Nov. 10, 1942. R. E. CORLEW 2,301,258

ELECTRICAL PLUG

Filed Jan. 6, 1942

Fig. 1.

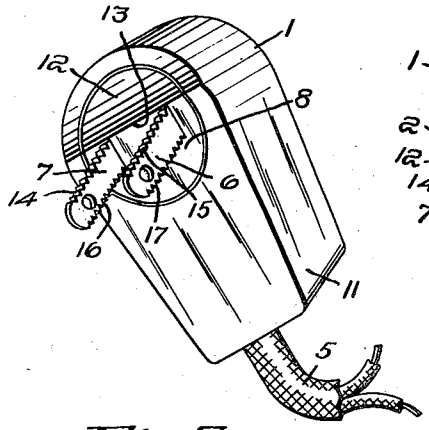


Fig. 2.

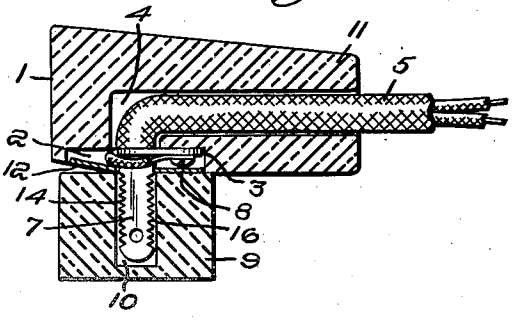


Fig. 3.

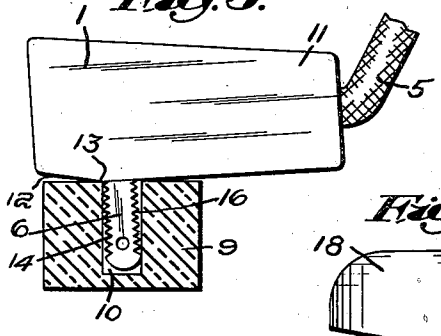


Fig. 4.

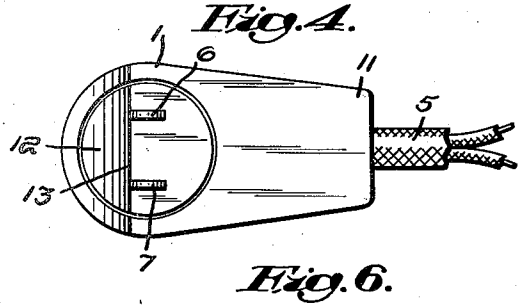


Fig. 5.

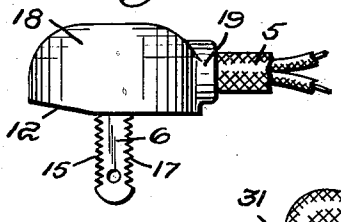


Fig. 6.

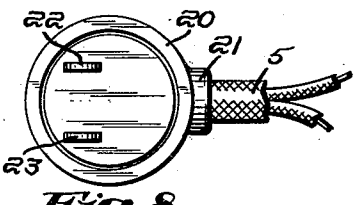


Fig. 7.

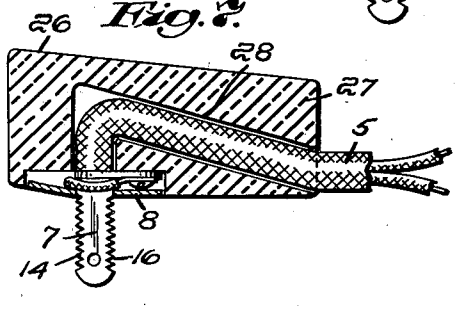
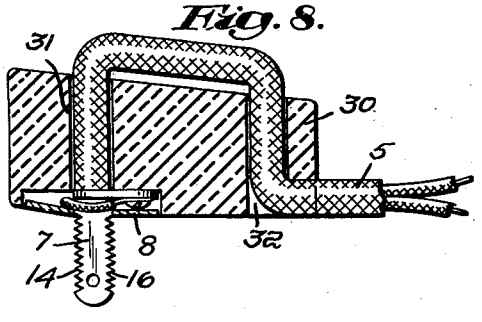


Fig. 8.



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ELECTRICAL PLUG

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Application January 6, 1942, Serial No. 425,757

7 Claims. (Cl. 173—361)

This invention relates to an electrical member and more especially to an electrical service plug of the type which includes a plurality of projecting contact prongs or contact blades.

In using a plug of this character, difficulty is sometimes experienced in satisfactorily maintaining the plug in engagement with a receptacle when the plug is subjected to a pull, as may for instance occur in moving about household appliances, or in the use of power-driven tools in machine shops, or in other ways. The plug may either become entirely removed from the receptacle or partly removed to an extent such that the circuit is opened. In each case a readjustment of the plug becomes necessary.

It is an object of the invention to improve electrical plugs and to provide means for more positively engaging the electrical plug in a receptacle, with a view to preventing disengagement of a plug from light pulls or tugs transmitted through conductor wires, such as may occur in the use of household appliances or machine tools and the like. The invention also aims to provide a simple, cheap and efficient electrical plug which may be very quickly installed and removed when so desired.

The nature of the invention and its objects will be more fully understood from the following description of the drawing and discussion relating thereto.

In the accompanying drawing:

Fig. 1 is a perspective view of the electrical plug of the invention;

Fig. 2 is an enlarged central cross section of an electrical plug similar to that illustrated in Fig. 1, engaged in a plug receptacle;

Fig. 3 is a view in side elevation and partial cross section illustrating the plug of the invention engaged in a plug receptacle in a substantially locked position;

Fig. 4 is a plan view of the plug;

Fig. 5 is a view in side elevation illustrating another form of electrical plug of the invention;

Fig. 6 is a plan view illustrating another modification of electrical plug; and

Figs. 7 and 8 are views in cross section illustrating still other modifications of electrical plugs.

The invention generally relates to an electrical plug structure having means for supporting conductor elements so that they are held in a laterally extending position throughout a substantial distance.

By laterally supporting the conductor elements or wires in a somewhat rigid manner throughout a substantial distance from the point of engagement of the contact prongs with a receptacle, there is obtained a leverage which, upon the conductor elements being pulled, tends to lock or jam the contact prongs in the receptacle and prevent undesirable disengagement of the plug.

The lever principle is combined with companion features tending to cooperate with a laterally extending arrangement of conductor elements. These companion features include improved formation of the contact faces of electrical plugs, improved construction of the contact prongs, and other improvements.

Considering these features more in detail, numeral 1 indicates an electrical plug having an opening 2 in which is supported a plate 3. Connecting with the opening 2 is a passageway 4 through which passes conductor elements 5. The inner extremities of the conductor elements 5 are electrically connected to the plate 3, in a conventional manner.

At an opposite side of the plate 3 are mounted contact prongs 6 and 7 which extend outwardly from the opening 2. Located about the prongs 6 and 7 is an insulating member which provides an outer contact face 8. The plug 1 is adapted to be engaged against a receptacle as 9, with the prongs 6 and 7 engaging in slots 10 of the receptacle, as illustrated in Fig. 2.

The plug 1 is formed with a side or lever portion 11, which projects laterally outward a substantial distance beyond the prongs 6 and 7. The lever portion 11 is preferably of a rigid tubular construction communicating with the opening 4 and supporting the conductor wires in a position such that a pull on the conductor wires acts through the leverage included by the distance between the contact prongs and the outer extremity of the lever portion 11.

In the form of plug illustrated in the drawing, the lever portion is integral with the body portion of the plug 1 and the complete unit may be formed in one operation, as for example by molding the unit from rubber, plastic, or other insulating material. Other means of providing a tubular portion may be employed such as a collar which includes a tubular extension, and which is adapted to be detachably mounted about the body of a conventional electrical plug, or other arrangements.

Locking or jamming of the contact prongs 6 and 7 in the receptacle, as obtained by the use of a lever portion of the character described, varies with the length of the lever portion, the arrangement of conductor elements in the lever portion, and the direction in which a pull is exerted on the conductor elements.

If a pull is exerted in a direction forming an acute angle with the plane of the face 8 of the plug, a relatively shorter lever portion may be required to prevent disengagement. A relatively longer lever portion is required to prevent disengagement when a pull is exerted on the conductor elements in a direction substantially perpendicular to the plane of the face 8 of the plug.

Greatest length of the lever portion, however, is required to resist disengagement of the plug

when a pull is exerted which acts in a direction at an angle between the acute angle referred to and the perpendicular direction noted, and which may be illustrated by an angle of 45° for instance.

To overcome disengagement of the plug by a pull exerted in the intermediate direction noted or other directions, it has been found that the distance between the contact prongs 6 and 7 and the extremity of the lever portion should be at least twice the length of the prongs. In speaking of preventing disengagement of the plug, it should be understood that no reference is being made to a pull or force of sufficient intensity to either tear the conductor wires away from the plug or bend or otherwise impair the prongs or plug which would thus permit disengagement.

For many uses, a plug having a rigid lever portion of less length than this preferred length, or of a length which extends a substantial distance outwardly beyond the body portion of an electrical plug, may be employed with desirable results. A lever portion which extends outwardly from the point of attachment of contact prongs to the plug to provide a leverage which includes a distance equal to or exceeding the length of the prongs 7 and 8, for example, furnishes a substantial improvement, and is especially desirable when employed in conjunction with other features of the invention hereinafter described.

The manner of arranging the conductor elements in a tubular lever portion of rigid character may also be important in determining the effectiveness of the lever portion. For example, locating the point of entry of the conductor elements 5 in the tubular portion, as nearly adjacent as possible to the plane of the contact face of the plug improves the operation of the lever portion 11.

An arrangement of this character may be secured in several ways. In Fig. 7, for instance, I have shown a plug 26 having a lever portion 27, in which is formed a passageway 28 which extends angularly from a point in the central portion of the plug to the outer end of the lever portion 27, thereby to approach closely the plane of the face 8 of the plug and support conductor elements 5 in this position.

A somewhat similar arrangement of the conductor elements may be obtained by the modification illustrated in Fig. 8, in which a plug 29 is formed with a lever portion 30 and two passageways 31 and 32. Conductor elements 5 are passed upwardly through passageway 31 and downwardly through passageway 32. Still other means of supporting the conductor wires adjacent the plane of the face of the plug may be utilized, as detachably secured collars being formed therein, or other structures.

Improved locking or jamming of a plug in a receptacle may also be obtained by features which especially cooperate with a lever portion, similar to some one of those lever portions now described. Figs. 1–4 inclusive illustrate one such feature, consisting of a bevel 12 formed by removing a part of the contact face of the plug as illustrated. The bevel 12 intersects the face 8 along a line 13 closely adjacent edges 14 and 15 of the prongs 6 and 7.

The bevel 12 provides for a space occurring between the plug and the receptacle 9 at a side of the prongs 6 and 7, which is opposite the lever portion 11. This space permits the prongs 6 and 7 to be pressed over to a greater extent in the openings 10 of the receptacle when a pull is exerted on the conductor elements 5, and the space also keeps the outer portion of the plug face from coming too quickly into contact with the receptacle, which might tend to withdraw the prongs slightly from the openings 10.

The combined action of the bevel 12 and the lever portion 11 is an important feature of the invention and not only provides a more positive locking of the plug in a receptacle but permits greater variation in the size of the lever portion 11 and the arrangement of the conductor elements 5 therein.

It is pointed out that in all plugs and receptacle assemblies of the character referred to, there is a slight clearance between the contact prongs 6 and 7 and the slots 10 in the receptacle. The clearance is provided to facilitate easy insertion and removal of the prongs in the receptacle. Such a clearance, however, tends to some extent to minimize the action of the lever portion 11, since it allows the side of the plug opposite the lever portion to come into contact with the receptacle face and acts as a fulcrum point before the prongs have had an opportunity to become jammed in the openings 10. As a result of this, there may occur a slight withdrawal of the prongs from the slots 10 before the prongs become jammed therein.

By removing portions of the plug face opposite the lever portion 11, the prongs 6 and 7 become pulled over and jammed in the openings, either slightly before or at the time of contact of the bevel 12 with the face of the receptacle along the edge 13, which largely prevents any slight withdrawal of the prongs from the slots 10 and furnishes a positive locking means.

Another improvement of the invention relates to a special contact prong construction, as has been illustrated in Figs. 1–4 inclusive. This improved prong construction may be employed either separately or in conjunction with the bevel 12 in a plug having a laterally extending lever portion.

The improved prong construction consists in front serrated edges 14 and 15 and rear serrated edges 16 and 17 of the prongs 6 and 7 respectively. The serrations may consist of roughened sides, sawtoothed edges, and other formations which are adapted to induce the prongs to cling more firmly to the sides of the slots 10 when the prongs are pressed thereagainst. If desired, the edges of the prongs at one side only may be serrated or other modifications resorted to.

It will be opserved that when the plug is tipped by pressure exerted at the end of the lever portion 11, those front serrated edges 14 and 15 of the prongs engage against adjacent upper portions of the sides forming the slots 10 in the manner illustrated in Fig. 3 of the drawing. At the same time the rear serrated edges 16 and 17 of the prongs engage at adjacent lower portions of the sides forming the slots 10 as is also illustrated in Fig. 3.

The clearance between the contact prongs and the slots 10 already noted above facilitates movement of the prongs in a tipped or jammed position, which allows the serrated edges to engage more firmly with sides of the slots and thus provide stronger locking of the prongs in the slots.

As in the case of the bevel 12, the serrated edges on the contact prongs cooperate with the lever portion 11 of the plug to provide an effective locking of the plug in a receptacle. Engagement of the serrated edges with sides of the slots as induced by the pull applied through the lever

portion 11 is adapted to further prevent disengagement of the plug from the receptacle, and also permits greater variation in the construction and size of the lever portion, as well as arrangement of the conductor elements in the lever portion.

The bevel face 12 allows the serrated edges to be more quickly tipped into a jammed position with respect to the sides of the slots 10, and the bevel thus coacts with both the serrated edges and the lever portion 11 in developing a locked engagement of the prongs in the slots 10.

It may, however, be desired to employ the prongs with a plug having a lever portion, either with or without the bevel 12, and still other arrangements may be resorted to, as for example the use of serrated edges, and the beveled surface may be combined with a plug 18 of substantially annular shape, as illustrated in Fig. 5, or plugs of other shapes. A conductor element 5 extends laterally out of a tubular portion 19, of a length substantially less than the lever portion 11 illustrated in Figs. 1–4 inclusive.

Various other changes may be resorted to, such as that shown in Fig. 6 for example, where a plug 20 having conductor elements 5 and laterally extending tubular portion 21, is provided with prongs 22 and 23 which are arranged in an off-center position so that the edges of the prongs 22 and 23 along one side become more nearly adjacent the outer rim of the plug. This arrangement also provides for the prongs becoming jammed more quickly in a receptacle without any slight withdrawal occurring. It may also be found desirable to utilize serrated edges on prongs independently of a lever portion on the plug.

It will be seen that I have disclosed means incorporated in an electrical plug for preventing disengagement of the plug from pulls exerted thereon in various directions, and that the means may include one or more features operating separately or in conjunction with one another. It is also pointed out that the plug means described are of a character lending themselves to cheap manufacture, easy assembly, and permit ready withdrawal of the plug from a receptacle in the usual way.

While I have shown a preferred embodiment of the invention, it should be understood that various modifications may be resorted to without departing from the spirit of the invention, as defined by the appended claims.

I claim:

1. As an article of manufacture an electrical service plug having contact prongs mounted in the plug, electrical conductor elements connected through the plug to the prongs, a lever portion integral with the plug and extending laterally from one side thereof, locking means consisting of a bevel formed at the face of the plug and also consisting of notched edges formed on the prongs at a point immediately adjacent the bevel, said locking means being responsive to a force acting through the said lever portion to jam the prongs in the openings of a plug receptacle.

2. As an article of manufacture an electrical service plug comprising a body portion having a flat face, contact prongs mounted in the body portion and extending from the flat face, electrical conductor means connected to the contact prongs through the body portion, said conductor means being supported in a laterally extending lever portion, locking means including a notched edge formed on one of the prongs at a point immediately adjacent the flat face of the plug, said locking means being responsive to a pull acting on the lever portion through the said electrical conductor means, thereby to engage the said notched edge over an edge formed in a plug receptacle adjacent openings for receiving the prongs.

3. As an article of manufacture an electrical service plug comprising a body portion, contact prongs mounted in the body portion, electrical conductor means connected to the prongs, said conductor means being rigidly supported in a laterally extending lever portion at one side of the body portion, said body portion at an opposite side thereof being formed with a bevel which terminates along an edge adjacent the prongs, said bevel being adapted to facilitate jamming of the prongs in a plug receptacle when a pull is exerted on the lever portion.

4. In an electrical service plug having contact prongs and electrical conductor means extending laterally from one side of the plug, a laterally extending lever portion supporting said electrical conductor means, a bevel terminating along an edge adjacent the prongs at a side of the plug opposite the conductor means, whereby the prongs may be slightly jammed by an upward pull on the cord.

5. As an article of manufacture an electrical service plug comprising a body portion having a flat face, contact prongs mounted in the body portion and projecting from the flat face, electrical conductor means electrically connected to the prongs in the body portion, a tubular extension at one side of the body portion and the prongs having the conductor means received therethrough, said flat face of the body portion being cut away along an opposite side of the prongs from the tubular extension.

6. As an article of manufacture an electrical service plug having contact prongs mounted in the plug, electrical conductor elements electrically connected through the plug to the prongs, a lever portion integral with the plug extending laterally from one side thereof, said lever portion having a passageway for receiving the electrical conductor elements therein, said plug presenting a flat face from which the contact prongs project, a portion of the flat face at a side of the prongs opposite the lever portion being cut away, and said prongs being formed with serrated edges.

7. As an article of manufacture, an electrical service plug comprising a body portion having a flat face, contact prongs mounted in the plug and extending from the flat face, electrical conductor elements electrically connected through the plug to the contact prongs, a lever portion integral with the plug and extending laterally from one side thereof, said lever portion having a passageway for receiving the electrical conductor elements therein, and said lever portion being of a substantially rigid character adapted to provide a leverage throughout the distance between its outer extremity and the said prongs when a pull is exerted on the electrical contact elements, the said flat face being cut away at one side of the prongs to permit the prongs being jammed slightly in an electrical plug receptacle, the edges of the prongs being serrated for the purpose of engaging within the said electrical plug receptacle when the prongs are jammed by means of the lever portion.

RUFUS E. CORLEW.