

Dec. 9, 1941.

H. K. KRANTZ

2,265,846

SWIVEL CONNECTOR

Filed Nov. 15, 1940

2 Sheets-Sheet 1

FIG. 1

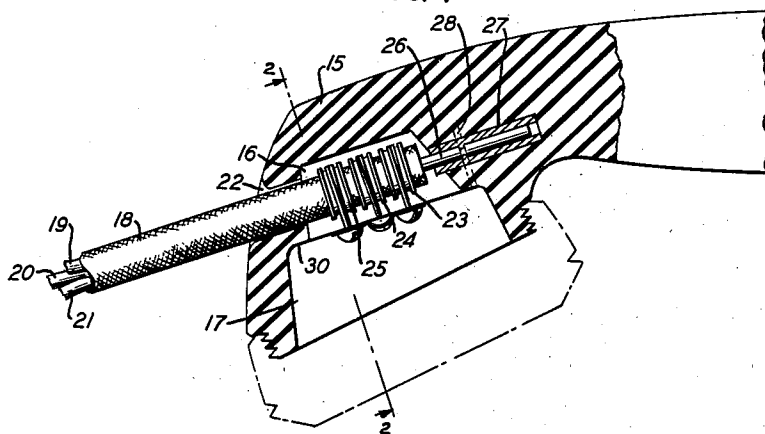


FIG. 2

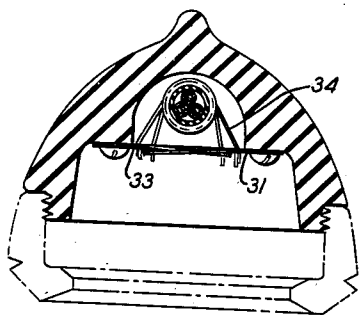


FIG. 3

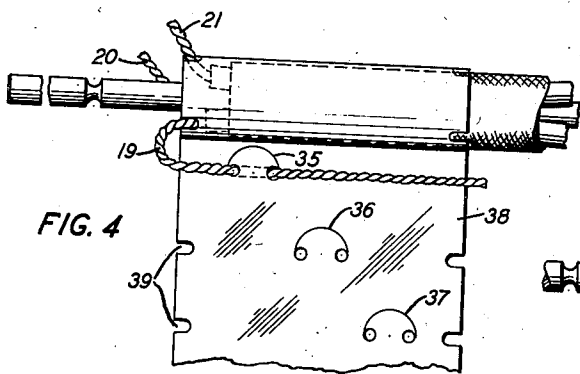
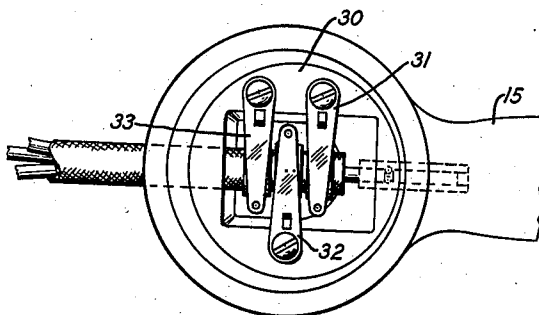
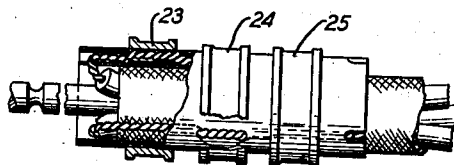


FIG. 4

FIG. 5



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FIG. 6

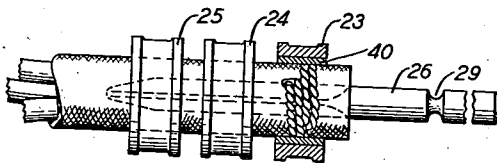


FIG. 7



FIG. 8

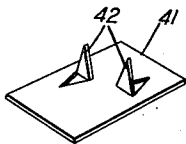


FIG. 9

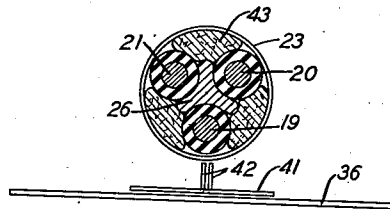


FIG. 10

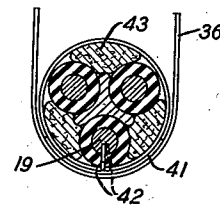
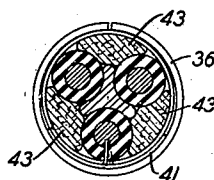


FIG. 11



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## UNITED STATES PATENT OFFICE

2,265,846

## SWIVEL CONNECTOR

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or to Bell Telephone Laboratories, Incorporated,  
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Application November 15, 1940, Serial No. 365,762

5 Claims. (Cl. 173—324)

This invention relates in general to swivel connectors and more particularly to such connectors for use with flexible cords for making connections to telephone handsets or similar apparatus.

One of the objects of the invention is to overcome undesired twisting and kinking of the flexible cords used in the telephone handsets and thereby result in more satisfactory service and increased cord life.

A more specific object is to produce a device of this character which will insure good non-microphonic electrical contacts and which will be economical to manufacture and have a long life when operating under severe service conditions.

To obtain these and other objects and in accordance with the features of the invention a swivel connector is provided in combination with a flexible cord in which contact rings are secured on the end of the insulated cord and a plug swivel is provided to anchor the cord in the associated apparatus and to prevent axial displacement. Because of the swivel anchorage the cord is free to rotate and thus prevent kinking and the contact rings engage corresponding contact members fixedly mounted in associated apparatus to provide a non-microphonic contact of low electrical and frictional resistance.

The invention may be more clearly understood by reference to the accompanying drawings, in which

Fig. 1 is a view partly in section of the receiver portion of a telephone handset equipped with a swivel connector embodying certain features of the invention;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a view looking into the receiver cavity with the receiver cap and unit removed;

Figs. 4 and 5 illustrate one method of connecting the cord conductors to the contact rings;

Fig. 6 illustrates an alternative method of connecting the cord conductors to the contact rings;

Fig. 7 illustrates a swivel plug for anchoring the cord; and

Figs. 8 to 11 illustrate still another method of connecting the cord conductors to the contact rings.

Referring more particularly to Figs. 1 and 3 of the drawings, the receiver end of the handset handle 15 is provided with a cavity 16 beneath the cavity 17 which is provided for the receiver unit. This unit and the connections within the

handset are not shown for the sake of clearness. The flexible cord 18 including conductors 19, 20 and 21 extends through an opening 22 and into cavity 16. Conductor rings 23, 24 and 25 are securely fastened on the outer covering or braiding of cord 18 and one end of the anchoring swivel pin 26, more clearly shown in Fig. 7, extends into the cord 18 while the other end extends into a sleeve 27 molded or otherwise secured in the handle 15. This sleeve serves as a bearing for swivel pin 26 and end motion between pin and sleeve is prevented by member 28 which extends into a circumferential slot 29 on the pin and is secured in the handle. The swivel pin 26 may be forced into the cord after the contact rings are in place or inserted before the rings are positioned on the cord. One end is fluted as shown on Fig. 7 so as to hold the respective conductors in spaced relation as shown more clearly in Figs. 9 to 11 and because of its surface characteristics, to insure the pin being firmly held in position under service conditions. Mounted on the shoulder portion 30 of handle 15 are the spring members 31, 32 and 33 equipped with contact loops 34, 34 preferably of phosphor-bronze wire or tinsel which engage the respective contact rings. These loops are securely fastened to the spring members which are adjusted to give the desired tension and insure a good non-microphonic contact. The electrical connections to the receiver and transmitter units of the set are made from these spring members but are not shown in the drawings for the sake of clearness.

A preferred method of securing the contact rings in position and connecting them to the conductors is shown in Figs. 4 and 5. As there shown, the bared ends of the conductors are bent back along the cord and are threaded through slits 35, 36 and 37 in a thin sheet 38 of flexible insulating material, such for instance as varnished linen. As shown in Fig. 4 the conductor 19 is threaded through slit 35 so that as sheet 38 is wrapped about the cord only a small portion of conductor equal to the length of slit 35 will be on the outside. In a like manner portions of conductors 21 and 22 are threaded through slits 36 and 37, respectively. The contact rings are then placed over the wrapped sheet 38 and contact with the exposed portions of the respective conductors. The swivel pin 26 is then forced into position insuring a rigid construction and satisfactory electrical contacts. The edges of the insulating sheet are preferably

provided with slots 39 to facilitate correct positioning of the conductors.

An alternative method for terminating conductors is illustrated in Fig. 6 in which short loops of the conductors are brought out through the braiding during the braiding operation. The insulation is removed from these loops and they are wrapped about the braiding and held in place by thin metallic bands 40. Over these bands are placed the contact rings 23 to 25 which may be secured by soldering or held in place merely by the forces exerted when the swivel pin 26 is forced into position.

Still another method of terminating conductors is illustrated by Figs. 8 to 11 in which a plurality of terminal members 41 provided with struck-up tangs 42 serve to electrically connect the conductors to the contact rings which are wrapped about the braided covering of the cord. Fig. 9 shows the various parts in position to be assembled. Fig. 10 shows the tangs forced into the tinsel conductor 19 and members 41 and 36 partially wrapped about the cord, and Fig. 11 is a cross-section view with the cord when completed. Preferably the tangs 42—42 are slightly out of alignment so that when the member 41 is wrapped about the cord the tangs which extend radially will exert a pincer action on the conductor and thus insure a satisfactory contact. Textile filler threads 43 are preferably provided as shown to insure a firm construction and one which is substantially circular in cross-section.

Swivel connectors in accordance with the invention in which the connectors are terminated directly on the cord make it possible to provide a satisfactory means for eliminating cord kinking without unduly increasing the cost or size of the apparatus and at the same time maintain contacts which are perfectly satisfactory for talking circuits.

What is claimed is:

1. A swivel connector comprising a flexible cord containing a plurality of insulated conductors enclosed in an insulating cover, a plurality of independent contact rings securely mounted in spaced relation directly on the insulating cover of said cord and connected to the respective conductors, swivel means for anchoring said cord and a plurality of contact members adapted to respectively engage said rings.

2. A swivel connector comprising a flexible cord containing a plurality of insulated conductors enclosed in an insulating cover, a plurality of contact rings encircling said cord and connected to the respective conductors, swivel means for anchoring said cord, said means comprising a member fluted at one end to permit its being forced into the cord and separate the conductors and having its other end provided with a circumferential slot cooperating with a fixed member to prevent axial motion while permitting free rotation and a plurality of contact members adapted to respectively engage said rings.

3. A swivel connector comprising a flexible cord containing a plurality of insulated conductors enclosed in a textile braiding, a plurality of independent metallic bands secured directly to said textile braiding and connected to the respective conductors, contact rings secured to said bands and connected to the respective conductors, swivel means inserted between the respective conductors of said cord for anchoring said cord and a plurality of contact members adapted to respectively engage said rings.

4. A swivel connector comprising a flexible cord containing a plurality of insulated conductors enclosed in an insulating cover, a plurality of contact rings encircling said cord and connected to bared ends of the respective conductors, a sheet of flexible insulating material wrapped about and separating said cord from said rings, said sheet being provided with a plurality of slits through which the bared ends of the respective conductors are threaded whereby a portion of each conductor is positioned on the outer portion of said wrapped sheet to engage its respective contact ring, swivel means for anchoring said cord and a plurality of contact members adapted to respectively engage said rings.

5. A swivel connector comprising a flexible cord containing a plurality of insulating conductors enclosed in an insulated cover, a plurality of metallic bands having tang portions engaging the respective conductors, a plurality of contact rings secured to the respective bands, swivel means for anchoring said cord and a plurality of contact members adapted to engage the respective contact rings.

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