United States Patent

Hansen

[15] **3,686,609**

[45] **Aug. 22, 1972**

[54] **GROUND TERMINAL**

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[22] Filed: **April 13, 1971**

[21] Appl. No.: **133,634**

[52] **U.S. Cl.**.....**339/14 R,** 24/73 B, 339/95 R

[51] **Int. Cl.** **H01r 3/06**

[58] **Field of Search**.....339/14, 95, 221, 276, 32, 33, 339/256, 258; 24/73, 213, 73 B, 73 SA; 85/5; 287/20.92 B

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[57] **ABSTRACT**

A ground terminal includes a pair of elongate resilient fingers which are flexible relative to each other and which include serrated saw tooth edges which extend in a direction away from the axes of the fingers and the saw teeth of each of the fingers also extend toward each other such that the terminal is adapted to be coupled either to the peripheral edge of a grounding panel or in an aperture in the panel.

10 Claims, 4 Drawing Figures

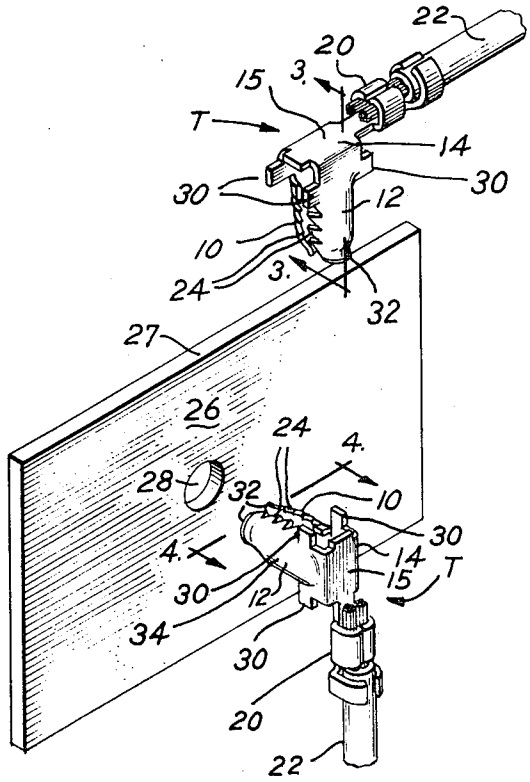


Fig. 1

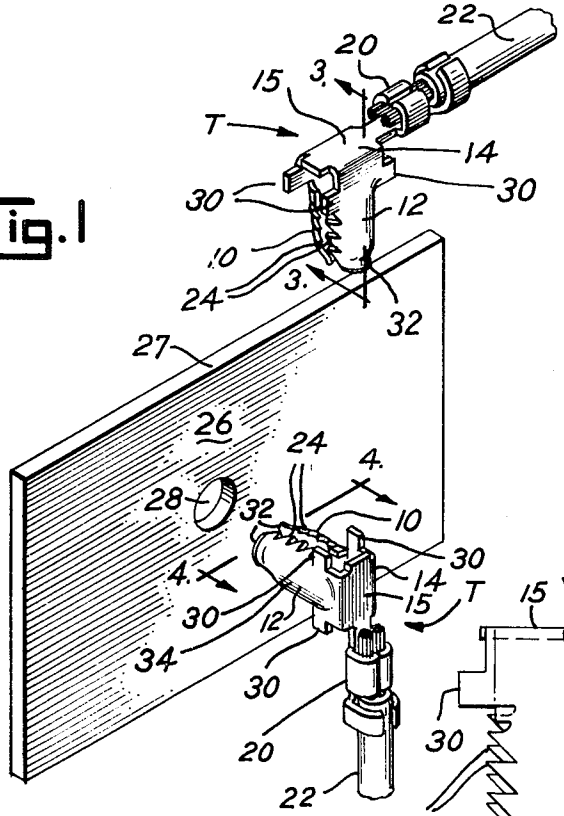


Fig. 3

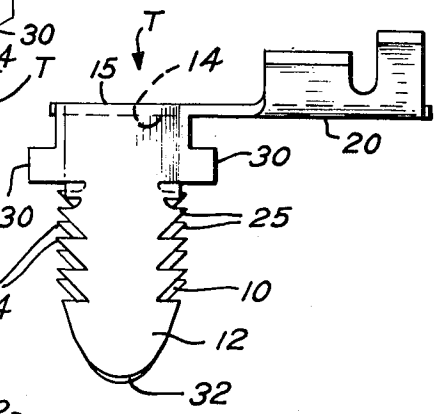


Fig. 2

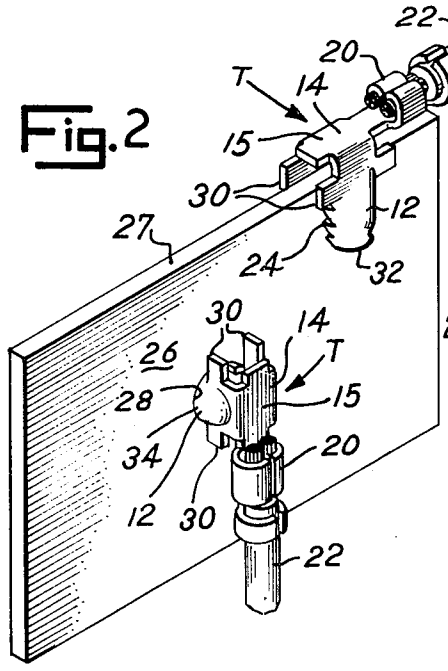
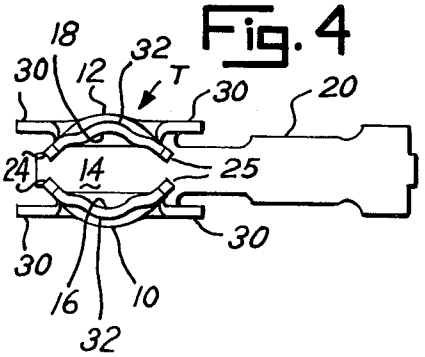


Fig. 4



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GROUND TERMINAL

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to an electrical ground terminal.

In the past, several forms of ground terminal have been employed to provide a suitable electrical ground connection in appliances or in automotive applications. These terminals generally have saw tooth edges which are grippingly mounted to a grounding plate of the appliance or the like. Usually such terminals are permanently installed at the time of manufacture of the appliance by being driven into their grounding relationship with the plate by a suitable impact tool at the factory. In order to utilize these prior terminals, it has been generally necessary to drill an aperture through the grounding plate, the terminal then being driven into the aperture where it engages the edges of the aperture to provide the necessary electrical grounding circuit between the terminal and the plate. Such prior terminals are generally incapable of being mounted to the grounding plate in more than one manner of mounting since the prior aperture mounted terminals, for example, have been constructed so as to particularly adapt them for aperture mounting.

The ground terminal constructed in accordance with the present invention may be mounted in the alternative either in a grounding plate aperture or to the edge of the grounding plate itself. In the present invention, this alternative mounting capability is possible without the necessity of providing several terminals of differing constructions each of which is adapted to one of the particular different methods of mounting. The ground terminal incorporating the principles of the present invention is capable of being installed quickly and easily and elaborate and expensive mounting tools are unnecessary, since mounting either to the edge or in an aperture of the grounding structure may be accomplished by a simple impact tool, such as a small hammer. Moreover, the ground terminal constructed in accordance with the principles of the present invention is capable of completing a direct ground circuit, even though the ground plate or other grounding structure to which the terminal is mounted may be coated with paint, oxide, dirt, rust or other non-conductive contaminants which might otherwise prevent adequate contact. Finally, the ground terminal constructed in accordance with the principles of the present invention engages the ground plate or other grounding structure, both by the gripping action of its teeth as well as by a spring action, thus insuring that the ground terminal will not work loose during operation and that the grounding circuit is maintained at all times.

In a principal aspect of the invention, an electrical terminal comprises a pair of elongate fingers which are spaced from each other and which are attached to each other by connecting means and a ferrule adapts the fingers to be connected with an electrical conductor. Gripping means are positioned adjacent the longitudinal edges of the fingers. The gripping means extend in a direction away from the longitudinal axes of the fingers and the gripping means of one of the fingers also extends in a direction toward the gripping means of the other of the fingers.

These and other objects, features and advantages of the present invention will be more clearly understood through a consideration of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWING

In the course of this description, reference will frequently be made to the attached drawing in which:

FIG. 1 is a perspective view of a suitable grounding plate and a pair of like ground terminals constructed in accordance with the principles of the invention prior to mounting in the alternative to the edge of the plate and through an aperture in the plate;

FIG. 2 is a perspective view similar to FIG. 1 in which the respective terminals are shown mounted to the edge and through the aperture in the plate;

FIG. 3 is a side elevation view of the ground terminal constructed in accordance with the principles of the invention and as viewed substantially along line 3—3 of FIG. 1; and

FIG. 4 is an end elevation view of the terminal taken substantially along line 4—4 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, a preferred embodiment of ground terminal T constructed in accordance with the principles of the invention is shown. Although a pair of terminals T are shown in FIGS. 1 and 2, it should be understood only one terminal will generally be employed in a given installation. Two terminals have been shown in the drawing simply to illustrate the alternative manner of mounting the terminal of the invention as will be fully explained later. Accordingly, since both of the terminals shown in the drawing are identical, the description which follows is applicable to either or both of the terminals.

The preferred ground terminal T of the invention comprises a pair of elongate resilient fingers **10** and **12** which extend in a direction substantially parallel to each other and which are attached to each other adjacent one end by a flat web portion **14** having an impact surface **15** for receiving the blow of a suitable impact tool. Both of the fingers **10** and **12** are preferably substantially curvilinear in cross section as shown for example in FIG. **4**, the concave surface **16** and **18** of the fingers **10** and **12**, respectively facing each other. A suitable termination ferrule **20**, preferably of the "B-type" is formed integrally with the web **14** for holding and electrically connecting the end of an electrical conductor **22** with the web **14** and fingers **10** and **12** to complete a grounding circuit therethrough. The ferrule **20** will not be described in detail, since it is of conventional design and is clearly shown in the drawings.

The entire terminal T is preferably stamped in one piece integral form from a suitable conductive material, preferably hardened plated steel, and the fingers are then bent from the stamped blank to assume the position shown in the drawings. The entire terminal is also preferably hardened by cold rolling and heat treating to insure that it will be resilient and not unduly deformed during mounting and use.

A plurality of saw tooth serrations **24** and **25** are formed adjacent the longitudinal edges of the fingers **10** and **12**. These saw teeth firmly engage the ground-

ing plate **26** or other grounding structure as shown in FIG. **2** when impact is imparted to the surface **15** by a suitable tool. These teeth both firmly mount the terminal T to the plate and electrically connect the terminal with the plate whether the terminal is mounted to the peripheral edge **27** or in an aperture **28** in the plate.

A plurality of stop tabs **30** are also provided preferably intermediate the length of the longitudinal edges of the fingers and extend from the finger edges between the web **14** and the saw tooth serrations **24** and **25**. The stop tabs **30** limit the depth of insertion of the terminal T when the terminal is to be inserted in the grounding aperture **28** as shown in FIG. **2** and insure registry of the teeth **24** and **25** with the edge of the aperture. In addition, the leading end of each of the fingers **10** and **12** is preferably slightly flared at **32** to facilitate mounting to the plate **26**.

Each of the fingers **10** and **12**, although being spaced from each other over their length, will flex toward and away from each other about the web **14** since they are resilient. Such resiliency provides the fingers with sufficient spring action to ensure the firm clamping of the terminal to the grounding plate. As shown in FIGS. **1** and **2**, terminal T when mounted in the aperture **28** of the grounding plate, not only firmly engages the plate as a result of the gripping action effected between the saw tooth serrations **24** and **25** with the edge of the aperture, but also the outer surface **34** of each of the fingers frictionally engages the edge of the aperture due to the spring action of the fingers. When the terminal is edge mounted, the saw teeth **24** and **25** will also engage the respective surfaces of the plate **26**, which are positioned in this instance between the fingers, and this engagement is also enhanced by the spring action of the fingers.

An important feature of the invention resides in the ability of the terminal T of the invention to be mounted alternatively and with equal facility either in the grounding aperture **28** in the grounding plate or to the edge **27** of the plate. This alternative mounting capability is made possible by the relative positioning of the saw tooth serrations **24** and **25** both with respect to each other and to the axes of the fingers. These serrations are positioned so that the teeth along the edge of the respective fingers point, not only toward each other, but in a direction away from the longitudinal axis of the respective fingers. Thus, the direction of the saw teeth serrations away from the longitudinal axes of the fingers allows the teeth to grip the edge of the grounding aperture **28** when the terminal T is inserted therein and the direction of the serrations toward each other allows the teeth to grip the opposing faces of the grounding plate **26** when the terminal is inserted over the edge **27** of the plate.

Although the respective fingers of the preferred embodiment of terminal have been shown as being substantially curvilinear in cross section, it will be understood that the cross section may be varied so long as the serrated tooth edges are directed both toward each other and away from the axes of the fingers. It should also be understood that the embodiment of the invention which has been described is merely illustrative of an application of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. An electrical terminal comprising:

a pair of elongate fingers spaced from each other over at least a portion of their length and attached to each other by connecting means,

ferrule means adapted to connect said fingers with an electrical conductor, and

gripping means adjacent the longitudinal edges of said elongate fingers, said gripping means extending in a first direction which is both away from the longitudinal axes of said fingers and beyond said longitudinal edges, and the gripping means of one of said fingers also extending in a second direction toward the gripping means of the other of said fingers.

2. The terminal of claim **1** wherein said gripping means comprise a plurality of saw tooth serrations extending from the longitudinal edges of said fingers.

3. The terminal of claim **1** wherein said fingers and said gripping means are substantially curvilinear in cross section defining concave surfaces on the fingers and the concave surfaces of said fingers face each other.

4. The terminal of claim **1** wherein said fingers are resilient and flex relative to each other.

5. The terminal of claim **1** wherein said fingers include friction surfaces thereon, the friction surfaces of the respective fingers being opposite each other.

6. The terminal of claim **1** wherein said connecting means comprise a web which joins said fingers adjacent one end thereof.

7. The terminal of claim **6** wherein said fingers are resilient and flex relative to each other about said web.

8. The terminal of claim **6** wherein said web includes an impact surface.

9. The terminal of claim **1** including stop means positioned between the ends of said fingers.

10. The terminal of claim **9** wherein said stop means extend from the longitudinal edge of at least one of said fingers in a direction opposite the longitudinal axis of said finger.

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