Dec. 31, 1940. E. S. McLARN 2,226,733

MULTICONDUCTOR TELEPHONE CORD AND CONNECTOR

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FIG. 1.

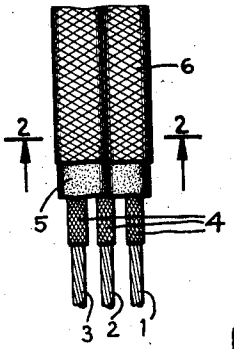


FIG. 2.



FIG. 3.

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MULTICONDUCTOR TELEPHONE CORD AND CONNECTOR

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FIG. 4.

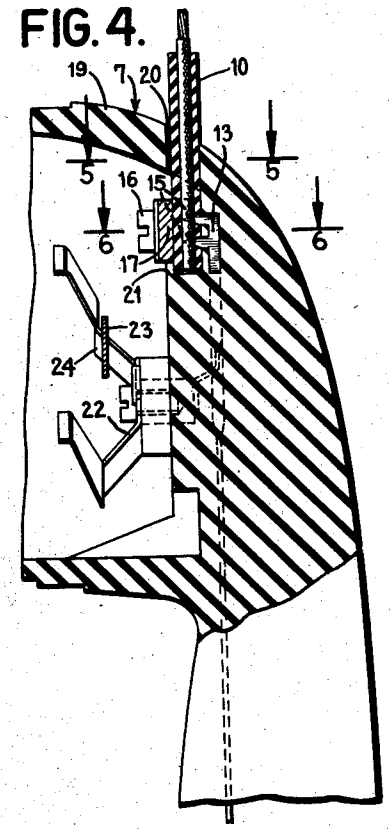


FIG. 5.

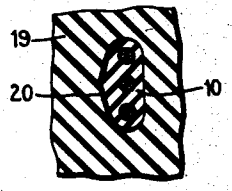


FIG. 6.

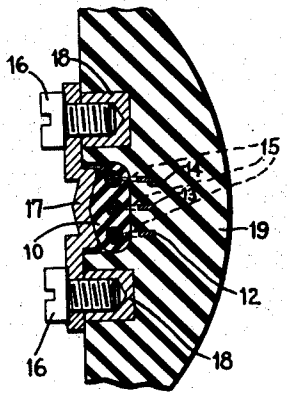


FIG. 7.

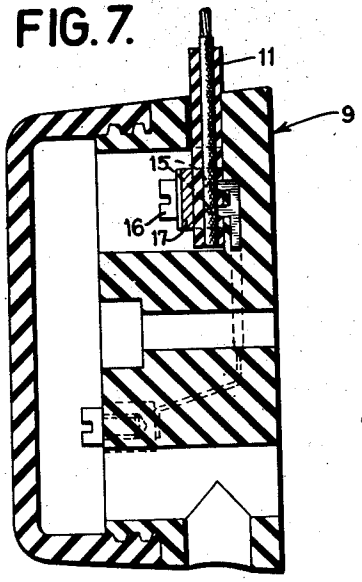
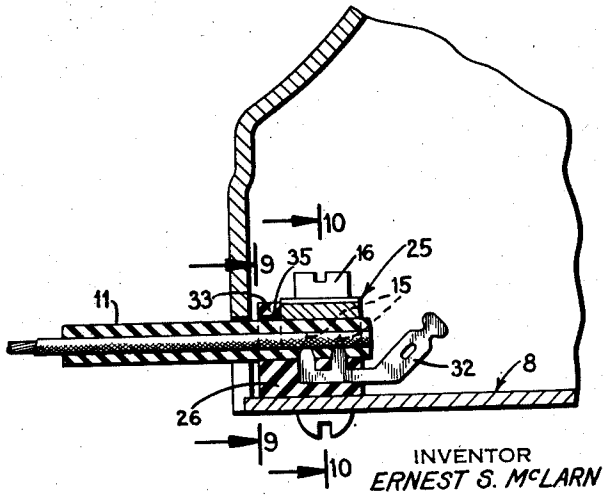


FIG. 8.



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FIG. 9.

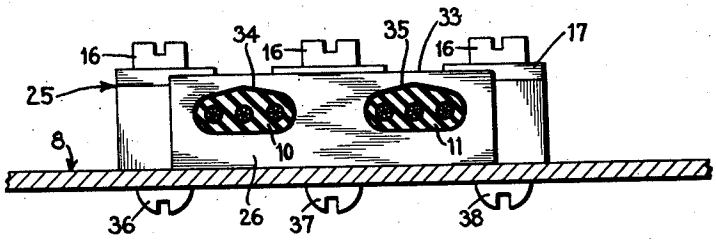


FIG. 10.

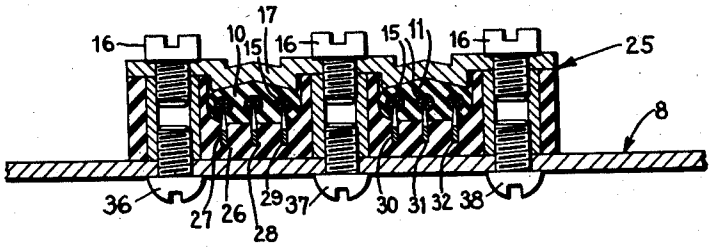


FIG. 11.

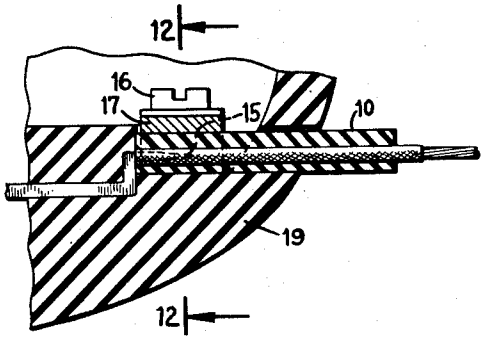
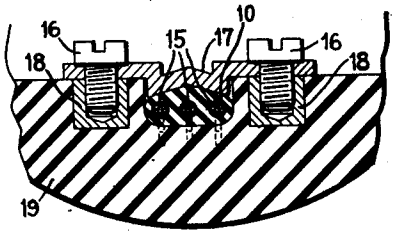


FIG. 12.



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UNITED STATES PATENT OFFICE

2,226,733

MULTICONDUCTOR TELEPHONE CORD AND CONNECTOR

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Application June 5, 1937, Serial No. 146,539

2 Claims. (Cl. 179—186)

This invention relates to telephone apparatus and pertains more particularly to instrument cords or wires and cooperating connectors, for telephones and other electrical apparatus.

In the past it has been customary to utilize for interconnecting the telephone receiver or handset with the stand and approximately round, very flexible cord having tinsel conductors, each of these conductors being separately insulated and the several conductors being held together by means of a braided cover or other suitable means. In order to provide for making a mechanically and electrically secure connection or joint with the related apparatus, these tinsel conductors have been provided with tips which are either soldered or clamped thereto. It has also been customary to form integrally with the conductors, or attach thereto, staycords, the function of which is to prevent undue tension being applied to the electric connections between the conductors and the associated apparatus.

Cords of the type just described have disadvantages since they are easily twisted and the twists are not obvious until the cord actually loops or snarls. These loops and snarls are not only rather difficult to remove but are injurious to the cord itself since they cause abrasion of the covering and even breakage of the conductors.

It is an object of my invention to provide an improved form of cord which is not only relatively cheap in cost, but has the advantage that loops and snarls do not easily form therein.

A further object of my invention is to provide cordage which is adapted to be made in a continuous, long piece, from which individual cords may be cut to the desired length, and to provide for cooperation with said cords an improved form of connector whereby the desired electrical connection between the end of the cord and an instrument may be quickly, easily and securely made.

More specifically, it is an object of my invention to provide cordage which is approximately flat or of ribbon shape with the conductors approximately parallel and approximately in the same plane, and has rubber insulation extruded over the conductors. Braided fabric or other suitable insulating material may likewise be used but the preferred insulation comprises a strong extruded material such as natural or artificial rubber or the like.

In accordance with my invention, I form cordage from which individual cords may be cut, by extruding over parallel conductors placed in substantially the same plane, a rubber insulation which is vulcanized in place. The conductors, which may be of the tinsel or stranded type, are protected from the rubber insulation by the application of a fabric braiding or knitted covering. The number of conductors is not material but usually for telephone purposes the cordage will be constructed with three conductors or two conductors. The cross section of the cordage may be perfectly symmetrical or may be unsymmetrical, for example, may have one side slightly raised or be otherwise distorted, so that the conductors can be inserted in a hole of a similar cross section only in one way, whereby it will be assured that the proper conductors are connected to the proper terminals of the associated apparatus. The cordage itself may be utilized with only a bare rubber covering or it may be supplied with a fabric braid.

Since the conductors are parallel to one another and have in the finished form substantially a ribbon shape, it is easy to insure the proper connection of the cord to any associated apparatus without the use of a coloring code for each of the individual conductors. I prefer to utilize, in connection with this cord, a clamp type connector which is provided with prongs or tines spaced apart one from another at substantially the same spacing as the conductors in the cord. These prongs or tines are forced through the end of the cord by means of a clamp held in position by screws or other suitable means. This type of connector not only insures an adequate electric circuit connection, but also securely grips the end of the cord so that no additional stay cord or other retaining means is necessary. In use the mechanical strains which may result are taken mainly by the braid and rubber covering if braided or by the rubber covering of the conductors alone if not braided and not by the conductors themselves.

An advantage of such cordage is, that it may be extruded continuously in lengths that are practically unlimited. From these long lengths individual cords of the proper dimension may be cut at the factory for use with new instruments or may be cut to the proper length in the field in the case of repairs made by operating telephone companies. There will be no waste since the electrical and mechanical connections are made at the end of the cord and no cord tips or stay cords are needed. Furthermore, no color scheme is necessary since the flat shape of the cord assures the proper connection of its conductors to associated apparatus. This latter feature assures

a saving of installation time since it is obvious how the cords should be connected.

A further very strong advantage of this type of cord is that its flat or ribbon shape insures that it twists less easily than a round cord, and that even one twist in the cord is very noticeable, and the chance of any user twisting the cord sufficiently to cause looping or snarling is very remote. All twists come out easily by holding the cord above the twist and allowing it to unwind of its own accord. Here again, the flat shape insures the complete removal of twist since any that might remain would be at once obvious to the user.

The above mentioned and further objects and advantages of my invention and the manner of attaining them will be more fully explained in the following description taken in conjunction with the accompanying drawings.

In the drawings,

Fig. 1 shows in plan view, a cord constructed in accordance with my invention,

Fig. 2 is a sectional view of the cord shown in Fig. 1, taken along section line 2—2 of the latter figure,

Fig. 3 is a partial assembly view of a telephone substation, showing the manner of connecting the several pieces of apparatus by means of the cord of the present invention,

Fig. 4 is a fragmentary sectional view of the hand-set, taken along section line 4—4 of Fig. 3,

Figs. 5 and 6 are sectional views, taken along section lines 5—5 and 6—6, respectively, of Fig. 4,

Figs. 7 and 8 are sectional views, taken along section lines 7—7 and 8—8, respectively, of Fig. 3,

Figs. 9 and 10 are sectional views, taken along section lines 9—9 and 10—10, respectively, of Fig. 8,

Fig. 11 is a side elevation view in sectional of a modified form of connector, and

Fig. 12 is an end sectional view taken along section line 12—12 of Fig. 11.

Referring more particularly to the drawings, in Fig. 1 is illustrated a section of cord constructed in accordance with my invention, and comprising three flexible conductors 1, 2 and 3, which may be of the tinsel or stranded type, each conductor being protected by a knitted or braided covering 4, and all three conductors being placed side by side in a parallel relation and substantially in the same plane, and insulated by means of a rubber jacket 5 which is preferably extruded on the conductors and then vulcanized. An outer braided covering 6 protects the rubber jacket and, at the same time, presents a finished appearance.

In Fig. 3 the cord of Fig. 1 is shown interconnecting a handset 7, telephone set 8 and terminal block 9. One length of cord 10 provides the electric circuits between the handset 7 and the telephone set 8, while a second length of conductor 11 provides connections between the telephone set 8 and the terminal block 9.

As shown in Figs. 3 and 4, the handset 7 has molded in it terminals 12, 13 and 14 which have upturned prongs or tines 15 which are forced through the end of the cord 10 by means of screws 16 and clamp 17. The screws engage with molded nut inserts 18 positioned in the handset, and the handset between the two inserts 18 is shaped to furnish a bed for the cord as shown more particularly in Fig. 6 which aligns the conductors of the cord with respect to the prongs 15. The proportion of parts is preferably such, that when the screws 16 are turned in to their fullest extent, the clamp 17 engages firmly with the heads of inserts 18, having compressed the cord end sufficiently to force the tines or prongs 15 through the conductors 1, 2 and 3 of the cord and, at the same time, compressed the rubber insulation sufficiently to insure a strong mechanical grip on the end of the cord, which will prevent the cord from pulling out. The holding effect might be increased by roughening the clamping surface of the clamp 17 or by providing corrugation therein.

The outer shell 19 of the handset preferably has an opening 20 of a shape similar to that of the cross section of the cord, and this is desirably of an unsymmetrical configuration so that the cord can be inserted in the opening of the handset in one position only. This will insure that the cord cannot be improperly connected. An abutment 21 serves as a stop for the cord when it is pushed through the opening 20 in the handset. The cord projects slightly beyond the clamping surface of member 17 so that when pressure is applied to this element by means of the screws 16, the end of the rubber insulation will bulge slightly, thereby making the withdrawal of the cord from the clamp even more difficult. The several parts 22, 23 and 24 are conventional springs for forming circuit connections with various parts of the handset, not shown.

The other or top end of cord 10 as viewed in Fig. 3, is connected to the telephone set 8 by means of a twin clamp 25 which is generally similar to the clamp of the handset which has already been described, except that the clamp 25 is adapted to cooperate with both cord 10 and cord 11. The terminal block assembly 25 is desirably formed of a block of insulating material 26, into which the several connectors 27, 28, 29, 30, 31 and 32 are molded, these connectors having prongs or tines 15 similarly to the corresponding parts shown in Figs. 4 and 6. The block 26 has an upturned flange 33 which is provided with two openings 34 and 35 through which the cords 10 and 11 pass, the openings preferably being of the same shape as the cross section of the cord so that the cord can be inserted in one position only, whereby erroneous connections will be made impossible. The terminal block 25 is secured to the telephone set 8 by means of screws 36, 37 and 38 which engage with the inserts molded into the insulating block 26.

In Fig. 7 the terminal block is provided with a clamping arrangement similar to that shown in connection with the handset.

Figs. 11 and 12 illustrate a connection similar to that already described and shown, for example, in Figs. 4 and 5, except that the prongs 15 are arranged to enter endwise with respect to the conductors of the cord, so as to pierce the conductors approximately axially. This arrangement has the advantage that the conductors are firmly squeezed against the prongs by the direct pressure of the clamps.

The instrument cord and connecting arrangement described in the preceding paragraphs possess many advantages. The cord itself will be cheap to construct and will, at the same time, be very strong and weather proof. No finishing operations for individual cords are required since no terminal tips or stay cords are needed. As a result there will be no waste in the manufacturing operation since it will be necessary merely to form a very long length of cord and then cut this to any desired lengths. The cord may be quickly installed since it is only necessary to un-

loosen, for example, the screws 16 of the handset, raise the clamping member 17 and push the end of the instrument cord 10 into position, then tighten the screws, this tightening action resulting in the prongs or tines 15 piercing the rubber covering and forcing themselves through the conductors 1, 2 and 3, thereby forming a weather proof electrical connection, while at the same time, the clamp 17 squeezes the rubber insulation strongly enough to hold the cord against withdrawal from the handset.

Since the cord may be cut to any desired dimension, it will not be necessary to stock different lengths of cord, this being a very great advantage particularly in the case of operating companies which are situated at a relatively great distance from the source of supply. Furthermore, since the cord is flat or ribbon-like in shape, color coding of the conductors is not needed for installation as it is merely necessary to place the connectors 12, 13 and 14 of the handset, for example, in the same relative position as the corresponding connectors 29, 28 and 27 of the telephone set, so that when the cord 10 is stretched between the handset and the telephone set the conductors will run directly in line from one connector to the other, e. g., as shown, in Fig. 3. And the same holds true with respect to the connectors of the terminal block 9 and of the telephone set 8. Therefore, even if the cord 10 does not have an unsymmetrical cross section as shown in the drawings, no difficulty will be encountered in making the cord installation since one end of the cord may be connected to either the handset or the telephone set and then the cord may be drawn through the hand of the installer so as to insure that there are no twists, and the second end then inserted in the other instrument so that the cord lies flat and runs directly from one of the sets of connectors to the other. In this position the proper forming of the several connectors will be insured to complete the correct electric circuit.

While I have described particular embodiments of my invention for the purposes of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention as set forth in the appended claims.

I claim:

1. In combination, a block of insulation material having fixed thereto in spaced relation a plurality of electrical connectors each having a sharpened prong, a unitary member fixed to said insulation block having an unsymmetrical opening, a multiconductor cord having a plurality of conductors spaced apart the same distance as said connectors and having an unsymmetrical cross-sectional shape corresponding to said opening for insertion endwise into said opening, and clamping means in said insulating block separate from said member for clamping said conductor end after insertion thereof endwise through said opening whereby the said sharpened prongs will pierce the conductors corresponding to the proper space position, and said cord will be compressed to hold it in connection with said block of insulation.

2. A telephone set comprising a cord comprising parallel conductors secured in a unitary insulation and having a relatively wide and thin unsymmetrical cross-section, a telephone stand provided with an unsymmetrical opening corresponding to the shape of the cord secured at one end thereof, a telephone handset having an unsymmetrical opening of similar shape secured to the other end of said cord, and means for securing said handset to said cord comprising metal teeth mounted in said handset, said teeth being spaced apart the same distance as said conductors, and means for clamping the end of said cord with said handset to compress the insulation for holding said cord in position and for causing said teeth to pierce the proper conductors to form an electric circuit therewith.

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