Aug. 22, 1961 F. S. WALTER 2,997,687

CONNECTORS

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Fig. 1.

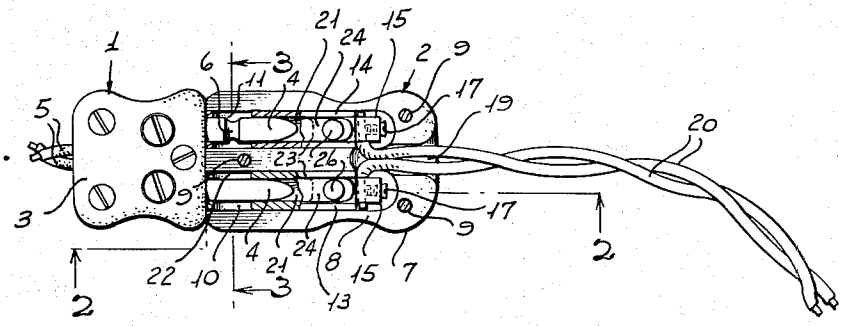

Fig. 2.

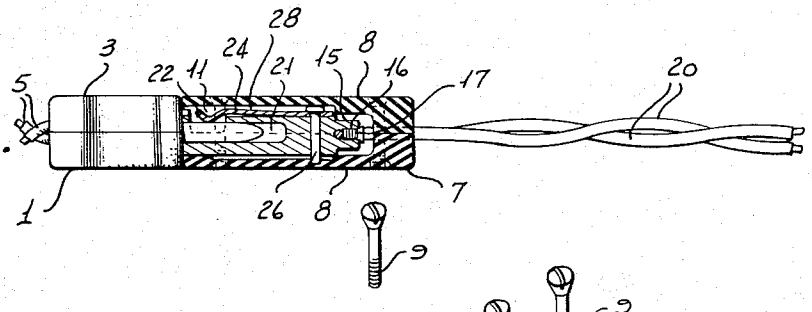

Fig. 3.

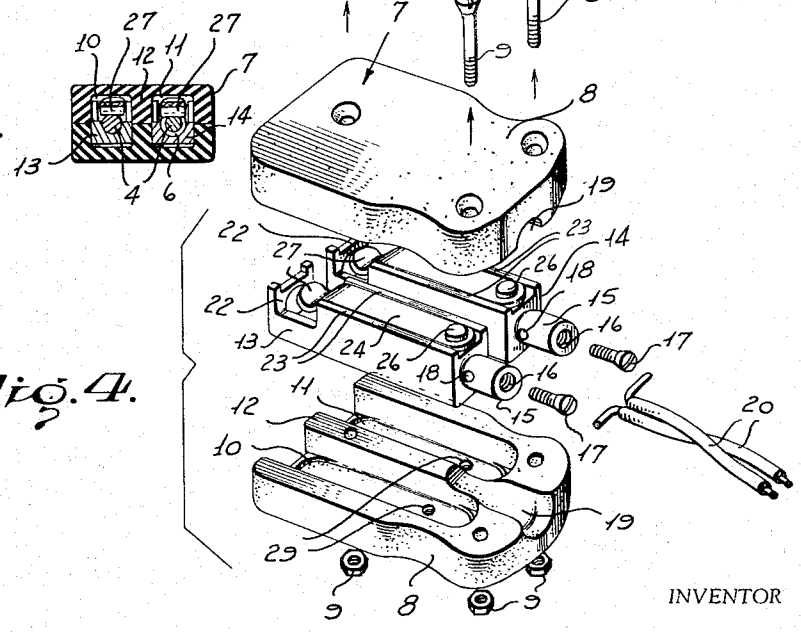

Fig. 4.

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Fig. 5.

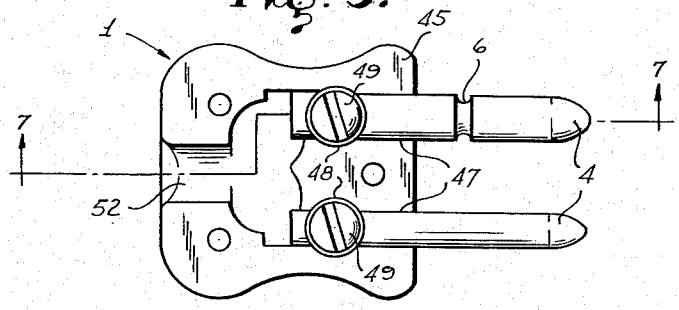


Fig. 6.

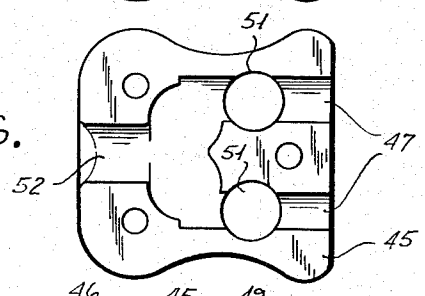


Fig. 7.

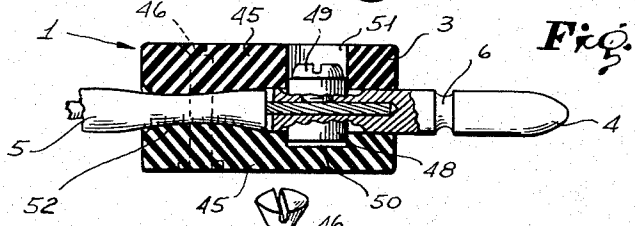
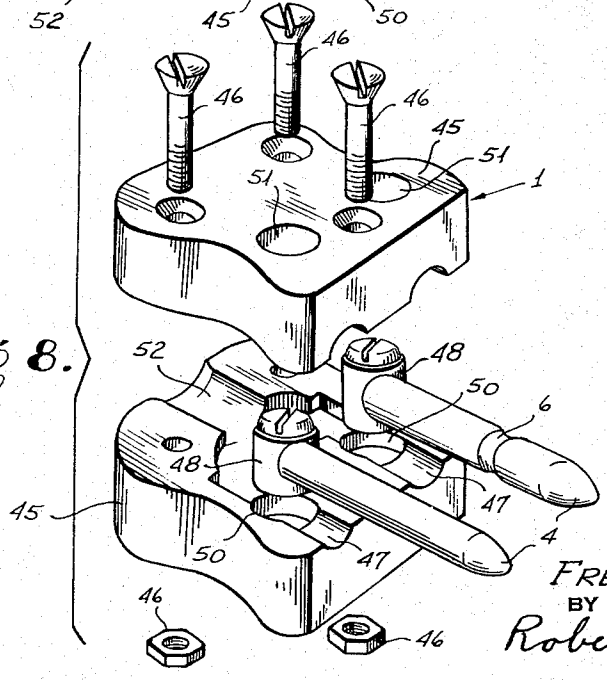


Fig. 8.



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2,997,687

CONNECTORS

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Filed Sept. 4, 1957, Ser. No. 681,919
1 Claim. (Cl. 339—291)

My invention relates to connectors and more particularly to plug and jack connectors employed in thermocouple leads, this application being a continuation-in-part of my copending application, Serial No. 201,110, filed December 16, 1950 and issued as Patent No. 2,823,364 on February 11, 1958.

It is well known that where temperature differences occur across the connections between thermocouples and leads, only connectors of matched thermocouple materials will eliminate the errors produced by using unmatched materials. Furthermore, where accurate temperature readings are required, it is generally recognized that, within the temperature range to which the connectors are subjected, the temperature E.M.F. characteristics of the materials used to complete the circuits must match those of the thermocouple.

One of the objects of my invention is to provide a multiplex type of plug and jack connector for employment in a plurality of thermocouple leads and which is capable of quick plug and jack assembly and disassembly for circuit making and breaking and constructed in a manner permitting the use of matched thermocouple materials.

An important object of my invention is to provide a connector of the foregoing described character which is simple in construction, durable in use, efficient in operation and economical in manufacture.

With the above and other objects in view, as will hereinafter appear, the invention consists in the combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Referring to the drawings wherein like reference characters designate like parts throughout the several views:

FIGURE 1 is a top plan view, partly in section, of my plug and jack connector with a housing component of the jack being removed for clarification;

FIGURE 2 is a sectional view, partly in elevation, taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a detail transverse sectional view taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a disassembled perspective view of the jack;

FIGURES 5 and 6 are interior plan views of the respective housing sections of the plug on an enlarged scale, the sections of FIGURE 5 having the prongs seated therein;

FIGURE 7 is a section taken on the line 7—7 of FIGURE 5; and

FIGURE 8 is a disassembled perspective view of the plug.

In practicing my invention, as illustrated in FIGURES 1 to 4 of the drawings, I provide a connector having a plug 1 and a jack 2 with the plug 1 comprising a housing 3 of insulating material and in which is housed the inner end sections of a pair of spaced tubular contact prongs or posts 4, the inner end sections having connected thereto leads 5, respectively. The prongs 4 extend outwardly through the front face of the housing and with one of the prongs 4 being of a greater diameter than the other and formed with a transverse latching groove 6.

The jack 2 is constructed with a housing or casing 7 of insulating material and formed with a pair of lengthwise separable sections 8 normally secured together in fixed relation by screw and nut assemblies 9. The housing 7 is formed with a pair of substantially square-shaped channels 10 and 11, respectively, in cross-section and which channels have coincident ends opening through the front end face of the housing. The housing 7 is provided with a centrally disposed and lengthwise extending partition 12 for isolating the channels 10 and 11 from each other and which partition 12 defines a common side wall for and between the channels.

Snugly fitted within the channels 10 and 11 are substantially square-shaped contact members 13 and 14, respectively, having cylindrical rear end sections 15 provided with axially threaded bores 16 accommodating binding screws 17 and which end sections 15 are formed with transversely disposed lead openings 18 communicating with the bores 16. The housing 7 is fashioned, between the rear end of the partition 12 and its rear end face, with a centrally disposed longitudinally extending slot 19 having its outer end opening through said rear end face and its rear end communicating laterally with the inner ends of the channels 10 and 11. Substantially intermediate its length, the slot 19 is of a somewhat flat ovate configuration in cross-section whereby leads 20 extending into the slot 19 will be clamped therein by the opposed walls of the sections 8 when the latter are in assembled relation, the leads 20 having their terminals extending through the openings 18 and clamped within the bores 16 by the screws 17, thus, establishing electrical connections with the members 13 and 14, respectively. By thus clamping the leads between the sections 8, the housing serves as a strain relief.

The front faces of the contact members 13 and 14 are disposed in substantially flush relation with the front end face of the housing and are formed with longitudinally extending sockets 21 for accommodating the prongs 4, respectively. The rear ends of the sockets 21 terminate an appreciable distance from the bores 16 while their front ends open through the front faces of the members 13 and 14, respectively, one of the sockets being of a greater diameter than the other to insure proper mating with the prongs 4.

The members 13 and 14, adjacent their front ends are formed with transverse grooves 22 providing access to the sockets 21 and have coincident faces each provided with a pair of spaced longitudinally extending ribs 23 between which is disposed a leaf spring 24. The rear ends of the leaf springs 24 are secured to the members by means of headed pins 26 having their shanks extending through the springs 24 and the members, between the sockets 21 and the bores 16, the shanks terminating an appreciable distance outwardly of the members and the heads of the pins overlying the springs 24. The front ends of the springs are formed with detents 27 extending within the grooves 22 and engaging the prongs 4 with one of the detents 27 seated within the groove 6, thus, latching the plug 1 and jack 2 together.

Coincident faces of the channels 10 and 11 are formed with furrows 28 for receiving the heads of the pins 26 while the opposed faces are provided with seats 29 in which are accommodated the outer ends of the shanks of the pins 26 whereby to preclude shifting of the members 13 and 14 relative to the housing. Inasmuch as the detents 27 are of a somewhat cuneiform construction, excellent contact with the prongs 4 is obtained while the detent 27, disposed within the groove 6, effects a positive seating therein and a resisted unseating therefrom upon insertion of the prongs 4 into and withdrawal from the sockets 21 to make and break the circuit between the leads 5 and 20, respectively.

In more detail, with reference to the plug 1 and as shown in FIGURES 5 to 8 of the drawings, the housing 3 is fashioned with a pair of lengthwise separable sections 45 normally secured together in fixed relation by screw and nut assemblies 46. The housing is provided with a

pair of cylindrical channels **47** of a size accommodating the prongs or posts **4** and which channels have coincident ends opening through the front end faces of the housing through which the prongs project. The inner end sections of the prongs or posts **4** are provided with right angularly extending cylindrical portions **48** of an appreciable greater diameter than the prongs **4**.

The inner end sections of the prongs **4** are fashioned with axially extending lead receiving openings which communicate with the inner ends of right angularly related threaded bores extending from coincident ends of the portions **48** and which bores are provided with binding screws **49** for securing the ends of the leads **5** therein, respectively. The opposite ends of the portions **48** are disposed within seats **50** formed in coincident faces of the channels **47** while the opposite opposed faces of the channels are formed with openings **51** accommodating the heads of the screws **49** and permitting ready access thereto.

The channels **47** have their rear ends terminating an appreciable distance inwardly of the rear face of the housing and which rear ends communicate with the rear end of a centrally disposed longitudinally extending slot **52** having its outer end opening through the rear end face of the housing **3**. The slot **52**, substantially intermediate its length, is of a somewhat flat ovate configuration in cross-section whereby the leads **5**, extending therethrough, will be clamped therein by the opposed walls of the sections **45** when the latter are in assembled relation, the leads **5** having their termini extending through the respective lead receiving openings of the prongs. The leads **5** and **20** constitute insulated wires which have their insulation removed from their terminals for effecting electrical connections.

The construction of my duplex jack and plug is such that it readily lends itself to the employment of suitable matching thermocouple metals, for example, iron and contantan or Chromel and Alumel, whereby I am enabled to provide a connector within a circuit having incorporated therein a thermocouple and a desired instrument, for instance, a pyrometer, without attendant errors from a temperature gradient.

Furthermore, the simplicity of construction of my connector is such that it readily lends itself to easy installation within a circuit while maintaining a high degree of ruggedness to withstand rough usage to which it may, at times, be subjected.

Without further elaboration, the foregoing will so fully explain the invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations.

It is obvious that the invention is not confined to the herein described use therefore as it may be utilized for any purpose to which it is adaptable. It is therefore to be understood that the invention is not limited to the specific construction as illustrated and described, as the same is only illustrative of the principles involved which are capable of extended application in various forms, and the invention comprehends all construction within the scope of the appended claim.

I claim:

In a duplex lead connector of the class described, a plug provided with a pair of spaced contact prong members adapted to be connected to a pair of lead wires, respectively, jack means detachably connected to said plug and provided with a pair of contact socket members receiving said prong members and adapted to be connected to another pair of lead wires for completing a circuit between the pairs of wires, respectively, said socket members being provided with resilient elements engaging said prong members to insure electrical connection between said prong and socket members, a housing of insulating material formed with a pair of spaced channels receiving said pair of socket members and including a partition extending between said socket members for isolating the latter relative to each other, said housing being formed with seats opening into said channels, said housing being formed with a pair of longitudinally separable sections detachably connected together and caging said socket members within said channels, said sections being separable to fully expose said socket members within one of said sections and permit ready removal of said socket members together with their respective lead wires from said last mentioned section, pins extending through said socket members and said elements for securing the latter to said socket members and having end sections projecting from said socket members into said seats for anchoring said socket members within said channels against endwise displacement and withdrawal from said housing through said channels upon disconnection of said plug from said jack means, said socket members being provided with openings for receiving the ends of lead wires, and screws threaded into said socket members for engaging and maintaining said ends within said openings.

References Cited in the file of this patent

UNITED STATES PATENTS

965,187	Hopkins	July 26, 1910
981,027	Stevens	Jan. 10, 1911
1,000,101	Marx	Aug. 8, 1911
1,291,933	Kuhn et al.	Jan. 21, 1919
1,518,639	De Reamer	Dec. 9, 1924
1,685,420	Higham	Sept. 25, 1928
1,742,834	Tischler	Jan. 7, 1930
1,872,678	Chamberlain	Aug. 23, 1932
1,917,009	Betts et al.	July 4, 1933
1,928,581	Watts	Sept. 26, 1933
2,105,884	Hanser et al.	Jan. 18, 1938
1,113,792	Ladd	Apr. 12, 1938
2,410,098	Muller	Oct. 29, 1946
2,431,999	Englehardt	Dec. 2, 1947
2,704,803	Crowley et al.	Mar. 22, 1955
2,779,007	Cunningham	Jan. 22, 1957
2,823,364	Walter	Feb. 11, 1958