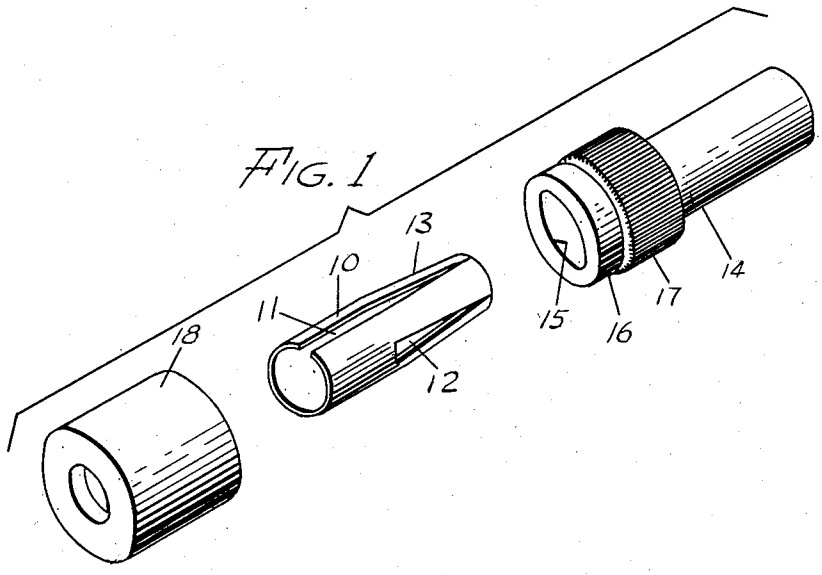
Oct. 6, 1959 N. F. DAMON 2,907,976

ELECTRICAL CONNECTORS AND CONTACTS THEREFOR

Filed July 27, 1956

FIG. 1



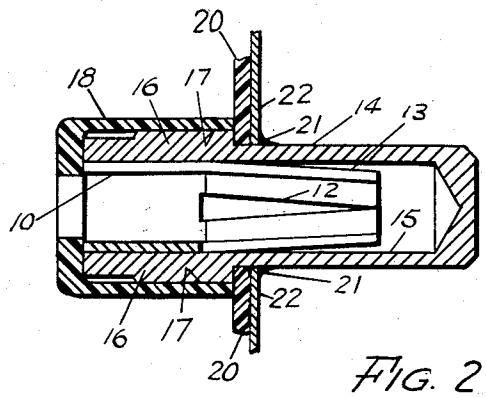


FIG. 2

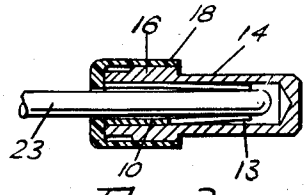


FIG. 3

INVENTOR
NEIL F. DAMON
BY Elmer J. Horn
ATTORNEY

United States Patent Office

2,907,976

Patented Oct. 6, 1959

2,907,976

ELECTRICAL CONNECTORS AND CONTACTS THEREFOR

Neil F. Damon, Weston, Mass., assignor to Raytheon Company, a corporation of Delaware

Application July 27, 1956, Serial No. 600,604

1 Claim. (Cl. 339—258)

This invention relates to electrical connectors, and more particularly, to a tubular contact suitable for use in such connectors.

In miniature equipment, and in printed circuits, particularly, it is important to have connectors, such as test jacks, that occupy a minimum of space and yet make good electrical contact and are mechanically secured to and insulated from the panel into which they are inserted.

In a representative embodiment of the invention a slotted sleeve of conductive resilient material, preferably beryllium copper, formed with fingers at its inner end, is inserted into the inside of a tube of conductive material having an inside diameter somewhat less than that of the slotted sleeve, so that when the slotted sleeve is inserted into the tube, it will be forced together, tending to close the slot and exerting considerable pressure on the inner walls of the tube to assure its retention within the tube. The inner slotted end of the slit tube is crimped inward before insertion to form inward pointing fingers that press against a mating pin inserted from the outer end. An insulator is inserted over the outer end of the outer tube, which is preferably of enlarged outer diameter, and knurled to retain the insulator. The insulator is preferably of a resilient material, such as nylon. The inner end of the tube is inserted into an opening in an insulating sheet supporting a printed circuit. One or more conductive portions of the printed circuit are soldered to the inner end of the outer conductive tube or sleeve by dip soldering, for example. Soldering may be facilitated by gold or other plating on the inner end of the outer conductive sleeve.

Other and further objects and advantages of this invention will be apparent as the description thereof progresses, reference being had to the accompanying drawings in which:

Fig. 1 is an exploded view of a miniature test jack embodying the invention;

Fig. 2 is a sectional view of the assembled miniature test jack of Fig. 1 mounted in a panel; and

Fig. 3 is a sectional view of the assembled miniature test jack of Fig. 2 with a probe inserted.

In Fig. 1, an inner slit tube of conductive material, preferably of beryllium copper, is designated by the reference numeral **10**. It is formed with a longitudinal slit **11** and slots **12** in the inner end forming fingers that are crimped inward to give a tapered section **13**. This tapered section **13** is forced into the open end of a contact sleeve **14** of conductive material, preferably brass. The opening **15** in this sleeve **14** has an inner diameter less than the outer diameter of the tube **10** so as to force the sides of the slit **11** together. If the sleeve is of the right material and thickness and has been appropriately heat treated, it will exert considerable pressure against the inner wall of the outer tube **14** to assume the position shown in Fig. 2. The outer portion of the outer tube **14** has a section **16** of enlarged diameter with the surface **17** of the section knurled, or otherwise roughened. An insulator **18** is tightly fitted over this enlarged section **16**, where it is held in place by the

knurling **17**. The sleeve **14** may be inserted into an opening in a printed circuit supporting panel **20** larger than the outside diameter of the insulator where it is retained by a filet **21** of solder connecting it to the printed circuitry **22** attached to the inner side of the panel **20**.

The operation of the invention is best understood by reference to Fig. 3, in which a test probe **23**, shown inserted into the inner tube **10**, contacts the fingers **13** which, due to their crimp, make a firm contact. The insertion of the probe **23** also increases the pressure exerted by the outer end of the sleeve **10** on the inner walls of the opening **15** in the tube **14** to complete the desired contact. It will also be noted that the probe **23** enters the larger end of the contact sleeve **10** and is led into contact with the fingers. In previous connectors of this general type the probe has been introduced in the region where the fingers are the closest together. This leads to the possibility of jamming the connector closed should a finger be pressed inward by the probe, the latter being forced to the outside of the finger between the finger and the outer sleeve, as can easily happen if the probe is not properly aligned with the connector. With the construction of the present invention this cannot happen and the connector cannot jam.

This invention is not limited to the particular details of construction, materials and processes described, as many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

An electrical receptacle of the type adapted to receive an elongate pin-like plug member, comprising an elongate sleeve member of electrically conductive material adapted to be connected to an electrical circuit and having a cylindrical inner surface of uniform diameter closed at one end only, an elongate resilient contact member of electrically conductive material having a first portion of substantially cylindrical hollow form adapted to lie within said sleeve member in contact with said inner surface adjacent the open end thereof, the external diameter of said first portion being normally significantly larger than the internal diameter of said cylindrical inner surface of said sleeve member, and a plurality of finger members forming a second portion of said contact member, said finger members all being secured to one end of said first portion and extending in a substantially common direction within said sleeve member with the free ends thereof tapered inwardly away from said cylindrical inner surface so as normally to lie closely adjacent one another, said contact member being split from end to end through both said portions to permit radial compression thereof, whereby the friction grip established between the inner cylindrical surface of said sleeve member and the outer cylindrical surface of said first portion of said contact member by virtue of the resilience of said contact member is enhanced upon the insertion of such elongate plug member through the open ends of said sleeve and contact members and between said free ends of said finger members.

References Cited in the file of this patent

UNITED STATES PATENTS

1,329,448	Von Post	Feb. 3, 1920
2,087,384	Lee	July 20, 1937
2,210,696	West	Aug. 6, 1943
2,477,849	Adams	Aug. 2, 1949
2,567,510	Drescher	Sept. 11, 1951
2,704,357	Johnson	Mar. 15, 1955

FOREIGN PATENTS

487,606	Germany	Dec. 14, 1929