Sept. 2, 1952 G. B. BENANDER ET AL 2,609,415

ELECTRIC CONNECTOR

Filed Aug. 24, 1949

Fig. 1.

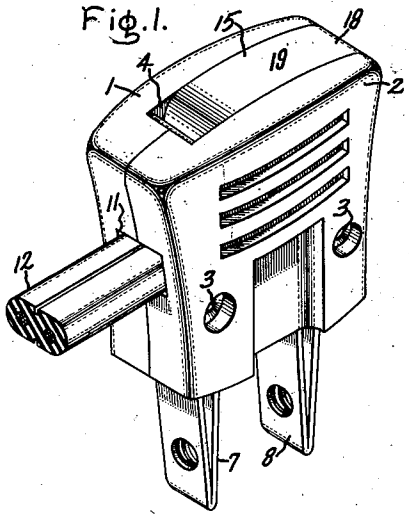


Fig. 2.

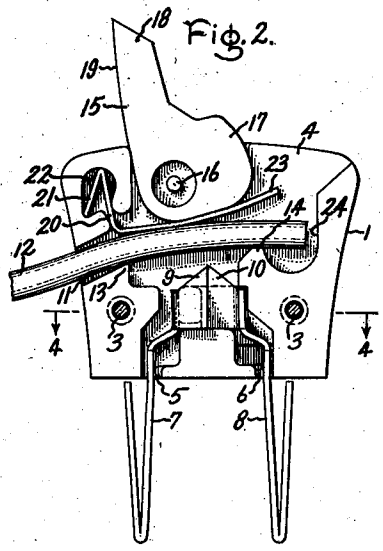


Fig. 3.

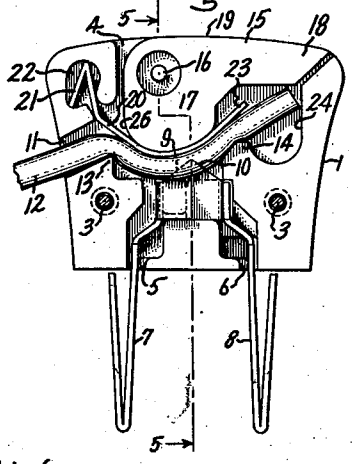


Fig. 4.

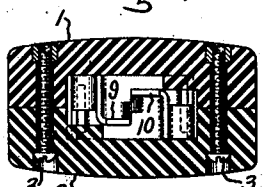


Fig. 5.

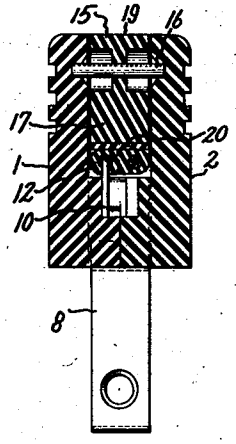


Fig. 6.

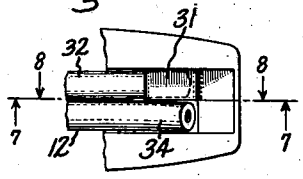


Fig. 7.

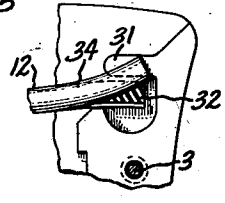
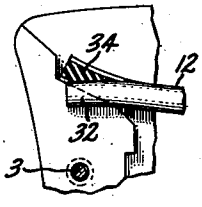


Fig. 8.



Inventors:
George B. Benander,
Gustaf R. Lawson,
by Otto R. Rieve
Their Attorney.

Patented Sept. 2, 1952

2,609,415

UNITED STATES PATENT OFFICE

2,609,415

ELECTRIC CONNECTOR

George B. Benander, Oaklawn, R. I., and Gustaf R. Lawson, Abington, Mass., assignors, by mesne assignments, to General Electric Company, a corporation of New York

Application August 24, 1949, Serial No. 112,073

9 Claims. (Cl. 173—361)

1

The present invention relates to electric connectors and more particularly to replacement plugs, receptacles, outlets and like connectors adapted to be attached to or detached from an end of an electric cord.

An object of the invention is to provide a simple and inexpensive connector which can be quickly attached to an electric cord to provide a strong, safe connection.

Other objects and advantages of the present invention will become apparent from the following description of the invention and with reference to the accompanying drawing.

In the drawing, Fig. 1 is a perspective view of a connector embodying the features of the present invention; Fig. 2 is an elevational view with one side of the connector body removed to show the arrangement of parts in the cord receiving position; Fig. 3 is a view similar to Fig. 2 illustrating the arrangement of the parts in the cord engaging position; Fig. 4 is a sectional view along line 4—4 of Fig. 2; Fig. 5 is a sectional view along line 5—5 of Fig. 3; Fig. 6 is a fragmentary top view of a modification of the invention and Figs. 7 and 8 are elevational views along lines 7—7 and 8—8 respectively of Fig. 6.

Referring to Fig. 1 of the drawing, the connector illustrated comprises a plug having a body part of substantially rectangular cross section preferably formed of two complementary members 1 and 2 made of molded insulating material such as a phenolic resin. In the modification of the invention shown in Figs. 1 to 5 inclusive, these body members are of identical construction so that the description of one will suffice for both.

The two members are secured together as by bolts 3 or other suitable means and in the assembled position cooperate to define a vertical recess 4 in the top of the connector body. Communicating with the bottom of this recess are a pair of grooves 5 and 6 in which a pair of electrical contact means 7 and 8 are disposed. The contact means are electrically connected respectively with piercing means in the form of prongs 9 and 10 protruding upwardly into the bottom portion of recess 4.

An aperture 11 communicating with the recess 4 through the front wall thereof provided means for inserting the end of an electric cord 12 into the recess above the prongs 9 and 10 in which position the cord is supported above and out of contact with the prongs by means of shoulders 13 and 14.

Means for pressing the cord downwardly between the supporting shoulders and into piercing

2

engagement with the prongs 9 and 10 comprise a lever 15 pivotally mounted in the top portion of the recess on a pin 16, which preferably is of spring material such as spring tempered music wire to allow some flexing for variations in the elasticity or hardness of different conductor insulations. The ends of the pin 16 are supported in the opposite side walls of the recess. The lever comprises a cam arm 17 and an operating arm 18 substantially at right angles to one another. It is adapted to be rotated between the cord receiving position shown in Fig. 2 and the cord clamping position of Fig. 3 in which the cam surface of arm 18 extends downwardly between the shoulders 13 and 14 a distance sufficient to press the cord into piercing engagement with the prongs 9 and 10, whereby the prongs, which are transversely spaced apart within the recess, are respectively in electrical contact with the conductors comprising the cord. The lever 15 is so constructed that when it is in the cord clamping position, the operating arm 18 is nested in the recess with its exposed surface 19 substantially flush with the top surface of the connector.

To facilitate the closing of the lever, particularly when the connector is used with a rubber insulated cord, a flexible strip 20 of insulating material, such as sheet fiber, is arranged within the recess between the cam surface and the cord 12. The strip has a bent end portion 21 adapted to anchor it in a small recess 22 communicating with the main recess 4 and the opposite or free end 23 of the strip extends generally transversely of the recess and beyond shoulder 14 when the lever 15 is in the raised position. With the cam arm riding on this strip, direct frictional contact thereof with the insulated conductor is avoided and the lever can be moved to the clamping position with little effort and without any tendency for the cam arm to eject the cord from the recess during the early part of the closing operation prior to the time when the cord is brought into engagement with the prongs 9 and 10.

To attach the connector to an electric cord, the end of the cord is inserted in the cord receiving aperture 11 where either directly or indirectly it exerts a pressure on the forward surface 26 of the cam arm 17 thereby rotating the lever to the position shown in Fig. 2. The cord is then pushed into the recess until the end contacts or approaches the back wall 24 of the recess and overlies shoulder 14. With the cord in this position, the lever is closed against the cord or the fiber strip, when such is present, to force a portion of the cord downwardly onto the prongs and to

clamp adjacent portions of the cord between the cam surface and shoulders 13 and 14 so that any pull on the cord will be absorbed by the clamped portions, particularly that adjacent shoulder 13 and will not be transmitted to the prongs 9 and 10.

The modification illustrated in Figs. 6 to 8 inclusive comprises means for separating the two conductors at the end of the cord within the recess to eliminate any chance of a short circuit between the ends even though the cord should not happen to be cut cleanly or in the case the insulation should push back from the ends of the conductors during insertion thereof into the connector.

In the modified connector, the back wall of the recess includes a transverse projection 31 on one of the members forming the connector body with the projection extending from the surface of the member forming part of the back wall of the recess and adapted to overlie the end of one of the conductors 32 of the cord. A sloping surface on the second member opposite or adjacent the projection 31 provides means for positively directing the end of the second conductor 34 upwardly and away from the end of conductor 32 at the time the cord is inserted into the connector recess. By this arrangement, when the cord is pressed into contact with prongs 9 and 10 by cam arm 17, the end of conductor 34 will remain in its upwardly directed position while projection 31 will prevent the end of conductor 32 from rising to a similar position. Except for projection 31 and the sloping wall portion, the detailed construction of the modified connector is the same as that shown in Figs. 1 to 5.

While the invention has been specifically illustrated with reference to a plug type of connector, from the description thereof it will be seen that it is not limited thereto but is applicable to the various electric connectors adapted to be electrically and mechanically connected to the end of an electric cord.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric connector comprising a body part having a vertical recess in the top thereof, contact means, piercing means electrically connected to said contact means and extending into the bottom portion of said recess, shoulder portions within said recess and on opposite sides of said piercing means, a cord receiving aperture communicating with said recess above said shoulder portions, a flexible metal pin extending transversely across said recess adjacent the top thereof, a lever pivotally mounted on said pin adjacent the top of said aperture and having an arm for pressing an electric cord into engagement with said piercing means, and a flexible strip having a free end adapted to be interposed between said lever arm and an electric cord.

2. An electric connector comprising a body part having a vertical recess in the top thereof, contact means, piercing means electrically connected to said contact means and extending into the bottom portion of said recess, shoulder portions within said recess and on opposite sides of said piercing means, a cord receiving aperture communicating with said recess above said shoulder portions, a flexible metal pin extending transversely across said recess adjacent the top thereof and a lever pivotally mounted on said pin and having a cam surface at one end thereof for pressing an electric cord downwardly between said shoulders and into contact with said piercing means.

3. An electric connector comprising a body part having a vertical recess in the top portion thereof, contact means, piercing means electrically connected to said contact means and protruding into the bottom of said recess, a cord receiving aperture communicating with said recess above said piercing means, a lever pivotally mounted adjacent the top of said aperture and having an arm for pressing an electric cord into engagement with said piercing means, and a flexible strip having a free end interposed between said lever arm and said cord.

4. An electric connector comprising a body portion having walls defining a recess in the top thereof, a plurality of electrical contacts, piercing means electrically connected one respectively to each of said contacts and projecting into the bottom portion of said recess, a cord receiving aperture positioned in one vertical wall of said recess to admit a poly conductor electric cord for contact along its length with said piercing means, means for effecting conductor end separation comprising protrusions positioned on a vertical wall of said recess opposite said aperture to be engageable one respectively with each of the conductors to divert the same along a plane passing between them, said plane being perpendicular to a plane including said conductors, and a lever pivotally mounted adjacent the top of said recess for pressing said conductors individually into contact with said piercing means.

5. An electric connector comprising two complementary members forming a body part, each of said members having grooves together defining a recess in said body part with an electric cord receiving aperture in one wall of said recess, contact means, piercing means electrically connected to said contact means and extending into said recess, each of said members further having oppositely inclined wall surfaces forming together an end of said recess facing said cord receiving aperture, said oppositely inclined surfaces being adapted to divert in opposite directions the conductor ends of a twin conductor cord when inserted into said aperture and through said recess to engage the end thereof, a lever pivotally mounted between said body members in said recess and having a cam surface for pressing said cord into engagement with said piercing means.

6. An electric connector comprising two complementary members forming a body part, each of said members having grooves defining a recess in said body part with an electric cord receiving aperture in one wall of said recess, contact means, piercing means electrically connected to said contact means and extending into said recess, each of said members further having oppositely inclined wall surfaces forming together an end of said recess facing said cord receiving aperture, said oppositely inclined surfaces being adapted to divert in opposite directions the conductor ends of a twin conductor cord when inserted into said aperture and through said recess to engage the end thereof, a flexible pin extending across said recess adjacent one end thereof with the ends of said pin supported in the walls defining said recess, a lever pivotally mounted on said pin for movement about a transverse axis, said lever including a cam arm within said recess for pressing an electric cord into engagement with said piercing means, an operating arm extending substantially at right angles to the cam arm and adapted to be received in said recess with the exposed surface thereof flush with the surface of said body when the cam arm is in the cord pressing position, and a flexible strip having one end anchored

in a wall of said recess and a free end interposed between said cam arm and the cord.

7. An electric connector comprising a body portion having a recess therein, contact means for engaging an external electrical circuit, piercing means electrically connected to said contact means and extending into said recess, a cord receiving aperture communicating with said recess, a flexible metal pin extending transversely across said recess adjacent one end thereof, a lever pivotally mounted on said pin and having a cam arm for pressing an electric cord into engagement with said piercing means, and a flexilbe strip having a free end adapted to be interposed between said lever arm and an electrical cord.

8. An electric connector comprising two complementary members forming a body part, each of said members having grooves together defining a recess in said body part with an electric cord receiving aperture in one wall of said recess, contact means, piercing means electrically connected to said contact means and extending into said recess, each of said members further having oppositely inclined wall surfaces forming together an end of said recess facing said cord receiving aperture, said oppositely inclined surfaces being adapted to divert in opposite directions the conductor ends of the twin conductor cord when inserted into said aperture and through said recess to engage the end thereof, a lever pivotally mounted between said body members in said recess and having a cam surface for pressing said cord into engagement with said piercing means, said lever having an open and a closed position, said lever in its open position exposing said recess to give visual indication of said cord separating recess end whereby the separation of the conductor ends may be ascertained before said lever is pivoted to its closed position.

9. An electric connector comprising a body portion having walls defining a recess therein with the open end of said recess lying in a plane including a surface of said body portion, contact means mounted in said body portion, piercing means electrically connected to said contact means and extending into said recess to lie in a wall thereof opposite its open end, a cord receiving aperture positioned in a wall of said recess to admit an electric cord therethrough, a flexible metal pin extending transversely across said recess, and a lever pivotally mounted on said pin, said lever having both a cam arm for pressing an electric cord into engagement with said piercing means and an operating arm extending away from said cam arm, said lever having dimensions adapting it to be received in said recess with an exposed surface of said operating arm lying substantially flush with said surface of said body portion to close the open end of said recess when said cam arm is in the cord pressing position.

GEORGE B. BENANDER.
GUSTAF R. LAWSON.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,977,677	Hill	Oct. 23, 1934
2,465,700	Tuttle	Mar. 29, 1949