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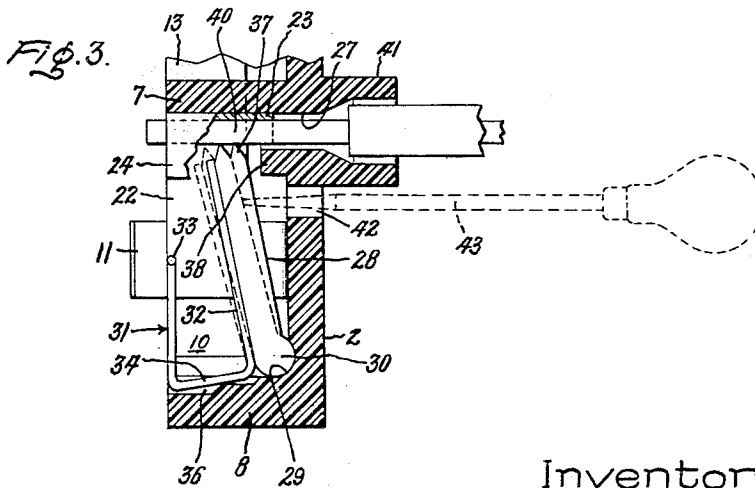
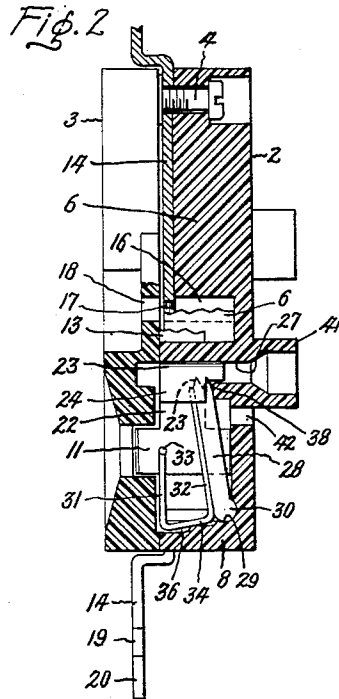
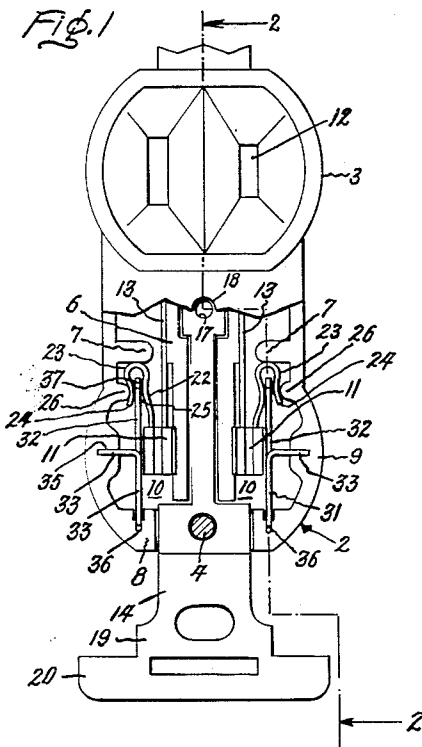
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WIRING DEVICE TERMINAL CONNECTING MEANS

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2 Sheets-Sheet 1



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## WIRING DEVICE TERMINAL CONNECTING MEANS

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3 Claims. (Cl. 339—255)

The present invention relates to wiring devices such as plug receptacles, switches, lamp sockets and the like, and particularly to the connectors which form a part of such devices for connecting the electric wires thereto.

The object of the invention is to provide an improved connector structure for such wiring devices in which the conducting wires are electrically connected to the wiring device and automatically locked in place by simply inserting the bared end of the wire through an opening in the housing of the device, and improved wiring structures embodying such connector structure.

For a consideration of what I believe to be novel and my invention, attention is directed to the following specification and to the claims appended thereto.

The invention is well adapted for use in a duplex plug receptacle and it is this application of the invention which I have elected to illustrate and describe. It is to be understood, however, that this is only by way of example and that the invention may be embodied in a similar manner in other types of wiring devices.

According to the invention, a wall of a cavity in a wiring device housing is provided with a conductor wire receiving opening an edge of which is flush with a terminal bar having a contact portion positioned against a cavity wall which forms a rigid backing for it, and extending across the wall having the conductor wire receiving opening in line with such opening is a locking tongue, one end of which is held against the cavity wall opposite the terminal bar, the other end projecting over an edge of the opening, a spring means, preferably held in place by a housing cover member, engaging the locking tongue and serving to bias the locking tongue toward the wall across which it extends and to hold the locking tongue end against the cavity wall opposite the terminal bar. With this arrangement a bared conductor wire end pushed through the opening into the cavity will be clamped between the terminal bar and the end of the locking tongue and the locking tongue will be wedged between opposed walls of the cavity.

In the drawing, Fig. 1 is a top plan view of a duplex plug receptacle embodying the invention, a portion of the receptacle cover being broken away to illustrate parts beneath it.

Fig. 2 is a sectional view taken on irregular section line 2—2, Fig. 1.

Fig. 3 is a detail sectional view on a scale larger than that of Figs. 1 and 2, showing the connector structure.

Fig. 4 is an exploded view of the receptacle.

Fig. 5 is a sectional view similar to Fig. 3 of a modification.

Referring to the drawing, 2 indicates the base of a duplex plug receptacle and 3 the cover which is attached to the base by screws 4, one at each end of the receptacle, which extend up through openings 5 in the base and thread into openings (not shown) in the cover. The base and cover are formed from suitable insulating material. Base 2 is provided with a central longitudinally extending partition wall 6 which in conjunction with transversely projecting walls 7, base end walls 8 and base side walls 9 define four contact and terminal cavities 10, two on each side of the receptacle. In each cavity 10 is a contact structure 11 comprising spaced contact fingers adapted to make contact with the contact blades of an attachment plug cap of usual construction, cover 3 being provided with slots 12 through which the contact blades of a plug cap may be inserted into engagement with the contact structure 11. The pair of

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contact structures on each side of the base are joined together by a connecting strip 13, the contact structures being shown as formed integral with the strip which strip serves to connect them electrically.

Extending longitudinally of base 2 is a mounting strap 14 which is positioned in a longitudinally extending groove in partition walls 6 and slots in the end walls of base 2. Strap 14 is clamped between base 2 and cover 3 and is held also by the screws 4 which extend through openings 15 in the strap. At its center in line with an opening 16 in wall 6, strap 14 is provided with a threaded opening 17 and cover 3 has an aligned opening 18 for receiving a face plate screw (not shown) for fastening a face plate over the receptacle. At its ends, strap 14 is provided with ears 19 having openings for screws for fastening the receptacle in an outlet box and widened ears 20 which may rest on a plaster surface for leveling the receptacle with respect to a plaster wall.

The structure so far described is a known one and is to be taken as typical of a plug receptacle or other wiring device structure.

My invention has to do with a construction and arrangement for fastening a conductor wire to a contact structure 11.

According to the illustrated embodiment of the invention, there is provided in connection with a contact structure 11 for connecting a conductor wire thereto a terminal bar 22 having a reversely bent end which defines a conductor wire receiving loop or groove 23 and an end 24 which stands in spaced relation to bar 22 and provides with it spaced guide walls which define a guide slot 25 which communicates at its inner end with loop or groove 23. The wall forming loop or groove 23 rests against the surface of a wall 7 which forms a backing for it. Each integral structure comprising to contact members 11, connecting strip 13 and terminal bars 22, is held in the base by being wedged between the adjacent side surface of partition wall 6 and a lug 26 with which end 24 engages.

In the bottom wall of base 2 in alignment with loop or groove 23 is a conductor wire receiving opening 27, an edge of which is substantially flush with the inner surface of the loop or groove, and extending across the bottom wall of the cavity in line with opening 27 is a locking tongue 28, one end of which rests against the inner surface of cavity end wall 8 opposite to wall 7, and is supported on the bottom wall. The other end of locking tongue 28 extends through guide slot 25 to a position where it overlaps the edge of opening 27 opposite loop or groove 23. The base end wall 8 thus forms a rigid backing for the locking tongue. For anchoring the locking tongue against the end wall, the bottom wall of the base is provided with an upwardly facing rounded depression 29 directly adjacent to the inner surface of the end wall in which a rounded head 30 on the end of the locking tongue rests; and it is held in such depression and against the inner surface of the end wall by a spring 31 which spring serves also to bias the locking tongue toward the bottom wall of the base. Spring 31 comprises an arm 32 which extends along the top of the locking tongue, an anchoring arm 33 which is clamped between base 2 and cover 3 and an offset arm 34 which connects anchoring arm 33 to arm 32. Anchoring arm 33 is held in a groove 35 in the top surface of base 2 and offset arm 34 is held in a groove 36 in end wall 8. The locking tongue is provided preferably with a wedge-shaped or serrate end as indicated at 37. Preferably there is provided for the free end of the locking tongue a stop 38 adjacent to opening 27 which serves to hold the tongue normally at an angle to the surface of the bottom wall of the base so that the holding spring pressing down on the top of the arm has a component which acts in a direction to hold the anchored end of the locking tongue in depression 29 and against end wall 8.

To connect an electric conductor wire to a terminal bar it is necessary merely to insert the bare end of the wire through opening 27 as shown in Fig. 3 where 40 indicates the end of a conductor wire from which the insulation has been removed. When thus positioned, the

free end of the locking tongue engages the wire and holds it firmly against the loop 23.

The free end of the locking tongue projects over opening 27 to a point such that it is spaced from the adjacent surface of the terminal bar loop a distance somewhat less than the diameter of the smallest wire with which the receptacle is to be used (for example, #14 American Wire Gage wire), so that when the wire is inserted into the opening, it will raise the tongue from a position as shown in Fig. 2 to a position as shown in full lines in Fig. 3 wherein the wire is positioned between the contact bar and the end of the locking tongue and the tongue extends at a downwardly sloping angle to the wire. When thus positioned, a pull on the wire serves to wedge it more firmly between the terminal bar and the end of the locking tongue bringing it into tight engagement with the terminal bar and holding it firmly against removal. Opening 27 is of a size to permit insertion of the largest diameter wire with which the receptacle is to be used (for example, #10 American Wire Gage wire) and the arrangement is such that the locking tongue will engage such size wire and lock it firmly against the terminal bar. Tongue 28 at its free end is provided with the serrate end so that it tends to bite into the wire especially when the wire is subjected to a pull. Surrounding each opening 27 is a sleeve 41 having an inside diameter larger than the overall diameter of the largest wire with which the receptacle is to be used, whereby a portion of the wire insulation at the base of the bared end will be housed by the sleeve as shown in Fig. 3 to prevent any exposure of bare wire.

To permit of removal of a wire after it has been connected to the receptacle, there is provided in the bottom wall of the housing beneath each locking tongue an opening 42 through which the end of a suitable tool, such as a screw driver, may be passed to engage the under side of a tongue and move it away from locking engagement with the wire end. Such a tool is indicated in dotted lines at 43 in Fig. 3, the locking tongue being shown in dotted lines as having been moved from engagement with the wire end.

To connect a conductor wire to the receptacle, the insulation is first removed from the end of the wire to expose a suitable length of bare conductor. The correct amount of insulation to be removed can be judged readily from the depth of the receptacle; or the amount to be removed can be measured by placing the wire against the side of the receptacle; or, if one is provided, by using the strip gage marked on the receptacle. The depth of sleeve 41 is such that the measurement is not critical. Then, after the insulation has been removed, all that is necessary is to push the bare end of the wire through the opening 27. This is a very simple operation which can be quickly performed without tools other than a tool for stripping the wire end. The arrangement is a substantial time saver over the usual screw connection, a thing of importance in view of the high cost of labor. At the same time it provides a wholly satisfactory terminal connection.

In the drawing, a terminal bar 22 is shown as being provided in connection with each contact 11 so that two wires may be connected to each pair of contacts. This arrangement permits of an incoming lead wire and a branch wire being connected to each side of the receptacle whereby the receptacle serves also as a junction block in a well understood manner.

In Fig. 5 is shown a modification of the invention wherein the locking tongue 45, corresponding to locking tongue 28 of Figs. 1 to 4, is held by a coiled spring 46 positioned between the top of the tongue and the under side of the receptacle cover, the tongue being provided with a projection 47 for holding the spring in position against it. Otherwise, the structure is similar to that of Figs. 1 to 4 corresponding reference numerals with the exponent  $\alpha$  added has been applied to corresponding parts.

The invention has the advantage that while it is simple in structure which enables it to be embodied in wiring devices at low cost, it nevertheless provides an entirely satisfactory terminal connection. Only two additional parts are required, the locking tongue which may be a simple metal stamping or a molded plastic part, and the spring. No pivot pins, screws or tapped holes are

required and no additional fastening parts are necessarily required since the locking means may be held in assembled position by the means already present for holding the wiring device assembled, the locking means being held between the base and the cover. Also the invention has the advantage that a structure embodying it can be assembled easily and without the use of special tools since all that is needed is simply to drop the parts into the molded base and fasten the cover in place, a simple and low cost operation.

In connection with the construction it is to be noted that all metal or live parts are entirely enclosed in the housing, no such parts being exposed where they may be accidentally contacted or accidentally brought into contact with an enclosing metal outlet box or the like; and this condition obtains after the device is wired since no bare conductor wire is exposed. This is an advantageous feature from both a safety standpoint and from a use standpoint for often considerable crowding of the wires is required in an outlet box.

However, advantages of the invention lie not only in its manufacture but also in its use since, as pointed out above, a conductor wire may be connected to a wiring device embodying the invention by merely pushing it into the device. And it may be disconnected by merely pushing the locking tongue from contact with the wire.

While the invention has been illustrated as being embodied in a wiring device in a manner such that the conductor wires are inserted through the back or bottom wall of the housing, it may be readily arranged in a manner such that the conductor wires are inserted through other walls of the housing.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a wiring device, a housing comprising a base member and a cover member, a contact member in the housing, a terminal bar connected to the contact member, said housing having a wall against which the terminal bar rests and which forms a rigid backing for it, a wall of said housing being provided with a conductor wire receiving opening, an edge of which is in alignment with said terminal bar, a locking tongue having a free end which stands partly over said opening in opposed relation to said terminal bar and which extends across the housing wall having said opening in alignment with such opening and at its other end engages against the wall of the housing opposite the wall against which the terminal bar rests which wall forms a fulcrum on which the locking tongue may pivot, spring means which engages said locking tongue to bias it toward the wall across which it extends and hold it against such wall, and means defining guide walls adjacent said opening for guiding the free end of the locking tongue.

2. A wiring device as defined by claim 1 wherein said guide walls are formed by walls of said terminal bar.

3. In a wiring device, a housing having a contact cavity, a contact in the cavity, a terminal bar connected to the contact having a wall portion shaped to define a bared conductor wire receiving groove and walls which define a guide slot connected with said groove, said wall portion being positioned against a first cavity wall which forms a backing for it, an adjacent cavity wall being provided with a conductor wire receiving opening in alignment with said groove, a locking tongue which extends across said cavity wall in which the opening is formed, one end of the locking tongue being positioned in said guide slot and projecting over the edge of said opening, the other end being positioned against the cavity wall opposite said first wall which wall forms a fulcrum on which the locking tongue may pivot, and spring means engaging said tongue for biasing it toward the cavity wall having the opening and toward said opposite cavity wall, whereby a bared conductor wire pushed through said opening will be clamped between the end of said locking tongue and the surface of said groove and the tongue will be wedged between said opposed walls.

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