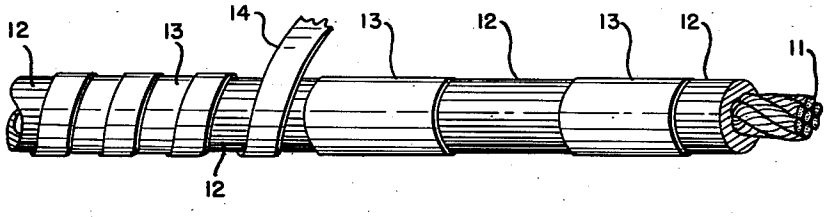
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AERIAL CABLE WITH EXTERNAL RADIO SIGNAL REFLECTION CORRECTION

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## AERIAL CABLE WITH EXTERNAL RADIO SIGNAL REFLECTION CORRECTION

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2 Claims. (Cl. 178—44)

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This invention relates generally to electrical apparatus and more particularly to cables for towing targets for radio object locating apparatus.

One type of cable that has been used previously for towing targets for radio object locating apparatus is ⅛ inch armored steel cable. This cable has the disadvantage of reflecting radio frequency energy from the nearby radio object locating apparatus. This causes undesirable echoes to appear at the radio object locating apparatus and if the set is an automatic tracking device the tracking will be unreliable.

It is an object of this invention, therefore, to provide a cable for towing radar targets which will have a relatively low radio frequency reflectivity.

It is a further object of this invention to provide a cable with low reflectivity and with mechanical strength and flexibility equal to that of cables with similar ratio of weight to length in cables previously used.

Other objects, features, and advantages of this invention will suggest themselves to those skilled in the art and will become apparent from the following description of the invention taken in connection with the accompanying drawing in which the sole figure is a perspective view of a section of cable constituting one embodiment of the invention.

Referring now to the drawing, the inner steel cable 22 is covered with an elastic, flexible, rubber-like insulating material 12. Over the insulating material 12, and spaced longitudinally at intervals are sleeves of conducting material 13 such as aluminum foil. Over the insulating material 12 and conducting material sleeves 13, there is wrapped spirally an armor material 14 such as steel.

The operation of the cable described above can best be understood by considering the reason why an ordinary cable has a high reflectivity when irradiated with radio frequency energy of normal incidence. In this case, a uniform current is caused to flow along the cable, and the resulting secondary or reflected waves will have effectively over ordinary ranges of radio object locating frequencies the same phase over the whole length of the cable. This results in a strong return signal.

My above-described type of cable prevents a uniform current flow, because the self-inductance per unit length of cable is no longer constant over the length of cable, but comprises a group of different low values originating in the

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shorted and unshorted sections, and in split-phase relation, since the conducting material sleeves 13 act to short out a number of turns of the armor material 14. Consequently, the secondary waves originating from different regions of the cable will no longer have the same amplitude, nor necessarily the same phase. The distance between sleeves 13 has been adjusted in such a way as to obtain the best possible destructive interference of these secondary or reflected waves. It is for this reason that the spacing between the sleeves 13 is a critical dimension of the above-described cable.

In practice, the operation of the improved cable is similar to the ordinary ⅛ inch armored steel cable with the exceptions that the armor 14 is separated from the inner steel cable 11 by a thin layer of insulating material 12, and that certain turns of the spiral armor 14 are shorted out by the metal sleeves 13. With this particular cable and the particular frequency of the transmitter with which it was tested, it was found that for best operation the conducting sleeves 13 should be spaced one inch apart and that each sleeve 13 be $^{15}/_{32}$ inch in length. The sleeves 13 were fastened to the insulating material 12 with a substance such as glue. The most critical dimension was found to be the spacing between sleeves 13. Tolerance of this dimension should be held to approximately $\frac{1}{32}$ inch.

It was found that the reflectivity of this type of cable was reduced 75%, when compared with the conventional cable at a frequency in the neighborhood of several thousand megacycles.

While there has been described what is at present considered the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. In an aerial cable for use in a zone of transmission of radio object-locating signals, an inner cable constructed of a continuous conducting part, an insulating material at least partially covering said inner cable, sleeves constructed of a conducting material overlying said insulating material, said sleeves being spaced at intervals along the length of said cable, and armor material spirally wound around said insulating material and said sleeves with interstitial space between the convolutions, the sleeve lengths and spaces between the sleeves being proportioned in

a definite relation to a given band of external radio signal frequencies incident externally on the cable.

2. The article of claim 1 in which the said spaces between the sleeves exceed in longitudinal extent the lengths of the sleeves.

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