

Feb. 23, 1943.

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2,312,017

OUTLET RECEPTACLE AND WALL PLUG THEREFOR

Filed March 4, 1940

Fig. 1

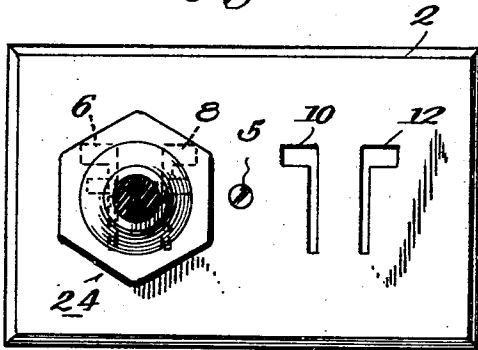


Fig. 2

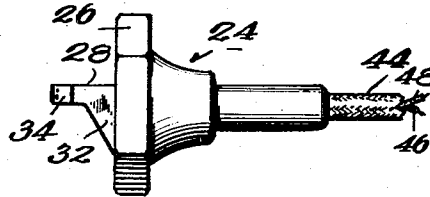


Fig. 3

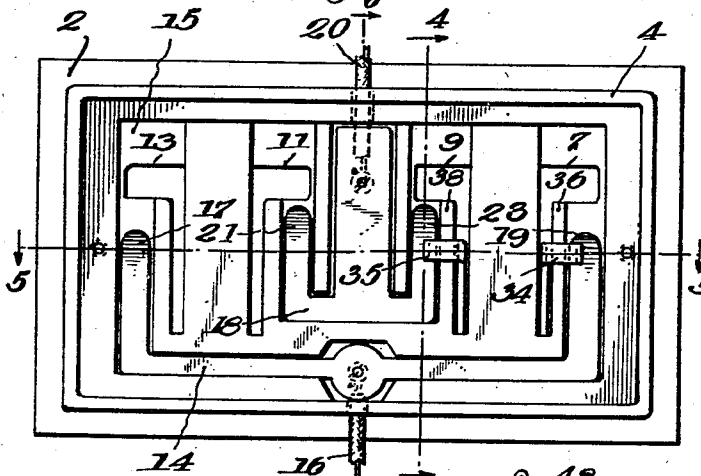


Fig. 4

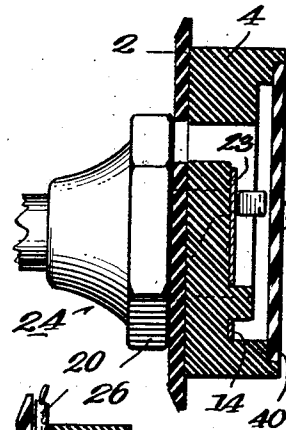


Fig. 5

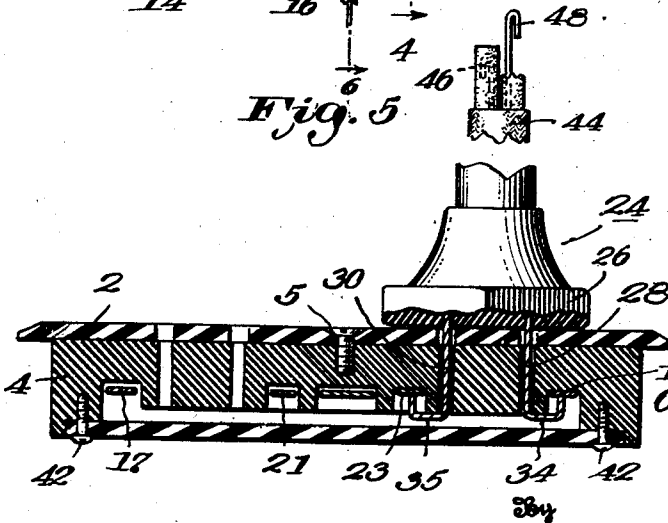
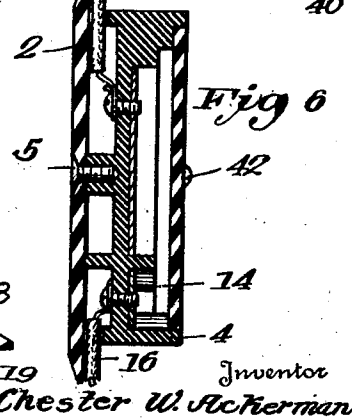


Fig. 6



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2,312,017

OUTLET RECEPTACLE AND WALL PLUG
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Application March 4, 1940, Serial No. 322,223

8 Claims. (Cl. 173—330)

The present invention relates to electrical connectors and more particularly to a combination of an outlet box and wall plug having certain improved features.

The outlet box or receptacle hereinafter described is preferably of the duplex type having certain improved features to eliminate or greatly reduce sparking and which is particularly designed to prohibit unauthorized tampering or accidental contact to complete a circuit.

The wall plug of the invention embodies certain features to cooperate with corresponding constructional features of the outlet box so that the plug may not be inserted by a child and includes certain features to increase the safety of operation and to decrease the likelihood of short circuits and sparking.

It is generally recognized that the ease with which the ordinary wall plug may be inserted in the outlet box or receptacle renders it particularly dangerous to children or infants and greatly increases the fire hazard in a home. This feature is also particularly annoying as it permits also the easy disconnecting of the circuit or removal of the plug, which is particularly apt to occur through accident, as by falling or stumbling over the wire connected to the plug and thus breaking the connection, or what is worse, producing a short circuit across the partly withdrawn plug.

The present invention includes the feature that the wall plug must first be moved in one direction in order to disconnect the circuit or to break the circuit, and must thereafter be moved at right angles to the first direction of movement in order to withdraw the plug from the wall box or receptacle. It will be apparent from the construction of the device of the invention as hereinafter described that the danger of a short circuit back of the plug, or in the outlet box in this construction is substantially eliminated, and that the wall plug may not be partly withdrawn thus making a poor contact as occurs frequently in the ordinary construction. Furthermore, there is less likelihood of the plug prongs or blades becoming sprung and thereby making improper contact with the circuit terminals of the outlet box, the form of prongs of the present invention being of a form to cooperate with spring engagement with the circuit terminals, thereby holding the plug flush against the face of the outlet box.

It will be obvious also from the construction as hereinafter described that it is substantially impossible to insert any object other than the plug designed for the particular outlet box to

obtain contact with the circuit terminals and thus receive a shock or to blow a fuse in the circuit.

Furthermore, the contact is made between the prongs or blades and the terminals of the circuit at the face of the circuit terminal plates thus eliminating short circuits due to frayed or crossed wires in the outlet box.

The outlet box of the invention is provided with channelling which serves to insulate the terminals from each other, the blades of the plug contacting with the corresponding terminal in a channel or depression, thus providing an insulating medium around each of the prongs or blades at the point of contact with the terminals.

The outlet box casing and the body of the wall plug are preferably made of a molded plastic composition which may be readily pressed into the channeled form to provide the desired insulating grooves in the structure to obtain the desired insulation of the terminals and to prevent sparking.

By the action of the spring contacts of the terminals there is a whip action in the disconnecting operation which assists in the prevention of sparking, and the spring pressure against the prongs of the plug assists in holding the plug rigidly in place.

One of the objects of the invention is to provide a novel form of outlet receptacle and plug which may not be disconnected by accident and which may not be connected or disconnected by children or infants accidentally or otherwise.

Another object of the invention is to provide a novel form of outlet receptacle and wall plug in which sparking on the making or breaking of the circuit is substantially eliminated.

Another object of the invention is to provide a novel form of wall plug and outlet receptacle therefor which requires a series of movements in different directions to insert the plug or to disconnect the plug so as to eliminate tampering with the connection by children and to prevent the disconnection by accidental pulling of the cord or wire connecting the plug.

Another object of the invention is to provide an edge to surface contact between the plug blades or prongs and the outlet box terminals so as to obtain a more effective contact and to lessen the tendency of sparking in making and breaking the circuit.

Another object of the invention is to provide a novel form of outlet receptacle in which the terminals of the circuit are held in a channel or groove construction so as to provide insulating

walls between the circuit terminals to prevent sparking and the likelihood of short circuits.

Another object of the invention is to provide a form of wall plug having circuit-connecting prongs with reversed ends, said reversed ends being adapted to ride over adjacent insulating wall members which serve as guides in the movement of the plug into and out of contact with the circuit terminals.

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

A further object of the invention is to provide a form of outlet box and wall plug having certain novel features to prevent sparking and short circuits and thereby greatly prolong the average life of the device.

With these and other objects in view, the invention comprises the various features herein-after 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, in which:

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

Fig. 2 is a side elevational view of the wall plug member;

Fig. 3 is an enlarged rear view of the outlet box with the back plate removed, the view showing the prongs of the wall plug in engagement with the outlet box terminals in the position of the plug indicated in Fig. 1;

Fig. 4 is a view in elevation, partly in section taken on the section line 4—4 of Fig. 3;

Fig. 5 is a cross sectional view taken on the section line 5—5 of Figure 3; and

Fig. 6 is a cross sectional view taken on the section line 6—6 of Fig. 3.

Referring more in detail to the drawing, the numeral 2 designates the face plate of the outlet box or receptacle which face plate is formed of insulating material and may be screwed or otherwise attached to the casing 4 by means of a screw member 5, for example.

In the face plate 2 are preferably a pair of openings 6, 8 on one side and another pair of openings 10, 12 on the other side to form a duplex arrangement by which a wall plug may be inserted into either of the two pairs of openings.

In the inner portion of the casing is a wall member 15 having corresponding openings 7, 9 and 11, 13 through which the prongs or blades of the plug member pass before engagement with the circuit terminals can take place.

The openings 6, 7, 8, 9, 10, 11, 12 and 13 are preferably formed with narrow slits in one direction and an enlarged portion near the end of the openings extending laterally in another direction so that in order to provide contact between the prongs or blades of the plug a combination of two movements in different directions is required, so that children or infants would not be likely to find or discover the proper combination of movements required in order to make or break contact with the electrical circuit. In the form as shown in the drawing the slits are vertically arranged and the enlarged openings or laterally extending portions are at the top, so that in inserting the plug member into the registering enlarged openings in the face plate 2 and the wall member 15, a first inward horizontal movement is used, followed by a vertical movement down-

wardly after the inner ends of the prongs or blades have passed beyond the inner face of the wall member 15.

It will be understood that the receptacle or outlet box may be mounted with its longest dimension horizontally or vertically as will be apparent to those skilled in the art, and that changes in the form or positions of the openings and other details of construction may be made without departing from the scope of the invention as defined in the annexed claims.

The wall member 15 of the casing 4 is preferably provided with a U-shaped bar member 14 which is connected to one of the leads 16 and with a T-shaped member 18 connected to the other lead 20, the branches 17 and 19 of the U-shaped member 14 and the branches 21 and 23 of the T-shaped member 18 extending to the opposite sides of the device within the casing so that contact may be made between the blades or prongs of the wall plug and the corresponding branches of the circuit terminals 16 and 20 on either side of the casing 4.

In order to prevent sparking or forming a short circuit between the terminals, the U-shaped member 14 and the T-shaped member 18 are preferably mounted in channels or depressions so as to form insulating wall portions between the branches and body portions of the opposite terminals of the circuit leads.

The insulating wall portions form also guide members on which the prongs of the plug member are supported during movement into or out of engagement with the corresponding branch members in the making or breaking of a circuit.

The wall plug member 24 comprises the usual body portion 26 and the prongs or blade members 28 and 30. The prongs or blades are preferably formed with an enlarged body portion 32 to give the desired strength and rigidity to the blades at the portions where they are connected to the body portion of the plug member. The end portions of the blade members are preferably reversed, being bent into a U-shaped form 34, 35 of a width so as to permit passage through the enlarged portions of the openings and to ride over the adjacent wall members as 36 and 38 shown in Fig. 3 of the drawing.

The casing 4 is provided with a back plate 40 of insulating material which may be held in place by screw members 42 as indicated in Fig. 5 of the drawing.

In inserting the plug member 24 for contact at the left of the face plate as shown in Fig. 1, the U-portions 34, 35 of the prongs or blades of the plug are inserted through the upper portions of the openings 6, 8 and the horizontal inward movement is continued until after the ends of the prongs have passed through the openings 7, 9 of the wall member 15 of the casing 4.

The U-shaped portions or reversed ends of the prongs are then moved downwardly over the guide members or wall portions 36 and 38 into contact with terminals of opposite polarity, the terminals being so positioned as not to contact simultaneously with said reversed ends, the said terminals having, in effect, different effective lengths. In the said movement of the prongs, contact is made immediately with the branch member 23 of the T-member 18. The inner edge of the U-member 30 forms an edge to surface contact, biting into the metal and pressing the branch member 23 inwardly thus forming a spring pressed engagement at the contacting portions. On further movement of the prongs down-

wardly over the guide members the blade portion 23 rides over the branch 19 of the U-shaped bar member 14, thus completing the circuit and furnishing current to the leads 44 of the plug member 24. The branch members 17 and 19 as well as the branch members 21 and 23 are outwardly bowed slightly so as to produce spring pressure contact with the edges of the prong members engaging therewith.

It will be apparent therefore that in order to make a proper electrical connection, two movements of the wall plug are necessary, one inwardly and one downwardly into the proper seating position. It will be apparent that the engagement of one of the prongs with one of the terminals in advance of engagement of the other prong with the other terminal has a tendency to eliminate sparking, and the last contact being made between an edge and surface, the current flows smoothly without perceptible sparking.

In a similar manner, in order to remove the plug member from the outlet box two movements in different directions are required, one an upward vertical movement and the other a horizontal outward movement after the U-members of the prongs are disengaged from the guide members 36 and 38 and register with the laterally extending portions of the openings in the wall member of the casing and the corresponding openings in the plate member.

It will be obvious therefore that the wall plug cannot be withdrawn from the outlet box by infants or children, and there is little likelihood of disconnecting the wall plug by accidental pulling of the cord 44, as might occur by stumbling or falling over the cord.

The wall plug is preferably provided with wires 44 having terminal steel spring clips 46 and 48 to which the wires of a cord may be easily attached by forming a knot, for example, in or at the end of the wire to be attached and then slipping the knot under the clip. The insulation may then be pulled over the joint and a winding of insulation applied in the usual manner. It will be apparent that the attachment tightens itself through tension or pull on the cord wires, thus making a better contact. The wires 44 are preferably of different length, so that the long wire insulation shields the shorter wire.

It will be understood that the arrangement of the circuit lead wires 16 and 20 on a face of the bracket member 4 opposite to that on which the contact members 14 and 18 are mounted, and the arrangement of these contact members in grooves or depressions, insulates the terminal portions of opposite polarity from each other and prevents sparking or short circuiting between the terminal portions. This shielding arrangement also prevents the possibility of making contact between the terminals by unauthorized persons by inserting metal implements into the openings on the face of the plate, since no contact is possible with a straight-in movement and a ground could be made only with an implement or device having a reverse curve at the end.

The L or reverse curved prongs of the plug insure proper positioning or contacting with the contact members which is particularly important in connection with use of high tension circuits.

It will be obvious that various changes may be made in the form of device shown and described without departing from the spirit and scope of the invention as defined in the claims annexed hereto.

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

1. An outlet receptacle and wall plug therefor comprising a body portion of insulating material in said outlet receptacle, circuit terminals of opposite polarity in said receptacle, recessed channeling in said body portion extending inwardly from the rear surface of said body portion and surrounding each of said terminals so as to separate them from each other, a wall plug having circuit connecting prongs with bent ends extending from the main portion of the prongs and adapted to contact with said terminals in said channels and passageways in said body portion of a form so related to that of said prongs as to permit passage of the prongs therethrough to the rear surface of said body portion and requiring consecutive movements of the prongs in different linear directions for contact of the prongs with said circuit terminals.

2. The combination of an outlet box and plug therefor which comprises a casing, said casing having a front and rear face, circuit terminals in said casing mounted in depressed channel portions extending inwardly in the rear face of said casing, said depressed channel portions forming insulating wall members in the casing between circuit portions of opposite polarity, a separate opening extending through the casing from the front to the rear face thereof adjacent each of said terminals, providing an insulating casing portion between adjacent openings and forming an insulating wall member between each of said openings and the adjacent depressed channel portion, a plug member adapted to be mounted on the front face of said casing, said plug member having separated free conducting prongs with laterally extending terminal portions adapted to pass through said openings and to ride over said wall members into engagement with the corresponding circuit terminal, each of said openings having a portion of sufficient size to permit passage of the said laterally extending terminal portions through the casing to the rear face thereof and means for resiliently holding the plug member in place.

3. The combination of an outlet box and plug therefor which comprises a casing, circuit terminals of opposite polarity mounted on one side of the casing in depressed channel portions forming insulating wall members between portions of the said circuit of opposite polarity, a plug member having prongs with reversed end portions extending laterally so as to permit straddling said wall members to engage said terminals, said wall members serving as guides for said end portions in movement into and out of engagement with said terminals, said terminals being mounted in positions relative to each other so that contact of one of said end portions with one of said terminals occurs in advance of contact of the other end portion with the other of said terminals and openings in said casing to permit passage of said reversed end portions therethrough.

4. The combination of an outlet box and plug therefor which comprises a casing, circuit terminals of opposite polarity mounted in said casing in depressed channel portions forming insulating wall members between adjacent channel portions containing terminals of opposite polarity, a plug member having prongs with reversed ends extending laterally so as to permit straddling said wall members and to ride thereon as guides for the movement of said ends into engagement with said terminals, said terminals being mounted in

said casing relative to each other so that contact of one of said terminals with one of said ends occurs in advance of contact of the other of said terminals with the other of said ends, said terminals being of spring material and mounted in bowed position to provide spring pressure engagement of said ends with said terminals, the contacting portions with the said ends being so positioned in relation to the said terminals as to provide edge to surface contact and openings in said casing to permit passage of said prongs therethrough.

5. The combination of an outlet box and plug therefor which comprises a casing, circuit terminals in said casing mounted in depressed channel portions in the rear side of said casing, said channel portions serving as insulating wall members between portions of the circuit of opposite polarity, a plug member having prongs with reversed ends extending laterally so as to permit straddling said wall members into engagement with said terminals, and a pair of openings in said casing adjacent said terminals, said openings having an enlarged portion and a narrow portion, requiring consecutive movements of said ends in directions at substantially right angles to each other for passage thereof into contacting engagement with said terminals.

6. The combination of an outlet box and plug therefor which comprises a casing, circuit terminals in said casing mounted in depressed channel portions in the rear side of said casing, said channel portions serving as insulating wall members between portions of the circuit of opposite polarity, a plug member having prongs with reversed ends extending laterally outwardly so as to permit riding over said wall members as guides for movement of said ends into engagement with said terminals, said terminals being mounted in the rear face of said casing in positions therein relative to each other so that contact of one of said ends with one of said terminals occurs in advance of contact of the other end with the other of said terminals, a pair of openings of symmetrical form in said casing requiring passage of said ends through the casing in one direction, and passage of the said ends in another direction thereafter before the said ends may be brought into contact with said terminals and a face plate over said casing having a pair of openings registering with said openings of symmetrical form.

7. The combination of an outlet box and plug therefor which comprises a casing, circuit terminals within the casing, a bar member connected to two of said terminals having the same polarity, said two terminals and said bar being retained in a channel portion in said casing, a second bar member connected to two others of said terminals having opposite polarity from that of the first two terminals, said second bar member and said other terminals being retained in another channel portion separate from that of the first named channel portion and forming insulating wall members between portions of the

circuit of opposite polarity, a plug member having prongs with reversed ends adapted to straddle said wall members and to engage two terminals of opposite polarity, said terminals having the same polarity being mounted in said casing to positions relative to the terminals of opposite polarity to that in inserting the said plug to engage one pair of terminals of opposite polarity, contact of one of said ends with one of said pair of terminals takes place in advance of the contact of the other of said ends with the other of said pair of terminals and openings in the said casing requiring the passage of the said ends therethrough into contact with the said terminals in depressed position in the said channels, whereby a circuit through a pair of terminals cannot be made by the passage of a metal instrument through said openings but requires passage of an instrument having a reversed curve laterally in two directions and extending the proper distance laterally in order to simultaneously engage terminals of opposite polarity.

8. The combination of an outlet box and wall plug therefor which comprises a casing, circuit leads mounted on one side of said casing, a metal T-member mounted on the other face of said casing and connected to one of said leads, a U-shaped member mounted on said other face of the casing and connected to the other of said leads, branch terminals connected to said T-member of one polarity, branch terminals connected to said U-member of opposite polarity from that of said T-member, each of said members being mounted in depressions in the said other face of the said casing and providing insulating wall members between terminals of opposite polarity, openings through said casing having portions thereof at right angles to each other, one portion of said openings being of sufficient size to permit passage of the ends of the prongs of the wall plug to pass therethrough, a wall plug having prongs with reversed ends diverging outwardly and adapted to ride on said wall members as guides in passing into engagement with branch terminals of opposite polarity to complete a circuit therethrough, portions of said openings being parallel with said terminals to permit movement of said wall plug into seating engagement with said terminals and a face plate over the said one side of the casing having openings therein corresponding to the said openings through the casing and in registration therewith, whereby movement through the openings in the face plate and through the corresponding openings in the said casing to the said other face thereof by the said ends and a subsequent movement thereof at right angles thereto into registering contact with branch terminals of opposite polarity is required before completing the circuit between the said terminals, whereby interference with the circuit except by the use of the proper plug and proper directional movement thereof into circuit closing position is substantially prohibited.

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