Jan. 16, 1962 R. H. GILLER 3,017,469

CORDLINE CONNECTOR FOR MEDICAL HEADLIGHT ASSEMBLY

Filed Dec. 12, 1958

Fig. 3

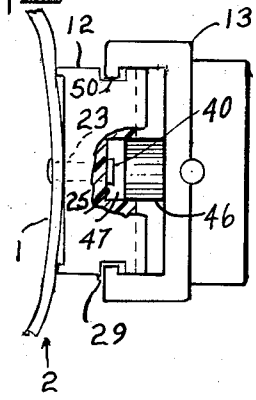
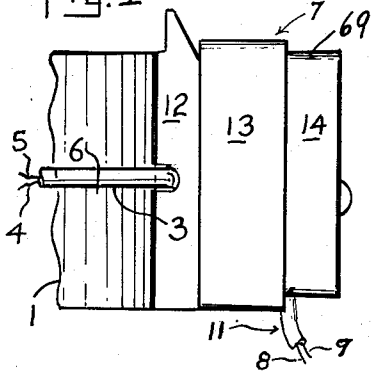



Fig. 1



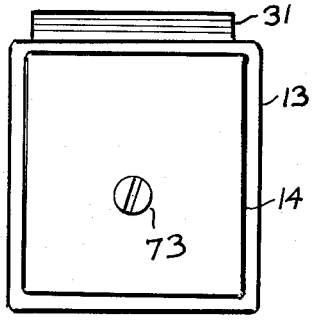
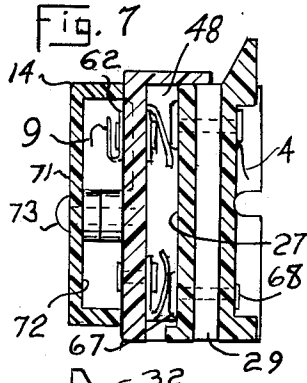




Fig. 2

Fig. 7



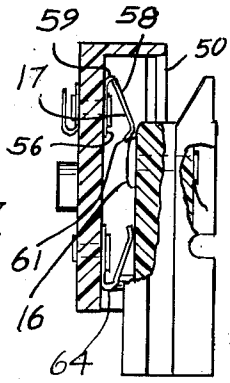




Fig. 9

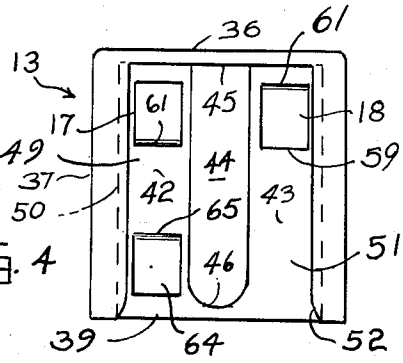



Fig. 4

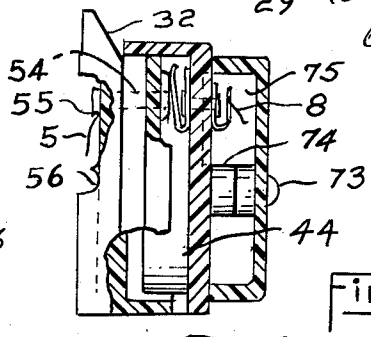



Fig. 8

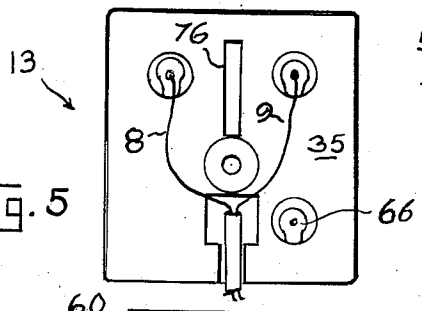



Fig. 5

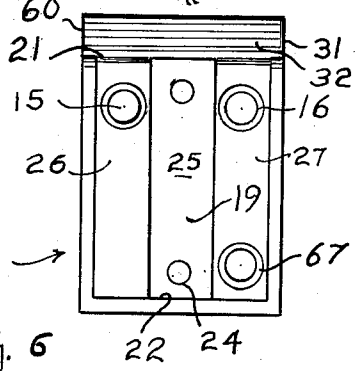



Fig. 6

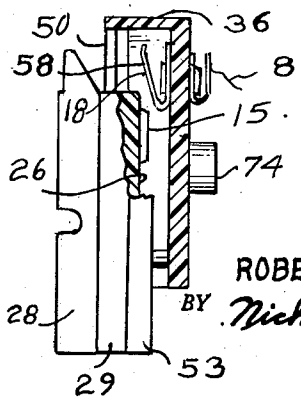



Fig. 10

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# CORDLINE CONNECTOR FOR MEDICAL HEADLIGHT ASSEMBLY

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12 Claims. (Cl. 200—52)

This invention pertains to medical headlight assemblies. More particularly, it is concerned with a cordline connector for electrically connecting the cordline of a conventional medical headlight assembly with the cordline of a source of electrical power.

Medical headlight assemblies are customarily used to throw a beam of light upon an object for purpose of visual examination. The conventional medical headlight assembly includes a headband worn about the head and carrying a headlight at the forehead area thereof. A short cordline extends from the headlight to the rear of the headband, where it bends and hangs downward and is adapted to be connected with a power supply cordline by means of a conventional plug-in connector. The latter includes a male member having a pair of pins or prongs which are adapted to be plugged into complementary holes of a separate female member, both members being attached to the free ends of the cordlines.

This conventional plug-in connector has various deficiencies. "Blind" connections are difficult to make with this type of connector, since it is located at the back of the person. It is difficult to "blindly" align the small pins of one member for plugging into the other member. Further, in order to open the circuit in the cordlines, it is required that the members be completely separated from one another. This requires repeated "blind" plugging and unplugging operations when using the device, attended by consequent annoyance and loss of time in attempting to align the unrestrained members for plugging engagement.

An object of this invention is, therefore, to provide a cordline connector for a medical headlight assembly which avoids the various deficiencies associated with conventional plug-in connectors.

Another object of the invention is to provide a cordline connector of an improved and practical type having many advantages.

In accordance with the invention a cordline connector is provided for a medical headlight assembly, having a pair of cooperating parts of which one is fixed to the headband of the assembly, and the other is adapted to be slidably engaged therewith, and guide means is provided for facilitating "blind" engagement of one with the other, using but one hand.

A further feature of the invention lies in a desirable arrangement of electrical contacts in one part of the connector which are slidably engageable with corresponding electrical contacts in the other part.

A further feature of the invention lies in the mode of slidable engagement of one part of the connector with the other, and in an arrangement of cooperating electrical contacts, whereby when the parts of the connector are fully separated no circuit is established through the contacts; when the parts are fully engaged, a circuit is established through the contacts; and when the parts are partially displaced relative to each other though still engaged, no circuit is established.

Another feature of the invention lies in a desirable association of detent means with the electrical contacts, whereby when the parts of the connector are partially displaced relative to each other the circuit through the contacts is broken and the person is advised thereof.

Accordingly, another object of the invention is to provide in a medical headlight assembly a cordline connector embodying all of the foregoing features.



The invention further lies in the particular structure of its component parts, and also in their general organization and cooperative association to effect the various purposes and advantages intended thereby.

The foregoing and other objects and advantages of this invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawings wherein an embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawings are for purposes of illustration and description and are not to be construed as defining the limits of the invention.

In the drawings:

FIG. 1 is a side elevational view of a cordline connector embodying the invention, and shown as attached to the headband of a medical headlight assembly;

FIG. 2 is a rear elevational view of the connector;

FIG. 3 is a bottom plan view thereof;

FIG. 4 is an elevational view of the front or inner face of the counterpart;

FIG. 5 is an elevational view of the back or rear face of the counterpart;

FIG. 6 is an elevational view of the rear face of the male part;

FIG. 7 is an elevational view of the right side of the connector shown in FIG. 2, but with the side walls of the parts of the connector cut away to show the position of the contacts at the right side when the parts of the connector are fully engaged;

FIG. 8 is a view similar to that shown in FIG. 7 but directed to the left side of the connector;

FIG. 9 is a cut away view similar to FIG. 7, but with the cover member omitted and showing the counterpart partially displaced relative to the male part; and

FIG. 10 is a cutaway view similar to FIG. 8, but with the cover member omitted and showing the counterpart partially displaced relative to the male part.

Reference is now directed to the drawings wherein there is shown a rear fragmentary portion **1** of a headband, generally designated **2**, of a conventional medical headlight assembly. The headband is adapted to fit about the head of a person. Extending forwardly from the back portion of the headband is a short electrical cordline **3** comprising a pair of wire conductors **4, 5** which are connected to the usual headlight socket, not shown, mounted to the forehead area of the headband. Fasteners, such as the staple **6**, secure the cordline to the headband. Associated with the headband is a cordline connector **7** which serves as a means of electrically connecting the wires **4, 5** of the headlight cordline with corresponding conductor wires **8, 9** of an electrical supply cordline **11**. The latter is usually long, and is connected to a source of electrical power, such as a transformer, not shown.

The connector **7** comprises a male part **12**, a female counterpart **13**, and a cover **14**. The male part **12** is fixed to the headband. It has a pair of electrical contacts, here shown as cam contacts **15, 16**, each of which is connected to a separate wire of the headlight cordline **3**. The female counterpart **13** is formed to slidably mate with part **12**. It has a pair of wiper electrical contacts, here shown as spring contacts **17, 18**, each connected to a separate wire of the supply cordline **11**. The latter contacts are adapted to be electrically engaged with or disengaged from the cam contacts. The cover **14** protectively covers over terminal connections of the spring contacts with the supply line.

The connector part **12** is of rectangular block form, having in its rear wall a vertically extending channel

track 19 (FIGS. 3, 6, 8, and 10) which opens through a narrow top wall 21, and is closed over at its bottom end by a wall 22. It is fixed to the rear portion 1 of the headband by a pair of rivets 23, one of which appears in FIG. 3, extending through holes 24 in the recessed wall 25 of the channel track. The latter divides the rear wall of part 12 into a pair of laterally spaced parallel vertically extending shoulders 26, 27. Part 12 further has a pair of parallel narrow side walls 28, centrally and lengthwise of each of which is a groove 29 which opens through the top wall 21. Forwardly of this top wall is a vertical extension 31 having a rear surface 32 which declines downward and rearward to the inner edge of the top wall.

The female part 13 is a counterpart of part 12 and is adapted to slidably engage with the latter. It is a shell, rectangular and box-like in form (FIGS. 4, 5). It has a back wall 35 from which extend forwardly and to an equal degree a top wall 36 and a pair of side walls 37. It is open in its bottom end 39, and also in its front end. Between the side walls 37 a pair of laterally spaced and vertically extending channels 42, 43 are defined by a vertical rib 44 which projects centrally from the inner face of the back wall 35. The upper end of the rib is integral with the underside of the top wall 36, and the latter extends forwardly a short distance beyond the forward face of the rib, as at 45. A rounded bottom end 46 of the rib extends to a point a litle short of the bottom end of the rear wall 36. This rib complements the channel track 19 of part 12, and is adapted to be slidably entered down into the channel track through the open top end of the latter. The rounded bottom end 46 of the rib serves as a pilot or guide to facilitate initial entrance of the rib into the channel track. The overhanging portion 45 of the top wall serves as a stop which limits the extent of downward insertion of the rib into the channel track upon abutting the top wall 21 of the connector part 12. The channels 42 and 43 of counterpart 13 complement the shoulders 26 and 27 of part 12. These shoulders are adapted to slidably enter upwardly into the channels 42 and 43 through the open bottom end 39 of the counterpart as the rib 44 of the latter is moved down into the channel track 19.

A clearance 47 is maintained between the forward face of rib 44 and the recessed wall 25 of the channel track when the connector parts 12 and 13 slidably engage with each other. In this engagement, clearances 48 are also maintained between the shoulders 26 and 27 and the corresponding opposed walls 49 and 51 of channels 42 and 43. The clearance 47 allows room for projecting head ends 40 of the rivets 23, so as to permit the rib to clear them as it slides down the channel track. The clearances 48 provide room for the leaf spring contacts 17 and 18, and the cam contacts 15 and 16; the latter being mounted one to each of the shoulders 26 and 27, and the former being mounted one to each of the recessed walls 49 and 51 of channels 42 and 43. The rib 44 projects in an axial direction only part way into the channel track 19 whereby the clearance 47 is obtained; and the shoulders 26 and 27 project in an axial direction only part way into the corresponding channels 42 and 43, whereby the clearances 48 are obtained.

Interlocking means is provided to maintain the counterpart 13 in a predetermined axial relation to part 12 as the one slidably mates with the other, whereby the rib 44 and the shoulders 26 and 27 project axially only part way into their respective channels. This interlocking means also serves to avoid "jumping" of the counterpart relative to the part 12 as it mates with the latter. To this end, the side walls 37 of counterpart 13 extend forwardly slightly beyond the inner face of rib 44, and at their free ends turn inwardly at right angles in opposed relation to each other to provide a pair of vertical tongues 50. The latter complement, and are adapted to be slidably entered down into the grooves 29 formed in the side walls of part 12. The axial depth of the channel track 19 is substantially equal to that of rib 44; and the axial depth of the channels 42, 43 is relatively greater than the axial dimension of the narrow side wall portions 53 of the shoulders 26, 27 extending rearwardly of the grooves 29. By this structural arrangement it is clear that as the connector parts 12 and 13 slidably engage, the clearances 47 and 48 will be maintained.

Since the fixed connector part 12 is located at the back of the headband, the operation of engaging the counterpart 13 with part 12 is done "blindly." To aid in this operation guide means is provided. The lower ends 52 of the tongues 50 are rounded outwardly, as appears in FIG. 4. These rounded ends cooperate with the inclined surface 32 and rounded side edges 60 of the latter, so that as the counterpart 13 is lowered to mate with part 12 it is guided into position by those cooperating elements, whereby the tongues 50 enter their respective grooves 29, and the rib 44 enters its channel track 19. As counterpart 13 slides downward into engagement with part 12, the leaf spring contacts 17, 18 thereof slide over and into resilient engagement with the corresponding cam contacts 15, 16.

The several cooperating electrical contacts of parts 12 and 13 have a desirable construction and arrangement whereby it is only necessary to partially displace counterpart 13 relative to part 12 to maintain the circuit in open condition; and means is provided to retain the counterpart in this condition.

The cam contacts 15, 16 are of identical structure. Each is similarly mounted to one of the shoulders 26, 27; and each is laterally aligned with the other. Each cam contact is defined by a circular rounded surface or beveled head of a separate grommet or rivet 54. Each rivet 54 has a terminal 55 projecting externally into a recess 56 in the forward face of part 12, where it connects with a separate one of the wires of the headlight cordline 3.

The leaf spring contacts 17 and 18 are of identical structure. Each is of V configuration, having an underlying flat arm 56, and an overlying flat arm 58 extending angularly away from a vertex end 59 and having a rounded portion or knee 61 at its free end. Each contact is contained in one of the channels 42, 43, and the underlying arm 56 thereof is fixed to the corresponding recessed wall of the channel by a rivet 62. An end of each rivet 62 projects externally from the back wall 35, where it connects with a separate one of the wires of the supply cordline 11. The spring contacts are laterally aligned with each other and occupy in their respective channels positions corresponding to the positions of the cam contacts 15 and 16. The angular spread of the outer arm 58 of each spring contact is such that the knee end thereof is in close proximity to or in light abutment with the face of the corresponding opposed shoulder 26 or 27 when the outer arm is not engaged upon its corresponding cam contact, as appears in FIG. 9. It is also to be noted that the outer arm of spring contact 17 extends as in FIG. 7 downward; whereas the outer arm 58 of spring contact 18 extends upward as in FIG. 10. The advantages of this arrangement will appear as the mode of engagement of the spring contacts with the cam contacts is described.

After the counterpart 13 has been initially engaged with part 12, it is progressively slid downward. As this occurs the knee 61 of spring contact 17 will abut the upper edge of cam contact 16 as in FIG. 9; and at the same time the depressed vertex end 59 of spring contact 18 will be clear of and overlie cam contact 15, as in FIG. 10. In this condition of the several contacts the circuit through the cordlines will be open and counterpart 13 will be partially displaced relative to part 12 although still engaged therewith. The abutment of the knee of spring contact 17 with the slightly projecting cam contact 16 acts as a stop offering resistance to further downward sliding movement of the counterpart 13 and thus maintaining the circuit through the cordlines in open condition.

Upon exertion of a slight downward force upon counterpart 13, the resistance of contact 16 is overcome as the outer arm of spring contact 17 is resiliently depressed and the knee thereof rides or wipes over the surface of cam contact 16; and at the same time the outer arm of spring contact 18 will progressively move over the corresponding cam contact 15 and bring its central area into wiping engagement with the latter. The respective contacts will be fully engaged with one another and a circuit will be established through the cordlines when the top wall 36 of counterpart 13 limits upon the top wall 21 of part 12. The wiping action of the contacts as they engage tends to also clean the contacts, thus insuring a good electrical contact.

The circuit through the cordlines may be opened by fully separating counterpart 13 from part 12; or by partially displacing it relative to the latter as in FIGS. 9, 10. The latter action is done "blindly"; and the person senses a click when the knee 61 of contact 17 overrides contact 16 and the outer arm 58 thereof springs outwardly to its normal angular position. To avoid possible over displacement in this respect detent means is provided.

This detent means comprises a second leaf spring contact 64 (FIGS. 4 and 7–10) which is in all respects identical in structure to the other leaf spring contacts 17, 18, but is electrically "dead"; that is, it is not connected to the supply cordline 11. This contact is riveted to the recessed wall 49 of channel 42, and is in reversed relation to the upper leaf spring contact 17 in such manner that its knee end 65 is in opposed spaced relation to the knee end 61 of contact 17. Further upward displacement of counterpart 13 relative to part 12 from the position shown in FIG. 9 will cause the knee 65 of the "dead" spring contact or detent 64 to abut the underedge of cam contact 16, and thus offer a slight resistance to further upward movement which is sufficient to warn the person that further upward displacement may cause the counterpart to fully separate from part 1.

The detent contact 64 is normally "dead." However, in case of emergency, such as may occur should the outer arm 58 of one of the other spring contacts break off for some reason, then the conductor wire of the disabled contact may be connected to the terminal end 66 of contact 64. To meet this emergency, a cooperating normally "dead" cam contact 67 is provided in a corresponding position on the shoulder 27 of part 12, as appears in FIGS. 6 and 7. This cam contact may be made "live" by connecting its terminal end 68 with a conductor wire of the cordline 3.

The cover 14 serves to cover over the exposed terminal connections of the leaf spring contacts with the supply cordline. It is rectangular in form, having four side walls 69, and a back wall 71. The forward ends of the side walls are adapted to abut flush upon the back wall 35 of counterpart 13, so that the terminal connections of the spring contacts are received within the inner recess 72 of the cover. A screw 73 threaded into a boss 74 of counterpart 13 secures the cover fast to the counterpart. A tongue 75 projecting forwardly from the interior of the cover a little beyond the side walls 69, is adapted to engage in a complementary slot 76 formed in the back wall 35 of counterpart 13, whereby the cover is restrained against rotation relative to the latter.

The principal parts 12, 13, and 14 of the cordline connector are formed of electrically non conductive material; preferably plastic, such as nylon. The latter is desired because of its inherent slippery characteristic and smoothness whereby the slidable engagement of the parts with one another is facilitated.

While an embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit and scope of the invention, as the same will now be understood by those skilled in the art; and it is my intent, therefore,



to claim the invention not only as shown and described, but also in all such forms and modifications as can reasonably be construed to fall within the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The combination with a body band carrying an electrical headlight cordline and with an electrical supply cordline, of a combined cordline connector and electrical switch comprising a stationary block part fixed to the body band and having a pair of electrical cam contacts connectable to the headlight cordline, a rear wall supporting the contacts, and a vertical channel track in the rear wall between the pair of contacts, the channel track having an end opening through a top end of the rear wall; and a counterpart to the stationary part having a rib complementing the channel track and adapted to be slidably received downward in the latter, the counterpart having a wall portion located along each longitudinal side of the rib, and a leaf spring contact means supported on each wall portion in a position corresponding to one of the cam contacts for slidable engagement with the corresponding cam contact upon full reception of the rib into the channel track, and one of the leaf spring contact means having a position relative to the other so that upon a predetermined partial reception of the rib into the channel track the last mentioned leaf spring contact means yieldingly limits in abutment with one of the cam contacts and the other leaf spring contact means is clear of the other cam contact.

2. The combination as defined in claim 1, wherein the counterpart has a back wall, the leaf spring contacts have terminal portions projecting through the back wall connectable with corresponding terminal portions of the supply cordline; and a cover is provided mounted to the back wall and covering over the connections of the said terminal portions.

3. The combination as defined in claim 2, wherein screw means secures the cover axially to the back wall, and a tongue provided in a forward wall of the cover engages slidably in a complementary slot in the back wall whereby the cover is restrained against rotation relative to the back wall.

4. The combination as defined in claim 1, wherein each cam contact is circular and has a rounded surface projecting slightly from the rear wall, tongue means in the counterpart is slidably engageable with complementary groove means in the stationary part so as to maintain wall portions of the counterpart in a fixed spaced relation to the rear wall of the stationary part, and wherein each leaf spring contact includes a leaf spring arm extending angularly toward the rear wall and having a knee end adapted to lightly abut and slide over said rear wall and over a corresponding cam contact as the rib is progressively received in the channel track.

5. The combination as defined in claim 4, wherein the stationary part includes guide means cooperable with the tongue means and with the rib for effecting upon "blind" abutment of the counterpart with the stationary part entrance of the rib into the channel track and entrance of the tongue means into the groove means.

6. The combination as defined in claim 5, wherein the guide means is a vertical extension of the stationary part forwardly of the channel track and has a rear surface declining downwardly to the open top end of the channel track and has slightly rounded side edge means declining downwardly to the groove means.

7. The combination as defined in claim 4, wherein the counterpart has a pair of side walls extending forwardly from the said wall portions, the tongue means comprises a tongue formed lengthwise of the free end of each side wall in opposed relation to each other, and the stationary part has a pair of parallel side walls, and the groove means comprises a groove extending lengthwise and centrally of each of said parallel walls and opening through the top ends of the latter.

8. A cordline connector for electrically connecting a

load line with a supply line, comprising a stationary part having a pair of electrical cam contacts connectable to the load line, a rear wall supporting the contacts and having a channel track extending vertically thereof between the cam contacts, the track opening through a top end of the rear wall; and a counterpart to the stationary part having a rib complementing the track and adapted to be slidably received downward into the latter, the counterpart having a wall portion located along each longitudinal side of the rib and a leaf spring contact supported on each wall portion in a position corresponding to one of the cam contacts for slidable engagement with the latter upon reception of the rib into the track; wherein each cam contact is circular and as has a rounded surface projecting slightly from the rear wall, tongue means in the counterpart is slidably engageable with complementary groove means in the stationary part so as to maintain the wall portions of the counterpart in a fixed spaced relation to the rear wall of the stationary part, wherein each leaf spring contact includes a leaf spring arm extending angularly toward the rear wall and having a knee end adapted to lightly abut and slide over said rear wall and over a corresponding cam contact as the rib is progressively received in the track; and wherein a second cam contact is supported upon the rear wall of the stationary part in spaced relation to and below one of the cam contacts, a second leaf spring contact is supported upon one of the wall portions in spaced relation to and below one of the said leaf spring contacts and in a position corresponding to that of the second cam contact, the second cam contact and the second leaf spring contact being adapted for connection respectively to a conductor of the load line and to a conductor of the supply line.

9. A cordline connector for electrically connecting a load line with a supply line, comprising a stationary part having a pair of electrical cam contacts connectable to the load line, a rear wall supporting the contacts and having a channel track extending vertically thereof between the cam contacts, the track opening through a top end of the rear wall; and a counterpart to the stationary part having a rib complementing the track and adapted to be slidably received downward into the latter, the counterpart having a wall portion located along each longitudinal side of the rib and a leaf spring contact supported on each wall portion in a position corresponding to one of the cam contacts for slidable engagement with the latter upon reception of the rib into the track; wherein each cam contact is circular and has a rounded surface projecting slightly from the rear wall, tongue means in the counterpart is slidably engageable with complementary groove means in the stationary part so as to maintain the wall portions of the counterpart in a fixed spaced relation to the rear wall of the stationary part, wherein each leaf spring contact includes a leaf spring arm extending angularly toward the rear wall and having a knee end adapted to lightly abut and slide over said rear wall and over a corresponding cam contact as the rib is progressively received in the track; and wherein a second leaf spring contact identical to the others is supported upon a wall portion in spaced relation to and below one of the leaf spring contacts and has an angularly extending leaf spring arm extending in opposed relation to that of the other contact spaced above whereby the knee portions of the opposed leaf spring arms are in opposed relation, the upper knee projecting downward and the lower knee projecting upward, whereby upon displacement of the counterpart relative to the stationary part the knee of the lower leaf spring contact is adapted to yieldingly abut the underedge of the cam contact corresponding to the upper leaf spring contact.



10. A cordline connector for electrically connecting a load line with a supply line, comprising a stationary part having a pair of electrical cam contacts connectable to the load line, a rear wall supporting the contacts and having a channel track extending vertically thereof between the cam contacts, the track opening through a top end of the rear wall; and a counterpart to the stationary part having a rib complementing the track and adapted to be slidably received downward into the latter, the counterpart having a wall portion located along each longitudinal side of the rib and a leaf spring contact supported on each wall portion in a position corresponding to one of the cam contacts for slidable engagement with the latter upon reception of the rib into the track; wherein each cam contact is circular and has a rounded surface projecting slightly from the rear wall, tongue means in the counterpart is slidably engageable with complementary groove means in the stationary part so as to maintain the wall portions of the counterpart in a fixed spaced relation to the rear wall of the stationary part, wherein each leaf spring contact includes a leaf spring arm extending angularly toward the rear wall and having a knee end adapted to lightly abut and slide over said rear wall and over a corresponding cam contact as the rib is progressively received in the track; and wherein the angularly extending arms of the leaf spring contacts extend in opposite vertical directions and have vertex ends opposite to the knee ends which are depressed relative to the knee ends and ride clear of the cam contacts, whereby upon movement of the rib down the channel track the knee end of that arm of the leaf spring contact extending downward will make contact with its corresponding cam contact prior to contact being made by the arm of that leaf spring contact extending in the opposite direction.

11. In a band adapted to encircle a member of the body, a combined cordline connector and electrical switch comprising a first member fixed to the band having a pair of spaced electrical cam contacts connectable with a load cordline, a second separable member slidably meteable in a downward direction with the first member and having a pair of electrical spring wiper contacts connectable to a supply cordline, each wiper contact having a position corresponding to one of the cam contacts; wherein each wiper contact has a knee end and an opposed relatively depressed end, the knee end of one of the wiper contacts facing in a direction reverse to that of the other wiper contact, and the separable member having a partially mating position relative to the first member wherein the knee end of one of the wiper contacts yieldingly abuts one cam contact and the depressed end of the other wiper contact overhangs in free relation the other cam contact, and the separable member having a full mating position relative to the first member wherein the wiper contacts are engaged with the corresponding cam contacts.

12. In a band as defined in claim 11, wherein a tongue in one of the members is slidably engageable with a groove in the other member, and guide means is provided for movement of the tongue into the groove.

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