June 11, 1963 R. R. LEWIS 3,093,431

ELECTRICAL CONNECTOR FOR USE IN AN EXPERIMENTAL CIRCUIT KIT

Filed Oct. 11, 1961

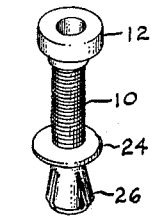


FIG.1

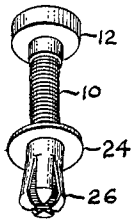


FIG.2

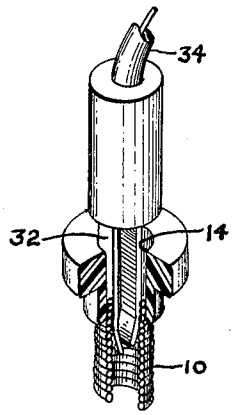


FIG.4

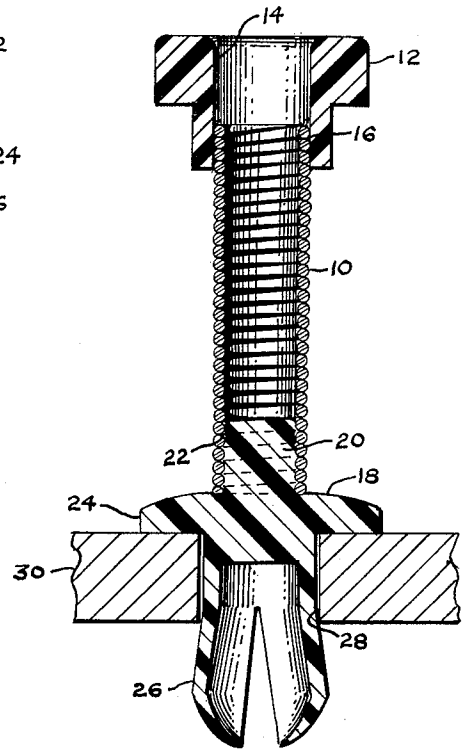


FIG.3

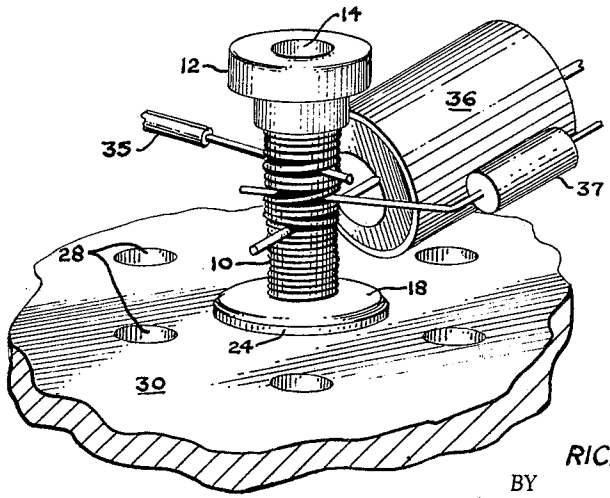


FIG.5

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ELECTRICAL CONNECTOR FOR USE IN AN EXPERIMENTAL CIRCUIT KIT

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2 Claims. (Cl. 339—18)

This invention relates to electrical connectors, and more particularly to an improved electrical connector for use in an experimental kit for constructing electrical or electronic circuits for educational purposes.

For teaching electrical theory with the aid of experimental circuitry, it is desirable to afford means for simply and conveniently making electrical connections between leads and components without the use of solder or tools, so that modifications in a circuit may readily be made, or a series of different circuits rapidly constructed. At the same time, it is necessary that connections of good conductivity be established by these means. It is also desirable to afford some form of base upon which the circuit components may be mechanically supported without the use of tools or complex, time-consuming mounting procedures. To minimize the number and variety of components in the kit, this support is preferably obtained by means of the connectors themselves.

It is accordingly the primary object of this invention to provide an improved electrical connector to which a plurality of leads or components may be quickly connected in good conductive relation without the use of tools, solder, or fasteners. It is a further object of the invention to afford an improved connector which cooperates with a base member to mechanically support circuit components connected thereto. Further objects and advantages of the invention will become apparent as the following description proceeds.

Briefly stated, the invention is preferably embodied in a connector having a conductive helical coil spring, an insulating mounting plug secured within one end of the spring, and an insulating cap or receptacle secured on the other end of the spring. The coil spring is readily expandable to receive wires or component leads in secure engagement between the turns thereof, for electrical connection as well as mechanical support. I prefer to form the spring of copper or copper-plated spring stock, and may also provide a gold flashing on the surfaces of the turns for maximum conductivity. The number of components or leads which may be connected by a single connector is limited only by the number of turns of the coil.

The insulating cap is formed of vinyl, nylon, or other suitable insulating material, and serves not only to protect the user against shock, but also affords a receptacle for the insertion of a banana plug connector axially into the interior of the coil, for connection of test instruments or other devices which are normally equipped with this type of plug.

According to a further feature of the invention, the mounting plug is formed of resilient insulating material and terminates in a split deformable portion for convenient mechanical mounting of the connector by insertion of the plug through a suitably formed opening of a peg board or other mounting base. Further, I prefer to form the plug with a circumferential locating flange for abutment against the peg board to support and locate the connector and the components connected thereto in a secure manner. By these means, a circuit may be arranged securely on the peg board or other base without the use of additional mounting or fastening means. To disassemble the circuit, the leads and components are merely pulled from the spring, and the connector plugs are manually extracted from the peg board. The plug and cap are preferably secured firmly to the ends of the

spring by means of epoxy resin or other adhesive, although they might alternatively be threaded resiliently upon the turns of the spring.

While the specification concludes with claims particularly pointing out the subject matter which I regard as my invention, it is believed that a clearer understanding may be obtained from the following detailed description of a preferred embodiment thereof, referring to the accompanying drawing, in which:

FIG. 1 is a pictorial view of the improved connector;

FIG. 2 is a pictorial view as seen from below the connector;

FIG. 3 is a cross-sectional view, showing the connector assembled in a peg board or mounting base;

FIG. 4 is a fragmentary pictorial view showing the method of connecting a banana plug in the receptacle or cap of the connector; and

FIG. 5 is a pictorial view showing the method of connection of leads and components to the connector.

Referring to the drawings, the improved connector includes a conductive helical coil spring **10**, which is preferably formed of a resilient but highly conductive material or composite of materials. I prefer to form this member of spring steel, copper plated and gold flashed, for maximum surface conductivity.

An insulating cap or receptacle **12** is formed with a cylindrical opening **14** to receive the upper end of the spring therein. I prefer to form the cap **12** of vinyl or other readily moldable plastic material, but any desired insulating material may be utilized. The insulating cap, being resilient, may be threaded on the spring **10**, but is preferably secured to the spring by means of a layer of epoxy resin or other adhesive material **16**, for maximum resistance to accidental separation when the cap is pulled by a user to disassemble the connector from a mounting board.

An insulating mounting plug **18**, formed of a resilient material similar to that of the cap **12**, has a cylindrical portion **20** which is snugly received in the lower end of the spring. Again, the portion **20** may be threaded into the spring, but I prefer to apply a layer of adhesive **22** to strengthen the assembly. The plug is formed with a circumferential locating flange **24**, and with a split deformable portion **26** for insertion into one of a plurality of openings **28** of a conventional peg board **30** or other desired mounting base. It will be apparent that the connector can be quickly plugged into or removed from the base, but that the split portion expands to its original configuration when the plug is inserted, as shown in FIG. 3, to hold the connector securely in place and provide firm support for circuit components mounted thereon.

As shown in FIG. 4, the opening **14** of the cap **12** is arranged to receive a banana plug **32** of a lead **34**, such as is commonly used to connect instruments and other electrical devices for experimental or test purposes. The plug enters the interior of the coil spring to make electrical contact therewith. Referring to FIG. 5, the method of connecting an illustrative series of leads and components **35**, **36**, and **37** is shown. The user has only to apply tension to the cap, or alternatively to bend the spring to one side, for convenient insertion of the leads between the parted turns of the spring.

By utilizing a plurality of the improved connectors in combination with a suitable peg board, an educational or experimental circuit kit may be afforded which requires no solder, tools, or additional fasteners for the rapid construction and electrical connection of any desired circuit. A circuit once constructed can be quite readily modified or disassembled, simply by withdrawing the leads and banana plugs from the connectors, after which the connectors may be pulled from the peg board.

Various changes and modifications will readily occur to those skilled in the art without departing from the true spirit and scope of the invention; I therefore intend to define the invention in the appended claims without limitation to specific details of the preferred embodiment herein described by way of illustration.

What I claim is:

1. An electrical connector adapted for use in constructing experimental circuits upon a mounting base having a plurality of openings formed therein, said connector comprising a conductive helical coil spring, an insulating cap having a cylindrical opening therethrough, one end of said spring being secured in said cylindrical opening for insertion of a plug connector therethrough into contact with the interior of said spring, and an insulating plug secured to the other end of said spring and having a split portion resiliently deformable upon insertion into an opening of said mounting base for supporting said connector, said plug being formed with a locating flange extending circumferentially thereabout for abutment upon said mounting base about said opening therein.

2. A kit for constructing experimental electrical circuits, comprising a mounting board formed with a plurality of spaced openings, and a plurality of electrical connectors each including an insulating plug having a split resiliently-deformable portion for insertion into one of said openings to mount said connector on said board, each of said connectors further including a conductive helical coil spring secured at one end thereof on said plug, and an insulating cap secured to the other end of said spring, said insulating cap being formed with a cylindrical opening for insertion of a plug connector therethrough into contact with the interior of said spring.

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