Sept. 13, 1938. L. N. DAVIS 2,129,914

LOCKING DEVICE FOR ELECTRICAL PLUG AND SOCKET ARRANGEMENT

Filed Oct. 4, 1935

Fig. 2.

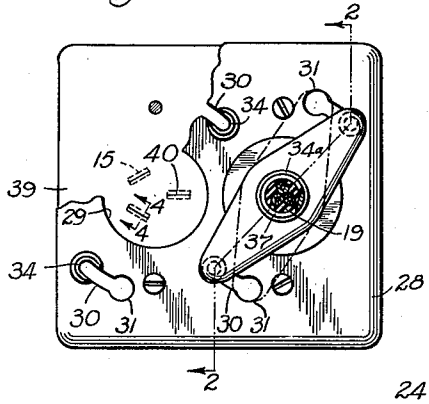


Fig. 1.

Fig. 3.

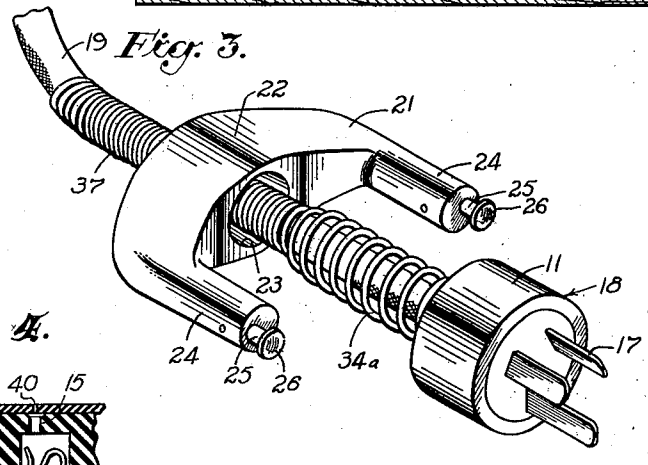
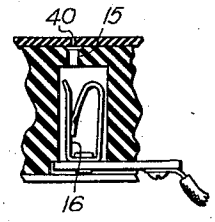


Fig. 4.



INVENTOR:
LEWIS NEWELL DAVIS,
BY Fred W. Davis
ATTORNEY.

Patented Sept. 13, 1938

2,129,914

UNITED STATES PATENT OFFICE

2,129,914

LOCKING DEVICE FOR ELECTRICAL PLUG AND SOCKET ARRANGEMENT

Lewis Newell Davis, Santa Monica, Calif., assignor to Douglas Aircraft Company, Inc., Santa Monica, Calif., a corporation of Delaware

Application October 4, 1935, Serial No. 43,532

1 Claim. (Cl. 173—330)

The invention constituting the subject matter of this application is an electrical plug and socket connection having a unique locking device forming a part thereof.

In manufacturing plants, particularly large ones, it is common practice to provide electrical sockets at certain locations throughout the entire factory so that an electrically operated device may be plugged in at any desired point in the factory. This is particularly a fact in those factories where it is necessary to move the apparatus around to various points where the apparatus is to be used.

Where no means is provided for holding the plug in the socket it is a nuisance to have the connection inadvertently broken, since it interrupts the workman's work and loses considerable time.

It is an object of my invention to provide an electrical connection in which the parts are locked together so that they cannot be accidently separated; in which the locking device takes the strain which is imposed upon the parts when there is a pull exerted on the cord tending to separate the parts of the plug; in which the plug portion or removable portion is resiliently held in place; and in which the removable part of the electrical connection is so designed that it may be used in connection with electrical sockets or other stationary parts of an electrical connection even though they are not designed for utilizing the locking feature of the invention; and which is strong and durable, cheap in construction; easy to install, and easy and convenient to operate.

Other objects and advantages of my invention will be pointed out in the following detailed description of my invention.

Referring to the drawing in which I have illustrated a form of my invention which has been found to be highly satisfactory in commercial use:

Fig. 1 is a vertical sectional view through a form of my invention and is taken along a line indicated by the arrows 2—2 of Fig. 2.

Fig. 2 is a plan view partially in section of the device shown in Fig. 1.

Fig. 3 is a perspective view showing the locking member of my invention and the manner in which it is mounted on the removable part of the electrical connection.

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 2.

In the form of my invention illustrated herein I provide an electrical connection including a socket element 10 and a plug element 11. According to standard practice, the socket element 10 is mounted in an outlet box 12 which may be mounted in a wall, or floor, or ceiling, or as a portable unit 14. In the form of the invention illustrated the socket element 10 is provided with three openings 15 which are positioned immediately above contacts 16 as shown in Fig. 4, and the plug element 11 is provided with projecting contact fingers 17 which are adapted to extend through the openings 15 and engage the contacts 16. This is all in accordance with standard practice. The plug element 11 consists of a body proper 18 which is adapted to fit against the outer face of the socket element 10 when the parts are installed together in proper electrical operating relationship. Extending from the plug element 11 is a flexible conductor 19 which is shown to be broken, but which in accordance with usual practice is extended to a suitable electrically operated device which is supplied with energy when the electrical connection is fitted together as illustrated by full lines in Fig. 1.

My invention provides a locking means or locking member 21 which is preferably in the form of a yoke as shown. The yoke 21 is provided with a nave or hub portion 22 having an opening 23 through which the flexible conductor 19 extends.

The yoke 21 is likewise provided with extending means in the form of a pair of parallel arms 24 which are adapted to extend on opposite sides of the plug element 11, as shown in Fig. 1. The locking means 21 is provided with connecting means for the purpose of connecting it to the socket element 10. This connecting means is in the form of the invention disclosed provided in the form of pins 25 which extend downwardly from the arms 24 in parallel relationship and which have enlargements or heads 26 mounted on the lower end thereof, these heads being provided with upper tapered or conical faces 27. The outlet box 12 is provided with a front plate or cover plate 28 having an opening 29 which exposes the outer face of the socket element 10, and this plate 28 is provided with a pair of arcuated slots 30 which are curved around a point located on the axis of the plug element 11. The ends of the slots 30 are enlarged as indicated at 31 and these enlarged portions are of sufficient diameter to permit the heads 26 to be extended therethrough. The remaining portions of the slots, however, are not of such a size and therefore the walls of the plate 28 defining the edges of the slots 30 will be engaged by the inclined or tapered faces 27 if an attempt is made to pull the locking member outwardly from the posi-

tions shown in Fig. 1 or at any time when the pins 25 are extended through the slots 30 and the heads are not in alignment with the enlarged ends 31. The ends of the slots 30 opposite the enlarged ends 31 are provided with countersinks 34 which may be done by pressing the metal upwardly, as shown. This is done for the purpose of providing receiving recesses in which the heads 26 may rest when the locking member is in a fully assembled or installed position.

Placed between the plug element 11 and the locking means 21 is a resilient pressure applying means for the purpose of resiliently retaining the plug in completely assembled position and for returning it to such position if it is inadvertently pulled partly from place. This resilient means is preferably provided in the form of a compression spring 34a, the lower end of which engages a clamp 34 which forms a part of the plug element 11, and the upper end of which preferably engages a shoulder 36 which is provided in the opening 23. In the form of my invention shown the compression spring 34a is provided with an extension 37 which is of relatively small diameter and fits closely to the outer surface of the flexible conductor 19 and acts as a means for preventing a caking of the flexible conductor which is desirable in order to prevent breakage.

An added feature of my invention is the provision of a pliable sheet which is in the form of a rubber sheet 39 placed between the upper end of the outlet box 12 and the cover 28 therefor. This is provided for the purpose of keeping dirt and other foreign matter from the outlet box 12 and its usefulness for this purpose is apparent from an examination of the drawing. Positioned in alignment with the openings 15 slits 40 are provided through which the contact fingers 17 may be extended.

In using the combination of my invention the first step in installing the parts together is to place the plug in installed position, as shown in full lines in Fig. 1. This may be done without engaging the locking member 21 and at this time the compression spring 34a holds the yoke 21 in a relatively raised position as indicated by the broken lines 43. The next step in the installation is to engage the yoke 21 and to force it downwardly. This causes a compression of the spring against the plug element 11. When the locking pins 25 approach the slots 30 the yoke is moved into an aligned position so that the heads 26 of the pins 25 will pass through the enlarged ends 31 of the slots 30. When the heads have passed through the enlarged ends 31 and rest in a plane below the wall 28 the yoke is then rotated in a clockwise direction in the form of my invention illustrated and is rotated until the pins 25 reach the ends of the slots 30 opposite the enlarged ends 31. The yoke is then released and the force exerted by the spring 34a in an upward direction raises the yoke and the pins attached thereto so that the tapered or inclined walls of the heads 26 rest in the countersinks 34. This will be effective in holding the yoke 21 in the position illustrated in full lines in Fig. 1 and in releasably locking the parts in this position.

It will be seen that when the parts are so installed the yoke 21 is attached directly to the cover of the outlet box 12, and that any forces or stresses of engagement of the yoke are transferred directly to the outlet box and not to the plug element or the conductor 19. It should, furthermore, be noted that by reason of the compression of the spring 34a between the yoke 21 and the plug element 11, the plug element is resiliently retained in place. Should the flexible conductor 19 be accidently pulled so that the plug element 11 is slightly raised from place and is thereafter released, the spring 34a is preferably of sufficient strength to forthwith return the plug element to fully installed position. The parts are so designed that it is impossible to fully remove the plug element from place, it being noted that the space above the plug element 11 and below the hub 22 of the yoke 21 is insufficient to allow a complete removal. Therefore, it is impossible to completely separate the plug element and the socket element, but when it is partially separated the spring 34a will, when the disturbing force is eliminated, return the parts to proper assembled position.

The electrical connection is disconnected by engaging the yoke, forcing it downwardly and then rotating it in a counter-clockwise direction, which brings the heads 26 into alignment with the enlargements 31 of the openings 30. The yoke is then allowed to be moved upwardly by the action of the spring 34a and thereafter the plug element 11 may be pulled from place.

It will be seen that if the yoke 21 and spring 34a and associated parts constituting my invention are installed on a plug element, that the plug element may be used even though the locking device is not used. Therefore, the installing of my invention on any of the removable parts of an electrical connection will not prevent or interfere with its free use on sockets or stationary parts which are not provided with cooperating attaching means. Under such circumstances the yoke 21 may remain in the position indicated by dotted lines 43.

I claim as my invention:

In a device of the class described the combination of: a socket element having electrical contacts, guide openings therefor, and a relatively flat wall having connection openings therein; a plug element having contact fingers adapted to extend through said guide openings and into engagement with said electrical contacts; a conductor connected to said plug element; a connecting yoke separate from said plug element having a hub in which there is an opening through which said conductor freely extends, arms extending at the sides of said plug element toward said socket element, and connection pins on said arms cooperating with said connection openings for locking said yoke to said socket element, said connecting yoke being separate from said plug element and surrounding said plug element when said connecting yoke is connected to said socket element and at that time constituting a protection means for said plug element; and a spring surrounding said conductor and compressed between said hub of said yoke and said plug element for resiliently holding said plug element in place.

LEWIS NEWELL DAVIS.