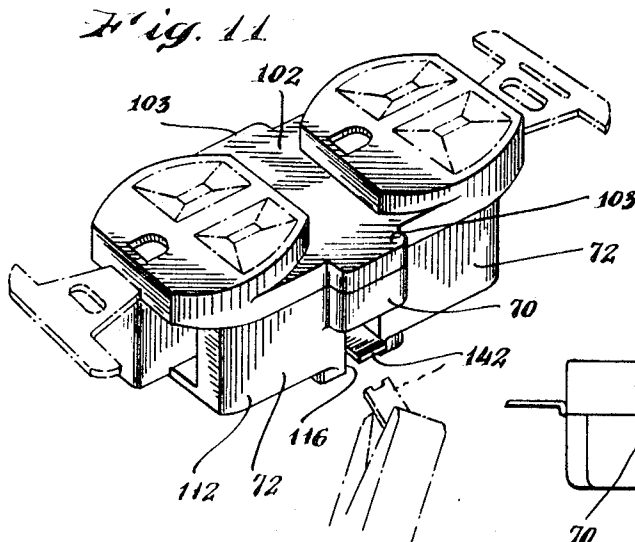
R. L. MARTIN

3,467,941

DUPLEX SOCKET CONTACT WITH BREAKOFF TAB

Filed Nov. 3, 1966

3 Sheets-Sheet 3



INVENTOR.

Robert L. Martin

BY

Paul E. Rockford
ATTORNEY.

1

2

3,467,941 DUPLEX SOCKET CONTACT WITH BREAKOFF TAB

Robert L. Martin, Cranston, R.I., assignor to General Electric Company, a corporation of New York
Filed Nov. 3, 1966, Ser. No. 591,844
Int. Cl. H01r 29/00, 3/06

U.S. Cl. 339—31

5 Claims

ABSTRACT OF THE DISCLOSURE

A duplex grounding outlet is provided having electric contact strips adapted to split circuit wiring by removal of a breakoff tab from each strip to permit separate power supply to each half of the duplex outlet. The breakoff tab is provided in readily accessible and easily severable combination with the housing.

This invention relates to a grounding outlet having multiple spring-biased fastening means for providing electrical engagement with inserted line wires. More specifically, it relates to a duplex plug receptacle having a pair of electrical line contacts each formed from a blank piece of sheet material and having a breakoff means readily removable from the exterior of the receptacle whereby each contact may be made in two separate pieces. Each of these can be connected for a split circuit wiring.

The invention contemplates an improvement over the device disclosed in U.S. Patent No. 3,339,170 of Robert Martin and assigned to the same assignee, and from which this application forms a continuation-in-part. As disclosed in the Martin patent, a plurality of breakoff tabs are provided for each line contact, whereby each contact can be made into two separate pieces. Each separate piece, therefore, can be connected to two wires of different sizes for split circuit wiring.

The breakoff tabs for each contact are preformed after the line contact is formed thereby providing a weakened portion between each of the breakoff tabs and its associated line contact.

Although a number of convenience outlet designs exist which provide a breakoff tab which is readily accessible from the exterior longitudinal sides of the device, these are characterized in having a contact strip which is largely vertically disposed relative to the longitudinal sides of the outlet structure. No device has been available heretofore which has a horizontally disposed contact strip, i.e. one lying parallel in the circuit wire connecting and circuit separation portions and which has a breakoff tab readily accessible from the external longitudinal side of the device.

Of particular importance in this respect is the provision of a contact strip which lies parallel to the back of the outlet structure so that wire fasteners may be provided which also lie essentially parallel to the back of the device and which are activated by pushing wires into the fastening structure as explained more fully in Patent No. 3,339,170, referenced above.

It is an object of this invention to provide a convertible plug receptacle having a line contact which is parallel to the back of the device and which is provided with a breakoff tab accessible from the longitudinal side of the device to permit separation of the contact into two separate pieces for a split circuit wiring.

It is another object of this invention to provide a line contact member for an electrical outlet device which utilizes an economy of material in its construction.

It is a further object of this invention to provide a duplex receptacle plug having breakoff tabs integral with their associated line contacts which are at all times conveniently accessible to removal.

It is still another object of this invention to provide a sturdy duplex plug receptacle which confines within its exterior outlines the breakoff portions of the line contact members but which make the breakoff portions readily accessible to a gripping tool.

Additional objects and advantages will be in part apparent and in part pointed out in the description which follows.

In one of its broader aspects the objects of the invention may be achieved by providing a duplex convenience outlet device adapted to split circuit wiring which comprises an insulated housing including a base and cover, elongated cavities in said base, said base cavities having disposed against the bottom thereof contact strips, said contact strip being adapted to receive at each end section thereof a line wire and a power blade in electrical connection therewith, and said strip having between said two end sections a breakoff tab integral with and extending laterally beyond the boundary of said end sections, the outer wall of each cavity in the base being formed with a side opening to provide access of a gripping tool to said breakoff tab, said cavitied base having a positioning boss formed therein to maintain separation of said end sections, and said cover having depending ribs to prevent the sections from rising above said positioning boss.

In one of its preferred embodiments, an electric outlet is provided for use with a grounding attachment plug to have a grounding contact and two U-shaped line contacts, each U-shaped line contact having at the terminus of each end section prong-receiving means and having provided in the base of each end section two separate cam arrangements for engaging two separate wires in a spring lock arrangement in the base of each contact end section.

To provide the four separate cam arrangements of the integral contact, the line contacts are formed from metal strip having good leaf spring properties and the strip is trifurcated at two longitudinal portions of the base of the line contact so as to form three parallel prongs or legs extending lengthwise of the contact. One end of each of the outer legs is made free of the base so as to form a cantilever cam leg. The two outer cam legs in combination with the central leg and the portion of the strip which joins the three legs at their held end comprises an E form which is integrated into each end section of the contact as one component element thereof.

Each of the cam legs may be up from the base of the U-shaped contact so that a wire may be pushed through an opening in the base in registry with the bent up end of the cam leg. A wire may thus be engaged in the base of the contact between the free movable end of the cam leg and the remaining edge or shelf of the contact base from which the free end was displaced as described more fully in U.S. Patent No. 3,339,170, referenced above. An inserted wire is electrically contacted on one side by the shelf and on the other side by the free end of the leg. Four wires, therefore, can be individually held in firm engagement with each U-shaped line contact.

Each line contact is provided with a breakoff tab defined in part by a protrusion extending beyond one longitudinal edge of the strip and in part by a plurality of spaced-apart slots extending from the outer longitudinal edges of the contact between the contact end sections and more specifically between the E forms, and extending to the middle portion of the contact. By removing the breakoff tab each end section of the strip can be made into a separate contact which can be connected to two wires of different sizes for a split circuit wiring.

The line contacts are enclosed within an insulating housing which is formed by two molded insulating members. One of these members, a base, is provided with a pair of cavities or recesses each of which snugly receives one of the U-shaped contact strips. Each recess is pro-

vided with an opening in the middle portion through its outer side wall to thereby allow access to the break-off tab on the contact strip for removal by bending it back and forth by movement of a gripping tool in the side opening of the housing.

Additional advantages and details believed to be novel in the article of this invention will become apparent from the following description and claims taken with the accompanying drawings, wherein:

FIG. 1 is a perspective view in elevation of a convenience electrical outlet or receptacle utilizing the principles of this invention;

FIG. 2 is a side elevational view of the electrical receptacle shown in FIG. 1;

FIG. 3 is a bottom view of the receptacle shown in FIG. 2;

FIG. 4 is a cutaway of the base portion of the plug receptacle showing the arrangement of contact strips;

FIG. 5 is a detailed perspective view of one of the contact strips according to the principles of this invention;

FIG. 6 is a detailed perspective view of a contact such as shown in FIG. 5 but in severed formation;

FIG. 7 is a perspective of a preform of a contact in layout form according to the principles of this invention;

FIG. 8 is a perspective view partially broken away of a cover portion of the receptacle shown in FIG. 1;

FIG. 9 is a plan view of the cover portion shown in FIG. 8;

FIG. 10 is an enlarged perspective view of a portion of FIG. 3 illustrating the means of assembly of a contact strip in the base portion of the receptacle according to this invention;

FIG. 11 is a perspective view of a modified form of the receptacle structure as shown in FIG. 1;

FIG. 12 is a side elevation of the device of FIG. 11;

FIG. 13 is an exploded perspective view of the inverted device to illustrate the bottom exterior of the base and the internals of the cover of the receptacle of FIG. 11; and

FIG. 14 is a sectional view of the device of FIG. 12 taken along the line 14—14 of FIG. 12.

With reference to FIG. 1, it will be seen that a grounding outlet receptacle constructed in accordance with the principles of this invention comprises a molded cover 2 having prong receptacles 4 and grounding receptacles 6, a mounting bracket 10 and a base portion 12. The base portion 12 comprises side walls 14 in each of which a side opening in the form of a vertical slot 16 extends part way through the base 12 as best shown in FIGS. 2 and 3. The slot 16 is bordered by rib members 18, the function of which will be explained later. As shown in FIG. 4, the base 12 houses a pair of U-shaped contact strip members 26 in longitudinal parallel recesses divided by an insulating center wall 20.

Since each of the line contacts 26 is identical, reference will be made to only one. It will be seen that the line contact is formed from a single strip of metal, preferably of spring tempered brass, and is generally of a shallow U-shape, as best shown in FIG. 5. The base of the U-shaped contact is generally rectangular in shape with two spaced portions of the base trifurcated so as to form two pairs of identical cam legs 28. The legs 28 are each cut free of the base at one end and partially bent so as to form cantilever cams 30. A channel (not shown) may be coined in the center of each of the legs 28 extending the length of the leg to add strength to the cantilever cam legs. Central leg 32 separates the cam legs 28 from each other and mechanically joins their held ends to a central portion 34.

The breakoff tab at the central section of the contact strip is partly defined by a plurality of transversely extending slots 38, 40 defining a breakoff tab 42, the tab also being partially defined by extending tab end extending beyond the longitudinal edge of the remainder of the

contact strip. The purpose of forming two separate contact pieces from each contact strip 26 is to permit split circuit wiring. The slots 38 extend from the outer longitudinal edge of the base toward the middle portion thereof and the slot 40 extends from the opposite outer edge to the area between the slots 38. With this arrangement the breakoff tab 42 may be removed from the strip as by bending back and forth and/or twisting the weakened portions 36 to become sheared along the central axis of the line contact 26 as best shown in FIG. 6. It is important that the breakoff portions be internally of the longitudinal strip boundaries so as to provide for ample leverage in manipulating the tab with a gripping tool until it is severed. Each upwardly extending arm of the U-shaped contact is formed to provide prong-receiving legs 44, 46 which are bifurcated portions of the contact strip 26. Legs 44, 46 are perpendicular to each other and provide a double wipe arrangement for engaging the prong of a connector.

Referring now to FIG. 7, the U-shaped contact 26 is shown in layout form and is seen to be of a generally rectangular strip form. It will be seen that the outwardly extended portion of the breakoff tab 42 has the same dimensions as the slot 40 extending inwardly from the opposite outer edge of the adjacent strip contact 26. The slot 40, which functions as a positioning means to be more fully described below, is formed by removal of metal for the breakoff tab of an adjacent contact strip during the cutting operation on appropriate sheet metal. With this arrangement a single die can be used for cutting a plurality of contact strips and the amount of waste metal is thus minimized by the effective transfer of metal from one contact strip to an adjacent strip.

Referring now to FIGS. 8 and 9, the positioning of the contacts 28 with respect to the molded cover 2 will be understood. One of the contacts 28 is shown mounted on the cover 2, while the other contact has been removed to better show the internal structure of the cover 2. Furthermore, in the duplex-type plug receptacle or outlet which is shown, the contacts are positioned symmetrical with respect to a perpendicular axis drawn through the center of the outlet and extending in a direction parallel to the length of the outlet. Since the overall device is symmetrical about such longitudinal axis, only one contact and its associated supporting structure will be discussed. The cover 2 is provided with an elongated rib 52 extending in the direction of the longer dimension of contact strip and upon which rests the center legs 32 of the contact strip. The elongated rib also serves as an insulating barrier between the cam legs 28. Each of the prong-receiving legs 44, 46 is snugly received in slots 48, 50 which terminate into the apertures 4 provided in the cover respectively for the insertion of prongs for engaging legs 44, 46. On both sides of the elongated ribs 52 are formed identical shelf portions 60. Each of these shelf portions is provided with a wire-receiving bore 58.

Adjacent the central outside portion of each rib 52 is a depending leg member 56 having an upper positioning section which occupies the slot 16 in the base 12 and a lower rectangular block section 54 which extends slightly below the rib 52. When the cover and base are assembled, the bottom surface of the block 54 of depending leg 56 rides on that portion of the breakoff tab within the outside longitudinal edge of the contact strip. By this riding action the breakoff tab is biased at or slightly below the plane of the contact strip and in effect when the tab 42 is removed can occupy the area previously occupied by parts of the breakoff portion 36 and the breakoff tab 42.

A grounding contact 62, shown positioned on the cover 2, is provided with two double wipe prong-engaging portions 70. A mounting bracket 10, which is provided with the usual mounting means at either end, is positioned on the molded cover in abutting relationship with the ground contact 62 and an insulated relation between the contacts

28. The molded base 12 is placed over the contacts 28 and the mounting bracket 10.

Referring now to FIG. 4, it will be seen that the base 12 is provided with an insulating wall or barrier 20 which extends lengthwise of the base and divides the base into two pockets each of which has a rectangular shape conforming to that of the base of the U-shaped line contacts 26. As shown in FIG. 10, the contact sits on the base 12 and adjacent the barrier 20. A positioning member 64, which also acts as an insulating member, projects from the barrier wall 20 as a right-angle rib member 68 which is adapted to fit in the lower narrower portion of the groove 40 in contact 26. As seen in FIG. 1, the breakoff tab 42 of the contact 26 extends to the ribbed edges 18 of the slot 16 in the side wall 14. The ribbed edges provide protection against the breakoff tab from contact with external objects and thus prevent shorting before the tab is removed. As shown in FIG. 3, the slot 16 extends into the base portion approximately to the central axis of the contact strip. It will be seen that the breakoff portions 36 lie approximately along this axis. Thus, the ribbed right-angle positioning member 68, the breakoff portions 36 and the edge of the slot 16 are all generally located on the same axis. This allows the break-off tab 42 to be moved or gripped by a suitable tool through the slot 16 thus causing the weakened portions 36 to be severed approximately along the central axis of the line contact 26. With this arrangement the severed portions 36 are separated by the insulating rib section 68 as well as being confined within the interior of the housing. Further, the depending member 54 now occupies the space left by the breakoff tab, thus completing the insulating barrier between the cross pieces 34.

The base 12 is provided with eight identical holes 22 through which wires are inserted to be engaged by the cam legs 28 in the line contact portion of contact strip 26. The free ends of the cam legs 28 extend within the projection of the holes 22 and the wire-receiving recesses 58 in the cover 2. A wire, upon being inserted in a hole 22, may first engage the shelf 60 and may be deflected by it to engage the inclined surface of the free end of cam leg 28 as it is further inserted. As the wire is inserted in the hole 22 and pressed against the free end of the cam leg 28, the cam leg is deflected in cantilever fashion throughout its length thereby providing a spring bias force on the side of the wire and securing it within the recess 58. With this construction the insertion of a wire in the spring lock fastening means not only causes deflection of the yieldable cam legs 28, but also causes a torsional deflection or yielding of the center legs 32 which aids in providing a spring bias force upon the wire. Rectangular apertures or access holes 24 are provided for the insertion of a tool to release the pressure lock wire fastening means. A tool such as a screwdriver (not shown) may be inserted through a rectangular aperture 24 and is brought to bear on the cam leg 28 thereby deflecting the cam leg away from the wire and releasing the wire.

After the wiring device is assembled and each breakoff tab 42 is subsequently removed in the manner described above, the separate end sections of each contact strip 26 are firmly held in place during and after removal of the breakoff portions by the cooperation of the right angle rib member 68, the elongated rib 52 and the slots 48, 50 with their respective portions of the line contact strip 26.

Although several embodiments of the invention have been depicted and described, it will be apparent that these embodiments are illustrative in nature and that a number of modifications in the apparatus and variations in its end use may be effected without departing from the spirit or scope of the invention as defined in the appended claims.

One such modification is illustrated in the structure illustrated in FIGURES 11 through 14.

Referring now to these figures a form of the conven-

ience outlet structure is shown which is preferred for use where a device of greater strength is desired without an attendant loss or sacrifice of the convenient accessibility and removability of the breakoff tab.

In the description which follows emphasis is placed on those portions of the device which are distinct from those shown and described with reference to FIGURES 1 through 10. The contact strip incorporated in the device of FIGURES 11 through 14 can be identical for example, with that described earlier and its description is not repeated here. Further the description given for the device of FIGURES 1 through 10 is not repeated for the portion of the insulating housing which is the same as that of the device shown in FIGURES 11 through 14.

The grounding contact 162 of FIGURE 13 is the same in essence as the grounding contact of FIGURE 9.

The greater strength of the device of FIGURES 11 through 14 is attributable to the bridge 70 which joins the side wall portions 72 to add a strength feature to the outer walls of the insulating base 112. This strength is beyond that added by the rib structure 18 of the device as seen in FIGURE 1.

The tab 142 is seen from the figures to be readily accessible to a gripping tool shown in phantom in FIGURE 11, and the cavity 116 in the lower portion of the side wall 72 is large enough to permit the gripping tool to articulate the tab and to cause it to sever at its joint with the contact strip.

Further it is evident particularly from FIGURE 13 that the protrusion of the tab 142 beyond the longitudinal boundary of the remainder of the contact strip does not create an assembly problem in inserting the strip into the base 112 of the insulation housing inasmuch as the clearance 71 on the inside of the bridge permits the contact strip to be inserted into its pocket in the base 112 without being bent or turned or otherwise maneuvered into place.

The cover 102 of the device is essentially the same at its upper portion as that of FIGURE 1 with the exception that a pair of ears 103 are provided as lids for the bridges 70 protruding in conforming fashion from each side of the device.

The lower or depending portion of the cover is also distinct in certain respects described below as may be seen by comparison of FIGURES 8 and 13. In particular the depending leg member 56 of FIGURE 8 has no counterpart in the structure of the cover 102. The other depending portions 150, 158, 160 and 154 have functions described with reference to the similarly numbered parts of the device of FIGURE 8.

What is claimed is:

1. A duplex convenience outlet device adapted to split circuit wiring which comprises an insulated housing including a base and a cover, a pair of elongated cavities in said base, said cavities having disposed against the bottom thereof electric contact strips, each contact strip being adapted to receive at each end section thereof a line wire and a power blade in electrical connection therewith, and said strip having between said two end sections a breakoff tab integral and substantially in the plane with and extending laterally beyond an edge of said strip, the outer wall of each cavity in the base being formed with a side opening to provide access of a gripping tool to said breakoff tab, each cavity of said base having a positioning boss disposed opposite said opening to maintain separation of said sections, and said cover having depending bosses to prevent the sections from rising above said positioning boss.

2. The device of claim 1 in which the line wire connection is through a pair of separate push-in connectors in each end section.

3. The device of claim 1 wherein the side opening is formed below an integral outwardly extending bridge connecting the wall portions above said opening.

4. The device of claim 1 having a tab and a slot on the opposite edge equal in depth to the extent of protrusion of said tab.

5. The device of claim 1 wherein each breakoff tab extends from between the bottom of said cavity and said depending boss.

2,974,301 3/1961 Slater ----- 339—14
3,339,170 8/1967 Martin ----- 339—14 XR

RICHARD E. MOORE, Primary Examiner

5 PATRICK A. CLIFFORD, Assistant Examiner

References Cited

UNITED STATES PATENTS

2,969,518 1/1961 Slater.

339—14

U.S. Cl. X.R.