Aug. 20, 1968 A. R. BRISHKA 3,398,391

HERMETICALLY SEALED CONNECTORS

Filed Aug. 10, 1967

FIG. 1

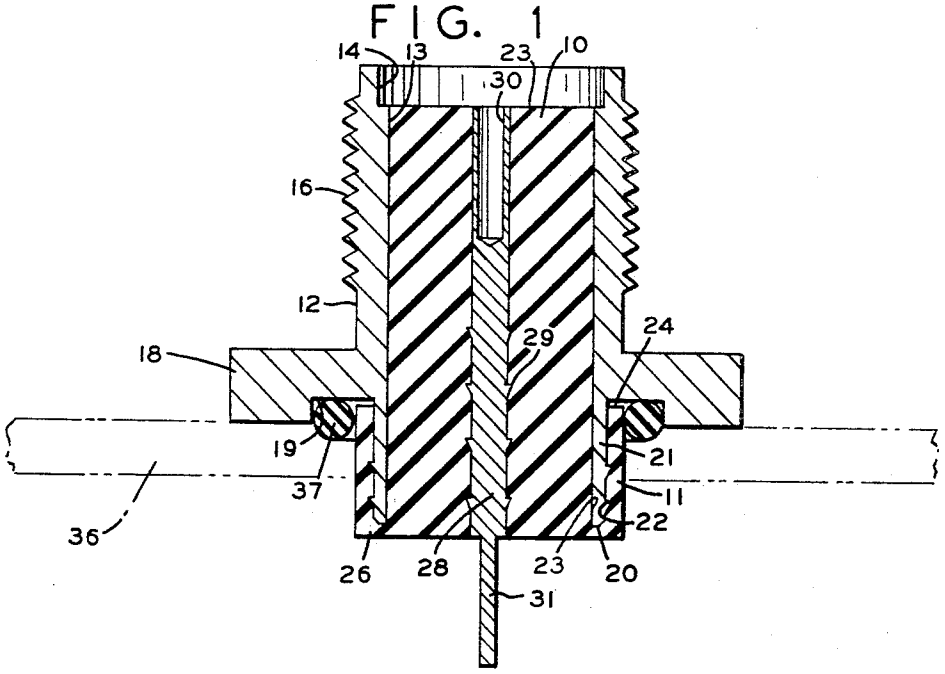
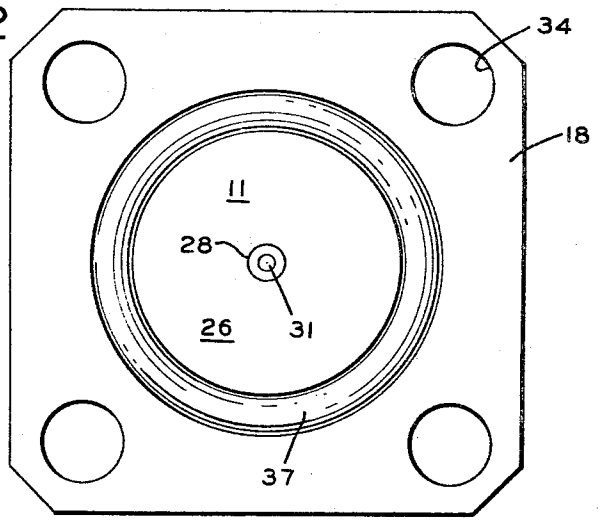


FIG. 2



INVENTOR.
ALEXANDER R. BRISHKA
BY
JOHN P CHANDLER
HIS ATTORNEY.

United States Patent Office 3,398,391 Patented Aug. 20, 1968

3,398,391

HERMETICALLY SEALED CONNECTORS

Alexander R. Brishka, 14 Sophia St., Mamaroneck, N.Y. 10543

Filed Aug. 10, 1967, Ser. No. 659,800
7 Claims. (Cl. 339—94)

ABSTRACT OF THE DISCLOSURE

A hermetically sealed panel receptacle comprising a tubular metallic body with means for attachment to the panel, a plastic insulator in interference fit in the body, an annular slot in the insulator receiving one end of the body, a center conductor through the insulator with a labyrinth seal between the insulator and the body and between the insulator and the conductor.

This invention relates to a panel receptacle and connector of the type requiring a hermetic seal which must remain intact over a wide range of temperature variations.

Hermetically sealed connectors are generally formed by employing ceramic or glass beads wherein a center conductor is fired into the bead and the bead assembly then fired directly into the connector or into a ring which is then soldered into the connector. Hermetically sealed connectors of this type are both costly and inefficient because of the difficulty in controlling the dielectric constant of the bead. It has also been found necessary in most cases to employ a second dielectric in addition to the glass or ceramic bead.

An important object of the invention is to provide a connector which retains its hermetic seal over a wide range of temperatures and which permits the use of a unitary insulator employing only one type of plastic dielectric material and wherein it is not necessary to bond the insulator to the metallic surfaces.

The connector of the present invention has three basic parts: a tubular metallic body, a metallic center conductor, and an insulator formed of plastic material, such as PTFE.

The metallic body has a through bore of uniform diameter except for a section of reduced diameter at its upper end. On its exterior, the body has a threaded section at its upper end followed by an attaching flange and a lower end section of reduced diameter.

The insulator has an interference fit with the bore in the body and it also has a lower end section of enlarged diameter of slightly greater length than the reduced section of the body. This enlarged diameter insulator section has an annular slot extending downwardly from the shoulder formed by said enlarged section and as the insulator moves upwardly in the body, the reduced diameter lower end section of the latter passes into this annular slot in snug fit relation. Thus, the reduced section of the metallic body is tightly enclosed, internally and externally by the plastic insulator material which forms therewith a hermetic seal just as does the plastic insulator with the inner surface of the metallic body. To further insure the seal, a number of annular grip flanges are formed on the reduced diameter metallic body section which cut with the external insulator section, forming a labyrinth path. The central conductor which is forced through the insulator also has grip flanges between its ends which form, with the insulator, the same labyrinth path.

In the drawing:

FIG. 1 is a central longitudinal section taken through a panel receptacle of the present invention;

FIG. 2 is a plan view thereof.

The device of the present invention includes an insulator **10** of cylindrical shape which is of uniform diameter except that at its lower end it has an enlarged section **11** extending over about ⅓ its length and an annular slot **23** which extends over the major portion thereof. The insulator has an interference fit in a tubular body **12** having a through bore **13** of uniform diameter, a short section **14** of larger diameter at its upper end, and an external thread section **16** at the same end. Near the lower end the body has an external annular flange **18** with a circular recess **19** on its lower surface.

Between this flange and the lower end **20** the body has a section **21** of reduced diameter and, hence, wall thickness and formed on its outer surface with annular grip flanges **22** which slope upwardly away from said lower end. The cross sectional width of annular slot **28** is about the same as the wall thickness of reduced section **21** which it receives in snug fit relation with the grip flanges fitting into the plastic body, thus forming a labyrinth path.

The upper end **23** of the cylindrical insulator is force-fitted into the tubular body from the lower end of said body and when the lower end **20** of the body reaches the upper end **24** of the enlarged insulator section it readily passes into slot **23** and forms a separate annular wall lying outside of and in close contact with the reduced body section **21**.

A central contact **28** is now pressed into the insulator, the contact having a plurality of annular gripping flanges **29** between its ends. The upper end has an opening **30** to receive a male contact in force fit relation and the lower end has a reduced contact section **31**.

The insulator may have a small predrilled hole or the metallic contact may simply be forced through the solid body. The gripping flanges, in addition to firmly enclosing the contact in the insulator body, also forms an effective hermetic seal with a labyrinth path.

The flange or base **18** has corner openings **34** to enable it to be mounted as by means of bolts to a panel or chassis shown in broken lines at **36**. A resilient O ring **37** is placed within recess **19** and is compressed therein against the panel, thus further insuring a hermetic seal.

After installation of the assembly, when there is an increase in temperature, the insulator, whose coefficient of expansion is greater than that of the metallic components, expands. The greater part of this expansion, occurs in a longitudinal direction, since the material has no other means of expansion. Any expansion in length applies a force against the gripping flanges of the contact thus maintaining an effective seal. When a decrease in temperature occurs, the insulator contracts, applying an inward radial force on the contact and the enlarged section **11** of the insulator lying outside reduced body section **21** contracts around this body section. It is apparent then, whether the insulator expands or contracts, the seal is always maintained.

The use of the terms "upper" and "lower" in the specification and in the appended claims are employed only for the sake of consistency with the figures of the drawing. While the connectors of the present invention will frequently be installed in horizontal panels, they usually will have a wide use in vertical panels, all as will be cleary understood.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is, therefore, to be understood that the exemplary embodiments are illustrative and not restrictive of the invention,

the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

The embodiments of the invention in which the exclusive property of privilege is claimed are defined as follows:

1. A receptacle for mounting on a panel or chassis and including a metallic body formed with a through bore, a section of reduced diameter at its lower end and provided with an external annular grip flange, and a flange above the reduced section for attachment to the panel, an insulator of plastic material received in interference fit relation in the body and provided with an enlarged section at its lower end, forming a shoulder, and having an annular channel therein extending downwardly from said shoulder, which receives said reduced body section in snug fit relation, and a metallic conductor passing through the insulator in force fit relation, said grip flange forming, with the insulator lying outside the same, a labyrinth seal, said flange adapted to be secured to said panel.

2. The structure described in claim 1 wherein the annular slot in the enlarged insulator section is of substantially the depth as the height of the reduced diameter body section received therein.

3. The structure described in claim 1 wherein the metallic conductor has an external grip flange to form a labyrinth seal with the insulator.

4. The structure described in claim 1 wherein the flange has an annular recess in its lower face surrounding the reduced diameter body section to receive a sealing gasket when the flange is mounted on the panel.

5. The structure described in claim 1 wherein the metallic conductor has an opening at one end to receive a male contact.

6. The structure described in claim 1 wherein the metallic body has an external threaded section.

7. The structure described in claim 1 wherein the insulator is formed from PTFE.

References Cited

UNITED STATES PATENTS

2,552,414	5/1951	Eriksen et al.	339—178 X
2,881,406	5/1959	Arson	339—94 X
2,906,986	9/1959	Schaefer	339—60
3,022,484	2/1962	Thompson	339—94 X
3,290,639	12/1966	Driemeyer	339—218 X
3,292,132	12/1966	Murphy	339—221 X

RICHARD E. MOORE, *Primary Examiner.*