

July 29, 1969

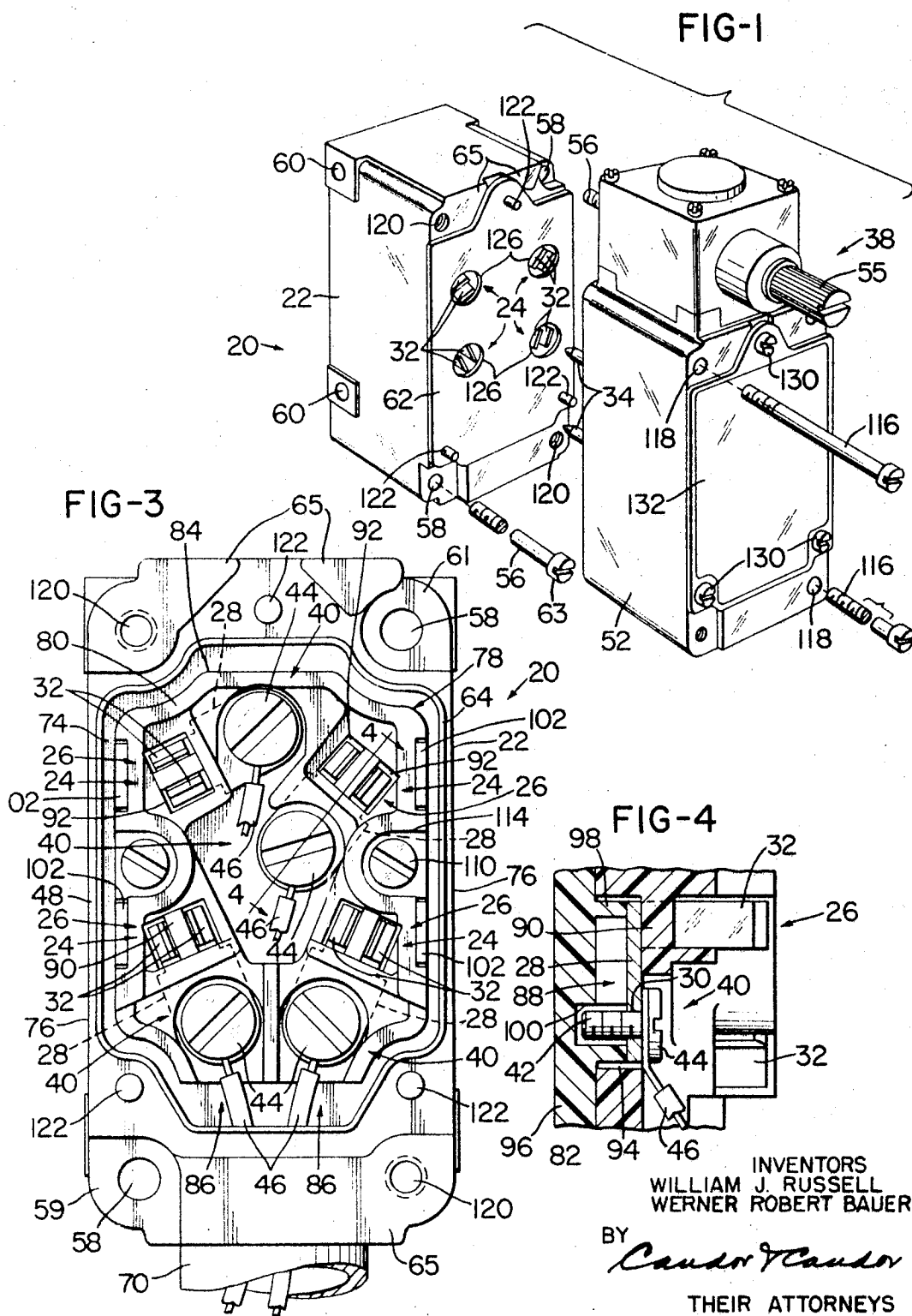
W. J. RUSSELL ET AL

3,458,679

PLUG-IN RECEPTACLE FOR A CIRCUIT SELECTOR SWITCH

Filed Sept. 2, 1966

4 Sheets-Sheet 1



July 29, 1969

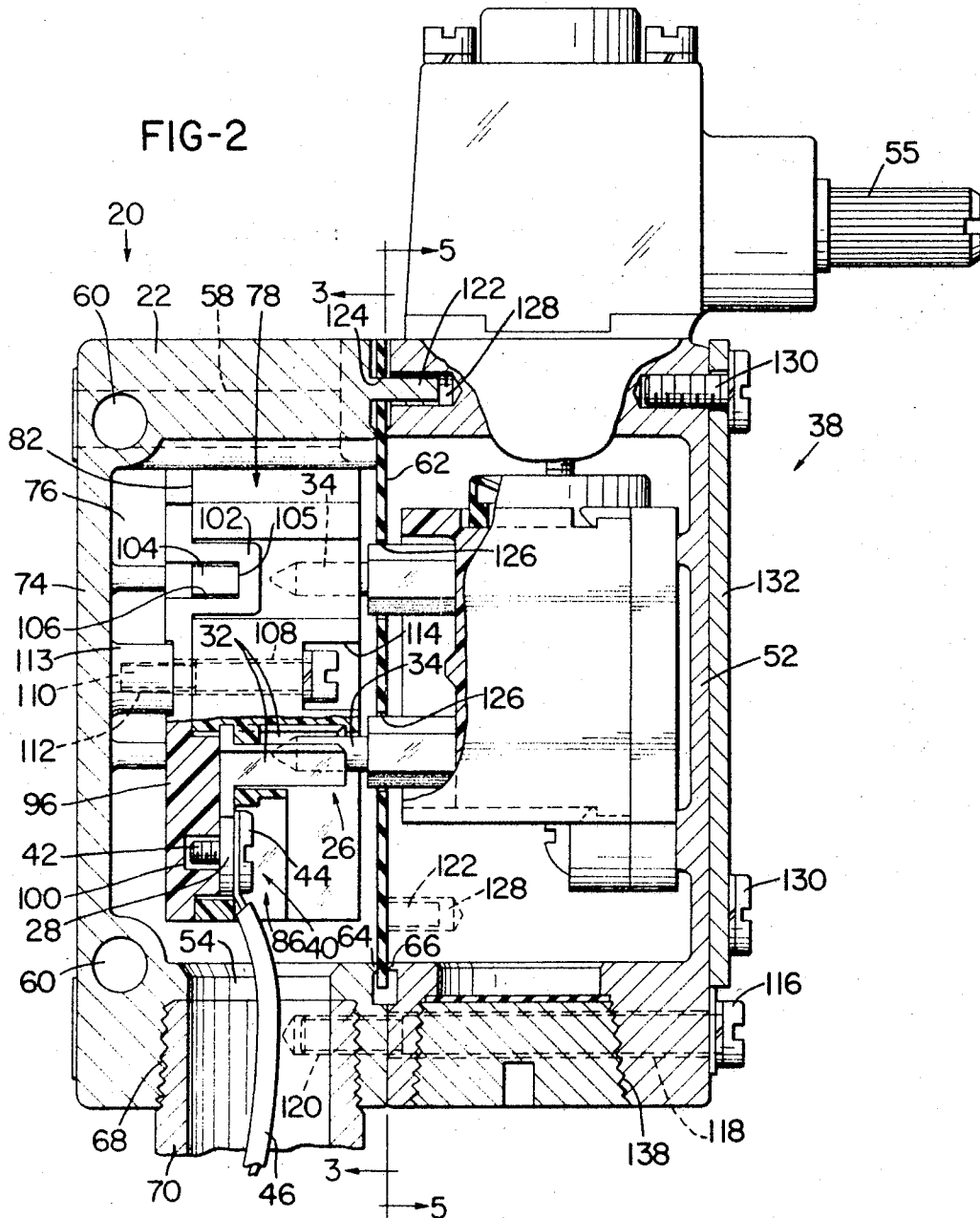
W. J. RUSSELL ET AL

3,458,679

PLUG-IN RECEPTACLE FOR A CIRCUIT SELECTOR SWITCH

Filed Sept. 2, 1966

4 Sheets-Sheet 2



INVENTORS
WILLIAM J. RUSSELL
WERNER ROBERT BAUER

BY
Caudor & Caudor
THEIR ATTORNEYS

July 29, 1969

W. J. RUSSELL ET AL

3,458,679

PLUG-IN RECEPTACLE FOR A CIRCUIT SELECTOR SWITCH

Filed Sept. 2, 1966

4 Sheets-Sheet 3

FIG-5

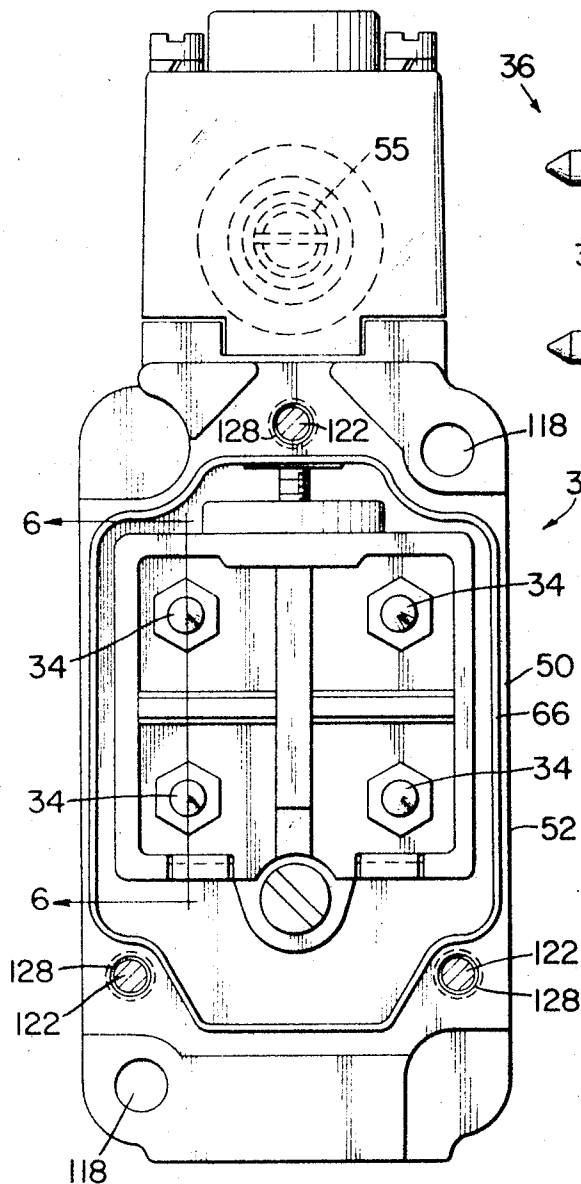


FIG-6

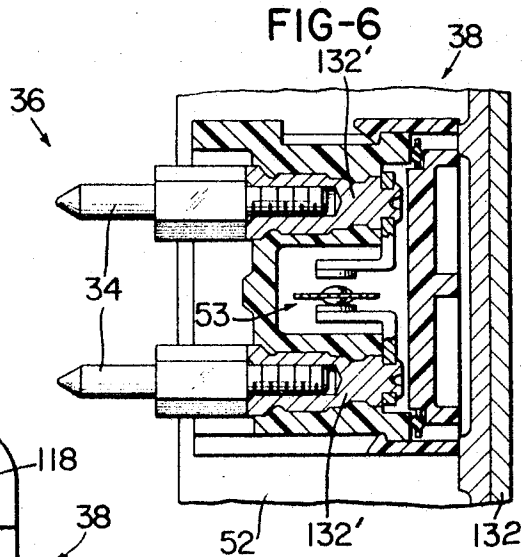
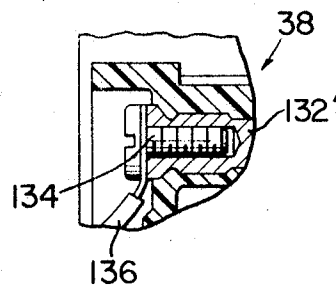


FIG-7



INVENTORS
WILLIAM J. RUSSELL
WERNER ROBERT BAUER

BY

Cantor & Cantor

THEIR ATTORNEYS

July 29, 1969

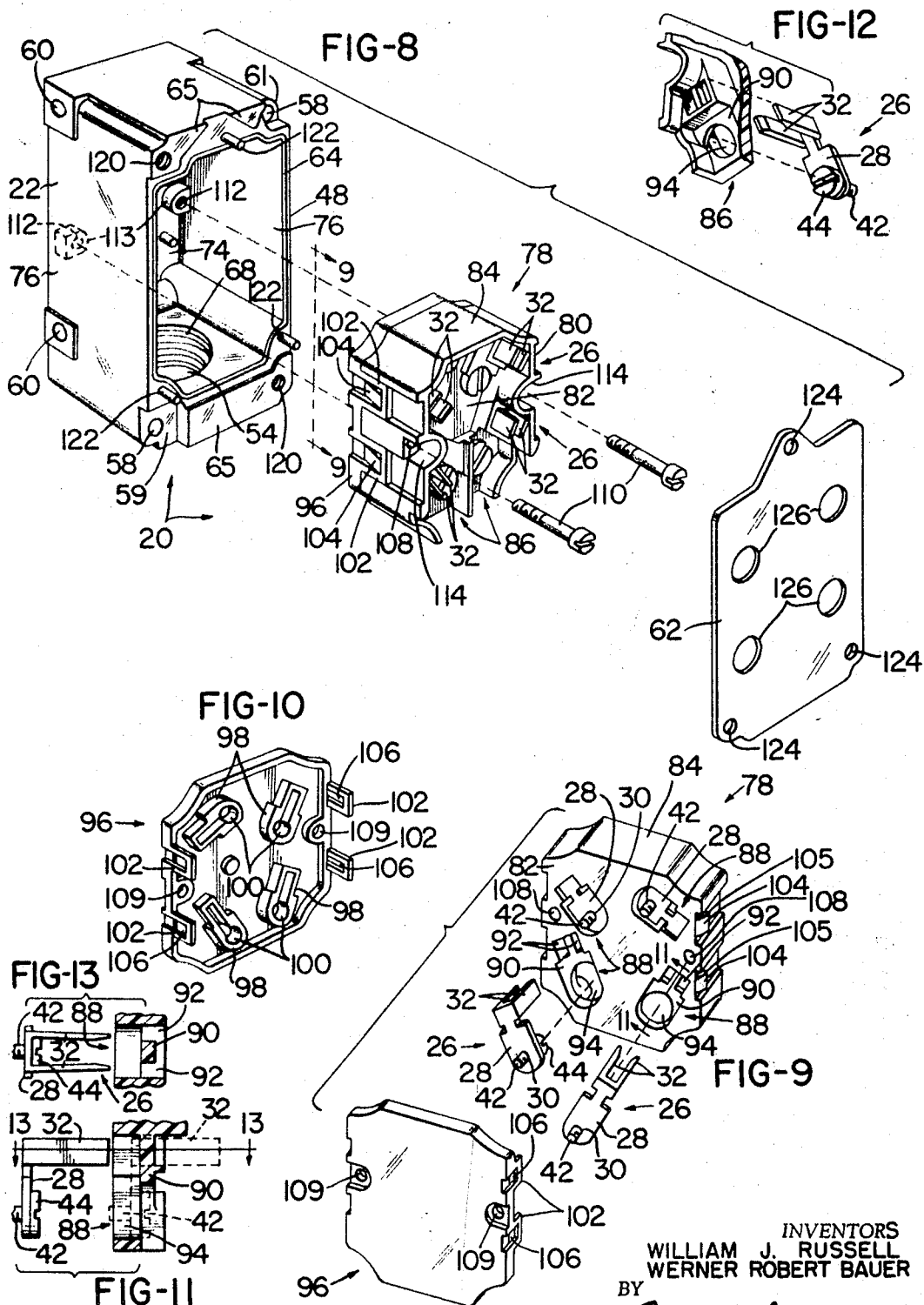
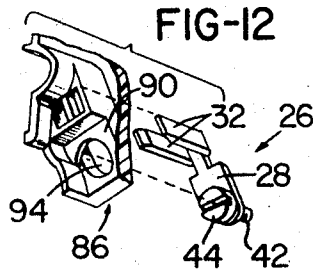
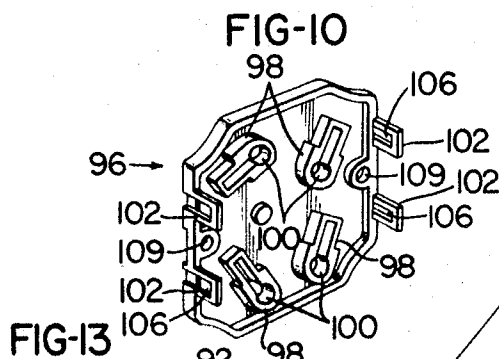
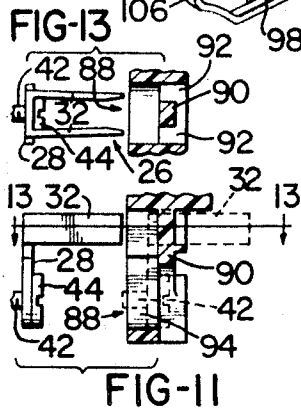
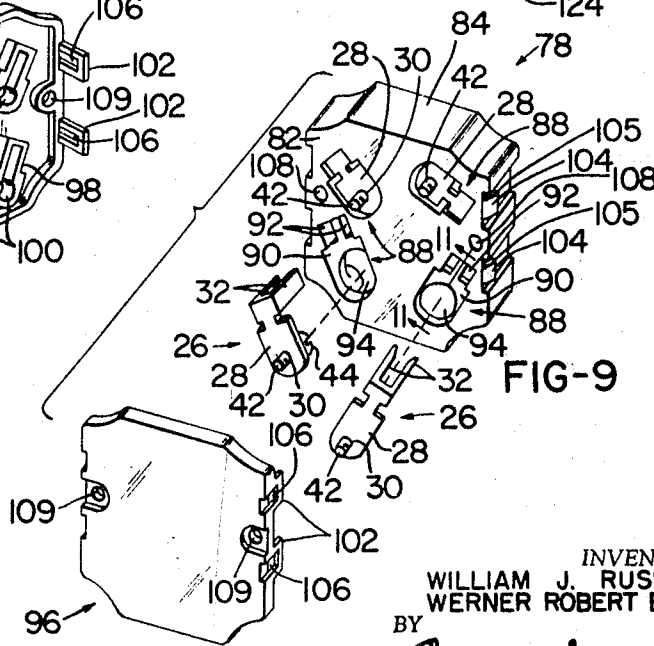
W. J. RUSSELL ET AL

3,458,679

PLUG-IN RECEPTACLE FOR A CIRCUIT SELECTOR SWITCH

Filed Sept. 2, 1966

4 Sheets--Sheet 4



INVENTORS
WILLIAM J. RUSSELL
WERNER ROBERT BAUER

BY

Caudor & Caudor

THEIR ATTORNEYS

1

3,458,679

PLUG-IN RECEPTACLE FOR A CIRCUIT SELECTOR SWITCH

William J. Russell, Malvern, and Werner Robert Bauer,
Radnor, Pa., assignors to Robertshaw Controls Com-
pany, Richmond, Va., a corporation of Delaware

Filed Sept. 2, 1966, Ser. No. 577,075

Int. Cl. H01h 9/02

U.S. Cl. 200—168

7 Claims

ABSTRACT OF THE DISCLOSURE

This application discloses a plug-in receptacle to receive a circuit selector switch. The plug-in receptacle has a plurality of loosely held prong socket members which receive the prongs of the switch. The socket members are held in an insulative cup which has a cup bottom and a false bottom or cover plate between which the prong socket members are loosely held. This enables the socket members more readily to receive the prongs. A resilient sheet cover seal member separates the receptacle and the switch.

This invention relates to a plug-in receptacle.

The plug-in receptacle may have a plug-in casing with ly useful in connection with a switch casing construction which is to be plugged in to such plug-in receptacle.

The plug-in receptacle may have a plug-in casing with a plug-in prong interlock means, and with a plug-in access opening in such casing to provide access to such prong interlock means. The plug-in access opening also receives a mating switch casing access opening, with the switch casing having switch prong interlock means to interlock with said plug-in prong interlock means.

The construction is such that the plug-in receptacle may be attached to a support with power supply means connected to said plug-in prong interlock means, and then said switch casing construction may be plugged into the plug-in receptacle with mating access openings and mating interlock means effectively joined together.

The plug-in casing may be in the form of a casing cup within which is held an insulative cup. The plug-in prong interlock means may be loosely held by the insulative cup in a manner readily to accept and interlock with the switch prong interlock means.

The power supply connecting means may be introduced into the plug-in receptacle through a second access opening and may be connected to the plug-in interlock means by manipulation through said plug-in access opening.

Other features of this invention are apparent from this description, the appended claimed subject matter, and/or the accompanying drawings, in which:

FIGURE 1 is an exploded, perspective view of the plug-in receptacle of this invention with a circuit selector switch construction about to be plugged into said receptacle.

FIGURE 2 is a general vertical cross section of said plug-in receptacle with the switch construction plugged into the receptacle.

FIGURE 3 is a front elevation of the plug-in receptacle taken along the line 3—3 of FIGURE 2, and with the flexible cover removed.

FIGURE 4 is a cross section taken along the line 4—4 of FIGURE 3.

FIGURE 5 is an elevation of the switch construction, taken along the line 5—5 of FIGURE 2, with the flexible cover removed.

FIGURE 6 is a cross section along the line 6—6 of FIGURE 5.

FIGURE 7 is a view of a portion of FIGURE 6, with a power supply attaching screw which may be used in

2

lieu of the plug forming attachments of FIGURE 6, when the switch construction is to be used independently of the plug-in receptacle.

FIGURE 8 is an exploded perspective view of the plug-in receptacle with the insulative cup outside the casing cup.

FIGURE 9 is an exploded perspective view from line 9—9 of FIGURE 8, and from the bottom side of the insulative cup, with the insulative cover plate spaced from the cup bottom.

FIGURE 10 is a perspective view of the other side of the cover plate shown in FIGURE 9.

FIGURE 11 is a cross section along line 11—11 of FIGURE 9.

FIGURE 12 is an exploded view of a portion of FIGURE 9, taken from the opposite side of the insulative cup of FIGURE 9.

FIGURE 13 is a cross section along line 13—13 of FIGURE 11.

A plug-in receptacle 20, according to this invention, may include a plug-in casing 22. The plug-in casing may contain plug-in prong interlock means 24, FIGURES 1—3, which are located in the plug-in casing. Such plug-in interlock means 24 may include a plurality of prong socket members 26, FIGURES 9 and 12. Each of these prong socket members 26 may include a base plate 28, with a screw receiving threaded opening 30 and a pair of prong receiving tongues 32, to receive a plurality of prongs 34, FIGURES 2 and 6, which are part of a switch prong interlock means 36 of a switch construction 38. Details of these plug-in interlock means 24, and switch prong interlock means 36 are more fully else where described.

The circuit selector switch construction 38 may be of a character such that the switch construction 38 may be plugged into the receptacle 20, after the receptacle has been mounted on a support. Also, the switch construction 38 may be slightly altered and may be mounted on a support without the use of the receptacle 20.

Plug-in power supply connecting means 40, FIGURE 3, on the plug-in prong interlock means 24 may be provided. Such power supply connecting means may include a plurality of screws 42, FIGURE 4, with screw heads 44. These screws 42 and screw heads 44 may be used to clamp the terminal wires 46 of a power supply means to the prong interlock members 26.

The plug-in casing 22 may have an access opening means 48, FIGURES 3 and 8, in the plug-in casing 22 to provide access to the plug-in prong interlock means 24, so that the power lines 46 may be secured to such interlock means 24 by screws 42 and screw heads 44. The access opening means 48 also receives a mating switch casing access opening means 50, FIGURE 5, of the switch construction 38. The switch construction 38 has a switch casing 52 which is provided with the access opening means 50 in such a manner that the switch casing 52 may be plugged into the plug-in casing 22 by the mating respective access openings 48 and 50. The switch casing 52 has a switch 53 connected to the prongs 34. The switch controls electric circuits passing through the prongs 34. The switch 53 is controlled by operating shaft 55.

The construction is such that the plug-in casing 22 may have the power lines 46 inserted therein, FIGURE 2, through the power line opening 54 and may have the power lines 46 attached therein by means of the screws 42 and screw heads 44, which are accessible for manipulation through the access opening 48, FIGURE 3. The casing 22 may then be secured to any desired support, not shown, by means of screws 56, FIGURE 1, which may be inserted through the openings 58 and into such support. Alternatively, the screws 56 may be inserted into the openings 60, so that the casing 22 may be secured to the support by its side walls, instead of its rear wall.

3

The openings 58 and 60 need not be threaded, so that the screws 56 may be inserted therethrough, and have their threads inserted into the support, not shown, for mounting the casing 20 on such support. The openings 58 are surrounded by depressed edge portions 59 and 61 which allow the screw heads 63 to be countersunk with respect to the flat portions 65 which are engaged by the face of the switch casing 38.

After the casing 22 has been mounted on its support, and the power lines 46 properly secured to the prong interlock means 24, then the switch casing 52 may be plugged into the casing 22, with the access opening means 48 and 50 mating each other, and with the prongs 34 interlocking into the prong receiving tongues 32, as can be seen from FIGURE 1.

If desired, a resilient sheet cover member or marginal seal member 62 may be held between the mating or aligned beads 64 and 66 of the access opening means 48 and 50.

A second opening means 54, FIGURE 2, may be provided with threads 68 to receive the power line conduit 70.

The plug-in casing 22 may be in the form of a casing cup, as shown in FIGURE 8, with a casing rim 48, a casing cup bottom 74, and a casing cup side wall construction 76. The casing rim 48, FIGURE 8, also forms the plug-in access opening means 48 heretofore described in connection with the other figures. The switch construction 38 has the switch casing 52 having a similarly shaped switch casing cup, as shown in FIGURES 2 and 5, and a switch casing side wall construction, the switch casing rim of which forms a mating switch casing access opening means of said switch construction 38 to mate with said plug-in access opening means 48.

An insulative cup 78 may be inserted in casing cup 22, and may have an insulative cup rim 80, FIGURES 3 and 8, adjacent to the casing cup rim 48. Also, the insulative cup 78 may have an insulative cup bottom 82, FIGURE 9 which is adjacent to the casing cup bottom 74. The insulative cup 78 also may have an insulative cup side wall 84. The insulative cup 78 may have a second access opening means 86, so that the power line may enter the second casing opening 54, FIGURES 2, 3 and 8, and be attached by the screws 42 and screw heads 44 before the switch construction 36 is plugged into the plug-in casing 22.

The insulative cup bottom 82 has a plurality of prong socket member receiving cavities 88, FIGURES 9, 11 and 13, on the under side of the bottom 82, or the near side of the bottom 82 in FIGURE 9. These cavities 88 have an intermediate wall 90 which prevents the base plate 28 of the prong receiving members 26 from passing completely through the cavities 88 into the interior of the insulative cup 78. A pair of openings 92 in the wall 90 allow the pair of prongs 32, 32 to pass through the wall 90. The prongs 32 extend through the bottom 82 into the interior of the insulative cup 78 and interlock with the prongs 34 of the switch construction, as shown in FIGURE 2.

The screws 42 and screw heads 44 extend through the cavities 88 and through the intermediate wall 90 completely through the bottom 82 of the cup, so that the screw heads 44 may be manipulated to attach the supply lines 46, through the access opening 48, as shown in FIGURE 3.

That is, the insulative bottom 82 of the cup 84 has a plurality of cavities 88, FIGURES 9, 11 and 13, through which the prongs 32, and the screws 42 and screw heads 44 may be made to pass into the interior of the cup 78, so that the power line cables 46 may be connected under the screw heads 44, and so that the prongs 34 of the switch construction 38 may be inserted into the prong receiving tongues 32.

The cavities 88 have the intermediate wall 90 which prevents the base plate 28 from completely passing through the cavities 88 into the interior of the cup. The inter-

4

mediate wall 90 has the pair of openings 92 through which the tongues 32 pass, as shown in FIGURE 13. Also, the wall 90 has the screw receiving openings 94, FIGURES 9, 11 and 12 through which the screws 42 and screw heads 44 pass into the interior of the cup 78.

In this manner, the tongues 32 and the screw heads 44 may be inserted into the interior of the cup 78, and the members 26 may be more or less loosely held in the openings 88, so that the tongues 32 may yield slightly when receiving the prongs 34. The members 26 are loosely held in the cavities 88 by the cover plate 96.

The cover plate 96, FIGURES 8, 9 and 10, may be snapped onto the bottom member 82 of the cup 78, to hold the socket members 26 loosely in place, after such socket members 26 have been inserted into the cavities 88. The cover plate has a plurality of socket member holding protrusions 98 to hold the respective socket members 26 in the cavities 88. The protrusions 98 have the general shape of the socket members 26, so that they may engage the base plate 28 and hold it loosely in place. The protrusions 98 have openings 100 to receive the ends of the screws 42, which extend into such openings 100.

The cover plate 96 has a plurality of resilient ears 102, which are biased inward slightly so that they can snap over the retaining lugs 104, which are provided in the side wall of the cup 84. The lugs 104 are adapted to extend into the openings 106 of the ears 102. The lugs 104 have slanting walls terminating in perpendicular edges 105 to cause the ears 102 to move outwardly and then to allow the ears to snap over the perpendicular edges 105, as the cover plate 96 is being pushed against the bottom member 82, upwardly, in FIGURE 9. The lugs 104 enter the openings 106 in the ears 102.

The insulative cup 78, with the cover plate 96 attached thereto, may be secured within the cup shaped casing 22, by moving it leftwardly, in FIGURE 8, into such casing 22 through the rim 48. The insulative cup 78 has a plurality of openings 108, FIGURE 8, which receive the screws 110, which pass through the openings 108, through the openings 109 in the cover 96, FIGURE 9, and into the threaded openings 112 in lugs 113, FIGURE 8, which are provided in the bottom of the casing 22. The side wall 84 of the cup 78 has curled portions 114, which permit the screws 110 to be inserted into the openings 108 and openings 112.

The switch casing 52 may be secured to the casing 22 by means of screws 116, which pass through unthreaded openings 118 into the threaded openings 120 in the casing 22.

Details of the switch construction 38, in casing 52 are more fully described in the application of William J. Russell, Ser. No. 577,011, filed Sept. 2, 1966, which is a companion application to this application and is filed concurrently herewith.

The socket members 26 are based at obtuse angles with respect to each other, and are also slightly loosely held within the cavities 88, by the cover plate 96, so that the prongs 34 may be more readily accepted during the plug-in operation. This loose fitting and obtuse angle construction compensates for production tolerances in the prongs 34 which require such construction.

The seal member 62 is mounted on pins 122 on the front of the receptacle casing 22. The seal member 62 has openings 124 which fit over the pins 122, as shown in FIGURE 1. The seal member also has openings 126 for permitting the prongs 34 to interlock with the tongues 32.

The switch casing 38 has openings 128 on its face to receive the pins 122 when the switch casing 38 is plugged in to the plug-in receptacle 20.

The openings 128 are threaded to receive the screws 130 for covering the switch casing 38 by changing the removable name plate 132 to a position covering the seal 62 and access opening 50 when the switch casing

38 is to be mounted on a support without the use of the plug-in receptacle 20, as described and claimed in said application of William J. Russell.

As more fully described in said application of William J. Russell, the switch prong constructions 36, FIGURE 6, may be unscrewed from the switch connecting screw sockets 132' of the switch 53, and the power line connecting screws 134 may connect the power lines 136 to the switch 53. The power lines 136 may pass through the unplugged opening 138, FIGURE 2, to a conduit similar to conduit 70. Then the switch construction 38 may be used independently of the plug-in receptacle 20.

In operation, FIGURES 2 and 3, the power supply wires 46, from conduit 70, are attached to the base plates 28 of the socket members 26 by means of the screws 42 and screw threads 44. This attachment is accomplished by the use of a screwdriver passing through the front access opening or rim 48 of the casing 22. The casing 22 may be attached to a support, not shown, by screws 56 which pass through openings 58 (or 60) into such support. The seal 62 may then be placed over the access opening or rim 48 with the openings 124 passing over the pins 122, and with the tongues 32 being exposed by the openings 126 in the seal 62. The switch casing 38 may then be plugged into the casing 22, with the prongs 34 interlocking with the tongues 32. The seal 62 is held between the beads 64 and 66 of the access openings 48 and 50. The casings 22 and 38 are then secured together by the screws 116.

Electric current passes through some of the wires 46, socket members 26, prongs 34, switch 53 and back to other wires 46 under the control of shaft 55.

An improved plug-in receptacle 20 has been provided which properly interlocks with the switch construction 38 in an efficient manner. The insulative cup properly insulates the live members of the construction and insures an effective connection between the tongues 32 and prongs 34.

The plug-in receptacle 20 cooperates with the switch construction 38 so that the switch construction 38 may be plugged into the receptacle 20 or may be mounted by itself independently of the receptacle 20, as more fully described in said application of William J. Russell, to which reference is made, if necessary, for such independent use of the switch construction 38.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. In combination: a plug-in casing; plug-in prong interlock means in said plug-in casing; plug-in power supply connecting means on said plug-in prong interlock means; plug-in access opening means on said plug-in casing to provide access to said plug-in prong interlock means, and to receive a mating switch casing access opening means of a switch construction which has mating switch prong interlock means to interlock with said plug-in prong interlock means, securing means securing said switch construction and said plug-in casing together, said plug-in access opening means also to provide access to said plug-in power supply connecting means for connecting and disconnecting said power supply to said power

supply connecting means on said plug-in interlock means, and in which said plug-in casing is in the form of a casing cup bottom and a casing cup side wall construction and with said casing rim forming said plug-in access opening means, and an insulative cup inside said casing cup with an insulative cup rim adjacent said casing cup rim, with an insulative cup bottom near said casing cup bottom and with an insulative cup side wall construction adjacent said casing side wall construction, and in which said plug-in casing has a second casing access opening means in said casing cup side wall construction to introduce power supply conductor means for connection to said plug-in power supply connecting means on said plug-in prong interlock means, and in which said insulative cup side wall construction has an insulative cup second access opening means aligned with casing access opening means to introduce said power supply conductor means into the interior of said insulative cup, and in which said insulative cup bottom has a plurality of conductive prong socket member receiving cavities on the lower side of said bottom, with a plurality of conductive prong socket members in said cavities.

2. A combination according to claim 1 in which each of said prong socket members includes a base plate with a screw receiving threaded opening and a pair of prong receiving tongues extending through said bottom into the interior of said insulative cup, and in which each socket member receiving cavity has a cavity screw receiving opening through which a screw head of a screw in said threaded opening may extend into the interior of said insulative cup, and in which each cavity also has a cavity pair of openings through which said pair of prong receiving tongues extend into the interior of said insulative cup.

3. A combination according to claim 2 in which an insulative cover plate is provided over said insulative cup bottom to hold said prong socket members in said cavities.

4. A combination according to claim 3 in which said insulative cover plate has a plurality of socket member holding protrusions to hold respective ones of said socket members in respective socket member receiving cavities.

5. A combination according to claim 4 in which each of said socket member receiving cavities is separated from said insulative cup interior by an insulative intermediate wall.

6. A combination according to claim 5 in which said intermediate wall is provided with said cavity screw receiving opening and said cavity pair of openings.

7. A combination according to claim 6 in which said prong socket members are loosely held in said insulative cup to receive and interlock with said switch prong interlock means.

References Cited

UNITED STATES PATENTS

3,029,322	4/1962	Waldrop	317—108
3,317,697	5/1967	Bauer.	
3,320,395	5/1967	De Smidt.	
2,916,591	12/1959	Benn	200—168
3,067,362	12/1962	Patton	317—120
3,158,703	11/1964	De Smidt	200—51

HERMAN O. JONES, Primary Examiner