Sept. 2, 1958 E. H. TERLINDE 2,850,711

ELECTRIC PLUG

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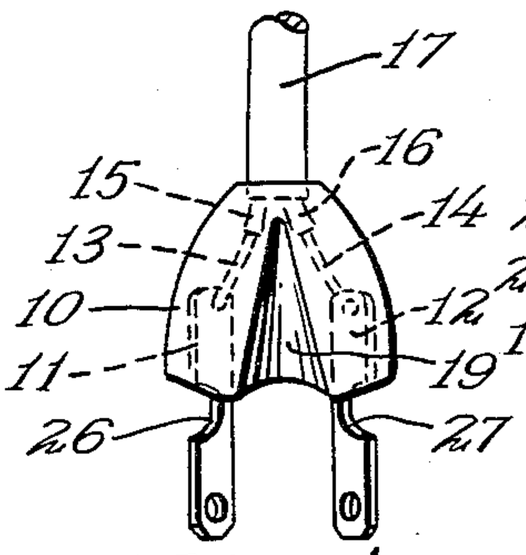

Fig. 1

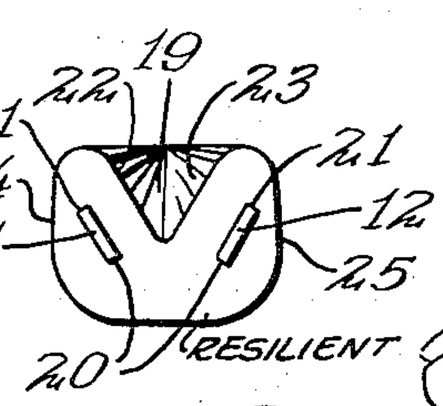

Fig. 2

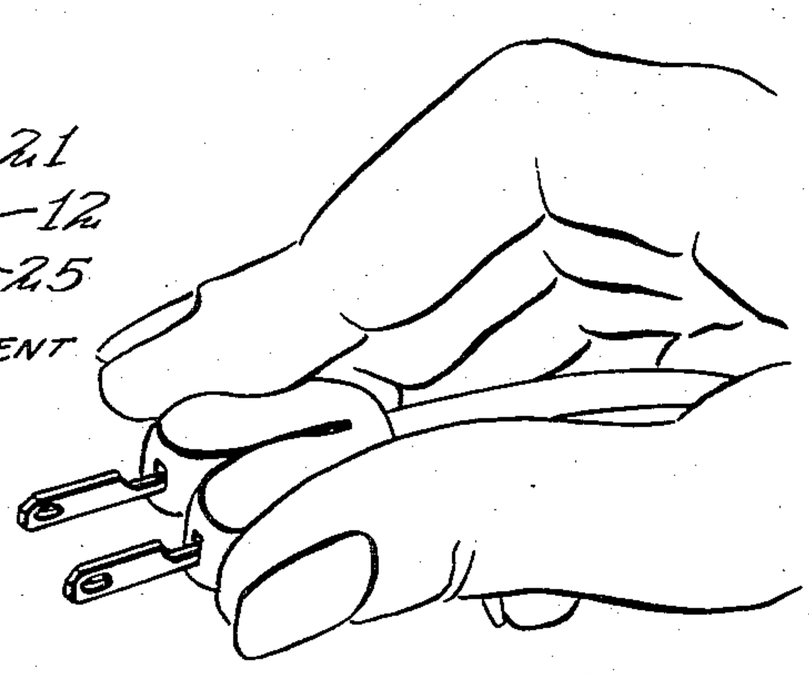

Fig. 3

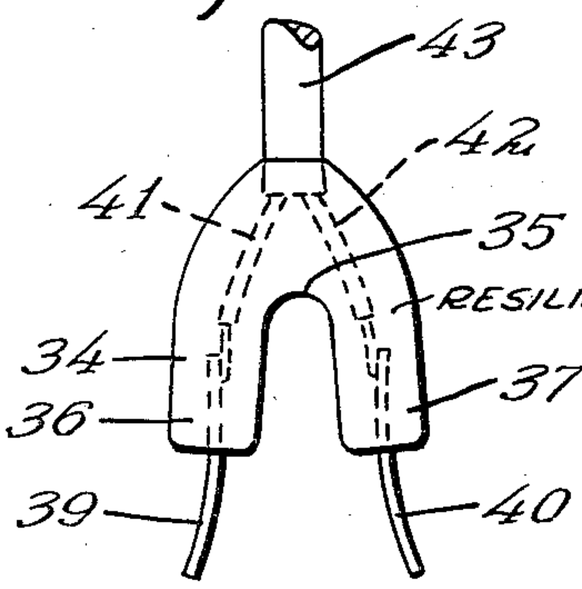

Fig. 4

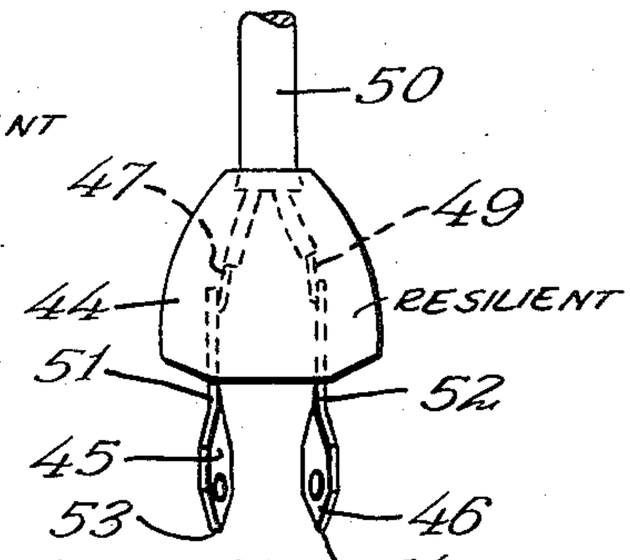

Fig. 5

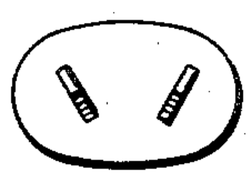

Fig. 6

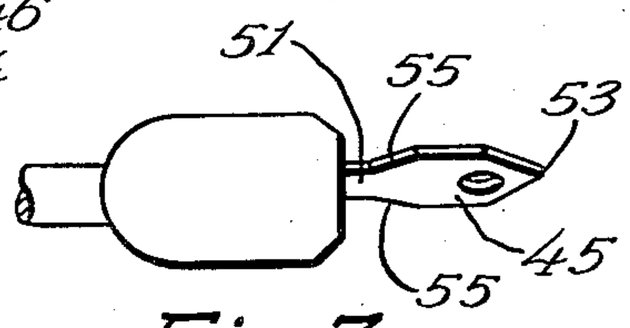

Fig. 7

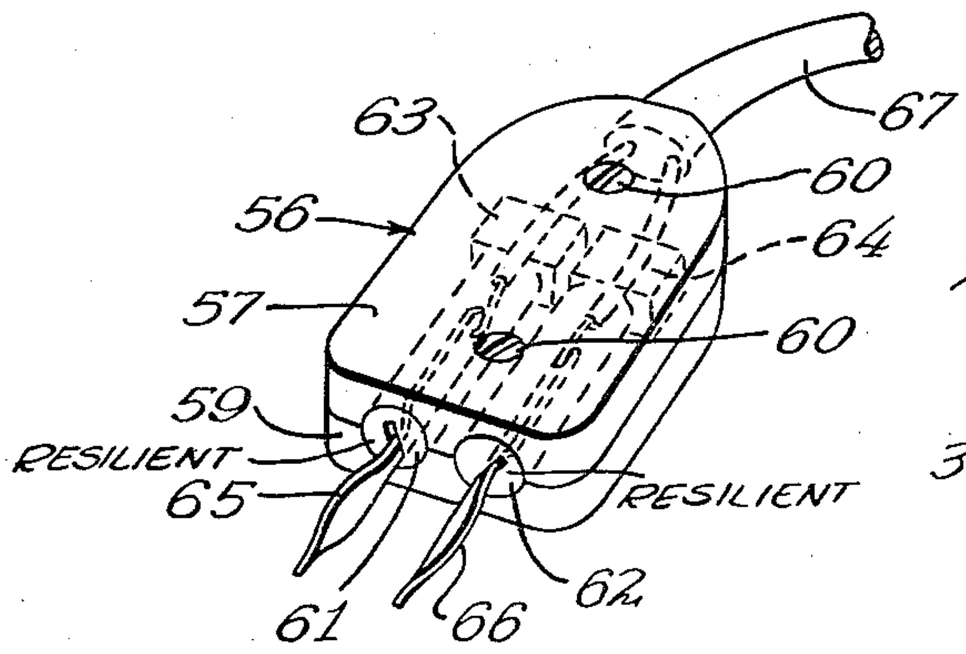

Fig. 9

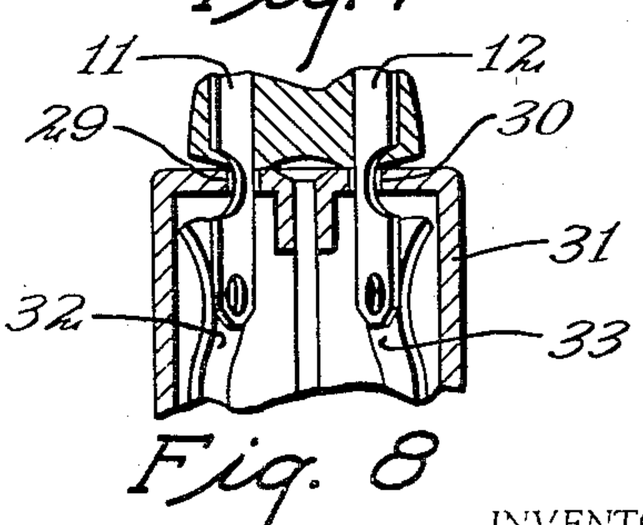

Fig. 8

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ELECTRIC PLUG

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7 Claims. (Cl. 339—62)

This invention relates to an improvement in electric plugs and deals particularly with a simple and effective plug which will effectively remain in position.

One of the difficulties often experienced with plugs of the type commonly used in electric receptacles lies in the difficulty which is often experienced in keeping the plug in place. The plugs are usually equipped with generally parallel prongs and the sockets usually include spring blades against which these prongs engage. The prongs are held in place merely by the frictional engagement between the prongs and the springs. In many instances this friction is not sufficient to hold the plug in the socket if there is any material pull upon the cord. An object of the present invention lies in the provision of a plug which is constructed so that it will remain engaged in the socket under normal stresses which might be provided thereupon. The arrangement is such that the plug must normally be engaged with the fingers if it is to be removed from its socket.

A feature of the present invention resides in the fact that, if desired, the plug may be actually locked in place in the socket. Sockets are usually made with the spring contacts enclosed within a plastic housing. This housing is usually provided with spaced slots into which the prongs may extend. If desired, the plug may be so arranged as to lock in this casing so that it cannot be removed except by manual manipulation.

A further feature of the present invention resides in the provision of a plug in which the contact prongs are resiliently supported. Portions of the prongs are normally out of parallel relation. The prongs may be turned into parallel relation by proper operation of the plug body. Thus the prongs may be bent parallel for insertion or removal of the prongs into the cooperative socket.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

Figure 1 is a top plan view of a plug showing the construction thereof.

Figure 2 is an end elevation view of the plug shown in Figure 1.

Figure 3 is a perspective view showing the plug in position for insertion into a socket.

Figure 4 is a plan view of a modified form of plug.

Figure 5 is a plan view of a modified form of plug construction.

Figure 6 is an end view of the plug shown in Figure 5.

Figure 7 is a side elevational view of the plug shown in Figures 5 and 6.

Figure 8 is a sectional view showing the manner in which the plug may lock into a socket of conventional form.

Figure 9 is a perspective view of another modified form of plug construction.

The plug may be formed in several different ways, each of which has its advantages and disadvantages. In other words, the various forms of construction are not believed entirely equivalent but have certain features in common.

With reference first to the structure shown in Figure 1 of the drawings, this figure illustrates a plug body **10** made of resilient material such as rubber or a resilient substitute. Into this body **10** is molded a pair of prongs **11** and **12**, these prongs being connected to conductors **13** and **14**. The major portion of these conductors are insulated as indicated at **15** and **16**, respectively, and are

enclosed in a cable **17** in the usual manner. In other words, the structure is very similar to the molded plugs which have been produced for some years, but in the present case it is essential that the bodies be cast of resilient material.

As indicated in the drawings, the plug body is provided with a generally V-shaped notch or groove **19** in one surface thereof. This groove **19** extends longitudinally of the body **10** between the prongs **11** and **12** and divides the upper portion of the body particularly at the extremity thereof. The groove is of sufficient depth to permit the flexing of the body **10** in a manner which will be later described in detail.

As is indicated in Figure 2 of the drawings, the prongs **11** and **12** are arranged with their flat surfaces on planes which intersect at an acute angle. As viewed in Figure 2 of the drawings, the lower edges **20** of the prongs are spaced apart a distance substantially less than the upper edges **21** thereof. The upper surface of the body **10** includes the notch **19**. As is indicated in Figure 2, the walls **22** and **23** of the notch **19** may be substantially parallel to the flat surfaces of the prongs **11** and **12**, respectively.

The purpose of this arrangement is to provide a structure in which the prongs have flat surfaces which are normally out of parallel relation but which can be flexed into parallel relation by a squeezing action on opposite sides of the plug body. In other words, by grasping the plug between the thumb and fingers so that the sides **24** and **25** may be subjected to inward pressure, the body of the plug will compress together on opposite sides of the notch **19** so that the walls **22** and **23** of the notch may virtually come into contacting relation, as is indicated in Figure 3. Thus by squeezing the walls of the plug the prongs may be swung into parallel relation so that they will readily fit into a socket of conventional design.

If it is preferred, the prongs may remain full and unbroken and the release of the squeezing pressure against the sides of the plug will cause these prongs to tend to return to their normal angular relation as indicated in Figures 1 and 2. This will cause a binding action against the walls of the slots of the socket into which the prongs are inserted. As a result, the plug will be securely anchored in the socket by friction but will release if sufficient pulling pressure is applied. The pressure necessary to release the plug is substantially greater than is usually experienced.

If it is desired, the plug may be actually locked in its socket. This is accomplished by providing notches **26** and **27** in the upper edges of the prongs **11** and **12** (as viewed in Figure 1) at a point adjoining the end of the plug body **10**. When the prongs are notched in this manner, they are not prevented from twisting by the walls of the slots such as **29** and **30** in the socket receptacle **31**, and, therefore, after the plug is inserted the prongs will assume their natural angular relation as is indicated in Figure 8. This is true because the notches **26** and **27** embrace the walls of the slots **29** and **30**. When the prongs have twisted into the position shown in Figure 8, they remain firmly against the spring contacts **32** and **33** within the plug and at the same time the outer edges of the notches form shoulders to prevent withdrawal of the prongs from the socket. Thus the plug cannot be removed by a longitudinal pull.

When the plug is to be removed from the socket the body of the plug is subjected to a squeezing pressure to close the notch **19** and to swing the prongs into, or toward, parallel relation. When they have been sufficiently twisted, they may be withdrawn from the socket housing with no difficulty.

In Figure 4 of the drawings I disclose a modified form

of construction. In this arrangement the plug body 34 is bifurcated at the extremity from which the prongs extend. In other words, the body 34 includes a central notch or slot 35 which separates the body into two spaced projections 36 and 37 encircling and embedding the ends of the prongs 39 and 40. The prongs 39 and 40 are connected to suitable conductors such as 41 and 42 which are embedded within the plug body and lead to a cable 43. As is shown in the drawings the prongs 39 and 40 normally diverge apart as indicated in Figure 4 of the drawings so that they are out of parallel relation. However, as the body 34 is formed of rubber or other suitable or similar resilient material, the projections may be flexed together to bring the prongs into parallel relation. In this position they may be inserted or removed from the socket.

It will be obvious that when the plug is to be inserted, the projections are flexed together until the prongs are parallel and the prongs may then be inserted into the socket body. When the prongs are in place the squeezing pressure on the plug body is released permitting the prongs to swing toward diverging position. This greatly increases the frictional engagement of the prongs in the socket and tends to prevent withdrawal of the plug.

In Figures 5 and 6 and 7 of the drawings I disclose another modified form of construction of plug. In this device the plug is provided with a plug body 44 of resilient material having prongs 45 and 46 projecting therefrom. These prongs are connected to conductors 47 and 49 which lead to the cable 50.

In the particular construction illustrated, the prongs are provided with neck portions 51 and 52 of reduced width preferably formed by reducing the thickness of the prongs from each side. The prong extremities are twisted to that the flat surfaces thereof lie on planes which intersect at an acute angle.

The prongs 45 and 46 are provided with pointed ends 53 and 54. When the plug is inserted into a socket, these pointed ends 53 and 54 enter the slots of the socket and the bevelled upper and lower edges of the prongs act to produce a twisting action of the prongs. The plug body is formed of material which is sufficiently resilient to permit the prongs to twist until the normally angular ends are substantially parallel. In other words, the pointed ends act as cams to twist the prongs until they are engaged in the socket and will slip through the socket slots. As the prongs are further inserted, the prongs are permitted to twist back into their normal angular relation by the engagenment of the reduced width or neck portions 51 and 52 of the prongs with the socket slots.

The removal of the plug is the reverse action of that described. As is indicated in Figure 7 of the drawings, the prongs are provided with inclined or diverging edges 55 adjoining the neck portions 51 and 52. These diverging edges 55 again act as cam surfaces to twist the prongs into generally parallel relation as the plug is pulled from the socket.

In Figure 9 another slightly modified form of construction is illustrated. In this figure is illustrated a plug 56 having a body formed of two sections 57 and 59 which are attached together in any suitable way such as by bolts 60. In the body of the plug and between the sections are provided two elongated inserts 61 and 62 of resilient material such as rubber. These inserts are preferably provided with anchoring end portions 63 and 64 which are rectangular in cross-section or otherwise shaped to prevent rotation of this end of the insert. The resilient plugs act to embed portions of prongs 65 and 66.

The prongs 65 and 66 are preferably twisted. The tapered ends of the prongs are generally parallel, while the planes of the surfaces of the prongs are diverging, at points spaced from the ends. The prongs also are narrower in width adjoining the portions embedded in the inserts 61 and 62.

The prongs are spaced to enter the slots of a plug socket. As the prongs are pushed inwardly, the shape of the prongs causes them to twist, twisting the outer ends of the inserts. When the narrower prong ends enter the socket slots, the prongs may twist back toward their normal position, creating a resistance to removal of the prongs.

Thus it will be seen that by resiliently supporting the prongs of the plugs they may engage in the sockets with substantially more friction than would otherwise be normally obtainable. Either the prongs may be manually moved into substantially parallel relation by a squeezing action on the body of the plug, or else the prongs are so shaped as to twist in the plug body, the body being sufficiently resilient to permit such action.

In accordance with the patent statutes, I have described the principles of construction and operation of my electric plug, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A plug including a body of resilient material, a pair of elongated strips forming prongs partially embedded in said body and projecting parallel therefrom in the same direction from said body, the flat surface of said prongs being arranged on planes intersecting at an acute angle, said body having a notch therein between said prongs, said notch extending longitudinally of said prongs, said body being flexible under compression transversely of said notch to move the walls of the notch together, the compression of said body to bring the notch walls together acting to twist said prongs toward parallel relation.

2. The construction described in claim 1 and in which said prongs include neck portions of reduced width adjoining said body.

3. A plug comprising a plug body of resilient material, a pair of prongs extending parallel and in the same general direction from said plug body and partially embedded therein, conductors connected to the embedded portions of said prongs, said prongs comprising strip members having flat surfaces arranged on planes intersecting at an acute angle, said body having an elongated notch therein between the edges of the prongs which are farthest apart, flexing of said body transversely of said prongs acting to partially close said notch and to twist the planes of said prongs toward parallel relation, said prongs having notches in the edges thereof most widely spaced apart.

4. The construction described in claim 3 wherein the notches in the edges of the prongs which are farthest apart, are near the point where said prongs become embedded in said plug body.

5. The construction described in claim 3 and in which said notch is generally V-shaped in cross section.

6. The construction described in claim 3 and in which said notch is generally V-shaped in plan with the apex of the V near the end of the plug body opposite the end from which the prongs project.

7. The construction described in claim 3 and in which said notch is generally V-shaped in cross section and in plan with the apex of the V near the end of the plug body opposite that from which the prongs project.

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