July 10, 1945. A. M. DAVID 2,380,151

OUTLET RECEPTACLE AND WALL PLUG

Filed Feb. 29, 1944

Fig. 1

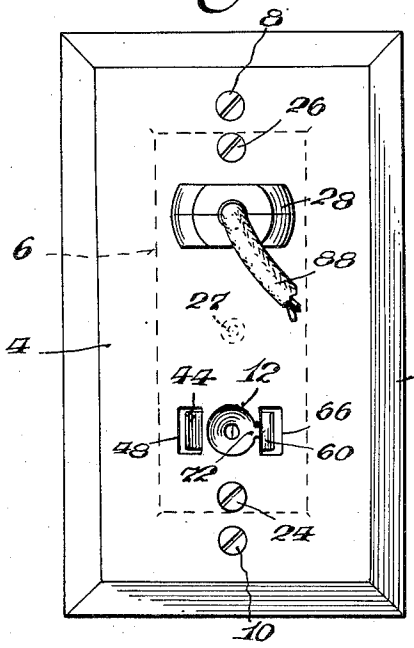



Fig. 2

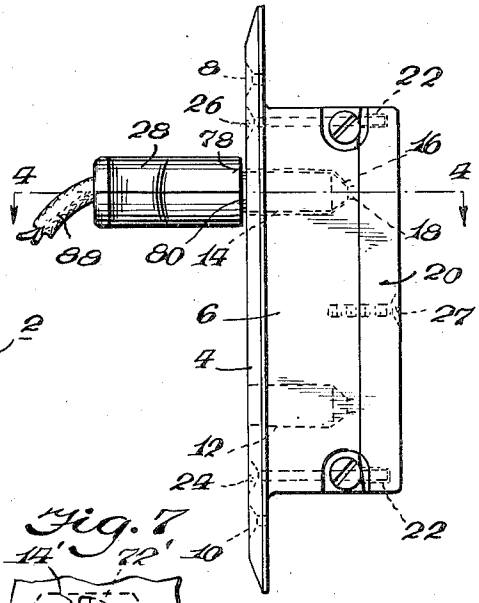



Fig. 7

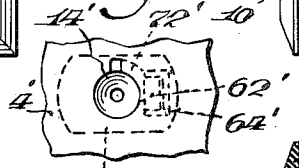



Fig. 3

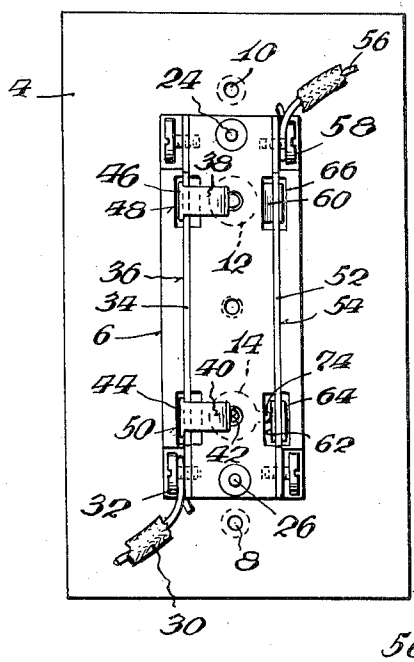



Fig. 4

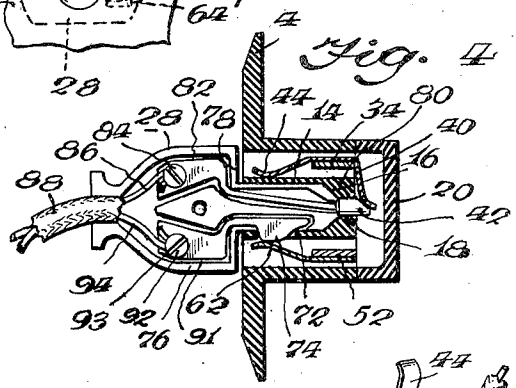



Fig. 5

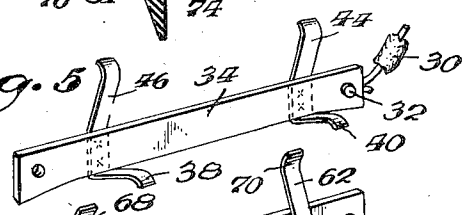
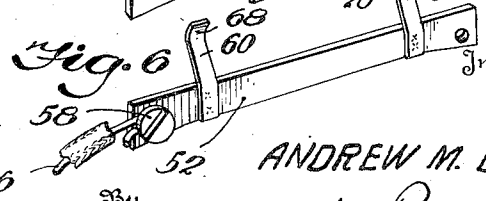



Fig. 6




Inventor

ANDREW M. DAVID,

By Akael M. Pedersen

Attorney

Patented July 10, 1945 2,380,151

# UNITED STATES PATENT OFFICE

2,380,151

## OUTLET RECEPTACLE AND WALL PLUG

Andrew M. David, Washington, D. C.

Application February 29, 1944, Serial No. 524,467

8 Claims. (Cl. 173—330)

The present invention relates to an outlet receptacle and wall plug, and more particularly to an outlet receptacle of a form adapted to receive a two-pronged wall plug of the usual form, or a single-pronged plug adapted to make contact or to complete a circuit in only one position of the plug.

The outlet receptacle or outlet box hereinafter described is preferably of the duplex type, having certain improved features to permit its use with either the usual form of two-pronged wall plug or a single-pronged plug of the form hereinafter described in detail, which embodies certain novel features forming a part of my invention.

It is well known that in the use of the ordinary two-pronged wall plug which is to be fitted into an outlet receptacle, it frequently happens that the wall plug must be inserted in the dark, or with insufficient illumination, so that it is extremely difficult to insert the plug into the proper openings, and it frequently requires several minutes before the proper position is found for the insertion of the plug. The insertion is rendered more difficult when the prongs are sprung in one direction or another and various means are often used for inserting the prongs which produces the likelihood of a short circuit or having the fingers burned. The form of single-pronged plug of my invention hereinafter described overcomes these difficulties in that there is only one opening in which the end of the plug is to be inserted, and by turning the plug through an arc less than 180°, contact with the opening in the outlet receptacle with which a part of the single-pronged plug registers will be immediately felt, so that with a forward push or movement, the plug is brought into contact with the circuit terminals of the outlet receptacle in one form of the invention hereinafter described, or with an additional movement or turn of the plug in another form of the invention hereinafter described.

One of the objects of my invention is to provide a novel form of outlet box and a single-pronged plug therefor, which is adapted to be readily inserted into the outlet box by the sense of touch, so as not to require illumination of the outlet box in order to insert the plug.

Another object of my invention is to provide a novel form of outlet receptacle which is adapted for use with either a single-pronged plug or a two-pronged wall plug of the usual form.

Another object of the invention is to provide a novel form of single-pronged plug which is adapted to be inserted in a receptacle in only one position and which provides for spring pressed engagement of the plug contacts with the contacts of the receptacle.

Another object of the invention is to provide a novel form of outlet receptacle and wall plug in which sparking on the breaking of the circuit is substantially reduced when the plug is withdrawn from the receptacle.

Another object of the invention is to provide a form of receptacle and plug in which engagement of the contacts is made by surface to surface contact with spring pressure engagement in a direction tending to firmly hold the plug in place.

Another object of the invention is to provide a novel construction in an outlet box and wall plug which is simple in form and which may be manufactured commercially at a low cost of production.

With these and other objects in view, the invention comprises the various features hereinafter more fully described and set forth in the annexed claims.

The various features of the invention are illustrated in the accompanying drawing showing the preferred form of the invention and a modification thereof, in which:

Fig. 1 is a front elevational view of an outlet receptacle and wall plug indicated in place in one of the openings;

Fig. 2 is a side elevational view of the outlet receptacle and the single-pronged wall plug member shown in Fig. 1;

Fig. 3 is a rear view of the outlet box with the back plate removed, showing the forwardly-extending prong or contact member of the wall plug in engagement with one of the contacts of the outlet receptacle and the lateral contact member of the plug in engagement with the other contact member of the outlet receptacle; the view is up-side-down relative to Fig. 1;

Fig. 4 is a view, partly in section, taken on the section line 4—4 of Fig. 2;

Fig. 5 is a detailed view in perspective of one of the contact members shown removed from the outlet receptacle, the form shown being adapted to contact with the forwardly-extending prong contact member of the wall plug;

Fig. 6 is a detailed view in perspective of the other contact member of the outlet receptacle which is adapted to contact with the lateral contact member of the wall plug; and

Fig. 7 is an enlarged fragmentary view showing a modified form of the invention, the single-pronged plug being indicated in seated position in dotted lines in a form of outlet receptacle having only one opening through the face plate.

This form of the outlet box is not adapted for use with the ordinary two-pronged wall plug.

Referring more in detail to the drawing, the numeral 2 designates the outlet box or receptacle of the preferred form of my invention, the receptacle having a face plate 4 and a body portion 6 which may be integral with the face plate or separable therefrom. The body portion and face plate may be made of any suitable insulating material. The outlet receptacle may be fastened in place in a wall by the usual fastening means such as screw members 8 and 10, for example, as illustrated in Figs. 1 and 2.

The face plate and body portion are provided with cylindrical openings 12 and 14 which extend through the face plate and through a portion of the body portion, as illustrated in Fig. 2, the lower portion of the cylindrical opening having a beveled conical section 16 which communicates with the smaller opening 18 at the back part or back face of the body portion. The rear face of the body portion is provided with a cover plate 20 which is adapted to be held in place by means of slots 22 passing over the threaded ends of the screw members 24 and 26, and a set screw 27, as indicated in Fig. 2.

In order to provide a circuit when the single-pronged plug 28 is inserted in place into the cylindrical opening 14, for example, one of the leads 30 of the circuit to be connected may be attached by means of a set screw 32, for example, to one end of the contact member 34 of copper or other suitable conducting metal. The bar 34 may be held in place in the body portion 6 in a recess or channel 36 extending vertically through the body portion as indicated in Fig. 3 of the drawing. Connected to the bar member or contact member 34 are lateral outwardly extending curved spring plate members 38 and 40 which extend substantially parallel to the rear face of the body portion and are adapted to contact with the forwardly-extending prong 42 of the wall plug in the manner shown in Fig. 4, and as indicated in Fig. 3 of the drawing. Branch members 44 and 46 of the contact bar 34, which may be extensions of the corresponding spring plates 38 and 40, are adapted to extend into openings 48 and 50 in the body portion so that if it is desired to use the ordinary two-pronged plug, one of the prongs may contact with the extension 44, for example, while the other prong engages the spring contact member 62. The recesses 48 and 50, in the preferred form of the invention, extend through the face plate and the body portion substantially parallel to the cylindrical openings 12 and 14, but do not communicate therewith, being separated by a wall of insulating material, as is evident from the structure indicated in Fig. 1.

The other contact member 52 of the outlet receptacle is embedded in a recess 54 in the body portion 6 substantially parallel with the recess 36, and may be connected to a lead wire 56 by means of a set screw 58 in the usual manner. Spring plate members 60 and 62 are attached to the contact member 52 in spaced relation so as to pass into openings 64 and 66 in the body portion and face plate of the receptacle, the curved portions 68 and 70 of the spring plates 60 and 62 being curved in a direction so as to be pressed outwardly away from the cylindrical openings 12 and 14 when engaged by either a double pronged wall plug or by the single-pronged plug in the manner hereinafter described.

The cylindrical opening 12 and the opening 66 are connected through the face plate and the outer half of the body portion by means of a passageway or opening 72, and said passageway being of a width so as to permit passage of the lateral contact member 74 of the single-pronged plug therein so as to pass into engagement with the spring plate member 62.

The single-pronged plug 28 is provided with a head or outer portion 76, having an inner face 78 adapted to contact with the front of the face plate 4 when forced into seating position in the cylindrical opening 14 in the position shown in Fig. 4 of the drawing. When the cylindrical portion 80 of the single-pronged plug is inserted into the cylindrical opening 14 of the outlet receptacle, the said plug may be turned through an arc until the lateral contact member 74 engages the opening or passageway 72, thus permitting further forward movement until the forwardly-extending prong 42 engages the spring plate 40 of the bar member 34.

In the form of construction of the single-pronged plug 28, as illustrated in Fig. 4, the forwardly-extending prong 42 passes through the cylindrical portion 80 of the wall plug and is supported in a passageway 82, the end portion of the prong member being held in place by means of a set screw 84, which serves also as a fastening means for one of the lead wires 86 of the wire 88. The lateral contact member 74 is similarly held in place in a recess 90 within the cylindrical extension 80 of the wall plug and in a recess 91 within the head 76 of the single-pronged plug. The end 93 of the lateral contact member is held in place in the head 76 by means of the set screw 92, which serves also as attaching means for the lead wire 94 of the wire 88, as shown in Fig. 4.

Assuming that the wire 88 is connected to a lamp or other device to be supplied with current, the single-pronged plug 28 is moved into a position adjacent one of the openings as 14 of the duplex wall receptacle, as shown in the drawing, and the cylindrical extension 80 of the plug is passed into the opening 14 until the lateral contact member 74 prevents further forward movement by engaging the outer periphery of the cylindrical opening 14. The single-pronged plug is then rotated or turned through an arc until the lateral contact member 74 engages the passageway or recess 72 communicating with the enlarged opening 64 containing the spring plate 62, and the single-pronged plug is then further inserted until the lateral contact member 74 engages the curved portion 70 of the spring plate 62 in the manner indicated in Fig. 4 of the drawing. The circuit is thus completed through engagement of the forwardly-extending prong 42 with the spring plate 40 of the contact member 34 and engagement of the lateral contact member 74 with the spring plate member 62 of the contact member bar 52.

The forward face of the prong 42 is flattened somewhat so that when it contacts with the spring plate 40, for example, contact is made through a comparatively large area, thus reducing resistance to the passage of the current and preventing substantial sparking at this point. In a like manner, the cam surface of the lateral contact member 74 is flattened somewhat so as to contact with the spring plate 62, for example, through a comparatively large area which similarly acts to decrease the resistance to the passage of the current and thus to prevent substan-

tial sparking when contact is made between these elements.

It will be noted that the lower portion of the lateral contact member **74** which contacts with the spring plate extension **62** is in the form of a cam which cooperates with the curve **70** of the spring member **62** so that in the seated position of the single-pronged plug, the cam portion of the contact member **74** engages a downward curve of the spring **62** so as to provide seating pressure in the seated position of the plug. In the seating movement of the plug, the cam portion of the lateral extension **74** first presses the spring plate **62** outwardly away from the lateral extension **74** and then, during subsequent seating movement of the plug, the cam and corresponding spring plate operate mutually to increase the seating pressure of the plug.

The form of the invention illustrated in Fig. 7 of the drawing is a modified form in which the face plate **4'** has only a single opening, as the cylindrical opening **14'** and the recess **72'**, which in this case may be located in the face plate at right angles to the position of the spring plate extension **62'** which is located in a rectangular opening **64'** in the body portion of the outlet receptacle in the same relative position with respect to the opening **14'** as the opening **64** bears to the opening **14** in Fig. 3 of the drawing, but is located under the face plate **4'**. When the single-pronged plug **28** is inserted into the opening **14'** so that the extension **74** passes through the recess **72'**, the polarity plug may then be turned in a clockwise direction through an angle of 90 degrees, for example until the lateral extension **74** contacts with a stop member, in which position the face of the cam on the extension **74** is in contact with the curved portion of the spring member **62'**. In the clockwise movement of the lateral contact member **74**, the cam portion thereof has a wiping action on the face of the spring extension **62'** by which any dirt or foreign matter present would be wiped away so as to provide a clean contact between the adjacent surfaces through which the current is to be passed. By this means a good electrical contact is provided and sparking is materially reduced. It is to be understood that the other parts of the modification indicated in Fig. 7 of the drawing which are not shown, are the same as has been shown and described in connection with Figs. 1 to 6 of the drawing, except that in this form of the device which is not adapted for use with a two pronged wall plug, the lateral extensions **44** and **46** shown in Fig. 5, and the corresponding openings **48** and **50**, illustrated in Fig. 3 of the drawing, need not be used. It will be clear, for example, that the inclined face at the end of the prong **42** will be employed in a direction so that when the wall plug has been inserted and rotated through an angle of ninety degrees to obtain contact of the cam on the lateral extension **74** with the curved surface of the spring plate **62**, the inclined flat surface at the end of the prong **72** will register with the flat surface of the spring plate **40**. In this form of the invention, however, the lateral contact member **74** should be in such a position in the cylindrical portion **80** of the polarity plug so that after the lateral extension **74** has passed through the recess **72** in the face plate the lateral extension **74** will be behind the back surface of the face plate so that it is free to rotate into wiping contact with the spring member **62'**.

By the term "single-pronged plug," as employed in the claims, is meant a plug having a single stem on which the contacts are mounted, as distinguished from the two pronged contacts of the usual double-pronged plug. The said single-pronged plug is further distinguished from the double-pronged plug in that the single stem has a special configuration or cross-sectional form such that it may be inserted into a stem-receiving opening of the receptacle in only one position of the stem, thus serving as a key by which engagement of the contacts of the plug with those of the outlet receptacle may be obtained in only the oriented position of the stem with respect to the opening in the receptacle. The said single-pronged plug when inserted into the receptacle has a fixed polarity with direct current, and a fixed grounded phase when used with alternating current.

It will be apparent that various changes or modifications may be made in the device as shown and described, as will be obvious to those skilled in the art, without departing from the spirit or scope of the invention as defined in the claims.

Having thus described the invention, what is claimed as new is:

1. An outlet receptacle and single-pronged plug therefor which comprises a body portion of insulating material in said outlet receptacle, a single-pronged plug having a single stem, a forwardly-extending contact member mounted on said stem, a laterally-extending contact member mounted on said stem and projecting outwardly from the surface thereof intermediate the ends of the stem, a transverse cylindrical opening in the body portion of the outlet receptacle extending through the said body portion, a slot in said body portion extending into said transverse opening, said transverse opening being adapted to receive said stem and said slot being adapted to receive said laterally-extending contact member, a spring contact member mounted in said body portion so as to contact with said forwardly-extending contact member when the plug is seated in said transverse opening, a second spring contact member mounted in said body portion adjacent said slot so as to contact with said laterally-extending contact member in the seated position of said plug and cam means on said laterally-extending contact member so as to provide pressure contact with said second spring contact member in the seated position of the plug in the outlet receptacle.

2. An outlet receptacle and single-pronged plug therefor which comprises a body portion of insulating material in said outlet receptacle, a face plate and a rear cover plate for said body portion, a transverse cylindrical opening in the body portion of the outlet receptacle extending through said body portion and said face plate, a slot in said body portion and said face plate extending into said body portion from said opening and parallel to the axis of said cylindrical opening, a single-pronged plug having a single stem adapted to fit into said cylindrical opening and having a head provided with an inner face adapted to contact with the face plate when the plug is seated in the cylindrical opening, a forwardly-extending contact member mounted on said stem, a laterally-extending contact member mounted on said stem adapted to fit into said slot, said laterally-extending contact member projecting outwardly from the surface of the stem intermediate the outer end of the stem and said inner face of the head of the plug, a spring contact member mounted in said body portion so as to contact

in pressure engagement with said forwardly-extending contact member when the plug is seated in said transverse opening, a second spring contact member mounted angularly in said body portion adjacent said slot so as to engage said laterally-extending contact member in the seated position of said plug and cam means on said laterally-extending contact member having a sloped cam surface adapted to engage said angular spring contact member so as to provide contact pressure and to urge the plug into seated position in said opening.

3. An outlet receptacle and single-pronged plug therefor which comprises a body portion of insulating material in said outlet receptacle, a face plate and a rear cover plate for said receptacle, a transverse cylindrical opening in the body portion of the outlet receptacle extending through said face plate, a slot in said body portion and said face plate extending from the periphery of said cylindrical opening into said body portion and said face plate parallel to the axis of said cylindrical opening, a single-pronged plug having a single stem adapted to fit into said cylindrical opening, a forwardly-extending contact member mounted on said stem having a beveled portion at the end thereof, a laterally-extending contact member mounted in connection with said stem and projecting outwardly from the surface thereof intermediate the outer and inner ends of the stem, said laterally-extending contact member being adapted to fit into said slot, a spring contact member mounted in said body portion so as to contact in pressure engagement with said beveled portion of the forwardly-extending contact member in the seated position of the plug, a second spring contact member mounted angularly in said body portion adjacent said slot so as to engage said laterally-extending contact member in the seated position of the plug and cam means on said laterally-extending contact member having a flat sloped cam surface adapted to engage said second spring contact member with increasing pressure during the seating movement of the plug and to apply pressure in the seating direction of the plug to retain the plug in the seated position in said outlet receptacle.

4. An outlet receptacle adapted to be used with either a two-pronged plug or a single-pronged plug, which comprises a body portion of insulating material in said outlet receptacle, a face plate and a rear cover plate for said receptacle, a transverse cylindrical opening in the body portion of the outlet receptacle, a corresponding cylindrical opening extending through said face plate, a slot in said body portion and face plate extending from the periphery of said cylindrical opening into said body portion and said face plate parallel to the axis of said cylindrical opening, a contact member having spring plate extensions mounted in said body portion, one of said extensions being mounted adjacent said slot to permit contact with a laterally-extending contact member of a single-pronged plug when inserted into said transverse cylindrical opening, a rectangular opening through said body portion and said face plate adjacent the second of said spring plate extensions so as to permit contact thereof with one of the prongs of a two-pronged plug when inserted into said rectangular opening, a second contact member mounted in said body portion having spring plate extensions extending therefrom, one of said spring plate extensions extending adjacent said transverse opening so as to permit contact with a forwardly-extending contact member of a single-pronged plug when inserted into said transverse cylindrical opening, a second rectangular opening through said body portion and said face plate extending adjacent the other spring plate extension of said second contact member and adapted for contact with the other prong of a two-pronged wall plug when inserted into said second rectangular opening, thereby permitting use of the outlet receptacle with either a two-pronged wall plug or a single-pronged plug.

5. An outlet receptacle of the duplex form adapted to be used with either two-pronged wall plugs or single-pronged plugs which comprises a body portion of insulating material, a face plate extending over the front of said body portion, a first transverse cylindrical opening extending through the face plate and into said body portion, a second transverse cylindrical opening extending through the face plate and into said body portion spaced from and parallel to said first cylindrical opening, a first contact member in said body portion having two lateral extensions, one of said extensions extending adjacent the first cylindrical opening and another of said extensions extending adjacent the said second cylindrical opening, both of said extensions being adapted to contact with the forwardly-extending contact member of a single-pronged plug when inserted into the adjacent cylindrical opening, a rectangular transverse opening extending through said face plate and into said body portion adjacent each of said cylindrical openings, second extensions connected to said first contact member adjacent said lateral extensions and to said rectangular openings, whereby when one of the prongs of a double-pronged plug is inserted into either of said rectangular openings the inserted prong will engage one of said second extensions, a slot in said body portion and face plate extending into the body portion from the periphery of each of said cylindrical openings parallel to the axes of said cylindrical openings, a second contact member in said body portion having two lateral extensions, each of said extensions extending adjacent one of said slots of said cylindrical openings, whereby when a single-pronged plug is inserted into either of said cylindrical openings, a laterally-extending contact member of the plug will extend into the corresponding slot into contact with one of said lateral extensions of said second contact member, a second rectangular opening adjacent each of said transverse cylindrical openings extending through said face plate and into said body portion, and second extensions from the said second contact member extending adjacent the said second rectangular openings whereby when the second prong of a two-pronged wall plug is inserted into one of said second rectangular openings, the prong will engage one of the said second extensions, whereby the duplex outlet receptacle may be used with either a double-pronged wall plug, or a single-pronged plug, or both.

6. A single-pronged plug comprising a body portion having a head member and a single cylindrical stem member of insulating material, a lateral slot in said stem member intermediate the outer end thereof and said head member, said lateral slot extending parallel to the axis of the said cylindrical stem member, a forwardly-extending contact member mounted within said head member and extending through said stem member, said contact member having an outer end portion with a flattened surface thereon to permit pressure contact through a substantial area with the contact engaged thereby, a lateral

contact member mounted within said head member and extending into said stem member, and a cam on said lateral contact member extending into and through said slot, the said cam surface being of a form relative to the contact to be engaged thereby to increase the seating pressure in the seating movement of the plug.

7. The combination of an outlet receptacle and single-pronged plug therefor which comprises a single-pronged plug having a head portion and a cylindrical stem portion of insulating material, a forwardly-extending contact member secured in said head portion and extending through said stem portion, a lateral slot in said stem portion, a laterally-extending contact member having a cam portion extending through said slot, said outlet receptacle having a body portion of insulating material, a face plate covering said body portion, a transverse cylindrical opening extending through said face plate and into said body portion, a narrow recess in said face plate communicating with said transverse cylindrical opening, an arcuate opening in said body portion opening into said transverse cylindrical opening in the body portion and having a depth of at least that of said narrow slot, the said arcuate opening extending through a substantial angle through an area including that of the said slot, whereby when the said single-pronged plug is inserted into said transverse cylindrical opening with its lateral contact member passing through said recess, said lateral contact member will not directly engage a contact of the outlet receptacle, a contact member mounted in said body portion so as to contact with said forwardly-extending contact member when the plug is seated in said transverse cylindrical opening, a second contact member mounted in said body portion laterally of said slot and adjacent one side of said arcuate opening in a position such that after the stem member of the plug is inserted into the cylindrical opening and said cam portion has passed through said recess, the plug may be rotated so that the cam portion may be turned through said arcuate opening into contact with said second contact member.

8. The combination of an outlet receptacle and single-pronged plug therefor which comprises a body portion of insulating material in said outlet receptacle, a face plate for said body portion, a transverse cylindrical opening in the body portion and face plate, a slot in said face plate extending outwardly from the periphery of the said cylindrical opening, an opening in the said body portion extending outwardly from said transverse cylindrical opening therein having a depth at least that of the said slot and extending laterally from the slot through a substantial area including that of said slot, a single-pronged plug having a single stem adapted to fit into said cylindrical opening, a forwardly-extending contact member passing through the end of said stem, a laterally-extending contact member projecting outwardly from the surface of the stem, said laterally-extending contact member being adapted to fit into said slot, a contact member mounted in said body portion so as to contact in pressure engagement of said forwardly-extending contact member in the seated position of the plug, a second contact member mounted in said body portion laterally of said slot so as to require rotary movement of said stem to provide wiping contact between said laterally-extending contact member of the plug and the corresponding second contact member and a stop member in said body portion for arresting the rotary movement of the stem after contact has been made between the said laterally-extending contact member and said second contact member of the outlet receptacle.

ANDREW M. DAVID.