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C. E. QUINN

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CONNECTOR

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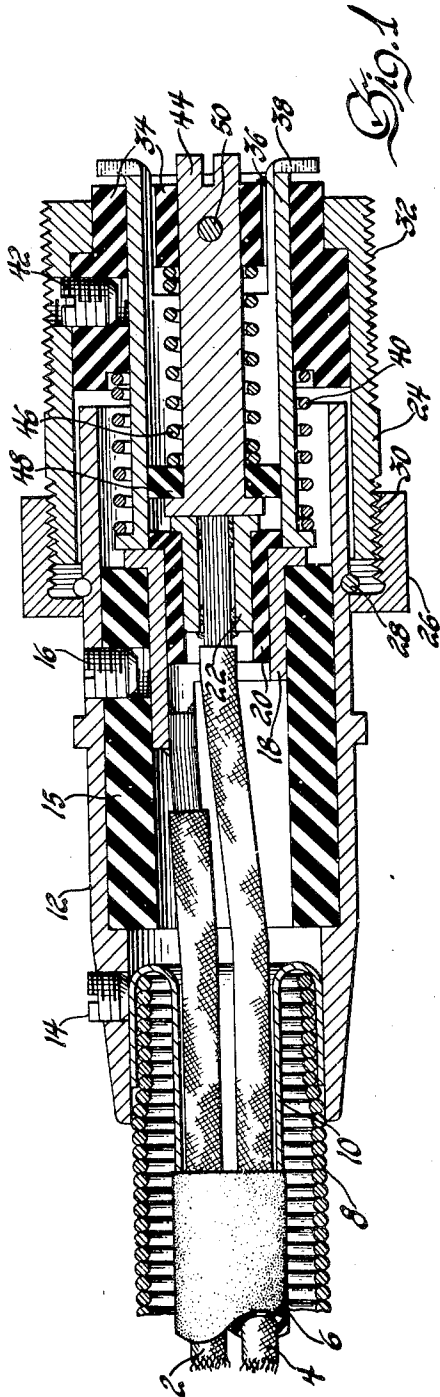


Fig. 1

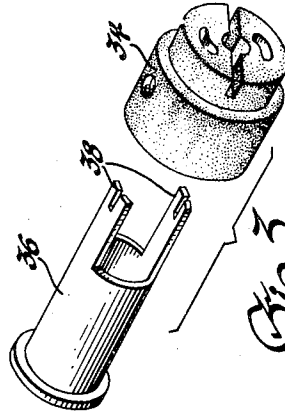


Fig. 3

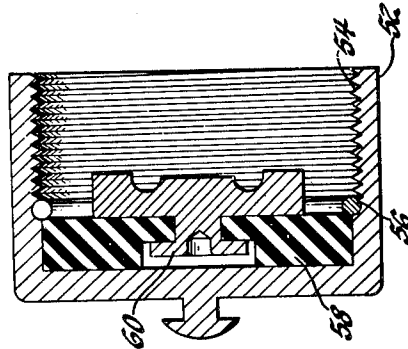


Fig. 4

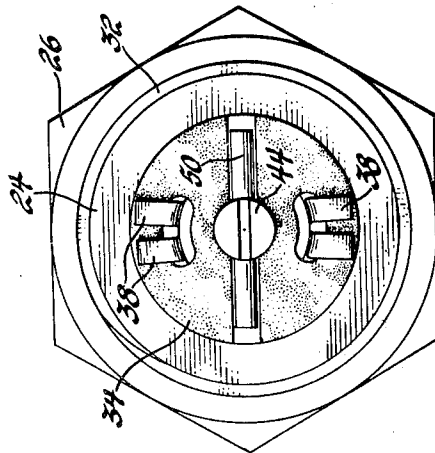


Fig. 2

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UNITED STATES PATENT OFFICE

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CONNECTOR

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2 Claims. (Cl. 173-328)

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The present invention relates to electrical connectors and more specifically to connectors for extremely low voltage circuits, for example, thermopile circuits. The requirements for such a connector are extremely rigid since the introduction or losses of voltages of extremely small magnitude will cause a very high percentage of error. Such connections must contain a minimum of junctions to keep the contact losses as low as possible. The contact resistance between the materials used must be maintained at a minimum. The connections between these contacts should not be affected by vibration or tension on the cables. The above requirements must be met in order that the losses within the connection will be maintained as low as possible. In order to minimize the introduction of spurious voltages to the circuit the connector must be shielded thermally, electrostatically and magnetically. The connector and all parts carrying current must be of material which matches the thermal characteristics of the associated conductors in order not to introduce thermal potentials. The prior art shows various means of meeting one or two of the above requirements but no connection was available prior to the present invention meeting all of these requirements.

It is the object of the present invention to produce a connector in which the losses and introduction of extraneous voltages is minimized.

It is a further object of this invention to make a connector which is thermally electrostatically and magnetically shielded.

It is also an object of this invention to produce a connector that is cheap to produce, efficient in operation and rugged in construction and fool-proof in use.

It is a still further object of this invention to produce a connector having concentric axially biased contact elements.

Further objects of this invention will be apparent in the specification, illustrated in the drawings and specifically pointed out in the claims.

Referring to the figures:

Figure 1 is a sectional view of the conductor as it is assembled with a parallel line cable.

Figure 2 is an end view of Figure 1 showing the method of retaining the contacts in the plug section of the connector.

Figure 3 is an exploded view showing the outer contact and the insulating member.

Figure 4 is a view of the shorting cap used with the connector.

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Referring more specifically to Figure 1, the conductors from the thermopile or other source of voltage are shown as a cable consisting of wires 2 and 4 with rubber insulation 6. This cable has an armor 10 soldered to a metallic spring 8 for securing said cable to the main casing of the plug 12. The set screw 14 prevents the transmission of any tension from the cable to the connectors. This plug carries therein an insulator of phenolic material 15 secured by set screw 16.

Outer contact element 18 is secured to the insulator 15 by a press fit therein and is electrically connected to the wire 2. Insulator 20 is secured inside contact 18 by a press fit therein. Inner contact 22 is secured by a press fit in insulator 20 and is electrically connected to wire 4. Another subassembly is contained in a shell 24 which is adapted to be screwed into an instrument cabinet or panel by means of threads 32 and is adapted to be secured to the plug 12 by means of threads 30 in cap 26, said cap being secured to the plug 12 by snap ring 28. The shell 24 carries therein, secured by set screw 42, an insulating member 34 which has openings therein for securing outer contact 36 and inner contact 44. Outer contact 36 is slidably secured to the insulator and limited in travel by ears 38 on the contact element. A compression spring 40 biases this element into contact with the element 18 when the connector is in the assembled position. These ears also prevent the accidental disassembly of contact 36 when the plug is disconnected from the shell.

The inner contact 44 is slidably secured in the insulator 34 by means of pin 50. This pin performs the same function as the so-called ears 38 on the contact 36. This inner contact 44 is biased in an axial direction against the contact 22 by means of compression spring 46. An insulator 48 is secured between the spring 46 and the contact 44. This insulator 48 also acts as a support to prevent canting of contact 44 with a resulting short circuit between it and contact 36.

Referring to Figure 2, the manner in which the ears 38 and the pin 50 restrain their respective contacts from excessive movement is shown.

From the above description it is apparent that a connector is produced having butt contacts of uniform pressure which are not affected by tension on the cable and only slightly affected by vibration. It is also apparent that these contacts, being concentric, are free from such linkage of magnetic flux as would introduce currents therein. The insulating material and the plug and

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shell arrangement thermally and electrostatically shield the elements therein.

Referring to Figure 4, the shorting cap 52 has screw threads 54 therein for engagement with threads on the shell 24 to attach this cap to the shell. An insulator 58 is retained in the cap by snap ring 56. This insulator may be of resilient insulating material, for example, rubber, or of comparatively non-resilient material, without departing from the scope of this invention. Secured to insulator 58 is a shorting cap 60 made from material of high electrical conductivity, preferably but not necessarily the same material as contacts 36 and 44.

It is to be understood also that although the invention has been described with specific reference to a particular embodiment thereof, it is not to be so limited, since changes and alterations therein may be made which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. A connector assembly adapted to mate with a second connector assembly to form a readily separable electrical connector, the first assembly including; an insulator, two concentric contact members slidable axially in said insulator, each of said contact members having an outwardly facing contact surface normal to the common axis

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of the contact members, means axially biasing each contact and urging its contacting surface in an outward axial direction with respect to said insulator, each contact member having a projection thereon engaging said insulator to hold it in assembly therewith.

2. A readily separable electrical connector having a first connector assembly as claimed in claim 1 and a mating assembly including; concentric electrical contact members connected to flexible electrical conductors and separated from each other by an insulating means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,259,186	Winston	Mar. 12, 1918
1,566,362	Benjamin	Dec. 22, 1925
1,869,936	Griswold	Aug. 2, 1932
2,015,477	Hurley	Sept. 24, 1935
2,344,192	Wantz	Mar. 14, 1944
2,369,860	Schroeder	Feb. 20, 1945
2,387,015	Gilbertson	Oct. 16, 1945
2,410,098	Muller	Oct. 29, 1946