July 3, 1951 S. J. SKONY 2,559,174

ELECTRICAL CONNECTOR WITH TANG AND GROOVE INTERLOCK

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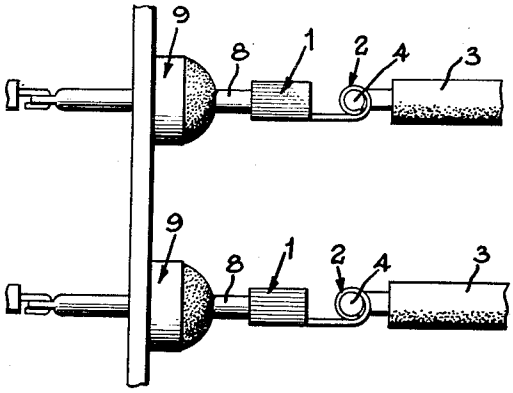


Fig. 1

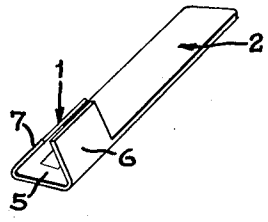


Fig. 2

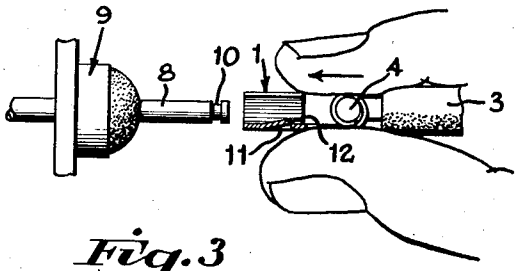


Fig. 3

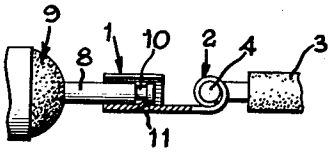


Fig. 4

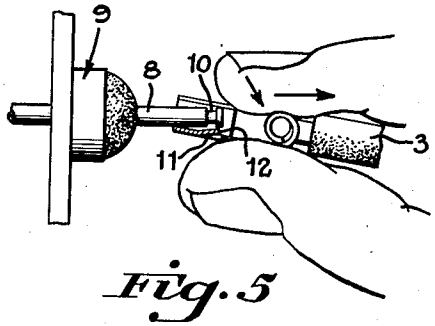


Fig. 5

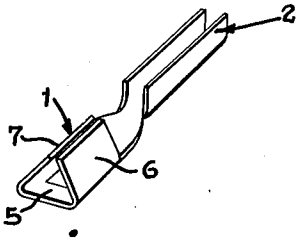


Fig. 6

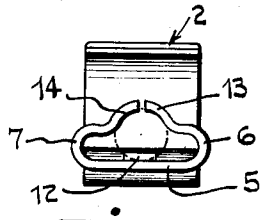


Fig. 7

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ELECTRICAL CONNECTOR WITH TANG AND GROOVE INTERLOCK

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1 Claim. (Cl. 173—363)

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This invention relates to an improved electrical connector adapted to be fastened upon the end of a wire, lead, or electrical conductor to facilitate attachment of such conductor to an electric terminal post.

The connectors of the present invention are adapted for use in a wide variety of different types of electrical apparatus. For purposes of illustration, the invention is disclosed in relation to the attachment of electric wires to the terminal posts of hermetic seal units of the type used in some of the modern refrigerators, since this environment illustrates the problems which have been encountered in the use of conventional connectors, and also serves well to illustrate the advantages of the present improvements.

A typical hermetically sealed refrigerator unit comprises a casing within which the operating parts, including electrical elements, are mounted. Electric leads must pass through the casing to these operating elements and, of course, since the casing is otherwise hermetically sealed, it is necessary to provide special arrangements for conducting the leads through the casing wall. To this end hermetic seal units are commonly employed, comprising a disc or base adapted to be welded or otherwise sealed to the casing wall over a hole therein, a terminal post which passes through the disc and through the wall so that the ends of the terminal post are accessible at the opposite sides of the wall and a ceramic insulative medium interposed, usually in fused relationship, between the disc and the post. Thus, the post is held rigidly in position by the insulating substance, but its ends are accessible for interconnection therewith of the lead wires within the casing and the feed or lead wires at the outside.

In the assembly of the refrigerating mechanism, the operator connects the leads to the terminal posts at the inside of the casing. Then the closure is completed, after which the hermetically sealed mechanism is placed in the machine and the feed or lead wires are connected to the post at the outside. The encasement is usually permanent, therefore, the interior parts are not accessible and if the mechanism within the casing does not operate properly, or if the electrical connections become ruptured, then, it is necessary for the operator of the machine to replace the whole unit.

Inasmuch as the terminal posts in the casing walls are physically mounted on the casing walls, they are subjected to all of the vibration

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of the apparatus. Thus, if the electrical interconnections within the casing are not fully reliable, then, after a period of time they tend to shake loose and it becomes necessary for a user of the machine to replace an expensive portion of the mechanism merely because of the disconnection. Moreover, when the wires come loose short circuiting frequently is caused, with attendant damage to the apparatus, and with attendant fire hazards.

The principal purpose of this invention has been to provide connectors which will form rugged, reliable and substantially non-detachable interconnection with the terminal post in a simple and convenient manner. A further purpose of the invention has been to provide connectors which, when necessary, may be detached by convenient manipulation, but which do not become detached under ordinary conditions.

Typical embodiments of the invention are shown in the drawings in which:

Figure 1 is an elevation showing attachment of the electrical connectors of the present invention to terminal posts projecting from hermetic sealing units.

Figure 2 is a perspective view showing the connective endwise portion of a device of the present invention.

Figure 3 is a view illustrating attachment of a wire equipped with a connector of the present invention to a terminal post.

Figure 4 is a sectional view of the relationship of the post and connector under normal service conditions.

Figure 5 is a view illustrating the manipulation to effect detachment of the connector from the terminal post.

Figure 6 is a perspective view generally similar to Figure 2 but with the shank end configurated in a modified way to receive the free end of an electrical wire or lead.

Figure 7 is an endwise view of the head of a connector of modified form.

Devices of the present invention consist essentially of a connective head indicated generally at 1, and a shank indicated generally at 2. The devices are made preferably of one piece construction of beryllium-copper, silver plated sheet metal or the like which possesses good conductive properties.

The shank portion 2 is configurated in any suitable way to facilitate attachment of a wire to the connector. As shown in Figure 1, the external lead wire 3 has its insulation stripped

away at the endwise portion to expose the conductor 4. The shank 2 of the connector may be curled to receive the wire which may then be soldered in place or the assembly may be squeezed to hold the wire. The shank may be curled upwardly as shown in Figure 1 to reside substantially in the plane of the head or it may be curled downwardly in somewhat offset relationship. In the alternative, the shank may be of trough shape as shown in Figure 6 and the bared end may be laid in the trough after which the portions of the shank may be bent over the wire to hold the connection, with or without soldering. These considerations will be governed by the space limitations and any suitable arrangement may be used as understood by those skilled in the art. The head portion of the connector consists of a central area 5 and ears 6 and 7 which reside respectively at opposite sides of the central area 5, the ears being bent up toward one another as shown in Figures 2 and 6 to provide a socket of generally triangular configuration. The size of the socket is such that the terminal post 8 may be received snugly within it as by means of a friction fit. The arrangement provides electrical interconnection of the terminal post 8 of the head 2 of the connector along three lines, one at the central area 5 and the two others being at points of engagement of the ears 6 and 7 with the terminal post.

As previously indicated, the terminal posts shown in the drawings extend from hermetic seal units which are indicated generally at 9. Since these hermetically seal constructions form no present part of the present invention, they are not disclosed in more detail than has already been described. However, the terminal posts 8 may be in the form of a conductive metal rod having a neck 10 which provides an outwardly facing shoulder near its end. The central area of the head of the connector comprises a tang 11 which is struck inwardly, the tang residing on an incline from the open end of the head. This tang is slightly yieldable. Since the dimensions of the socket area of the head are such that the post 8 is received snugly therein, the post upon telescopic engagement with the head, bears upon the tang 11 pushing it out of the way slightly until the neck 10 of the post coincides with the innermost projection of the tang 11. Therefore, the inward end 12 of the tang residing in the neck constitutes an abutment which prevents detachment of the connector from the post by axial withdrawal.

The connection is effected readily by pushing the head onto the post by movement thereof in the direction of the arrow as seen in Figure 3. However, since the tang abutment resides within the post neck when the attachment is completed, any withdrawing movement in an opposite direction brings the abutment surface 12 of the tang into engagement with the annular face of the neck which prevents further withdrawing movement, or disengagement of the two pieces. The connection, therefore, is a very positive one and cannot be broken inadvertently or through the effects of vibration which is encountered in the use of electrical apparatus. Also, it is to be observed that the connection, though positive, is rotatable. The annular nature of the neck 10 permits interconnection to be effected regardless of the radial relationship of the head 2 (or tang 11) to the post.

To assemble leads equipped with these conductors to terminal posts, the operator merely grasps the head to which the wire previously has been affixed and pushes the head onto the post.

In many instances, a positive connection of the type just described is desired in conjunction with facilities for detachment necessitated by the repair or replacement of electrical parts of equipment. Detachment with the units of the present invention is effected by canting the head slightly in respect to the terminal posts so that the tang 11 is swung out of the neck 10 whereby it clears the obstruction which the neck otherwise provides. This is shown in Figure 5. Though the engagement of the post within the head socket is snug, still the ears 6 and 7 are yieldable slightly, but still sufficiently to permit the head to be angulated about the fulcrum defined by the outer edgewise portion of the central area of the head to the position shown in Figure 5. The outer endwise portion of the post is forced against the inner face of the ears 6 and 7 sufficiently to spread them slightly and thereby permit the parts to assume the position shown. Thereafter the head can be withdrawn by movement in the direction shown by the arrow. Beryllium-copper strip material provides sufficient elasticity or resiliency to enable the head to be manipulated in the manner just described many times without permanently distorting the head or impairing the permanence of the normal non-detachable connection.

The modified form of construction shown in Figure 7 embodies a head of generally triangular configuration, excepting that the ears 6 and 7 respectively are interconnected with the base 5 through greater radii, and the upper endwise portions of the ears 6 and 7, i. e., the portions 13 and 14, are of arcuate configuration so as to conform with the peripheral contour of the terminal post 8, as is indicated by the dotted line. Thus, this construction provides contact of the connector head with the terminal post over greater area. Also, the greater radii through which the ears join the central portion 5 permits better flexing without danger of rupture. This type of contact, made of yieldable material such as phosphor bronze, may be attached to and removed from terminal posts many times without loss of its connective ability.

The head construction shown in Figures 5 and 7 is otherwise similar to the previously described and the tang 12 may be of the type previously disclosed. For purposes of illustration, the shank portion 2 of the apparatus shown in Figure 7 is bent upwardly so as to be partially closed, ready for an insertion of a wire after which the closure of the shank about the wire, with or without soldering, may be completed.

For use in connection with hermetically sealed apparatus such as a modern refrigerator, space limitations are very important and the interconnections, therefore, are only small pieces which occupy a minimum of space, less in fact than conventional connectors now available, and much less than the space required for a soldered joint between the wire and the post.

Having described my invention, I claim:

A detachable electrical connection constituted by a resilient sheet metal socket member and a rigid post member, the socket member comprising a central portion and ears at opposite sides thereof, the ears being bent toward each other to provide a flexible sleeve of generally triangular configuration in cross-section, a tang projecting

inwardly from the central portion of the sleeve to provide an inwardly facing abutment whereby the tang is depressed by the entering post but the end of the tang presses against the post, said post comprising an elongated member adapted to fit snugly within said sleeve-like socket, said post provided with an outwardly facing shoulder cooperative with the said tang to constitute a lock against axial withdrawal of the post from the socket, the resiliency of the ears of the sleeve permitting the disengagement of the shoulder on the post from the tang upon application of canting withdrawal pressure to the post.

SIGMUND J. SKONY.

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