

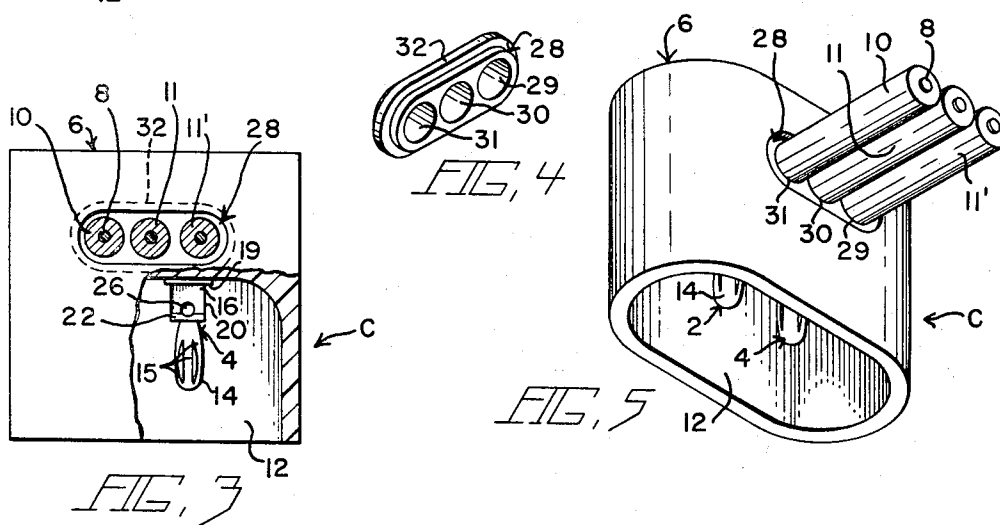
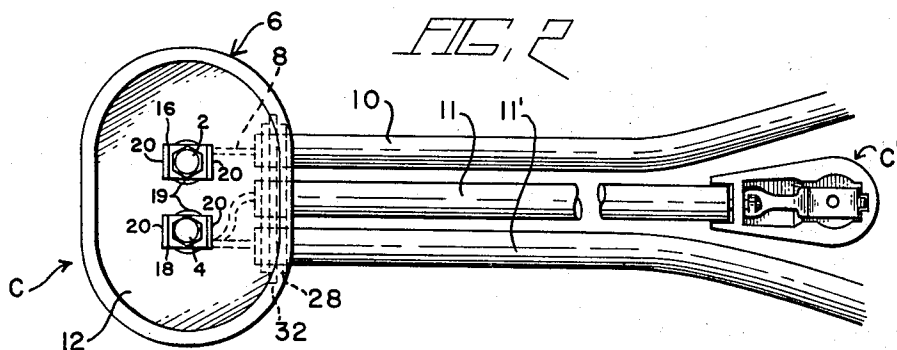
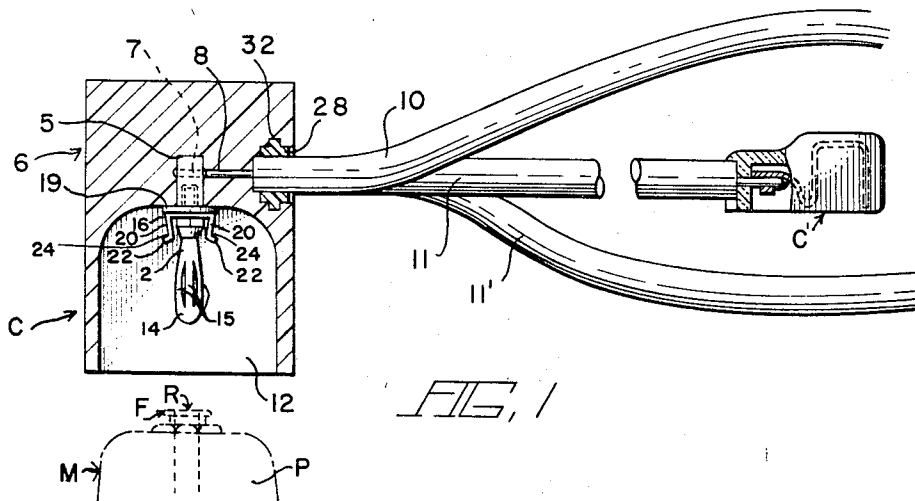
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3,406,370

ELECTRICAL CONNECTOR

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3,406,370

ELECTRICAL CONNECTOR

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ABSTRACT OF THE DISCLOSURE

The invention constitutes an electrical connector for connecting high voltage leads to a magnetron comprising contact pins with spring clips therearound for engaging associate contact receptacles and circumferential flanges, respectively, on the magnetron. The contact pins are mechanically and electrically secured to the high voltage lead wires, and the entire connector is encapsulated in a dielectric housing. The housing is substantially rigid; yet pliable so as to conform around a portion of a magnetron and effect a moisture-proof seal at the interface. A grommet defining sealing means and strain relief means is disposed in the housing where the leads extend therefrom. The connector is pushed onto a magnetron during which time the contact pins engage respective receptacles, the spring clips engage their associate circumferential ridges and the housing sealingly engages a portion of the magnetron.

This invention generally relates to electrical connectors, and particularly relates to sealed, detachable, high voltage connectors for terminating high voltage leads to a magnetron.

The term magnetron, as used herein, denotes a type of super-high frequency oscillator with internal resonant circuits, designed to operate in a given centimeter band and capable of delivering certain pre-determined kilowatts of peak power under pulsed conditions. These properties make this type of magnetron highly desirable for use from sea level to extremely high altitudes.

Heretofore, there has been no suitable high voltage magnetron connector which would operate at a peak anode voltage at a high altitude. If prior connectors operated at the above conditions, they frequently failed if the magnetron mis-fired and the anode voltage surged to a large anode voltage. These prior connections also failed when operated in high humidity or moisture conditions because of dielectric break down or failure.

It is therefore an object of the present invention to provide a new and improved, sealed, detachable, high voltage connector which is operable at extreme conditions such as a peak anode voltage and high altitude. At these conditions, the connector may encounter and will continue to operate during surges of anode voltage above normal anode voltages without any stray voltage arc-over.

Another object is to provide a high voltage connector which is operable where high atmospheric pressures and extreme moisture conditions are present.

Another object is that of providing a high voltage connector which is not only rugged in construction, but has no exposed current carrying parts, is completely sealed against the ingress of moisture, minimizes the effect of corona discharge, and offers a high degree of safety to personnel.

A further object is the provision of such a connector which has conventional insertion type contact pins with improved clip means thereon to hold the contact pins in engagement with their associate sockets.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the inven-

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tion; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they modify it in various forms, each as may be best suited to the conditions of a particular use.

These and other objects of the invention are achieved in a preferred embodiment comprising stamped and formed contact pins having spring clips therearound to engage circumferential flanges on a magnetron when the pins bottom in their associate receptacles. In a magnetron, one receptacle defines a heater connector and the other defines a cathode connector. The contact pins are electrically and mechanically secured to high voltage lead wires, and the entire connector is encapsulated in a housing which is substantially rigid; yet pliable so as to conform around a portion of a magnetron and effect a moisture proof seal at the interface therebetween. A grommet is disposed in the housing where the leads project therefrom. This grommet seals the connector at that point and provides strain relief means to protect the leads from the effects of undue bending stresses.

In the drawings:

FIGURE 1 is a sectional view of a connector according to the present invention;

FIGURE 2 is a bottom plan view of the connector of FIGURE 1;

FIGURE 3 is a partially sectioned end view of the connector of FIGURE 1;

FIGURE 4 is a perspective view of a sealing grommet; and

FIGURE 5 is a perspective view of the connector.

Referring now to the drawings, and particularly to FIGURE 1, a connector C in accordance with this invention includes one or more contact pins 2 and 4 secured to a semi-rigid dielectric housing 6 by conventional injection molding techniques. One end of each pin 2 and 4 is threaded into a metal bushing 5 which is disposed in the mass of housing 6. Each bushing 5 has a transverse hole 7, which hole is adapted to mechanically and electrically receive the conductor 8 of a lead wire 10. This mechanical and electrical connection is effected by soldering, however, it may be effected by crimping or in any other suitable manner. The contact end 14 of each pin 2 and 4 is disposed to project into cavity 12 of housing 6, and is adapted to insertably mate with an associate receptacle R on a component e.g. magnetron M. Cavity 12 has a configuration to mate with portion P of magnetron M. Contact ends 14 include pin-like spring tips having a series of outwardly directed spring leaves 15, formed into the bodies thereof, and are known in the art as "Banana Plugs."

Spring clips 16 and 18 are secured to each contact pin 2 and 4 where contact ends 14 project into cavity 12, and they are spaced from the entrance to cavity 12 by washers 19. Clips 16 and 18 are formed to define a generally U-shape, the sidewalls 20 of which incline inwardly towards each other. The free ends 22 of sidewalls 20 are disposed to bend outwardly away from each other by virtue of transverse creases 24. A hole 26 is formed into each sidewall at crease 24, FIGURE 3. Clips 16 and 18 are adapted to snap into place onto circumferential flanges F of the associate receptacle on a magnetron M when contact ends 14 are disposed in their respective receptacles. Holes 26 provide recesses into which portions of the flanges become disposed. This arrangement maintains the connector on a magnetron.

A silicone rubber sealing grommet 28 is molded into housing 6 where lead wires 10, 11, and 11' join the housing. Grommet 28, in this case, includes a generally rectangular-shaped member having rounded ends and three

cavities 29, 30, and 31 extending therethrough. These cavities are adapted to snugly receive portions of the outer insulation of lead wires 10, 11, and 11'. Grommet 28 also has a peripheral flange 32 which constitutes holding means to prevent the grommet from being accidentally pulled or otherwise removed from housing 6. Grommet 28 constitutes sealing means, by virtue of its snug engagement with lead wires 10, 11, and 11' to seal the connector against the ingress of water or moisture. Grommet 28 also constitutes strain relief means, by virtue of its pliability, to relieve undue bending stresses on the lead wires where they join housing 6.

In assembly, lead wires 10, 11, and 11' are prepared by stripping predetermined portions of insulation from their ends to expose lengths of conductors. Each lead wire is inserted into a cavity of grommet 28 whereafter the grommet is positioned at a proper place relative to the stripped ends of the leads. The conductors are inserted into and secured, by soldering or crimping, to bushings 5. Notice in FIGURE 2 that the conductor of lead wire 10 is secured to one bushing 5, and the conductors of lead wires 11 and 11' are secured to another bushing 5. This is a typical interconnecting scheme, the alteration of which will not depart from the scope of this invention.

The above sub-assembly is secured to a proper jig fixture whereafter housing 6 is molded around the ends of the lead wires. Washers 19 and spring clips 16 and 18 are then disposed over the threaded ends of contact pins 2 and 4 whereafter pins 2 and 4 are threadably secured to their respective bushings 5. The extending ends of lead wires 10, 11, and 11' are prepared and secured to conventional connectors C' such as that shown on lead wire 11 or connectors of the type disclosed in U.S. Patent No. 2,958,844. This constitutes an assembled connector according to the present invention.

An assembled electrical connector, as disclosed herein, is secured to a magnetron by pushing the connector proper onto the glass or porcelain portion P of the magnetron which mates pins 2 and 4 with receptacles R so that pins 2 and 4 enter their respective receptacles R, and housing 6 snugly skirts portion P. Spring clips 16 and 18 snap into place onto circumferential flanges F on the magnetron to lock the connector in place. Cavity 12 of housing 6 snugly engages portion P of the magnetron such that the interface between cavity 12 and portion P is sealed against the entry of moisture and water. This arrangement also increases the voltage breakdown path between contacts and outside equipment by captivating the contacts. If desired, silicone grease or the like may be placed in cavity 12 to provide additional seal and decrease the effect of corona discharge.

It should be pointed out that the present connector is used in conjunction with a magnetron, however, it may be used in any like application wherein lead wires are sealed into a connector against the penetration of foreign matter and moisture.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be noted that the particular embodiment of the invention, which is shown and described herein, is intended as merely illustrative and not as restrictive of the invention.

I claim:

1. An electrical connector comprising a housing of dielectric material, contact members in said housing, lead wires connected to said contact members, sealing means disposed in said housing in engagement with said leads, strain relief means on said sealing means to relieve undue bending stresses where said lead wires join said connector, said sealing means including a flexible grommet to snugly grip said lead wires and snugly grip said housing and flex with said lead wires if said lead wires are bent or

twisted away from their normal axis relative to said connector, said grommet having flange means thereon to prevent its removal from said housing, and clip means on said contact members including inwardly-directed sections and outwardly-directed sections and holes disposed in the junctions therebetween.

2. An electrical connector for connecting lead wires to a component comprising a dielectric housing of stiffly-flexible material having contact means, one end of said contact means embedded in said housing and connected to said lead wires, another end of said contact means disposed to project in a cavity in said housing, said another end of said contact means engageable with associate receptacles in said component, said cavity adapted to snugly engage a portion of said component to define a seal therebetween, sealing means on said connector in engagement with said lead wires, strain relief means on said sealing means to relieve undue bending stresses on said lead wires, and clip means on said contact means including a spring clip having inwardly-directed sidewalls with outwardly-directed tips with holes at the junctions of said sidewalls and said tips, said clip means adapted to tightly engage circumferential flanges in said component and maintain said connector on said component.

3. An electrical connector according to claim 2 wherein said holes in said clip means engage circumferential flanges on said component when said contact members bottom in their respective receptacles.

4. An insulated and sealed electrical connection between high voltage lead wires and a component comprising a connector housing of dielectric material in snug engagement with a portion of said component whereby said connection is sealed against moisture, contact members in said housing in electrical engagement with receptacles in said component, and clip means on said contact members, said clip means having holes therein in mechanical engagement with circumferential flanges on said component.

5. In an electrical connector for connection with contact member means of a component, a dielectric housing having a cavity therein, said cavity having a configuration conforming to a section of said component around said contact members, said housing being disposable on said component with said cavity receiving said section and forming a seal therebetween, contact means in said housing and having first section means and second section means, said first section means being disposed within said cavity for electrical engagement with said contact member means when said housing is positioned on said component, said second section means being positioned in said housing, insulated conductor means connected to said second section means and having a part positioned within said housing, and a sealing and strain relief means secured in said housing and having a pliability greater than that of the material of said housing, said sealing and strain relief means being in snug engagement with said part of said conductor means to provide a seal around said conductor means and to provide strain relief to said conductor means.

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