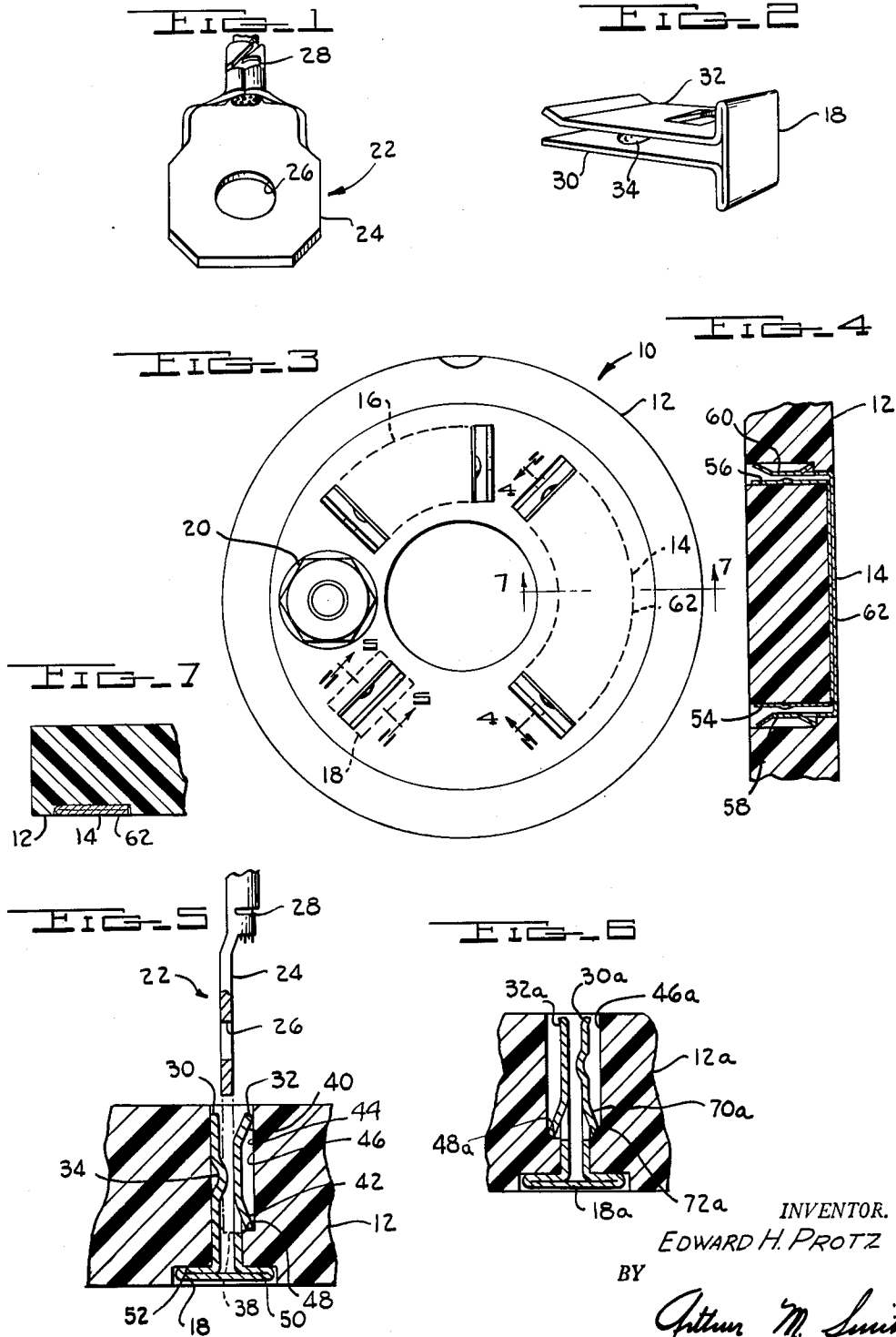


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ELECTRICAL RECEPTACLE  
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**ELECTRICAL RECEPTACLE**

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The present invention relates to electrical connectors adapted for use in wiring harnesses, switches, and the like, and it is particularly well suited for use as a terminal board unit in conjunction with a rotary switch in the headlight circuit of an automobile.

Prior to this invention the conventional connectors used in such rotary switches have not been wholly satisfactory. The female receptacles for receiving the male terminals of the wiring harness extend above the surface of the connector block or junction board so that in handling and installing these units the receptacles frequently will be bent and subsequently will not provide a good connection. This may necessitate replacing the connector block or junction board after it has been completely installed in the lighting circuit of the automobile, which replacing operation may be considerably more costly than the mere cost of the damaged item.

In these conventional connectors the contact area adapted to be engaged by a switch element normally has been placed on one side of the terminal board and the female receptacle on the other side with a rivet passing through the board and joining the contact area and the receptacle. As explained, such a construction is very vulnerable to damage and it necessitates special production machinery for manufacturing the connectors as well as requiring the joining of several electrically conductive elements which may cause excessive voltage drops across the connector.

It is one of the objects of this invention to provide a terminal board unit particularly adapted for use in a light circuit for connecting the male terminals of a wiring harness with a switch unit, said terminal board unit being constructed and arranged so that the receptacles thereof for receiving the terminals will be protected from being deformed thereby providing good electrical connections and avoiding unnecessary replacement costs.

It is another object of the present invention to provide a terminal board unit of the foregoing character wherein the contact adapted to be engaged by a switch element and the receptacle are formed from a single strip of resilient conductive material to eliminate unnecessary voltage drop across this unit, and wherein the contact and its associated receptacle and the terminal board in which they are mounted are constructed and arranged to permit rapid manual assembly thereof thereby eliminating the need for special production machinery.

It is still another object of the present invention to provide a terminal board unit of the foregoing character wherein the receptacles employed are designed to receive spade type terminals and to effect optimum electrical connections therebetween.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Fig. 1 illustrates a spade type terminal adapted to be

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used with the electrical connectors forming a part of the present invention;

Fig. 2 illustrates one embodiment of an electrical connector forming a part of the present invention and which is adapted to receive a spade type terminal of the type shown in Fig. 1;

Fig. 3 is a top view in reduced scale of a terminal board unit constituting one embodiment of the present invention;

Fig. 4 is a fragmentary sectional view of the terminal board unit taken on the line 4-4 of Fig. 3 to illustrate one of the electrical connectors used;

Fig. 5 is a fragmentary sectional view taken on line 5-5 of Fig. 3 illustrating another electrical connector;

Fig. 6 is a fragmentary sectional view similar to Fig. 5 showing a modified form of electrical connector; and

Fig. 7 is a section taken on the line 7-7 of Fig. 3.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawing and particularly to Fig. 3, the terminal board unit 10 can be seen and it includes the terminal board 12 in which are mounted a plurality of electrical connectors 14, 16 and 18. The terminal board 12 may be made of any suitable dielectric material which may be molded, stamped, machined or the like to the desired shape.

Extending from the terminal board 12 is a stud connection 20 which is the battery terminal for supplying current from the battery of the motor vehicle to the head lamp circuits via the switch unit (not shown) in which the terminal board unit 10 is adapted to be used.

The electrical connectors 14, 16 and 18 are made from resilient strips of copper, bronze or other electrically conductive materials which may be readily stamped or otherwise formed to a shape similar to that shown of the connector 18 in Fig. 2. Each of these electrical connectors are adapted to receive at least one spade type terminal 22 of the type shown in Fig. 1. As there shown, the terminal 22 has a flat spade-shaped portion 24 in the center of which is an aperture 26, the purpose of which will be explained hereinafter. The end of said portion 24 has an electric conductor 28 attached thereto, which conductor 28 may be a portion of a wiring harness (not shown) for the light circuit of an automobile.

The electrical connector 18, shown in Fig. 2 has two relatively wide, flat, resilient arms 30 and 32 which are spaced apart to receive therebetween the flat spade-shaped portion 24 of the terminal 22. The arm 30 has a detent 34 which extends inwardly so that it will project into the aperture 26 of the terminal 22 when the latter is inserted between the arms 30 and 32. This can best be seen in Fig. 5 wherein the terminal 22 is shown in phantom lines 38 in an inserted position.

The arm 32 has two prongs 40 and 42 which project outwardly into engagement with the sidewall 44 of the aperture 46 which extends through the dielectric terminal board 12. These prongs 40 and 42 being resilient in character serve to bias the arm 32 toward its associated arm 30 thereby retaining the terminal 22 in place within the electrical receptacle when the aperture 26 is fitted over the detent 34. This biasing action of arm 32 also serves to provide a tight electrical connection between the terminal 22 and the receptacle formed by the arms 30 and 32. It should be observed that this electrical connection has a relatively large contacting surface be-

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tween the terminal 22 and the receptacle, thus effecting a good electrical connection.

The prongs 40 and 42 also perform other functions. The prong 40, adjacent the open end of the receptacle, is outwardly flared so as to provide a guiding surface permitting the terminal 22 to be readily inserted into the receptacle. The prong 42 abuts against the shoulder 48 and aids in locking the electrical connector 18 in terminal board 12. As is believed understood, the electrical conductor 18 is inserted into aperture 46 from the lower side of terminal board 12, as viewed in Fig. 5, and the prong 42 will spring outwardly over shoulder 48 to prevent the electrical connector 18 from being pulled out of the aperture 46.

The closed end of the receptacle formed by arms 30 and 32 is a flat head 50 which overlaps the recessed portion 52 formed in terminal board 12 thereby forming a contact area for the movable element of a switch (not shown) and at the same time cooperating with the prong 42 to retain the electrical connector 18 in a fixed position.

It should be noted that the opposite ends of the electrical connector 18 are substantially flush with the opposite surfaces of the terminal board 12, thus providing complete protection against deforming the electrical connector 18 after it has been inserted in its proper place in terminal board 12. It should also be noted that the electrical connector 18 can be inserted in place merely by introducing the open end of the receptacle into the lower end of aperture 46 and pressing the same thereinto until prong 42 springs over the shoulder 48. This operation can be carried out manually in a rapid and simple manner, it being understood, however, that it can also be automatically performed by suitable assembling machinery, if desired.

It may be necessary to employ electrical connectors which require larger contact areas for use by the movable element of the switch (not shown) than the electrical connector 18 provides, and for this purpose electrical connectors such as 14 and 16 are used. These latter connectors are constructed alike and for the purpose of disclosure only electrical connector 14 will be described.

As shown in Figs. 3, 4 and 7, the electrical connector 14 extends into two apertures 54 and 56 which are substantially the same as the aperture 46, previously described. The receptacles 58 and 60 also are similar to the receptacle formed by the arms 30 and 32. Electrical connector 14 differs in having the relatively long contact surface 62 joining the receptacles 58 and 60 as one integral unit, which connector can also be formed from a single strip of resilient conductive material merely by folding the same lengthwise and splitting open the opposite ends into two pairs of arms and thereafter shaping such arms similar to the arms 30 and 32, previously described.

Fig. 6 shows a modified form of the arm construction that can be used with any of the electrical receptacles of the present invention. As there shown the electrical

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connector 18a has an additional prong 70a formed on the arm 30a for seating against the shoulder 72a of aperture 46a. By virtue of this construction, a wider aperture 46a is provided and both of the arms 30a and 32a can yield when a spade type terminal is inserted therebetween and both said arms will be resiliently pressed against the inserted terminal. This modification is particularly advantageous for use when spade type terminals which may be oversized may be employed.

It should be observed that each of the embodiments of the electrical connectors described are formed from one strip of conductive material thus reducing to a minimum the numbers of elements required to manufacture the terminal board unit 10 and also eliminating the need to make several electrical connections between various elements of the terminal board unit 10, thus effecting a minimum voltage drop across said terminal board unit 10.

Having thus described my invention, I claim:

1. A terminal board unit for use with a rotary switch comprising a dielectric board having a plurality of radially disposed slots extending therethrough and a plurality of spade type receptacles positioned within said slots each with one of its ends open to receive a spade type terminal and with its other end closed in flush relationship with the surface of said board to provide a contact for a rotary switch element of said switch, at least two of said receptacles being joined at their other ends so as to form a relatively long unitary contact surface.

2. In a terminal board unit, an electrical connector formed from a single strip of resilient metal, said strip being folded and cut to form at the distal ends thereof two pairs of parallel arms, each pair being adapted for receiving a spade type terminal, the portion of said strip intermediate said arms being flat and normal to said arms to provide an electrical contact surface.

3. A terminal board unit for use with a rotary switch comprising a dielectric board having a pair of slots extending therethrough, one wall of each slot having a shoulder formed therein, an electrical connector formed from a single strip of resilient metal, said strip being folded and cut to form at the distal ends thereof two pairs of parallel arms, said pairs extending respectively one each into said slots and being adapted to receive spade type terminals, the portion of said strip intermediate said arms being normal to said arms to provide a contact for a rotary switch element of said switch, one arm of each of said pairs having a detent for engaging the shoulder of its associated aperture so that said strip will be retained in said board.

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