

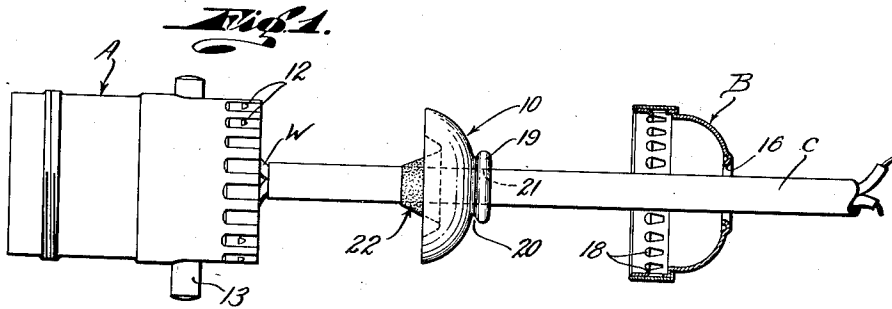
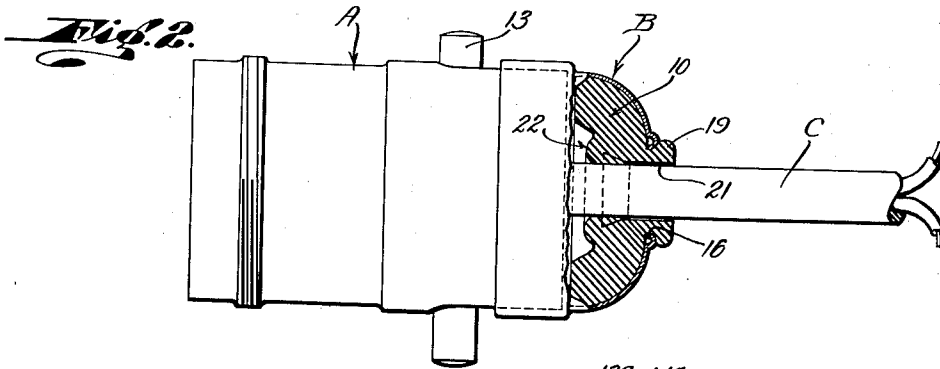
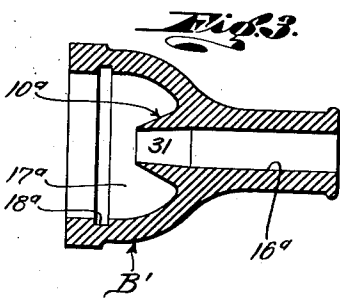
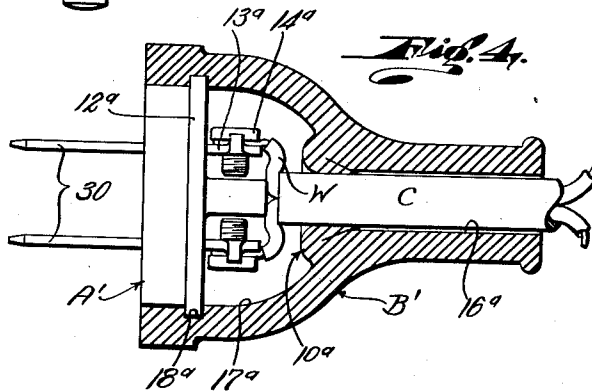
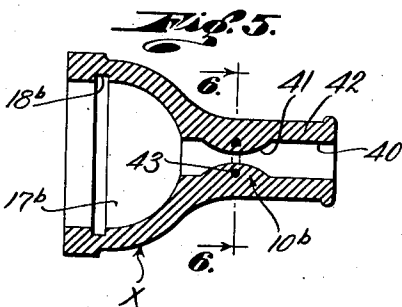
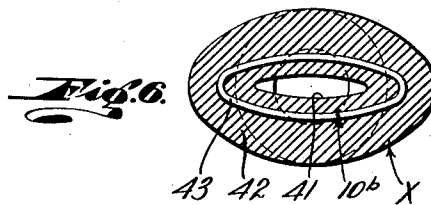
June 22, 1943.

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2,322,491

ELECTRICAL COUPLING

Filed Dec. 1, 1941



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2,322,491

ELECTRICAL COUPLING

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Application December 1, 1941, Serial No. 421,128

2 Claims. (Cl. 173—322)

This invention relates to electrical coupling devices and has particular reference to electrical plugs, jacks, sockets, and the like. It is a general object of this invention to provide a simple, practical and durable device of this nature.

The plugs, sockets, etc. employed on extension cords, depending lighting fixtures, the cords of electrical appliances, lamps, radio receiving sets, etc. are subjected to hard usage and are the source of short circuits and fire hazards. For example, in the case of electric toasters, vacuum cleaners, electric percolators, etc. which are in daily use the appliance may be plugged in several times a day. In a great many instances the person, in withdrawing the plug from the socket, merely grasps the cord or wire and exerts an outward force thereon to free the prongs from the socket. The strain or force thus applied is transmitted to the bared wires secured on the binding posts or screws of the plug or socket, as the case may be. The wires at the binding posts or screws are soon frayed and parted by this repeated pulling and, in some instances, the screws or anchors for the wires are broken or torn loose. This results in the creation of short circuits and dangerous hazards.

Another object of this invention is to provide an electrical coupling device in the nature of a plug, jack, or socket embodying novel and highly effective means for relieving the bared wires and the posts or anchoring screws of the pulling forces and strains accompanying the disconnection of the coupling and the use of the electrical device or appliance with which the coupling is associated.

Another object of this invention is to provide a coupling device of the character mentioned having means for directly transmitting all strain and pull from the wire or cord to the body of the plug, socket or jack, as the case may be, thus preventing such forces from reaching the points of connection of the individual conductors or leads with the contact elements, posts or mechanisms of the coupling, socket or switch.

Another object of this invention is to provide an electrical coupling device of the character referred to in which the means for transmitting the pull or force from the electrical cord to the body of the coupling is capable of withstanding very heavy strains and its grip on the cord is proportional to the force applied, that is, the heavier the pull on the cord the tighter said means grips the cord to resist movement of the cord relative to the body of the coupling.

Another object of this invention is to provide

an electrical coupling device of the character mentioned in which the means for preventing the transmission of force from the cord to the bared wires and binding posts does not bite into, cut, fray or wear the covering of the cord.

Another object of this invention is to provide an electrical coupling device of the character referred to in which the means for transmitting the pulling forces from the cord directly to the body of the coupling is a simple inexpensive part readily embodied or assembled in the coupling.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of my invention, throughout which description reference is made to the accompanying drawing, in which:

Fig. 1 is a view of one embodiment of the invention attached to an electrical cord and in condition for final assembling, showing the body of the coupling in longitudinal cross section and illustrating the other parts in side elevation. Fig. 2 is an enlarged view similar to Fig. 1 illustrating the coupling in the assembled condition. Fig. 3 is a longitudinal detailed sectional view of the coupling section of another form of the invention. Fig. 4 is an enlarged longitudinal detailed sectional view showing the sheath or section of Fig. 3 in the final assembled position with a portion of the plug and the cord in side elevation. Fig. 5 is a view similar to Fig. 4 illustrating still another form of construction and Fig. 6 is an enlarged transverse detailed sectional view taken as indicated by line 6—6 on Fig. 5.

The present invention may be embodied in electrical coupling means and devices of various types employed on electrical apparatus, appliances and lighting fixtures, etc. In the following detailed disclosure I will describe several typical embodiments of the invention, it being understood that the invention is not to be construed as limited or restricted to the specific forms herein disclosed but is to be taken as including any features or modifications that may fall within the scope of the claims.

The embodiment of the invention illustrated in Figs. 1 and 2 may be said to comprise, generally, a section A to which the wires W of a cord C are secured, a section B forming a sheath or cover for the section A and a member 10 for preventing outward movement of the cord C relative to the section B.

The general coupling construction may vary greatly in design and character. As shown, the coupling is an assembly of the two sections A and

B, the section A constituting the active coupler section for receiving or for cooperating with a complementary coupling means and the section B forming an end or cap for the section A.

The section A comprises a body 11 which may be formed as a socket, either threaded or slotted, to receive a complementary electrical coupler or may carry the usual prongs of a plug. In the present case it may be considered that the body 11 is in the nature of a socket. As shown, the body 11 is a generally cylindrical member provided at its inner or rear part with a series of grooves or notches 12. The protective and insulating sheath of the cord C is removed from the inner part of the cord to leave the individual wires exposed and the wires W have their end parts secured in the section A. The bared portions of the wires W are secured in the section A in any conventional manner. The section A may be considered as including or housing a switch controlled by a shiftable shaft or pin 13 projecting from opposite sides of the section. The present invention is not primarily concerned with the details of the insulation or other specific means of the coupler section A and as these parts may be conventional they have been omitted from the present disclosure.

The section B is removably secured to the section A to cover the rear portion of the section A and to protect and house the bared wires W and other conductive elements of the coupling. The section B may be formed of metal suitably insulated or may be constructed of rubber, rubber composition, synthetic rubber, or the like. In the drawing the section B is illustrated as formed of metal. The section B is a cup shaped member having a central opening 16 in its rear wall for receiving the cord C. The forward portion of the section B is formed to have latching or locking cooperation with the rear portion of the section A. Detents 18 are provided on the interior of the section B to cooperate with the notches 12. The section B is adapted to be pressed or forced over the rear end portion of the section A to grip the body 11 and to have the detents 18 latch in the notches 12. The gripping engagement of the section B on the section A and the cooperation of the detents 18 with the notches 12 resists the forces required for the engagement and disengagement of the coupling from its complementary fixture or coupling element. In other words, the section B is securely connected with the section A by the engagement just described and can only be disengaged from the section A by an intentional disengaging operation. The interior of the section B is sufficiently large to receive the wires W, etc. with ample clearance and there is a substantial clear space in the rear portion of the section. The rear wall of the section B is preferably, though not necessarily, spherically concave.

The member 10 is an important feature of the invention. The part 10 serves to prevent outward movement of the cord C relative to the section B and thus serves to relieve the exposed wires W, the anchors for the wires, etc. of excessive strains when the cord C is pulled during the use of the electrical appliance or in disengaging the coupling. In the form of the invention being described the member 10 is a simple separately formed element engaged on the cord C and cooperable with the rear wall of the section B. The member 10 is formed of flexible resilient material, such as rubber, rubber composition, synthetic rubber, or the like. It is pre-

ferred to make the part 10 relatively soft and to give it substantial resiliency.

The member 10 is shaped and designed to fit within the coupling section B. Where the bottom or rear wall of the section B is concave the rear side of the member 10 is spherically curved or convex to generally conform to the internal configuration of the section B. The opening 16 in the section B is sufficiently large to pass the wire or cord C with considerable clearance. It is customary to equip the opening 16 with a bushing or ferrule of insulating material for rather closely engaging about the cord C and to line the interior of the section B with insulation. Where the member 10 is to be installed or employed the ferrule is removed from the opening 16 and the insulating lining may be removed. It is to be understood that where the coupling is initially constructed to have the member 10 as one of its elements that the ferrule and insulation, just referred to, may be entirely dispensed with. The rear portion of the member 10 is formed to latch or engage in the opening 16. A knob or boss 19 is provided on the member 10 to engage in the opening 16. The boss 19 is provided with an external annular groove 20 so that when the boss is forced through the opening 16 it remains in the opening. The opening 16 may be formed with a bead or rounded lip for latching in the groove 20 to better retain the member 10. With the boss 19 latched in the opening 16 the member 10 forms an effective insulating lining for the interior of the section B, it being understood that the member 10 may remain clear of the section A. The member 10 is tubular or annular being provided with a central longitudinal opening 21 for passing or receiving the cord C and the member 10 may be slid on the cord either individually or as an element or part of the section B. It is preferred to proportion the member 10 so that the opening 21 closely or snugly receives the cord C.

The inner or forward end of the member 10 is provided with a part 22 for binding on or gripping the cord C. As best illustrated in Fig. 1 of the drawings the forward or inner face of the rounding relation to the cord C. The part 22 is jected forwardly from the concave surface in surrounding relation to the cord C. The part 33 is conical or frusto-conical having a tapering or conical surface. The opening 21 continues centrally through the part 22 to its forward end. While the part 22 may initially protrude beyond the forward extremities of the member 10 it is proportioned so that it will not engage the bared wires W or the section A. The external surface or at least the forward portion of the external surface of the part 22 may be roughened for the purpose to be later described.

In assembling and employing the coupling illustrated in Figs. 1, 2 and 3 of the drawings the section B is first slid onto the cord C and the member 10 is either slid onto the cord separately or when latched in the section B. The bared portions of the wire W are secured in the section A in the usual manner. Fig. 1 of the drawings illustrates the relationship between the parts prior to the final assembling. Where the member 10 is independent of the section B, as illustrated, the member and the section B are brought together and the boss 19 is snapped or latched into the opening 16. In most instances, it may be preferred to assemble the member 10 in the section B prior to the positioning of the section on the cord C. When the section A has been secured

to the end of the cord the member 10, or the section B carrying the member 10, is moved along the cord C toward the section A. The gripping engagement or frictional engagement of the part 22 with the cord C resists this movement and as the section B is forcibly moved along the cord the part 22 is distorted. This distortion first occurs in the thin apex portion of the part 22. This apex portion tends to grip the cord C and as the assembly or member 10 moves forwardly the apex portion of the part 22 turns back and is drawn rearwardly into the opening 21. As the forcible movement of the member 10 along the cord continues the forward portion of the conical part 22 is drawn further into the opening 21. Where the exterior of the part 22 is roughened there is greater resistance to the forward movement and the action just described is facilitated. By the time the member 10 and the section B approach the section A the entire forward or apex portion of the part 22 is turned rearwardly and engaged within the opening 21. As the part 22 is conical it is of increased wall thickness toward its base and its thick base portion offers increased resistance to further reversion. Accordingly, by the time the section B reaches the position illustrated in Fig. 2 of the drawings the inverted part 22 has obtained a very firm binding or gripping engagement with the cord C. It will be seen from an inspection of Fig. 2 that the major portion of the part 22 is turned back into the opening 21. This reversed portion is very tightly forced inwardly against the cord C and is maintained in firm gripping engagement with the cord by the resiliency of the base of the part 22 and the thick walled body of the member 10. The conical part 22 by reason of its configuration offers great resistance to complete reversion. Accordingly, the partially reversed or inverted part 22 tightly engaged in the section B dependably resists movement of the cord C rearwardly relative to the coupling. The partially reversed conical part 22 thus forms a positive stop or abutment which prevents the cord C from being drawn or pulled out of the section B. It is to be observed that the resistance offered by the part 22 increases in proportion to the pull exerted on the cord. With the part 22 distorted or reversed, as above described, it is difficult, if not impossible, to further reverse the part while pulling on the cord C and the part thus forms a positive stop collar on the cord. Accordingly, the forces that may be applied to the cord C during the use of the electrical appliance and when disconnecting the coupling are not transmitted to the bared wires W or any of the elements of the coupling but are assumed almost entirely by the part 22. The part 22 remains effective as a positive stop so long as the coupling remains assembled and the part never works loose. It is to be understood that the section B is latched onto the section A by the cooperation of the detents 18 with the notches 12 or by other equivalent conventional latch means.

When it becomes necessary or desirable to detach the coupling from the cord C the section B is freed or unlatched from the section A and is moved rearwardly along the cord C. This rearward movement of the section B along the cord C causes the part 22 to resume its initial conical form and the part 22 relaxes its grip on the cord.

It is to be observed that the member 10 is a simple inexpensive element readily embodied in a previously constructed coupling or inexpensively embodied in the coupling at the time of manu-

facture. The member 10 may be designed for embodiment in couplings of different characters, designs, etc. and may be formed as an attachment suitable for use with conventional couplings, etc. of different classes.

The embodiment of the invention illustrated in Figs. 3 and 4 of the drawings may be said to comprise, generally, two coupling sections A' and B' and a part 10^a for preventing the cord C from being pulled from the assembly sections.

The sections A' and B' may be substantially the same in construction as the above described sections A and B or may be of other design. In the case illustrated, the section A' is a generally cylindrical member provided at its rear end with a radially projecting annular flange 12^a and provided at its forward end with the customary prongs 30 for engaging in an electrical socket. The rear side of the section A' carries spaced posts 13^a which in turn are provided with screws 14^a for securing the bared portions of the individual wires W. The section B' is a tubular element having a central longitudinal opening 16^a in its rear portion for receiving the cord C and the forward portion of the section B' is enlarged or flared to engage over the section A'. The flared forward portion of the section B' has a cavity or socket 17^a for receiving the section A' and its posts 13^a, screws 14^a, etc. and for receiving the exposed wires W. The wall of the socket 17^a has an annular groove 18^a for receiving the flange 12^a. The section B' is formed of rubber, rubber composition, synthetic rubber, or the like, and grips the section A' through its resiliency. The engagement of the flange 12^a in the groove 18^a and the gripping engagement of the resilient section B' on the section A' securely connects the sections but permits the sections to be intentionally disconnected.

In the structure of Figs. 3 and 4 the part 10^a is an integral portion or extension of the section B'. The part 10^a projects forwardly from the rear wall of the socket 17^a in surrounding relation to the mouth of the opening 16^a. The part 10^a is tubular having a longitudinal opening 31 for receiving the cord C. The opening 31 is smaller in diameter than the opening 16^a so that the part 10^a grips or snugly engages the cord. In accordance with the invention, the part 10^a is conical or frusto-conical having a forwardly tapering or converging surface terminating at the mouth of the opening 31. The part 10^a is flexible and resilient. If desired or believed necessary, the surface of the part 10^a or at least the forward portion of its surface may be roughened.

In the use or operation of the coupling illustrated in Figs. 3 and 4 of the drawings the section B' is first slid along the cord C to a position some distance from the end of the cord. The exposed portions of the wires W are then secured to the posts 13^a by the screws 14^a and the section B' is moved forwardly along the cord C to engage it on the section A'. This forward movement of the section B' along the cord C causes the conical part 10^a or a substantial portion of the part 10^a to be reversed or turned in upon itself. This action is substantially the same as described above in connection with the part 22. As shown in Fig. 4 of the drawings, the part 10^a is drawn or distorted rearwardly through its own opening 31 to project into the opening 16^a. This distortion of the part 10^a causes the part to tightly grip or bind on the cord C. The disposition and configuration of the part 10^a are such that the part effectively resists rearward

movement of the cord C relative to the section B'. The part 10^a being fixed to or integral with the section B' cannot bodily move rearwardly with the cord C and its frictional engagement with the cord necessitates continued or further distortion of the part 10^a if the part is to permit rearward movement of the cord C. The wall thickness of the part 10^a is increased toward the base of the part and with the part 10^a in a condition such as shown in Fig. 4 the part effectively resists movement of the cord C in a rearward direction. Accordingly, the part 10^a constitutes an effective grip or stop which prevents the cord C from being pulled from the coupling.

It is to be observed that in the case of the part 22 and the part 10^a described above there is no danger of cutting into, wearing, fraying, or otherwise injuring the cord C. The parts 22 and 10^a being relatively soft pliable elements cannot injure the sheath or covering of the cord C.

Figs. 5 and 6 of the drawings illustrate a coupling section X embodying another form of stop means or cord gripping means 10^b.

The section X may be of the same general configuration as the section B described above and may be designed to be removably secured on the section A or the section A'. As illustrated, the section X comprises a one piece body of rubber, rubber composition, or the like, flared at its forward end to have a socket 17^b for receiving the section A or A', which socket has an annular groove 18^b corresponding in purpose to the groove 18. The rear portion of the section X has a longitudinal opening 40 for receiving the cord C and the rear portion of the section may be shaped and proportioned to constitute a convenient handle or grip. The opening 40 is preferably cylindrical and of such size that it readily receives the cord C. The opening 40 extends forwardly to join the socket 17^b.

In this form of the invention the means 10^b for gripping the cord C comprises a portion 41 of the opening 40 of oval transverse cross section. The oval opening portion 41 is preferably spaced between the ends of the main opening 40. The major transverse axis of the opening portion 41 is longer than the transverse axis of the opening 40, while the minor transverse axis of the opening portion 41 is much shorter than the transverse axis of the main opening. The part 42 of the body section X which encloses or surrounds the oval body portion 41 is likewise oval in transverse cross section and its major and minor transverse axes are coincident with the corresponding axes of the opening portion 41. This is clearly illustrated in Fig. 6.

By pressing on the opposite sides of the body part 42 along its major axis the body part may be distorted to make the opening portion 41 cylindrical or generally cylindrical. If desired, a continuous or split wire 43 of oval shape may be embedded or cast in the oval body portion 42 to increase its resistance to flexure and distortion. Where the section X is constructed of rubber, rubber composition, synthetic rubber, or the like, the oval body part 42 and that portion of the section which defines the oval opening 41 are integral with the section X.

When the coupling is to be secured on the cord C the opposite sides of the oval body part 42 are pressed inwardly along the major axis of said part. Sufficient force is applied to distort the body part 42 and to make the opening portion 41 substantially cylindrical. This permits the section X to be readily slipped on the cord C. Following the attachment of the section A or A' to the cord wires W the oval portion 42 is again distorted by squeezing it along its major transverse axis and the section X is moved along the cord and engaged on the section A. When the pressure is removed from the oval portion 42 the inherent resiliency of the part 42 and the resiliency of the wire 43 returns or tends to return the opening portion 41 to its original oval configuration. As the cord C is generally cylindrical and its diameter is greater than the minor transverse diameter of the oval opening 41 the walls of the opening 41 tightly grip the cord. This gripping action dependably resists the pulling of the cord C from the section X. The gripping action resists or prevents movement of the cord C relative to the section X and the gripping means serves to prevent the pulling forces from reaching the wires W, screws, binding posts, etc.

Having described typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A coupling for use on an electrical conductor comprising a cup like coupling section receiving the cord, a fixed part associated with the section and to which the cord is attached, and a tubular member of flexible resilient material conforming to and bearing against the internal surface of the section and surrounding and gripping the conductor, said member having an inwardly projecting frusto-conical tubular portion whose inner end part is turned back within itself so that said frusto-conical portion tightly grips the conductor and increases its grip on the conductor when the conductor is subjected to an outward pull to relieve said fixed part of such pull.
2. A coupling for use on an electrical conductor including a hollow coupling section having an opening, a fixed part associated with the section and to which the cord is attached, and a frusto-conical tubular member of flexible resilient material having a base flange which conforms to and bears on the internal surface of the coupling section around its opening, the apex portion of said member being turned back within itself so that the said member tightly grips the conductor and increases its grip on the conductor when the conductor is subjected to an outward pull to relieve said fixed part of such pull, the external surface of said apex portion being roughened to have more effective frictional engagement with the conductor.

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