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2,402,279

ELECTRICAL CONNECTOR

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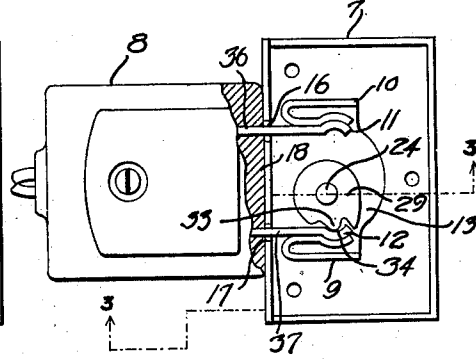
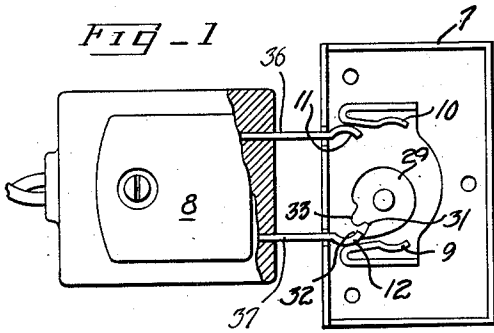


FIG - 2

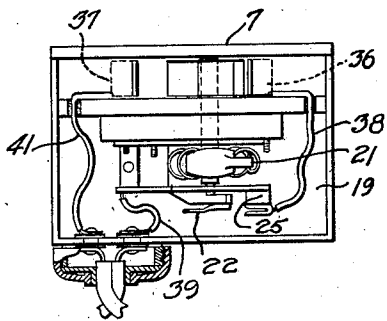


FIG - 4

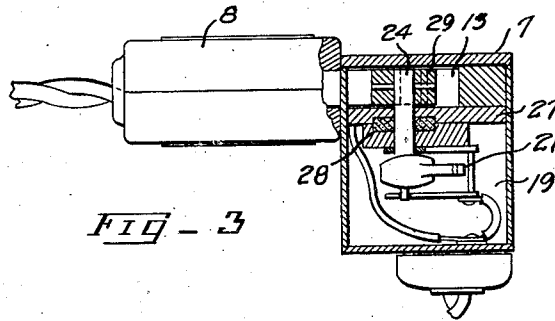


FIG - 3

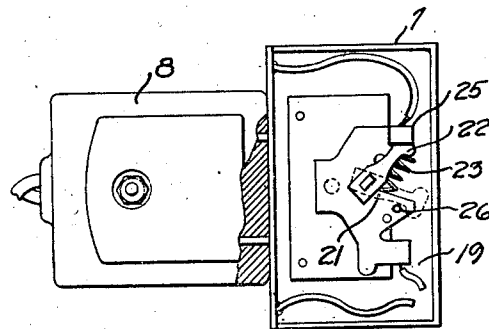


FIG - 5

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UNITED STATES PATENT OFFICE

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ELECTRICAL CONNECTOR

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3 Claims. (Cl. 200—51.09)

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The invention relates to electrical connectors and more particularly to the type of electrical connector including as an integral part thereof an electrical switch mechanism.

An object of the invention is to provide an electrical connector of the character described wherein the electrical switch mechanism is contained within a gas-tight chamber and is operated exteriorly of such chamber to open and close an associated electrical circuit whereby the making and breaking of the circuit, and attendant arcing at the switch contacts, is effected and takes place in a closed chamber thereby enabling the use of the connector in an atmosphere of combustible gas without danger of igniting such gas.

Another object of the invention is to provide an electrical connector of the character described composed of separable connector sections having electric contact members movable into and out of sliding engagement upon attachment and detachment of the sections but wherein the electric circuit is made and broken as above described within a gas-tight chamber provided in one of the sections, whereby the sections may be safely attached and detached and the electric circuit respectively energized or de-energized in an atmosphere of combustible gas without danger of igniting such gas.

A further object of the invention is to provide a detachable electrical connector of the character above embodying in one of the sections a gas sealed electric switch actuated to closed and open position upon movement of said sections into attached and detached position respectively and wherein the switch is closed after sliding engagement between the section contact members is established and the switch is opened while such contact members are in engagement whereby the making and breaking of electric circuit is controlled exclusively by the switch thus eliminating arcing at the contact members.

Still another object of the invention is to provide a detachable electrical connector embodying the features mentioned above in a substantially standard type plug and socket construction.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description

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may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 illustrates an electrical connector constructed in accordance with the present invention and shown with the socket section in cross section and the plug section in a side elevation, the sections being in partially attached position.

Figure 2 is a view similar to Figure 1 but shown with the sections in fully attached position.

Figure 3 is a cross sectional view taken substantially on the plane of line 3—3 of Figure 2.

Figure 4 is a cross sectional view through the switch chamber of the socket section with the plug and socket sections in attached position.

Figure 5 is a bottom view of the connector as viewed in Figure 3 with the lower casing portion removed, parts being shown in section.

The electrical connector of the present invention comprises briefly a provision in a connector body of a gas-tight chamber within which is mounted the make and break contact members of an electric switch mechanism, in combination with a means, preferably manually operated, exteriorly of the chamber and adapted to motivate the switch apparatus between open and closed positions, whereby the connector body may if desired be mounted and operated within an environment of combustible gas or the like without danger of admitting the gas to the sealed chamber and ignition of the gas therein by reason of the usual arcing which occurs at the switch contacts at instant of make and break of the electric circuit.

While various forms and types of motivating devices may be used in the combination above described to obtain various applications of the present invention, I have here illustrated the invention in a pair of detachable plug-in connector sections wherein additional features of novelty are incorporated as will be hereinafter more fully described. As illustrated in the accompanying drawing, the electrical connector is composed of a socket section 7 and a plug section 8 provided with pairs of electric contact members 9 and 10, and 11 and 12 respectively, so mounted and positioned so as to slidably engage over a substantial length on attachment of the sections. As here shown the contact members 9 and 10 are in the form of more or less conventional folded leaf spring contact strips mounted in spaced substantially parallel relation in a chamber 13 provided in the body of the socket section 7 and opening to an outer face 14 of the body at spaced plug contact receiving slots 16 and 17, the strips 9

and 10 being mounted adjacent the slots with their length perpendicular to the face 14. Contact members 11 and 12 are, with the exception hereinafter noted, of conventional plug prong type projecting from an end face 18 of the plug section 8 in spaced substantially parallel relation perpendicular to the end face 18 and positioned for entering through the slots 16 and 17 of the socket section for sliding engagement with the contact strips 9 and 10.

As an important feature of the present invention, the electric circuit "make" and "break" is not effected upon engagement and disengagement of contacts 9—12, but rather in a separate gas-tight chamber 19 provided in the body of the socket section 7, although this making and breaking of the electrical circuit is automatically effected by attachment and detachment of the plug and socket sections. Mounted within the closed chamber 19 is a rotary toggle switch 21 which may be of standard design and formed with an oscillatory switch arm 22 which is moved with snap-action by an over-center operating spring 23 between closed position, as illustrated in full lines in Figure 4 against a switch contact 25, and an open position, shown in dotted lines, against a stop 26. Actuation of the over-center spring means 23 is effected by a shaft 24 which extends from the switch 21 through a wall 27 of the socket body into the chamber 13, the shaft being sealed to the wall 27 to close the opening through the wall around the shaft by means of a compressed gasket 28 or the like.

As will be best seen in Figures 1 and 2, the shaft 24 extends into the chamber 13 between the contact strips 9 and 10 at substantially right angles to the longitudinal axes of these strips, thus disposing the shaft at substantially right angles to the line of insertion of the plug prongs 11 and 12. Fixed on the shaft in chamber 13 is an offset means here in the form of a crank wheel 29 which is adapted to be engaged and rotated by the plug prong 12 upon attachment of the sections, the form and arrangement of the parts being such as to cause a throwing of the switch arm 22 from open to closed position during the movement of the plug prong 12 from initial engagement with the wheel 29, as illustrated in Figure 1 to a fully inserted position of the prong, as illustrated in Figure 2. The crank wheel 29 is preferably formed with an outstanding shoulder portion 31 which is initially engaged by the forward end 32 of the plug prong 12 as shown in Figure 1, so that upon attachment of the sections the crank wheel 29 is rotated in a counterclockwise direction, with reference to Figure 1, to operate the over-center spring means 23 as above described. It will be noted with reference to Figure 1 that the plug contact members 11 and 12 enter into sliding engagement with the socket contact members 9 and 10 prior to initial engagement of the plug prong 12 with the crank wheel shoulder 31. Preferably the rotation imparted to the wheel 29 by the prong 12 upon attachment of the sections, is such as to cause a throwing of the switch to closed position, only when the sections are moved to substantially fully attached position. Thus the electric circuit is energized while the contact members 9—12 are in firm engagement and no arcing in the chamber 13 results.

Means is provided for rotating the crank wheel 29 in a reverse direction upon detachment of the sections so as to throw the switch 21 from closed to open position. As will be best seen from Fig-

ures 1 and 2 there is provided for this purpose on the wheel 29 immediately adjacent the shoulder 31 a gear lobe or tooth 33 which is adapted to nest or mesh in a socket 34 provided in the plug prong 12 adjacent the end 32 thereof. As the plug prong 12 is inserted and a joint movement of the prong and wheel 29 is effected as above described, the gear lobe 33 rotates into a seated position in the socket 34 thereby interlocking the wheel and prong for joint movement. Thus when the sections are moved away from an attached position as illustrated in Figure 2 the crank wheel 29 is rotated, this time in a clockwise direction with reference to Figures 1 and 2, so as to throw the switch 21 from closed to open position. Here again the operating parts are so designed and arranged as to cause the switch to throw to open position while the contact members 9—12 are in firm engagement thereby breaking the electric circuit in the closed switch chamber 19.

The socket section is adapted to be connected to an electric power circuit by terminals 36 and 37. In the present instance the terminal 36 is connected to the switch contact 25 by means of a conductor 38. The other switch contact or switch arm 22 is connected to the contact strip 10 by conductor 39 and the contact strip 9 is connected to the terminal 37 by conductor 41.

I claim:

1. An electrical connector composed of detachable socket and plug sections, electric contact members carried by said sections for movement into and out of sliding electrical engagement as said sections are moved into and out of attached position, said socket section being formed with a closed gas-tight chamber sealed from said contact members carried by said socket section, a snap-action electric switch mounted in said chamber, and means for operating said switch connected thereto and extending into adjacent relation with respect to one of said contact members carried by said plug section for engagement and displacement by one of said contact members carried by said plug section, said means and said switch being attached and arranged to provide an opening of said switch upon movement of said sections from attached position towards detachable position but while said contact members are in sliding engagement.

2. In an electrical connector of the character described a pair of detachable connector sections each having a plurality of contact members positioned for sliding engagement with each other for a substantial length of movement upon attachment and detachment of said sections one of said sections providing a substantially sealed chamber, a snap-action switch mounted in said chamber, an actuating member connected to said switch for moving the latter from open to closed position and vice versa upon reciprocation of said member, said member extending through the wall of said chamber and mounted adjacent to one of the contact members on the switch carried section for operative engagement and displacement by a contact member carried by said other section, said parts cooperating to move said switch to closed position during the attaching movement of said sections after said contact members are slidably engaged and to move said switch to open position during the detaching movement of said sections while said contact members are in sliding engagement.

3. An electrical connector composed of detachable socket and plug sections, electric contact

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members carried by said sections for movement into and out of sliding electrical engagement as said sections are moved into and out of attached position, said socket section being formed with a closed gas-tight chamber sealed from said contact members carried by said socket section, a rotary toggle switch mounted in said chamber and having an operating shaft extending from said chamber to adjacent one of said contact members of said socket section, offset means mounted on

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said shaft and positioned for engagement and displacement by one of said plug section contact members so as to displace said switch to closed position upon attachment of said sections, said last named contact members and said offset member being formed with interfitting portions adapted to cause a reverse movement of said offset portion and an opening of said switch upon movement of said sections towards detached position.

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