

Dec. 24, 1963

Y. M. HOAG

3,115,381

CONNECTING DEVICE

Filed Dec. 30, 1960

FIG. 1

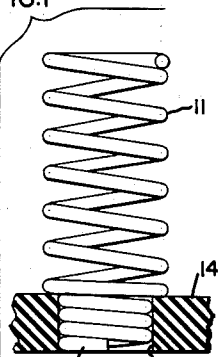


FIG. 2

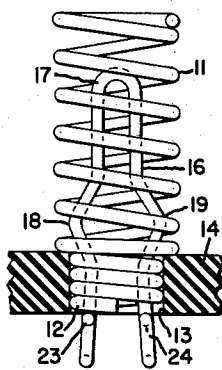


FIG. 3

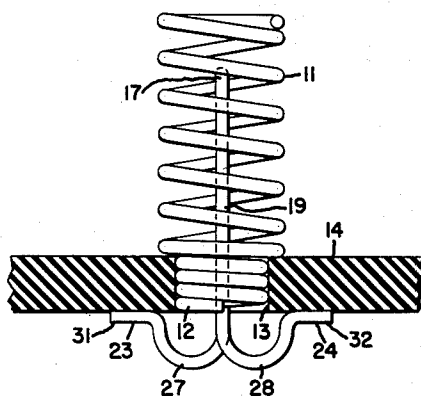


FIG. 5

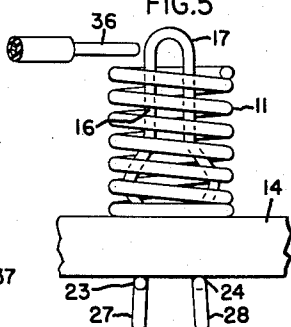


FIG. 4

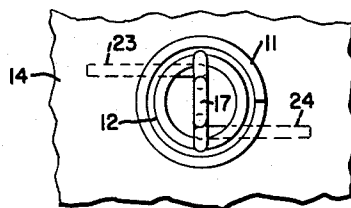


FIG. 6

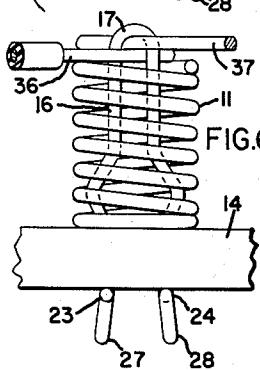


FIG. 7

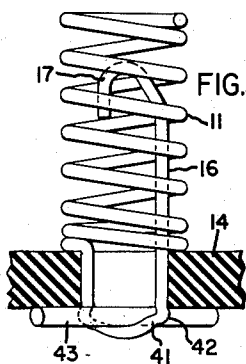


FIG. 8

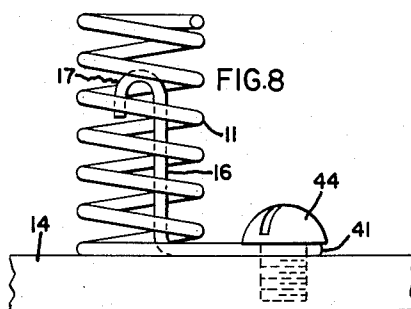


FIG. 9

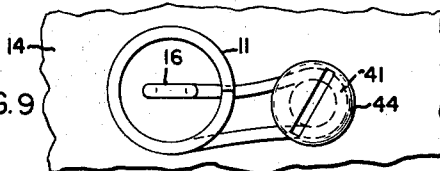
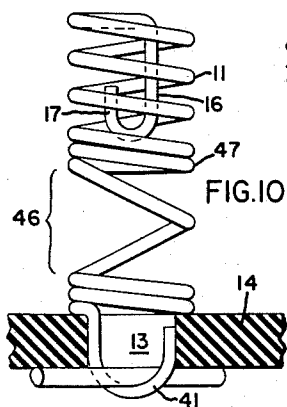


FIG. 10



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3,115,381

CONNECTING DEVICE

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Filed Dec. 30, 1960, Ser. No. 79,917
8 Claims. (Cl. 339-217)

This invention relates to connecting devices, and more particularly to connector terminal devices for connecting electrical wiring.

There are various known types of connector terminals, such as screw types and spring or clip types. There has been a need for a new and improved connector terminal for use in electronic constructional kits, where the main requirements for such a connector terminal are low cost, simplicity, manipulability, and reliability.

An object of the invention is to provide a connecting device which is simple, reliable, easily manipulated, and low in cost.

Another object is to provide a connecting device which can easily and quickly be manipulated by youngsters.

A further object is to provide an improved connecting device for use in electronic constructional kits.

A still further object is to provide a connecting device which can be attached to a mounting board without the use of tools.

Still other objects will be apparent from the following description and claims, and from the accompanying drawing in which:

FIG. 1 is a front view of a preferred embodiment of the connecting device in accordance with the invention, showing the two parts thereof in partly assembled condition on a mounting board,

FIG. 2 is a front view of the connecting device in assembled condition,

FIG. 3 is a side view of the device of FIG. 2,

FIG. 4 is a top view of the device of FIG. 3,

FIGS. 5 and 6 illustrate how electrical connecting wires are inserted in and attached to the connecting device,

FIG. 7 is a side view of an alternative embodiment of the invention,

FIG. 8 is a front view of a further embodiment of the invention,

FIG. 9 is a top view of the embodiment shown in FIG. 8, and

FIG. 10 is a front view of another embodiment of the invention.

The connecting device of the invention comprises, basically, a compressible helical spring adapted to be mounted onto a mounting board or chassis, and a loop-shaped post member arranged inside the helical spring and adapted to receive an electrical connector wire when the helical spring is compressed.

Now referring to the preferred embodiment of the invention illustrated in FIGS. 1 through 6 of the drawing, a compressible helical spring 11, wound from resilient spring wire, is provided with a neck 12 of reduced diameter at the lower end thereof, the turns of the spring at the neck 12 being closely spaced, whereas the turns of the remaining portion of the spring 11 are spaced apart so that the spring 11 may be compressed when pressure is applied thereto in an axial direction. The neck portion 12 of the spring 11 is adapted to fit snugly into an opening 13 through a mounting board 14. The mounting board 14 may be a board or chassis made of insulative material, such as fiber board or plastic, which serves as the mounting board or chassis of an electronic constructional kit or other suitable device.

A loop-shaped post member 16, made from resilient spring wire or other suitable material, has an apex portion 17, and outwardly extending shoulders 18 and 19

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on the sides 21 and 22 thereof. The end regions of the sides 21 and 22 remote from the apex 17 are respectively provided with legs 23 and 24 extending transversely with respect to the sides 21 and 22, these legs 23 and 24 being generally parallel with respect to each other.

To assemble the connecting device of FIGS. 1 through 6, the neck portion of the helical coil 11 is inserted into the opening 13 of a mounting board 14, this mounting board 14 being illustrated in cross-section to better reveal the opening 13 therein. Preferably, the neck 12 fits snugly within the opening 13. This snug fit is easily provided due to the resilient nature of the turns of the spring comprising the neck portion 12. If desired, the opening 13 may be provided with threads, so that the neck portion 12 of the spring may be threaded therein. The length of the neck portion 12 is preferably, though not necessarily, the same as the thickness of the mounting board 14.

The loop-shaped post member 16 is then inserted, as indicated by the arrow 26, into the spring 11 through the neck 12 thereof, to the position shown in FIGS. 2, 3 and 4. In this assembled position, the shoulders 18 and 19 of the loop-shaped member 16 engage and lock within the helical spring 11 at a position just above the neck portion 12, the resiliency of the loop member 16 maintaining the shoulders 18 and 19 in this locking position. In this assembled position, the legs 23 and 24 of the loop-shaped post member 16 engage against the underside of the mounting board 14 and are so oriented, as shown, to stabilize the position of the post member 16.

The lower-most portions of the member 16 are curved away from the mounting board 14, as indicated at 27 and 28, so that only the outer extremities 31 and 32 of the legs 23 and 24 will engage against the underside of the mounting board 14, thereby insuring maximum vertical stability of the loop-shaped post member 16.

The connecting device functions as follows. To connect an electrical wire to the device, the top of the helical spring 11 is manually pressed downwardly to the position shown in FIG. 5, thereby exposing the apex 17 of the post 16 so that the bared end 35 of an electrical connector wire may be inserted into and through the loop formed by the apex 17, whereupon the spring 11 is released and urges upwardly against the wire 36, as shown in FIG. 6, thereby holding the wire 36 securely and making a good electrical connection to the wire 36 and to other wires 37 which also are inserted through the loop of the apex 17 of the post member 16.

In many applications, the desideratum will be to electrically connect together a plurality of hookup wires 36, 37 by means of the connecting device, in which event it is not necessary that the connecting device itself be electrically conductive. For such applications, either or both of the helical spring 11 and the loop-shaped post 16 may be made of non-conductive material, such as resilient plastic.

The spring 11 is readily depressed manually, by pressing downwardly thereon with one or two fingers or with a thumb and finger, or with a screwdriver blade or other suitable object.

In the embodiment of FIG. 7, the helical spring 11 and loop-shaped member 16 are formed from a single piece of wire, as shown, the intermediate portion of the wire between the spring 11 and loop member 16 being curved as indicated at 41 in a manner to fit snugly into an opening 13 in a mounting board 14. In this embodiment, the opening 13 may be in the shape of a narrow slot, thus insuring that the bottom of the helical spring 11 will seat against the board 14 and remain securely in position when the spring 11 is pressed downwardly from the top in order to insert wires under the apex 17 of the loop member 16.

In many situations, the plug-in portion 41 can be made to fit in the opening 13 sufficiently tightly so that the connector terminal will remain in place during normal use. The securing of the coupling device to the mounting board 14 may be enhanced by providing outwardly protruding shoulders 42 on the curved portion 41, whereby these shoulders 42 can pass through the opening 13 and will expand slightly outwardly just below the opening 13 when the connecting device is in place. A further or alternative means of more tightly securing the coupling device to the mounting board 14, is to provide a pin or wire 43 extending through the portion 41 just below the mounting board 14.

In the embodiment shown in FIGS. 8 and 9, the helical spring 11 and loop member 16 are the same as in the embodiment of FIG. 7. The connector loop 41, however, extends laterally of the axis of the spring 11, and is attached to the mounting board 14 by means of a screw 44 or rivet attached to the mounting board 14 and extending through the laterally positioned loop 41.

FIG. 10 illustrates a modification of the connection device, in which the device is attached to a mounting board 14 by means of a plug-in loop 41 extending into an opening 13, similar to the embodiment of FIG. 7. In FIG. 10, the wire-receiving loop 16 is inverted from the other embodiments shown and the helical spring 11 is provided with a lower region 46 in which the turns are widely spaced apart. In operation, when the spring 11 is pressed downwardly, the apex 17 of the loop becomes exposed in the region 46, whereupon connector wires may be inserted through the apex 17 of the loop. Upon release of the spring 11, the connector wire will be tightly held against a turn 47 at the upper part of the region 46.

While preferred embodiments of the invention have been shown and described, other embodiments and modifications thereof will be apparent to those skilled in the art and will fall within the scope of the invention as defined in the following claims.

What I claim is:

1. An electrical connector device comprising a compressible helical spring provided with a neck portion at an end thereof, said neck portion having a smaller diameter than the remainder of said helical spring and being adapted to fit into an opening in a mounting board so that said remainder of the helical spring abuts against and extends from one side of the mounting board, a post member comprising an elongated loop of resilient material adapted to extend into said helical spring from the neck end thereof whereby the apex of said loop is exposed for insertion of a connector wire therein when said helical spring is compressed, the end of said elongated loop remote from the apex thereof being provided with at least one leg portion extending laterally from the axis of said elongated loop, said leg portion being adapted to abut against the other side of said mounting board when said post member is inserted into said helical spring from said other side of the mounting board, at least one side of said elongated loop being provided with an outwardly extending shoulder for providing locking engagement with the inside of said helical spring at a region immediately beyond said neck portion when said post member is inserted into said helical spring from the other side of said mounting board, thereby holding said connector device in place on said mounting board due to said abutment of the helical spring against said one side of the board and said abutment of the leg

portion of the elongated loop against said other side of the board.

2. A device as claimed in claim 1, in which the end of said elongated loop remote from the apex thereof is provided with a pair of legs extending laterally in generally opposite directions from the plane of said elongated loop and adapted to engage against the underside of said mounting board.

3. A device as claimed in claim 2, in which said legs are curved to clear the spring and mounting board in the vicinity of said opening.

4. A device as claimed in claim 2, in which said legs respectively extend along spaced-apart mutually parallel axes.

5. An electrical connector device comprising a compressible coiled spring and a post member, said post member having an apex portion at one end for receiving electrical wires, an outwardly extending shoulder portion adapted to frictionally engage the inner surfaces of said coiled spring when inserted therein, and an outwardly extending resilient gripping means at the end opposite to said apex portion whereby said connector may be attached to an opening in a board by placing the coiled spring on one side of the board in registration with the opening and inserting said post member through said opening from the other side of the board until said resilient gripping means makes resilient contact with the other side of the board so as to urge said shoulder portion which engages the coiled spring and hence a portion of said coiled spring toward the board.

6. A connector device as set forth in claim 5 wherein an end portion of said coiled spring is of reduced cross-sectional area so as to form a shoulder which bears against the board when said end portion is inserted in a hole in a board, said shoulder portion of the post member being arranged to engage said coiled spring at the vicinity of said shoulder of the coiled spring.

7. A connector device as set forth in claim 5 wherein said shoulder portion of said post member extends in one plane and said resilient gripping means extend in planes that are generally perpendicular to said one plane so as to provide stability for said connector in two different directions.

8. A connector device as set forth in claim 6 wherein said shoulder portion of said post member extends in one plane and said resilient gripping means extend in planes that are generally perpendicular to said one plane so as to provide stability for said connector in two different directions.

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