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2,674,645

HERMETICALLY SEALED ELECTRICAL CONNECTOR RECEPTACLE

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Fig 1

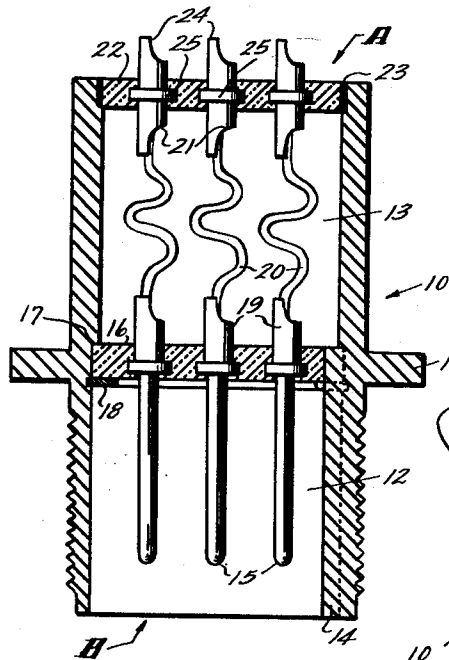


Fig 3

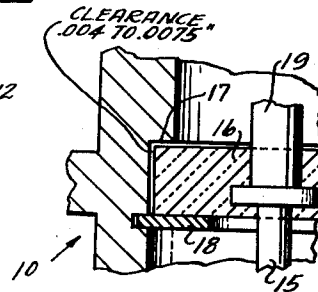


Fig 4

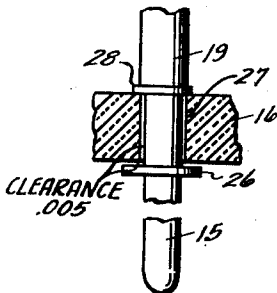
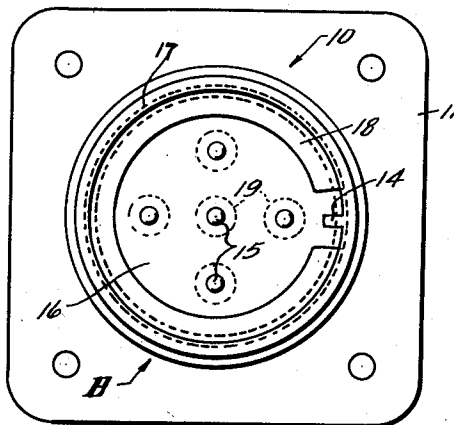


Fig 2



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HERMETICALLY SEALED ELECTRICAL
CONNECTOR RECEPTACLE

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1 Claim. (Cl. 174—50.52)

(Granted under Title 35, U. S. Code (1952),
sec. 266)

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The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a hermetically sealed electrical connector receptacle intended especially for use with electronic assemblies in which access of water vapor or liquid water to an electronic assembly within a container must be avoided while preserving correct electrical accessibility thereto.

In electronic assemblies used in aircraft, for example, difficulty has been encountered in the use of the standard Army and Navy multiple contact receptacles for the reason that the male plug which fits into such receptacles is necessarily not a tight fit and therefore not always in exact axial alignment with the pins. In course of time therefore, the bending or tilting which the repeated insertion and removal of the plug, necessarily or not, causes the pins to undergo, loosens the hermetic seal around the bases of the pins, thereby allowing water vapor to enter the container and to give rise to short circuits by wetting and corroding the components of the assembly.

One object of the invention is to provide a hermetically sealed electrical connector receptacle in which the seal about the bases of the pins is not the seal depended upon to make the container a hermetically sealed one.

Another object of the invention is to provide an electrical receptacle which occupies substantially standard dimensions, and which may be treated with the customary roughness without being susceptible of the seal being broken by insertion and removal of the plug.

Another object of the invention is to provide a substantially standard Army and Navy electrical receptacle in which a substantial amount of slack is provided between each pin and each hermetic seal.

Referring now to the drawings,

Fig. 1 is a vertical section of the hermetically sealed electrical connector receptacle taken along the line 1—1 of Fig. 2.

Fig. 2 is a front elevation of the receptacle showing the usual appearance of the receptacle when mounted upon a panel.

Fig. 3 is a detail of Fig. 1 showing the amount of clearance per side between the pin disk and the receptacle wall.

Fig. 4 is an enlarged detail of a fragment of the pin disk showing a modified form of pin mounting in which each pin is mounted with sufficient clearance to have an independent ability to tilt.

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In the figures, 10 is a metallic shell preferably made of a material to which solder will readily adhere. That is to say that the shell 10 is made preferably of other metal than aluminum. The shell 10 is provided with a flange 11 which may be square as shown in Fig. 2 or round or of a regular shape. Its edges may be square as shown, or may be beveled to provide a larger sealing surface for soldering purposes. The flange 11 is preferably located about midway between the ends of the shell 10. It thereby creates two chambers 12 and 13, the first being the plug-receiving or female chamber the wall of which is threaded on its outer surface and the second a slack-conductor-containing chamber which is hermetically sealed at its end A, which is the end intended to project into the container containing the electronic assembly. The other end, which faces the operator, is designated B. The chamber 12 is provided on its inner wall with a keyway 14 for the purpose of insuring correct polarity between the plug (not shown) and the customary pins 15. The pins 15 are imbedded, preferably by molding in a disk 16 which is made of thermo-setting synthetic resin. The disk 16 loosely abuts an internal shoulder 17 in the shell 10 and is held therein by a snap ring 18. No precautions are needed to make the disk 16 moisture-tight within the shell 10; on the contrary it should be loosely mounted as shown in Fig. 3 to have an overall side play of 0.008 to 0.015 inch, i. e. from .004 to .0075" per side and some play at the top. The purpose of such looseness is to enable the pins 15 to tilt sufficiently to accommodate a plug in which the holes may be somewhat out of pattern or alignment. If a hermetic seal were attempted in the usual manner between the disk 16 and the inner wall of the shell, any tilting of the pins 15 due to a misaligned plug would tend to disrupt the seal and give rise to the troubles now being experienced in which the hermetic quality of the seal becomes destroyed. Extending through the disk 16 are the tubular soldering lugs 19 of the pins 15. These as well as other parts of the pins 15 are conventional in this art and are intended for the connection by soldering or swaging between the lug 19 and a pigtail conductor 20 in which there is a considerable amount of slack. The other ends of the pigtail conductors 20 are soldered to other tubular lugs 21 of the same kind which are imbedded in a disk 22, which is made of vitreous or ceramic material. A metal disk with vitreous insulation about the pins 15, such as sold under the the trade name "Fusite" is the full equivalent of a glass or ceramic disk.

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As shown, the glass or ceramic disk is preferably metallized on its periphery with thin platinum or other metal to which soft solder will adhere. It is sealed into the chamber 13 with a soft solder seal 23. Other tubular lugs 24 extend beyond the disk 22 for the attachment of the conductors of the electronic assembly (not shown). The lugs 21 and 24 are parts of pins which are embedded in the vitreous or ceramic material 22 each by a shouldered portion 25, through which there is no internal communication through the disk 22 whereby the hermetic quality of the seal would be destroyed. In other words, the shouldered portion 25 is solid.

Fig. 4 shows a modification which may be added to the features already described and which has for its object to enable the pins 15 to fit a more grossly misaligned plug than they can align with if the disk 16 only has clearances. In Fig. 4 there is a .005" clearance on each side of the pin 15 between it and the disk 16, making .010" clearance in all in a radial direction. Axially there is .005" clearance, this existing between the lower surface of the disk 16 and a shoulder 26 which may be integral with the pin 15 or may be raised thereon by swaging, upsetting or any other appropriate process. The pins are prevented from dropping through the opening 27 in the disk 16 by a second shoulder 28 which may be similarly created. It is not intended that loose pins should be used without a loose disk 16, but a loose disk may be employed with tight pins.

In the appended claims, the words "hermetic" and "hermetically sealed" are intended to convey the dictionary sense of these terms, namely, that the seal is impermeable to gases and vapors as well as to liquids. Seals which depend upon rubber gaskets, synthetic resin washers and the like may be impermeable to gases when new, but even so, soon become permeable.

I claim:

An electrical connector receptacle comprising a

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tubular shell, a flange extending outwardly from said shell whereby said connector may be attached to or be fitted into a panel, an internal shoulder integral within said shell at substantially the middle point thereof, a first disk of heat-resisting electrically insulating material loosely abutting said shoulder to have a predetermined clearance axially and radially at its periphery, means abutting said disk for retaining said disk against said shoulder with sufficient axial and radial clearance to allow said disk to tilt slightly, a plurality of electrically conducting pins extending through said disk in a pre-arranged pattern and terminating in lugs, a second disk comprising nonporous ceramic material said disk being inserted substantially in one end of said shell and hermetically sealed therein at its periphery, a plurality of hollow pins hermetically embedded in said second disk and adapted for the attachment for conducting wires arranged in a pattern similar to and substantially in alignment with the pins in said first disk, slack wire conductors connecting the corresponding lugs of said first and second disks, the latter pins having lugs for the attachment of external conductors, said lugs extending beyond the second disk.

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