Sept. 4, 1956 R. R. SCOVILLE 2,762,030

TERMINAL LUG

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FIG. 1.

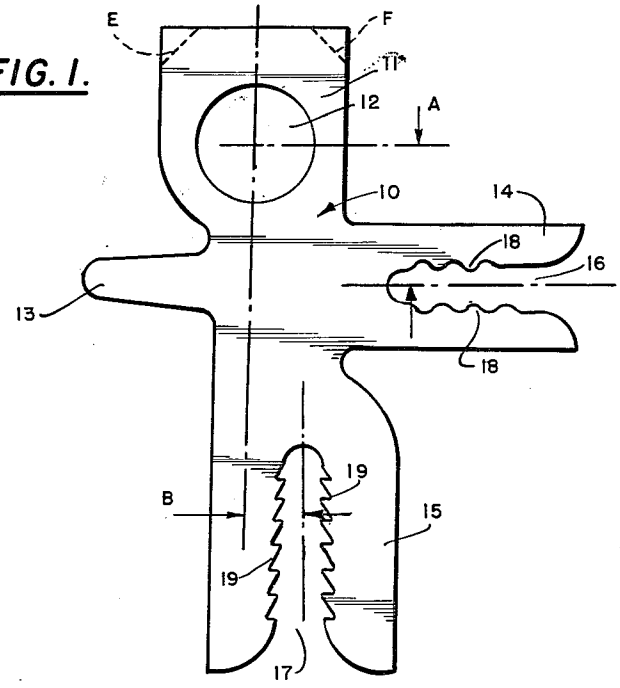
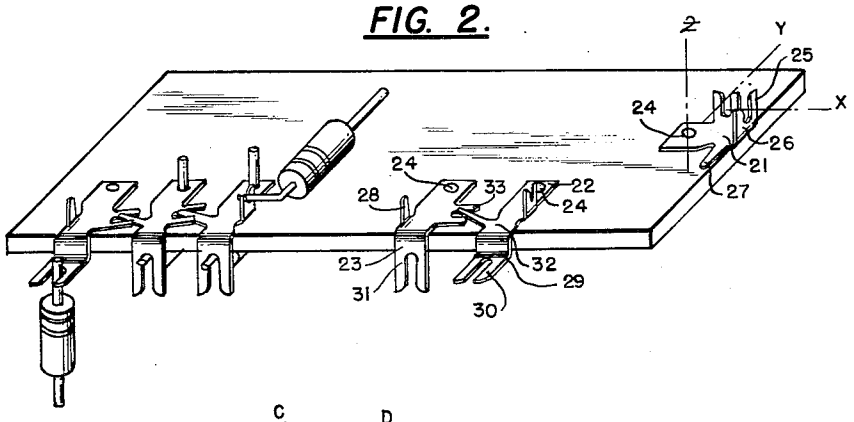


FIG. 2.



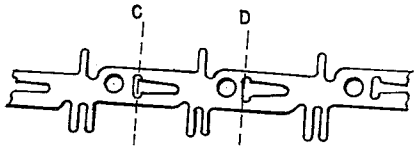


FIG. 3.

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TERMINAL LUG

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8 Claims. (Cl. 339—277)

The present invention relates to connecting devices and is more particularly concerned with a novel terminal lug for use in electrical circuit applications.

A considerable number of terminal lug devices are already known in the art for providing connecting means in electrical circuit applications. For the most part, these known terminal lugs have been subject to several disadvantages, however. First, such terminal lugs have generally been designed to accommodate but a single electrical connection; or, on the other hand, when an attempt has been made to so design a terminal lug that plural connections may in fact be coupled to the said lug, considerable care has still been required to assure that the said plural connections do not interfere with one another. Again, it is often desired that terminal lugs be electrically interconnected to provide, in essence, a terminal strip, and in the past separate electrical connections have been required to effect such an interconnection of terminal lugs.

In most circuit applications the foregoing disadvantages of known terminal lugs require undue complication and unnecessary expense in the wiring of a circuit, and, further, seriously limit the possible circuit arrangements which may be effected. The terminal lug of the present invention obviates the foregoing difficulties and permits much greater facility in the wiring of an electrical circuit.

It is accordingly an object of the present invention to provide a novel terminal lug.

A further object of the present invention resides in the provision of an electrical connector device capable of receiving several connections from a plurality of directions without the said connections interfering with one another.

A still further object of the present invention resides in the provision of a terminal lug which may receive electrical connections by "clip-in" or automatic hopper feeding techniques.

A still further object of the present invention resides in the provision of an electrical connector having integral strapping clips whereby the said connector may be quickly connected to like connectors.

Another object of the present invention resides in the provision of basic connector units which may be readily installed at high speed by automatic machines thereby to form terminal strips.

Still another object of the present invention resides in the provision of a terminal lug which is inexpensive to fabricate and employ, and which may be produced by known manufacturing techniques.

A further object of the present invention resides in the fabrication of the terminal lugs in continuous strips which may be stored on reels for later automatic feeding to high speed installing machines, the lugs being snipped off and even bent as installed on terminal strips.

In providing for the foregoing objects and advantages, a terminal lug in accordance with the present invention comprises a metallic member having at least two forked portions substantially at right angles to one another, and

further including a projecting tooth adapted either to act as a connecting post for external electrical connections or to cooperate with one of the said forked portions of a similar connector for strapping such plural connectors together. The terminal lug of the present invention further has a mounting portion which preferably includes eyelet means for securing the said lug to a terminal board. The said eyelet is in turn so disposed with respect to the remaining portions of the terminal that an electrical connection may be inserted therein and such an electrical connection, in passing through the said eyelet, does not interfere with any other connections made to either the forked portions or the projecting tooth portion of the said terminal lug. The terminal lug is further so constructed that the several connection portions thereof may be bent into a plurality of different configurations with respect to one another, whereby one or more of my novel terminal lugs may be utilized to receive electrical connections both above and below a terminal board and from a plurality of distinct directions.

The foregoing objects, advantages and construction of the present invention will be more readily seen from the following description and accompanying drawings in which:

Figure 1 represents a terminal lug in accordance with the present invention before the several portions thereof are bent to desired positions.

Figure 2 depicts a terminal board having a plurality of terminal lugs disposed thereon in accordance with the present invention, and

Figure 3 represents a string of terminal lugs in accordance with the present invention and adapted to be fed to automatic machinery for attaching the said terminal lugs to a terminal board.

Referring now to Figure 1, it will be seen that a terminal lug **10** in accordance with the present invention may comprise a metallic punching or other machining of electrically conductive material. The lug **10** comprises a first portion **11** having a substantially circular aperture **12** formed therein. It should be understood that if the said aperture **12** does take the form shown, a separate eyelet is preferably used in conjunction with the said aperture **12** for mounting the terminal lug **10** upon a board structure. In the alternative, however, the aperture **12** may take the form of an eyelet dimpled into the terminal lug itself whereby auxiliary eyelets need not be employed in mounting the lug. In addition, it should be noted that, if desired, two corners of the portion **11** may be bent sharply downward if desired, along lines E and F, for instance, whereby two short sharp teeth are formed which may dig into a mounting board thereby to prevent twisting of the terminal lug.

Formed integrally as portions of the terminal **10** are a projecting tooth portion **13**, a first forked portion **14** disposed substantially opposite the tooth portion **13**, and a second forked portion **15** disposed substantially at right angles to portions **13** and **14**. Forked portions **14** and **15** of the terminal lug **10** define, respectively, centrally located slots **16** and **17** for the reception of electrical connectors, and the said slots **16** and **17** in turn preferably define toothed or rippled edges **18** and **19** respectively to facilitate the gripping action on a connector inserted therein. The slot **16** preferably defines a cross dimension substantially the same as that of tooth portion **13** whereby as will become apparent from the following discussion, plural terminal lugs may be readily interconnected. The aperture **12** is so disposed that the center thereof is displaced from the center line of the portion **14** by a predetermined distance A, and the said center of aperture **12** is further displaced from the center line of the slot **17** by a distance B. It will be seen, therefore, that a wire or other connector extending through the aperture **12** will

not interfere with a wire passing through the slot 16 and/or with a wire passing through the slot 17, because of the said displacements A and B. Because of this feature it is possible to bend the tooth portions 14 and 15 each upward, for instance, at substantially right angles to the plane of the drawing, and connections may be coupled to the terminal 10 at slots 16 and 17 as well as through aperture 12 without any of these connections interfering with one another in respect to physical displacement. Referring to a system of Cartesian coordinates, it is thus possible with the terminal lug of the present invention to connect wires or other connections from each of the "X," "Y" and "Z" directions without there being any physical interference therebetween.

It should further be noted that because of the slots 16 and 17, defined respectively in the forked portions 14 and 15 of terminal 10, lead wires of circuit components or other electrical connections may either be clipped into the said slots 16 and 17 or may, in the alternative, be wrapped about the portions 14 and 15 or about either leg of the said forked portions 14 and 15. Again, the projecting tooth 13 of the terminal 10 may serve to receive even further lead wires by a "wrap-around" technique, and thus each of the portions 13, 14 and 15, as well as aperture 12, may act as possible connection points for external lead wires.

When either of the portions 14 or 15 are utilized as connection points by a "wrap-around" technique, it will be noted that the forked construction of each of these portions provides in effect two tabs at each location for receiving such a "wrap-around" connection. On the other hand, when the portions 14 and 15 are to be used for receiving "clip-in" connections, the lead wires of an external circuit component may be wedged into the said slots 16 and/or 17 whereby they are maintained in place by the toothed edges 18 and 19 respectively.

While I have described the tooth projection 13 as serving to receive possible "wrap-around" connections, in the preferred embodiment of my invention the said portion 13 serves a much more important purpose. It will be noted that the said portion 13 is so disposed in respect to the other portions of the terminal 10 that plural terminal lugs 10 of the type shown in Figure 1 may be strapped together, without there being any auxiliary connectors required, by the simple expedient of wedging the projecting tooth 13 of one terminal lug 10 into, for instance, the slot 16 of a further terminal lug 10. This system, as well as other possible terminal lug configurations in accordance with the present invention, may be seen more readily by reference to Figure 2.

It will be seen that in accordance with the present invention a terminal board 20 may be utilized to carry plural terminal lugs thereon. There such lugs have been shown and these have been designated respectively as 21, 22 and 23. Each of the said terminal lugs 21, 22 and 23 are mechanically coupled to the board 20 by an eyelet 24, and, if desired, by the short teeth formed by downwardly bending corners of the said lugs along lines E and F. As has been discussed previously, the said eyelet 24 of each of the terminals 21, 22 and 23 may serve to receive a wire or other electrical connection therethrough for providing a first electrical coupling to the respective terminal lug. Referring more particularly to the terminal lug 21, it will be seen that the two forked portions thereof, 25 and 26, may, if desired, be bent upward and substantially at right angles to the plane of the board 20. Because of the displacement of eyelet 24 with respect to the centers of the slots of each of forked portions 25 and 26 of the terminal 21, plural wires or other electrical connections may be connected to the said terminal 21. Such connections or wires may come from each of the "X," "Y" and "Z" directions designated in the said Figure 2, and as will be apparent, there will be no physical interference between any connection coming from any of the said directions with a connection coming from any other direction. In the particular case of terminal lug 21 the projecting tooth 27 has been shown as disposed substantially parallel to the plane of board 20. Clearly, however, the said projecting tooth 27 may be bent upward as is projecting tooth 28 of terminal lug 23, thereby to provide a still further electrical connection point.

The various portions of the terminal lugs in accordance with the present invention may be bent to a number of other desired configurations to satisfy the interconnection requirements of any given electrical circuit. Thus, referring to the terminal 22, shown in Figure 2, it will be seen that one of the forked portions may be bent at two right angles to the edge of terminal 20, thereby to assist in fixing or retaining the terminal 22 adjacent the edge of the board 20. Thus, the terminal 22, when bent as shown, defines a first downward extending portion 29 in close proximity to the edge of the board 20 and a further portion 30 at right angles to the portion 29 and substantially parallel, if desired, to the plane of the board 20. Rather than employing the double right-angle bend of the terminal 22, the same retaining action may be obtained (as is shown in respect to terminal 23, for instance), by bending the portion 31 directly downward and again in close proximity to the edge of the board 20.

The strapping feature of the present invention is shown by the interconnection of the terminal lugs 22 and 23, and this is accomplished by disposing the said lugs adjacent one another and then bending a projecting toothed portion 32 of the terminal lug 22, for instance, into wedging contact with the forked portion 33 of the further lug 23. The several forked portions of the lugs are so arranged that the projecting tooth 32 is held in place by the tension of the tines or forks of the forked portion of the said further lug, thereby to provide a good electrical connection between the terminal lugs. This same action occurs when wires are "clipped" into a terminal lug by wedging the lead wire of a circuit component, for instance, between the said forks or tines of the terminal lug.

A considerable facility of circuit arrangement is permitted by the lug of the present invention, and it should be noted for instance (and referring to the nomenclature of Figure 1), that the projecting tooth 13 of one lug may interconnect with the forked portion 15 of another lug rather than with the forked portion 14 of the said other lug. Again, each of the parts 13, 14 and 15 of the terminal lug 10 may be permitted to lie in the same plane as the portion 11 thereof, or may be bent either upward or downward at any given angle, to the plane of the said portion 11, or one or more of the said parts 13, 14 and 15 may be bent at a plurality of angles to the plane of the said portion 11. Each of these possible bending configurations falls within the concept of the present invention.

It should further be noted that, as has been shown in Figure 2, the terminal may be utilized as a side projecting terminal (see 22) in a "deck" type terminal strip, or may further be employed to provide terminal strips of the "wall" type (see 21 and 23). Because of the many possible bent configurations of the strip, the said terminal lugs in accordance with the present invention may be used to mount components either parallel to or perpendicular to a board device. In this respect, for instance, and referring to Figure 2, it will be seen that the portion 31 of terminal 23 may receive one lead wire of a circuit component which is mounted in a direction substantially parallel to the terminal board 20, while the arrangement of the portion 30 of the terminal lug 22 permits the reception of a lead wire of an external component mounted substantially perpendicular to the board 20. In addition, plural terminal lugs may be mounted upon a terminal board and a forked portion of each may be bent at substantially right angles to the plane of the said board whereby an electrical connector may be clipped between the said bent portions thereby to provide an elongated conductor for supporting one or more components parallel

to a terminal board. While the terminal lugs 22 and 23 shown in Figure 2 have each been mounted adjacent the edge of the board 20, it should be noted that the lug 21 is not so mounted and may in fact be carried anywhere on the board 20. Again, when it is desired to utilize a terminal lug not relying upon edge support of a terminal board, as is the case with respect to lug 21, the eyelet of the lug may be cut or nicked at the edges thereof or, as has been mentioned previously, two corners of the main body of the lug may be bent down sharply to provide means digging into the terminal board, thereby minimizing the tendency of the terminal to twist. As before, such centrally mounted terminals may be readily strapped to one another by interconnecting the projecting tooth 27 of such a centrally mounted lug with either of the forked portions of a further lug.

It should be noted that terminal lugs in accordance with the present invention may be fabricated of a number of electrically conductive materials, and in any desired size. While the relative dimensions of the parts 13, 14 and 15, shown in Figure 1, are accurate in respect to a preferred embodiment of the present invention, the several component portions of my terminal lug may be made individually either larger or smaller, longer or shorter, depending upon the particular use to which the overall lug will be put. Further, the positions of portions 13 and 14 may be interchanged whereby both "right-hand" and "left-hand" lugs may be provided.

In addition, the terminal lugs of the present invention readily lend themselves to automatic machinery techniques of bending and attachment. Thus, referring to Figure 3, it will be seen that, in accordance with the present invention, plural terminal lugs may be formed, for instance by punching techniques, in a continuous elongated strip configuration. The terminal lugs so formed are effectively connected head-to-tail and may be stored on a reel whence they may be threaded into an eyelet attaching machine. When such a procedure is used the automatic machinery employed may include means pre-bending the strip-type terminals in accordance with the discussion of Figure 2, and individual terminals may then be snipped off, for instance along lines C and D, as they are eyeletted onto the terminal board.

While I have described preferred embodiments of my invention, it must be understood that the foregoing discussion is meant to be illustrative only and many modifications will suggest themselves to those skilled in the art, and these are intended to be included within the scope of my invention as set forth in the appended claims.

Having thus described my invention, I claim:

1. A bendable electrical connector defining a pair of forked portions disposed substantially at right angles to one another for receiving electrical connections thereto, and at least one projecting tooth portion spaced from each of said forked portions and substantially colinear with one of said forked portions.

2. A terminal lug adapted for selective bending and comprising a first elongated connector portion of electrically conductive material, a second elongated connector portion of electrically conductive material, said first and second connector portions extending substantially at right angles to one another in a common plane, said lug further defining a substantially circular aperture in said common plane for selectively providing mechanical and further electrical couplings to said lug, the center of said substantially circular aperture being non-colinear with the extended centerlines of both said first and second elongated portions.

3. The structure of claim 1 in which said connector further defines fastening means for mechanically connecting said electrical connector to a mounting board, the center of said fastening means being non-colinearly displaced from the extended centerlines of each of said projecting tooth and forked connector portions.

4. The structure of claim 3 in which said connector has two corners thereof bent sharply downward adjacent said fastening means to define a pair of teeth digging into said mounting board thereby to prevent twisting of a connector mounted on said mounting board.

5. The structure of claim 4 wherein said connector includes a planar portion, one of said forked connector portions being bent at substantially right angles to said planar portion, the other of said forked connector portions being bent at an angle to said planar portions in a direction opposite to that of said first mentioned forked connector portion.

6. The structure of claim 1 wherein said connector includes a planar portion, one of said forked connector portions being bent at an angle to said planar portion, the other of said forked connector portions being bent for a first portion thereof at substantially right angles to said planar portion in a direction opposite to that of said first mentioned forked connector portion and being bent for a further portion thereof into a plane substantially parallel to that of said planar portion.

7. An elongated strip of electrical terminals comprising a plurality of terminal portions integrally connected in head-to-tail relationship, each of said terminal portions defining a planar member having a first elongated bifurcated connector integrally formed and coplanar therewith, said planar member further defining a second integrally formed coplanar elongated conductive connector substantially colinear with the extended centerline of said first bifurcated connector, said planar member also defining a third elongated bifurcated connector coplanar therewith and disposed at substantially right angles to said first and second connectors, said third elongated bifurcated connector of each of said terminal portions being joined integrally to the planar member of an adjacent terminal portion in said elongated strip of terminals.

8. The structure of claim 1 wherein said projecting tooth portion is substantially complementary in configuration to the space between the legs of at least one of said forked connector portions whereby plural terminals may be readily strapped to one another by wedging the projecting tooth portion of one of said connectors between the legs of a forked portion of another of said connectors.

References Cited in the file of this patent

UNITED STATES PATENTS

2,183,109	Sipe	Dec. 12, 1939
2,264,040	Johnson	Nov. 25, 1941

FOREIGN PATENTS

229,811	Great Britain	Nov. 5, 1925