SELF-EJECTING LINE PLUG

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ABSTRACT
A plug is provided for insertion into an ordinary wall outlet and contains a mechanism for effecting self-ejection when the line cord is pulled laterally with respect to the plug. A line cord is attached to the plug and supported on a trigger member disposed to pivot about a vertical axis within the plug. The trigger member is normally biased to a central position by means of laterally disposed, oppositely acting compression springs bearing against a forwardly directed trigger arm. An ejecting member is biased in a forward direction to assume a normal attitude parallel to the plug prongs and extending slightly forwardly beyond the ends thereof. When the prongs are inserted into the wall socket, the ejecting member is pushed rearwardly and is cocked beneath a catch portion of the trigger arm. When sufficient lateral force is exerted on the cord to pull the trigger arm to either side a predetermined minimum distance, the trigger arm releases the ejecting member which springs forward under the influence of its compression spring to forceably eject the plug which may then be safely retrieved by manually pulling the line toward the operator.

2 Claims, 4 Drawing Figures
SELF-EJECTING LINE PLUG

This invention relates to electrical plugs and, more particularly, to an electrical plug with built-in facility for self-ejection in response to lateral translation of the line which it terminates.

Appliances, such as vacuum cleaners, are often fitted with rather lengthy line cords, and it is a common occurrence for the appliance operator to be significantly far removed from the wall outlet when it becomes necessary to change the plug from one outlet to another. Under such circumstances, it is a temptation for one to attempt to pull the plug from the remotely located socket in order to transfer it to another socket to obviate the necessity for walking to and from the original socket to remove the plug properly. However, such method of withdrawing the plug from a socket often results in bent and damaged prongs and, more importantly, may result in damage to the electrical conductors within the cord often rendering them permanently or intermittently open. The cause of such problems is the amount of force necessary to effect the withdrawal of the plug from the wall socket, which force is increased when the attempt is made at a lateral angle as is the usual case. Thus, it will become readily apparent that it would be highly desirable to provide a plug with the capability of ejecting itself from the socket in response to moderate lateral strain placed upon the cord, the ejection taking place in a direction directly outwardly from the socket and not at an angle thereto.

It is therefore a broad object of our invention to provide a plug incorporating the capability for self-ejection.

It is another object of our invention to provide such a plug in which the ejection mechanism is automatically set when the plug is inserted into the socket.

It is a still further object of our invention to provide such a plug in which the ejection mechanism is tripped in response to modest lateral strain placed on the cord terminating with the plug.

In another aspect, it is an object of our invention to provide a plug adaptor incorporating such features, which rabbits into a standard plug, thereby affording the ejection feature to an appliance fitted with a standard plug.

The subject matter of the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, may best be understood by reference to the following description taken in connection with the accompanying drawing of which:

FIG. 1 is a cutaway view from the top illustrating a plug incorporating the features of our present invention;

FIG. 2 is a partially cutaway side view of the plug of FIG. 1 illustrating the trip and ejection mechanism in further detail;

FIG. 3 illustrates a variant embodiment of our invention consisting of an adaptor plug containing the ejection mechanism and capable of receiving a line cord terminating in a standard plug; and

FIG. 4 is a partially cutaway side view of the adaptor illustrated in FIG. 3.

Referring simultaneously to FIGS. 1 and 2, it will be observed that the plug includes a housing 1 from which conductor prongs 2 extend forwardly to mate with a conventional wall outlet socket in the usual manner. The plug may optionally include a standard ground prong 3 or may be the more conventional design. Additional prong configurations will occur to those skilled in the art. A trigger mechanism 4 is pivotally fixed proximate the rearward end of the plug housing 1 by means of cylindrical projections 5 into corresponding apertures 6 molded or otherwise provided within the housing cavity. The axis of rotation of the trigger mechanism is substantially normal to a plane passing through the centerline of the prongs 3. A line cord 7 enters the rearmost portion of the trigger mechanism 4, and the conductors comprising the line cord are split and secured to the prongs 2 and 3 in any approved manner.

The trigger mechanism 4 includes a forwardly extending trigger arm 8 which terminates at its forward end in a catch portion 9. A relatively thin upward projection 10 from the trigger arm 8, generally above the catch portion 9, is biased to a generally central location within the plug housing 1 by oppositely acting compression springs 11 and 12 bearing, respectively, on the upward projection 10 and opposite inner walls of the plug housing 1. Thus, it will be understood that the trigger mechanism is normally positioned with the trigger arm 8 generally parallel to the prongs 2 and 3.

A two position ejection pin 13 is disposed within the plug housing 1 for longitudinal travel between an extended position at which its forward end terminates proximate the forward ends of the prongs 2 and a retracted position in which its forward end terminates proximate the forward end of the plug housing 1. A compression spring 14 biases the ejection pin 13 to the fully extended position; however, when the ejection pin 13 is in the fully retracted position, as best shown in FIG. 2, the catch portion 9 engages an enlarged diameter portion 15 of the ejection pin 13 to maintain it in the fully retracted position against the bias of the compression spring 14.

In operation, the plug is inserted into a wall socket in the usual manner. As the plug is pushed into the socket, the ejection pin 13 is pushed rearwardly until it is snapped into the fully retracted position, which is held by the action of the catch portion 9 of the trigger arm 8 upon the shoulder 15 as previously described. Subsequently, lateral force exerted on the line cord 7 transmitted from any position along the length of the line cord 7 pivots the trigger mechanism 4 against the bias of the compression springs 11 or 12, and when the rotational translation of the trigger mechanism 4 exceeds a maximum predetermined by the physical characteristics of the various mechanism components, the catch portion 9 of the trigger arm 8 will translate laterally a sufficient distance to disengage shoulder 15 of the ejection pin 13 which is then free to jump forwardly under the influence of the compression spring 14 thereby forcibly ejecting the plug from the socket.

The embodiment of our invention illustrated in FIGS. 1 and 2 is especially useful for original equipment manufacture or for direct replacement of an existing plug to an appliance or the like. FIGS. 3 and 4 illustrate an adaptor incorporating the principles of our invention for coupling an existing conventional plug to a wall socket to realize the benefits of the invention. A plug housing 20 contains a trigger mechanism corresponding to that described in conjunction with FIGS. 1 and 2 and includes a rearwardly directed trigger mechanism.
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21 corresponding to the trigger mechanism 4. However, the rearward portion of the trigger mechanism 21 terminates in a female socket 22 into which a standard plug 23 may be fitted. It will be apparent that lateral translation of the cord terminated by the standard plug 23 will cause the trigger mechanism 21 to pivot effecting the release of the ejection pin within the plug housing 20 in the same manner previously described in conjunction with the configuration of FIGS. 1 and 2.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

We claim:

1. An electrical plug adapted to couple an electrical cord to an electrical socket comprising:
   A. a plug housing having conductive prongs extending forwardly therefrom for mating with the electrical socket, and
   B. an ejection mechanism disposed within said plug housing, said ejection mechanism including:
      1. an ejection pin having a forward end and a rearward end, said ejection pin adapted for longitudinal travel generally parallel to said prongs, said ejection pin having an increased diameter shoulder portion proximate its rearward end,
      2. first spring means biasing said ejection pin forwardly to a position at which its forward end terminates proximate the forward ends of said prongs,
   3. a trigger mechanism pivotally fixed within said housing for limited rotation about an axis normal to a plane passing through the centerlines of said prongs, said trigger mechanism including a forwardly directed trigger arm terminating in a catch portion and an upwardly directed projection, said catch portion adapted to engage said shoulder portion of said ejection pin to hold said ejection pin in a retracted position at which its forward end terminates proximate the forward end of said housing,
   4. second spring means biasing said trigger mechanism to a normal position at which said trigger arm is aligned with said ejection pin, said second spring means comprising second and third compression springs bearing against, respectively, opposite sides of said upwardly directed projection and opposite sides of the inside surface of said plug housing, and
   5. means coupling the line cord to said trigger mechanism whereby lateral pull on the line cord pivots said trigger mechanism sufficiently to disengage said catch portion of said trigger arm from said shoulder portion of said ejection pin such that said ejection pin translates forwardly under the influence of said first spring means to eject the plug from the socket.

2. An electrical plug according to claim 1 which further includes a female plug fixed to the rearward portion of said trigger mechanism for receiving a standard electrical plug.

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