

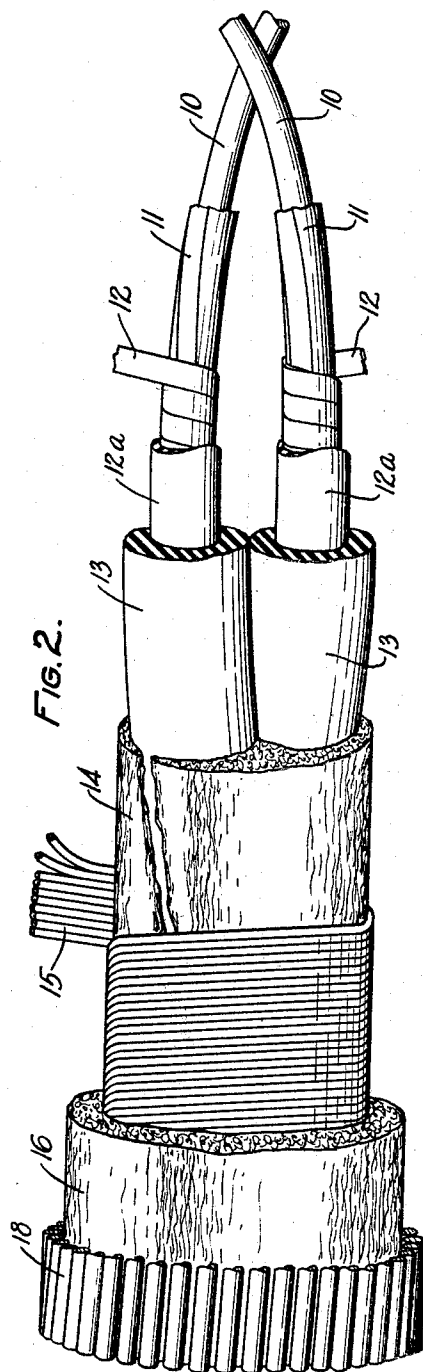
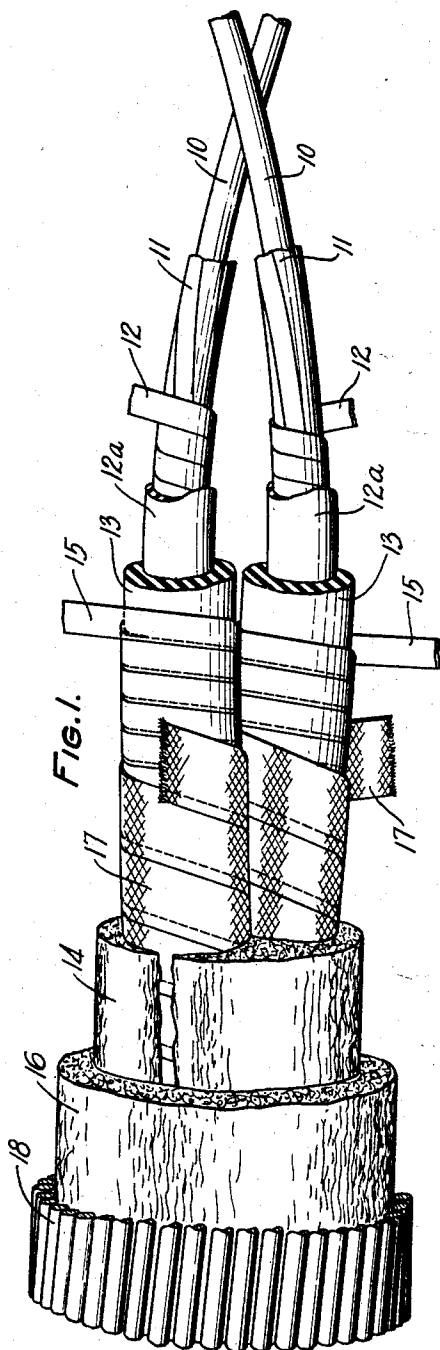
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SUBMARINE SIGNALING CABLE

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SUBMARINE SIGNALING CABLE

Application filed May 18, 1929. Serial No. 364,112.

This invention relates to submarine signaling cables in general and more particularly to cables of the twin core type.

An object of the invention is to reduce losses occurring in submarine signaling cables, especially at telephone frequencies or carrier frequencies in or above the voice range.

Another object of the invention is to decrease the attenuation for voice frequencies of long loaded submarine telephone cables.

A further object of the invention is to reduce that portion of the dissipative electrical losses of a twin core submarine signaling cable which are due to the presence of protective metallic envelopes such as Teredo tapes.

In order to protect the gutta percha or other thermoplastic insulation of the core of a submarine signaling cable from the attacks of Teredo or other submarine borers, it is customary to surround such portions of the core which are liable to the attacks with a metal layer such as brass. However, in the case of twin core cables of great length operating at frequencies in the voice range or higher, the eddy current losses in Teredo tape of the usual dimensions become a factor of importance. Such is the case not only when the cores each are surrounded by a separate Teredo tape but also when both cores are surrounded by a common Teredo tape. By methods of analysis not necessary to be stated here it may be shown that the losses occurring in a twin or other multiple core cable with either of these types of Teredo tape of the usual dimensions are more troublesome than with single core construction. These losses increase the attenuation of the signaling currents considerably and result in general from the presence of a magnetic field having a component perpendicular to the surface of the tape.

The Teredo tapes as heretofore used have a width of about one inch. Such tapes on a twin core conductor would cause large losses especially at voice and higher frequencies.

In order to decrease these losses, this invention proposes to depart from previous practice by using a subdivided Teredo pro-

ductive sheath such as a large number of tapes of greatly reduced width or of convolutions of fine wires.

The invention is primarily applicable to continuously loaded twin core telephone or other high frequency telephone conductors but is not limited in its application either to loaded conductors or frequencies as high as voice frequencies.

Fig. 1 of the accompanying drawing discloses a form of the invention in which the two cores of a twin core cable have individual layers of Teredo tape applied thereto; and

Fig. 2 discloses an arrangement in which the two cores are surrounded with a single layer of Teredo protection in the form of fine wires closely spaced.

In both figures of the drawing the conductors of the cable may consist of the usual central core 10 with flat surrounding strips 11 having applied thereto loading material 12 in the form of tape or wire which is imbedded in semi-liquid pressure equalizing material 12a, the insulating material 13, layers 14 and 16 of jute and armoring wire 18 being of suitable construction as indicated.

Referring more particularly to Fig. 1 the Teredo protecting layer may consist of one, two, or four or any other suitable number of relatively narrow tapes applied with a slight overlay as indicated. The overlapping parts, or the entire inner tape surface, may be insulated from each other by means of metallic oxide, a layer of fabric impregnated with bituminous material or other suitable insulating agents known in the art. See, for example, Gilbert's U. S. Patent 1,700,476, January 29, 1929. The width of the tape 15 may be as a maximum $\frac{1}{2}$ inch (12.7 mm.) and may be narrower than this down to the extreme case in which the tape assumes the form of wire. The Teredo tape or tapes 15 may be severally surrounded by fabric tape 17 provided for the purpose of avoiding conductive contact of the metallic tape or tapes of one core with the tape or tapes of the other.

In the construction of Fig. 2 a single Teredo protecting layer is laid about the worming of jute 14 which serves to make the two cores

13 into a round, or approximately round structure. As illustrated, the protective layer consists of fine wires 15 about 0.01 inch (0.254 mm.) when made of brass or copper.

5 The wires are laid to touch one another or are very closely and uniformly spaced so that a Teredo cannot penetrate between them.

In a construction in accordance with Fig. 1 or Fig. 2 either wire or tape may be used for the Teredo protecting layer. The invention is not in any respect limited to brass or copper Teredo tape or wire. Other materials such as nichrome, nickel-iron-chromium alloys, or copper-manganese-aluminum alloys of high resistivity and low permeability or both and resistant to corrosion in sea water may be used. A suitable thickness in the case of tape is about .004 inch (1.00 mm.) although the thickness may be greater or less as desired.

20 What is claimed is:

1. A submarine signaling cable comprising a core insulated with thermoplastic material, a layer of conducting material spiralled around said core to protect the insulation thereof from Teredos etc. and armor wires, said core including a conductor or conductors characterized in this, that the width of any element of the said layer of conducting material is less than $\frac{1}{2}$ inch (12.7 mm.), whereby eddy current losses in said conducting material are reduced.

2. A submarine signaling cable comprising a plurality of magnetically loaded and insulated electrical conductors, and means for protecting the insulation against damage caused by submarine borers, such as Teredos, characterized in this, that the means consists of metal tapes not in excess of $\frac{1}{2}$ inch (12.7 mm.) in width, said tapes being applied individually to each insulated conductor whereby losses due to eddy currents flowing in the tapes are reduced.

3. An insulated submarine signaling cable of the multi-core type having armor wire applied therearound and in addition having means for protecting the insulation against Teredos, said means being in direct contact with said insulation, characterized in this, that the protective means consists of convolutions of fine wire, whereby the generation of eddy currents in said means is reduced.

In witness whereof, I hereunto subscribe my name this 15th day of May, 1929.

JOHN J. GILBERT.