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E. D. WINKLER
ELECTRICAL CONNECTOR

2,838,739

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2 Sheets-Sheet 1

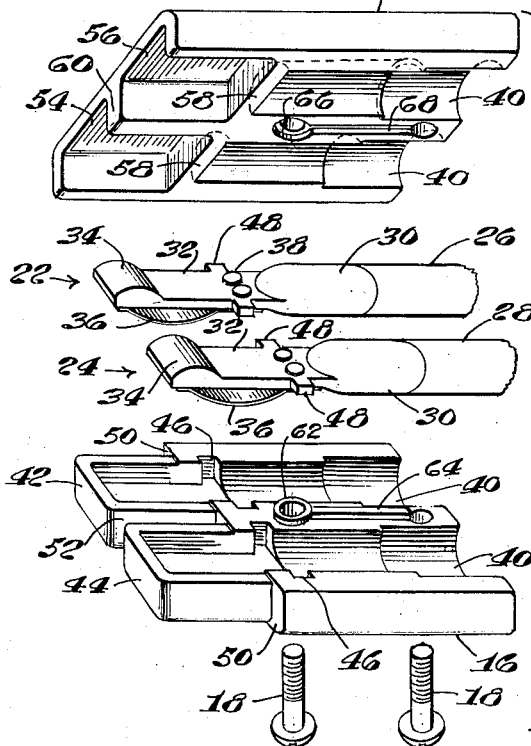
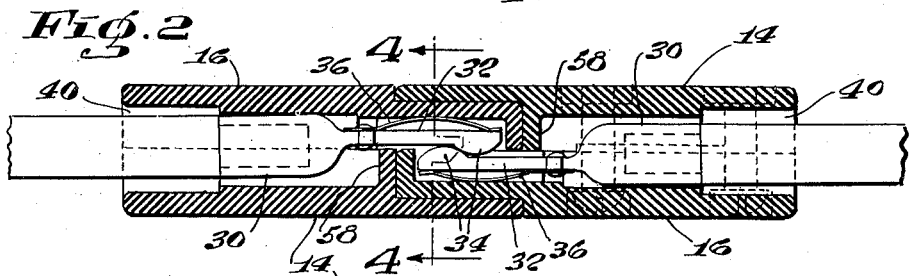
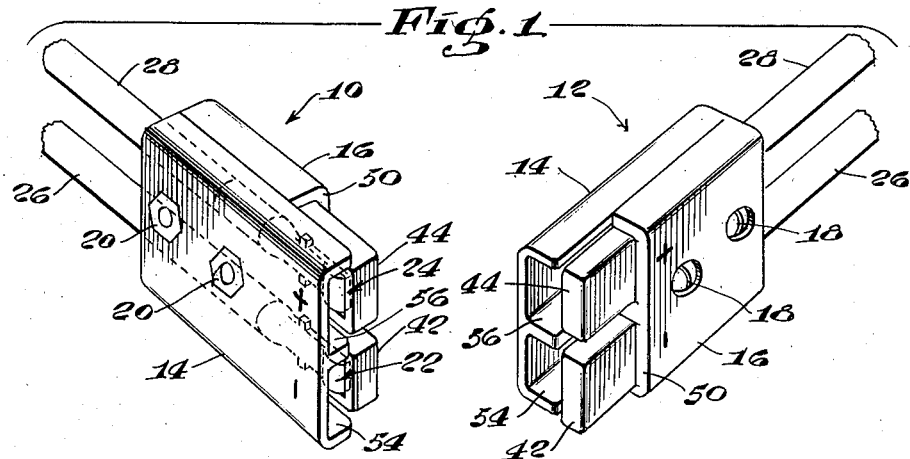
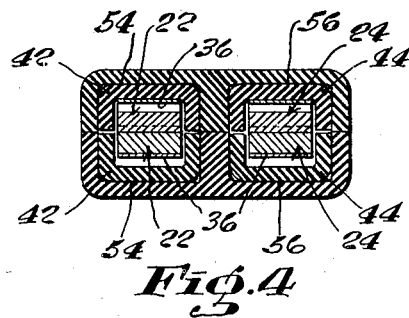


Fig. 3



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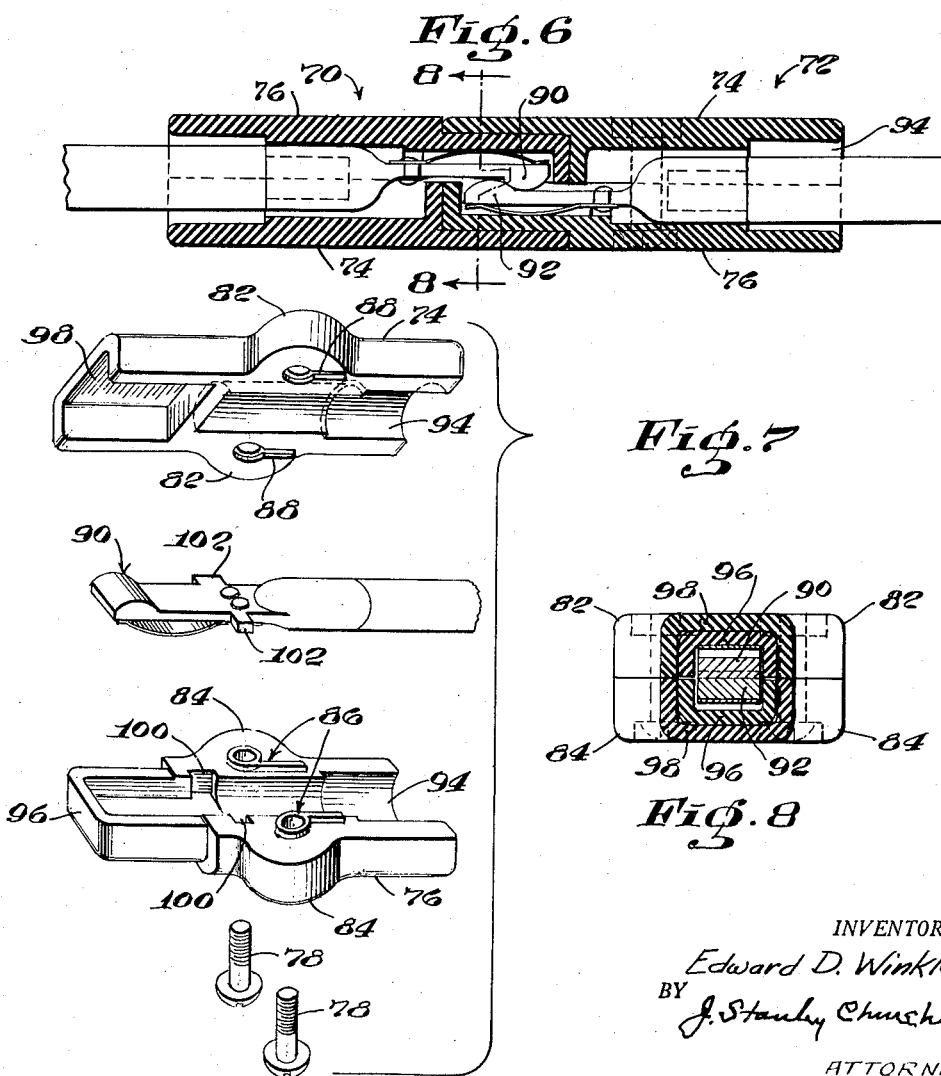
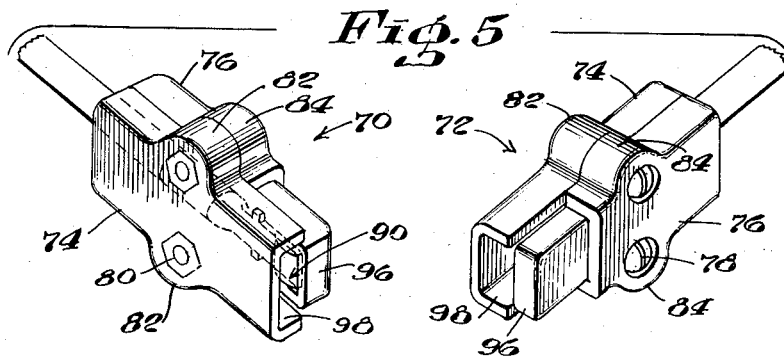
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1

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ELECTRICAL CONNECTOR

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7 Claims. (Cl. 339—47)

This invention relates to an electrical connector.

The invention has for an object to provide a novel and improved electrical connector which may be economically manufactured and used with advantage for general use and which is provided with electrical contacts adapted to be engaged by contacts of an identical connector.

With this general object in view and such others as may hereinafter appear, the invention consists in the electrical connector hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a perspective view of a pair of identical two-pole connectors embodying the present invention;

Fig. 2 is a cross-sectional view of a pair of two-pole connectors joined together;

Fig. 3 is an exploded perspective view of a two-pole connector showing the relationship of the various parts;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of a pair of identical single-pole connectors;

Fig. 6 is a cross-sectional view of a pair of identical single-pole connectors joined together;

Fig. 7 is an exploded perspective view of the single-pole connector; and

Fig. 8 is a cross-sectional view taken on the line 8—8 of Fig. 6.

In general, the present invention contemplates an electrical connector of novel construction of the type having one or more identical contact or terminal members and which is adapted for longitudinal telescoping engagement with a second and identical connector. The present connector is provided with an insulating housing surrounding and enclosing the terminals for maximum insulating protection and in which provision is made for movably and yieldably mounting the terminals in a manner such that the terminals may be resiliently interlocked in their engaged position so as to prevent inadvertent disengagement thereof during normal usage. The present terminals are also adapted for self-cleaning during engagement and disengagement thereof and are shaped so that any pitting of the terminals caused by arcing at the extreme ends thereof during disengagement will not impair the efficiency of the terminals at the areas of contact in their engaged position. Also, with the present construction of connector, the connectors can be joined together in one position only so that when separate lines of fixed or non-changeable polarity are used, the same polarity may be maintained at all times. In practice, the polarity of the terminals may and preferably will be marked on the outer face of the insulating housing.

Referring now to the drawings, Fig. 1 illustrates a pair of two-pole electrical cable connectors indicated at 10, 12 comprising exact counterparts adapted for longitudinal telescoping engagement to form an electrical connection. As herein shown, each connector includes an insulating housing split longitudinally to form two half sections com-

2

prising an upper half section 14 and a lower half section 16, as viewed in Fig. 3, and which are detachably connected together by bolts 18 and nuts 20.

In the embodiment of the invention illustrated in Figs. 1 to 4, each insulating housing is arranged to support two identical contact members 22, 24 forming the terminals of electrical cables 26, 28 respectively, and as herein shown, each terminal is provided with a cylindrical end portion 30 bored to receive the end of the cable into which it may be soldered. The contacting end of each terminal comprises an elongated flat portion 32 substantially rectangular in cross section provided with a rounded or convex end portion 34 projecting from one surface thereof. On its opposite surface the contacting end of each terminal has attached thereto by rivets 38 an outwardly curved leaf spring 36, one end of the leaf spring being secured by the rivets and the other end being free.

The illustrated insulating housing is substantially rectangular in form, each half section 14, 16 shown in Fig. 3 having a main or rearwardly extended body portion hollowed out semi-circularly to form circular openings 40 in the assembled connector through which the cable ends of the terminals extend. The lower half section 16 of the housing is provided with two spaced forwardly extended terminal-receiving pockets 42, 44 substantially U-shaped in cross section and closed at their outer ends. The pockets 42, 44 are aligned with their respective cable openings 40, and the contacting end of each terminal is received in its pocket with the leaf spring 36 bearing against the bottom wall of the pocket and with the convex contacting portion 34 of the terminal extending above the side walls of the pocket, as shown.

In order to prevent longitudinal displacement of the terminals in the insulating housing, each lower half section is provided with grooved portions or slots 46 adjacent the inner ends of the pockets 42, 44 arranged to receive laterally extended ears 48 formed on the terminals, as illustrated.

As thus far described, it will be seen that the contacting end of each terminal is enclosed in its respective pocket except for the engaging face thereof which is resiliently urged by the leaf spring 36 toward the cooperating terminal. As herein shown, the side and bottom walls of the pockets 42, 44 are recessed or offset from the main body portion of the lower half section providing shouldered portions 50 thereabout, the spaced relationship of the pockets providing a slot 52 there between extending to the plane of the shouldered portions.

The upper half section 14 of the insulating housing, as viewed in Fig. 3, is provided with a corresponding forwardly extended portion coextensive with the body portion and shaped to provide two inverted U-shaped sockets 54, 56 open at their outer ends and closed at their inner ends by transversely extended wall portions 58 defining the adjacent end of the body portion, the two sockets being defined and separated by a longitudinally extended central partition wall 60. The socket-forming extension of the upper half section extends over the terminal-receiving pockets 42, 44 of the lower half section, and the sockets 54, 56 are of a size such as to snugly receive the pockets 42, 44 of a second and identical connector, the end of the socket-forming extension of one connector engaging the shouldered portion 50 of the second connector when the connectors are fully engaged. Also, when thus engaged, the central wall 60 of one connector fits into the slot 52 of the second connector, and the closed end walls of the pockets of one connector are engaged with the inner end walls 58 of the sockets of the second connector.

In order to align the two half sections 14, 16 in registered relation for assembly, the lower half section 16 is provided with a raised circular portion 62 about one

3

of the bolt openings and with a longitudinally extended raised portion 64 arranged to be fitted into correspondingly shaped recessed portions 66, 68 respectively formed in the upper half section 14. Also, the bolt openings in the half sections may be countersunk, as illustrated, to present the heads and nuts of the bolts below the outer surface of the insulating housing. It will also be observed that the terminals of each connector are enclosed in the pockets 42, 44 with only the upper contacting portions exposed, and that the socket-forming portions extending over the exposed portions of the terminals also provide a protective insulating wall above the terminals.

With this construction it will be seen that when two identical connectors are engaged by extending the pockets 42, 44 of one connector into their respective sockets 54, 56 of the second connector, the rounded contacting faces 34 of each spring-pressed terminal are slidably engaged by each other, initial inward movement of the connectors effecting downward movement of the terminals in their respective pockets against the springs 36. Upon continued inward movement the high points of the curved portions pass by each other, and as the connectors approach full engagement, the springs 36 effect upward movement of the terminals in their pockets to present the curved portions 34 in hooked or interlocked relation to each other, as illustrated. The cable openings 40 and the pockets 42, 44 are formed to provide ample clearance about the terminals movably supported therein to permit lateral movement of the terminals toward and away from each other, as described, and in practice, the terminals may effect a slight rocking movement about their respective curved leaf springs 36 as the terminals are engaged. It will also be observed that the transversely extended wall portions 58 serve to limit the upward movement of the terminals in their respective pockets when the contacts are disengaged. In practice, the metallic terminals may be coated with silver to provide an efficient contact.

From the above description it will be seen that in operation, any pitting of the terminals caused by arcing at the extreme ends thereof during disengagement will not impair the efficiency of the contacting surfaces when the terminals are in their fully engaged position, and that the sliding movement of the terminals against each other during engagement and disengagement will effect self-cleaning thereof. It will also be observed that the polarity of the terminals may be marked on the housing and that the connectors may be engaged in one position only such as to maintain the same polarity at all times.

Referring now to Figs. 5 to 8 illustrating a single-pole embodiment of the present invention, Fig. 1 shows a pair of single-pole connectors 70, 72 comprising exact counterparts adapted for longitudinal telescoping engagement to form an electrical connection. The construction of the single-pole connector may be similar to the construction of the connectors above described except that it has provision for supporting but one terminal, and as herein shown each connector includes an insulating housing split longitudinally to form upper and lower half sections 74, 76 respectively, as viewed in Fig. 7, and which are detachably connected together by bolts 78 and nuts 80 which are disposed in laterally extended ears 82, 84 of each half section. Raised portions 86 extending from the lower half section are arranged to engage similar recessed portions 88 formed in the upper half section to register the half sections in assembled relation. The single terminal in each connector, indicated at 90, 92 may be of the same construction as above described, and the insulating housing may be similarly provided with cut-out portions in each half section forming a cylindrical bore 94 through which the cable end of the terminal extends. The lower half section 76 is provided with a forwardly extended terminal-receiving pocket 96 recessed with relation to the main

4

body portion, and the upper half section 74 is provided with an extension coextensive with the main body portion forming an inverted U-shaped socket 98 extended over the terminal-receiving pocket similar in construction and mode of operation to the corresponding portions of the double-pole connector described. The lower half section 76 is also provided with similar grooves 100 arranged to receive the laterally extended ears 102 formed on the terminal to prevent longitudinal displacement of the same in its insulating housing.

With this construction it will be seen that when two identical single-pole connectors 70, 72 are engaged by extending the terminal-receiving pocket 96 of one connector into the socket 98 of the second connector, the spring-pressed terminals 90, 92 will be slidably engaged with each other, and that when the curved contacting portions of the terminals pass by each other they are resiliently engaged in hooked or interlocked relation, as above described and as illustrated in Fig. 6.

As illustrated in Fig. 7, the laterally extended retaining ear 102 on one side of the terminal may be of a different size than the ear on the opposite side, the mating grooves 100 being of corresponding sizes to receive the ear on one side only whereby to prevent installation of the terminal in its socket in any other position than with the contacting face directed upwardly during assembly of the connector.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. An electrical connector comprising a hollow insulating housing split longitudinally to form two half sections detachably connected together, one of said half sections having a terminal receiving pocket longitudinally extended therefrom, the other half section having a socket forming portion longitudinally extended therefrom, the pocket of one connector being adapted for longitudinal telescopic insertion into the socket of a second and identical connector when the connectors are engaged, a rigid terminal member provided with a substantially flat contacting portion, said contacting portion having a rounded projection in one of its surfaces adjacent the end thereof, said terminal member resiliently supported within one of the hollow insulating portions in detached relation to the walls thereof, a curved leaf spring carried by said terminal and in engagement with the forward portion of the bottom surface of the contacting portion of said terminal member, said rigid terminal being mounted to yield laterally when slidably engaged with an identical terminal in the second connector, said resiliently supported terminals being shaped to effect lateral depression of each other into their respective pockets during initial engagement and to effect interlocking engagement with each other when fully engaged, said insulating sockets enclosing said pockets when the connectors are engaged, said housing being formed to provide clearance to permit limited lateral movement of the rigid and resiliently mounted terminal member, and means carried by said contacting portion for preventing longitudinal displacement of the terminal in its insulating housing.

2. An electrical connector as defined in claim 1 wherein the insulating housing is provided with an opening in its rear end portion of a diameter greater than the sectional diameter of the terminal member to facilitate assembly and disassembly of the terminal with relation to the housing.

3. An electrical connector comprising a hollow insulating housing split longitudinally to form two half sections detachably connected together, one of said half sections having a plurality of individual spaced terminal-receiving pockets longitudinally extended therefrom, the other half section having a longitudinally extended portion forming a plurality of spaced sockets, the pockets of one con-

5

necter being adapted for longitudinal telescopic insertion into the sockets of a second and identical connector when the connectors are engaged, a rigid terminal member resiliently supported and mounted within each of said pockets in detached relation to the walls thereof, a curved leaf spring carried by the rigid terminal for urging the same outwardly from the pocket, said terminals being mounted to yield laterally when slidingly engaged with identical terminals in the second connector, said resiliently mounted terminals being shaped to effect lateral depression of each other in their respective pockets during initial engagement and to effect interlocking engagement with each other when fully engaged, said housing being formed to provide clearance to permit limited movement of the rigid and resiliently mounted terminal member laterally thereof, and means for preventing longitudinal displacement of the terminal in its insulating housing, said longitudinally extended portions of the insulating housing being U-shaped in cross section with the open sides thereof facing inwardly, the outer ends of said pockets being closed and the outer ends of said sockets being open, said sockets being defined by longitudinally extended rib portions disposed between the side walls of the U-shaped extension.

4. An electrical connector as defined in claim 1 wherein the resiliently mounted rigid terminal member is provided with a rounded projection on its contacting face arranged to cooperate with the rounded projection of the terminal member of the second connector, the rounded projections being arranged in hooked relationship when the connectors are engaged to effect said interlocking engagement.

6

5. An electrical connector as defined in claim 1 wherein the longitudinally extended portions of the insulating housing are U-shaped in cross section with the open sides thereof facing inwardly, the outer end of said pocket being closed and the outer end of said socket-forming portion being open.

6. An electrical connector as defined in claim 1 wherein projections are formed on one of said half sections for cooperation with depressions formed on the second half section to register the half sections in assembled relation.

7. An electrical connector as defined in claim 1 wherein the half sections of said hollow insulating housing form openings providing ample clearance to permit lateral movement of said rigid terminals toward and away from each other, one of said half sections having grooved portions for cooperation with laterally extended portions formed on said terminal contacting portion to prevent longitudinal displacement and to permit lateral movement of the terminal in said housing.

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