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L. E. GAVITT

2,313,234

TINSEL CORD

Filed Sept. 14, 1940

Fig. 1.

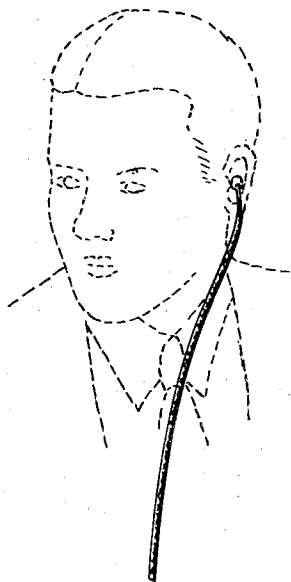


Fig. 2.

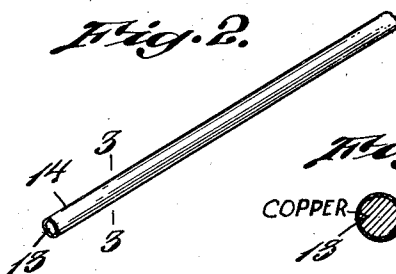


Fig. 3.



Fig. 4.

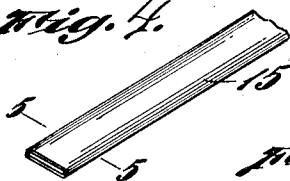


Fig. 5.



Fig. 6.

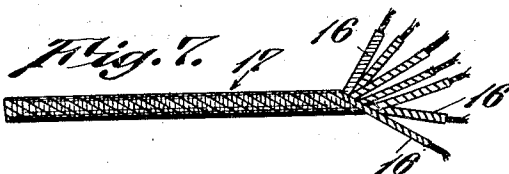
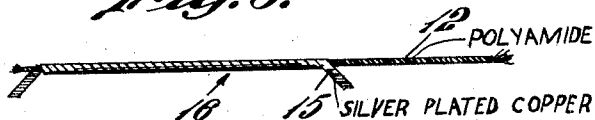


Fig. 8.



Fig. 9.

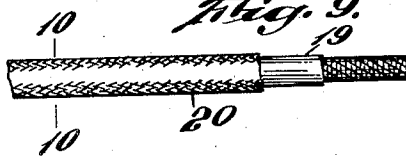
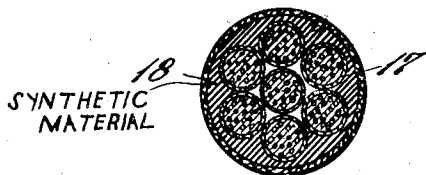


Fig. 10.



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UNITED STATES PATENT OFFICE

2,313,234

TINSEL CORD

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Application September 14, 1940, Serial No. 356,762

3 Claims. (Cl. 174—120)

This invention relates to a cord of that type frequently used on acoustic instruments, one example being for assisting those hard of hearing and of the type which will be worn for a considerable length of time by the person, and another example being for microphones.

The invention has for one of its objects to provide a light-weight cord of greater tensil strength than that usually appearing on the market at the present time.

Another object of the invention is to provide a cord which will be resistant to perspiration and to the oil and acids of the skin and therefore one which will last longer by freedom of deterioration from these causes.

Another object of the invention is to provide a cord which will be extremely flexible and one which at the same time will be resistant to abrasion by the flexibility of its parts one on the other or from outside abrasion with which it may be contacted.

Another object of the invention is to provide a cord having all of these qualities of a minimum outside diameter and one light in weight so as to provide a minimum pull upon the instrument attached to the ear.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a perspective view illustrating the use to which the cord may be placed;

Fig. 2 is a perspective view of a piece of round wire having a plated surface;

Fig. 3 is a section on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the plated ribbon after the same has been flattened;

Fig. 5 is a section on line 5—5 of Fig. 4;

Fig. 6 shows this plated ribbon of Fig. 4 wrapped about a core;

Fig. 7 shows several of the strands of Fig. 6 twisted together;

Fig. 8 shows a coating about the twisted strands of Fig. 7;

Fig. 9 shows the structure of Fig. 8 with a braided covering applied; and

Fig. 10 is a sectional view on line 10—10 of Fig. 9 on a still greater enlarged scale.

In the use of instruments for assisting in hearing, it is exceedingly desirable that the cord may be made of light-weight material and yet have considerable tensil strength and also be of such material that the perspiration or the oil and acids given off by the skin will not detrimentally

affect the same, while the cord will be resistant to abrasion. The usual cord which has heretofore been provided on the market consisted of a plurality of strands each with a cotton core which lacked the tensil strength in a small diameter which was desirable. Also, the cord usually was covered with a material such as rubber which was attacked by the acids of the skin which soon rotted the cord and the core thereof. In order that the cord might be strong enough, the size of the cord had to be increased. To avoid these disadvantages I have provided strength in the core and built up this strength by providing an outside covering sheath of a strong material which will accomplish this result. I have further provided an encasement for the strands which are resistant to the acids and oil of the skin and have so treated the covering that it is exceedingly resistant to abrasion, all of this being more fully described hereinafter.

With reference to the drawing, 12 designates the core of one of the strands which will be of a material which is many times stronger in tensil strength than the cotton which is usually provided at this location and yet will be of no greater diameter and no greater weight. Material which I have found suitable is "Nylon." "Nylon" is a synthetic filament more fully set forth in Patent 2,130,948, dated September 20, 1938, and referred to therein as polyamide obtained by condensation polymerization from diamine and dibasic carboxylic acid.

A solid copper wire 13 is plated with silver as at 14 and is rolled into a flat ribbon form, as shown at 15 in Figs. 4 and 5 and is then wrapped helically about the cord 12, as shown in Fig. 6, throughout the length thereof. The strands thus wrapped, designated generally 16, are twisted together, as shown in Fig. 7, at 17, and then such cord is embedded in an oil-resistant extruded covering, such as "Neoprene," 18 which will permeate through all of the twisted strands to cause them to be substantially embedded in a solid mold material. "Neoprene" is a polymerized chloroprene.

This "Neoprene" is selected because of its resistance to oils and acids and its waterproofing properties and is found to be much better than rubber or latex, which under some conditions might be used. A substitute for this "Neoprene" would be some synthetic organic substance commonly referred to as synthetic resin which would have substantially the water-resistant and oil-resistant properties of "Neoprene" and also possess the flexibility which is necessary to a cord

of this character, and at the same time provide longer wearing qualities for the cord. Such a synthetic organic sheathing would not necessarily require a further covering of "Nylon" braid as the surface of the resin presents an attractive appearance and is especially resistant to abrasion. The "Neoprene" used will be extruded onto the core and kept at a minimum diameter so as to just cover each of the strands to provide a casing.

After this extruded covering is placed on the cord, I treat its surface 19 with a wax of any good insulating properties such, for example, as cerease wax. Cerease wax is a pretolatum type of wax having a melting point of 155° F. A braid is then placed upon the cord so covered. This braid is designated generally 20 and will be formed of yarn of a strong tensil strength and small diameter such, for instance, as "Nylon." After the wire is so covered, it is passed through a steam bath which causes the braid to absorb wax which is placed upon the covering 19 which impregnates this braided covering and causes a sufficient amount of wax to extend through each of the interstices of the braid and about the outer surface so that the braid is exceedingly wear-resistant. Further, the end of the cord if cut will not fray because of this wax and heat treatment which has been given it.

In cases where the cord is to be used for a microphone, instead of placing a braided covering over the insulating material, the covering will be a braided copper shield over the conductor and then a heavy wall of high-grade rubber insulation will be placed over the braided copper shield.

The structure above described has the advantage of resisting heat to an extent enabling soldering of the tinsel strand without charring of the core, while the wax film prevents fraying of the covering and increases its resistance to wear to a considerable extent.

I claim:

1. A hearing aid cord comprising a plurality of twisted tinsel strands embedded in an over all covering of polymerized chloroprene with a covering of fabricated strands of a polyamide obtained by condensation polymerization from diamine and dibasic carboxylic acid, said covering being coated with a wax film.
2. A hearing aid cord comprising a plurality of twisted tinsel strands embedded in an over all covering of polymerized chloroprene with a covering of fabricated strands of a polyamide obtained by condensation polymerization from diamine and dibasic carboxylic acid, said covering being coated with a wax film, each tinsel strand having a core of a polyamide obtained by condensation polymerization from diamine and dibasic carboxylic acid.
3. A hearing aid cord comprising a plurality of twisted tinsel strands, each strand having a core of a polyamide obtained by condensation polymerization from diamine and dibasic carboxylic acid wrapped with a metallic ribbon, and said strands being embedded in a perspiration-resistant moldable electrical insulating material.

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