Feb. 24, 1959 H. HUBBELL 2,875,424

SCREWLESS MEANS FOR ATTACHING CONDUCTORS TO ELECTRICAL DEVICES

Filed May 13, 1953

Fig. 1.

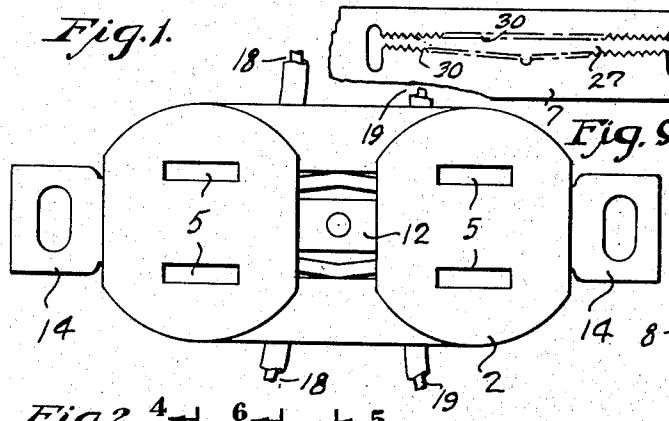


Fig. 8.

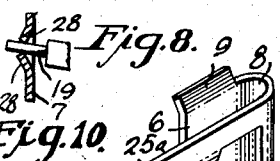


Fig. 9.

Fig. 10.

Fig. 2.

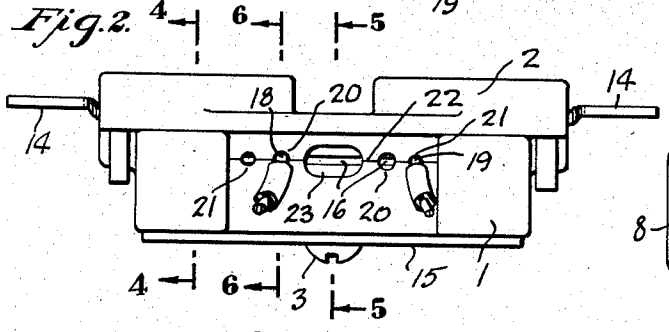


Fig. 7.

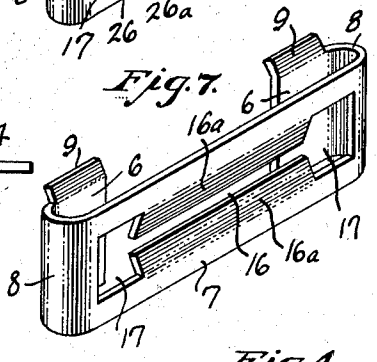


Fig. 3.

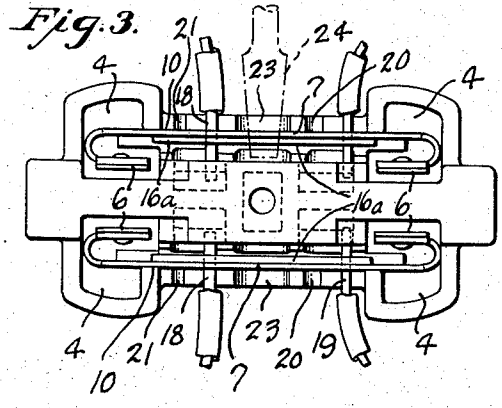


Fig. 4.

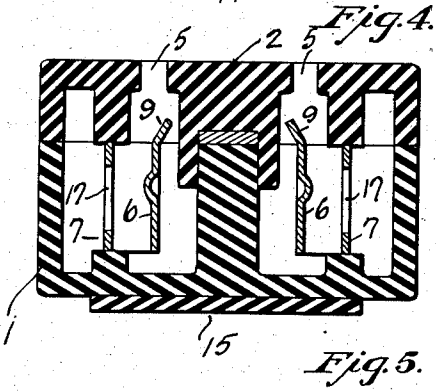


Fig. 5.

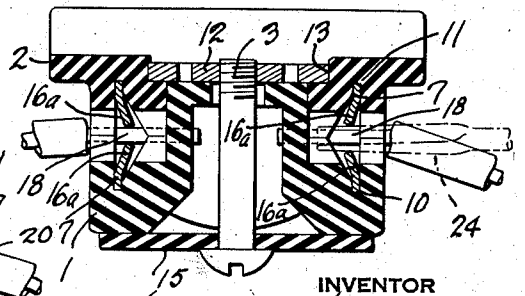
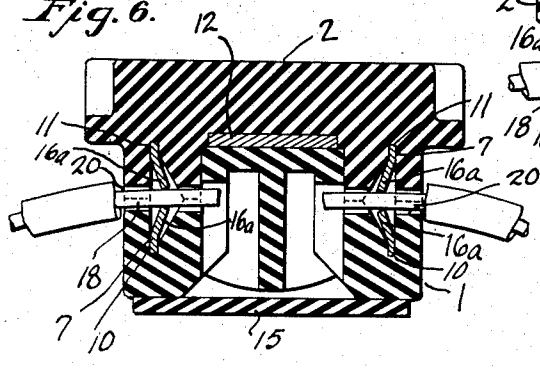


Fig. 6.



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SCREWLESS MEANS FOR ATTACHING CONDUCTORS TO ELECTRICAL DEVICES

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Application May 13, 1953, Serial No. 354,833

8 Claims. (Cl. 339—164)

This invention relates to electrical devices, and particularly to a screwless means for attaching conductors to contacts in these devices, and has for an object to provide a simple and effective means for securing electrical conductors, such as lead wire conductors, to the contacts in electrical devices without the use of the usual binding screws.

Another object is to provide such a securing means for the conductor wires which become effective to not only grip and hold the wires but also form an effective electrical contact, by a mere insertion of the end of the conductor wires into the securing means.

Another object is to provide such a construction in which a flattened screw driver bit or similar tool may be inserted in the connecting means, and by a simple turning movement release the grip on the conductor wire so that it may be removed from and disconnected from the device.

With the foregoing and other objects in view, I have devised the construction illustrated in the accompanying drawing forming a part of this specification. It is, however, to be understood the invention is not limited to the specific details of construction and arrangement shown but may embody various changes and modifications within the scope of the invention.

In this drawing:

Fig. 1 is a front elevation of an outlet receptacle employed as an example to illustrate the use and application of the present invention;

Fig. 2 is a side view thereof;

Fig. 3 is a front view of the rear section of the body with the front section removed;

Figs. 4, 5 and 6 are transverse sections substantially on lines 4—4, 5—5 and 6—6 respectively of Fig. 2;

Fig. 7 is a perspective view of one of the contact elements and connecting means removed from the insulating body;

Fig. 8 is a similar view showing a modification;

Fig. 9 is a side elevation of a portion of the contact member showing a modified arrangement, and

Fig. 10 is a transverse section thereof, showing how a conductor wire may be secured thereby.

This improved screwless means for attaching a conductor wire is shown in connection with an electrical outlet receptacle of the type adapted for mounting in a wall outlet box to which the conductor wires of a house wiring system may be led and connected to the receptacle, but it will be understood this particular device is used merely by way of example to show the invention, and that this improved connecting means may be used for connecting the lead wires to the contacts of other electrical devices, such, for example, as switches and the like.

The electrical device shown comprising the electrical outlet receptacle comprises a body member of suitable molded insulating material including the two separable sections 1 and 2 connected by suitable means such as a screw 3, the body section 1 being provided with compartments 4 facing forwardly and in alignment with entrance openings or slots 5 in the front section 2 leading to these compartments for entrance of the contact blades of the standard plug-in connector cap for engagement with receptacle contacts within the receptacle. This is shown as a duplex receptacle comprising two pairs of these entrance slots, thus permitting the plugging in of two plug-in caps into this receptacle at the same time. Stationary receptacle contacts of any suitable type are mounted in the compartments 4 at the inner side of the entrance slots 5, those shown comprising substantially flat spring metal members 6, one for each of the compartments 4, and are located to the rear of the slots 5 so as to engage the contact blades inserted through these slots. In the duplex receptacle shown there are two pairs of these contacts, and corresponding contacts of each pair are connected by a connecting conductor bar 7. In the construction shown this connecting bar is a strip of resilient conductor metal of thin sheet metal (the thickness being greatly exaggerated on the drawing) bent at its opposite ends upon itself as shown at 8 to provide the receptacle contacts 6, and the upper ends may be bent laterally somewhat as shown at 9 to guide the contact blades as they are inserted through the slots 5 to engage one side of the contacts 6. There are two of these connected contact elements in each receptacle, and the open side of the body section 1 is provided with a longitudinal groove 10 in which the lower edge of the bar or strip 7 is seated, and the upper section 2 of the body is provided with corresponding grooves 11 in which the opposite edges of the strips 7 are seated. Thus when these receptacle contacts and their connecting strips are mounted in the body they are seated first in the grooves 10 in the lower section 1, and then when the upper section 2 is placed on the lower section the top edges of the bar 7 are seated in the grooves 11 of the upper section, and then when the two sections are secured together the two opposite edges of the connecting bar 7 are rigidly mounted and positioned as indicated in Figs. 5 and 6. The two sections 1 and 2 of the body are secured together by a screw 3. A mounting yoke 12 comprising a suitably shaped strip of metal is seated in a longitudinal recess 13 in the section 2 of the body and is provided at its opposite ends with the usual mounting ears 14 for mounting it in the usual wall outlet box (not shown) in the house wiring system. At the lower side of the body is an insulating plate 15 of compressed insulating material and the screw is passed through this plate and threaded into the yoke 12 to thus secure the two body sections together.

For securing the conductor wires to the contacts 6 and the connecting conductor bar or strip 7, this strip is provided with a narrow longitudinal slot 16, and this may extend any given length desired, and in the device shown terminates in enlargements 17 at the opposite ends of the slot. The side walls of the slot between these enlargements are inclined or bent laterally from the plane of the strip 7 in the same direction, and therefore these walls 16*a* at opposite sides of the slot are inclined backwardly and outwardly in opposite directions from the edges of the slot, and these inclined walls are located on the inner side of the strip opposite the outer walls of the body, so that these walls may yield inwardly under their resilient or spring action to permit the insertion of the bared ends of a conductor wire into the slot between these edges to be gripped by these edges. The width of the slot is made such that it is normally somewhat less than the diameter of the wire to be inserted in the slot so that as the wire is inserted it will spread the sides of the slot or force them laterally and outwardly. In other words, the inclined side walls at opposite sides of the slot will yield laterally and outwardly as the wire is inserted, and the resilient action

of the metal of the strip 7 will cause the free edges of the slot to grip the opposite sides of the wire. It will be seen that as the walls of the opposite sides of the slots are inclined inwardly an outward pull on the wire will tend to cause these inclined side walls to straighten or narrow the slot, and this will cause the sharp or squared corner edges of the slot to firmly grip the opposite sides of the wire with sufficient pull to dig somewhat into the wire, and the greater the pull on the wire the greater will be the holding or gripping effect. This clamping or gripping effect forms a firm hold on the wire to prevent its being withdrawn from the strip, but it also provides a very effective electrical contact between the strip and the wire.

In the drawing, wires of different sizes are shown as being attached to the same strip. That is, the wire **18**, for example, may be a larger wire, say 12-gauge, while the other wire **19** may be of smaller diameter, say 14-gauge, and this attaching means will firmly hold and grip either size of wire, the slot, however, normally, when no wire is inserted, being somewhat narrower than the diameter of the smallest wire to be secured thereby. The resilient yieldable side walls, however, will yield sufficiently to permit insertion of the larger wire. The holding and gripping effect will be the same for both.

For facilitating insertion of the wires to make the electrical connection, the opposite side walls of the insulating body are provided with openings **20** and **21** therethrough in alignment with the slot **16** in the conductor strip, and these openings may be provided in the dividing line **22** between the two sections of the body, the openings being formed half in each section. The openings **20** are made larger for the larger wires **18** and the openings **21** smaller for the smaller wires **19**, and as the openings are in alignment with the slot **16** they provide means for directing the end of the wire into the slot so that in making the electrical connection of these conductor wires to the contacts in the receptacle all that is necessary is to insert the ends of the wire through the proper openings **20** or **21** into the slot **16** in the connector. As shown in Fig. 6 of the drawing, the openings **20** and **21** are preferably carried through the insulating material of the body on both sides of connecting bar **7**. As shown in Fig. 2, there are two pairs of openings, that is, two of the larger openings **20** for the larger wire and two of the smaller openings **21** for the smaller wire, in the arrangement shown being spaced on opposite sides of the receptacle. That is, by connecting two wires to connector **7** not only may the receptacle contacts **6** be connected to the house wiring system, but the connector **7** may be used as a through connection continuing the house circuit through the receptacle. As the opposite edges of the strip or bar **7** are seated and held in the grooves or channels **10** and **11** of the body sections **1** and **2**, this strip or bar is firmly held against lateral movement. It is therefore held against inward movement as a wire is inserted and spreads the opposite sides of the slot inwardly and laterally. These channels also hold the strip or bar **7** from outward movement by an outward pull on a wire while gripped and held in the slot **16**.

Referring to Fig. 2, there is shown between the openings **20** an enlarged elongated opening **23** also in alignment with the slot **16**, and this opening is large enough to permit insertion of the flattened bit end of a screw driver or similar tool, indicated in broken lines **24**, into the slot **16**, and then by turning this bit it will spread apart, or cause the side edges of the slot **16** to yield or spread outwardly to release the conductor wires **18** or **19** and permit them to be withdrawn from the receptacle. It will be clear that this is a very simple operation to merely insert the bit of the screw driver and turn it to release the wires, and then after the bit has been removed the same or other wires may be easily and quickly connected to the device by merely inserting their free ends into the openings **20** or **21** and into the slots **16** in the connector bar.

In the modified arrangement of Fig. 8, the slot corresponding to the slot **16**, instead of being a straight slot of substantially uniform width, as shown in Fig. 7, is stepped or widened at the central portion, as indicated at **25**, leaving narrower portions **26** at the opposite ends to receive the ends of the wires to be connected to the device. In this way somewhat greater flexibility is secured, as only the shortened portions **26***a* at the opposite sides of the portion **26** of the slot need yield as the wire is inserted. In this case the screw driver bit or similar tool for releasing the wires would be inserted in the wider portion **25** of the slot, the walls **25***a* at the opposite edges of this widened portion being inclined in opposite directions away from the sides of the slot to effect the operation the same as in the first form.

In the modification shown in Figs. 9 and 10 the connecting bar or strip **7** is the same as in the other forms and connects the two stationary contacts **6** (not shown), but in this case the longitudinal slot **27** for receiving and securing the conductor wires is the same as in the form of Fig. 7 and the walls are inclined in opposite directions from the opposite edges of this slot the same as in the first form, as shown at **28**, to receive the conductor wire **18** or **19**, except that in this case either one or both edges of the slot are provided with a series of small teeth **30** which may be saw-like teeth to give a more piercing grip to the wire, and they also would prevent the wire sliding longitudinally in the slot. Otherwise the construction, operation and effect is the same as in the other forms.

A holding or gripping effect on the wire could be secured by inclining the side wall on only one side of the slot, leaving the other straight, but this is not as effective or satisfactory as inclining both sides as shown.

It will be clear from the above that this means of securing the lead wires to the contacts in the device is a very simple one which eliminates the use of the usual binding screws, which involves the making of the screw, tapping the hole in the supporting base and assembling of the screw, all of which operations are eliminated in this device, and it further simplifies the connection of the lead wire to the contact as it eliminates the necessity of winding the wire about the stem of a screw and the setting up of the screw. In other words, all that is necessary in making the connection is to insert the end of the wire in a slot formed between the oppositely inclined walls, and the connection is completed. Furthermore, the greater the pull outwardly on the lead wire the greater is the gripping and holding effect, and there is nothing to loosen up or inadvertently release the lead wires as often happens where binding screws are used as the connecting means.

Having thus set forth the nature of my invention, I claim:

1. In a device of the character described, an insulating body member having a side wall, an electrical contact in said member, means for connecting a conductor wire to said contact comprising a substantially flat elongated strip of resilient conductor metal connected to the contact and provided with a longitudinal narrow slot, the walls of the strip inclined and extending laterally from the edges of the slot and yieldable to permit insertion of the bared end of a conductor wire through the slot between said edges to be gripped thereby, the side wall of the insulated body provided with an opening in alignment with the slot to direct the bared end of the wire into the slot, and said body provided with another opening to one side of the first opening and in alignment with the slot to permit insertion of a flattened screw driver bit and the like into the slot and by a turning action to separate the edges of the slot and release the wire.

2. In a device of the character described, an insulating

body member provided with a side wall, a pair of spaced electrical contacts in said member, means for connecting a conductor wire to the contacts comprising a substantially flat elongated strip of resilient electrical conductor metal extending between and connected to the contacts, said strip provided with a narrow elongated longitudinal slot, the walls of the strip inclined and extendingly laterally from the edges of the slot and yieldable to permit insertion of the bared end of the conductor wire through the slot between said edges to be gripped thereby, said body provided with longitudinally spaced openings in its side wall in alignment with the slot to direct the bared ends of conductor wires into the slot, and said wall of the body also provided with an opening between the first openings in alignment with the slot for insertion of a flattened screw driver bit and the like into the slot and by a turning movement to separate the opposite edges of the slot and release the wires.

3. In a device of the character described, an insulating body member having a side wall, an electrical contact in said member, means for connecting a conductor wire to said contact comprising a substantially flat elongated strip of resilient conductor metal connected to the contact and provided with a longitudinal narrow slot, the walls of the strip on at least one side of the slot inclined and extending laterally from the adjacent edge of the slot and yieldable laterally to permit insertion of the barred end of a conductor wire through the slot between its edges to be gripped thereby, said body being provided with longitudinal oppositely facing spaced grooves in which the opposite outer edges of the strip are seated and held against lateral movement, and the side wall of the insulating body provided with an opening in alignment with the slot to direct the bared end of the wire into the slot.

4. In a device of the character described, an electrical contact, and means for connecting a conductor wire to said contact comprising a substantially flat elongated strip of resilient conductor metal connected to the contact and provided with a narrow longitudinal slot having edges at least one of which comprises a series of teeth, the walls of the strip inclined and extending laterally from the edges of the slot and yieldable to permit insertion of the end of a conductor wire through the slot between said edges to be gripped thereby, said teeth providing means to increase the grip on the wire and hold it against sliding longitudinally in the slot.

5. In a device of the character described, an insulating body member comprising two superimposed sections provided with longitudinal aligned grooves in their opposed faces, an electrical contact in said member, means for connecting a conductor wire to said contact comprising a substantially flat elongated strip of resilient conductor metal connected to the contact and provided with a longitudinal narrow slot, the walls of the strip inclined and extending laterally from the edges of the slot and yieldable to permit insertion of the free end of a conductor

wire through the slot between said edges to be gripped thereby, and the outer side edges of the strip seated in said grooves to be held thereby against lateral movement as the wire is inserted in the slot and also by a pull on the wire.

6. Electric wiring apparatus in combination, an insulating housing, an electrical contact in said housing and means for connecting a conductor to said contact comprising an elongated flat strip of resilient metal connected to the contact and provided with a longitudinal central slit, the metal of the strip adjacent the slit forming converging wings to guide and receive a bared conductor between the free edges of the slit to grip the same and resist withdrawal, means forming part of said housing engaging the outer edges of said strip wings to prevent spreading thereof on attempted conductor withdrawal, and a conductor entrance hole in said housing aligned with said slit.

7. Electric wiring apparatus in combination, a rigid insulating housing having a longitudinally channeled body and a cover, an electric contact wholly submerged in said channel, means for connecting a conductor to said contact comprising an elongated strip of resilient metal end-connected to said contact, lying along the channel bottom and longitudinally centrally slit, the slit edges forming borders for converging wings extending laterally from a wall of said channel and yieldable to accept the bared end of a conductor through the slit for gripping by said borders, a wall of said body having a wire receiving hole therethrough in alignment with the slit to direct a conductor thereto, and a second larger hole in the same alignment but spaced from the first to receive a nail to spread the wings and release a gripped wire from the slit.

8. The apparatus as defined in claim 7 in which the outer edges of said strip are closely engaged by the channel walls adjacent said wings to prevent spreading of the latter on the application of withdrawal tension on the conductor.

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