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F. BEAL

2,384,273

ELECTRICAL CONNECTION MEANS

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Fig. 1.

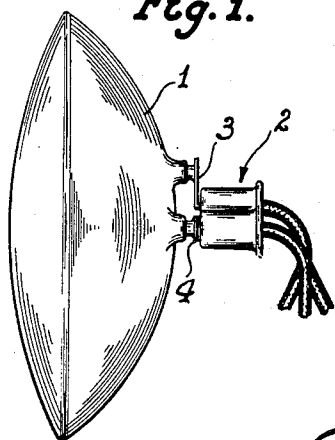


Fig. 2.

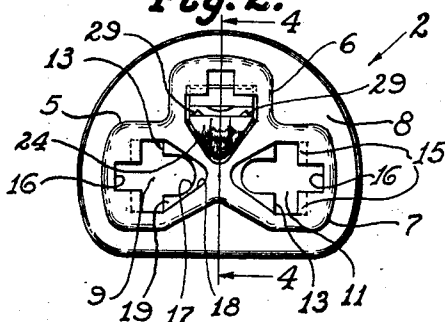


Fig. 4.

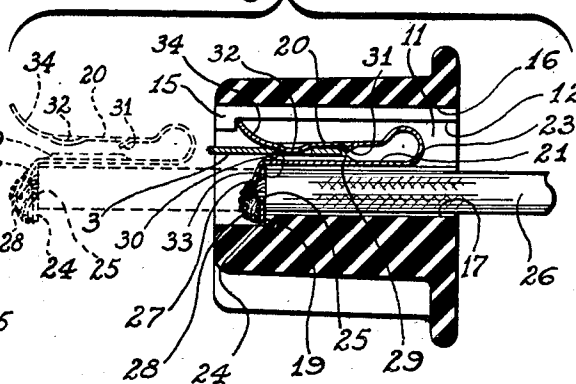


Fig. 3.

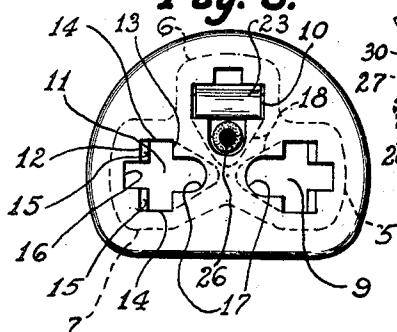


Fig. 5.

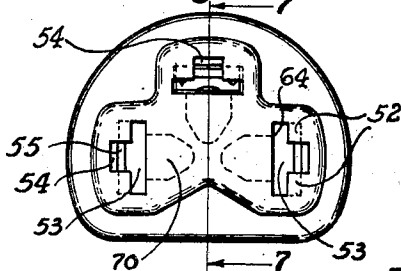


Fig. 6.

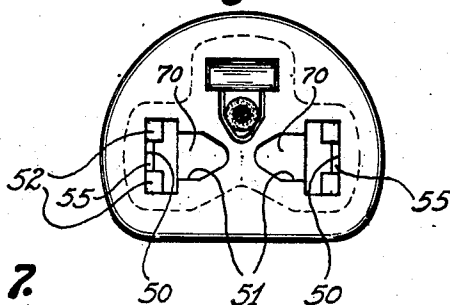
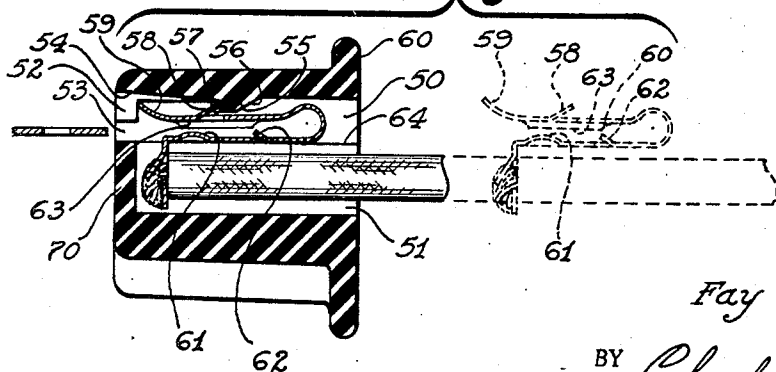


Fig. 7.



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UNITED STATES PATENT OFFICE

2,384,273

ELECTRICAL CONNECTION MEANS

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3 Claims. (Cl. 173—328)

This invention relates generally to electrical connection means and particularly to connectors adapted for detachable association with respect to a lamp or other electrical apparatus for establishing a through connection between the source, line, and lamp.

More specifically, the invention is directed to a connector provided with a plurality of terminal posts or receptacles, each of which is adapted to detachably resiliently receive and retain one of a plurality of terminal studs, which project from the rear extremity of a headlamp.

One particular object is to provide a connector having at least a single terminal post or receptacle that is associated with a mounting member of insulating material in such a manner that the receptacle may adjust itself to accommodate a terminal stud when the latter is inserted into the receptacle.

Another object is to provide a construction of the character just referred to, in which each receptacle is so constructed and arranged that it may be inserted into an opening or aperture provided in the mounting and snapped securely in place.

Another object of the invention is to provide a terminal receptacle which may be easily and quickly released from the mounting by which it is carried.

A further object of the invention is to provide improved means whereby the bared end of the conductor wire may be secured to a terminal receptacle in a desirable manner prior to permanently securing the two together.

A further object is to provide a connector in which the said improved means above referred to provides means assisting to direct or guide a terminal stud into the terminal receptacle.

A still further object is to provide a connector that may be economically manufactured and assembled on a production basis.

Other objects and advantages of this invention will be apparent after considering the description hereinafter set forth in conjunction with the drawing annexed hereto.

Referring to the drawing:

Figure 1 is a relatively small side view of one form of a connector embodying the invention, as applied to an electrical headlamp of a vehicle;

Figure 2 is a relatively large front or end view of the connector, showing one of the receptacles and conductors assembled therewith;

Figure 3 is a rear or end view of the connector shown in Figure 2;

Figure 4 is a longitudinal section taken substantially on line 4—4 of Figure 2, showing certain details;

Figure 5 is a front end view of a modified form of connector;

Figure 6 is a rear end view of the connector shown in Figure 5; and

Figure 7 is a longitudinal section taken substantially on line 7—7 of Figure 5 disclosing certain details of construction.

Referring particularly to Figure 1 of the drawing wherein one form of the invention is disclosed, numeral 1 generally designates a vehicle headlamp which is adapted to be supported within a suitable housing or to a mounting not shown, and 2 generally designates a connector which is adapted to be detachably connected to the headlamp. Obviously, the connector may be designed and constructed for use in connection with electrical apparatus other than a vehicle headlamp, and it is to be understood that the connector may be provided with one or a plurality of terminal receptacles, depending on the use or application of the connector.

The headlamp may be provided with any desirable number of terminal connections or studs, but as herein shown, is preferably provided with a terminal stud 3, and a pair of studs 4, the latter of which are arranged in spaced apart relation substantially equidistant from the focal axis of the headlamp, while stud 3 is located above said axis intermediate said studs 4. Only one of the studs 4 is shown in Figure 1. The studs 3 and 4 may be constructed as desired, but as herein shown, are preferably comprised of sheet metal, and formed with angular projections, which extend rearwardly of the headlamp, each projection being preferably provided with a circular aperture as clearly shown in Figure 4, the purpose of which will be described later.

The free extremities of the studs are preferably made planar or flat, the extremity of the stud 3 being arranged horizontally and the extremities of studs 4 preferably vertically or at right angles to the plane of stud 3.

The connector 2 includes a mounting preferably in the form of a block of moulded insulating material, and as clearly shown, is preferably provided with longitudinally extending substantially parallel tubular portions 5, 6, and 7, arranged more or less in triangle formation, the portions being provided with apertures 9, 10, and 11, respectively, arranged in circumferential relation. The tubular portions 5 through 7 are preferably joined together by suitable converging radial portions, most clearly shown in Figure 2. In other words, the radial portions provide partitions.

In order to assist in assembling or disassembling the connector with respect to the terminal studs, the rear extremity of the mounting is preferably provided with a flange 8, preferably annular in form, except for a beveled portion adjacent its lower extremity. The portions of the flange, particularly intermediate the extremities

of the portions 5 through 7, provide finger holds for removing the connector from the lamp.

Inasmuch as the tubular portions, receptacles, and conductors are substantially identical, it is believed that a description of one of the tubular portions and a receptacle will be sufficient. Referring to the tubular portion 7, it will be noted that the aperture 11 extends substantially entirely longitudinally through the portion. This aperture 11 is adapted to receive a resilient terminal receptacle, and as clearly shown, is preferably rectangular in cross-section bounded by side walls 12 and 13, and end walls 14, as most clearly shown in Figures 2 and 3. The front extremity of the side wall 12 preferably terminates in a pair of spaced apart abutments 15, which project a predetermined distance across the entrance end of the aperture 11, so as to provide an entrance opening of a size slightly smaller than the cross-sectional size of the aperture 11. The side wall 12 is interrupted by having a channel or slot 16 which preferably extends entirely longitudinally through the mounting. The purpose of this slot will be described in detail later.

The opposite marginal side wall 13 of the aperture 11 is interrupted by a conductor receiving channel or groove 17, the bottom wall of which is preferably curved, as shown in Figures 2 and 3. Thus, the channels or slots 16 and 17 are arranged at right angles to the rectangular aperture 11, and are communicatively connected together. The front extremity of the portion 7 is preferably provided with a recess 18 preferably triangular in form, which is of a size slightly greater than the cross-sectional size of the channel 17, so as to provide, among other things, a shoulder or stop 19. In other words, the front extremity of the channel 17 is provided with an enlargement or recess which is adapted to receive a part of the receptacle. The shoulder 19, as clearly shown in Figure 4, is arranged at right angles to the longitudinal axis of the mounting, and is spaced axially apart from the abutments 15.

The receptacle, which is adapted to receive the stud 3, is preferably constructed from a rectangular blank of resilient sheet metal, which is folded back upon itself to provide spaced apart substantially parallel contacting leg portions 20 and 21, preferably joined at one extremity by an offset substantially cylindrical portion 23. Obviously, the portion 23 may be otherwise formed, or be omitted entirely. However, it is desirable that the receptacle be provided with some desirable means in order to prolong its life by increasing its resiliency.

The contacting leg portion 21 is preferably provided with an integral triangular offset lug portion 24, arranged substantially at right angles to said leg portion, as clearly shown in Figure 4. The offset 24 is adapted to fit within the confines of the triangular recess or enlarged extremity 18 of channel 17, and in abutment with the shoulder 19. The offset 24 is preferably provided with an aperture which is adapted to receive the relatively short bared end 25 of the insulated conductor 26, the aperture being formed by an outstruck integral tongue or ear 27. The aperture and tongue are so constructed and arranged that the bared end 25 of the conductor may be inserted into the aperture and by a slight twist of the conductor, or twist of the receptacle with respect to the conductor, the bared end will be caught by the tongue 27 sufficiently to hold the receptacle temporarily to the conductor, so that, if desired, the bared or

exposed wire end may be permanently secured in place by a drop of solder 28, or by grasping the conductor and tilting the receptacle into a tank of liquid solder. The tongue 27, as clearly shown, is preferably curved, inclined, or arranged at an angle with respect to the offset lug 24, and is adapted to more or less provide a cam surface whereby to assist in directing the stud 3 in between the contacting portions 20 and 21. In many instances, it has been found advantageous to press the tongue upon the wire to secure the wire to the receptacle.

In order to insure a good electrical contact between the stud 3 and the receptacle, the leg 21 is preferably provided with a pair of parallel intumed portions 29, which may be provided at any desirable location. As herein shown, the portions are preferably formed by turning inwardly the marginal side edges of the portion 21, the front extremities of the portions 29 being preferably beveled, as indicated at 30, in order to provide cam surfaces assisting to guide the stud 3 more directly in between the leg portions 20 and 21.

The leg or contacting portion 20 of the terminal receptacle is preferably provided with an intumed integral stop 31, substantially opposite the rear extremities of the intumed portions 29, as clearly shown in Figure 4. The leg is also provided with a detent 32 in the form of a rounded projection, which extends into the receptacle for cooperation with the aperture 33 provided in the stud 3. The stop 31 is preferably located across from the intumed portions 29, and near the detent 32 so that the free extremity of the stud 3 by engaging the stop will position the aperture 33 of the stud to be received by the detent, the lower planar portion of the stud 3 being pressed to firmly engage said portions 29 to insure good electrical engagement. The detent 33 also provides a cam surface assisting to direct the stud into the receptacle.

As above set forth, one object of the invention is to provide improved means whereby the terminal receptacles may be snapped into locking engagement with the mounting, and this is accomplished by providing the front extremity of the leg portion 20 with an outwardly curved resilient tongue or finger 34, the free extremity of which is adapted to cooperate with the abutments 15, as most clearly shown in Figure 4.

The receptacle is first adapted to be permanently connected to the conductor 26, and in order to assemble the conductor 26 and receptacle with the mounting, it is only necessary to first thread a length of the conductor through the apertures 11 and 17 from the front, and when the substantially cylindrical portion 23 enters the aperture 11, the conductor 26 is moved into the conductor receiving channel 17. Further inward movement of the receptacle into the aperture causes contraction of the receptacle, or specifically, movement of the leg portions 20 and 21 toward each other, and when the receptacle is moved still further so that the offset lug portion 24 engages the shoulder 19, the receptacle will expand, or specifically, the tongue portion 34 of the leg portion 20 will snap outwardly to engage the abutments 15. As clearly shown by the dotted lines in Figure 4, the receptacle prior to assembly with the mounting, is preferably expanded, and when assembled is slightly contracted, as shown by the full lines.

In some instances, it has been found desirable to provide means whereby the terminal receptacle may be easily and quickly disconnected from its mounting. Such release may be accomplished by

inserting a tool through either end of the channel or slot 16, preferably adjacent its front end, to a point whereby the free extremity of the tongue 34 may be engaged by the tool and pressed inwardly out of engagement with the abutments, whereupon the receptacle may be pushed outwardly, in a direction opposite to that which it entered the mounting. In lieu of the slot 16, a small hole might be provided in the wall of the tubular portion 7, opposite the tongue 34 so that a tool may be inserted through the hole to release the tongue from the abutments 15. Moreover, it is apparent that it is not essential to provide releasing means of the character just referred to.

As clearly shown, the conductor receiving channel 17 adjacent aperture 11 is preferably made slightly greater in cross-sectional size than the other conductor receiving channels so as to take a larger sized conductor which carries a higher amperage to the filament of the headlamp to which one of the studs 4 is electrically connected.

The embodiment of the invention disclosed in Figures 5 through 7, will not be described. In this embodiment, the parts substantially correspond to the parts above described with the exception that provisions are made whereby the receptacle and the conductor secured thereto may be assembled to the mounting by inserting the receptacle and conductor into the mounting from the rear.

Numeral 50 represents a longitudinal aperture preferably of rectangular shape in cross-section, and 51 represents a triangular aperture, or specifically, an aperture of channel shape, the bottom of which is provided with converging and curved walls. The aperture 50, as clearly shown, is adapted to receive the terminal receptacle, and the aperture 51, the insulated conductor, including a portion of the receptacle. The front extremity of the aperture 50 is preferably provided with a pair of spaced apart abutments 52, which project a predetermined distance across the aperture 50. The front extremity of the aperture 51 is closed by an integral end wall 70, and this wall together with the abutments 52, among other things, is constructed to provide a stud receiving aperture 53, as shown in Figure 7. Adjacent the aperture 53, there is provided an angular notch 54, which serves the same purpose as the channel 16, above referred to. The side wall of aperture 50 opposite aperture 51 is preferably provided with an abutment 55 intermediate its extremities, having a cam surface 56 and a shoulder or abutment 57.

One leg of the resilient terminal receptacle is preferably provided with an outwardly struck ear 58, arranged in spaced relation to the resilient continuation 59 or extremity of the leg portion 60. The ear 58 and continuation 59, as clearly shown, are angular in form and project in opposite directions, and are so constructed and arranged that when the receptacle and conductor wire secured thereto are inserted into the apertures 50 and 51 from the rear side of the mounting, the leg portions of the receptacle will be contracted, in view of the fact that the continuation 59 will be cammed inwardly by the cam surface 56. Further inward movement of the receptacle by pushing on the conductor will cause the continuation to ride over the abutment 55, and the instant the free extremity of the continuation 59 engages the abutments 52, the leg portions of the receptacle will expand sufficiently to cause the ear 58 to engage the

shoulder 57, as clearly shown in Figure 7. In other words, the continuation 59 and ear 58 are caught between the abutments 52 and 55. As clearly shown by the dotted lines in Figure 7, the receptacle is preferably expanded slightly before inserting the same into the mounting, and after assembly, the leg portions are held substantially in parallel relation, at least they are brought closer together so as to more fully insure a desirable gripping action upon the terminal stud. Also, as clearly shown, the detent 61, stop 62, intumed portions 63, are located in positions opposite to the similar elements above referred to in connection with the Figures 1, through 4. The width of the receptacle is preferably such that one leg of the receptacle is adapted to engage the side wall 64 of aperture 50, as clearly shown in Figure 7. It is to be particularly noted that entry of the terminal receptacle into the mounting is accomplished by manipulation of the conductor, which is secured to the receptacle. This arrangement provides quick assembly, but if found desirable, the parts may be so constructed and arranged that the receptacle may be grasped and pressed into place within the confines of the mounting without pushing on the conductor.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of the invention; and, therefore, I do not wish to be understood as limiting myself to the exact form, construction, arrangement, and combination of parts herein shown and described.

I claim:

1. Electrical connection means including, a single piece mounting provided with an aperture, a two legged generally U-shaped receptacle insertable into said aperture, one wall of said aperture being provided with a pair of longitudinally spaced apart abutments projecting into the aperture and forming a recess therebetween, and one of the legs of said receptacle having a pair of yieldable portions engaging said abutments for detachably holding said receptacle in assembly with said mounting.

2. Electrical connection means including, a mounting provided with a longitudinally extending aperture provided with a pair of abutments, a resilient receptacle disposed within said aperture engaging one of said abutments, said receptacle having a part yieldably engaging the other abutment assisting to hold said receptacle assembled with said mounting, and an aperture extending through said one abutment through which tool means may be inserted back of the receptacle to shift it whereby to release said receptacle part from said other abutment.

3. Electrical connection means including, a one piece mounting provided with an aperture having a shoulder and an abutment projecting outwardly from a wall of said aperture, a substantially U-shaped terminal receptacle insertable into said aperture and providing a passage for the reception of a plug conductor terminal axially in the passage adjacent the free extremities of the leg portions of the U, and a pair of longitudinally spaced apart resilient portions provided on one of the legs disposed between and cooperating with said shoulder and said abutment for holding said receptacle in said aperture.

FAY BEAL,