May 7, 1957 E. S. KIGLER 2,791,624

TRANSMISSION CABLE FOR HIGH FREQUENCIES

Filed Sept. 8, 1953

FIG. 1.

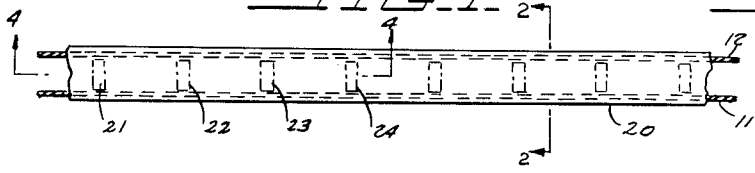


FIG. 2.

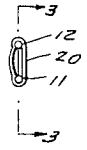


FIG. 3.

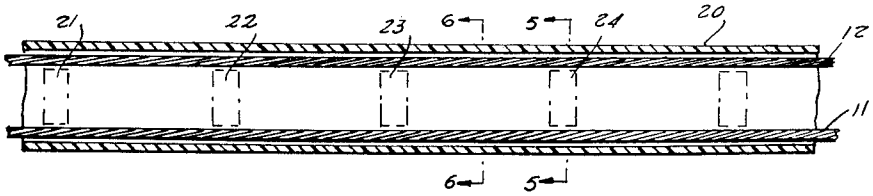


FIG. 4.

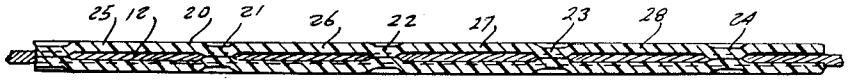


FIG. 5.

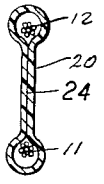


FIG. 7.

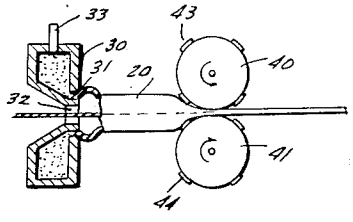
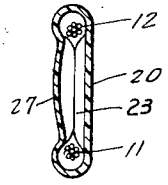


FIG. 6.



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TRANSMISSION CABLE FOR HIGH FREQUENCIES

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2 Claims. (Cl. 174—113)

This invention relates to transmission cables especially useful for conducting high frequency currents such as used in television systems, etc.

It has already been proposed to make use of air as a dielectric material in transmission cables. For example, wires have been embedded in the opposite sides of a tube made of dielectric material, and wires have been maintained in spaced relationship by a series of spaced separators.

Among the objects of this invention is to provide a transmission cable of simple and economical construction which provides for air or similar desirable fluid as a dielectric separator. Air has a zero power factor, is low dielectric constant, is readily available and the said dielectric constant is invariable.

Among other objects of the invention is to provide a cable comprising two conductors fixed in an insulating tube and separated from each other by air spaces of fixed width and a process of making such product.

These objects and others ancillary thereto are obtained by providing a pair of conductor elements, surrounding the conductors with a tube of dielectric plastic material and thereafter pinching and sealing the tube together at spaced points along the length thereof so as to hold the tube in flat position at said spaced points with the conductors fixed in the tube one at each side thereof.

A very convenient way to surround the conductors by the tube is to extrude a tube while continuously introducing the conductors into an opening in the nozzle used to extrude the tube. The tubes may be made of any desired thermoplastic material. If desired, however, the tube may be formed first and the conductors introduced and sealed therein afterwards. Examples of suitable thermoplastic materials include the polyvinyl resins such as polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride, acrylonitrile, polyvinyl carbozole and copolymers of such materials; polyethylene; polystyrene; cellulose esters and ethers such as cellulose acetate, cellulose acetate butyrate, ethyl cellulose, etc.; the nylon type of polymeric materials, etc. Since the surrounding means is first formed as a tube the portions thereof between the united regions tend to expand outwardly to provide an air space between the two conductors held at either side of the cable.

The invention both as to its organization and its method of operation together with additional objects and advantages thereof will be best understood from the following descriptions of specific embodiments thereof when read in connection with the accompanying drawing in which:

Fig. 1 is a plan view of the cable of the invention.

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 2 but on an enlarged scale.

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a cross-sectional view similar to Fig. 2 but taken on line 5—5 of the enlarged Fig. 3.

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 3.

Fig. 7 is a diagrammatic view illustrating a method of making the product.

The finished product shown in Figs. 1–6 comprises the conductors 11 and 12 within the flattened tube 20. Transverse portions of the tube 20 are sealed together at spaced regions 21, 22, 23, 24, etc. along the length thereof. These spaced portions are rather short linearly with respect to the length of the cable but extend substantially from one conductor 11 to the other conductor 12 transversely of said cable as shown in Fig. 3.

Intermediate the adjacent sealed portions 21—22, 22—23, etc. are unsealed areas, 25, 26, etc., at least one side of which tends to bulge outwardly to provide air filled regions between conductors 11 and 12.

A convenient way to make the cable of the invention is illustrated in Fig. 7. A tube is continuously extruded through nozzle 30 having an annular orifice 31 and an opening 32 inside of the orifice area through which wires to be covered can be introduced. Thermoplastic tube forming material is introduced under pressure through conduit 33. The extruded tube 20 is drawn off and is passed between heated rollers 40, 41, each of which contain matching projections 43, 44 thereon. As the tube 20 passes between rollers 40, 41 portions of the tube 20 along the length thereof are pressed together by heated projections 43, 44 and sealed or fused together to produce the device of Fig. 1.

It will be seen that the cable of the invention is very easy to make, requires less material than where wires are completely embedded in dielectric material, provides a cable which has air as a dielectric and is very economic and effective. If desired other fluids or gases besides air may be sealed into the cable.

The features and principles underlying the invention described above in connection with specific exemplifications will suggest to those skilled in the art many other modifications thereof. It is accordingly desired that the appended claims shall not be limited to any specific feature or details thereof.

I claim:

1. In a cable for the transmission of high frequency currents, a pair of conducting elements, and a flattened continuous tubular body of dielectric material surrounding said conducting elements, a first of said conducting elements extending along one side of said flattened tubular body, a second of said conducting elements extending along the opposite side of said flattened tubular body, said flattened tubular body having the opposite portions thereof united at spaced intervals to hold said body in flattened shape and to hold the said conductors in position at the side of said flattened tube and to provide spaced air bubbles within the tubular body extending between the conductors.

2. The process of making a transmission cable comprising the steps of continuously extruding a tube of insulating thermoplastic material, continuously introducing into the tube as it is extruded a pair of spaced conductors, continuously flattening said tube and sealing the tube at spaced portions along the length thereof to hold the tube in flattened condition and to position the said conductors along the edges of the flattened tube.

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