

Feb. 10, 1942.

J. M. ROGIE

2,272,432

ELECTRICAL CONNECTOR

Filed Nov. 28, 1940

FIG. 1



FIG. 2

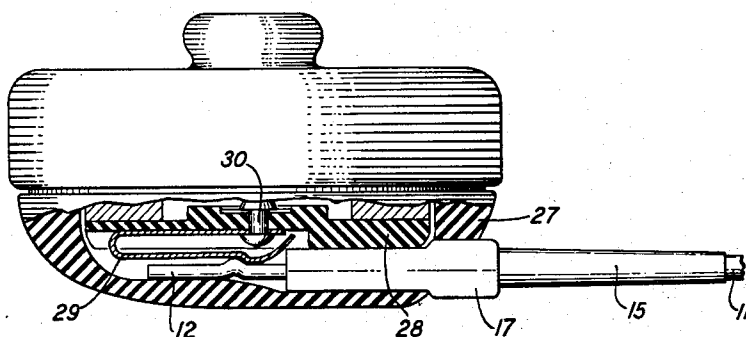


FIG. 3

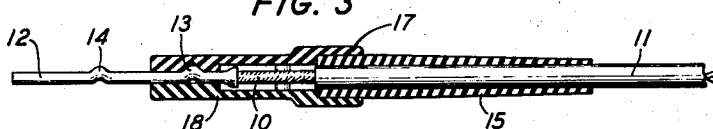


FIG. 4

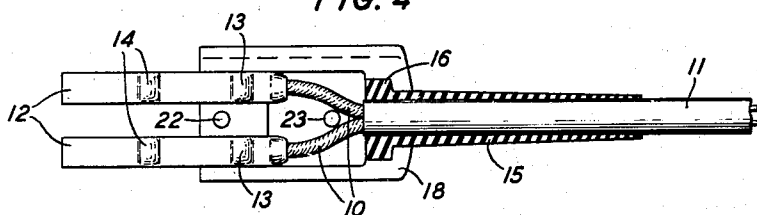


FIG. 5

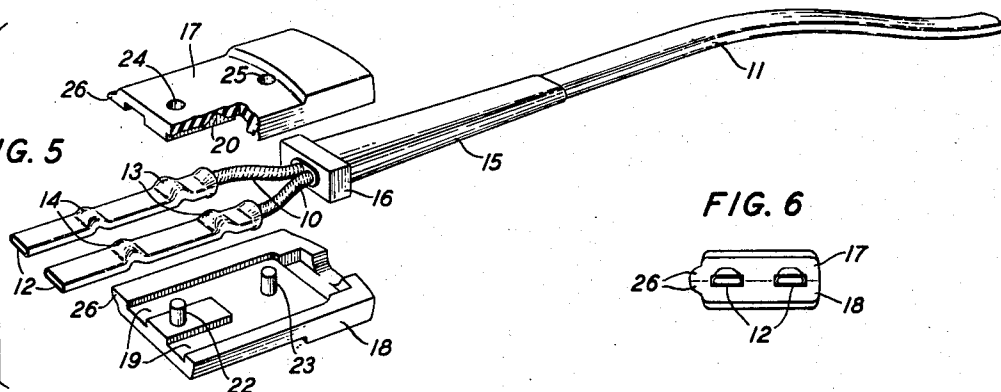
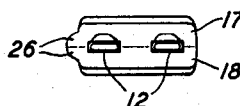


FIG. 6



INVENTOR
J. M. ROGIE

BY *H. G. Bandfield*
ATTORNEY

UNITED STATES PATENT OFFICE

2,272,432

ELECTRICAL CONNECTOR

James M. Rogie, West Orange, N. J., assignor to
Bell Telephone Laboratories, Incorporated, New
York, N. Y., a corporation of New York

Application November 28, 1940, Serial No. 367,524

3 Claims. (Cl. 173—332)

This invention relates to electrical connectors and more particularly to connectors of the plug and jack type for use with flexible conductors on hearing aids or similar apparatus.

In apparatus for aiding the hearing of the deaf small receivers are positioned in the ears of the user and it is therefore not only necessary to insure good electrical contacts but it is also highly desirable that the flexible cords and connectors be as light and inconspicuous as possible. It is, therefore, an object of this invention to provide an electrical connector suitable for use on such apparatus which will insure satisfactory electrical connections and which will be light, inconspicuous and economical to manufacture. This and other objects of the invention are obtained by employing the ends of the cord conductors reinforced by metallic tubes, as the actual terminal members of the connector and positioning these terminals in an insulating plug shell so that they are firmly and accurately held in position. The plug shell is provided with a ridged portion cooperating with a corresponding opening in the apparatus with which it is associated so that the plug may be inserted in only one position thus polarizing it. Furthermore the cord is anchored in the plug sleeve by a collar on a tapered sheath placed over the covering or jacket of the flexible cord. These and other features of the invention may be more clearly understood by reference to the attached drawing, in which:

Fig. 1 is a perspective view approximately to scale of a plug and cord embodying the features of the invention;

Fig. 2 is a greatly enlarged view partly in section showing this plug associated with an ear-piece for deaf sets;

Fig. 3 is a sectional view of the plug and sheath;

Fig. 4 is a plan view with one half of the plug shell removed;

Fig. 5 is a view of the various parts ready for assembly; and

Fig. 6 is an end view of the plug.

Referring more particularly to Figs. 3 to 5, there is disclosed a flexible cord comprising a pair of silk or plastic insulated conductors 10—10 enclosed in a covering or jacket 11 of rubber or plastic insulation which is preferably extruded thereabout while the conductors are maintained in parallel relation. Alternatively this covering may be a covering of textile threads. The insulation from the ends of the conductors is removed and they are threaded through thin walled

nickel tubes and having an inner diameter sufficient to permit the bared conductors being threaded therethrough. The tubes with the enclosed conductors are then placed in a suitable fixture and subjected to sufficient pressure to form the flat terminal members 12—12. These terminal members are provided with struck-up portions or projections 13—13 and 14—14 to respectively aid in securing the members in an insulating shell and to cooperate with contacting springs in associated apparatus in a manner to be described later herein.

In order to prevent undue strain on individual conductors and to increase the life of the cord, the end of the cord is provided with a tapered protecting sheath 15. This sheath is preferably formed by wrapping the end of the cord jacket with a plastic resin tape and then placing it in a mold where it is subjected to heat and pressure to form a tapered sheath having a flange portion 16. The plug shell consists of two similar members 17 and 18 of suitable insulating material and provided with longitudinal slots 19—19 to receive the terminal members 12—12 and depressions 20—20 to receive and position the projections 13—13. Cavities 21—21 are provided in members 17 and 18 to receive the flange portions 16 of sheath 15 thereby making it possible to anchor the cord so that undue stress will not be exerted on the individual conductors. The shell members 17 and 18 are cemented or otherwise secured together, the various parts being accurately positioned by pins 22 and 23 in member 17 which enter corresponding openings 24 and 25 in member 18. The pin 23 further serves as a separator between conductors 10—10 thereby providing increased insulation. In order to polarize the device ridges 26—26 are formed on members 17 and 18 thereby providing the plug with a semi-circular projection on one edge as more clearly shown by Fig. 6.

In Fig. 2 this plug with its cooperating contact springs is shown in connection with the ear-piece of a hearing aid. The lower housing 27 of the ear-piece is provided with an opening corresponding to the contour of the plug member as shown in Fig. 6 so that the plug may be inserted in only one position. A circular disc 28 of insulating material is provided with U-shaped contact springs 29—29 secured at one end to the disc by means of rivets 30. The free ends of these springs are formed so that when the plug is inserted the projections 14 ride over the formed end of spring 29 and are held firmly in place, the greater length of the plug shell being enclosed

within the housing 27. In Fig. 1 the connector is shown substantially to scale, the length of the plug shell being approximately $\frac{3}{8}$ inch and the connecting cord being approximately $\frac{1}{4}$ by $\frac{1}{8}$ inch in size. It will be noted that while this connector is arranged to insure perfect electrical contacts it is very light and small in size and is not any more conspicuous than is the ordinary cord attached to eye-glasses.

What is claimed is:

1. A terminal member comprising a plurality of contact members consisting of thin nickel tubes threaded over the bared conductors of a connecting cord and pressed flat, said tubes before being pressed having an inner diameter only slightly larger than the diameter of the bared conductors threaded therethrough, each of said contact members being provided with a plurality of crimped projections, which serve to anchor the bared conductors therein.

2. In an electrical connector for flexible cords, a plug member including an insulating shell, metallic tubes threaded over the bared ends of the conductors of said cord and subjected to pressure to form flat contact members, each of said contact members being provided with a trans-

verse projection crimped therein to fit into a corresponding slot in said shell portion and with a second crimped projection adapted to cooperate with a contact spring member associated therewith, the bared ends of said conductors being threaded through said tubes and anchored therein by said crimped portions.

3. An electrical connector for flexible cords comprising a plug member adapted to engage contact springs of apparatus with which said plug is to be associated, said plug member comprising an insulating shell having a projecting ridge on one edge only, contact members consisting of metallic tubes threaded over the bared ends of said conductors and pressed flat, said contact members being provided on the same side only with crimped projections adapted to engage contact springs on the associated apparatus and an opening in the housing of the associated apparatus to receive said plug, said opening being enlarged at one side to receive the ridge of said plug shell whereby the plug may be inserted only in the position in which the projections on said contact members engage said associated contact springs.

JAMES M. ROGIE.