Sept. 14, 1965 C. M. SMITH 3,206,705

GROUNDING WIRING DEVICE

Filed April 12, 1963 2 Sheets-Sheet 1

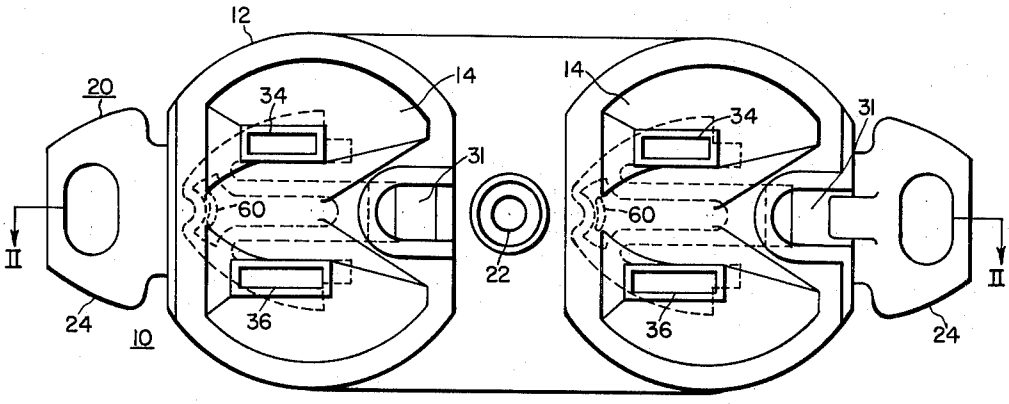


Fig.1.

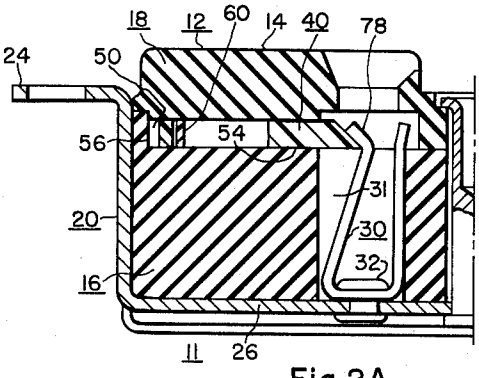


Fig.2A.

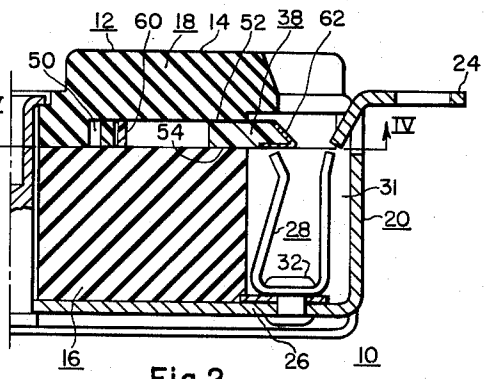


Fig.2.

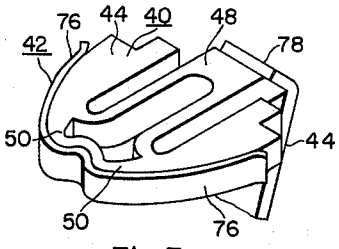


Fig.3.

WITNESSES

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Sept. 14, 1965 C. M. SMITH 3,206,705

GROUNDING WIRING DEVICE

Filed April 12, 1963 2 Sheets-Sheet 2

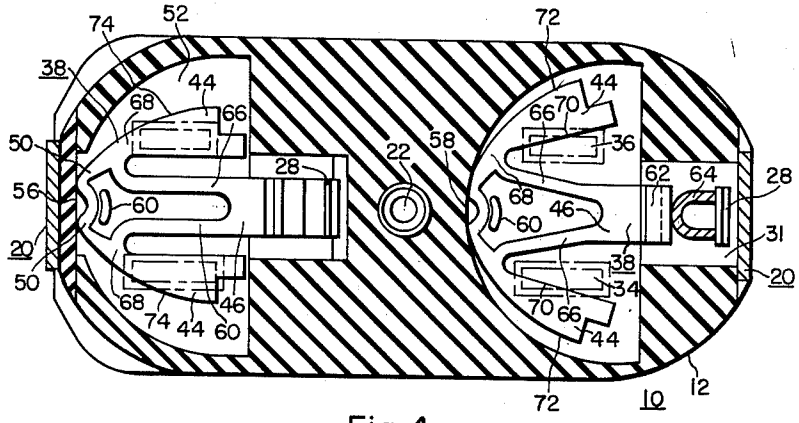


Fig. 4.

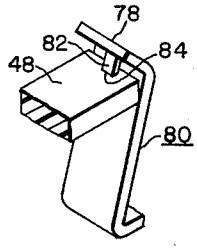


Fig.5.

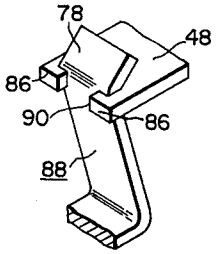


Fig.6.

United States Patent Office 3,206,705 Patented Sept. 14, 1965

3,206,705

GROUNDING WIRING DEVICE

Clarence M. Smith, Trumbull, Conn., assignor, by mesne assignments, to Westinghouse Electric Corporation, a corporation of Pennsylvania

Filed Apr. 12, 1963, Ser. No. 272,668
8 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 does not 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 apparatus 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 simply 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. Spring supported flexible insulative barrier means or resilient flexible insulative barrier means are provided with one or more barrier portions thereof in alignment with one or more of the 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 barrier means respond to plug grounding prong insertion with flexing movement of the barrier portion or portions outwardly from the power prong slots so as to free the latter for simultaneous plug power prong insertion. Thus, in obtaining the "slot open" condition, the need for unitary movement of a plug blocking or barrier member and the need for added device interior space for such unitary movement are avoided. 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 the device grounding slot can be employed to maintain the movable barrier means normally in its open position, that is in the position which permits insertion of the plug power prongs.

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

Another object of the invention is to provide a grounding wiring device wherein blocking action against plug power blade entry is produced by resilient flexible means which requires relatively little space for operation since it need only be flexed by the plug grounding blade, as opposed to moved unitarily, in providing for grounding plug insertion.

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 having flexible prong barrier means and constructed in accordance with the principles of the invention;

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

FIG. 2A shows a part of a longitudinal section of the grounding wiring device taken along the reference line II—II of FIG. 1 wherein flexible barrier means structure is provided in modified form;

FIG. 3 shows a perspective view of a spring supported flexible insulative barrier member employed in the grounding wiring device of FIG. 2A;

FIG. 4 shows a cross section of the grounding wiring device of FIG. 1 taken along the reference line IV—IV of FIG. 2;

FIGS. 5 and 6 show respective perspective views of modified support arrangements for the flexible member of FIG. 3.

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 a 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 (when 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 provide a strap portion **26** to which respective grounding contacts **28** are secured by any suitable means such as respective rivets **32**.

In another embodiment of the invention shown in FIG. 2A, wherein like reference characters are employed for like parts, the mounting member **20** also wraps around the back of the wiring device **10** to provide a strap portion **26** to which respective grounding contacts **30** are secured by any suitable means such as the 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** or **30** of the respective embodiments of the invention shown in FIG. 2 and FIG. 2A 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 or 11. 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 into the wiring device 10 or 11, 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, the present invention cooperatively provides in a grounding wiring device flexible insulative barrier means disposed in relation to 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. In the illustrative case of the wiring device 10, the flexible barrier means are provided in the form of an insulative barrier member 38 (FIG. 4) which has both the property of flexibility and the property of substantial resiliency. In prescribing the property of substantial resiliency, it is meant that the barrier member 28 normally will return to its original form after it has been deflected by an external force.

In the case of the wiring device 11, the flexible insulative barrier means include a flexible insulative barrier member 40 which is characterized with only a limited degree of resiliency. In order to offset any deficiency in resiliency, backup resilient spring means or member 42 is disposed in cooperative relationship with the barrier member 40 so as to assure development of sufficient return force for the purpose of urging the barrier member 40 into its original form after removal of deflection forces. In this manner, the relatively rigid requirement of high resiliency for the barrier member 38 is avoided at the cost of introducing an additional structural element but, accordingly, a wider range of materials can be employed in forming the barrier member 40.

The barrier members 38 and 40 are generally similar in structure and include one or more deflectable barrier portions 44 which normally block the slots 34 and 36, or one of these slots, but which are deflected, without any requirement of unitary barrier member movement, to respective slot opening positions by means of an actuating portion 46 or 48 of the barrier member 38 or 40. The deflectable barrier portions 44 are deflected between slot closing and slot opening positions about respective barrier member pivot portions 50.

In the wiring device 10, each resilient flexible barrier member 38 is disposed between upper and lower housing support surfaces 52 and 54 so as to restrict the barrier member 38 against frontal and rearward movement. Otherwise, each barrier member 38 is generally extended longitudinally of the housing 12 and the barrier member pivot portions 50 are disposed against abutment means or stop surface 56 or 58 (FIG. 4) so as to prevent unitary movement of barrier members 38 longitudinally outwardly of the associated slots 34 and 36. Unitary longitudinal movement of each barrier member 38 toward the associated slots 34 and 36 can be prevented by additional abutment or stop means such as cover projection 60.

The barrier member 38 actuating portion 46 is sufficiently elongated to extend into the associated grounding pocket 31 in alignment with the entry path of a plug grounding prong. Preferably the end of the barrier member actuating portion 46 is suitably provided with a metal tip or cover 62 (FIG. 2) in the interest of durability against wear.

When a grounding prong 64 (FIG. 4) is inserted into the grounding pocket 31, camming action is produced against the metal cover or cam surface 62 of the barrier member actuating portion 46 and as a consequence force is transmitted through the actuating legs 66 of the actuating portion 46 to the respective barrier portions 44 adjacent reference point 68 which is a given leverage distance from the associated barrier member pivot portion 50. The moment of force thus applied to the barrier portions 44 causes such portions to flex or deflect about the associated barrier member pivot portions 50 and outwardly of the respective slots 34 and 36.

If necessary because of geometric or other limitations, additional camming action can be applied directly against the barrier portions 44 by the incoming power prongs of the plug, for example against portions 70 assuming that the total barrier portion movement produced by the grounding prong 64 is sufficient for this additional camming action to occur. Housing side surface 72 or 74 can serve as an abutment to limit the amount of outward movement of the barrier portions 44. The inherent flexibility of the barrier member 38 is such that all of the necessary bending throughout the member 38 necessary for the described movement of barrier portions 44 can occur without any resulting fracture or the like.

The barrier portions 44 remain in slot opening position as long as the grounding prong 64 (or a force producing equivalent thereof such as that described in copending application Serial No. 245,222, entitled Grounding Wiring Device, filed by Gunnar E. Anderson, on December 17, 1962, and assigned to the present assignee) is retained in the grounding pocket 31. When the grounding prong 64 is withdrawn from the pocket 31, the inherent resiliency of the barrier member 38 causes the barrier and actuating portions 44 and 46 to return to their respective original positions. The barrier member 38 can thus operate in the described manner on a cyclical basis.

The structural and operational nature of the barrier member 38 in the wiring device 10 generally applies to the barrier member 40 in the wiring device 11 of FIG. 2A. In this case, however, the material employed for the barrier member 40 is characterized with less resiliency although it does have good flexibility. Accordingly, the backup spring member 42 is generally disposed or contoured to provide direct resilient return force against the respective barrier portions 44 upon deflection of the latter and thus is interposed between the flexible barrier member 40 and the housing abutment or stop surfaces 56 (or 58) and 74 (or 72). Any deficiency in internal resilient return force of the barrier portions 44 is therefore provided by arm portions 76 of the backup spring member 42.

Another feature of the barrier member 40 is that the actuating portion 48 is relatively foreshortened for end engagement with end portion 78 of the grounding contact 30. This feature can also be provided for the barrier member 38 in the wiring device 10 and it dispenses with any predetermined need for an end metallic covering such as the metallic cap 62 on the actuating portion 48. Instead, camming action by the incoming grounding prong is applied directly against the contact end portion 78 and the generated forces are then transmitted through the actuating portion 48 to the barrier portions 44. Although the housing abutment projections 60 can in some applications be eliminated because of the restriction provided by the contact end portions 78 against longitudinal movement of the barrier member 40, it is still desirable in other applications to make use of the projections 60 so as to restrict the barrier member 40 against unitary lateral movement unless other lateral abutment means are provided for this purpose.

In some cases it is desirable to tie the end of the actuating portion 48 of the barrier member 40 to the adjacent contact end portion 78 both to impose additional return spring force on the barrier portions 44 through the actuating portion 48 and to maintain the barrier member 40 in place. Accordingly, in FIGURE 5 there is shown a contact 80 having a portion 82 struck-out from its end portion 78 for engagement with the actuating portion 48 in a suitable recess 84 therein. Alternatively, as shown in FIG. 6, the actuating portion 48 can be provided with end latching portions 86 which engage the contact end portion 78. In this event, contact 88 on which the con-

tact end portion **78** is provided should be sufficiently wide so that the spacing between end surfaces **90** of the latch portions **86** is sufficient to allow passage of a plug grounding prong therebetween.

In the foregoing description, several structural arrangements have been set forth to point out the principles of 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 side 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, an elongated flexible and resilient insulative barrier member supported relative to said housing in a reference plane generally perpendicular to the prong insertion direction, means for supporting said barrier member against unitary longitudinal movement in said reference plane, said barrier member having a barrier portion normally located to block insertion of a power prong through at least one of said power prong slots, said barrier member also having an actuating portion extending longitudinally of said barrier member with a free end portion thereof disposed in alignment with said grounding prong slot, said actuating portion resiliently urging said barrier portion pivotally out of its blocking position in response to camming force generated by insertional movement of said grounding prong and transmitted to said actuating portion in the reference plane longitudinal direction generally toward said barrier portion.

2. A grounding wiring device comprising an inslulative housing having a pair of power prong slots and a grounding prong slot in one side 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, an elongated flexible and resilient insulative barrier member supported relative to said housing in a reference plane generally perpendicular to the prong insertion direction, said barrier member having a barrier portion normally located to block insertion of a power prong through at least one of said power prong slots, said barrier member also having an actuating portion extending longitudinally of said barrier member with a free end portion thereof disposed in alignment with said grounding prong slot, a pivot portion of said barrier member supported against longitudinal movement in said reference plane and integrally connected with said barrier portion, said actuating portion resiliently urging said barrier portion pivotally out of its blocking position adjacent a point spaced a given lever arm distance from said pivot portion in response to camming force generated by insertional movement of said grounding prong and transmitted to said actuating portion in the reference plane longitudinal direction generally toward said pivot and barrier portions.

3. A grounding wiring device as set forth in claim **2** wherein a pair of barrier portions for the respective power prong slots and respective integral pivot portions therefor are provided as portions of said barrier member, said actuating portion having respective longitudinally extending legs integrally attached to said barrier portions a given lever arm distance from said pivot portions.

4. A grounding wiring device as set forth in claim **2**, wherein a metallic cap is disposed on said actuating end portion so as to provide a durable cam surface for direct camming action by said grounding prong on said actuating portion.

5. A grounding wiring device as set forth in claim **1** wherein said insulative housing is provided with a pair of faced portions each of which has a pair of power prong slots and a grounding prong slot for insertion of respective grounding plugs, and a pair of said elongated flexible resilient insulative barrier members are supported in said housing for respective cooperation with said slots in the manner described.

6. A grounding wiring device as set forth in claim **1**, wherein spring means are supported in said housing so as to provide resilient return force against said barrier portion if the material used to form said insulative barrier member has insufficient resiliency in operation to provide the necessary return force on the barrier portion.

7. A grounding wiring device as set forth in claim **2**, wherein said free end portion of said actuating portion is engaged with an end arm portion of the associated grounding contact in a housing pocket in which the grounding contact is supported so that camming action by said grounding prong is imposed against said contact arm end portion with the resultant forces transmitted to the barrier member actuating portion in the manner described.

8. A grounding wiring device as set forth in claim **2**, wherein said free end portion of said actuating portion is engaged with an end arm portion of the associated grounding contact in a housing pocket in which the grounding contact is supported so that camming action by said grounding prong is imposed against said contact arm end portion with the resultant forces transmitted to the barrier member actuating portion in the manner described, and a projection on one of said end portions is disposed in latching engagement with the other end portion so that additional return force is imposed on said barrier member by the resilient returning movement of said contact arm.

References Cited by the Examiner

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682,727 11/52 Great Britain.

JOSEPH D. SEERS, *Primary Examiner.*