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C. M. SMITH ET AL

2,915,736

WIRING DEVICE

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Fig. 1.

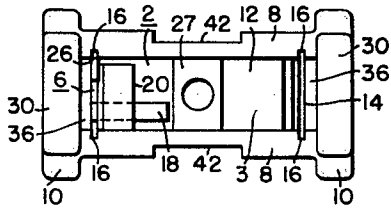


Fig. 3.

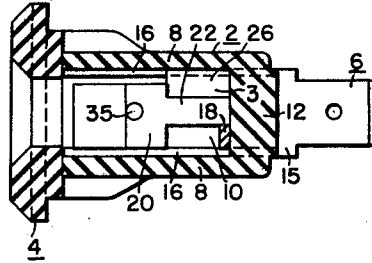


Fig. 2.

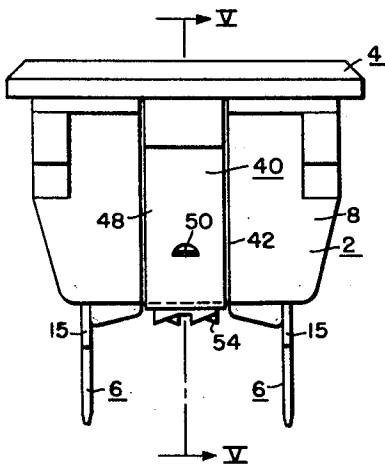


Fig. 4.

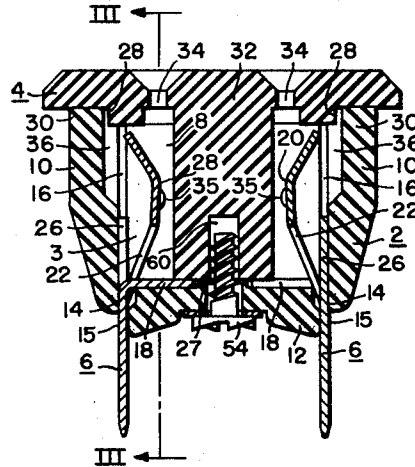
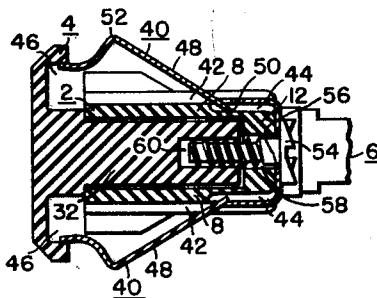


Fig. 5.



WITNESSES

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1

2,915,736

WIRING DEVICE

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9 Claims. (Cl. 339—170)

Our invention relates to a wiring device and more particularly to an electrical wiring device, such as an electrical receptacle, having electrical contacts located therein which are engaged by inserting an electrical connector.

As is well known, many wiring devices are manufactured as a complete unit or subassembly which is provided with contact means for making electrical connections to the device, and means, such as a socket or engageable contacts, so that the device may be used in conjunction with some other electrical means or device. It has also been the general practice to reduce the cost of assembling such devices by providing simplified means for securing the electrical contacts within the device. In some instances the electrical contact means have been provided with portions which may be deformed into engagement with the housing of the device so as to secure the electrical contacts in the housing, or to rivet the electrical components to the housing. Such a procedure has also required that separate means be used to secure the housing components together. Such separate securing of the individual components of the device has obviously increased the number of operations required in assembling the device and equally obviously has increased the cost of such a device. In order to eliminate such duplication of labor, we have provided a new and improved electrical contact and housing structure which cooperate with each other in a new and novel manner so that only one securing means is required to properly secure all the components of the device together. In addition, in some instances, it is desirable to provide mounting means on the device so that the device may readily be mounted to a panel. With our invention such mounting means may also be secured to the housing by the same securing means utilized to secure all the other components of the device together.

Accordingly, one object of our invention is to provide a new and improved wiring device having only a single means to secure all the components thereof together.

Another object of our invention is to provide a new and improved wiring device having a two-part housing with a portion of all the electrical means within the housing clamped between the parts of the housing.

A more specific object of our invention is to provide a new and improved wiring device having a housing with a separable base and cover, portions of which are located in close proximity to each other, and electrical components each having an integral portion located between such closely located portions of the housing so the electrical components are clamped within the housing when the parts of the housing are secured together.

Another more specific object of our invention is to provide a new and improved electrical receptacle having a cup-shaped base with spaced contacts located therein, each having a portion extending laterally outward into engagement with the base, and a cover for the base hav-

2

ing a portion forcing the extending portions of the contacts into firm engagement with the base.

These and other objects of our invention will become more apparent upon consideration of the following detailed description of a preferred embodiment of our invention when taken in conjunction with the attached drawing, in which:

Figure 1 is an enlarged top plan view of the housing of a wiring device with the cover removed and showing one electrical contact located therein which is constructed in accordance with the principles of our invention;

Fig. 2 is an enlarged side elevational view of a wiring device constructed in accordance with the principles of our invention;

Fig. 3 is a cross-sectional view of the wiring device shown in Fig. 2 taken substantially along the lines III—III of Fig. 4;

Fig. 4 is a cross-sectional view of the wiring device shown in Fig. 2 and taken substantially along the longitudinal center line thereof; and

Fig. 5 is a cross-sectional view of the wiring device shown in Fig. 2 taken substantially along the lines V—V thereof.

Referring to the drawing, it will be noted that an electrical receptacle constructed in accordance with the principles of our invention may comprise a cup-shaped housing 2 and a separate cover 4 which is formed to cooperate with the open side of housing 2 so as to form a unitary enclosure for the receptacle. A pair of electrical contacts 6 are supported in spaced relationship within the housing 2, and accordingly, housing 2 and cover 4 are formed from any suitable electrical insulating material, such as a molded plastic material which may readily be provided with the requisite structure as hereinafter described. Inasmuch as contacts 6 are for electrical conducting purposes, they are formed from any suitable electrically conductive material, such as an alloy of copper, and as will become apparent hereinafter, a material having sufficient resiliency so as to be operable as hereinafter described, such as a spring temper brass.

As shown, the housing 2 is a one-piece molding having a pair of longitudinally extending spaced side walls 8 which are joined together at each end by means of laterally extending end walls 10. The lower or inner ends of the side walls 8 and the end walls 10 are joined together by means of an integral base 12 so that an elongated chamber or cavity 3 is formed between the side walls 8 and end walls 10 of housing 2. Each end of the base 12 is provided with a laterally extending slot 14 in alignment with the inner surface of the adjacent end wall 10. Each side wall 8 of the housing 2 is provided with a slot 16 which extends upwardly along the inner surface of the side walls 8 from each of the slots 14 to the upper and open end of the housing 2 so as to form oppositely spaced slots 16 at each end of the housing 2.

Referring to Figs 1, 3 and 4, it will be noted that an intermediate portion 15 of each contact 6 is flat in form and is wider than the remainder of the contact so as to be closely received within the opposed slots 16. With such a construction, the intermediate portions 15 of the contacts 6 may easily be inserted from the open side of the housing 2 into the opposed slots 16 so that the contacts 6 are located within the cavity 3 of the housing 2. In order to positively locate the contacts 6 with respect to the housing 2, the lower portion of each contact 6 located within the cavity 3 is provided with an integral elongated rectangular lug 18 which extends longitudinally inwardly of the cavity 3 adjacent one of the side walls 8 and over the inner surface of the base 12. Inasmuch as the contacts 6 are inserted from the open side of the housing 2, it will be obvious that the lugs 18 are formed so

3

that the sides adjacent the side walls 8 are spaced inwardly of the end walls 10.

Each contact 6 is also provided with a face 20 spaced inwardly from the adjacent end wall 10, for the purpose of engaging the prongs of an inserted male connector, not shown, and for such purposes the face 20 is resiliently supported so as to be capable of establishing good electrical contact with such an inserted prong after repeated use. If desired, the upper portion of the face 20 may be slanted longitudinally outwardly toward the adjacent end wall 10 in order to guide the prong into engagement with a lower portion of the face 20, as hereinafter described. In order to resiliently support the face 20 of the contact 6 in spaced relation to the adjacent end wall 10 of the housing 2, it will be noted that the contacts 6 are formed to provide a support 22 which is integral with the face 20 and extends upwardly from the portion of the contacts 6 located above the base 12. As shown, the support 22 also extends angularly inwardly of the cavity 3 and is approximately one-third of the width of the portion 15 of its contact 6 and of a length substantially equal to the length of the lug 18. By such a construction the contacts 6 may easily be formed as a one-piece member by various well known shop processes from standard size sheet or strip material.

By forming the support 22 and the lugs 18 to approximately the same length, it will be noted that an upwardly extending leg 26 is formed on the other side of the contact 6 which is spaced laterally from the lug 18, and between which the support 22 extends. Leg 26 is utilized for obtaining additional rigidity of each of the contacts 6 within the housing 2 due to its engagement with a slot 16 throughout its entire length. Inasmuch as the support 22 is only approximately one-third the width of the contact 6, the face portion 20 of contact 6 extends laterally outwardly from each side of the support 22. It will be obvious, however, that the face portion 20 cannot have the same lateral width as the lateral distance between opposed slots 16, as such would prevent the face 20 from being received between the side walls 8 of housing 2. Accordingly, the sides of the face 20 are trimmed so that the face 20 may be moved longitudinally between the side walls 8 of the housing 2.

With such construction it can be seen that the contacts 6 may easily be located within the housing 2 by merely inserting the intermediate portions 15 of the contacts 6, into the opposed slots 16. Thereafter, the contacts 6 may be slid inwardly of the housing 2 so that the lower or outer ends of the contacts 6 pass through the slots 14 in the base 12 and extend outwardly from the outer surface of the base 12. Such inwardly sliding movement of the contacts 6 will continue until the lug 18 engages the inner surface of the base 12, at which time it will be noted the upper end of the face 20 is located slightly inwardly from the upper and open end of the housing 2. Although as shown and described, the outer ends of the contacts 6 extend outwardly of the base 12 in the form of contact prongs, it is obvious that if desired that such ends may be formed in any suitable manner so as to be engaged by electrical connecting means. It is also obvious that although slots 16 and slots 14 have been described, if desired, the portions 15 of the contacts 6 need not necessarily be flat, provided that cooperable openings are provided in the housing 2. With the flat outer end of the contacts 6, as shown, electrical connections may quickly be made to the contacts 6 by merely pushing formed connections thereon. It will also be noted that the inner surface of the base 12 is provided with an upwardly extending projection 27 centrally thereof having a longitudinal length less than the longitudinal distance between the opposed ends of the lugs 18. In particular, however, it will be noted that the projection 27 extends inwardly of the housing 2 a distance somewhat less than the thickness of the material of the lugs 18.

4

Referring to Figs. 4 and 5, the cover 4 is rectangular in form and is provided with a U-shaped recess 28 on its under surface adjacent each of its ends. The bight portion of recess 28 extends laterally between the sides of the cover 4 and has the outer end of its arms extending toward but spaced inwardly from the outer ends of the cover 4. Each end wall 10 of the housing 2 is provided with a generally rectangular projection 30 extending outwardly from its upper end which is of a size so as to be closely received within the recess 28 in the cover 4. Thus, the engagement of the projections 30 in the housing 2 within the recesses 28 in the cover 4 properly locates the cover 4 on the housing 2 when the cover 4 is placed on the housing 2.

The underside of the cover 4 is also provided centrally thereof with an integral rectangular projection 32 which extends inwardly of the housing 2 so that its lower or inner surface is spaced closely adjacent the upper surface of the projection 27 on the housing 2. It will be noted that the lower or inner end of the projection 32 has a longitudinal length so that it extends over the upper surface of the lugs 18 on each of the contacts 6. As is more fully described hereinafter, by biasing the projection 32 of cover 4 towards the base 12 of the housing 2, the lugs 18 of each contact 6 are clamped in place when the cover 4 is held in this position.

The cover 4 is also provided adjacent each side of the projection 32 with a pair of formed spaced openings 34 substantially in alignment with the faces 20 of the contacts 6. As the prong size and spacing of a male connector is well known, corresponding spacing of the openings 34 and the contact faces 20 may easily be determined. With such a construction as shown, the prongs of the inserted connector extend through the openings 34 in the cover 4 so that they engage the upper surface of the slanted upper end of the faces 20 of the contacts 6. Such engagement of the prong with the face 20 causes the end of the prong 20 to force the face 20 longitudinally outwardly of the cavity 3 when sufficient force is applied to the connector. Such deflection of the faces 20 will continue until the flat portion of each face 20 is in alignment with the inserted prong, at which time the prong will slip past the face and be retained therein by the spring bias of the face 20. Inasmuch as the face 20 is deflected longitudinally outwardly of the cavity 3, a recess 36 is provided in each end wall 10 adjacent the upper end of the housing 2 for receiving the free end of the face 20 therein when the face 20 is deflected. If desired, each face 20 of the contacts 6 may be provided with a longitudinally inwardly extending projection 35 for establishing electrical contact with the prong in the well known manner.

In order to provide a device which may be assembled to a panel by merely inserting the device within an opening in the panel, it will be noted that a resilient mounting clip 40 is provided which may be formed from any suitable resilient material such as spring steel. Such a clip is identical to the one shown in the copending application of C. M. Smith entitled "Wiring Device," Serial No. 537,330, filed Sept 29, 1955, and which has been assigned to the same assignee as this invention. As shown, each outer side of each side wall 8 of the housing 2 is provided with a slot 42 extending the entire depth of housing 2. A second slot 44 is also provided centrally of each slot 42 which extends upwardly from the lower edge of the base 12 towards the open end of the housing 2 for approximately one-third the length of the housing 2. In a manner similar to the above identified case, the under surface of the cover 4 is provided with recesses 46 in alignment with each of the slots 42, respectively, in the housing 2, for receiving the free ends of the mounting clip 40.

Referring to the clip 40, it will be noted that each of its arms 48 are initially formed so as to extend substantially perpendicular to its bight portion and are spaced

from each other so as to be closely received in the slots 42 of the housing 2. Such initial portions of the arms 48 have a length of approximately one-third the depth of the housing 2 and thereafter each arm 48 is formed so as to extend outwardly away from the outer surface of the side walls 8. It will be noted that the lower part of the outwardly extending portion of each arm 48 is provided with an integral inwardly extending lug 50 which is located in the slot 44. Also, the outwardly extending portion of each arm 48 is reversely bent at a point located slightly inwardly of the under surface of the cover 4 so as to form a knee 52 and the free end of each arm 48 extends upwardly beyond the upper edge of the housing 2 into a cover recess 46. Thus, spring clip 40 may quickly and easily be secured to the housing 2 by merely inserting the lower portion of the arms 48 into the slots 42 on each side of the housing 2. Although the spring clip 40 is not shown in the free state, it will be noted with reference to Fig. 5 that the outer surface of the free end of each arm 48 engages the outer surface of its recess 46 in the cover 4, and in order to accomplish such purpose, the arms 48 are initially compressed together so that they may be inserted into the recesses 46. Inasmuch as force is required to compress the arms 48 towards each other during such assembly process, the cover 4 may be retained on the housing 2 during assembly due to the spring bias of the arms 48. In order, however, to provide a positive securing means for holding the entire assembly together, a screw 54 is provided which extends through a clearance opening 56 in the bight portion of the spring clip 40, a clearance opening 58 in the base 12 and into a close fitting opening 60 in the projection 32 of the cover 4. It, of course, will be obvious that the openings 56, 58 and 60 must be in alignment with each other. Further, various types of securing devices may be utilized such as a self-tapping screw, or the opening 60 in the projection 32 may be provided with threads, whereby a standard machine screw may be used. As shown, an ordinary lag screw has been utilized to hold the entire assembly secured together.

Thus, it will be noted that by our invention we have provided a compact wiring device which requires only a single securing means, that is the screw 54 for securing all the parts of the device together. Further, all the components are simply formed so as to be readily assembled by mere insertion in or on each other. Also, each of the components has a structure so that all the components are locked in their proper relation with respect to each other.

Accordingly, having described a preferred embodiment of our invention in accordance with the patent statutes, it is desired that our invention be not limited to the specific construction illustrated, inasmuch as it will be apparent to those skilled in the art that many modifications thereof may be made and that it be accorded an interpretation consistent with the broad spirit and scope of its principles.

We claim as our invention:

1. An electrical receptacle comprising, a cup-shaped housing of insulating material, at least one resilient electrical contact strip, opposed slots at one side of the housing extending inwardly from the open side of said housing for freely receiving opposite side edges of said contact therein from the open side of the housing so as to support said contact adjacent to said one side of said housing, a projection extending laterally from said contact for engagement with the inner surface of the base of said housing to limit insertion of the contact, a cover for said housing having integral means extending inwardly thereof so as to engage said projection, means for securing said cover to said base with said projection clamped between said base and said inwardly extending means on said cover, an opening in said cover between said inwardly extending means and said one side of the housing, and said contact having an integral portion spaced outwardly

from said projection and extending toward said inwardly extending means on said cover in alignment with said opening so as to be engageable by means inserted through said opening.

2. An electrical receptacle comprising, a cup-shaped housing of insulating material, a pair of opposed slots in opposite sides of said housing extending inwardly from the open side of said housing, a resilient electrical contact having a portion located within said slots whereby said contact may be slidably inserted in said slots from the open side of said housing, said contact having an upper portion narrower than the spacing of said opposite sides so as to be laterally movable therebetween, said upper portion of said contact extending inwardly of said housing, said lower portion of the contact having a projection extending laterally therefrom in engagement with the inner surface of the base of said housing between said sides of the housing in which said slots are located, a cover for said housing having integral means extending inwardly thereof so as to engage said projection, means for securing said cover to said base with said projection clamped between said base and said inwardly extending means on said cover, an opening in said cover in alignment with said upper contact portion so that the latter is engageable by means inserted through said opening.

3. An electrical receptacle comprising, a cup-shaped housing of insulating material, two spaced pairs of opposed slots in one pair of opposite sides of said housing extending inwardly from the open side of said housing, resilient electrical contacts having portions closely slidably received within said pairs of slots, respectively, so that said contacts may be slidably inserted in said slots from the open end of said housing, said contacts each having an upper portion narrower than the spacing of said opposite sides so as to be laterally movable therebetween, said upper portions of said contacts extending inwardly of said housing, said lower portions of said contacts each having a projection extending laterally inwardly therefrom in engagement with the inner surface of the base of said housing between said sides of the housing in which said slots are located, a cover for said housing having integral means extending inwardly thereof between said contacts so as to engage said projections, means for securing said cover to said base with said projections clamped between said base and said inwardly extending means on said cover, said openings in said cover on opposite sides of said inwardly extending means, and said upper portions of said contacts each having an integral portion spaced outwardly from said projection extending toward said inwardly extending means on said cover in alignment with said openings, respectively, so as to be engageable by means inserted through said openings.

4. A wiring device comprising a cup-shaped housing of insulating material having an elongated opening extending through the base thereof, an elongated electrical contact inserted into said housing from the open side thereof with one end passing through said elongated opening, said contact having an integral intermediate portion extending inwardly of said housing, a cover for said housing having an integral projection with its inner end engaging said intermediate portion of said contact, an opening in said cover to permit access to said contact, mounting means on the outer side of said housing for securing said device to a panel and having a portion overlying the base of said housing in alignment with said integral projection on said cover, and securing means extending through said portion of the mounting means and through the base of the housing into engagement with the inner end of said projection for securing said cover, mounting means and housing together with said intermediate portion of said contact clamped between said integral projection of said cover and said base of said housing.

5. A wiring device comprising, a cup-shaped housing of insulating material having an elongated opening extending through the base thereof, elongated grooves ex-

tending inwardly of the sidewalls of said housing located at opposite ends of said opening, respectively, and joined thereto so as to form a pair of spaced guide grooves leading to said opening, an elongated electrical contact having at least one end portion inserted along said grooves from the open side of said housing to extend through said opening, said contact having an integral intermediate portion extending laterally inwardly of said housing engaging the inner surface of the base of said housing to limit insertion of said contact, a cover for said open side of said housing having an integral projection extending inwardly of said housing with its inner end engaging said portion of said contact, an opening in said cover to permit access to the portion of said contact within said housing, and means for securing said cover and housing together with said intermediate portion of said contact clamped between the base of the housing and the inner end of said projection of said cover.

6. A wiring device comprising, a housing of insulating material having an open side, an elongated contact, guide means formed integral with the interior of said housing and extending from adjacent the open side thereof inwardly for guiding said contact for insertion movement longitudinally into the housing, said contact having a laterally extending part for engagement with a part of the base of the housing to limit insertion of the contact, means on the outside of the housing for mounting the housing on a support and having a portion overlying said part of the housing base, a cover for the open side of the housing having an integral projection extending into engagement with said laterally extending part of the contact when the cover is in place, and securing means extending through said portion of the mounting means and through the base of the housing into engagement with said cover projection for securing the cover, mounting means and housing together with said laterally extending part of the contact clamped between said cover projection and the housing base.

7. A wiring device comprising, a housing of insulating material having an open side, an elongated contact, guide means formed integral with the interior of said housing and extending from adjacent the open side thereof inwardly for guiding said contact for insertion movement longitudinally into the housing, said contact having a laterally extending part for engagement with a part of the base of the housing to limit insertion of the contact, resilient U shaped supporting means on the outside of the housing for mounting the housing on a support and having its bight portion overlying said part of the housing base and the arms thereof extending along opposite sides of the housing and formed with outwardly bent portions to cooperate with an apertured support, a cover for the open side of the housing having an integral projection extending into engagement with said laterally extending part of the contact when the cover is in place, and securing means extending through the bight portion of the mounting means and through the base of the housing into engagement with said cover projection for securing the cover, mounting means and housing together with said laterally extending part of the contact clamped between said cover projection and the housing base.

8. A wiring device comprising, a housing of insulating material having an open side, an elongated contact, guide

means formed integral with the interior of said housing and extending from adjacent the open side thereof inwardly for guiding said contact for insertion movement longitudinally into the housing, said contact having a laterally extending part for engagement with a part of the base of the housing to limit insertion of the contact, resilient U shaped supporting means on the outside of the housing for mounting the housing on a support and having its bight portion overlying said part of the housing base and the arms thereof extending along opposite sides of the housing and formed with outwardly bent portions to cooperate with an apertured support, a cover for the open side of the housing having an integral projection extending into engagement with said laterally extending part of the contact when the cover is in place, and securing means extending through the bight portion of the mounting means and through the base of the housing into engagement with said cover projection for securing the cover, mounting means and housing together with said laterally extending part of the contact clamped between said cover projection and the housing base, grooves formed in said opposite outer sides of the housing for receiving at least portions of said arms, and interengaging projection and recess means on said portions of said arms and the base of said grooves.

9. A wiring device comprising a cup-shaped housing of insulating material having a pair of spaced elongated openings extending through the base thereof, a pair of elongated electrical contacts each inserted into said housing from the open side thereof with one end of each of said contacts passing through one of said elongated openings, each of said contacts having an integral intermediate portion extending laterally inwardly of said housing and engaging the inner side of the base of said housing to limit insertion of the contacts from the open side of said housing, a cover of insulating material for the open side of said housing having an integral projection extending into the housing between said contacts and with its inner edge engaging said intermediate portions of said contacts, openings in said cover to permit access to the portions of said contacts within the housing respectively, and means for securing said contacts, cover and housing together with said intermediate portions of said contacts clamped between said integral projection of said cover and said base of said housing.

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