

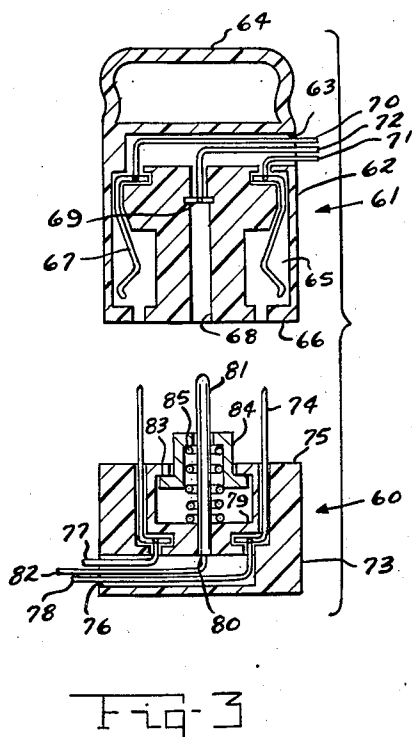
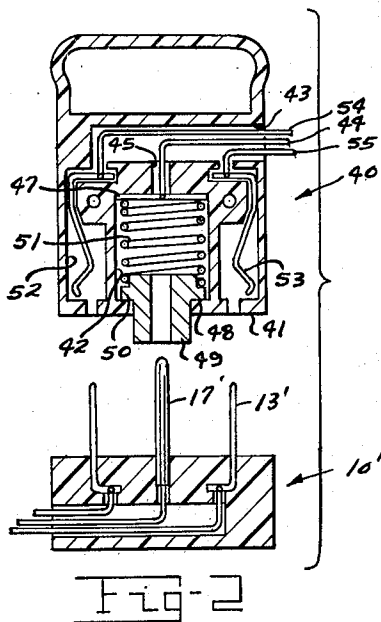
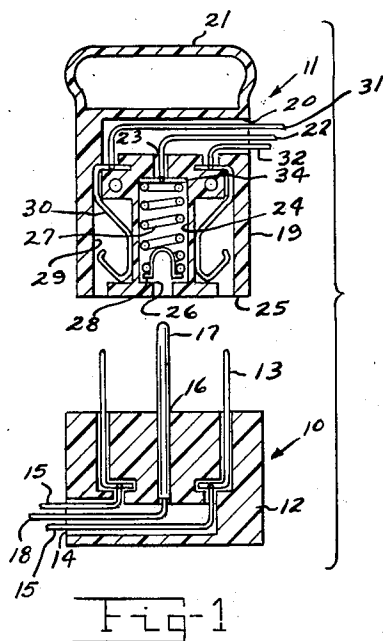
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J. L. MERCER ET AL

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ELECTRIC PLUG

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INVENTORS
JOHN L. MERCER
JOHN J. BRUNNER
BY *Tom Walker*
ATTORNEY

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ELECTRIC PLUG

John L. Mercer and John J. Brunner, Springfield, Ohio

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This invention relates to electric plugs and more particularly to a self ejecting plug which functions both as a connector and a switch and is completely automatic in operation.

In many applications, as in starting an internal combustion engine a momentary connection of a power source will serve a useful function. Connection of the power source is generally effected by means of an electric plug applied to a mating socket on the device to be energized. To date, plugs of this nature have required a positive release operation to disengage them. While some are conditioned to eject subsequent to operation of a manual control, to our knowledge, the subject invention is the first to provide a true automatic self ejecting plug. In many applications, as in the example noted, a device of this nature is important from the standpoint of efficiency, economy and safety.

The present invention provides a simple plug assembly which can be applied and maintained in connected relation with a minimum of effort and for a required period of time to provide a power supply to equipment to be energized. The device is pressure connected and on relief of pressure is completely automatic and self ejecting to break the connection which it effects.

A primary object of the invention is to simplify the construction as well as the means and mode of operation of electrical connector plugs whereby such plugs may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of applications, and will be unlikely to get out of repair.

Another object of the invention is to provide a simple pressure operated electric plug.

A further object of the invention is to provide a pressure applied connector plug which automatically ejects under release of pressure.

An additional object of the invention is to provide an electrical connector device including a male and female unit wherein one of said units is automatically triggered by the connection for automatic self ejection as required.

A further object of the invention is to provide an electrical connector plug possessing the advantageous structural features, the inherent meritorious characteristics, and mode of operation herein described.

With these primary and other objects in view, as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings or their equivalents.

Referring to the accompanying drawing, wherein are shown a few but not necessarily the only forms of embodiment of the invention:

Fig. 1 is a vertical cross sectional view of an electric connector in accordance with the invention;

Fig. 2 is a vertical cross sectional view of a modification of the connector assembly illustrated in Fig. 1; and

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Fig. 3 is a vertical cross sectional view of yet a further embodiment of the invention.

The connector assembly illustrated in Fig. 1 consists of a male unit 10 and a female unit 11. The male unit 10 includes a relatively solid shell 12 which conventionally mounts a pair of spaced parallel connector blades 13 projecting from one face. The shell 12 is suitably apertured at 14 so that wires 15 connected to the anchored extremities of blades 13 may pass to the device to be energized.

Fixed in an aperture 16 centrally of shell 12 is a rod 17 which projects intermediate and parallel to blades 13 and slightly beyond their outer extremities. The innermost end of rod 17 extends to aperture 14, connecting there to a ground wire 18 leading from the shell to the device to be energized. As will be evident, rod 17 serves as a ground connector and a centering means for the female unit 11.

The female or socket unit 11 consists of a housing 19 laterally apertured at 20 adjacent its outer end 21 for introduction of a three conductor cord from a power source (not shown). The cord includes a neutral or ground wire 22 which extends from the aperture 20 through a narrow central passage 23 in housing 19 to the inner end of a cylindrical recess 24 therein. Recess 24 opens to the other end 25 of the housing 19 where it is reduced in dimension by an internally projecting flange providing a shoulder 26. To the inner end of recess 24 at the passage 23, the neutral wire 22 connects to a metal plate 34 to which a coil spring 27 seats. A cup shape metal element 28 having a peripheral radial flange is applied over the outer extremity of the coil spring 27 to have its peripheral flange biased to the shoulder 26 thereby. As disposed, the cup portion of element 28 opens outwardly of the recess 24 for purposes to be described.

Diametrically spaced to either side of the recess 24, passages 29 are provided. The passages 29 open from the end 25 of the housing 19 and extend inwardly to communicate with the aperture 20. The passages 29 are reduced in cross section at their inner extremities and at their outer extremities. Spring formed metal slide contacts 30 are secured to the housing 19 in each of the passages 29, their inner extremities extending through the reduced inner portions of the passages 29 to hook over housing structure and be anchored in a recess therein within the aperture 20. Conductors 31 and 32 from the power source respectively connect to the ends of the contacts 30 anchored within the aperture 20.

The outer ends of the spring contacts 30 are bent or reversed on themselves to bias oppositely in the respective passages 29 and in the path of the reduced openings thereto to the end 25 of the housing 19.

The electrical plug assembly thus provided is employed in the following manner. The male unit 10 is generally connected to the device to be energized. The female unit 11 which is connected by conductors 31 and 32 to a source of power is directly applied to the male unit 10, the rod 17 engaging in the central cup portion of the element 28 and the blades 13 entering passages 29 in the housing 19 and making a wiping contact with the biased extremities of the contacts 30 fixed therein. The female unit 11 is pressure applied and as it is seated to the male unit, the ground connector rod 17 which is longer than the blades 13 makes contact with the neutral wire 22 through the cup element 28, coil spring 27 and the plate 34 in the recess 24 of the housing 19. In the process, the coil spring 27 is compressed. This automatically triggers the female unit for automatic self ejection as the pressure employed in applying the female unit is released. The spring 27 expands as the hand is removed from the female unit to cause an immediate and automatic separation of the housing 19 from the male

unit 10 to open the connection provided between the contact elements 13 and 30 to the source of power. The net result is a complete ejection of the female unit from the male unit. Thus, the function of the self ejecting plug unit 11 is simple and automatic and responsive to pressure relief. It may be held to the unit 10 sufficiently long to energize the device to which it is connected and on release or relief of the pressure therefrom it substantially instantaneously and automatically ejects itself to break the connection effected.

A modification of the invention is shown in Figure 2 of the drawings. The male unit 10' employed here is substantially identical to the first described embodiment and requires no further detailed description. However, the female plug unit 40 is distinctive. The unit 40 is provided with a central cylindrical cavity 42 inwardly of its mating face 41. The body 40 is laterally apertured at 43 adjacent its outer end for introduction of a three wire conductor cord suitably connected to a power source (not shown). The ground wire 44 extends through a narrow passage 45 centrally of the body 40 to connect to a metal plate 47 seated in the inner extremity of the cavity 42. The cavity 42 is reduced in dimension at the mating face 41 of the plug 40 to provide a shoulder 48 defining the entrance to the cavity. A tubular bearing 49 of a metallic nature is disposed in the cavity 42 to have an external flange 50 intermediate its extremities about the shoulder 48 to have one end of the bearing project outwardly of the face 41 of the plug body.

A coil spring 51 seats in cavity 42 to plate 47 at one end and the flange 50 of the bearing 49 at its other end which is thereby biased to project from the face 41 of the plug body 40. Diametrically spaced to either side of central cavity 42, passages 52 are provided which open at the face 41 of the plug body to one end and communicate with lateral aperture 43 at their other end. The respective passages are reduced at their respective ends as in the first described embodiment of the invention. Spring formed contact blades 53 are respectively disposed in passages 52, their inner ends extending through the inner reduced portions of passages 52 to anchor to body 40 in aperture 43. The outer ends of blades 53 are reversely bent mutually inwardly and biased in the path of the reduced openings thereto in the face 41 of the plug body. Power leads 54 and 55 from the power source respectively connect to the inner ends of contact blades 53 in aperture 43.

In the use of this form of the invention, the male unit 10' may be connected to the device to be energized. As the female unit 40 is pressure applied to the male unit 10', the blades 13' on the male plug element enter passages 52 to make contact with elements 53 while the ground blade 17' which projects beyond blades 13' engages through bearing 49. The bearing 49 is pressured inwardly of cavity 42 as the female unit is seated and the ground rod 17' connects to plate 47 to ground wire 44. The spring 51 is energized in the process by bearing 49 to cause an automatic self ejection of female plug element 40 on relief of the connecting pressure. Thus the nature and function of this form of the invention is similar to that first described.

Fig. 3 shows yet another form of the invention. Here a female unit 61 and a male unit 60 form the connector assembly of the invention. The unit 61 consists of a body 62 laterally apertured at 63 to its outer end 63 to its outer end 64. Parallel passages 65 inwardly of its mating end 66 communicate with aperture 63 and house spring wiper blades 67 mounted as in the device described with reference to Fig. 2 of the drawing. A cylindrical passage 68 relatively central of and parallel to passages 65 extends from face 66 of unit 61 to aperture 63 and has a metal contact plate 69 transversely seated adjacent to aperture 63. A three conductor cord from a power source (not shown) has its power leads 70 and 71 respectively connected to the inner ends of contact blades

67 in aperture 63 while the neutral wire 72 connects to plate 69 in central passage 68.

The male unit 60 includes a body 73 conventionally mounting parallel contact blades 74 to project from its mating face 75. Body 73 is laterally apertured at 76 for connection of a three conductor cord from the device to be energized. The power leads 77 and 78 therein respectively connecting to the inner ends of contact blades 74. A cavity 79 in the mating face 75 of body 73 is connected by passage 80 to aperture 76. Ground blade 81, seated in body 73 within passage 80 to connect at its inner end to the ground wire 82, projects parallel to and beyond blades 74.

The cavity 79 is reduced at the mating face of body 73 to provide a shoulder 83. A cap 84 having a peripheral flange in sliding engagement with the wall defining cavity 79 is contained by shoulder 83. The cup portion of cap 84 opens inwardly of cavity 79 and is centrally apertured to bear on ground blade 81. A coil spring 85 about blade 81 seats in cap 84 and the base of cavity 79 to bias the cap to project its cup portion from the face 75 of body 73.

This connector assembly operates similarly to the first described embodiments. As the units 60 and 61 are pressed together, blades 74 of the male unit enter passages 65 to contact elements 67 while ground blade 81 enters passage 68 in the female unit to make contact with ground plate 69. In the process, the mating face 75 of the male unit approaches the mating face 66 of the female unit to bias cap 84 inwardly of the male unit to energize spring 85 to eject and separate the male and female units on relief of the connecting pressure.

Thus, the particular advantages of the subject invention in applications requiring a quick connect-disconnect operation are readily apparent. Embodiments are simple and positive as to function.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprises an illustrative form of several modes of putting the invention into effect and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described our invention, we claim:

1. A connector including, a male connector element, a female connector element, said elements being adapted for a pressured connection, at least one of said elements having means connected operative to apply a constant separating impulse to said elements to automatically initiate disconnection of said elements on pressured connection thereof.

2. An electrical connector including, the first means providing a male coupling element, a second means providing a female coupling element, said means having conductive contacts mating on connection of said coupling elements and automatic ejector means biased outwardly of at least one of said coupling elements and means on the other of said coupling elements operative to energize said ejector means on mating thereof whereupon said ejector means will become automatically operative to initiate disconnection of said coupling elements.

3. An electrical connector plug including, a casing, a pair of contact blades fixed to project from one face of said casing, a ground blade projecting from said one face of said casing, means defining a cavity in said casing

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about said ground blade, means slidably mounted to said casing and within said cavity about said ground blade, and means in said cavity causing a normal projection of such slidably mounted means outwardly of said casing and energized by application of the plug to initiate immediate and automatic ejection thereof.

4. An electrical plug unit including, a housing having conductive coupling means at one face, biasing means mounted to said housing, said housing being pressure applied for engagement of said coupling means to make an electrical connection, said biasing means being energized on making such connection and operative to automatically initiate a break of such connection on removal of the pressure on said housing.

5. An electrical connector plug including, a housing having a cavity in one face, spring means in said cavity, plate means contained in overlying relation to the spring means to the open end of said cavity, socket means to opposed sides of said cavity having wiper contacts therein for connection to a suitable power source, and means in said cavity for connection to a ground wire whereby on pressure application under the influence of external pressure to a three blade plug the ground blade thereof will engage said plate and energize said spring so that on relief of said external pressure said housing will automatically eject itself.

6. An electrical connector including a first connector element for connection to a device to be energized, a second connector element for connection to a source of power, said elements being adapted for connection under the influence of external pressure, at least one of said elements having means connected for applying a constant separating impulse to said elements energized on connection of said elements and operative to automatically disconnect said elements on removal of the external pressure.

7. An electrical connector plug including, a housing having a cavity in one face, spring means in said cavity, a cupped plate contained in overlying relation to the spring means to the open end of said cavity, contact means in said housing to opposed sides of said cavity, means connecting to said contact means for conducting current therethrough, said cupped plate normally projecting outwardly of said cavity and biased inwardly thereof by application of said plug under the influence of external pressure to energize said spring means so that on relief of the external pressure said housing will automatically eject itself.

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8. An electrical plug device including, a housing, a cavity in said housing, a bearing tube in said central cavity, means in said cavity normally biasing said bearing tube to project from said housing, additional cavities in said housing about said central cavity, electrical wiper contacts mounted to said housing in said additional cavities whereby on application of said housing in engagement to a mating electrical coupling under the influence of external pressure, said contacts will serve to transmit power as long as such connection is maintained by external pressure, said bearing tube being operative to automatically initiate the ejection of said housing and break the connection established the moment such connection is not physically maintained by external pressure.

9. An electrical coupling device including, a housing, a cavity in said housing, a bearing tube in said cavity, means in said cavity normally biasing said bearing tube to project from said housing, electrical contacts mounted to said housing to opposite sides of said cavity whereby, on application of said housing in pressured engagement to a mating electrical coupling under the influence of external pressure, said contacts will serve to transmit power as long as such connection is maintained by external pressure, said bearing tube being operative to automatically initiate the ejection of said housing and break the connection established the moment such connection is not physically maintained by external pressure and a metal plate transversely of said cavity and biased to the base thereof by said biasing means, said plate providing a ground wire connector and said bearing tube being adapted to receive a ground connector therethrough.

10. An electrical coupling device comprising, a body element having electrical contacts including a ground contact accessible at its coupling face and means mounted to said body element including an energizing element at said coupling face for triggering said coupling to automatically initiate self ejection on coupling thereof.

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