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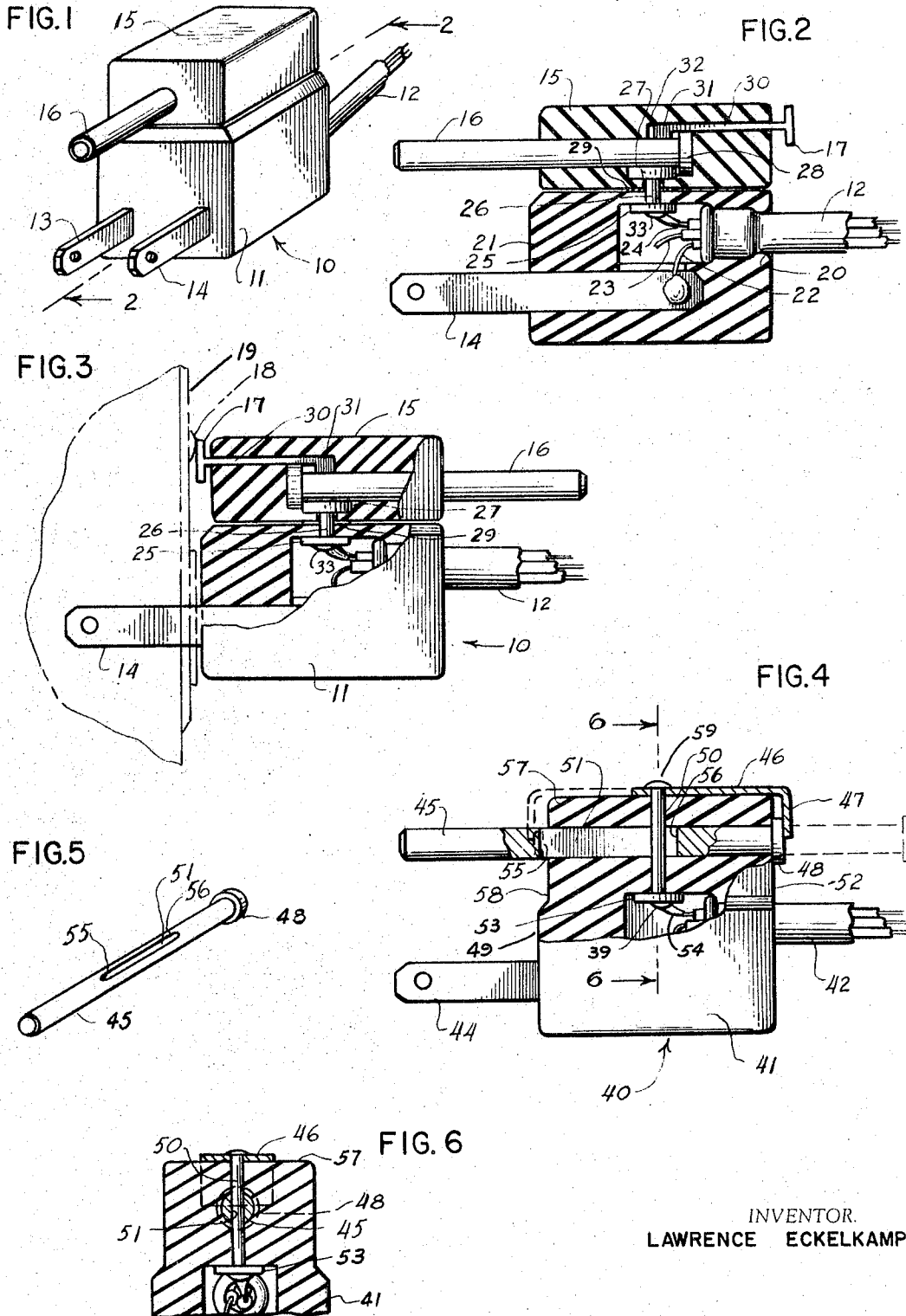
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3,299,390

ELECTRICAL CONNECTOR WITH GROUNDING TERMINAL

Filed Oct. 6, 1964

2 Sheets-Sheet 1



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FIG. 7

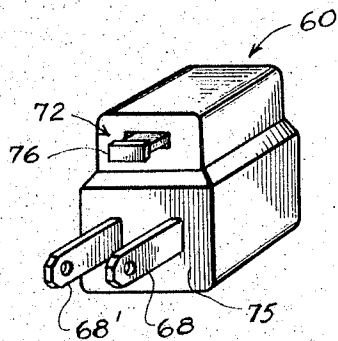


FIG. 8

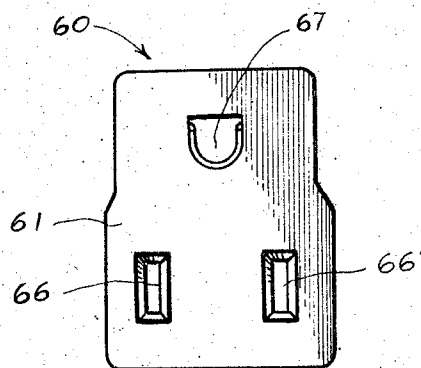
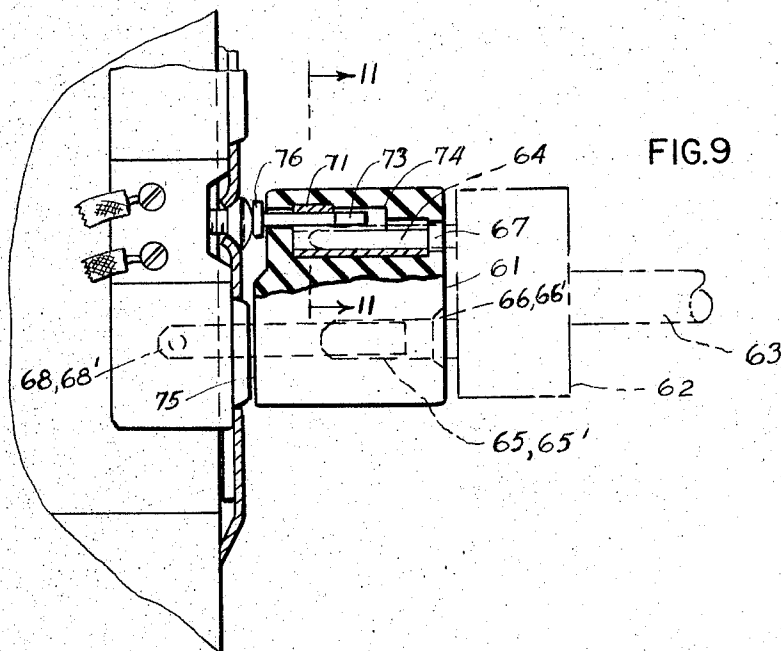
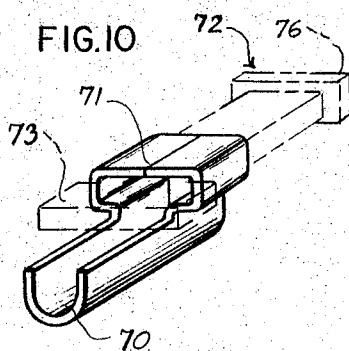
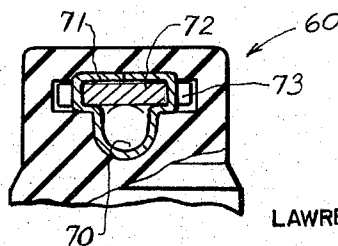


FIG. 11



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3,299,390 ELECTRICAL CONNECTOR WITH GROUNDING TERMINAL

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13 Claims. (Cl. 339-12)

This invention is directed to electric plugs for connecting three-wire systems to two-prong wall receptacles.

Many electrical appliances are provided with a separate ground connection for the metal parts. This ground connection is commonly made through a three conductor electric cable terminating in a male plug having three outwardly extending prongs. Two of the prongs are the usual current-carrying members. The third is a ground. To enable the use of such three-prong systems with conventional two-prong receptacles, a converter plug is marketed which has a female side for receiving the three prongs and a standard two-prong male plug on the opposite side. The ground is accomplished by a separate wire extending through the plug housing and terminating in a fork which is to be connected to the wall receptacle plate by removing the housing screw, inserting the fork connector under the screw, and then replacing the housing screw. Many users do not take the trouble to make the necessary connection thereby effectively nullifying the safety of the ground system.

It is an object of this invention to provide a plug which may be used with the three-wire system and other grounded receptacles and which also may be used with either a two-prong or a three-prong wall receptacle. It is another object of this invention to provide a convertible electrical plug which may be used with either the two-prong wall receptacles or the three-prong wall receptacles. It is still another object of this invention to provide a converter plug which receives the standard three-prong plug of the appliance and which may be inserted into standard two-prong female electrical receptacles and accomplishes the safety ground automatically.

Other objects and advantages of the invention will become apparent to those skilled in the art upon reading the following disclosure.

FIGURE 1 is a perspective view of a swivel top electric plug in the usual position for use with a three-prong wall receptacle.

FIGURE 2 is a cross-section taken along lines 2-2 of FIGURE 1.

FIGURE 3 is a broken away side elevation showing the swivel type ground plug in reverse position for use with a two-prong wall receptacle.

FIGURE 4 is a broken away side elevation of a modified embodiment of the plug.

FIGURE 5 is a perspective view of the ground prong of the plug shown in FIGURE 4.

FIGURE 6 is a partial section taken along 6-6 of FIGURE 4.

FIGURE 7 is a perspective view of the converter electric plug.

FIGURE 8 is a front elevation of the female side of the converter plug of FIGURE 7.

FIGURE 9 is a side elevation with partial section of said converter plug.

FIGURE 10 is a perspective view of the magnetic ground holding element of said converter plug, and

FIGURE 11 is a fragmentary section through line 11-11 of FIGURE 9.

In its broadest aspect, the invention provides electric plugs for electrically coupling a three wire system to a two-prong female wall receptacle utilizing a magnetic ground connection.

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In one of its aspects the invention provides electric plugs which are adapted to terminate a three wire cable having two current carrying wires and a ground wire, which are adapted to connect with standard three-prong female wall receptacles and also with standard two-prong female wall receptacles. This is accomplished by providing a ground prong which may be used with the three-prong receptacle, and which is moved out of position for use with a two-prong receptacle. A magnetic ground plate is provided for ground contact when used with the two-prong female wall receptacle. Two embodiments of this aspect of the invention are illustrated in FIGURES 1-3 and FIGURES 4-6 respectively. The term "three wire systems" include the standard three wire (one a ground) cables as well as equivalent systems where the ground may be another component than a wire, e.g. the cable sheath.

Reference is made to the drawings and particularly FIGURES 1, 2 and 3 which illustrate the swivel top convertible plug 10. The plug 10 has a housing 11 and ingress means 20 through which the three wire cable 12 enters the plug housing 11. Electrical contact is made with wall receptacle through the two outwardly extending current prongs 13 and 14. The upper portion of the housing is a swivel top 15 having an outwardly extending ground prong 16 and an outwardly extending magnetic ground plate 17 extending in a direction opposite to prong 16. For connection with the three-prong female wall receptacles, ground 16 extends in the same direction as do grounds 13 and 14, as illustrated in FIGURES 1 and 2. For use with standard two prong wall receptacles, swivel top 15 is rotated 180° removing prong 16 from the male face 21 of plug 10. A ground connection is made between the two-prong female wall receptacle and the plug 10 through contact between the magnetic ground plate 17 with metal screw 18 on the wall receptacle housing plate 19. Alternatively, where plate 19 is metal, contact may be made between said housing plate 19 and ground 17 directly.

FIGURES 2 and 3 illustrate the internal connections and mechanism of a swivel top convertible plug. In the interior of the plug housing, cable 12 terminates in three outwardly extending wires, 22, 23 and 24. Current carrying wires 22 and 23 are connected to internal extensions of prongs 13 and 14 respectively. The ground wire 24 is electrically connected to the head 33 of pivot pin 26. Pivot pin 26 is stationed in housing 11 by plate 25. Pivot pin 26 terminates in and makes electrical contact with plate 27 which in turn is in electrical contact with ground prong 16. The swivel top 15 is spaced from the main housing 11 of the plug by a spacer 29 around pivot pin 26. The magnetic ground plate 17 is supported by rod 30 which terminates in a shoulder 31. To facilitate contact between ground plate 17 and screw 18 which may protrude to different heights from the plate face, adjustment in the amount of extension of the ground 17 is provided by having internal cavity 32 in swivel top 15 greater in size than necessary to contain rod 30 and shoulder 32. The maximum extension is limited by protruding shoulder 31 of rod 30. Electrical contact with the ground is made by contact between shoulder 31 and rod 30, and shoulder 28 on the extension of prong 16, respectively. Alternatively, the magnetic ground plate may be external of the housing, similar to the ground illustrated in FIGURE 4, but without the rotatable feature.

Another embodiment of the electric plug utilizes a retractable prong instead of a swivel top, as illustrated in FIGURES 4, 5 and 6. The plug 40 has a housing 41 which receives the three wire cable 42. Electric contact is made with the wall receptacle through the two outwardly extending current-carrying prongs 44 which are

connected to the current carrying wires of cable 42. The upper portion of the plug housing contains ground prong 45 extending outwardly in the same direction as the current carrying prongs and properly spaced to fit three-prong female wall receptacles. The ground prong 45 extends through the upper part of the housing 41 terminating in a protruding shoulder 48 which rests on the rear face 52 of the plug housing. When the ground prong is in the extended position, as shown in FIGURE 4, it is held rigidly in place by magnetic ground plate 47 which is connected to arm 46. Arm 46 is connected to pivot rod 50 and is rotatable about said rod. To use the convertible plug 40 with a two-prong female wall receptacle, arm 46 is rotated sufficiently so that the shoulder 48 is clear of plate 47. Retractable ground plug 45 is moved in the direction of face 52 whereby the outwardly extended portion of said ground prong 45 is retracted into the housing and the rear portion of said ground prong, terminating in shoulder 48, projects outwardly from the rear face 52. Arm 46 terminating in ground plate 47 is then further rotated until it is in a position 180° from its original position. In this rotated position, magnetic ground plate 47 is adapted to contact the metal face of a wall receptacle, or a metal screw on the wall receptacle face. To better position magnetic ground plate 47 and also the retracted ground prong 45, the upper portion 58 of the male face 49 of the plug 40 is recessed. Controlled lateral movement of ground prong 45 is provided by slot 51 extending through said prong. Pivot rod 50 is formed so that it fits through slot 51. The maximum movement of prong 45 is that in which pivot rod 50 is positioned so that it touches the front 55 or the rear 56 of said slot 51, respectively. The shape of pivot rod 50 is conformed to slot 51 and proportioned so that there is sliding contact between rod 50 and the internal side walls of ground 45 which define slot 51.

FIGURES 4 and 6 illustrate the internal connections in plug 40. Cable 42 terminates in the interior of the plug in three outwardly extending wires. The two current carrying wires, not illustrated, are connected to internal extensions of current carrying prongs 44. The ground wire 54 is electrically connected to the head 39 of pivot rod 50. Pivot rod 50 is positioned in the housing 41 by plate 53. Pivot rod 50 makes electrical contact with ground prong 45 by sliding contact with the internal sides of said ground which define the slot 51. Pivot rod 50 extends through the top face 57 of plug 40. Pivot rod 50 terminates in a positioning head 59. Electrical contact between pivot rod 50 and ground face 47 is provided from pivot rod 50 to arm 46.

Another embodiment of my invention provides a converter electric plug for connecting an electric cable terminating in a three-prong male plug, with a standard two-prong female wall receptacle, using a magnetic ground contact in place of a standard ground prong. Particular reference is made to FIGURES 7, 8, 9, 10 and 11 depicting said converter plug 60 having a female face 61 adapted to receive the three prongs of male plug 62 which are attached to a three wire-containing cord 63. This three-prong male plug 62 has a ground prong 64 in electrical contact with the ground wire, and two prongs 65 and 65' which are current-carrying members. The converter plug 60 is adapted to receive the two prongs 65 and 65' in female receptors 66 and 66'. The ground prong 64 is received in female receptor 67.

The receptors 66 and 66' contain means for electrically contacting prongs 65 and 65'. Said means terminate as outwardly extending prongs 68 and 68' from the male plug side 75 of converter plug 60.

The ground prong 64 when inserted into plug 60 comes into sliding and electrical contact with channel 70 which terminates in an upwardly extending offset closure 71. Closure 71 is adapted to enclose and be in sliding contact with ground means 72. Magnetic ground means 72 terminates in a rear T-section 73 which is of larger size than

closure 71 thereby preventing magnetic ground 72 from moving through closure 71. Ground 72 is prevented from disengaging from closure 71 in the opposite direction by the internal conformation of the converter plug and specifically by the rear wall of cavity 74. The relative positioning and proportions of ground 72, channel 70, and prong 64, are such that when prong 64 is fully inserted in plug 60, it is in electrical contact with both channel 70 and a portion of ground 72. Magnetic ground 72 extends outwardly through side 75 and terminates in face 76 which will usually be larger in area than would a cross-section through ground 72. Face 76 is adapted to make electrical contact with a metal plate or a metal housing screw on said plate, immediately adjacent the two female receptacles. To provide for use with wall receptacles of somewhat differing design, versatility is provided by face 76 having sufficient surface to contact screws in differing locations. The sliding contact between offset closure 71 and magnetic ground 72 provides for a ground connection which automatically adjusts to provide the extension required. The sliding magnetic ground may be replaced by a ground structure external of the housing, such as the ground plate and arm (fixed in the embodiment) illustrated in FIGURE 4.

Although the invention has been described in terms of specific embodiments, the claims include variations that come within the spirit and scope thereof.

I claim:

1. An electric plug having an outwardly extending magnetic ground connector plate and two outwardly extending prongs, said plug providing an electrical coupling means between (a) a three wire system having two current carrying wires and a ground and (b) a wall receptacle adapted to receive only two-prong male plugs; said plug comprising a plug housing having

(i) means for electrically connecting said two wires and said ground to three internal connections in said plug housing,

(ii) means for connecting each of said outwardly extending prongs to a current carrying connection in said housing, and

(iii) means in said housing for making electrical contact between the ground connection in said housing and said outwardly extending magnetic connector plate.

2. A swivel top electric plug adapted to connect a three wire cable having two current carrying wires and a ground wire, with two prong female wall receptacles and also three prong wall receptacles, said plug being electrically connected with said three wire cable, said plug consisting of a swivel top and a base, said base having

(i) two outwardly extending current carrying prongs, each of said prongs being electrically connected with one of said current carrying wires,

(ii) rotatable means for connecting said base housing with said swivel top, said swivel top having

(a) a ground prong extending outwardly from one side, and

(b) a magnetic ground plate extending outwardly from another side, said ground prong and said plate being in electrical contact with said ground wire.

3. The electric plug of claim 2 wherein said magnetic ground plate extends outwardly in a direction opposite that of said ground prong.

4. A swivel top electric plug adapted to connect a three wire cable having two current carrying wires and a ground wire, with two-prong female wall receptacles and also with three-prong female wall receptacles, said plug comprising a swivel top, and a base housing, said base housing having

(i) means for introducing said three wire cable into said housing,

(ii) two outwardly extending current carrying prongs,

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each of said prongs being electrically connected with one of said current carrying wires, and

- (iii) rotatable means for connecting said base housing with said swivel top and means for electrically connecting said ground wire with a ground connection in said swivel top; said swivel top having a ground prong extending outwardly through one side, and a another side, said ground prong and also said magnetic ground plate being electrically connected to said ground connection.

5. The electric plug of claim 4 wherein said rotatable means for connecting the swivel top to the base housing is also the electrical means for connecting said ground wire to said ground prong.

6. The electric plug of claim 5 wherein said magnetic ground plate extends outwardly in a direction opposite that of said ground prong.

7. An electric plug adapted to connect a three wire cable having two current carrying wires and a ground wire, with two-prong female wall receptacles, and said plug comprising a housing having

- (i) means for introducing said three wire cable into said housing,
 (ii) two outwardly extending current carrying prongs, each of said prongs being electrically connected with one of said current carrying wires,
 (iii) a retractable ground prong extending outwardly parallel to said current carrying prongs; in electrical contact with said ground wire; and means for retracting said extended ground prong into said housing, and
 (iv) a swivel magnetic ground plate in electrical contact with said ground wire and rotatable to the male face of said plug when said ground prong is in the retracted position.

8. The electric plug of claim 7 wherein the retractable ground prong extends through the housing, and wherein the magnetic ground plate is positioned so that when it is rotated to the housing face opposite the male face, it engages the rear of the retractable ground prong.

9. The electric plug of claim 7 wherein a rod electrically connects said ground wire to said retractable ground prong and also to said magnetic ground plate.

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10. The electric plug of claim 9 wherein the inwardly extending portion of said ground prong has a slotted aperture, and said rod extends through said aperture.

11. An electric plug providing an electrical coupling means between a three-pronged male electrical plug, and a wall receptacle adapted to receive only two-prong male plugs comprising

- (i) a housing having female means for receiving a three-prong male plug, one of said prongs being a ground and the other two prongs being current-carrying members,
 (ii) internal means in said connector plug for electrically connecting each of said current-carrying members to current carrying prong extending outwardly from said converter plug, to form a standard two-prong male connection, and
 (iii) internal means in said converter plug for electrically connecting said ground prong with an outwardly extending magnetic connector plate adjacent said current-carrying prongs.

12. The electric plug of claim 11 wherein said means for connecting said ground prong with said magnetic connector plate comprises a channel terminating, in the direction of the male face of said electric plug, in an upwardly extending offset closure adapted to enclose and be in sliding contact with an inwardly extending support for said magnetic connector plate.

13. The electric plug of claim 12 wherein said inwardly extending support for said magnetic connector plate terminates in a T-section adapted to engage said upwardly extending offset closure of said channel.

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