Oct. 11, 1949. E. E. NORRIS 2,484,525

ELECTRIC CONNECTOR

Filed Oct. 2, 1946

Fig. 1

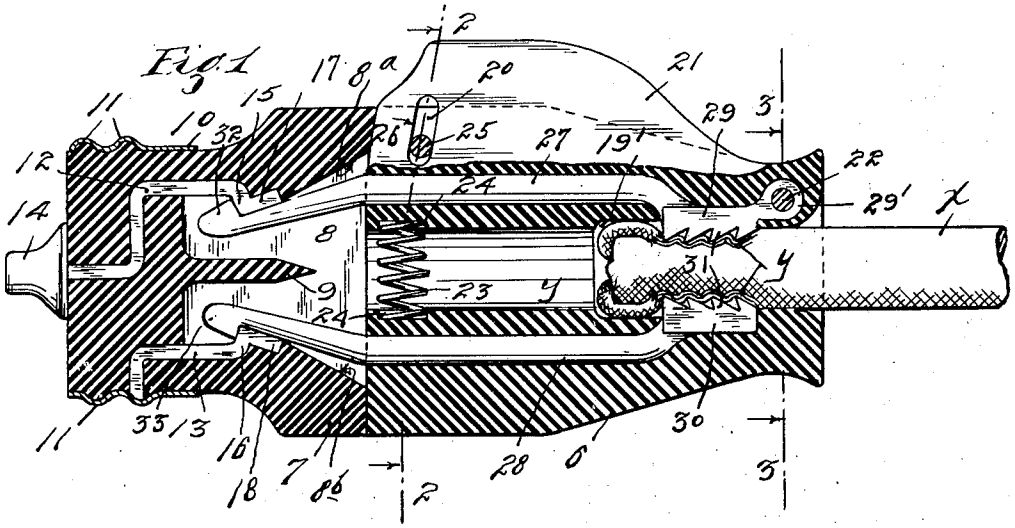


Fig. 2

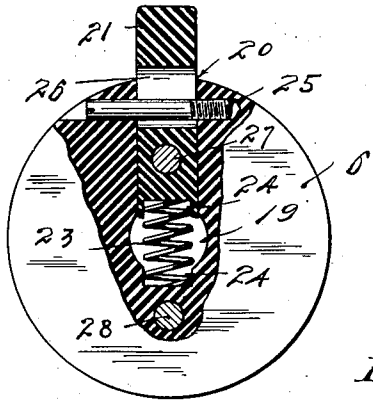


Fig. 3

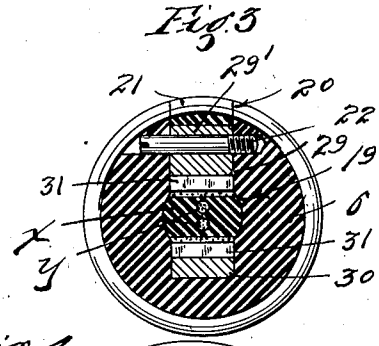


Fig. 4

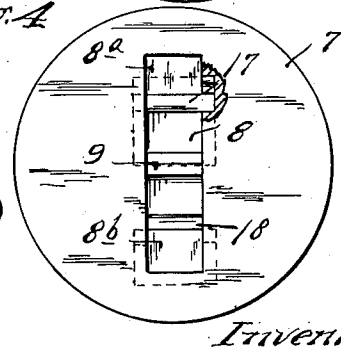
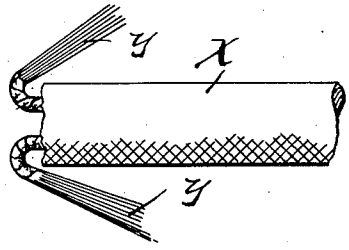


Fig. 5



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ELECTRIC CONNECTOR

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13 Claims. (Cl. 173—343)

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My invention relates to improvements in electric connectors of the type comprising two sections such as a plug and a plug base.

The objects of the invention are, first, to provide a sectional connector having electrical conductors and electrodes that are separably connected and that afford a novel lock that separably connects the sections of the connector, second, to provide novel means for releasing the lock, third, to provide novel means for releasably holding the conductors and electrodes in electrical contact, fourth, to provide a novel anchor for attaching an electrical cord to a connector, fifth, to provide novel means for connecting electrical wires to terminals. Other objects of the invention will be apparent from the following description, reference being had to the drawing.

To the above end, generally stated, the invention consists of the novel devices and combination of devices hereinafter described and defined in the claims.

In the accompanying drawing, which illustrates the invention, like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a view of the improved connector principally in longitudinal central section;

Fig. 2 is a view partly in end elevation and partly in transverse section taken on the irregular line 2—2 of Fig. 1;

Fig. 3 is a view principally in transverse section taken on the line 3—3 of Fig. 1;

Fig. 4 is an end view of the plug base removed from the plug, and

Fig. 5 is a fragmentary view of the electric cord showing the wires thereof stripped and turned backwardly.

The sectional connector illustrated comprises a plug 6 and a plug base 7 of cylindrical formation and each thereof moulded of an insulating material.

The words "inner" and "outer" to be hereinafter used in describing certain parts of the connector, refer to the long axis of the plug and plug base when connected.

The inner end of the plug base 7 is a narrow recess 8 into which projects, from the back thereof, a transverse guide 9 for a pair of electrodes as will hereinafter appear. This guide 9 is integral with the plug base 7. On the outer end portion of the plug base 7 is a conductor jacket 10 having a screw threaded formation 11 for attaching the plug base 7 to an outlet, not shown.

Two conductor bars 12 and 13 are imbedded,

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at their outer end portions in the plug base 7, and their inner end portions extend into the recess 8 on opposite sides of the guide 9. The conductor bar 12, at its outer end, is attached to a contact 14 on the outer end of the plug base 7 at the axis thereof. The conductor bar 13, at its outer end, is attached to the conductor jacket 10.

The inner end portions of the conductor bars 12 and 13, in the recess 8, are upset to afford a pair of opposing lock shoulders 15 and 16, respectively. The end portions of the conductor bars 12 and 13 inwardly of the lock shoulders 15 and 16 afford contacts 17 and 18 that are in diverging relation. As shown, the lock shoulders 15 and 16 are in inwardly converging relation. It is important to note that the narrow sides of the recess 8 converge from the inner end of the plug base 7 to the opposing sides of the contacts 17 and 18, at the inner ends thereof, as indicated at 8a and 8b.

It is further important to note that the edge portions of the conductor bars 12 and 13 are imbedded in the plug base 7 at the sides of the recess 8, as shown by full and broken lines in Fig. 4, and thereby securely hold the end portions of said conductor bars from moving out of position.

Within the plug 6 is a round axial passageway 19 and a radial slot 20 both of which extend the full length of said plug. The slot 20 extends from the outer side of the plug 6 to the passageway 19.

A lock releasing thumb piece 21, in the form of a flat plate, is mounted in the slot 20 and hinged, at its outer end portion, on a pin 22 in the form of a screw that has threaded engagement with the plug 6. A coiled spring 23, mounted in opposing seats 24 in the plug 6 and the thumb piece 21, extends transversely through the passageway, at the front end portion thereof. This spring 23 is under strain to move the thumb piece 21 outwardly on its hinge pin 22.

A pin 25, similar to the hinge pin 22, has threaded engagement with the plug 6 and extends transversely through the slot 20 and a transverse slot 26 in the thumb piece 21. The purpose of the pin 25 is to limit the outward movement of the thumb piece 21 under the action of the spring 23. It will be noted that the inner side of the thumb piece 21, at its hinge pin 22, is on a shorter radius than the passageway 19 and hence the thumb piece 21 extends into said passageway for an important purpose as will hereinafter appear.

A pair of electrodes 27 and 28, in the form of round rods, have their outer end portions, imbedded, the former in the thumb piece 21 and the latter in the plug 6. Jaws 29 and 30 integral with the outer end portions of the electrodes 27 and 28 respectively are also imbedded, the former in the thumb piece 21 and the latter in the plug 6. On the opposing faces of the jaws 29 and 30, which are rectangular, there are, on each thereof, a row of teeth 31 that extend the full width thereof and project into the passageway 19.

The jaws 29 have a hinge lug 29' through which the hinge pin 22 extends and thereby reinforces the respective end portion of the thumb piece 21.

The electrodes 27 and 28 project materially outwardly of the inner end of the plug 6 and into the recess 8. The end portions of the electrodes 27 and 28 in the recess 8 are in converging relation and have on their free ends lock hooks 32 and 33, respectively. The lock hooks 32 and 33 are constructed and arranger to interlock with the lock shoulders 15 and 16 respectively, when the electrodes 27 and 28 are inserted into the recess 8 and thereby couple the plug 6 to the plug base 7 and complete the electrical connection between said plug and plug base.

To couple the plug 6 to the plug base 7 it is only necessary to move the plug 6 axially toward the plug base 7 to insert the electrodes 27 and 28 into the recess 8. During the coupling of the plug 6 and the plug base 7 the lock hooks 32 and 33 slide on the converging surfaces 8a and 8b and the contacts 17 and 18 are contracted thereby against the compressed spring 23. When the lock hooks 32 and 33 move out of engagement with the contacts 17 and 18 they snap into interlocking engagement with the lock shoulders 15 and 16 under the action of the compressed spring 23. The inclined surfaces of the lock shoulders 15 and 16 produce a cam action on the lock hooks 32 and 33 and thereby draw the plug 6 into abutting engagement with the plug base 7.

To remove the plug 6 from the plug base 7 it is only necessary to press the finger piece 21 inwardly against the tension of the spring 23 to disengage the lock hook 32 from the lock shoulder 15 and thereby contract the electrodes 27 and 28 whereby the lock hook 33 may be disengaged from the lock shoulder 16 and permit said electrodes to be withdrawn from the recess 8.

An electric cable X having therein duplex wires Y is attached to the plug 6 in a novel manner. The wires Y at one end of the cable X are stripped of insulation and laid back onto said cable on opposite sides thereof. This end portion of the cable X is inserted into the passageway 19 at the inner end thereof. Before the cable X is inserted into the passageway 19 the pin 25 is removed and the thumb piece 21 opened wide enough to withdraw the jaw 29 and its teeth from the passageway 19 and permit the cable X to be inserted into said passageway.

When inserting the cable X into the passageway 19 said cable is held with the wires Y in the projected plane of the jaws 29 and 30 so that the teeth 31 will contact the wires Y when said jaws are closed. When inserting the cable X into the passageway 19 it is positioned with its inner end portion beyond the jaws 29 and 30 and in a recess 19' formed by increasing the diameter of the passageway 19.

When the cable X correctly positioned in the passageway 19, the thumb piece 21 is closed and

the pin 25 replaced to clamp the jaws 29 and 30 onto the wires Y and the cable X. This closing of the jaws 29 and 30 flattens that portion of the cable X between the jaws 29 and 30 and thereby securely anchors the same to the plug 6. The closing of the jaws 29 and 30 causes the teeth 31 thereof, to crimp the wires Y at a plurality of longitudinally spaced points and press the same into the cable X. Obviously this crimping of the wires Y produces a plurality of electrical contacts between the wires Y and the teeth 31.

From the above description it is evident that the conductors 12 and 13 and the electrodes 27 and 28 perform a double function to wit, a mechanical coupling that connects the plug 6 and the plug base 7 and an electrical coupling that completes the circuit through the connector. The spring 23 is insulated from the electrodes 27 and 28 and hence no current can pass through the same. This compressed spring 23 keeps the electrodes 27 and 28 and their lock hooks 32 and 33 in good electrical contact with the connectors 12 and 13 and their lock shoulders 15 and 16.

The section of the cord X held compressed by the jaws 29 and 30 tends to move the thumb piece 21 outwardly and thereby assists the spring 23 in holding the electrodes 27 and 28 in good electrical contact with the connectors 12 and 13.

The guide 9 prevents the electrodes 27 and 28 from coming into contact with each other when operating the finger piece 21, and also acts as an insulation between said electrodes.

As heretofore stated, the cam action between the lock hooks 32 and 33 and the lock shoulders 15 and 16 holds the plug 6 in abutting engagement with the plug base 7 thereby reducing wiggle or play between said plug and plug base to a minimum. This efficient locking of the plug to the plug base is highly desirable especially in radio and sound equipment cords because of the fact that the least movement or scraping action between electrical contacts in such equipment produces small electric arcs or sparks which are amplified into the speaker.

The teeth 31 make very positive contact with the wires Y and at the same time the current will be split up or shunted through a plurality of contacts, to wit, the teeth 31, thereby reducing the actual load per contact.

From what has been said, it will be understood that the invention described is capable of modifications as to details of construction and arrangement within the scope of the invention herein disclosed and claimed.

What I claim is:

1. A connector having a pair of opposing electric contact jaws, means for adjusting one of the jaws relative to the other thereof, in combination with an electric cord extending between the jaws and having duplex wires the end portions of which are turned back onto opposite sides of the cord and engaged by said jaws, said jaws pressing the wires onto the cord and compressing the cord to electrically connect the jaws and the wires and anchor the cord to the connector.

2. The structure defined in claim 1 in which a considerable end portion of the cord is inwardly of the jaws.

3. The structure defined in claim 1 in which the jaws have wide teeth that crimp the wires and press the same into the cord.

4. A connector having an insulating body member, a pair of electric contact jaws mounted in the body member, means for adjusting one of the jaws relative to the other thereof, in combination

with an electric cord extending between the jaws and having duplex wires, the end portions of which are turned back onto opposite sides of the cord and engaged by the jaws, said jaws pressing the wires onto the cord and compressing the cord to electrically connect the jaws and the wires and anchor the cord to the body member.

5. The structure defined in claim 4 further including relatively wide teeth on the jaws that crimp the wires and press the same into the cord.

6. A connector having an insulating body member provided with a passageway and a radial slot extending from the outer side of the body member to the passageway, a hinged insulating finger piece in the slot, a pair of electrodes mounted the one in the body member and the other in the finger piece, said electrodes having a pair of opposing contact jaws extending into the passageway, in combination with an electric cord extending into the passageway between the jaws and having duplex wires the end portions of which are turned back onto the opposite sides of the cord and engaged by the contact jaws, said jaws pressing the wires onto the cord and compressing the cord to electrically connect the jaws and the wires and anchor the cord to the body.

7. The structure defined in claim 6 further including relatively wide teeth on the jaws that crimp the wires and press the same into the cord.

8. An electrical plug having a solid cylindrical body member having in one end portion a relatively long and deep recess and in its other end a bore extending into the recess for an electric cable, said body member also having a longitudinal channel extending into the recess, an insulating carrier mounted in the channel, hinged to the body member and extending outwardly thereof to afford a finger-piece, a pair of electrodes, one of which is diametrically opposite the channel and embedded in part in the body member, the other electrode being embedded in part in the carrier, and a spring normally holding the carrier projected.

9. The structure defined in claim 8, further including a pair of opposing jaws on the electrodes.

10. The structure defined in claim 8, further including a pair of jaws on the electrodes having opposing serrations.

11. The structure defined in claim 8, further including a stop pin mounted in a bore in the body member extending transversely through the channel and a slot in the carrier.

12. An electrical plug and socket having solid insulating body members in endwise abutting engagement, said body members having in their abutting end portions communicating recesses, the plug body member having in its outer end a bore extending into the respective recess for an electric cable, said plug body member also having a longitudinal channel extending into its recess, an insulating carrier mounted in the channel, hinged to the respective body member and extending outwardly of said body member to afford a finger-piece, a pair of electrodes, one of which is diametrically opposite the channel and embedded in parts in the respective body member, the other electrode being embedded in part in the carrier, said electrodes having means for attaching an electric cable thereto, a spring normally holding the carrier projected, the outer end portions of the electrodes being in converging relation, extending into the recess in the socket body member and having outturned shoulders in diverging relation, and a pair of connectors, embedded in part in the socket body member and having converging cam surfaces constructed and arranged to be engaged by the electrodes when coupling the two body members and thereby move the electrode in the carrier toward the other electrode, said connectors having lock shoulders inwardly of the cam surfaces, with which the shoulders on the electrodes interlock when they move out of engagement with the cam surfaces.

13. The structure defined in claim 12, further including a guide on the socket body member between the two connectors.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,890,484	Allenic	Dec. 13, 1932
1,957,773	Good	May 8, 1934
2,136,193	Karst	Nov. 8, 1938
2,411,846	Bir	Dec. 31, 1946