April 25, 1967 M. A. JURIS ET AL 3,316,528

ELECTRICAL CONNECTOR CONTACTS

Filed July 1, 1964

Fig. 1.

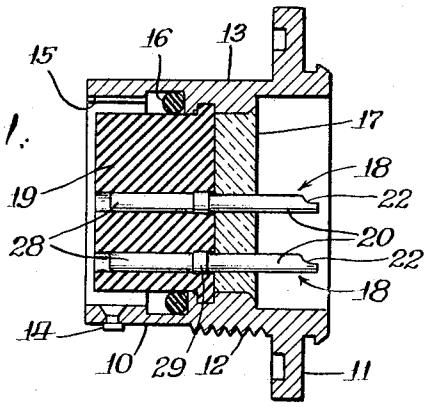
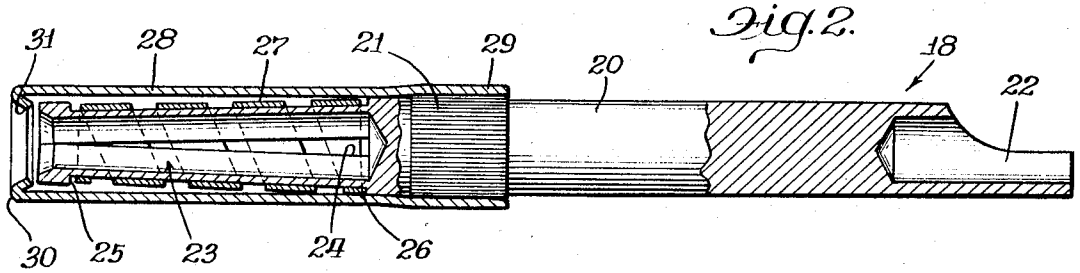


Fig. 2.



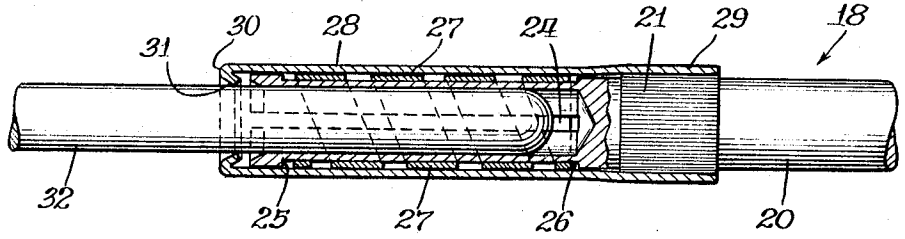


Fig. 4.

Fig. 3.



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United States Patent Office

3,316,528

Patented Apr. 25, 1967

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3,316,528

ELECTRICAL CONNECTOR CONTACTS

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Filed July 1, 1964, Ser. No. 379,626

1 Claim. (Cl. 339—259)

This invention relates to electrical connectors and more particularly to an improved type of sleeve contact, shown in the present disclosure in a form adapted to utilization in a connector of the hermetically sealed type.

It is the general aim of the invention to provide a sleeve contact adapted to mate with a conventional cylindrical contact pin wherein the sleeve is of such design and construction as to be more satisfactory and more dependable than types heretofore developed. More specifically, it is among the objects of the present invention to provide a sleeve contact having low inherent resistance and relatively high current-carrying capacity, yet, at the same time being of compact mechanical design, completely enclosed, and of electrical and mechanical design capable of long-extended use and well capable of withstanding improper usage or abuse. In this connection, it may be pointed out that in certain exacting connector applications, it is essential that the millivolt drop existing across a pair of contacts be as low as possible, yet at the same time, it is equally important that the contact design be such that the sleeve is not subject to damage by the insertion of an oversize pin or test probe. This is accomplished in the present invention with an arrangement such that the electrical current path extends only through a single piece of metal which need have very little inherent resilience in itself since the mating contacts are held in resilient engagement, as tightly as desired, by a tempered spring member capable of withstanding high operating temperatures without damage, compactly arranged, and in an assembly wherein all critical parts of the contact assembly are completely enclosed.

A present preferred embodiment of the invention is illustrated in the drawings attached to and forming a part of the present specification, wherein

FIGURE 1 is a cross-sectional view of an hermetically sealed electrical connector having contacts as disclosed herein;

FIGURE 2 is a central sectional view of a socket contact as contemplated by the present invention;

FIGURE 3 is a side elevational view of a helical coil spring employed in the contact and

FIGURE 4 is a fragmental sectional view similar to FIGURE 2 but showing a mating contact pin within the socket contact.

In the connector shown in FIGURE 1, the receptacle shell **10** may be conventional. Such shells are ordinarily of unitary metal construction, generally having a mounting flange **11** and screw threads **12**, flattened at **13** for mounting in a panel or bulkhead. Ordinarily, one or more bayonet studs **14** are provided for engagement with a mating plug, and keyways **15** may be formed on the interior of the shell in appropriate arrangement to fit corresponding keys on the plug. Suitable sealing means, such as the O-ring **16**, may be provided.

A typical connector will include one or more contact members supported in a glass or ceramic sealing member **17**, hermetically sealed within the receptacle shell and bonded to the mounting shank portions of the individual

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contacts **18**. The forward ends of the individual contacts extend through an insulating insert **19** to a position such that they are accessible from the front face of the receptacle.

The individual contacts **18** each include a mounting shank **20** having a knurled portion **21** thereon with a solder pocket **22** at the rearward end of the contact to receive a flexible conductor and thin walled split sleeve pin socket **23** at the forward end of the contact. As shown, the split sleeve **23** is divided into a pair of generaly semi-circular collet jaws by a longitudinal slot **24** and the outer diameter of the sleeve is turned down between shoulders **25** and **26** to receive a coiled contraction spring **27**. The spring **27** (FIGURE 3) is preferably formed of a narrow strip or ribbon of thin, flat, heat-treated metal such as beryllium copper, having a high degree of resiliency and capable of withstanding elevated temperatures without damage. The spring **27** and the split sleeve portion **23** of the contact are enclosed and protected by a tubular hood **28**, having a skirt **29** press-fitted on the knurled portion **21** of the contact shank **20**.

The forward end of the hood has an inwardly directed flange **30** to provide a limiting orifice **31** of fixed diameter; large enough to admit a contact pin **32** of proper size, (FIGURE 4) but small enough to exclude an oversize contact pin or test probe. The tubular portion **28** of the hood is of internal diameter such that, while some expansion and contraction of the split sleeve and spring **27** will occur, (FIGURE 4), the expansion will be so limited that the elastic limit of the parts cannot be exceeded. It follows that the sleeves are not apt to be damaged by misalignment of the mating pin contacts, or by use of a test probe.

At the same time, it should be observed that the effect of the coil spring on the thin-walled split sleeve will be to cause the sleeve to snugly grip the pin along the entire length of their telescoping engagement, insuring the best possible electrical union.

From the foregoing, it will be apparent that an electrical contact constructed in accordance with the present disclosure will not only be highly resistant to damage and abuse, but will also have inherently high electrical conductivity and low millivolt drop. This is accomplished by the unique arangement of parts whereby the electrical path extends through only a single piece of metal, which may be of a high conductivity metal since this piece in itself need not have any considerable degree of springiness or resilience, yet the resiliency necessary to adequately grip a mating contact pin is afforded by the coil spring **27**, which does not necessarily conduct any electrical current. The arrangement of the contact sleeve is simple, compact, and well protected since both the sleeve and the spring are at all times completely enclosed by the hood portion, the mouth of which is of the "closed entry" type, having an aperture sized to exclude oversize pins or probes, and to thus minimize any possibility of damage by misuse.

We claim:

In an electrical connector, a contact comprising a relatively long slender body portion consisting of a single integral piece of high conductivity metal having a rearward end including means for attaching a flexible conductor thereto and having a forward end including a generally cylindrical split sleeve comprising a pin socket, said socket being split into a plurality of separate individual jaws in opposed relationship to each other, with said split sleeve having a reduced outer diameter portion extending be-

tween a rearwardly facing shoulder adjacent the front of the sleeve and forwardly facing shoulder adjacent the rearward end of said sleeve; a tubular hood for providing a limiting orifice of fixed dimension surrounding and enclosing said split sleeve and closely spaced with respect to the outer surfaces of the aforesaid jaws, together with a relatively flat, thin radial compression coil spring of plural helical convolutions encircling and intimately contacting the aforesaid split sleeve substantially along the full distance between the aforesaid shoulders to resiliently contact said sleeve uniformly along the length thereof, yet arranged to contact the tubular hood of the assembly upon insertion of a pin into said split sleeve to prevent permanent deformation of the jaws by flexing beyond their elastic limit.

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