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L. F. BAKER

2,404,682

PLUG AND SOCKET CONNECTOR

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Fig. 1.

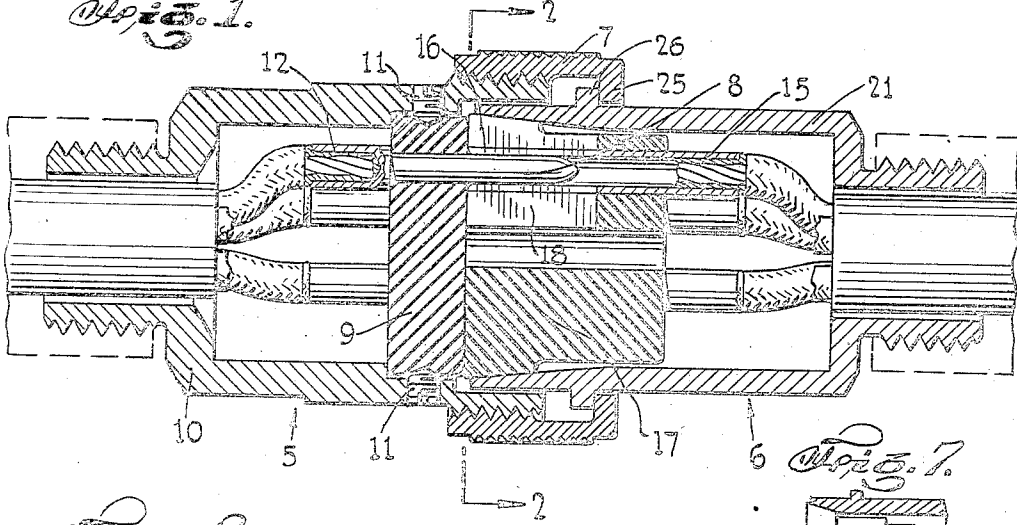


Fig. 2.

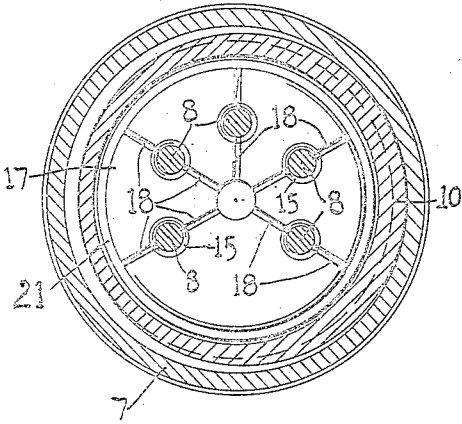


Fig. 3.

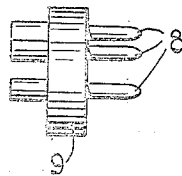


Fig. 7.

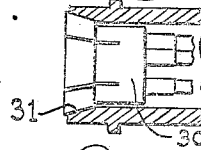


Fig. 4.

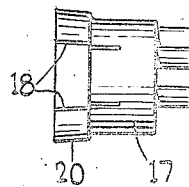


Fig. 5.

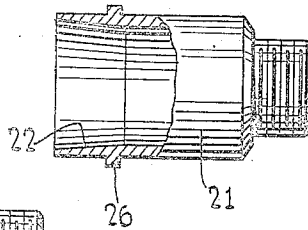
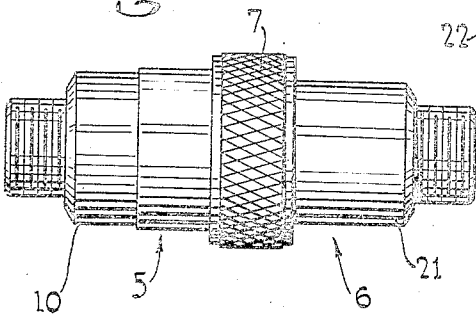


Fig. 6.



INVENTOR.
LEWIS F. BAKER
BY
Hammond & Lillie
ATTORNEYS

UNITED STATES PATENT OFFICE

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PLUG AND SOCKET CONNECTOR

Lewis F. Baker, Southport, Conn.

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7 Claims. (Cl. 173-328)

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The present invention has for an object to provide a multiple electrical plug and socket connector which can be expeditiously and economically manufactured and which will be reliable in operation and of long, effective life in service.

It is an object of the invention to provide a connector of this type wherein pressure between the mating electrical contact members is insured when the connector is coupled and wherein effective operation is maintained even after considerable wear has occurred. In radio, electronic and other electrical fields where pieces of appliance are to be coupled and uncoupled to facilitate installation, repair, replacement or relocation it is frequently desirable to be able quickly to connect a number of the circuits of the apparatus and as quickly to disconnect the circuits when required. Multiple circuit connectors are used for this purpose, thus to avoid the nuisance, confusion and possibility of error which attends the use of a number of separate, individual connectors.

The present invention provides a connector wherein the contact elements are of such construction that wear is compensated by adjustment and pressure engagement of the contacts is insured. In the preferred embodiment, as the parts are connected and disconnected the wiping engagement is such as will insure good electrical contact in spite of wear. In the preferred embodiment, also, the pressure of the connector parts against each other when they are pressed together in the act of making the connection tends to cause contraction of the socket elements by causing relative movement of parts which engage with cam action to press on the socket elements.

The invention has been developed more particularly in designing a connector for use in electronic and control applications but its field of use is in no sense limited thereto. The connector designed for this purpose has included round prong contacts and corresponding round sleeve contacts adapted to receive the prongs and such an embodiment will be more particularly described for the purposes of illustrating the principles of the invention.

The nature and objects of the invention will be better understood from a description of a particular illustrative embodiment, for the purposes of which description reference should be had to the accompanying drawing forming a part hereof and in which

Figure 1 is a central longitudinal sectional view

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of a coupling embodying certain of the features of the invention.

Fig. 2 is a transverse sectional view taken on the line 2-2 of Fig. 1.

Figs. 3 and 4 are views in side elevation of an insulating member in which the male contacts are secured and a contractible insulation member in which the female contacts are secured, respectively.

Fig. 5 is a side view partly in section of the casing of the socket member.

Fig. 6 is a side view of the coupling as a whole.

Fig. 7 is a view of an alternative construction with greater taper.

The coupling shown for purposes of illustration comprises a plug member 5 and a socket member 6 with a connecting threaded sleeve 7 which suitably secures the parts together.

The plug member carries a number of parallel contact prongs 8 projecting from a block 9 of insulation material in which the prongs are rigidly secured. The plug is firmly but removably held in a casing 10 as by screws 11, while recesses 12 in the concealed ends of the prongs afford convenient attachment for conductors which may be soldered therein.

The socket member 6 includes a number of contact sockets 15 which may be split sleeves, as shown, having slightly flexible elements 16 and an insulation member 17 slotted for a portion of its length, as indicated at 18, to provide slightly flexible elements in which the sockets are rigidly secured. As shown, the slots in the split sleeves and the slots 13 in the insulation member are matched and they may, in fact, be cut through after the sleeves and insulation member are otherwise completely formed.

It is an important feature of the invention that the insulation member shall be contractible and adapted to contract the split sleeves to compensate for wear and insure pressure between the contacts. In the arrangement shown the contractibility is provided by the slotted arrangement described and this is sufficiently illustrative of the principle involved.

The contraction may be effected in various ways. In the plug shown the insulation member and the casing are formed with suitably cooperating cam surfaces which upon suitable pressure as the parts are put together in making a connection and resultant movement cause contraction of the sockets on the prongs inserted therein. More specifically, the insulation member is formed with a truncated conical surface 20 which extends part way along the flexible or contractible

portion and the casing is formed with a corresponding conical surface 22. As the plug and socket members are put together in use the insulation block 9 presses against the face of the insulation member 17 and tends to cause relative movement of the engaging conical surfaces to tighten the contact sockets on the prongs. If wear has occurred a corresponding contraction of the contact sockets will be effected and pressure of engagement and a good wiping contact between the prongs and the socket elements will be maintained.

With proper proportion of the parts and suitable operation the necessary friction and gripping pressure will be obtained but without seizing. The angle of the cones should be chosen with that object in mind. There are certain advantages in making the cone less than the critical friction angle in that as the sockets are contracted they remain so and a wiping contact is insured. On the other hand, with a large angle the plug and socket members may be arranged to engage and separate with little rubbing and little wear.

If the connector is suitably designed with proper regard to correlation between the force to be used in coupling the connector, the angle of the tapered cam surfaces, and the friction of the several movable parts, then such wear as occurs will be sufficiently compensated by the contraction of the female contact elements to provide pressure for good electrical contact without such gripping as would make difficult separation of the plug and socket.

Whether means to hold the plug and socket members together or means to draw them forcibly together and hold them in this position is required will depend upon the intended use of the coupling. If any means is required then any suitable means such as a bayonet connection, a threaded sleeve or other device may be applied. In the connector shown in Fig. 1 a retainer member 7 is provided which has an inwardly extended flange 25 engaging a corresponding flange 26 on the casing 21 and internal threads engaging corresponding threads on the casing 10. The range of movement of the retaining member 7 is such that it may be used not only to hold the parts together against separation but also it may be operated to pull the casings together and therefore to force the relatively tapered parts together. The outer surface of the retaining member 7 is knurled to provide a better grip thereon but the knurling is made relatively fine in order that not too effective a grip will be provided.

The insulation member 30 shown in Fig. 7 has a taper 31 greater than the angle of friction and is adapted to release automatically.

The foregoing particular description is illustrative merely and is not intended as defining the limits of the invention.

I claim:

1. An electrical coupling comprising interengageable plug and socket members, the plug member including a number of projecting male contacts and a casing in which the contacts are secured, the socket member including a corresponding number of female split-sleeve contacts, an insulation member in which the split-sleeve contacts are secured, said insulation member being slotted adjacent the split-sleeve contacts to provide flexible elements adjacent thereto and means for pressing the flexible elements to compress the split-sleeve contacts to increase the

pressure on the male contacts when the plug and socket members are connected.

2. An electrical coupling comprising interengageable plug and socket members, the plug member including a number of parallel, projecting contact prongs and a casing in which the contacts are carried, the socket member including a corresponding number of contact sockets, each comprising opposed flexible elements, an insulation member slotted to provide a number of flexible elements with slots therebetween, the opposed flexible contact elements of each contact socket being mounted in adjacent flexible elements facing each other and means for pressing the flexible elements of the insulation member together to cause the flexible elements of the socket members to grip the prongs when inserted therein.

3. An electrical coupling comprising interengageable plug and socket members, the plug member having a number of parallel projecting contact prongs, the socket member having a corresponding number of contractible contact sockets adapted to receive the contact prongs, a contractible insulation member in which the contractible contact sockets are mounted to be contracted by contraction of the insulation member, a casing in which the insulation member is mounted, said casing and insulation member being formed with cooperating cam surfaces arranged to cooperate to cause contraction of the insulation member when pressure is suitably applied to the insulation member upon insertion of the prong contacts in the contractible contact sockets.

4. An electrical coupling comprising interengageable plug and socket members, the plug member having a number of parallel contact prongs, the socket member having a corresponding number of contractible contact sockets adapted to receive the parallel prongs, a contractible insulation member in which the contact sockets are mounted and by which they are arranged to be contracted, a casing in which the insulation member is mounted, the insulation member and casing having tapered inter-engagement such that pressure of the plug member against the insulation member will cause compression of the insulation member and contraction of the contact sockets.

5. An electrical coupling comprising interengageable plug and socket members, the plug member including a shouldered casing, an insulating block fitting into the shouldered casing, and a plurality of plug contacts secured in and extending through the block, the socket member including a tapered casing, a split contractible insulation member fitting in and movable in the tapered casing and having a plurality of parallel longitudinal contractible bores therethrough, and split sleeve contacts in said bores, the plug and socket casings having thread and nut connection to draw the casings together and thereby contract the split sleeve contacts substantially as described.

6. An electrical connector as defined in claim 4 wherein the taper between the insulation member and its casing is less than the critical angle of friction.

7. An electrical connector as defined in claim 4 wherein the taper between the insulation member and its casing is greater than the critical angle of friction.

LEWIS F. BAKER.