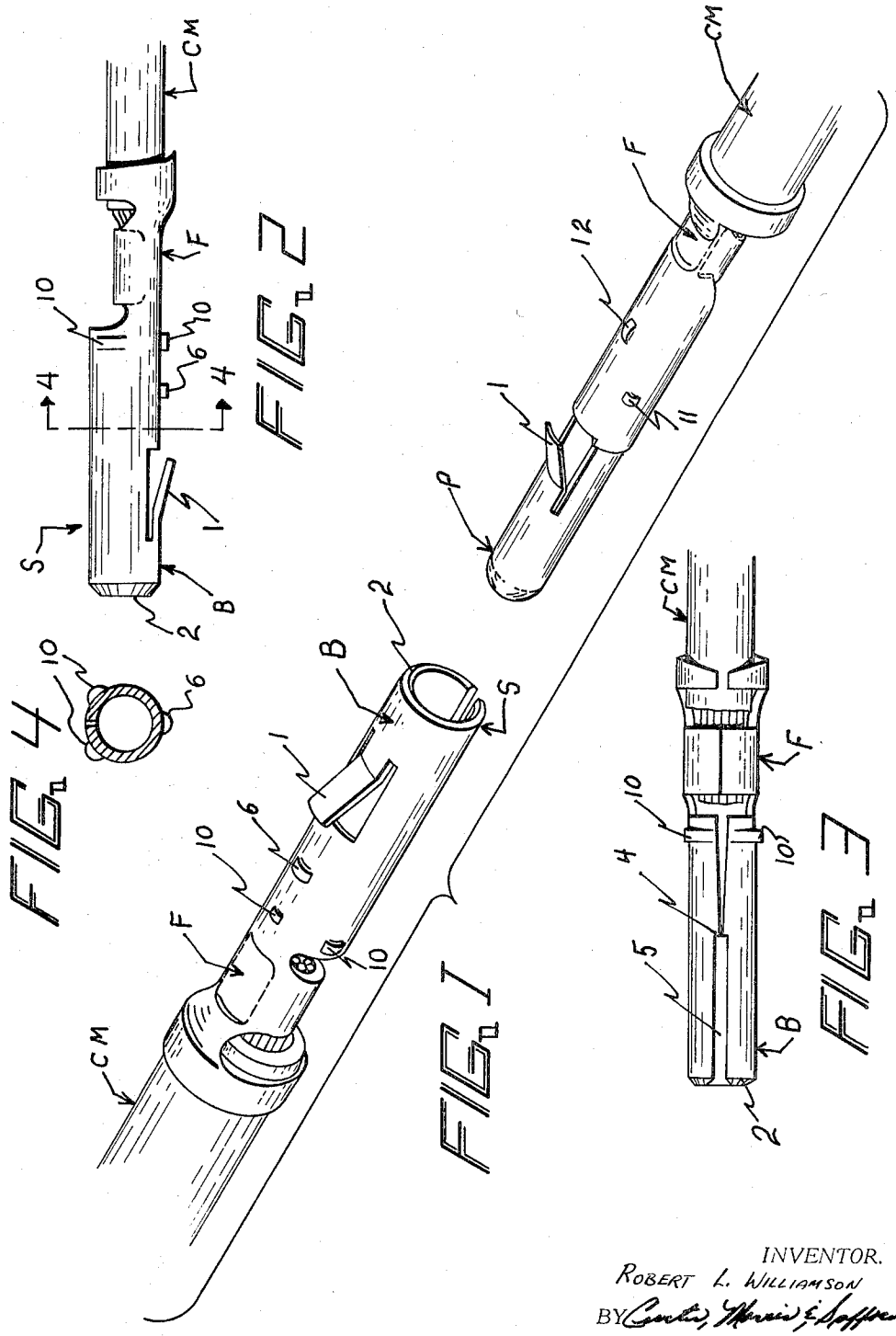
March 28, 1967 R. L. WILLIAMSON 3,311,866

ELECTRICAL CONNECTORS

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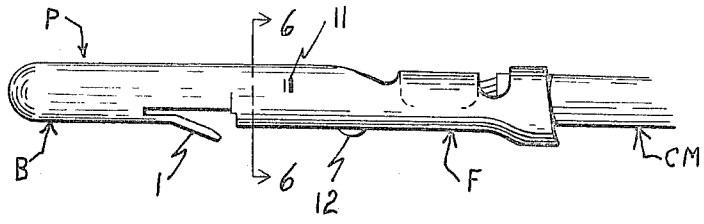
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FIG. 5



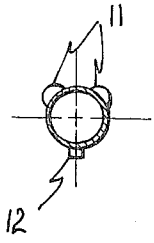


FIG. 6

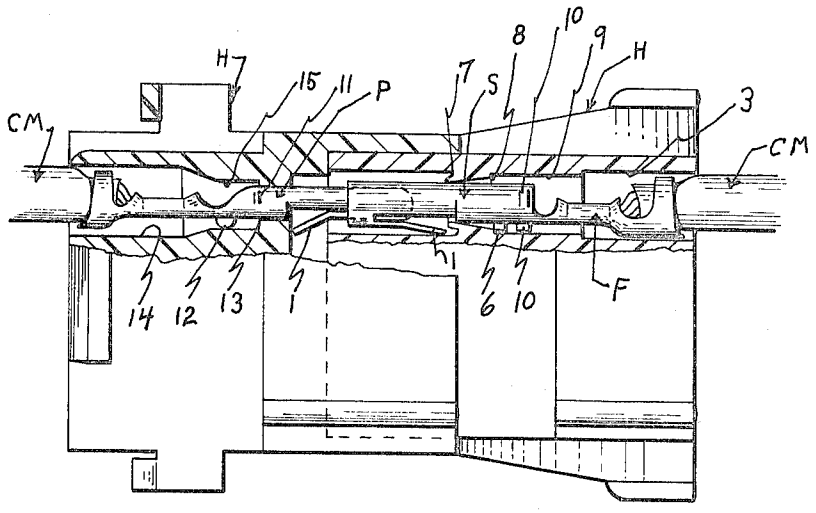


FIG. 7

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ELECTRICAL CONNECTORS

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Filed Mar. 17, 1964, Ser. No. 352,600
4 Claims. (Cl. 339—217)

This invention relates to electrical connectors and more particularly to pin and socket connector elements.

Pin and socket connector elements are well known in the electrical field and have been used to provide electrical connections for numerous electrical equipment, appliances, computers, systems, etc. These connector elements are generally mounted in mating housing members which provide proper alignment between the corresponding pins and sockets, protection therefor and insulation thereof.

It has been found that when the housing members containing the pins and sockets are mated, the pins do not readily engage the respective sockets due to misalignment caused by manufacturing tolerances in the electrical connectors as well as the housing members, changes of temperature, other environmental conditions and manufacturing design of the connector elements.

It is, therefore, an object of the present invention to provide electrical connectors of the pin and socket variety each of which have the same outside diameter along its body portion.

Another object of the present invention is to provide stabilizing means on each connector element to stabilize them within their respective housing members.

An additional object of the present invention is the provision of a pin and socket assembly which is easy to manufacture and is devoid of complexity.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration and principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is a perspective exploded view of the connector elements;

FIGURE 2 is a side elevational view of the socket element;

FIGURE 3 is a top plan view of FIGURE 2;

FIGURE 4 is a section taken along lines 4—4 of FIGURE 2;

FIGURE 5 is a side elevational view of the pin element;

FIGURE 6 is a view taken along lines 6—6 of FIGURE 5; and

FIGURE 7 is a partially sectioned view showing the pin and socket in mated relationship in their respective housing members which are also in mated relationship.

Turning now to the drawings, there is shown a pin element P and a socket element S. Each element is provided with a ferrule portion F in which the conductor portion of a conductor means CM is secured by cold-forging or crimping techniques disclosed in U.S. Patent No. 2,600,012. Ferrule portion F also may include a section to engage the insulation of the conductor means. Of course, the conductor means may be secured to the connector elements in any other well-known manner.

The connector elements are preferably formed by

shaping a sheet metal blank or strip of suitable, electrically-conductive material, such as, brass, bronze or other alloy, the metal being sufficiently hard and resilient in order to provide excellent spring quality thereto as well as being malleable to permit the cold-forging or crimping techniques mentioned above.

Each connector element includes a body portion B which has the same outside diameter therealong and includes a spring latch means 1 such as disclosed in U.S. Patent application, Ser. No. 545,527, filed April 21, 1966. While the outside diameter of pin element P is the same along its body portion, it is slightly larger than the inside diameter of socket element S so that a proper frictional fit therebetween is effected to provide excellent mechanical and electrical connection in addition to minimum of insertion and extraction forces.

Entrance 2 of body portion B of socket element S is slightly inclined on the outer and inner surfaces to facilitate entry within an opening 3 of a housing member H such as disclosed in U.S. Patent No. 3,179,738 and entry of pin element P thereinto, respectively.

At the top of body portion B of socket element S, the ends of the body portion at 4 are almost in engagement and these ends taper slightly away from each other in a direction toward ferrule portion F as shown in FIGURE 3. This provides a C-shaped type spring action concentrated at this location.

Extending forward of location 4, the ends of body portion B are spaced with respect to each other in a substantially parallel manner to define a gap 5 which extends the rest of the length of the body portion. The front section of the body portion to where the spring latch means begins also defines a C-shaped type spring action. Gap 5 in the body portion facilitates the insertion of the pin element within the socket element due to the fact that less surface area of the socket element engages the pin element. Gap 5 also lends excellent resiliency to the body portion since the ends are far enough apart to allow sufficient play therebetween. The inner end of gap 5 terminates slightly beyond the free end of the spring latch means and well over half the length of the body portion.

As can be discerned, the spring latch means does not provide continuity between the two C-shaped type spring areas; therefore, at location 4, there is provided a forked type spring which abets the forward C-shaped type spring.

The body portion of socket element S includes a projection 6 preferably in alignment with spring latch means 1 and spaced therefrom. When the socket element is disposed within opening 3 of housing member H, spring latch means 1 engages the edge or is disposed under annular lip 7 and projection 6 engages annular shoulder 8 of section 9 of opening 3. Spring latch means 1 and projection 6 serve to lock the socket element within opening 3 of the housing member.

Spaced from projection 6 are further projections 10 which are equidistantly spaced around body portion B. Projections 10 project outwardly from body portion B a distance which is slightly less than the diameter of section 9 of opening 3 to allow the socket element to be easily inserted within the opening. Projections 10 define stabilizing means to stabilize the socket element within opening 3. Projections 10 and annular lip 7 allow socket element S to move freely within opening 3 so that it will properly align itself for engagement with a respective pin element.

Projections 10 are preferably disposed at about 120° intervals around body portion B and one of projections 10 is preferably located in alignment with projection 6 which aids in stabilizing the socket element in its opening.

Turning now to pin element P as illustrated in FIGURES 5–7, body portion B thereof has the same outside

diameter and the nose section thereof is rounded to facilitate entry within the socket element. Spaced from spring latch means **1** are projections **11** which are located in the same plane normal to the longitudinal axis of the pin element and which are substantially equidistant from the vertical plane passing through the longitudinal axis.

Spaced rearwardly of projections **11** is another projection **12** in alignment with the spring latch means. Projections **11** engage an annular shoulder **13** of opening **14** in housing member H' to limit the inner movement of the pin socket within this opening while spring latch means **1** prevents the pin socket from being removed from the housing member without depressing the spring latch means.

Projections **11** and **12** also define a stabilizing means for the pin element in opening **14** since they extend outwardly from the body portion a distance slightly less than the diameter of section **15** of opening **14** in which they are disposed and in a manner similar to that of the projections on the socket element. Thus, projections **11** and **12** of the pin element allow it to move freely in opening **14** to a limited extent in order to properly align itself with its respective socket element during mating relationship therebetween and the housing members.

It should also be pointed out that since the outside diameter of each body portion of the pin and socket elements are the same therealong, this provides better coaxial relationship with the opening of the housing member in which the element is disposed and decreases the complexity of the parts during manufacture thereof since no parts on the body portions with different diameters are needed.

As can be discerned, there has been disclosed novel pin and socket elements which are easy to manufacture, easy to insert within housing members and are readily engaged to provide an excellent mechanical and electrical connection.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiment of the invention, which is shown and described herein, is intended as merely illustrative and not as restrictive of the invention.

I claim:

1. An electrical connector comprising a dielectric housing having mateable parts each provided with at least one passageway extending therethrough, a socket terminal and a pin terminal in the passageway of each part, said terminals having means at one end secured to conductor means and mateable body portions, the body portion of said socket terminal having substantially the same diameter therealong, the body portion of said pin terminal having substantially the same diameter therealong, said body portion of said pin terminal being electrically mateable with said body portion of said socket terminal when said parts of said housing are mated together, means on said body portions and in the passageways to secure the socket terminal and pin terminal within the passageways, and stabilizing projections located around said body portions to stabilize the socket and pin terminals within the passageways with some of said stabilizing projections being part of said securing means.

2. An electrical connector according to claim **1** wherein part of said stabilizing projections on one of said socket terminal and said pin terminal and all of said stabilizing projections on one of said socket terminal and said pin terminal are disposed substantially equi-distantly around said body portions.

3. An electrical connector according to claim **1** wherein said stabilizing projections are located adjacent said means secured to conductor means.

4. An electrical connector according to claim **1** wherein said stabilizing projections comprise arcuate members stamped out of said body portions.

References Cited by the Examiner

UNITED STATES PATENTS

2,330,948	10/1943	Brand et al.	339—217 X
2,431,583	11/1947	Penfold	339—205
2,814,024	1/1957	Narozny	339—193
3,026,496	3/1962	Gluck	339—217 X
3,178,673	4/1965	Krehbiel	339—217

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