March 16, 1965 G. E. ANDERSON 3,173,731

GROUNDING WIRING DEVICE

Filed Dec. 17, 1962 2 Sheets-Sheet 1

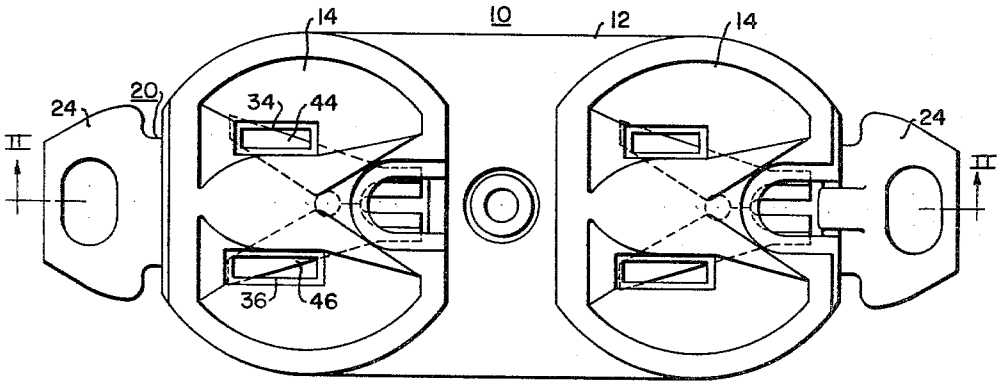


Fig. 1

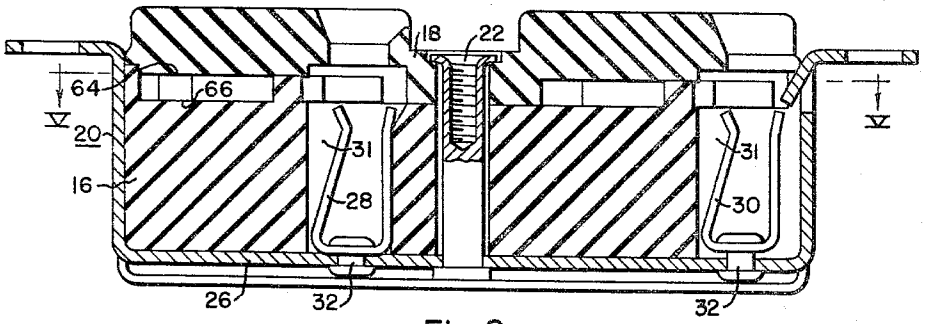


Fig. 2

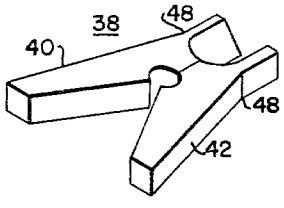


Fig. 3

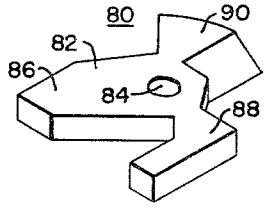


Fig. 4

WITNESSES

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GROUNDING WIRING DEVICE

Filed Dec. 17, 1962 2 Sheets-Sheet 2

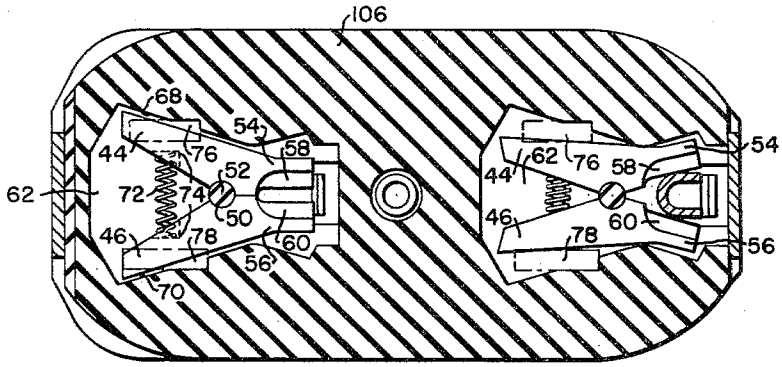


Fig. 5

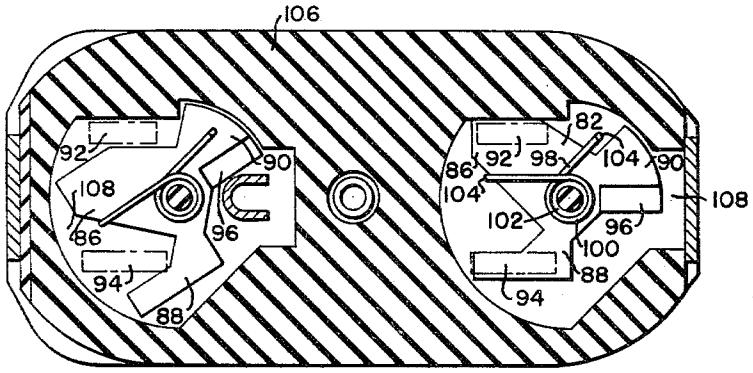


Fig. 6

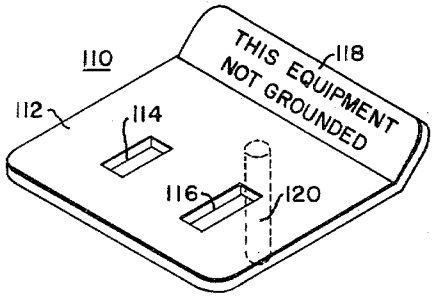


Fig. 7

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3,173,731

GROUNDING WIRING DEVICE

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3 Claims. (Cl. 339—14)

The present invention relates to grounding wiring devices and more particularly to grounding outlets in which a plug can be inserted only if it is provided with a grounding prong or, if the plug doesn't have such a prong, then only if an adapter, which may incorporate indicia of such use, is employed therewith.

The primary purpose of using a grounding circuit through a wiring device is to provide safety against shock to the user of apparatus which is energized through the wiring device. With increasing domestic and business use of appliances and the like and with increasing safety consciousness on the part of underwriters as well as engineers and members of the public in general, it is becoming more and more important that a grounding wiring device be operative to receive an apparatus plug only if the apparatus plug is provided with a grounding prong or, if not so provided, then only if the aparatus user has specific notice of the fact that the apparatus is ungrounded even though it is plugged into a grounding wiring device. Thus, in the first instance, the user obtains the safety of ground protection because the grounding device has accepted the plug. In the second instance, although the grounding device would normally reject the non-grounding plug (namely, one which does not have a grounding prong), an adapter can be used to provide plug acceptance and safely render obvious the fact that grounding protection is absent.

In accordance with the broad principles of the present invention, a grounding wiring device comprises an insulative housing in which at least a pair of power contacts and a grounding contact are supported so as to be engageable with respective plug power and grounding prongs inserted through respective slots aligned with the device contacts. Pivotable insulative means are spring seated in the housing and are provided with one or more barrier portions in or in alignment with one or more of the power prong slots to prevent entry of the plug power prongs unless the plug also has a grounding prong, in which case the pivotable means respond to plug grounding prong insertion with pivotal movement of the barrier portion or portions away from the power prong slots so as to free the latter for simultaneous plug power prong insertion. The pivotal response is based on camming action induced by the plug grounding prong against the pivotable means.

If it is desired to use a non-grounding plug (this terminology was previously defined) in the grounding device, then an adapter having a prong-like projection insertable through a device grounding slot can be employed to maintain the pivotable means normally in its open position, that is in the position which permits insertion of the plug power prongs. Further, the adapter can be provided with a body or front facing which provides indicia of the fact that although a non-grounding plug can be inserted in the grounding device, because of the presence of the adapter, such plug would not provide ground protection.

It is therefore an object of the invention to provide a novel and efficient grounding wiring device which receives an apparatus plug only if the apparatus plug is provided with a grounding prong.

An additional object of the invention is to provide a novel and efficient grounding wiring device wherein safety

is provided against insertion of foreign objects into the power prong slots of the device when a plug is not inserted therein.

It is a further object of the invention to provide a novel and efficient grounding wiring device wherein pivotable insulative means are provided with one or more barrier portions in or in alignment with one or more of the wiring device power prong slots so as to prevent entry of the plug power prongs unless the plug also has a grounding prong in which case the pivotable means respond to grounding prong insertion with movement of the barrier portion or portions away from the power prong slots so as to free the latter for power prong insertion.

An additional object of the invention is to provide a novel and efficient grounding wiring device wherein pivotable insulative means comprising a pair of juxtaposed spring seated insulative members prevents plug prong entry unless the plug has a grounding prong.

A further object of the invention is to provide a novel and efficient grounding wiring device wherein the extent of pivotal movement of the plug prong barrier portions of the pivotable insulative means is greater than that of a grounding prong cam portion of pivotable insulative means.

These and other objects of the invention will become more apparent upon consideration of the following detailed description along with the attached drawings, in which:

FIGURE 1 is a top plan view of a grounding wiring device constructed in accordance with the principles of the invention;

FIG. 2 shows a longitudinal section of the grounding wiring device taken along the reference line II—II of FIG. 1;

FIG. 3 shows a perspective view of one embodiment of pivotable insulative means employed in the grounding wiring device of FIG. 1;

FIG. 4 shows a perspective view of another embodiment of pivotable insulative means employed in the grounding wiring device of FIG. 1;

FIG. 5 shows a cross-section of the grounding wiring device taken along the reference line V—V of FIG. 2 and showing the pivotable insulative means of FIG. 3 in place;

FIG. 6 shows a view similar to that shown in FIG. 5 but it shows the pivotable insulative means of FIG. 4 in place; and

FIG. 7 shows a perspective view of an adapter usable with the grounding wiring device of FIG. 1.

More specifically, there is shown in FIG. 1 a grounding wiring device **10** having an insulative housing **12** in one or more parts. In this case, the grounding wiring device **10** is in the form of the grounding outlet which is provided with a pair of faced portions **14** for receipt of respective plugs (not shown). However, other wiring device forms, such as a combination switch outlet, a single outlet receptacle, or a cord connector (where portability perhaps places more importance on safety), can incorporate the invention. Further, although the insulative housing **12** is shown in this embodiment as comprising a base member **16** and a cover member **18** on which the faced portions **14** are provided, a single integral housing or a housing having more parts can be employed.

A mounting strap or yoke member **20** is employed in this instance to hold the base and cover members **16** and **18** in secured relation through the cooperation of securing means **22**. Further, the mounting member **20** is provided with respective end ears **24** for the purpose of mounting the wiring device **10** in an outlet box (not shown). As observed in FIG. 2, the mounting member **20** wraps around the back of the wiring device **10** to pro-

vide a strap portion 26 to which respective grounding contacts 28 and 30 are secured by any suitable means such as respective rivets 32. In other applications of the invention, the mounting member 20 can be provided in other forms, for example the strap portion 26 can be omitted and instead the mounting member 20 can extend substantially straight across the wiring device 10 between the mounting ears 24.

A pair of elongated conductive terminals or contacts (not shown) are suitably supported in the housing 12 or base member 16 so that respective prong engaging arms are disposed in alignment with plug power prong slots 34 and 36 through the faced portions 14. The grounding contacts 28 and 30, of course, are disposed in the housing 10 or base member 16 so as to be free from short circuiting with the power contacts (not shown), for example in grounding contact pockets 31.

With the structure so far described, it is clear that the power prongs of a non-grounding plug could be inserted through the prong slots 34 and 36 of either faced portion 14 for the purpose of obtaining power from the power contacts in the wiring device 10. In such a case, a user does not have ground protection even though the plug is connected to a grounding wiring device. In the alternate situation, where a plug having a grounding prong is inserted in the wiring device 10, there is no such danger since then the grounding plug does in fact provide ground protection.

In order to avoid the risk associated with the former circumstances, one embodiment (FIGS. 1–3 and 5) of the present invention cooperatively provides in a grounding wiring device pivotable insulative means 38 comprising a pair of insulative arm members 40 and 42 having respective portions 44 and 46 disposed in or in alignment with the power prong slots 34 and 36 so as to prevent the entry of plug power prongs unless a grounding prong is simultaneously inserted into the grounding pocket 31 or an equivalent of the grounding prong is maintained in the grounding pocket 31. It is noted, however, that only one of the pivotable means portions 44 and 46 may be employed in one of the slots 34 or 36, and, if this is the case, it is preferable that the slot 34 be blocked by the portion 44 and that the slot 36 (neutral) then be left open without the use of the pivotable means portion 46 since the power contact aligned with the latter enlarged slot is normally itself grounded through the "white" electric lead or conductor to the system ground of the power circuit. The fact that the insulative means 38 are pivotable renders it particularly adaptable to use in cord connectors and other devices of limited circular cross-section.

In this embodiment, the insulative arms 40 and 42 pivot in a plane generally perpendicular to the plug prong insertion path or paths. Each arm member 40 or 42 can be shaped as desired but preferably is generally elongated and angled or elbowed as indicated by the reference character 48 so as to facilitate disposition of the arm portions 44 and 46 in alignment with the power prong slots 34 and 36. Each arm 40 or 42 is further provided with an arcuately surfaced pivot portion 50 which is pivotally supported against housing post 52 (or other suitable pivot post such as the shank of a fastener or screw) for pivotal movement of the arms 40 and 42 in the manner previously described. Respective end portions 54 and 56 of the arms 40 and 42 are provided with confronting cam surfaces 58 and 60 which are simultaneously cammed by an inserted grounding prong so as to produce opening pivotal movement of the arms 40 and 42.

Suitable supporting means are provided for the pivotable insulative means 38 or arms 40 and 42 so as to enable the latter to move as described when properly actuated. Thus, the housing 12 or the base and cover members 14 and 16 are molded with a suitable interior contour so as to provide respective pockets 62 for the respective pairs of arm members 40 and 42. Further, each pair of arm members 40 and 42 are substantially

held against forward movement by a rearwardly facing wall surface 64 of the cover member 18 and is similarly held against rearward movement by a forward facing wall surface 66 of the base member 16. Arcuately shaped structural ribs (not shown) can be provided on the surfaces 64 and 66 (or on the arm members 40 and 42) to reduce friction. Preferably, each arm 40 or 42 is also limited in its closing pivotal movement by means of side wall surfaces 68 and 70 respectively. The supporting means also include the housing post 52 and the arcuate arm pivotal portions 50 which provide for pivotal insulative member movement in the manner already described.

Spring means (in this instance a coil spring 72) are seated in confronting pockets 74 of the arms 40 and 42 and extended therebetween so as normally to urge the arms 40 and 42 pivotally about the housing post 52 into their respective slot closing positions. Alternately, for example, a separate coil spring can be used for each arm 40 or 42. At the same time, the arm cam surfaces 58 and 60 are urged toward each other into the grounding prong insertion path in the grounding contact pocket 31.

In a grounding plug, the grounding prong normally projects outwardly a greater distance, in the neighborhood of ⅛" in this example, than do the power prongs. Therefore, when a grounding plug is first inserted into the wiring device 10, the grounding prong first cams against pivotal responding means or camming surfaces 58 and 60 on the arms 40 and 42 so as to urge the arms 40 and 42 pivotally through the pocket 62 away from the grounding contact pocket 31 and against the return force of the spring means 72. When the grounding prong has advanced inwardly a given amount, the arm barrier portions 44 and 46 will have advanced toward each other and away from the slots 34 and 36 so that the plug power prongs can begin to be inserted through the slots 34 and 36. If desired, respective cam surfaces (not shown) can be provided on the barrier portions 44 and 46 so as to provide for additional opening camming action by the plug power prongs on such surfaces. However, if, as preferred, the distance of the barrier portions 44 and 46 from the pivot point (post 52) is sufficiently greater than that of the cam surfaces 58 and 60, the barrier portions 44 and 46 undergo amplified movement and the barrier cam surfaces referred to in the previous sentence become unnecessary in most applications.

The relative amount of camming provided by the surfaces 58 and 60 is dependent upon the angle at which the camming surfaces 58 and 60 are provided with the rear side of the arms 40 and 42 and upon the spacing between the surfaces 58 and 60. In particular, as this angle becomes smaller, the surfaces 58 and 60 become longer and with a given spacing therebetween provide (within limits) more camming action. It is also noted that it is preferable that the barrier portions 44 and 46 substantially close all or nearly all of the cross-sectional area of the slots 34 and 36, but in some instances it may be necessary to leave a small portion 76 or 78 of this area open in the interest of obtaining desired camming results in a given wiring device structure.

Once an inserted plug is removed from the wiring device 10, spring action produced by the spring means 72 urges the arms 40 and 42 to pivot to their original positions and a new insertion of a grounding plug can again be accomplished in the manner described. However, a non-grounding plug, namely one without a grounding prong, cannot be inserted into the wiring device 10 because of the blocking or closing action of the barrier portion 44 or barrier portions 44 and 46 and because any removal of the blocking portions 44 and 46 from blocking or closing position into an open position can only be accomplished by means of at least a given amount of initial camming action against the grounding prong camming surfaces 58 and 60 in the grounding contact pocket 31. Additionally, the barrier portions 44 and 46 provide added safety in that various foreign objects

normally cannot be inserted through the power prong slot **34** or slots **34** and **36** into engagement with the wiring device contacts.

In FIG. 6 there is shown another embodiment of the invention similar to the embodiment just described (and therefore identical reference characters are used for like parts), but in this instance pivotable insulative means **80** (FIG. 4) comprise a single insulative member **82** having an opening **84** in which the housing pivot post **52** is located so as to support the member **82** for pivotal movement. The pivotable member **82** is provided with three arms **86**, **88** and **90** which are respectively provided with barrier portions **92** and **94** normally closing the plug power prong slots **34** and **36** and cam portion **96** normally disposed in the grounding prong entry path in the grounding contact packet **31**. Spring means, in this case a hairspring **98**, are again employed to urge the pivotable member **82** into its normal slot closing position. As one alternate example, a single suitably supported coil spring can be employed. The hairspring **98** is provided with a clamping loop **100** which is disposed against flange **102** projecting outwardly from the rear side of the pivotable member **82** and with respective end fingers **104** which are disposed in respective housing openings (not shown) so as to normally hold the member **82** in slot-closing position.

Housing **106** of the embodiment of the invention in FIG. 6 differs from the housing **12** of the embodiment of the invention in FIG. 1 so as to provide a pocket **108** for pivotal movement of each pivotable member **82** in a plane generally perpendicular to the insertional path of the plug prongs. Another difference also lies in the provision of the previously noted openings (not shown) for reception of the hairspring fingers **104**.

Operationally, the pivotable member **82** provides results substantially similar to those provided by the pivotable members **40** and **42** of the embodiment of the invention shown in FIGS. 1–3 and FIG. 5. Thus, insertion of a grounding prong through the device grounding slot into the grounding pocket **31** produces camming action against the camming surface **96** so as to produce unitary pivotal movement of the pivotable member **82**. The barrier portions **92** and **94** are then displaced from alignment with the slots **34** and **36** so as to free the latter for insertion of the plug power prongs. If desired, camming surfaces (not shown) can also be provided on the barrier portions **92** and **94** so as to provide additional camming action by the plug power prongs once camming action has been initiated against the camming surface **96** by the plug grounding prong. However, similar to the previous case, if the length of the arms **86** and **88** is sufficiently greater than the length of the arm **90**, the barrier portions **92** and **94** undergo amplified movement and the added camming surfaces just referred to become unnecessary in most applications.

If it is desired in either of the described embodiments of the invention to render the grounding wiring device usable with non-grounding plugs, then a separate two slotted and three pronged brightly colored adapting device (not shown) can be used, or an adapter **110** (FIG. 7) can be employed therewith. In this case, the adapter **110** is provided with a thin overlay portion **112** (for example $\frac{1}{64}$ inch) with slots **114** and **116** therethrough so as to be locatable against the front surface of either faced portion **14**. The adapter slots **114** and **116** then are aligned with the faced portions slots **34** and **36**. If desired, an end flap **118** extending from the overlay portion **112** can be provided to facilitate handling of the adapter **110**. The essential functioning part of the adapter **110** is a prong-like projection **120** which extends rearwardly thereof for insertion in the grounding contact pocket **31** and preferably for engagement with the grounding contact **28** or **30** thereby to hold the pivotable arms **40** and **42** or the pivotable member **82** normally in open position, namely the position where the barrier portions **44** and **46** or **92** and **94** free the slots **34** and **36** for insertion of plug power prongs. One advantage of using a relatively large sized overlay portion **112** as a part of the adapter **110** is the fact that it can be provided with a bright color or it can be provided, as shown, with printed material thereon denoting the fact that a plug inserted therethrough is ungrounded. Suitable strength for the adapter **80** can be provided through the use of a non-brittle insulative material such as nylon. For similar reasons, nylon can be employed for the pivotable arms **40** and **42** or the pivotable member **82**.

The foregoing description has been presented only to illustrate the invention. Accordingly, it is desired that the invention be not limited by the embodiments described but, rather, that it be accorded an interpretation consistent with the scope and spirit of its broad principles.

What is claimed is:

1. A grounding wiring device comprising an insulative housing having a pair of power prong slots and a grounding prong slot in one face wall thereof for insertion of plug power prongs and a plug grounding prong into engagement with respective aligned power and grounding contacts supported in the wiring device, insulative means pivotable in a plane generally perpendicular to the prong insertion direction, said insulative means including a pair of juxtaposed elongated insulative members having respective barrier portions normally located to block insertion of power prongs through said power prong slots, said insulative members also having respective confronting but spaced cam portions normally located in alignment with said grounding prong slot and disposed to engage said grounding prong upon insertional movement of the latter therebetween so as to urge said barrier portions pivotally out of their normal blocking positions and to open said power prong slots, and means for supporting said insulative members for operation in the manner described, said supporting means including a pivot element disposed between said cam portions and said barrier portions and about which respective confronting arcuately surfaced portions of said insulative members pivot, said supporting means also including a housing surface which limits closing pivotal movement of each insulative member.

2. A grounding wiring device comprising an insulative housing having a pair of power prong slots and a grounding prong slot in one face wall thereof for insertion of plug power prongs and a plug grounding prong into engagement with respective aligned power and grounding contacts supported in the wiring device, insulative means pivotable in a plane generally perpendicular to the prong insertion direction, said insulative means including a pair of juxtaposed elongated insulative members having respective barrier portions normally located to block insertion of power prongs through said power prong slots, said insulative members also having respective confronting but spaced cam portions normally located in alignment with said grounding prong slot and disposed to engage said grounding prong upon insertional movement of the latter therebetween so as to urge said barrier portions pivotally out of their normal blocking positions and to open said power prong slots, and means for supporting said insulative members for operation in the manner described, said supporting means including a coil spring engaging and extending between said insulative members so as normally to urge the latter into their blocking positions, said supporting means also including a pivot element disposed between said cam portions and said barrier portions and about which respective confronting arcuately surfaced portions of said insulative members pivot.

3. A grounding wiring device comprising an insulative housing having a pair of power prong slots and a grounding prong slot in one face wall thereof for insertion of plug power prongs and a plug grounding prong into engagement with respective aligned power and grounding contacts supported in the wiring device, insulative means pivotable in a plane generally perpendicular to the prong

insertion direction, said insulative means including a pair of juxtaposed elongated insulative members having respective barrier portions normally located to block insertion of power prongs through said power prong slots, said insulative members also having respective confronting but spaced cam portions normally located in alignment with said grounding prong slot and disposed to engage said grounding prong upon insertional movement of the latter therebetween so as to urge said barrier portions pivotally out of their normal blocking positions and to open said power prong slots, and means for supporting said insulative members for operation in the manner described, said supporting means including a pivot element disposed between said cam portions and said barrier portions and about which respective confronting arcuately surfaced portions of said insulative members pivot, said supporting means also including a housing surface which limits closing pivot movement of each insulative member, the distance of said barrier portions from said arcuately surfaced portions being greater than the distance of said cam portions from said arcuately surfaced portions so as to provide for amplified opening movement of said barrier portions.

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