

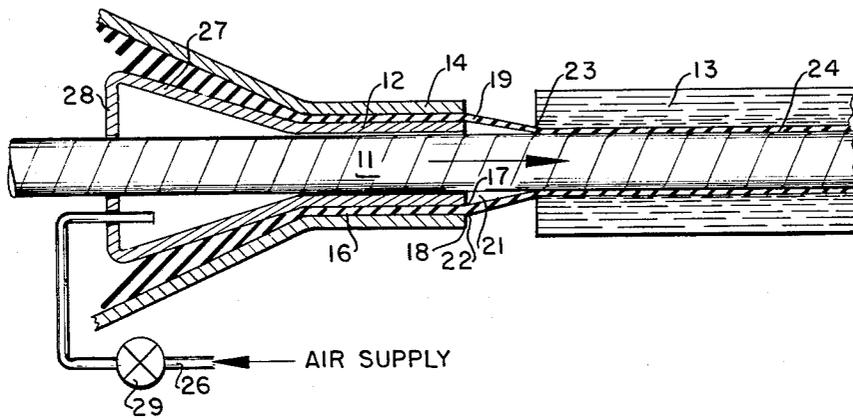
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METHOD OF JACKETING TELEPHONE CABLES

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HIS AGENT

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**METHOD OF JACKETING TELEPHONE CABLES**  
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 assignments, to Anaconda Wire and Cable Company,  
 a corporation of Delaware  
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My invention relates to telephone cables and particularly to a method of jacketing such cables without increasing their capacitance unbalance.

In the manufacture of telephone cables it is necessary to balance the capacitance of the pairs making up the cable core. For this purpose great care is taken to have uniform insulation on each wire and to apply appropriate tension during the pair twinning, quadding, and cabling operations. To make sure that all operations have been conducted satisfactorily it is customary to perform electrical tests on the cable cores prior to the application of cable jackets. It has been found, however, that cores which conform to all specification requirements prior to jacketing will sometimes have high capacitance unbalance after they are jacketed.

Telephone cables to which my invention is directed comprise a core made up of pairs and/or quads of copper conductors stranded together, covered by a core wrapping. The conductors are each covered by a thermoplastic insulation and a heavy thermoplastic jacket is applied over the covering of the core. Although it has been known that the thermoplastic insulations may be damaged by the heat of extrusion of the jacket it has not been practicable to cover the cores with thick, heat insulating core wrappings because of the understandable commercial need to keep the diameters and weights at a practical minimum. Instead the jackets are applied by so called "tubing" methods while the core coverings are kept as thin as possible. In the tubing method of applying the jackets the core tube and die are selected so as to extrude the jacket in the form of a tube considerably larger than the cable core and then draw the jacket down to the core. This is done by advancing the core somewhat faster than the jacket is extruded so that the latter necks down over the former. By the time the jacket comes into contact with the cable it has cooled somewhat and at that point it is immediately submerged into the water of a cooling trough. This has the effect of abstracting the heat from the jacket but it also causes the jacket to shrink and in so doing the jacket compresses the core and wedges itself into some of the valleys of the outer pairs, also driving the core covering down into those valleys.

The compression of the cable jacket thus has the effect of disturbing the configuration of the pairs relative to each other and the unbalance which may have been negligible in the cable core prior to jacketing is found to have increased to an unacceptable value in the jacketed cable.

I have discovered that if compressed air is introduced into the core tube during the extrusion of the jacket, shrinkage of the jacket can be controlled to prevent any compression of the cable core with the result that no increase in capacitance unbalance will ensue. My method comprises the steps of forming a cable core of a plurality of twisted pairs having low capacitance unbalance and extruding an oversized thermoplastic jacket such as a polyethylene jacket over the core while simultaneously introducing pressurized gas under the jacket.

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I advance the core at a speed slightly greater than the speed of extrusion of the jacket so as to draw down the jacket, water-cool the jacket and shrink the jacket by means of said cooling while regulating the air pressure so as to have the jacket make contact with the surface of the core without compressing the core.

A more thorough understanding of my invention may be gained from a study of the appended drawing.

In the drawing the figure shows a sectionalized plan view of cable being jacketed in accordance with the method of my invention.

Referring to the figure a core 11 which comprises a plurality of pairs of telephone conductors is advancing through a core tube 12 into a cooling trough 13. The pairs of the core 11 may also be twisted into quads and my invention has particular relevance to such cores since avoidance of capacitance unbalance is more critical for quadded cables. A die 14 surrounds the core tube 12 and a thermoplastic material such as polyethylene 16 is forced by known extrusion means, not shown, between the core tube 12 and the die 14. An edge 17 of the core tube 12 is substantially flush with an edge 18 of the die 14 with the result that the plastic 16 is extruded in the form of a tube 19 around the core 11. Due to the thickness of the wall of the core tube 12 the tube 19 is spaced from the core 11 leaving an annular space 21. The core 11 is advanced faster than the material 16 is being forced from the die 14 with the result that the tube 19 is drawn down to the core and reduced in thickness at the same time. Thus the thickness of the wall of the tube 19 at a point 22 where it leaves the die is greater than its thickness at a point 23 where it contacts the core 11. At about this point 23 the core enters the cooling trough 13 where heat is abstracted from the tube 19 and the latter shrinks to its final size to form a jacket 24 on the core 11.

To prevent the jacket 24 from shrinking too tightly so as to compress the core 11 I introduce air or other pressurized gas into the core tube 12 through piping 26 from a supply not shown. To maintain the gas pressure around the core the core tube 12 which has a funnel portion 27 is provided with a bushing 28 which has a slide fit over the core 11. The pressure within the core tube 12 can be controlled by means of a valve 29, and in my process the pressure is maintained so as to let the jacket 24 collapse around the core 11 to the extent of contacting the core around its surface but not enough to permit the jacket to compress the core or to enter the valleys between the conductors comprising the same.

I have invented a new and useful process for making telephone cables for which I desire an award of Letters Patent.

I claim:

1. The method of making a telephone cable having low capacitance unbalance comprising the steps of:
  - (1) forming a cable core of a plurality of twisted pairs having low capacitance unbalance,
  - (2) extruding an oversized thermoplastic jacket over said core while
    - (a) simultaneously introducing pressurized gas under said jacket,
    - (b) said gas entering and remaining between the pairs of said core,
  - (3) advancing said core at a speed slightly greater than the speed of extrusion of said jacket so as to draw down said jacket,

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- (4) water-cooling said jacket and  
 (a) shrinking said jacket by means of said cooling,  
 (5) maintaining said gas pressure in said core during  
 said cooling, and  
 (6) regulating said air pressure within said core so  
 as to have said jacket make contact with the sur-  
 face of said core,  
 (7) said gas pressure preventing said jacket from  
 shrinking sufficiently to compress said core.  
 2. The method of claim 1 wherein said jacket is 10  
 polyethylene.

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