

Sept. 17, 1968

D. R. DE TAR

3,402,382

MULTICONNECTOR CONNECTOR WITH REMOVABLE CONTACT MEMBERS

Filed Dec. 1, 1966

FIG. 1

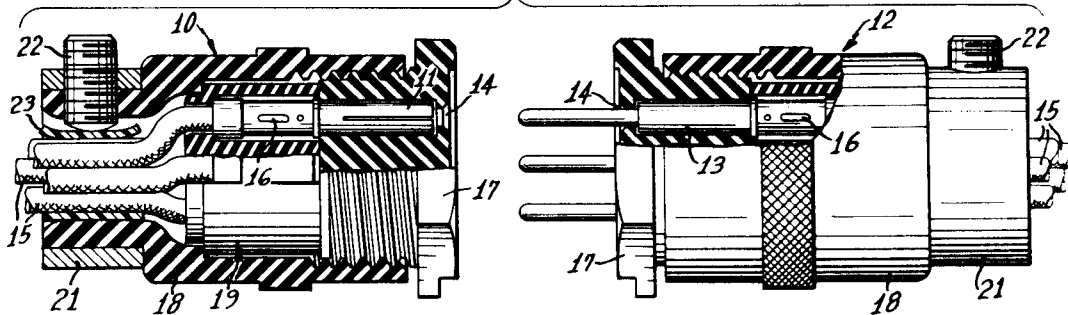


FIG. 2

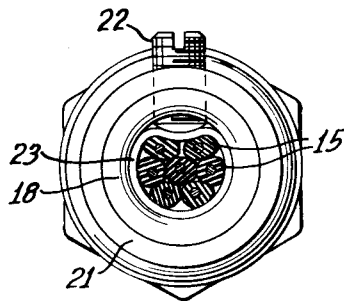


FIG. 3

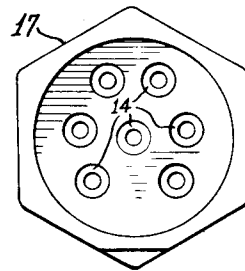


FIG. 4

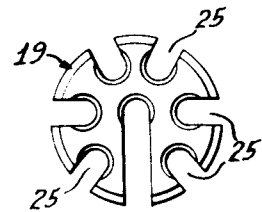
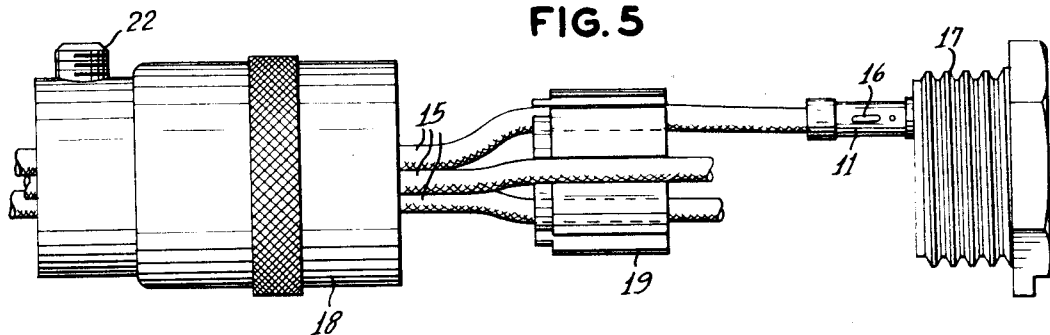


FIG. 5



1

3,402,382

## MULTICONTACT CONNECTOR WITH REMOVABLE CONTACT MEMBERS

Donald R. De Tar, Stratford, Conn., assignor to Litton  
Systems, Inc., Beverly Hills, Calif., a corporation of  
Maryland

Filed Dec. 1, 1966, Ser. No. 598,506

6 Claims. (Cl. 339-103)

### ABSTRACT OF THE DISCLOSURE

An electrical connector comprising an insulating body for supporting the connector contacts, a spacer block provided with radial grooves to position the contacts for convenient assembly of the connector and secure the contacts in the insulating body, and a cap threaded on said insulating body and adapted to lock said spacer block and contacts in assembled relation. The connector may include strain relief means for the conductors which also locks the cap against accidental loosening of the threaded engagement thereof with the insulating body of the connector.

This invention relates to multicontact connectors for interconnecting electrical circuit conductors, and more particularly to a compact connector which is readily assembled from simple component parts and adapted to withstand the stringent requirements of prolonged service. The connector comprises a connector body bored to receive the mating ends of contacts, a juxtaposed spacer block grooved to radially receive and position the contacts at the other ends thereof; a hood threaded to the body and holding the spacer block and contacts in assembly against the body and receiving conductors crimped to the contacts; and a strain relief setscrew in the hood bearing against a plastic collar which surrounds the conductors.

It is an object of the invention to provide an improved construction having a plurality of removable contact members which are securely held in the connector body but which can be readily assembled and replaced therein.

Another object of the invention is to provide a multicontact connector having an internal spacer block for positioning the terminals and their connecting wires during assembly and for locking the terminals in place when the connector is assembled.

Another object of the invention is to provide, in a connector having a threaded cap, novel means for preventing the cap from accidentally becoming unscrewed or loosened in use.

A further object of the invention is to utilize similar or identical connector parts in a pin-and-socket connector, so that the respective pin-and-socket connector bodies differ only in the shape of the contacts per se.

A feature of the invention relates to an improved conductor clamp for gripping the electrical cable or conductors attached to the connector body to relieve the ends of the conductors of tension when the conductors are pulled or subjected to stress relative to the connector body.

Other objects, features and advantages of the invention will become apparent from the following description of a typical embodiment thereof shown in the accompanying drawings, wherein

FIG. 1 is a side view partially in section of the pin-and-socket connector members, shown spaced apart with the mating faces abutting;

FIGS. 2 and 3 are end views of the socket connector shown in FIG. 1;

FIG. 4 is a detailed view of the spacer block which receives and positions the respective contact members; and

2

FIG. 5 is a view showing a step in the assembly of the connector.

Referring to the drawings, a socket or female connector body 10 shown in FIG. 1 includes a plurality of socket contacts 11. The mating connector body 12 is also shown, having a plurality of pin contact members 13.

The opposed or mating faces of the male and female connector bodies are shown as provided with identical restricted apertures 14 which, in the case of the pin connector element, support the ends of the pin contact members 13. The apertures 14 in the socket connector element prevent the insertion of oversize pin contacts which would damage the socket contact members 11. A hollow section at the rear end of each contact member permits crimping the electrical conductors 15 to the contacts, as indicated at 16, to provide a permanent, low-resistance electrical connection in accordance with standard practice.

Each connector body comprises similar or identical insulating members including a contact-supporting member or mounting block 17, a threaded cap or hood 18 and an internal grooved spacer block 19. The diameter of the bores in the mounting block 17 is slightly larger than the diameter of the contact members, as shown, to permit lateral movement of the contact members to facilitate alignment of said members when the pin-and-socket connector bodies are mated. When the cap or hood 18 is threaded onto the connector body 17, as shown in FIG. 1, it forms with the block 17 an insulating shell or enclosure for the contacts 11, 13 and for the ends of the electrical conductors 15 attached thereto. As shown, the cap or hood 18 is provided with an internal shoulder engaging the rear face of the spacer block 19 to secure the block firmly in position against the inside face of the connector body 17 and thereby lock the contact members 11, 13 in position in each connector body.

In the embodiment shown by way of illustration, the hood 18 is provided with a central opening for the electrical conductors 15 and has an external metal ring 21 molded in or attached to said hood and surrounding said opening. A setscrew 22 is threaded in the ring 21 and engages a plastic collar 23 embracing the conductors 15 when the setscrew is tightened as shown in FIG. 2, thus securely clamping the conductors to the shell of the connector and relieving the contact terminal members of any strain which might be exerted externally on the conductors. By reason of the close spacing of the clamping element 23 from the rear of the spacer block 19 and the stiffness of the conductors 15, the clamping arrangement including the setscrew 22 serves to prevent accidental loosening of the hood 18 from the threaded engagement with the body 17 during use. In order to lock the setscrew 22 in the hood 18, the hole bored in the hood to receive the setscrew preferably is not formed with threads and is smaller in diameter than the outside diameter of the setscrew. This frictionally binds the setscrew in the hole through the plastic hood and serves as a fastener without requiring any lock nut or similar locking device to prevent loosening of the setscrew.

In order to insure that the contact members 11 and 13 are securely positioned in the assembled connector body but are readily removable when desired, the connector body 17 and spacer block 19 are preferably formed as shown more clearly in FIGS. 3 and 4. Referring to these figures, it will be seen that the radial grooves 25 in the spacer block 19 are aligned with the bores in the connector body 17 and the grooves 25 are formed with a shoulder portion which engages the rear end of each contact member 11, 13, as shown more clearly in FIG. 1. As shown in FIG. 5, in assembling the connector, the conductors 15 after being crimped to the contact members 11 are passed through the hood 18 of the connector. The ends of the conductors 15 adjacent the contact members

11 are laid in the grooves 25 in the spacer block 19. This step positions the contact members for assembling into the bores in the connector body 17. As shown in FIG. 4, the grooves 25 are preferably enlarged at the bottom to fit the rear portions of the contact members 11, 13, thus positioning said members so that they can be readily inserted into the body 17 during assembly. When the spacer block 19 is placed against the rear face of the connector body 17, the hood 18 may be threaded onto the connector body, thus clamping the spacer block 19 against the connector body and securing the contact members 11, 13 in place. When the setscrew 22 is tightened, the assembly is complete. Obviously the connector may be readily disassembled for removal or replacement of the contact members by unscrewing the threaded hood or cap 18.

It will be apparent that a connector embodying the invention is compact and rugged, and incorporates component parts which are simple to manufacture and readily assembled. The removable contact feature, without separate locking springs, is an important one in miniature or compact connectors. While the structure shown illustrates a practical embodiment of the invention, it is to be understood that the detailed construction of the component parts may be modified in many respects without departing from the scope of the invention. In the specification and claims, the term "connector" is used to refer to the combined assembly of both the pin-and-socket connector bodies and also to either of them separately, as is common in the art. In practice, while the complete connector may be said to include both mated connector elements, each element is generally referred to as a "connector."

What is claimed is:

1. In a multiple-contact connector for electrical conductors, in combination,
  - a connector body provided with a plurality of longitudinal bores, each constricted in diameter at the mating face of said body,
  - contact members disposed in said bores and engaging the constricted portion thereof to limit the outward movement of each contact member in the connector body, said contact members being formed for attachment to the conductors or wires by crimping,
  - a cap or hood threaded on said connector body and forming therewith an insulating shell enclosing the contact members and the ends of the electrical conductors, and
  - a spacer block of insulating material having peripheral radially extending grooves to receive and position the contact members, inside said shell, said spacer block being removable from the connector body and shell, and insertable in said shell during assembly of the connector.
2. A connector according to claim 1, in which the peripheral grooves in said spacer block are shaped to

secure the contact members mounted therein against movement away from the mating face of the connector body.

3. A connector according to claim 1, in which the cap or hood is provided with an opening for the conductors, a setscrew adjacent said opening, and a plastic collar in said opening deformed by the setscrew to grip the conductors and furnish strain relief for the connector contact members.

4. In a multiple-contact connector for electrical conductors, in combination,

a connector body provided with an external threaded portion and a plurality of longitudinal bores,

a contact member disposed in each of said bores, each bore being provided with a shoulder portion to position the contact member in fixed relation to the mating face of the connector body,

each of said contact members being provided at one end thereof with a contact portion adapted to mate with the cooperating contact of the connector, and at the opposite end with a crimping section,

a threaded cap or hood adapted to engage the threaded portion of said connector body and forming with said body an insulating shell enclosing the contact members and the ends of the electrical conductors crimped to said contact members, and

a spacer block of insulating material in said shell, said spacer block being provided with a plurality of radial grooves at the periphery of said block and extending the length of the block to receive and position the contact members during assembly of the connector.

5. A connector according to claim 4, in which said threaded cap or hood, when assembled on the connector body, engages the spacer block and locks the block and contact members in place in the connector body.

6. A connector according to claim 5, in which the bores in the connector body are shaped to receive either pin or socket contact members for use in either male or female connectors.

#### References Cited

##### UNITED STATES PATENTS

|           |         |                 |           |
|-----------|---------|-----------------|-----------|
| 1,956,842 | 5/1934  | Welch           | 339—209 X |
| 2,032,501 | 3/1936  | Reynolds        | 339—196 X |
| 2,095,254 | 10/1937 | Holliday et al. | 339—89    |
| 2,224,585 | 12/1940 | Abbott          | 339—103 X |
| 2,231,124 | 2/1941  | Joseph          | 339—89    |
| 2,809,361 | 10/1957 | Woofter et al.  | 339—59 X  |

##### FOREIGN PATENTS

|         |        |                |
|---------|--------|----------------|
| 624,999 | 2/1936 | Germany.       |
| 907,845 | 6/1960 | Great Britain. |
| 70,448  | 2/1928 | Sweden.        |

RICHARD E. MOORE, *Primary Examiner*.

**U.S. DEPARTMENT OF COMMERCE**

**PATENT OFFICE**

**Washington, D.C. 20231**

**UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION**

Patent No. 3,402,382

September 17, 1968

Donald R. De Tar

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

-- 4 --. Column 4, line 36, claim reference numeral "5" should read

Signed and sealed this 3rd day of February 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

**WILLIAM E. SCHUYLER, JR.**

Commissioner of Patents