

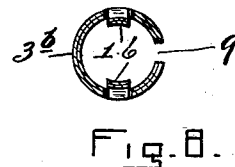
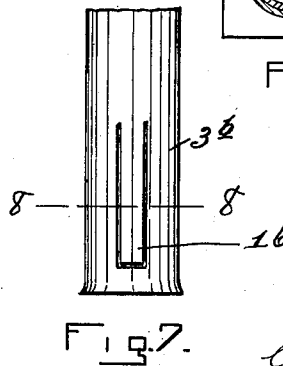
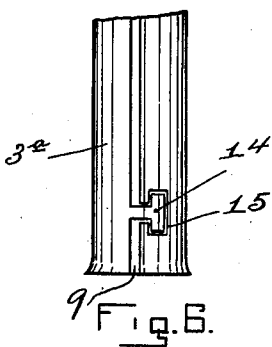
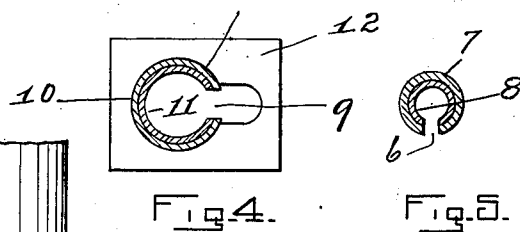
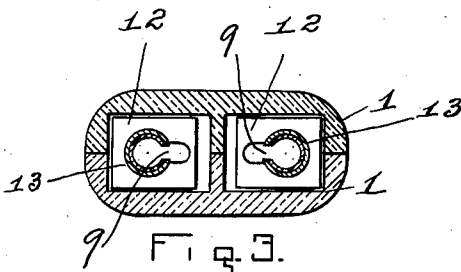
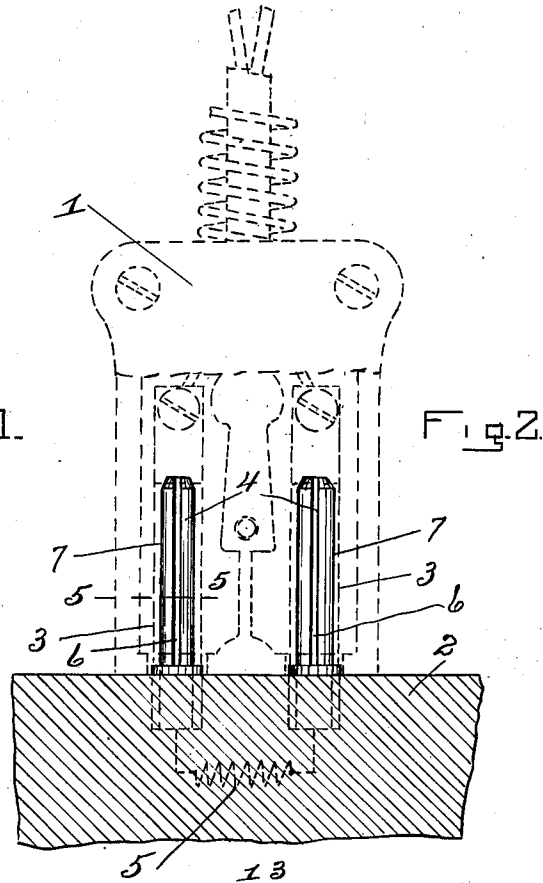
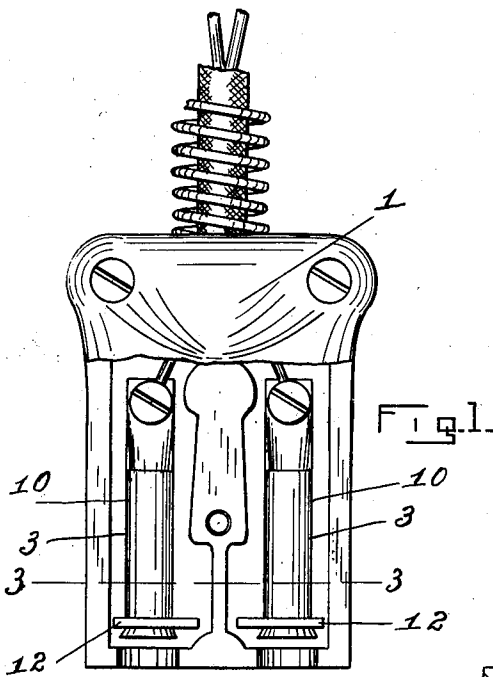
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1,635,830

W. J. GAGNON
ELECTRICAL CONNECTER

Filed Feb. 29, 1924

2 Sheets-Sheet 1.



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2 Sheets-Sheet 2

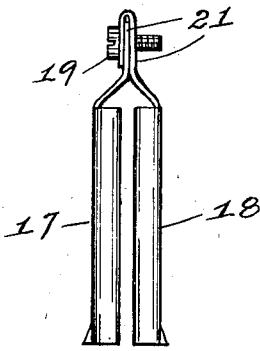


Fig. 9.

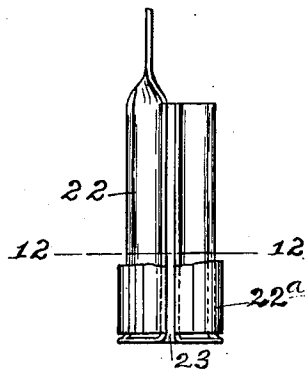


Fig. 11.

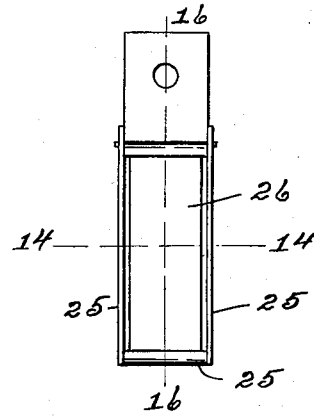


Fig. 13.

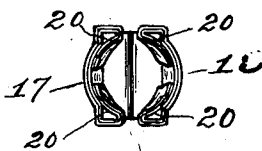


Fig. 10.



Fig. 12.

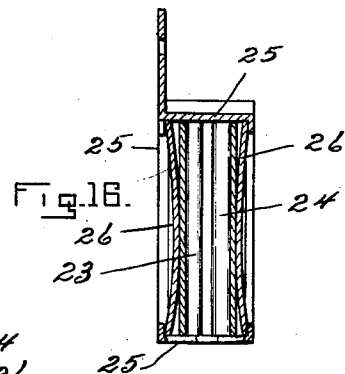


Fig. 16.

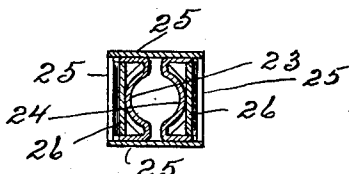


Fig. 14.

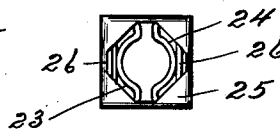


Fig. 15.

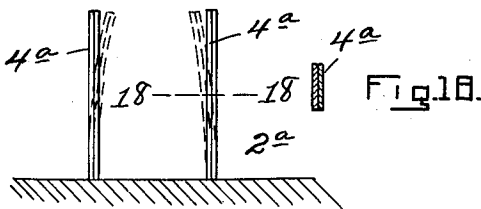


Fig. 17.

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UNITED STATES PATENT OFFICE.

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ELECTRICAL CONNECTER.

Application filed February 29, 1924. Serial No. 695,972.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

This invention relates to means for connecting electrical conductors together.

Certain objects of the invention are to obtain a more effective engagement between cooperating contact portions of the connector.

Other objects will appear in connection with the following description.

Fig. 1 of the drawings is a view in side elevation of a socket-member of an electrical connector with the housing partly broken-away to expose to view the two contact-sockets which are made in accordance with my invention.

Fig. 2 is a vertical cross-section of a broken-away portion of the plug-member of the connector, showing in side elevation the two plugs, and illustrating diagrammatically a resistance included in the circuit between the plugs.

Fig. 3 is a cross-section taken on the broken line 3—3 in Fig. 1.

Fig. 4 is a view on a larger scale showing a cross-section of one of the contact-sockets enclosed by the expansion-limiting plate as shown in Figs. 1 and 3.

Fig. 5 is a cross-section on the broken line 5—5 through one of the plugs shown in Fig. 2.

Fig. 6 is a view in side elevation of a broken-away portion of one of the contact-sockets having integral means for limiting expansion of the socket.

Fig. 7 is a view in side elevation of a broken-away portion of a contact-socket formed with spring tongues.

Fig. 8 is a cross-section of the same taken on the broken line 8—8 in Fig. 7.

Fig. 9 is a view in side elevation of a two-piece contact-socket embodying my invention.

Fig. 10 is a view of the open end of the same.

Fig. 11 is a view in side elevation of a contact-socket embodying my invention adapted to receive either a round plug or a flat plug.

Fig. 12 is a cross-section of the same taken on the broken line 12—12 in Fig. 11.

Fig. 13 is a view in side elevation showing a modified form of my invention with respect to the contact-socket.

Fig. 14 is a cross-section of the same taken on the broken line 14—14 in Fig. 13.

Fig. 15 is a view of the open end of the same.

Fig. 16 is a longitudinal section of the same taken on the broken line 16—16 in Fig. 13.

Fig. 17 is a view similar to Fig. 2, showing a plug member provided with flat plugs in accordance with my invention.

Fig. 18 is a horizontal cross-section taken through one of the plugs on the broken line 18—18 in Fig. 17.

For convenience of illustration, the dimensions of certain parts have been exaggerated in the drawings.

Referring to Figs. 1, 2, 3, 4 and 5, the connector comprises a socket-member, 1, and a plug-member, 2.

I have shown the socket-member, 1, provided with two contact-sockets, 3, and the plug-member, 2, provided with two plugs, 4, although my invention is equally applicable to a single contact-socket, 3, and a single plug, 4.

In the drawings I have shown the invention as applied to an electrical connector as used for ordinary household devices such as toasters, coffee percolators, electric flat-irons and the like, in which case a plurality of contact-sockets and plugs are employed, the plug-member, 2, being the device to be heated by means of a resistance, 5, included in the circuit between the plugs, 4.

In applying my invention to the plug, 4, I preferably make the plug in the form of a hollow post, split longitudinally along one side as shown at 6; and form the wall of the plug of two metals, 7 and 8, of split cylindrical form welded or otherwise secured together, the inner member, 8, having a higher coefficient of expansion than the outer member, 7, whereby under the action of heat the post tends to expand or increase in diameter.

In applying my invention to the contact-socket, 3, the socket is preferably split longitudinally as shown at 9, and the wall of the socket is formed of two metals, 10 and 11, of split cylindrical form, the outer metal, 10, having a higher coefficient of expansion than the inner metal, 11, the two members 10

and 11, being secured together by welding or in any other known manner.

The operation of the device is as follows:

A plug, 4, is inserted in a contact socket, 3, they being made to substantially fit together. When the electric current is transmitted between the contact-socket, 3, and the plug, 4, if the plug does not fit sufficiently tightly within the contact-socket, the socket and plug become heated, causing the plug to tend to expand and the contact-socket to tend to contract, due to their respective thermostatic constructions.

The split portion of the wall of the plug thus tends to move under the action of heat toward the wall of the cooperative contact-socket; and in a similar manner the split portion of the wall of the contact-socket under the action of heat tends to move toward the cooperative contact-plug.

Any looseness in the fitting of the plug within the contact-socket is thus automatically corrected in the operation of the device.

In order to prevent undue or injurious expansion or displacement of the walls of the contact-socket by careless insertion of a plug into the socket, I prefer to provide the device with means for limiting the expansion of the contact socket as shown in Figs. 1, 3 and 4.

This expansion-limiting means comprises a plate, 12, formed with an aperture, 13, of a diameter corresponding with the maximum diameter to which the contact socket is to be expanded. This plate freely encircles the contact-socket near its open end as shown in the drawings, and serves effectively to prevent injurious expansion of the socket.

In Fig. 6 I have shown the expansion-limiting means formed integral with the contact-socket, 3^a, and in the form of a T-shaped tongue, 14, projecting from one edge of the split wall of the socket and occupying a similarly shaped opening, 15, in the wall of the socket on the opposite side of the split, with provision for sufficient lost motion to permit limited expansion of the socket.

In the construction shown in Figs. 7 and 8, the contact-socket, 3^b, is formed with integral spring-tongues, 16, in its wall on opposite sides of the split, 9, the pressure of which springs upon an inserted plug is increased by the thermostatic action of the wall of the socket when heated; the socket wall being made of two thicknesses of metal substantially as described, with respect to contact-sockets, 3.

In Figs. 9 and 10, I have shown the invention applied to a contact-socket formed of two members, 17 and 18, the longitudinal

edges of which are introverted as shown at 20, to form substantially cylindrical contact-surfaces for engagement with the plug.

The members, 17 and 18, are secured together by means of a binding-screw, 19, passing through ears, 21, on the inner ends of the respective members.

In Figs. 11 and 12, I have shown my invention applied to a contact-socket of a form adapted to receive either a cylindrical plug or a flat plug.

This socket comprises an inner member, 22, in the general form of a cross, split or open along one side at 23, whereby it can be expanded or contracted.

The inner member, 22, is enclosed by a cylindrical member, 22^a, formed of two thicknesses of metal welded or otherwise secured together, the outer thickness of metal having a higher coefficient of expansion than the inner thickness.

The cylindrical member, 22^a, is split along one side to permit it to expand and contract.

The inner member, 22, is made of resilient sheet metal, and is readily compressed by the outer cylindrical member, 22^a, when the latter is contracted under heat.

In Figs. 13 to 16 inclusive I have shown a contact-socket formed of two complementary members, 23 and 24, enclosed within a metal cage, 25, between two metal plates, 26, which plates are curved inwardly to engage the respective socket-members, and have a higher coefficient of expansion than the metal of which the sides of the cage are formed.

Under the influence of heat, the plates, 26, tend to elongate; and as the elongation is prevented or limited by the top and bottom of the cage with which the ends of the plates are in engagement, the plates tend to curve inwardly to a greater extent, thereby forcing the socket-members, 23 and 24, toward each other and thus toward a contact-plug which may be inserted in the socket.

In Figs. 17 and 18 I have shown a plug member, 2^a, having two parallel flat plugs, 4^a, each formed of two thicknesses of metal welded or otherwise secured together, the outer thicknesses having a higher coefficient of expansion than the inner thicknesses. Under the action of heat these plugs will tend to bend toward each other and tend to more tightly engage the contact-sockets on a complementary socket-member.

If desired one only of the plugs, 4^a, may have the described thermostatic construction.

By reversing the positions of the two thicknesses of metal in the plugs they can be caused to diverge instead of converge under the action of heat to accomplish the desired purpose.

In the use of electrical connectors of the

type to which this invention is particularly applicable, there is a tendency for the resilient and tempered parts to become annealed under the action of great heat developed in the use of the electrically heated device to which the electric current is supplied through the connector, resulting in loose contacts and resultant arcing between contact-surfaces which should be in close contact with each other.

My invention tends to overcome this difficulty by automatically increasing the pressure between contacting surfaces as the temperature of the connector parts increases.

I do not wish to be limited to the constructions shown and above described, as, for certain purposes of the invention, various changes may be made in the form and arrangement of various parts of the device without departing from the spirit of the invention.

I make no claim herein specifically to the forms of my invention shown in Figs. 6 to 18, inclusive, as the constructions shown in said figures are included in certain of the generic claims of the present application, and are made the subject of separate applications filed as divisions of this application, and copending herewith.

What I claim as new and desire to secure by Letters Patent is—

1. A separable connector for electrical conductors comprising a contact socket and a contact plug adapted to mate therewith, said plug comprising a hollow cylindrical bi-metallic shell adapted for frictional and electrical contact with the contact socket, said shell being longitudinally split to permit its lateral expansion under the influence of heat.

2. A connector for electrical conductors including a split contact-socket having means whereby its movement of expansion is limited; and a split contact-plug having a thermostatic element tending under the action of heat to expand the plug.

3. A separable connector for electrical conductors comprising a contact socket and a contact plug adapted to mate therewith, the socket and plug each comprising a hollow cylindrical bi-metallic shell adapted for frictional and electrical contact with each other, said shells being longitudinally split to permit of their contraction and expansion, respectively, under the influence of heat.

In testimony whereof, I have hereunto set my hand this 16th day of February, 1924.

WILLIAM J. GAGNON.