Dec. 12, 1939. C. E. GILBERT 2,183,016

ELECTRICAL CONNECTOR

Filed May 19, 1937

Fig. 1.

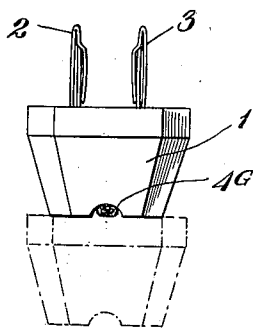


Fig. 2.

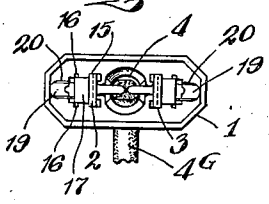


Fig. 3.

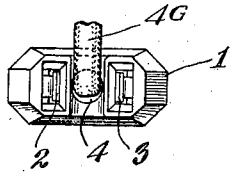


Fig. 4.

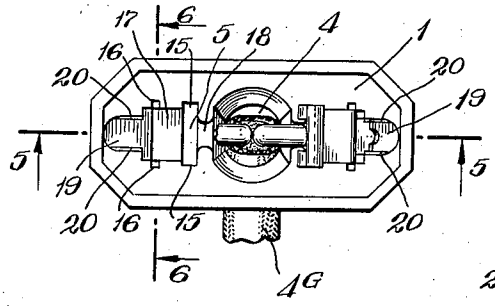


Fig. 5.

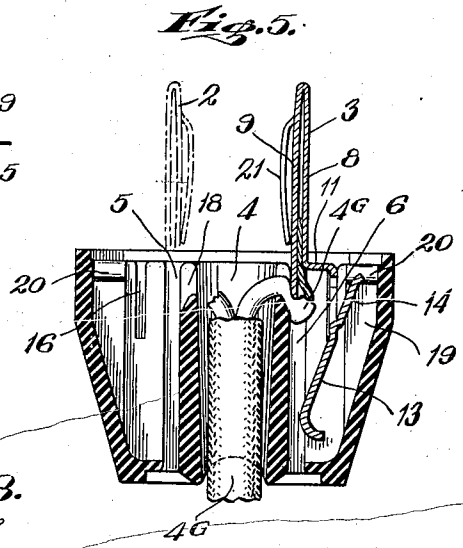


Fig. 7.

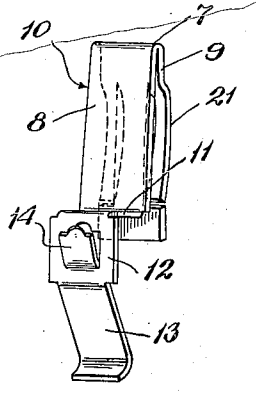


Fig. 8.

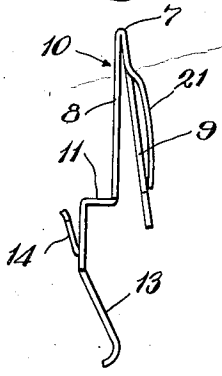
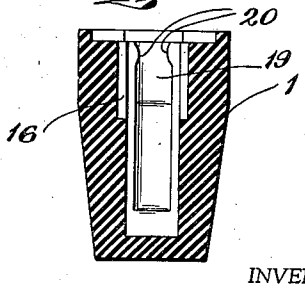


Fig. 6.



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Patented Dec. 12, 1939

2,183,016

UNITED STATES PATENT OFFICE

2,183,016

ELECTRICAL CONNECTOR

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Application May 19, 1937, Serial No. 143,400

4 Claims. (Cl. 173—334)

This invention relates to a new and useful improvement in combined electrical connectors and auxiliary outlets. Among its features are a one-piece molded body adapted to rigidly and securely retain, without the use of screws, rivets, or other similar devices, contact elements, not only for making the usual connection between a conductor and an electrical outlet, but also providing an auxiliary outlet with which another connector can be inserted, so that two or more conductors can be supplied with current from a single main outlet, and a novel means for maintaining the contact legs in parallel alignment. The device, although providing both a connector and auxiliary outlet, need be no larger than a connector alone, and may be manufactured and assembled at very low cost.

The form selected for illustration and description resembles in size and shape an electric "plug," having the usual two contact blades, but it will be understood that the invention is not limited in any respect thereto, but may be embodied in many other forms and conductor capacities.

In the drawing:

Fig. 1 is a side elevation of a connector showing in dotted line another similar connector attached thereto;

Fig. 2 is an end view of the connector of Fig. 1;

Fig. 3 is a similar view of the other end of the connector of Fig. 1;

Fig. 4 is an enlarged view similar to Fig. 2 showing the parts with greater clarity and with one contact element omitted;

Fig. 5 is a side elevation in section taken upon the line 5—5 of Fig. 4 viewed as indicated by the arrows;

Fig. 6 is an end elevation in section taken upon the line 6—6 of Fig. 4, viewed as indicated by the arrows;

Figs. 7 and 8 are views of a contact element.

As shown, the device consists of a body 1 of non-conducting material, which may be made in one piece by a simple molding operation, and two contact elements, 2 and 3, each of which may be stamped out of a single piece of conducting material. No other parts, such as screws or rivets for retaining the contacts within the body, for connecting them to a conductor, or for connecting another connector, are required.

The body 1 is provided with a central passage 4 for the admission of a conductor 4a, such as a two-wire insulated cord, and two passages 5 and 6 symmetrically disposed upon opposite sides of passage 4, which also pass completely through the body, and within which the contact elements 2 and 3 are positioned.

A contact element is shown in Figs. 7 and 8. It consists of a strip of resilient conducting material bent upon itself as at 7, into two legs 8 and 9, which form a blade 10, suitable for insertion in an outlet. Somewhat above the free end of leg 9 leg 8 is bent at substantially a right-angle and then bent again so as to form a shoulder 11. This leg then resumes its original width for a portion 12, from which a narrower contact portion 13 extends. In portion 12 is an outwardly extending locking tongue 14.

The side walls of each passage 5 and 6 are grooved as shown at 15 and 16 to widen the passage at these points to admit the contact blade and portion 12 of the contact element, respectively. Grooves 15 extend from one end of the body to the other, whereas the depth of grooves 16 is limited substantially to the length of portion 12 of the contact element, as shown in Figs. 5 and 6.

The width of intermediate portion 17 of the passage is slightly greater than the width of shoulder portion 11 of the contact element. The inner end wall of the passage is provided with a channel 18, giving access to the central passage 4. The outer end wall of the passage is intersected by a channel 19, from the side walls of which project shoulders 20.

In use, the conductor 4a, from the end of which the insulation has been removed, is passed through the central passage 4 and its bare end pinched between the legs of the contact element. The element is then inserted in one of the recesses 5 or 6, as shown in Figure 5, and pushed in until portion 12 seats at the bottom of grooves 16. The locking tongue will then be positioned directly below shoulders 20, and will engage with these shoulders to lock the contact elements securely in position against longitudinal displacement. Also, since portion 12 of the contact element fits into groove 16 and legs 8 and 9 into grooves 15, the contact blade cannot move laterally out of correct alignment. This is important because, in the majority of connectors, the contact blades ultimately become loose so that they no longer maintain rigid parallel alignment, and contact with the outlet is impaired and uncertain.

As will be seen from Fig. 5, a contact 13 of the contact element projects into passage 5 or 6, as the case may be, between grooves 15 adjacent the end opposite to that from which the blade 10 extends, and the ends of legs 8 and 9, forming blade 10, are held together with the conductor

between them, by grooves 15, assuring positive contact between the contact element and the conductor. The conductor 4a is bent sharply around the end of leg 9 of the contact element, and bent again sharply where it passes into central passage 4 from groove 18. Between these bends it is jammed between leg 9 and the bottom end of notch 18 and thus is so securely held that it cannot be pulled out, or otherwise inadvertently disconnected. The other contact element and conductor are similarly assembled within the body.

To make contact with an electrical outlet, the connector blades 10 are pushed into the outlet in the usual way. If a second connection to the same outlet is desired, a second connector of the same or any standard construction is simply pushed into the first connector, as indicated in Figure 1, its blades making contact through contacts 13 of the first connector. By adhering to connectors of this invention, three or more connectors can be connected to a single outlet without the use of any separate multiple connection devices, and all of them will occupy no more space laterally than a single connector.

Another valuable feature may, if desired, be embodied in this invention. It consists of means for holding the connector securely within an outlet irrespective of the position or condition of the contact of the outlet. It is a very common experience to find that plug-in connectors are very insecurely held by the electrical outlet, with the result that they pull out too easily, or fall out of their own accord. As a general rule, the spring tension of the contacts in the outlet, which are supposed to press firmly against the contact prongs of the connector, are depended upon to retain the connector within the outlet. However, very frequently these spring contacts are too weak, or become permanently bent back through use, so that they not only fail to hold the connector securely, but often allow it to wobble about so that the electrical connection is broken, even though the connector may still be retained in the outlet. This results, not only in great inconvenience, but has been the cause of many short circuits and even fires within the walls of buildings.

To obviate this difficulty and danger, each of the contact elements of the connector of this invention is provided, on the leg other than that with which the contact of the outlet engages, with the outwardly-bowed tongue 21. In the drawing it is assumed that the leg just referred to is leg 9, and the outwardly-bowed tongues 21 are shown located in approximately the mid-section of that leg, so that they will enter the outlet when the connector is inserted therein. Tongues 21 may be formed when the connector is stamped without materially complicating the process.

When the connector is inserted in the outlet, tongues 21 will press against the walls of the recesses in which the connector blades are received, without materially altering the position of the blades. This pressure of tongues 21 against the walls of the outlet will hold the connector securely within the outlet, irrespective of the pressure between the blades and the contacts of the outlets. Therefore, if the outlet is in sufficiently good condition to make any electrical contact at all, it will be maintained because the possibility that the connector will wobble about has been eliminated. As is well known, a very slight contact is sufficient as long as it is maintained, so that even though the spring contacts of the outlet may have become weakened or bent somewhat out of their original position, the connector and outlet will function adequately unless the outlet is completely out of repair.

In this way, a very common difficulty and a real danger is substantially eliminated without complicating or adding to the cost of the connector appreciably. Earlier efforts to achieve the same result have been directed towards changing the shape of the contact blades so as to insure a stronger contact between the blades of the connector and the contacts of the outlet. That is to say, the blades have been provided with a spring element projecting towards the contacts of the outlet to insure a firm contact between them. This, however, merely results in springing the contacts of the outlet backward to an undesirable degree, and in the ultimate fixing of the contacts in such backwardly-sprung position, so that, sooner or later, the same undesirable conditions prevail. Also the outlet has been rendered practically useless for connectors having blades not provided with such spring elements.

If desired a single tongue 21 positioned midway between the edges of the leg of the contact element may be substituted for the two tongues shown, but the latter are preferred since they supply double the frictional resistance of a single tongue and their spaced relation provides a more substantial support against movement within the outlet.

I claim:

1. An electrical connector which includes a body of insulating material provided with a passage therethrough adapted to receive a contact element, each of the side walls of said passage being provided with a plurality of parallel grooves opposed to similar grooves in the other side wall, a contact element seated in said passage consisting of a strip of conducting material in the form of two legs joined at one end for making connection with another connector, said two legs being held together with a conductor between them by a pair of said opposed grooves in the side walls of said passage, one of said legs being provided with an offset extension engaging with another opposed pair of said grooves.

2. An electrical connector according to claim 1, in which one of said legs is provided with a portion for making contact with still another connector.

3. An electrical connector which includes a body of insulating material provided with a passage therethrough to receive a contact element, each of said walls of said passage being provided with a plurality of parallel grooves opposed to similar grooves in the other side wall, a channel opening into said passage and provided with inwardly projecting shoulders, a contact element seated in said passage consisting of a strip of conducting material in the form of two legs joined at one end for making connection with another connector, said two legs being held together with a conductor between them by a pair of said opposed grooves in the side walls of said passage, one of said legs being provided with an offset extension engaging with another opposed pair of said grooves, and one of said legs being provided with an offset tongue engaging with said shoulders of said channel.

4. An electrical connector acccording to claim 3, in which one of said legs is also provided with a portion for making contact with still another connector.

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