Nov. 13, 1962 K. D. DEE ETAL 3,064,229

ELECTRICAL CONNECTOR

Filed Jan. 19, 1959

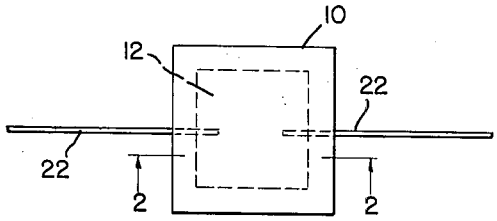


FIG. 1.

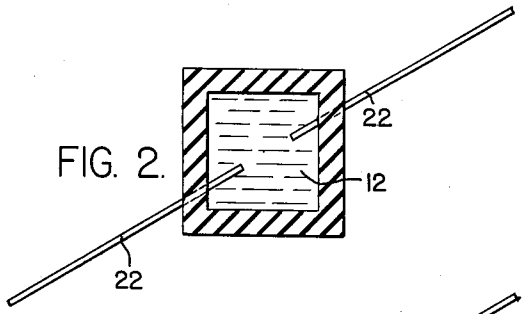


FIG. 2.

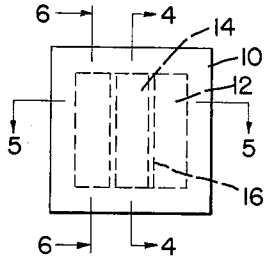


FIG. 3.

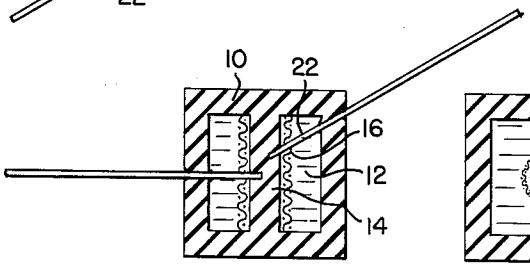


FIG. 4.

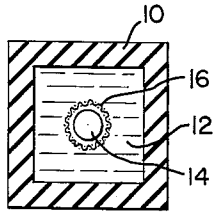


FIG. 5.

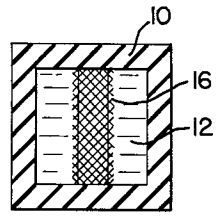


FIG. 6.

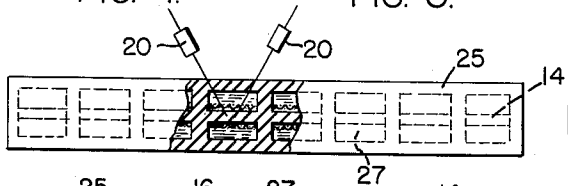


FIG. 7.

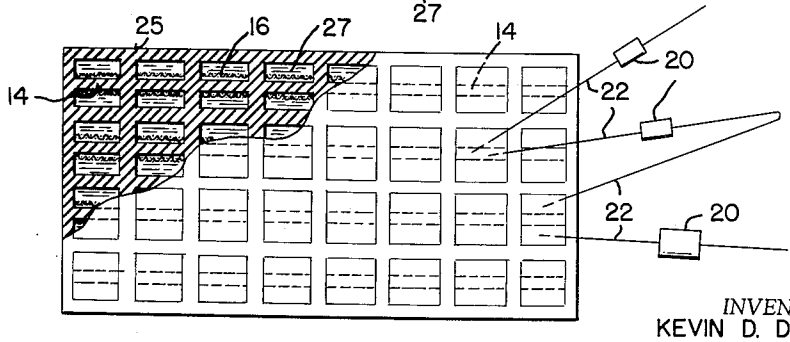


FIG. 8

INVENTORS
KEVIN D. DEE AND
LLOYD G. K. CARR

BY

Attorney

United States Patent Office 3,064,229 Patented Nov. 13, 1962

3,064,229

ELECTRICAL CONNECTOR

Kevin D. Dee, % Tasman House, Kawerau, New Zealand, and Lloyd G. K. Carr, North Garden, Va.

Filed Jan. 19, 1959, Ser. No. 787,576
5 Claims. (Cl. 339—113)

The present invention relates to an electrical connector, and more particularly to an improved connector for effectively connecting electrical or electronic components.

At the present time, it is common practice to connect individual electrical or electronic components, such as capacitors, resistors, transistors, or the like by soldering. The use of solder in connecting such components has many disadvantages. In the laboratory, for example, where many experimental circuits are continually being connected and disconnected, the making of soldered joints is time consuming; and the construction of such circuits requires a skilled technician to insure that the joints are properly soldered, and that the hot soldering iron does not come in contact with any of the components. Also, under conditions where the circuit or apparatus is subjected to extreme shock or vibration, the rigidity of the soldered joint sometimes causes it to separate.

One of the objects of this invention is to provide an improved electrical connector whereby the terminal wires of individual components may be easily connected and disconnected at will.

Another object of this invention is to provide an improved electrical connector whereby the terminal wires or prongs of components may be merely inserted in the connector to effect the connection.

Another object of this invention is to provide an improved electrical connector which reduces contact resistance to a minimum.

Another object of this invention is to provide an improved electrical connector which will permit the connection of a plurality of individual components by one connector.

A further object of this invention is to provide an improved electrical connector which serves as its own insulator.

A further object of this invention is to provide an improved electrical connector which will insure an effective connection even under environmental condition of shock or vibration.

A further object of this invention is to provide an improved electrical connector which will maintain its effectiveness under environmental conditions of extreme humidity or dampness.

A still further object of this invention is to provide an improved electrical connector which may be used in multiple as a "breadboard" for an experimental laboratory.

A still further object of this invention is to provide an improved electrical connector which is inexpensive to manufacture, convenient to use, and versatile in its application.

Other objects of this invention will become apparent from the drawings, the specification, and the appended claims.

In the drawings:

FIG. 1 is a side elevation of one embodiment of this invention showing a pair of terminal wires connected thereby;

FIG. 2 is a sectional view taken at line 2—2 of FIG. 1 showing the terminal wires connected thereby in an alternative position;

FIG. 3 is a side elevation of a modified electrical connector;

FIG. 4 is a sectional view of the connector shown in FIG. 3 taken on line 4—4 of FIG. 3 and looking in the direction of the arrows and showing a pair of terminal wires connected thereby;

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3 and looking in the direction of the arrows;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 3 and looking in the direction of the arrows;

FIG. 7 is an end elevation partly broken away showing still another modification of this invention in the form of an experimenter's testing panel; and

FIG. 8 is a plan view of FIG. 7 having a section partly broken away to show its interior.

Referring to the drawings, and particularly to FIGS. 1 and 2, there is illustrated one embodiment of the electrical connector of the present invention. This connector comprises a resilient, penetrable hollow housing or shell **10**, which has a closed chamber that is filled with an electrical conductive medium **12**. The housing **10** may be made of natural or synthetic rubber, such as neoprene, or in some applications it may be preferable to make the housing of a silicon self-sealing rubber.

The conductive medium which fills the housing or shell **10**, is a wet gelatinous substance that is a metalized colloidal emulsoid system. This emulsoid system may be made by introducing a metallic salt such as cupric chloride or ferric chloride into a colloidal emulsoid, such as agar. One emulsoid system which was effective in practice was made by preparing a saturated solution of ferric chloride, and adding just enough agar to form a wet jelly-like substance. The presence of the metallic salts imparts preservative qualities to the agar, thus preventing the harmful growth of bacteria.

To connect a pair of electrical or electronic components having terminal wires or prongs such as **22**, the ends of the wires **22** are inserted through a wall of the housing **10** and into the gelatinous substance **12**. The elasticity or resiliency of the housing **10** and the gelatinous nature of the conductive material prevent the gelatinous susbtance **12** from escaping between the wire **22** and the housing and also causes the inserted wire or prong **22** to be gripped securely in the housing. As is obvious, the conduction of current takes place through one terminal wire **22**, the conductive medium, and through the other inserted terminal wire **22**.

Referring to FIGS. 3 through 6, a modified electrical connector is illustrated which has a resilient penetrable core **14** which may be made of natural or synthetic rubber. The core **14** is attached in the chamber of the housing **10** and immersed in the metalized colloidal emulsoid. This core may be formed integral with the housing **10** or be cemented in place. Surrounding the core **14** is a fine metallic screen or grid **16** which may be composed of fine copper wire. To connect the components, by this modified connector, the terminal wires **22** are inserted through the housing **10**, into the metalized colloidal emulsoid, through the screen **16**, and into the core **10**. The addition of the core **14** and the wire screen **16** better secures the terminal wire in the connector and further guarantees the absence of contact resistance within the connector. With this connector, the conduction of current takes place from one inserted wire to the other inserted wire through the wire screen or grid **16** and the colloidal emulsoid system **12**.

FIGS. 7 and 8 show the electrical connector constructed in multiple in the form of a laboratory testing panel, or breadboard. This embodiment comprises a resilient penetrable matrix **25** which also may be made of natural or synthetic rubber such as the housing **10**. The matrix **25** has a plurality of separate chambers **27** which are filled with the conductive medium hereinbefore mentioned. If

desired, resilient penetrable cores 14 also may be inserted in the conductive medium in each of the chambers 27 or formed integral with the matrix 25. These cores are covered with a fine metallic screen 16. The terminal wires 22 may be inserted through the top or bottom of the matrix 25, into the metalized colloidal system in the chambers 27, and through the screen 16 into the core 14.

In FIGS. 7 and 8 components such as 20 are shown with their terminal wires 22 inserted in the top of the matrix 25 and connected thereby.

It is apparent from the foregoing, that in all of the embodiments, on removal of a terminal wire from the housing, the characteristics of the rubber housing causes the puncture to close, thus preventing the escape of the conductive medium. The use of silicon rubber is advantageous where a pressure differential exists between the chamber and exterior surface of the housing.

The surface of the housing 10 or matrix 25 may be provided with suitable registration marks to be used as a guide for the penetration of the housing by the terminal wires 22.

It is apparent that the emulsoid system may be metallized by metallic salts other than those heretofore mentioned. For example, copper sulphate may be used, or if the terminal wires are silver, silver nitrate salt may be employed. It is also apparent that the gelatinous mass may be made from materials other than agar.

Although the connectors shown herein are rectangular in shape, and have a rectangular chamber therein, it is understood that these connectors may be of any configuration.

Thus, it is apparent that we have provided an improved electrical connector, whereby the individual components may be connected and disconnected at will, and which connector can be used over and over again.

While the invention has been described in connection with several embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described our invention, what we claim is:

1. An electrical connector, comprising a plastic, rubber-like, penetrable, self-sealing housing having walls of substantially uniform thickness forming a chamber fully closed on all sides for holding a conductive medium, the walls of said housing being penetrable over the entire surfaces thereof, and an electrically conductive medium in said chamber, said medium being a colloidal emulsoid of a metallic solution, the walls of said housing being penetrable by, and to receive, a pair of conducting wires which are removably insertable at any point through walls of said housing into said conductive medium so that current can pass from one of said wires through said conductive medium to the other of said wires.

2. An electrical connector, comprising a rubber-like penetrable self-sealing housing forming a closed chamber for holding a conductive medium, a rubber-like penetrable core mounted in said chamber, and an electrically conductive medium filling said chamber around said core, said medium comprising a colloidal emulsoid of a metallic solution in a gelatinous base, said housing and core being penetrable to receive a pair of conducting wires which are removably inserted through the wall of said housing and said conductive medium into the penetrable core so that current can pass from one of said wires through said conductive medium to the other of said wires, said core assisting in holding said wires in position in said connector.

3. An electrical connector, comprising a rubber-like penetrable self-sealing housing forming a closed chamber for holding a conductive medium, a rubber-like penetrable core mounted in said chamber, a conductive wire grid around said core, and an electrically conductive medium filling said chamber and the interstices of said grid around said core, said medium being a colloidal emulsoid of a metallic solution in a gelatinous base, said housing and core being penetrable to receive a pair of conducting wires which are removably inserted through the wall of said housing and said conductive medium and through said grid and into the penetrable core so that current can pass from one of said wires through said conductive medium and said grid to the other of said wires, said core assisting in holding said wires in position in said connector.

4. An electrical connector, comprising a rubber-like penetrable housing, a plurality of rubber-like partitions within said housing and dividing said housing into a plurality of closed chambers, a rubber-like penetrable core mounted in each of said chambers, and an electrically conductive medium filling each of said chambers around its core, said medium being a colloidal emulsoid of metallic solution in a gelatinous base, the outside wall of said housing being penetrable to receive pairs of conducting wires which are removably inserted through the outside wall of said housing into the conducting medium, one pair of wires being removably insertable into each of a plurality of said chambers and into the cores associated with the respective chambers.

5. An electrical connector according to claim 4 wherein a fine wire grid is mounted in each of said chambers around each core.

References Cited in the file of this patent

UNITED STATES PATENTS

1,067,024	Hall et al.	July 8, 1913
1,955,005	Maloney	Apr. 17, 1934
2,028,775	Hetenyi	Jan. 28, 1936
2,508,250	Goffstein	May 16, 1950
2,710,369	Booe	June 7, 1955
2,740,099	Schultz	Mar. 27, 1956
2,858,518	Chrystie et al.	Oct. 28, 1958

OTHER REFERENCES

Hyde, abstract of application Serial No. 206,902, published May 20, 1952, 370 O.G. 757.