Sept. 3, 1957 C. L. LUCAL 2,805,402

PRESSURE TYPE SOLDERLESS CONNECTOR

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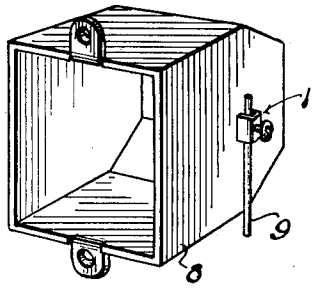


Fig. 1.

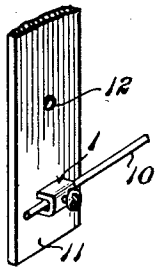


Fig. 2.

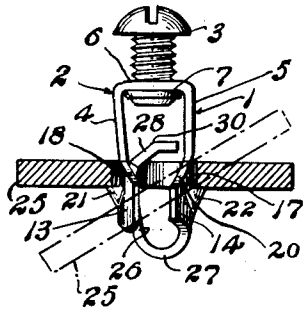


Fig. 3.

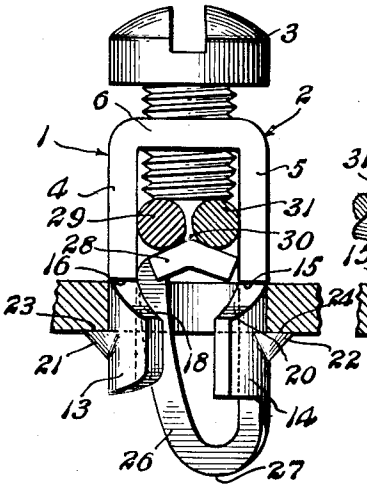


Fig. 4.

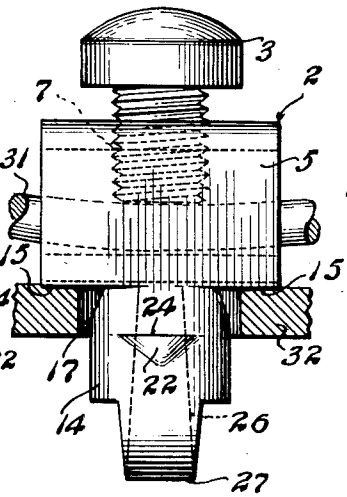


Fig. 5.

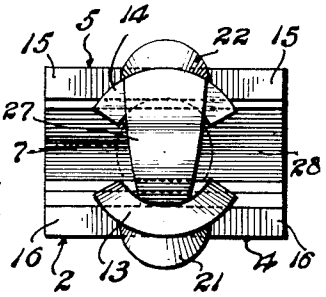


Fig. 6.

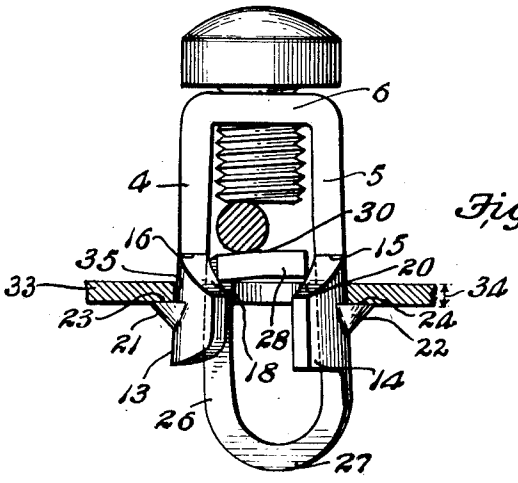


Fig. 7.

INVENTOR.
Charles L. Lucal
BY
Frease & Bishop
ATTORNEYS

United States Patent Office

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PRESSURE TYPE SOLDERLESS CONNECTOR

Charles L. Lucal, Canton, Ohio

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6 Claims. (Cl. 339—14)

This invention relates to electrical connecting devices and more particularly it pertains to solderless connectors for electric conductors.

Electric codes require that certain switch or outlet boxes be grounded. Ordinarily when such boxes are installed no means are provided for ground wire connections. Consequently, various means are used when the box is installed to provide ground wire connections to comply with code requirements. A ground wire is usually attached to an outlet or switch box with a screw secured to a hole in the box. Such a ground wire connection is not a satisfactory permanent installation.

In the past most ground wire connecting devices have been provided either with two or more pieces, or require access to the other side of the box for tightening the device in place. In addition, many such devices require the use of solder in order to provide a satisfactory connection.

The device of the present invention is a solderless connector that is installed from one side of a work surface. It is an integral unit which may be inserted and tightened into place by a single screw by which the ground wire is also connected. The structure of the device is such that it can not thereafter become inadvertently or easily separated from its location. Finally, the device is readily inserted into an ordinary aperture such as a screw hole in the wall of an outlet box without the use of special tools.

Accordingly, it is a general object of this invention to provide a connector for wires to a surface.

Another object of this invention is to provide a connector that may be applied solely by the use of pressure and without the use of solder.

Another object of this invention is to provide a connector for electrical wires which may be installed from one side of a work surface without requiring access to the other side of the surface.

Finally, it is an object of this invention to provide an improved ground wire connector which incorporates the foregoing desiderata in an inexpensive manner.

These and other objects and advantages apparent to those skilled in the art from the following description and claims may be obtained, the stated results achieved and described difficulties overcome by the discoveries, principles, apparatus, parts, combinations, subcombinations and elements which comprise the present invention, the nature of which is set forth in the following statement, a preferred embodiment of which—illustrative of the best mode in which applicant has contemplated applying the principles—is set forth in the following description, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The nature of the improvements in the electrical connector of the present invention may be stated in general terms as including a channel member having flanges and a web therebetween, one flange being longer than the other and having a reversely-turned end portion extending between the flanges, a pressure bar on the end of said end portion and integral therewith, the bar having an inverted V cross-section and being inclined to the flanges, a screw extending through the web, and the flanges being expandible into a tightly seated position within an aperture in the surface to which the connector is to be attached when the screw is tightened to engage a wire against the bar and thereby cause expansion of the flanges.

The preferred embodiment of the invention is illustrated, by way of example, in the accompanying drawings wherein:

Fig. 1 is a perspective view of an electric switch box showing a ground wire connector attached thereto;

Fig. 2 is a perspective view of a bus bar, showing the ground wire connector attached thereto;

Fig. 3 is a side view of the connector;

Fig. 4 is a side view of the connector installed in an apertured surface;

Fig. 5 is an elevational view of the connector as shown in Fig. 4;

Fig. 6 is an end view of the connector shown in Fig. 5; and

Fig. 7 is a side view of the connector installed in another surface.

Similar numerals refer to similar parts throughout the various figures of the drawings.

Referring to the drawings, a wire connector is generally indicated at **1**. It may be attached to an electric switch box or outlet box **8** that is apertured to receive a portion of the connector **1** for the connection of a ground wire **9**. Moreover, the connector **1** may be attached to a member **11** (Fig. 2) that may be either a bus bar having one or more apertures **12** for connection of one or more lead wires **10**, or the member **11** may be a portion of a frame of an electrical appliance to which it may be desirable to attach a ground wire, such as wire **10**.

The connector **1** is shown in greater detail in Figs. 3 to 7. It includes a U-shaped or channel member, generally indicated at **2**, and a screw **3**. The channel member **2** comprises opposite flanges **4** and **5** as well as a web **6** therebetween. The web **6** is apertured at **7** to receive the screw **3**.

The flanges **4** and **5** include upper and lower portions as shown in the various figures of the drawing. The upper portions of the flanges are adjacent the web **6** and are the widest portions of the connector **1**. The lower portions **13** and **14** of the flanges **4** and **5** are narrower than the upper portions and form therewith shoulders **15** and **16**, respectively, on the flanges. The shoulders **15** and **16** face the direction opposite the web **6**. Moreover, the lower portions **13** and **14** are arcuate, as shown in Fig. 6, so that the lower portions may be easily inserted into an aperture. As shown in Figs. 3 and 5, upper surfaces **18** of the lower flange portion **13** are inclined downwardly in opposite directions from the shoulders **16**. Likewise, the lower portion **14** of the flange **5** has inclined upper surfaces **20** extending downwardly in opposite directions from shoulders **15**.

In addition, the flange portions **13** and **14** are provided respectively with projections or ears **21** and **22** that extend outwardly from said flange portions. As shown in Fig. 3, the ears **21** and **22** are preferably lanced out of the flanges and include upper surfaces **23** and **24**, respectively, which are adepated for engagement with a wall **25** on opposite peripheral edges of an aperture **17** (Fig. 4).

As shown in Fig. 3 the flange **5** includes an elongated portion **26** that extends below the lower end of the flange **4**, bends upwardly at **27**, and projects between the flanges **4** and **5** where it contacts the lower portion **13** of the flange **4**. On the end of the elongated portion **26** is an

integral pressure bar or pad 28. The elongated portion 26 is tapered between the lower portion 14 and the bar 28, the end nearer the bar being smaller as shown in Figs. 5 and 6.

The bar 28 is disposed between the flanges 4 and 5 above the shoulders 15 and 16. The bar 28 is preferably coextensive with the upper portions of the flanges 4 and 5 and is inclined to the vertical axis of the connector 1 as well as the flanges. Moreover, at the bar 28 the distance between the flanges 4 and 5 is less than the width of the bar. In addition, the bar 28 is preferably an inverted V-shaped member forming an apex 30.

When the connector is inserted into an aperture, as shown in Figs. 1 and 2, the connector 1 is in the contracted position (Fig. 3) with the flanges 4 and 5 inclined toward each other from the web 6 and with the screw 3 withdrawn. In the contracted position the connector 1 may be inserted into the aperture 17 in member 25 (Fig. 3) with the ears 21 and 22 on one side and the shoulders 15 and 16 on the other side of the member. When the aperture is smaller than the distance between the ears 21 and 22, the connector 1 may be inserted by inclining its vertical axis to the plane of the member 25 in order to first extend the ear 22 through the aperture 17 (Fig. 3) and then rotating the connector until the ear 21 is also through the aperture.

The screw 3 is then preferably turned down against the bar 28 to spread the flanges. The pressure of the screw 3 forces the bar 28 to turn down from the inclined position (Fig. 3) to the lateral position (Fig. 4). The screw is then retracted, a wire 29 is inserted, and the screw is retightened. As the bar 28 moves, the thinnest portion of the elongated portion 26 adjacent the bar yields, and the flanges 4 and 5 spread against opposite peripheral portions of the aperture 12. In addition, the ears 21 and 22 overlap the member 25 with the surfaces 23 and 24 abutting the member. Finally, the wire 29 is tightly clamped between the screw 3, the bar 28 and the flange 4.

Thus, the connector 1 is installed with the member 25 clamped between the ears 21 and 22 on one side and the shoulders 15 and 16 and bar 28 on the other side, and with the arcuate flange portions 13 and 14 seated in the aperture 12.

As shown in Fig. 4 the connector 1 may be used to attach two wires. A wire 31 may be placed on the bar 28 adjacent the flange 5 on the side of the apex 30 opposite the wire 29. Moreover, the wires 29 and 31 may be of different size if desired.

The connector 1 is preferably constructed with the distance between the surface 24 and the shoulders 15 (and the surface 23 and the shoulders 16) substantially equal to the thickness 32 of the member 11. Where the connector 1 is installed in a member 33 (Fig. 7) having a thickness 34 less than the distance between the surfaces 23 and 24 and the corresponding shoulders 16 and 15, the screw 3 is turned further into the web 6, forcing the undersurface of the bar 28 against the member 33. For this purpose the bar may be flattened substantially from its inverted V-shape, and the member 33 is clamped between the ears 21 and 22 and the bar 28.

Where the connector 1 is inserted into the member 33 having an aperture 35 (Fig. 7) substantially greater than the aperture 17 (Fig. 4), the screw forces the extremities of the bar 28 against the member 33 on opposite sides of the aperture. In addition, the apex 30 of the bar 28 is further depressed until the bar engages the inclined surfaces 18 and 20 on the flange portions 13 and 14, respectively. The inclined surfaces 18 and 20 slide when the bar 28 contacts them, forcing the flanges 4 and 5 further apart and into snug engagement with the opposite peripheral portions of the aperture 35. Thus the bar 28 serves as a wedge for separating the flanges 4 and 5 initially and subsequently by engaging inclined surfaces 18 and 20 when necessary.

Accordingly, the device of the present invention presents a connector which may be used for the connection of grounding wires to switch boxes, outlet boxes, electrical appliances and the connection of lead wires to bus bars. In addition, the connector may be used for attachment of non-electrical objects to a wall such as attaching an object to a sheet metal wall. The chief advantage of the connector 1 is that it may be inserted and tightened in place from the same side of the work surface without requiring access to the other side for final tightening or adjustment and without the use of solder.

In the foregoing description certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction shown.

Having now described the features, constructions and principles of invention, the characteristics of the solderless connector, and the advantageous, new and useful results provided; the new and useful discoveries, principles, parts, elements, combinations, subcombinations, structures and arrangements, and mechanical equivalents obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. A wire connector for attachment to an aperture in a plate, including a U-shaped member having flanges and a web therebetween, a screw extending through the web and between the flanges, the flanges having a contracted position and an expanded position, the flanges also having corresponding outwardly-extending projections remote from the web, a screw-actuated pressure bar on one flange between the flanges, the flange projections and pressure bar being integral parts of the U-shaped member, the bar having a width greater than the distance between the contracted flanges, and the bar also having an unwedged position between the contracted flanges and a wedged position between the expanded flanges.

2. A wire connector for attachment to an aperture in a plate, including a U-shaped member having flanges and a web therebetween, a screw extending through the web and between the flanges, the flanges having a contracted position and an expanded position, the flanges also having corresponding outwardly-extending projections remote from the web, one of the flanges having an elongated portion projecting between the flanges, a screw-actuated pressure bar on the end of the elongated portion and located between the screw and the projections, the flange projections, pressure bar and flange elongated portion being integral parts of the U-shaped member, the bar being wider than the distance between the contracted flanges, and the bar also having an unwedged position between the contracted flanges and a wedged position between the expanded flanges.

3. A wire connector for attachment to an aperture in a plate, including a U-shaped member having flanges and a web therebetween, a screw extending through the web and between the flanges, the flanges having a contracted position and an expanded position, the flanges also having corresponding outwardly-extending projections remote from the web, the flanges having corresponding outwardly extending shoulders between the projections and the web, one of the flanges having an elongated portion projecting between the flanges, a screw-actuated pressure bar on the end of the elongated portion and located between the screw and the shoulders, the flange projections, pressure bar and flange elongated portion being integral parts of the U-shaped member, the bar being wider than the distance between the contracted flanges, and the bar also having an unwedged position between the contracted

flanges and a wedged position between the expanded flanges.

4. A wire connector for attachment to an aperture in a plate, including a U-shaped member having flanges and a web therebetween, a screw extending through the web and between the flanges, the flanges having upper portions adjacent the web and having lower portions narrower than the upper portions and forming oppositely extending shoulders therewith, the flange lower portions having outwardly-extending projections, one of the lower portions having an elongated portion projecting between the flanges, a screw-actuated pressure bar on the end of the elongated portion between the screw and the shoulders, the pressure bar being wider than the distance between the contracted flanges, and the bar also having a first

position yieldingly inclined to the contracted flanges and a second position perpendicular to the expanded flanges.

5. The construction defined in claim 4 in which the lower flange portions are arcuate with the outwardly-extending projections on the convex side thereof.

6. The construction defined in claim 5 in which the arcuate lower flange portions are provided with oppositely-extending inclined end surfaces.

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