April 18, 1933. O. S. MARKUSON 1,904,873

ELECTRIC CABLE

Filed Jan. 2, 1926

Fig. 1.

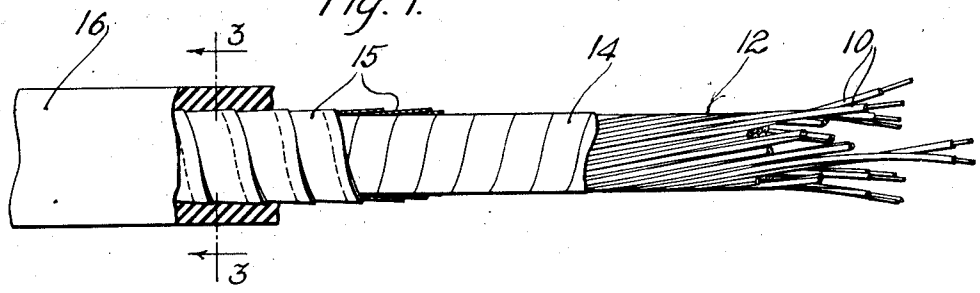


Fig. 2.

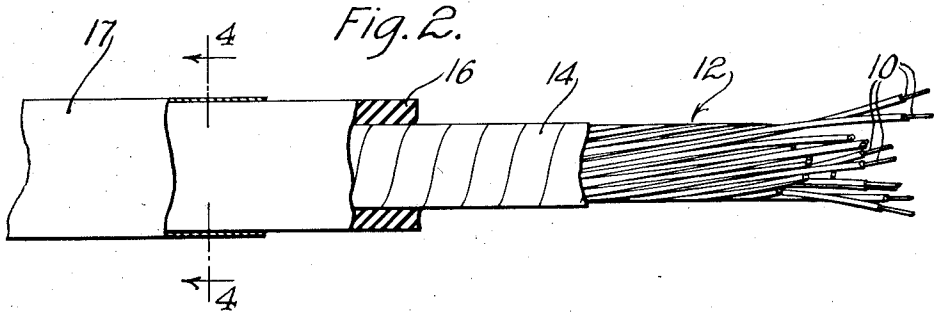


Fig. 3.

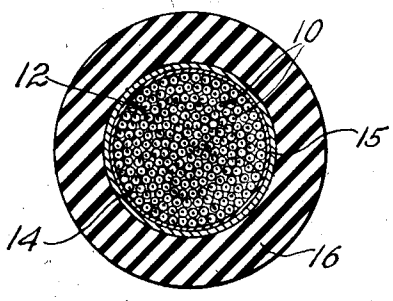
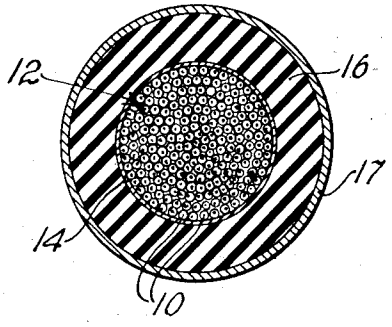


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRIC CABLE

Application filed January 2, 1926. Serial No. 78,798.

This invention relates to electric cables, and more particularly to the type employed for the transmission of intelligence telephonically.

It has been the practice in some instances in connection with the manufacture of telephone cables to form the cable by stranding pairs of paper insulated conductors together, binding the thus formed conductors and finally extruding a sheath of lead over the insulated conductors. This type of construction embodies certain outstanding features, namely, the high cost of the lead sheath and the inherent characteristics of the lead sheath to react deleteriously when subjected to chemical and electrolytic action. It is therefore the object of the present invention to construct a cable which may be manufactured economically and is substantially unaffected by electrolysis as well as being considerably lighter in weight than cables of the foregoing construction.

According to one embodiment the present invention contemplates a telephone cable constructed by arranging a plurality of paper insulated conductors of low resistance stranded together with a thin sheath of metal, preferably of lead alloy tape, associated therewith to protect the conductors against electrical inductive interference and to increase the mechanical strength of the cable and a covering of material which is impervious to moisture.

Other objects and advantages of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawing illustrating the embodiments thereof, in which

Fig. 1 is an elevation, partly in section, showing the preferred form of the improved telephone cable;

Fig. 2 is an elevation, partly in section, showing another form of the improved telephone cable;

Fig. 3 is a vertical sectional view along the line of 3—3 of Fig. 1; and

Fig. 4 is a vertical sectional view along the line of 4—4 of Fig. 2.

Referring to the drawing (Figs. 1 and 3), the numeral 10 indicates a plurality of low resistance copper wires insulated with paper, cotton, silk or other suitable material, usually twisted together in pairs, the pairs being stranded together loosely in layers to form a group or bundle 12. The group 12 may be formed in any suitable manner, but preferably by the usual and well known form of strander, which has associated therewith a tape serving head by which a paper wrapping 14 may be applied spirally to retain the group comprising the conductors within a predetermined diameter. Surrounding the paper wrapping 14 is a flexible sheath 15 which is formed by applying a comparatively thin metallic ribbon or tape, preferably composed of lead alloy, spirally around the cable so that the edges of adjacent turns slightly overlap each other. The sheath 15 serves as a shield for the cable circuits against extraneous inductive interference, thus providing the cable circuits with more stable electrical characteristics, and also mechanically strengthens the cable. A covering 16 of tough rubber, gutta percha or a gutta percha substitute, such as Gentzsch's compound, may then be applied by drawing the conductors through an extruding machine, which may be of the usual type which applies the covering in one or more layers around the entire length of the thus arranged conductors.

The cable illustrated in Figs. 1 and 3 described in the foregoing description is of particular utility where telephone cables are employed in underground systems which is the principal type of construction used in large cities. The employment of an outer imperforate non-metallic covering 16 of the character described, instead of the usual lead sheath, generally employed in cables of this type, minimizes damage to the cable from electrolytic action to which lead is particularly susceptible due to the decomposition resulting when subjected to a neighboring source of electrical energy. It also results in a cable which may be manufactured economically and with a decided reduction in the weight thereof, as will readily be apparent, since the usual comparatively thick layer of lead forming the outer sheath of cables of this type is omitted.

In some cases it may be advantageous to employ a cable of a construction slightly different from the type of construction heretofore described, in which case the spirally arranged sheath 15 applied directly to the paper wrapping 14 is omitted, and the gutta percha covering 16 is preferably provided with a protective sheath 17 (Figs. 2 and 4) composed of a thin continuous layer of lead alloy applied in a well known manner by the usual type of extrusion press. This outer sheath 17 of lead serves as a protection to the rubber, gutta percha or gutta percha substitute covering 16 against water penetration and chemical decomposition which might take place if the covering 16 were exposed directly to atmospheric conditions, such as is the case when the cables are employed of the aerial or overhead construction, and also as a shield to the cable circuits against extraneous inductive interference. It may be preferable, in some instances, to form the outer protective sheath of wire or any suitable strand applied spirally, in a manner well known to form a continuous unbroken sleeve, in place of the thin layer of lead, or to apply a fabric tape composed of some such material as cotton, jute, hemp, etc., the tape being impregnated either previously to its application to the cable or thereafter with any suitable compound capable of resisting chemical decomposition due to atmospheric conditions and also serving as a mechanical reinforcement for the cable.

What is claimed is:

1. A telephone cable comprising a plurality of pairs of paper insulated conductors, a continuous insulating sheath composed of a paper ribbon applied spirally around the conductors, a relatively thick sheath of tough rubber applied to the outside of said paper ribbon sheath, and a thin continuous lead covering surrounding the sheath of tough rubber for protecting said conductors against extraneous electrical disturbances.

2. A telephone cable comprising a plurality of individually insulated conductors assembled into a solid core, a continuous insulating medium disposed therearound to form an imperforate sheath therefor, a sheath composed of thin lead ribbon wrapped helically about said imperforate sheath, and a relatively thick sheathing of tough rubber formed about and engaging the lead sheath.

In witness whereof, I hereunto subscribe my name this 28th day of December A. D., 1925.

OSCAR SEVERIN MARKUSON.