Feb. 20, 1968 C. GARAMSZEGI 3,370,141

ELECTRICAL RECEPTACLE HAVING ZERO POTENTIAL UNTIL AN ELECTRICAL PLUG IS POSITIONED THEREIN AND INCLUDING CIRCUIT BREAKER MEANS

Filed Oct. 21, 1965 3 Sheets-Sheet 1

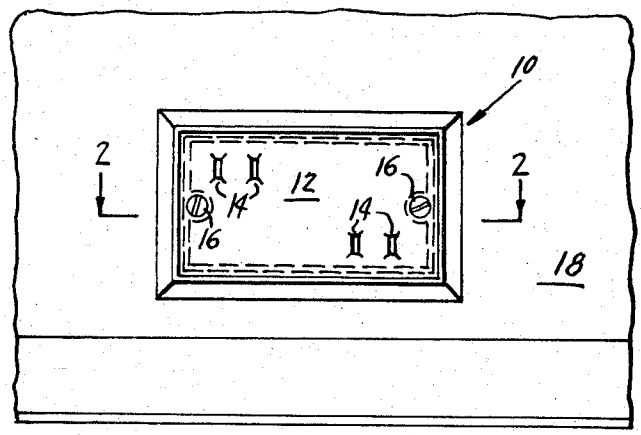


FIG. 1

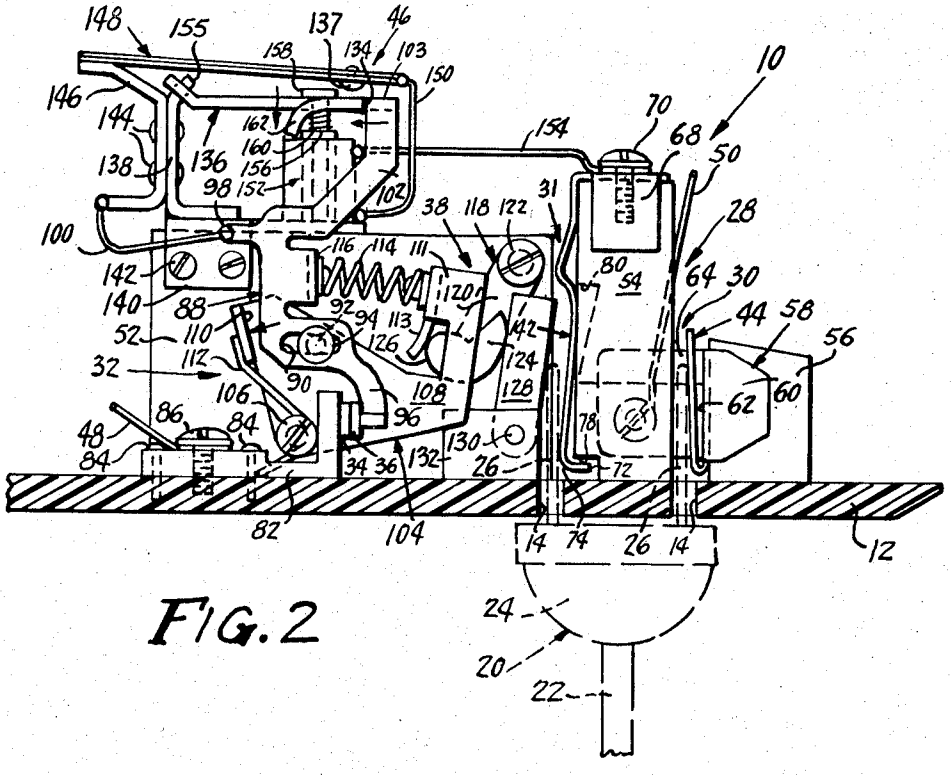


FIG. 2

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Filed Oct. 21, 1965 3 Sheets-Sheet 2

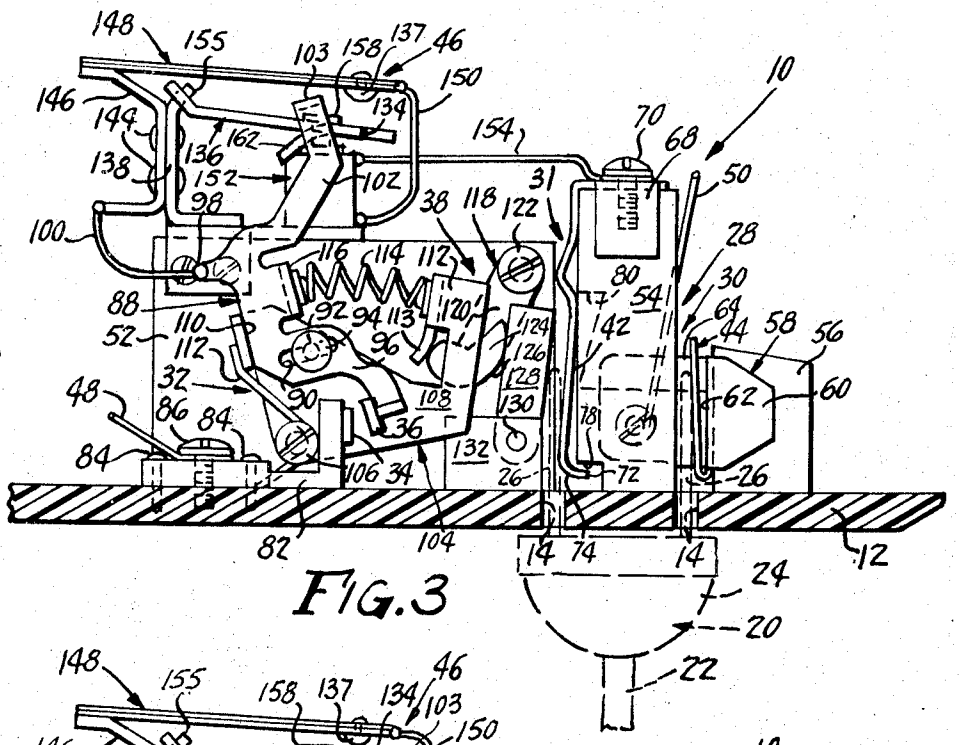


FIG. 3

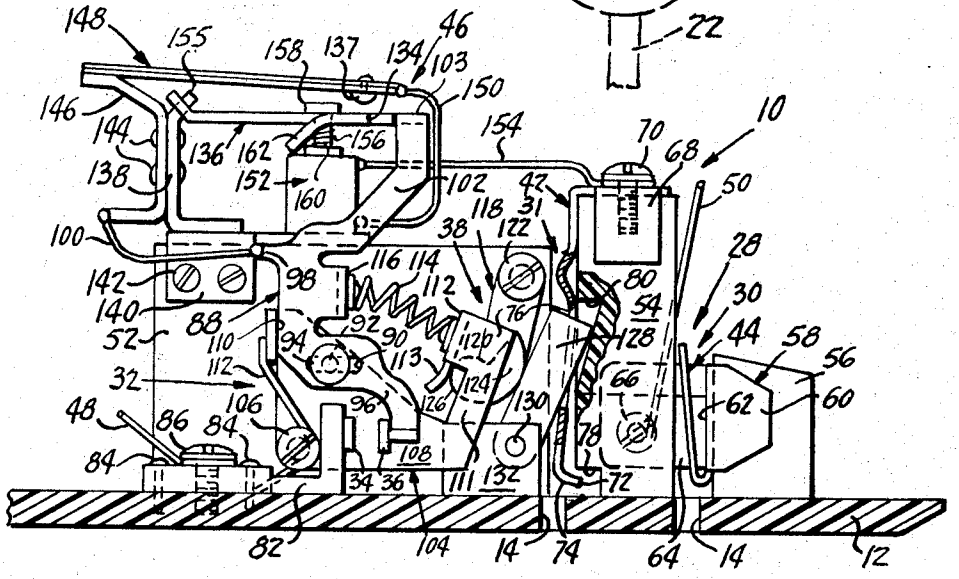


FIG. 4

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FIG. 5

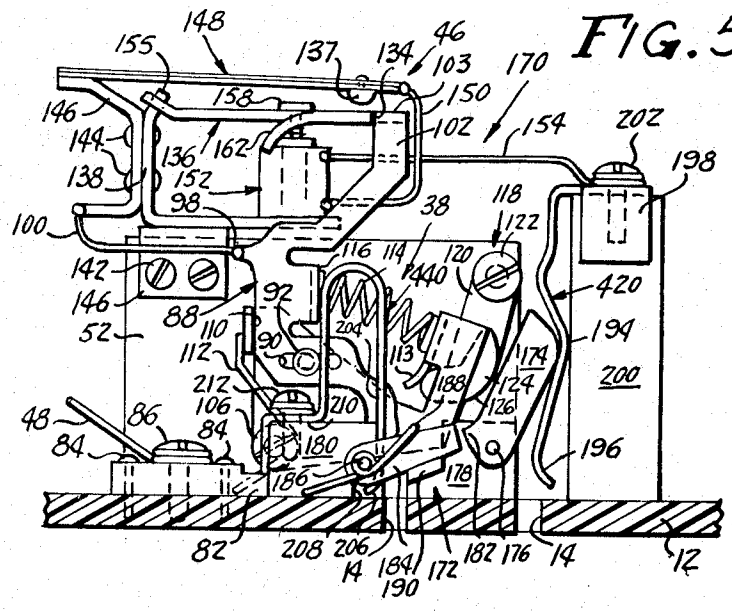


FIG. 6

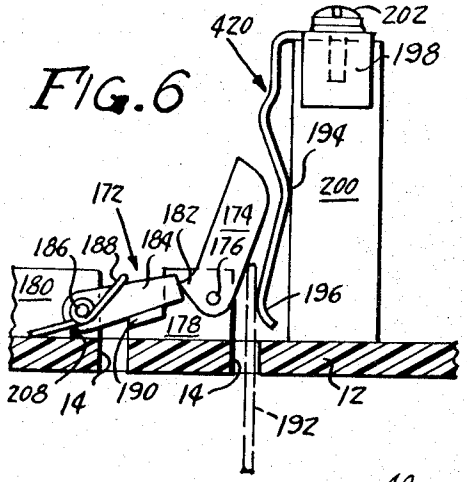


FIG. 7

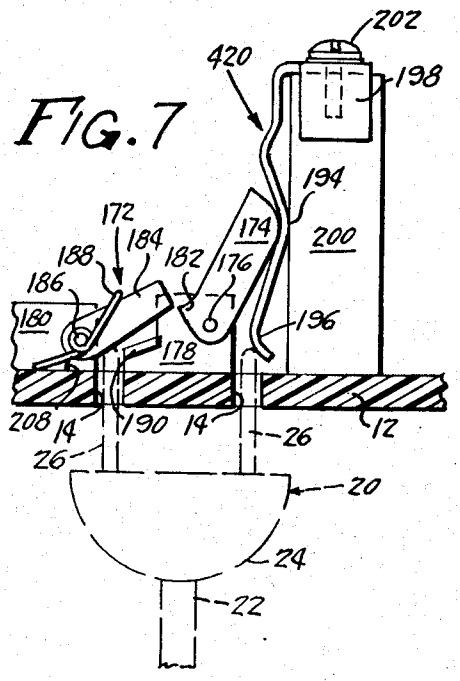
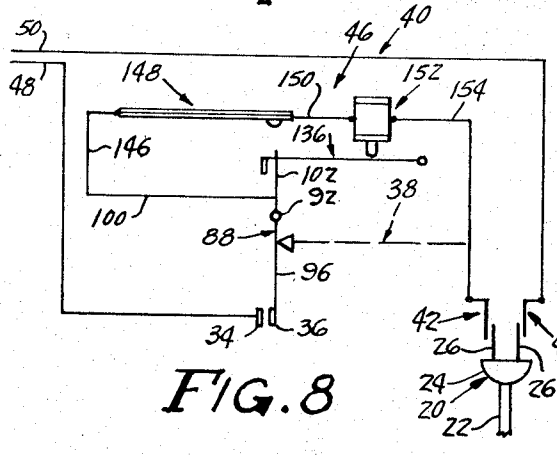


FIG. 8



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3,370,141

ELECTRICAL RECEPTACLE HAVING ZERO POTENTIAL UNTIL AN ELECTRICAL PLUG IS POSITIONED THEREIN AND INCLUDING CIRCUIT BREAKER MEANS

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15 Claims. (Cl. 200—115.5)

This invention relates to an electrical wall receptacle, and more particularly to a wall receptacle of the type delivering zero potential to the outlet terminals until an electrical plug is positioned in electrical communication with the terminals.

It is known in the prior art to provide a wall receptacle having the general characteristics mentioned but it is unfortunate that they include such disadvantages as have precluded their general adoption. Foremost among these disadvantages is one of expense since the wall receptacles of the prior art provide only a single safety feature resulting in the added expense because of the components needed to perform such safety functions with all the remaining components of a conventional building electrical circuit still being required.

It is an object of the instant invention to provide a wall receptacle providing an electrical potential only when a removable electric plug is associated therewith and which includes means for severing the electrical circuit through the wall receptacle upon the passage of current therethrough above a predetermined value.

Another object of the instant invention is to provide a wall receptacle of the character described which may be utilized in the wiring of a new building circuit or in the rewiring of an old building circuit which obviates the requirement of a plurality of centrally disposed circuit breaker or fuse stations.

Still another object of the instant invention is to provide a wall receptacle such that a plurality thereof may be attached in parallel to a single branch line such that the overload of a single receptacle will not de-energize the entire branch line.

A further object of the instant invention is to provide a wall receptacle including a circuit severing mechanism which may be reset merely by removing an associated electrical plug and replacing the same.

A still further object of the instant invention is to provide a wall receptacle having the following operational characteristics: the removal of an associated electrical plug results in a zero potential across the outlet terminals for safety purposes, an electrical potential is applied to the outlet terminals only when an electrical plug is partially engaged with the receptacle, the imposition of current flow through the receptacle above a predetermined value automatically severs the wall receptacle circuit, and the removal of an associated plug automatically conditions the receptacle for delivery of electrical potential although zero potential will exist across the outlet terminals until the associated plug is placed in engagement therewith.

Still another object of the instant invention is to provide a wall receptacle of the character described including means for severing the wall receptacle circuit upon the imposition of current flow therethrough at a prolonged rate slightly above the predetermined safety limit.

A further object of the instant invention is to provide a wall receptacle of the character described including means for severing the wall receptacle circuit upon the imposition of an impulse current flow substantially above the predetermined safety limit.

Other objects and advantages of the instant invention,

as well as the invention itself, reside in the combinations of elements, arrangements of parts, and features of construction and operation, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein there are disclosed preferred embodiments of this inventive concept.

In the drawings:

FIGURE 1 is a front elevational view of a wall receptacle secured in operating position in a building wall;

FIGURE 2 is a horizontal enlarged cross-sectional view of the wall receptacle of FIGURE 1 taken substantially along line 2—2 thereof as viewed in the direction indicated by the arrows illustrating a single unit for controlling current flow to a pair of outlet terminals, showing the electrical circuit thereof in a closed current delivering condition;

FIGURE 3 is a horizontal enlarged cross-sectional view similar to that of FIGURE 2 showing the wall receptacle unit in a current severing condition to preclude the delivery of electrical potential to the outlet receptacles with a removable electric plug positioned adjacent thereto;

FIGURE 4 is a view of the receptacle units of FIGURES 2 and 3 with the electrical plug removed;

FIGURE 5 is a cross-sectional view of an alternate form of positioning means for energizing the outlet terminals upon the insertion of an electrical plug showing the relative positions of the components when the plug is not inserted therein;

FIGURE 6 is a partial cross-sectional view of the alternative device of FIGURE 5 with a single probe inserted therein;

FIGURE 7 is a partial cross-sectional view of the alternative device of FIGURE 5 showing the movement of the locking components by an electric plug; and

FIGURE 8 is a schematic view of the electrical circuit and mechanical operating devices necessary to operate the wall receptacle of the instant invention.

OVERALL CONSTRUCTION AND OPERATION

Referring now to the drawings in detail, wherein like reference characters designate like elements throughout the several views thereof, and particularly to FIGURE 1, there is indicated generally at **10** a wall receptacle having a rectangular face plate **12** forming two sets of diagonally spaced pairs of prong receiving slots **14** with plate **12** being secured by suitable frictional fasteners **16**, such as screws or the like, to a wall **18** of a building structure. Referring now to FIGURES 2 to 4 inclusive, there is indicated generally at **20** a conventional removable male electric plug having a suitable power cord **22** leading to a plug **24** and electrically connected to a pair of male prongs **26** inserted in prong receiving slots **14**.

Wall receptacle **10** includes a dielectric frame shown generally at **28** affixed to face plate **12** and forming a pair of openings indicated generally at **30**, **31** for receiving prongs **26** of electric plug **20**. Wall receptacle **10** also includes a mounting means shown generally at **32** providing relative movement between a first fixed contact **34** and a second movable contact **36** with a motion transmitting means designated generally at **38** being engageable with prongs **26** for selectively positioning contacts **34**, **36** in the closed position shown in FIGURE 2. A power delivery circuit denominated generally at **40** in FIGURE 8 provides electrical communication between contacts **34**, **36** and a pair of outlet terminals shown generally at **42**, **44** and openings **30**, **31** through a circuit opening means designated generally at **46** for opening power delivery circuit **40** upon the flow of current through above a predetermined limit.

Power delivery circuit **40** includes a pair of electric wires **48**, **50** which may be connected to a suitable power source for delivering alternating current therethrough. As may be seen in FIGURE 8, wire **50** is connected to outlet terminal **44** with wire **48** being connected to contact **34** for engagement with movable contact **36** and subsequent electrical connection through mounting means **32**, circuit opening means **46** and outlet terminal **42**. As will be explained more fully hereinafter, the insertion of electrical plug **20** into openings **30**, **31** results in the manipulation of motion transmitting means **38** to close contacts **34**, **36** thus resulting in a closed power delivery circuit delivering electrical potential across outlet terminals **42**, **44** for operating an appliance connected to plug **20**. As will also be more fully explained hereinafter, the delivery of current through power delivery circuit **40** at a rate slightly greater than a predetermined value or at an impulse rate substantially greater than the predetermined value will result in the activation of circuit opening means **46** to manipulate mounting means **32** for moving contacts **34**, **36** to the open position ceasing the delivery of current to terminals **42**, **44**.

It will be seen, therefore, that wall receptacle **10** provides a first safety feature in preventing the delivery of electrical potential to outlet terminals **42**, **44** until plug **20** is inserted, thus precluding a small child from being injured thereby. Another safety feature is present in wall receptacle **10** to cease current flow through circuit **40** when the rate thereof is slightly greater than a predetermined value, such as will occur upon a prolonged overload of the system. A saill further safety feature is present by providing means for interrupting power deivery circuit **40** when the current flow therethrough is very high, such as may occur during a shorting-out of plug **20** or the appliance to which it is attached. As will be more fully explained hereinafter, a still further advantage resides in wall receptacle **10** since mounting means **32** and motion transmitting means **38** are so constructed and arranged to allow the reset of circuit **40** to pass current therethrough upon the removal of plug **20**.

FRAME AND OUTLET TERMINAL CONSTRUCTION

As previously indicated, frame **28** is made of a dielectric material and includes a first panel **52** providing a support for mounting means **32**, motion transmitting means **38** and circuit opening means **40**, a second panel **54** and a third panel **56**. Panels **52**, **54**, **56** are substantially aligned and spaced slightly apart to form openings **30**, **31** therebetween in order to receive male prongs **26**.

Secured to third panel **56** is a S-shaped bracket designated generally at **58** having a first leg **60** secured to the forward face thereof a second leg **62** secured to panel **56** facing opening **30** and carrying a reverted prong which constitutes outlet terminal **44**. A third leg **64** extends rearwardly of second panel **54** and is electrically separated therefrom providing connection between a releasable connector **66** securing electrical input wire **50** to bracket **58**. Since bracket **58** is made of an electrical conductor, such as copper, it will be seen that one side of power delivery circuit **40** is complete.

Outlet terminal **42** is releasably secured to second panel **54** by a metal U-shaped bracket **68** and a threaded screw **70**. Outlet terminal **42** is biased by its own construction and characteristics toward first panel **52** and includes a lower bent end **72** forming an arcuate camming surface **74** at the junction thereof. As may be seen most clearly in FIGURE 4, opening **31** is displaced slightly from slot **14** such that prong **26** will contact arcuate camming surface **74** when inserted into opening **31** insuring close electrical contact therebetween. As may also be seen most clearly in FIGURE 4, outlet terminal **42** forms an elongate longitudinal slot **76** for receiving part of motion transmitting means **38** as will be more fully explained hereinafter.

Second panel **54** forms a cutout **78** adjacent face plate **12** for receiving bent end **72** when plug **26** is inserted into opening **31** as may be seen in FIGURES 2 and 3. Second panel **52** also forms a triangular cutout **80** aligned with slot **76** in outlet terminal **42** to receive part of motion transmitting means **38** as may be seen in FIGURE 4.

MOUNTING MEANS

Mounting means **32** includes a stationary metal L-shaped bracket **82** having one leg thereof secured to face plate **12** by a plurality of suitable frictional fasteners **84**, such as rivets, screws or the like, with the short leg thereof carrying fixed contact **34** in a substantially vertical attitude. Electrical input wire **48** is releasably secured in a conventional manner to the long leg of L-shaped bracket **82** by a screw **86**.

Mounting means **32** includes a load carrying arm designated generally at **88** forming a horizontal elongate slot **90** receiving therein a pivot pin **92** positioned vertically above the short leg of L-shaped bracket **82** and equipped with an enlarged head **94** precluding inadvertent outward movement of load carrying arm **88**. A contact carrying arm **96** is a downwardly extending part of load carrying arm **88** and carries movable contact **36** for selectively positioning contact **36** against and away from stationary contact **34** as may be seen by a comparison of FIGURE 2 with FIGURES 3 and 4. Load carrying arm **88** forms a protuberance **98** connected to an electrical wire **100** leading to circuit opening means **46** as will be explained more fully hereinafter, with an upwardly extending latching arm **102** extending substantially above pivot pin **92** and protuberance **98** as will also be explained more fully hereinafter.

Pivot pin **92** is rigidly fastened to a positioner shown generally at **104** which is pivotally mounted about a pivot pin **106** securely fastened to first panel **52** of frame **28**. It will be seen, therefore, that load carrying arm **88** undergoes three types of movement, rotating about the axis of pivot pin **92**, rotating along with positioner **104** about the axis of pivot pin **106** and slidably moving with respect to positioner **104** through the coaction of slot **90** and pivot pin **92**.

MOTION TRANSMITTING MEANS

In addition to being a part of mounting means **32**, positioner **104** also constitutes a component of motion transmitting means **38** and includes an irregularly configured planer plate **108** having a right-angled segment **110** positioned adjacent load carrying arm **88** to the left of pivot pin **92** as may seen in FIGURES 2 to 4 inclusive. Propelling positioner **104** and load carrying arm **88** in a clockwise direction about pivot pin **106** is a return spring **112** coiled about pivot pin **106**, bearing against face plate **12** and secured, as by welding or the like, to segment **110**. Plate **108** forms an upwardly and outwardly extending L-shaped arm **111** carrying a rearwardly extending flange **113** with a helical spring **114** biasing apart flange **113** and a rearwardly extending flange **116** on load carrying arm **88**.

Motion transmitting means **38** also includes a cam designated generally at **118** including an arm **120** pivotally mounted by a pivot pin **122** on first panel **52** carrying a cam lug **124** presenting an involute camming surface **126**. A connecting block **128** is pivotally mounted by a pivot pin **130** secured between first panel **52** and a support block **132** affixed to face plate **12**.

FIGURE 4 illustrates the starting position before plug **20** is inserted into openings **30**, **31** through slots **14**. It should be pointed out that contacts **34**, **36** are in the open position precluding the flow of electrical current through power delivery circuit **40** consequently resulting in a zero potential across outlet terminals **42**, **44**. As prongs **26** are inserted into openings **30**, **31**, the leftmost prong in FIGURE 2 will contact arcuate camming surface **74** of outlet terminal **42** thus pivoting bent end **72** into cutout **78** allowing for the passage of leftmost prong **26**. A prong

will then contact connecting block **128** and begin pivoting it in a counter-clockwise direction about pivot pin **130** as may be seen in FIGURE 2. Connecting block **128** will contact involute camming surface **126** of cam **118** with another portion of camming surface **126** contacting rearwardly extending flange **113** of positioner **104**.

Accordingly, positioner **104** and load carrying arm **88** will begin a counter-clockwise rotation about the axis of pivot pin **106** as may be seen in FIGURE 2. A rearwardly extending flange **103** of latch arm **102** will come in contact with a notch **134** of a pivoted armature plate shown generally at **136** of circuit opening means **46** thereby precluding further counter-clockwise rotation of arm **88**. Continued insertion of prongs **26** into openings **30, 31** will pivot connecting block **128** an additional increment resulting in further counter-clockwise rotation of positioner **104**. During this incremental rotation of positioner **104**, segment **110** thereof bears against load carrying arm **88** at a point slightly above pivot pin **92** to allow helical spring **114** to slide load carrying arm **88** with respect to pivot pin **92** thus resulting in the closing of contacts **34, 36**.

Inserting prongs **26** an additional increment into openings **30, 31** will result in additional rotation of connecting block **128** and cam **118** to further rotate positioner **104** in a counter-clockwise direction. During this additional incremental rotation of positioner **104**, load carrying arm **88** will be secured against rotation by contact with notch **134** and stationary contact **34**. Accordingly, slot **90** and pivot pin **92** act as a lost motion connection between positioner **104** and load carrying arm **88**. FIGURE 2 illustrates the completed insertion of plug **20** into receptacle **10** with the counter-rotation of the components of mounting means **32** and motion transmitting means **38** being precluded by the positioning of prong **26** in opening **31**. It should now be apparent that an electrical path including electrical input wire **48**, L-shaped bracket **82**, stationary contact **34**, movable contact **36**, load carrying arm **88**, protuberance **98** and wire **100**, is completed.

CIRCUIT OPENING MEANS

Circuit opening means **46** includes an L-shaped bracket **138** vertically secured to first panel **52** by a U-shaped connector **140** and a plurality of frictional fasteners **142**, such as screws or the like. Fixedly secured to the long leg of L-shaped bracket **138** by a pair of frictional fasteners **144** is a substantially U-shaped member **146** having the upper leg thereof extending above L-shaped bracket **138** with the lower leg of member **146** being connected to wire **100**. Fixedly secured on the upper end of U-shaped member **146** is a bimetallic strip **148** having upper and lower layers of metals having different coefficients of thermal expansion. In the illustrated device the upper layer of strip **148** should have the higher coefficient for reasons more fully explained hereinafter.

Electrical wire **150** connects the free end of bimetallic strip **148** to the winding of a solenoid shown generally at **152** while another electrical wire **154** connects the other side of the winding of solenoid **152** to releasable screw **70** on second panel **54**. It will thus be seen that power delivery circuit **40** is completed upon the juxtaposition of contacts **34, 36** in order to deliver electrical energy to outlet terminals **42, 44**. Conversely, the opening of contacts **34, 36** will sever power delivery circuit **40** thus precluding the development of electrical potential across outlet terminals **42, 44**.

Armature plate **136** is pivotally mounted on an inturned upper end **155** of L-shaped bracket **138** and is provided with an aperture through which a plunger **156** of solenoid **152** extends. An enlarged boss **158** may be secured to the terminal end of plunger **156** with a helical spring **160** surrounding plunger **156** for slidably positioning armature plate **136** adjacent boss **158**.

In the operation of circuit opening means **46**, the insertion of plug **20** in openings **30, 31** will complete power delivery circuit **40** as previously mentioned. Should a short occur in the appliance to which plug **20** is attached, a sufficiently high current impulse will pass through solenoid **152** retracting plunger **56** and depressing armature plate **136**. Since helical spring **114** is biasing positioner **104** and load carrying arm **88** apart, flange **103** of latch arm **102** will clear notch **134** with load carrying arm **88** being pivoted in a counter-clockwise direction to result in the position shown in FIGURE 3. As soon as flange **103** clears notch **134**, contacts **34, 36** will become separated thus severing circuit **40** and precluding the further passage of electrical current to plug **20**.

The only operation required to reset latch arm **102** from the position shown in FIGURE 3 is to remove plug **20** which releases the binding engagement between block **128**, cam **118** and flange **113** to allow return spring **114** to pivot load carrying arm **88** and positioner **104** in a clockwise direction. To avoid any possibility of flange **103** of latch arm **102** becoming fouled on armature plate **138**, an arcuate camming surface **162** is formed thereon to allow the smooth movement of flange **103** across plate **136**. The only operation required to reactivate circuit **40** is the replacement of male prongs **26** in openings **30, 31**, resulting in the closed circuit arrangement of FIGURE 2. It should be apparent that solenoid **152** should be selected to trip armature **136** at a desired current flow through circuit **40**. By balancing the strength of the solenoid coil against the weight of plunger **156** it will be apparent that a normal current flow through circuit **40** will not activate solenoid **152** while a current surge will retract plunger **156**.

It will be readily apparent that solenoid **152** will sever circuit **40** only when a relatively high current rate is achieved within power delivery circuit **40** thus allowing a prolonged current flow above a desired level. To obviate such a disadvantage, bimetallic strip **148** is constructed such that a normal current flow will produce a given amount of temperature increase thus flexing strip **148** in a downward direction a predetermined amount. The increase in current flow through circuit **40** will result in an increase in temperature of strip **148** thus creating additional downward flexing whereby the free end of strip **148** may contact the free end of armature **136** thus freeing flange **103** from within notch **134**. When such a condition occurs, helical spring **114** will rotate load carrying arm **88** in a counter-clockwise direction separating contacts **34, 36** ceasing current flow through circuit **40**.

ALTERNATIVE EMBODIMENT

Referring now to FIGURES 5 to 7 inclusive, a modified form of the electrical receptacle of the instant invention is designated generally at **170** in the description of which identical reference characters will be used for identical elements or combinations of elements for purposes of clarity and brevity with new or different element sbeing provided with new reference characters. The main difference between receptacles **10** and **170** resides in the provision of a blocking means designated generally at **172** requiring the insertion of a dual pronged device to deliver electrical potential to a pair of outlet terminals shown generally at **420, 440**, which correspond to outlet terminals **42, 44** of receptacle **10**. The remaining differences reside in the rearrangement of the components of receptacle **10** for the operation of blocking means **172**.

A connecting block **174** is rotatably mounted by a pivot pin **176** on a support block **178** located between slots **14** in much the same manner that connecting block **128** is supported on block **132**. In common with the operation of receptacle **10**, the forced rotation of connecting block **174** in a counter-clockwise direction acts to manipulate load carrying arm **88** closing contacts **34, 36** which are hidden behind a second support block **180**. Connecting block **174** carries a blocking protuberance **182** spaced from pivot pin **176** in the path of a blocking lever **184**

pivotally mounted on support block **180** by a pivot pin **186** and biased in a clockwise direction by a coiled spring wire **188**. Support block **178** is provided with a forwardly extending ledge **190** limiting the clockwise rotation of clocking lever **184** such that the forward end thereof will be engaged with blocking protuberance **182** when connecting block **174** is rotated in a clockwise direction by a single probe **192** as may be seen in FIGURE 6.

It will be seen, therefore, that the insertion of a single probe **192** into rightmost slot **14** will not manipulate load carrying arm **88** since connecting block **174** is effectively precluded from contact with cam **118**. The insertion of a dual probe device, such as electric plug **20** as may be seen in FIGURE 7, will allow connecting block **174** to contact cam **118** in order to manipulate load carrying arm **88**, close contacts **34, 36** and deliver electrical potential across outlet terminals **420, 440** in much the same manner that receptacle **10** operates. This is achieved since leftmost prong **26** of plug **20** rotates blocking lever **184** out of the path of rotation of blocking protuberance **182** before rightmost prong **26** contacts connecting block **174**. It is thus seen that the insertion of a single probe through rightmost slot **14** will not deliver electrical potential across terminals **420, 440** since power delivery circuit **40** is open because of the spaced apart relation of contacts **34, 36**. As will be more fully pointed out hereinafter, it will be apparent that the insertion of a single probe into the leftmost slot **14** will not injure an individual so doing since power delivery circuit **40** cannot be closed unless connecting block **174** is forcibly rotated in a counterclockwise direction.

Outlet terminal **420** is made of a spring metal member and is provided with a bulge **194** adjacent the arcuate end of connecting block **174** and a curved end **196** which contacts rightmost prong **26** in much the same manner that arcuate camming surface **74** of outlet terminal **14** contacts leftmost prong **26**. The upper end of outlet terminal **420** includes a U-shaped connector **198** surrounding the upper end of a block **200** and is secured thereto by a threaded screw **202** which acts as a releasable connector between solenoid conduit **154** and outlet terminal **420**.

Outlet terminal **440** includes a U-shaped spring metal end having a long leg **204** extending adjacent leftmost slot **14** and is equipped with an arcuate camming edge **206** which, when depressed by a leftmost prong **26**, resides in an indentation **208** formed by support block **180**. Outlet terminal **440** also includes a horizontal section **210** secured to support block **180** by a threaded screw **212** which acts to provide a releasable connection between electrical wire **50** leading to an alternating current power source as previously mentioned. Camming edge **206** of outlet terminal **440** is normally positioned in the path of leftmost prong **26** such that the insertion of electrical plug **20** cams long leg **204** to the left as shown in FIGURE 5 insuring electrical contact therebetween. It will be apparent that the insertion of probe **192** into leftmost slot **14** will not deliver electrical potential across terminals **420, 440** since contacts **34, 36** cannot be closed except by connecting block **174**.

SUMMARY OF OPERATION

As is apparent from the foregoing description of receptacle **10**, a number of different operations are conducted thereby including the de-energization of outlet terminals **42, 44** upon the removal of plug **20**, the energization of terminals **42, 44** upon the insertion of plug **20**, the de-energization of circuit **40** upon an impulse or instantaneous high current flow therethrough, the de-energization of circuit **40** upon a prolonged rate of current flow slightly above a predetermined value and the resetting of current opening means **46** upon the retraction of plug **20**.

The de-energization of circuit **40** when plug **20** is removed is the result of the action of return spring **114** on a positioner **104** and consequently on load carrying arm **88** to shift load carrying arm **88** to the right as may be seen in FIGURE 4. The energization of circuit **40** upon the insertion of plug **20** into openings **30, 31** is caused by the shifting of load carrying arm to the left to juxtapose contacts **34, 36**. The de-energization of circuit **40** because of an impulse overload is the result of a high rate of current flow through solenoid **152** retracting plunger **156** disengaging notch **134** from flange **103** of latch arm **102**. The de-energization of circuit **40** when a prolonged current flow slightly greater than a predetermined value is caused by bimetallic strip **148** flexing because of the increased temperature thereof contacting armature plate **136** and releasing flange **103** from notch **134**. In the event that bimetallic strip **148** does not flex sufficiently to contact the free end of plate **136**, a protuberance **137** may be formed on the end thereof.

It is now seen that there is herein provided an improved electrical receptacle having all of the objects and advantages of the instant invention and others, including many advantages of great practical utility and commercial importance.

Since many embodiments may be made of the instant inventive concept, and since many modifications may be made of the embodiments hereinbefore shown and described, it is to be understood that the foregoing is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. In an electrical receptacle of the type having an apertured face plate, terminals adjacent said apertures engageable with the prongs of a removable electrical plug, movable contacts in a receptacle circuit for normally deenergizing the terminals when the plug is removed, and motion transmitting means translating the inward movement of the plug into closing movement of the contacts, the motion transmitting means being biased toward the deenergized position and engageable with the prongs for holding the contacts in closed position, the improvement comprising

current responsive means for moving at least a pair of the contacts apart upon the flow of current through the circuit in excess of a predetermined amount, and

means held in inoperative relation upon opening of said contact, by said current responsive means through the motion transmitting means by the plug in the receptacle for returning the motion transmitting means and the contacts to the normally deenergized position upon removal of the plug.

2. An electrical receptacle comprising:

means forming outlet terminals for engagement with a removable electric plug,

a power delivery circuit connected to said outlet terminals for delivering electrical potential to said outer terminals only when said plug is engaged therewith including a pair of normally open electrical contacts,

means mounting said contacts for relative movement from a closed position for delivering electrical potential to said terminals to an open position to prevent delivery of electrical potential to said terminals when said plug is not in engagement therewith,

motion transmitting means engageable with the prongs of said removable plug when said plug is adjacent said terminals for closing said contacts upon the retraction and reinsertion of said plug in said terminals, and

means in said circuit for opening said contacts when said circuit carries a current flow above a predetermined value and said plug is in engagement with said terminals.

3. The structure of claim **2** wherein said circuit opening means includes overload means for opening said circuit upon prolonged delivery of a current through said

circuit at rates slightly above said predetermined value, and

impulse overload means for opening said circuit upon a current pulse substantially greater than said predetermined value and substantially greater than said current flow necessary to actuate the first named overload means.

4. An electric receptacle comprising:

a face plate forming prong receiving slots,

means on said face plate forming outlet terminals adjacent said slots engageable with a removable electric plug,

a power delivery circuit carried by said face plate connected to said outlet terminals for delivering electrical potential to said outlet terminals including a pair of electrical contacts,

means mounting said contacts for relative movement from a closed position for delivering electrical potential to said terminal to an open position to cease delivery of electrical potential to said terminals,

motion transmitting means engageable with the prongs of said removable plug when said plug is adjacent said terminals for moving said mounting means to said closed contact position upon retraction and reinsertion of said plug in said terminals, and

circuit opening means in said circuit for moving said mounting means from said closed contact position to said open contact position when said circuit carries a current flow above a predetermined value,

said circuit opening means and said mounting means including latching means for selectively holding said mounting means in said contact closing position,

further including means for unlocking said latching means for releasing said mounting means from said contact closing position,

wherein said unlocking means includes overload means for unlocking said latching means when said circuit carries a prolonged current flow at a rate slightly above said predetermined value, and

wherein said unlocking means includes impulse overload means in series with said overload means for unlocking said latching means when said circuit carries a current impulse substantially greater than said predetermined value and substantially greater than said current flow necessary to actuate the first named overload means.

5. An electric receptacle comprising:

a face plate forming prong receiving openings,

means on the face plate forming outlet terminals adjacent said openings for engagement with a removable electric plug,

a power delivery circuit connected to said outlet terminals for delivering electrical potential to said outlet terminals including a pair of electrical contacts,

means mounting said contacts for relative movement from a closed position for delivering electrical potential to said terminals to an open position to cease delivery of electrical potential to said terminals, said mounting means including a load arm carrying one of said contacts and being mounted for movement on said receptacle, and means normally biasing said load arm toward said contact opening position,

motion transmitting means engageable with the prongs of said removable plug when said plug is adjacent said terminals for moving said load arm to said closed contact position upon movement of said motion transmitting means by the insertion of said removable plug, and

means in said circuit for opening said contacts when said circuit carries a current flow above a predetermined value including latch means holding said load arm in said contact closing position, and means for unlocking said latch means when said current exceeds said predetermined value,

wherein said motion transmitting means includes a block pivotally mounted adjacent at least one of said openings for engagement with and rotation by a male prong inserted into said openings, a positioner pivotally mounted on said receptacle, means transmitting the rotational movement of said block to said positioner, spring means connecting said positioner and said load arm biasing said load arm away from said positioner in a first direction, spring means biasing said positioner toward said load arm in a second direction, said mounting means including means slidably and pivotally mounting said load arm on said positioner for engaging said load arm with said latch means of said circuit opening means and for closing said contacts upon rotation of said block.

6. The structure of claim 5 wherein said latch means includes an armature mounted for movement from a first position holding said load arm in said contact closing position to a second position releasing said load arm from said closing position, said armature moving means including a solenoid in said power delivery circuit.

7. The structure of claim 5 wherein said latch means includes an armature mounted for movement from a first position holding said load arm in said contact closing position, said armature moving means including a bimetallic strip in said power delivery circuit.

8. An electric receptacle comprising:

a face plate forming prong receiving openings,

means on said face plate forming outlet terminals adjacent said openings for engagement with a removable electric plug,

a power delivery circuit connected to said outlet terminals for delivering electrical potential to said outlet terminals including a pair of electrical contacts,

means mounting said contacts for relative movement from a closed position for delivering electrical potential to said terminals to an open position to cease delivery of electrical potential to said terminals, said mounting means including a load arm carrying one of said contacts and mounted for movement on said receptacle, and means biasing said load arm toward said contact opening position,

motion transmitting means engageable with the prongs of said removable plug when said plug is adjacent said terminals for moving said load arm to said closed contact position upon movement of said motion transmitting means by the insertion of said removable plug,

means in said circuit for opening said contacts when said circuit carries a current flow above a predetermined value including latch means holding said load arm in said contact closing position, and means for unlocking said latch means when said current exceeds said predetermined value,

wherein said latch means includes an armature mounted for movement from a first position holding said load arm in said contact closing position to a second position releasing said load arm from said contact closing position, and

including means for moving said armature from said first position to said second position.

9. An electric receptacle comprising:

a face plate forming prong receiving openings,

means on said face plate forming outlet terminals adjacent said openings for engagement with a removable electric plug,

a power delivery circuit connected to said outlet terminals for delivering electrical potential to said outlet terminals including a pair of electrical contacts,

means mounting said contacts for relative movement from a closed position for delivering electrical potential to said terminals to an open position to cease delivery of electrical potential to said terminals, said mounting means including a load arm carrying one of said contacts and mounted for movement on said

receptacle, and means biasing said load arm toward said contact opening position,

motion transmitting means engageable with the prongs of said removable plug when said plug is adjacent said terminals for moving said load arm to said closed contact position upon movement of said motion transmitting means by the insertion of said removable plug,

means in said circuit for opening said contacts when said circuit carries a current flow above a predetermined value including latch means holding said load arm in said contact closing position, and means for unlocking said latch means when said current exceeds said predetermined value,

including means precluding the actuation of said motion transmitting means unless at least two of said openings receive a prong, said actuation precluding means including blocking means for engagement with a prong inserted therein and means mounting said blocking means for movement between a first position overlying said one opening in position to preclude movement of said motion transmitting means to a second position out of the path of movement of said motion transmitting means upon insertion and retraction of a prong into said one opening.

10. In an electrical receptacle of the type constructed to receive a removable electrical plug and including a pair of contacts and a current sensing device which is actuated by current in excess of a predetermined current flow, the improvement comprising:

means for normally positioning said contacts in a first open condition;

means operably interconnecting the sensing device and the contacts for moving the contacts from a closed position to a second open position upon actuation of said sensing device, and

means operably interconnecting the contacts and being engageable by said plug for returning said contacts to said first open condition from said second open position upon removal of said plug from said receptacle and closing the contacts upon re-insertion of said plug.

11. The receptacle of claim **10** wherein the closing means comprises:

means engageable with said plug for closing said contacts only when said plug is received in said receptacle.

12. The receptacle of claim **11** wherein said closing means is engaged by one prong of said plug and further comprising:

means engageable by a second prong of said plug of blocking operation of said closing means except when said second prong engages said blocking means.

13. The receptacle of claim **11** further comprising:

a second current sensing device in the receptacle disposed and constructed for triggering the means operably interconnecting the first sensing device and the contacts,

one of said current sensing devices being sensitive to a small long-term current excess and the other of said current sensing devices being sensitive to a large short-term current excess.

14. The receptacle of claim **10** further comprising:

a second current sensing device in the receptacle disposed and constructed for triggering the means operably interconnecting the first sensing device and the contacts,

one of said current sensing devices being sensitive to a small long-term current excess and the other of said current sensing devices being sensitive to a large short-term current excess.

15. An electrical receptacle comprising:

outlet terminals for engagement with a removable plug,

a pair of electrical contacts,

contact mounting means carrying one of said contacts, said mounting means being mounted in said receptacle for moving said contact from a normally open position to a closed position and to an abnormally open position,

current sensing latch means normally engaging said contact mounting means for normally preventing said contact from being moved to said abnormally open position and for releasing said contact mounting means for moving said contact to said abnormally open position upon the flow of current in excess of a predetermined value,

motion transmitting means operable by engagement of said plug in said receptacle for moving said mounting means to close said contacts, and

means operable by removal of said plug from engagement in said receptacle for returning said mounting means for moving said contact to said normally open position from said closed position and from said abnormally open position.

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