Feb. 4, 1941. A. W. J. BROMLEY 2,230,481

HOISTING CABLE

Filed Jan. 30, 1939

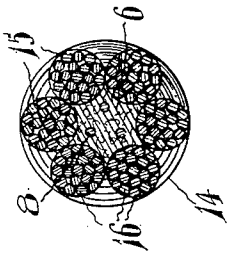

Fig. 2.

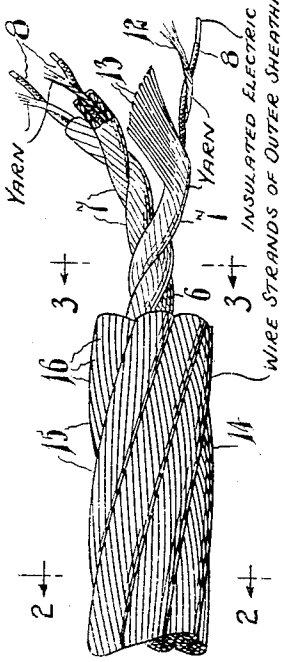

Fig. 1.

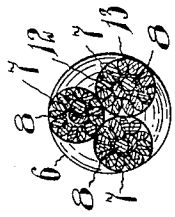

Fig. 3.

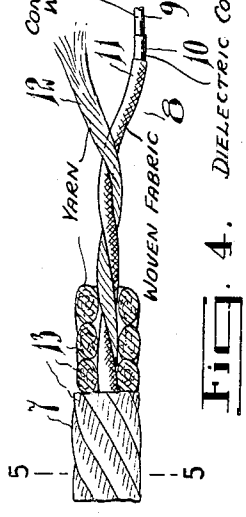

Fig. 4.

Fig. 5.

Inventor
Arthur W. J. Bromley
By Frederick C. Bromley
Atty.

Patented Feb. 4, 1941 2,230,481

UNITED STATES PATENT OFFICE

2,230,481

HOISTING CABLE

Arthur W. J. Bromley, Whitney Township, Ontario, Canada

Application January 30, 1939, Serial No. 253,578

5 Claims. (Cl. 174—108)

My invention relates to improvements in the art of forming supporting and conducting cables commonly referred to as conductor wire ropes. The object of the invention is to produce a wire rope especially suited for safety and signal purposes in mines, and one that is capable of withstanding varying tensional loads imposed upon it without damage to the embedded electric conductor or conductors therein.

In the operation of a mine-cage it is imperative that communication be maintained constantly between the tender and hoistman in order that the tender may signal desired movements of the cage. Therefore it is mandatory that the electric conductor be practically free of detrimental tensional stresses even though the weight supporting sheathing of the haulage rope is subjected to heavy loads conducive to excessive tensile strains. The electric conductor must also be so implanted in the weight supporting sheathing as to allow for stretch and bending in order that electrical transmission may not be disrupted by breakage.

The present invention provides a conductor wire rope that fulfills these requirements, and one that from tests made has proved to be practical and serviceable.

A distinctive feature of the invention is that it is comparatively inexpensive to manufacture and provides a conductor whereby transmission of electric energy may be relied upon and utilized for many purposes such as for instance the operation of safety switches in a cage, or establishing communication between the cage and the surface of the hoist.

Having described the nature of my invention, reference is made to the accompanying drawing in which Figure 1 is a side elevation of the wire rope showing the laminae as broken away successively to illustrate the composite structure.

Figure 2 is a cross section taken on line 2—2 of Figure 1.

Figure 3 is a cross section taken on line 3—3 of Figure 1.

Figure 4 is a side elevation partly in section of one of the strands of the core.

Figure 5 is a cross section taken on line 5—5 of Figure 4.

Like numerals of reference denote similar parts in each figure of the drawing.

In the drawing, the preferred structrue given by way of example but not of limitation comprises the provision of a malleable core generally denoted by the numeral 6. The core is composed of several strands 7, desirably three in number, indicated at 7.

In the embodiment of the present disclosure the strands are of identical construction. In constructing a strand I take an electrical conductor 8, composed of a conductor wire 9 with the usual dielectric coating 10 and tubular covering 11 of closely woven fabric, and twist it helically together with a yarn 12 that serves as a filler for the convoluted conductor—best shown in Figure 4. The electrical insulation for the conductor wire may be somewhat modified, if so desired.

In this way I produce a composite centre or base for the individual strand, the base or centre consisting of the helically twisted or coiled conductor and the yarn. In effect the yarn serves to fill in the interspaces of the helices of the conductor to thus round it out and present a more or less solid body suited to resist compressive stresses imposed upon the successive helices in the ultimate formation of the wire rope. The lay of the helices of the conductor preferably is not as great as that of the wire strands in the completed wire rope. The object in so twisting or coiling the conductor is to accommodate incidental elongation and contraction of the conductor due to bending or tensional strains on the weight supporting sheathing.

The sinuous insulated conductor is thus rendered elastic to a certain degree throughout its length sufficient at any rate to obviate tensile strain on the copper wire in the use of the cable.

To complete the strand 7, I take a series of individual yarns 13 and coil or lap them helically about said conductor 8 and its yarn filler 12, keeping said yarns in contact with and parallel to one another in order to compose a tubular sheathing of fibrous material around the composite centre. Accordingly it will be seen that there is provided an outer cylindrical lay of yarn, such as hemp, enclosing the sinuous conductor to fully protect it. The complement of strands 7 are subsequently helically twisted or wound about one another to compose the composite centre or core 6, which may be treated or impregnated with a suitable protecting solution as is common in the art.

While I have recounted the core as having each strand provided with an electric conductor, this of course is not essential for the invention is equally applicable to a core in which only one of its strands contains a conductor. In constructing a core in which a conductor is omitted from a strand the conductor may of course

be replaced by a yarn centre or the entire strand could be of an entirely different structure.

To complete the wire rope, an outer sheathing of stranded steel is wound around the core 6 in conventional manner and applied by machines well known in the manufacture of cables. This weight supporting sheathing is generally denoted by the reference numeral 14 and comprises a plurality of strands 15 each composed of a suitable number of twisted wires 16. The strands 15 are formed and applied in known manner such as to insure a close wrap about the core whereby the relatively soft core is compacted solidly and forced into intimate contact with the wires of the strands, as is clearly depicted in Figure 2.

It will be manifest from the preceding description that I have devised a simple and practical improvement in the manufacture of conductor wire ropes.

What I claim is:

1. A supporting and conducting cable comprising a weight supporting sheathing of stranded wires having a long lay; a multi-stranded non-supporting core having flexible characteristics and a relatively short lay, the lays of the sheathing and the core extending in the same direction, the core being malleable and being compacted in said sheathing to fill the interstitial spaces of adjacent strands thereof, the component strands of the core being twisted about one another and each having an axis which is helical in form that is displaced from the center of the core, at least one of the core strands being composed of an electric conductor helically extended through the centre portion thereof with the axis of its helix coinciding with the axis of the strand which contains it, a fibrous material lapped helically about the conductor to fill the spaces of the helix thereof so as to form a core strand base with the conductor for precluding collapse of the conductor under compressive stresses, and a series of individual yarns lapped around said base to compose a tubular sheathing therefor.

2. A structure in accordance with claim 1 and in which the electric conductor consists of a wire having a dielectric coating and a fabric covering.

3. A supporting and conducting cable comprising a weight supporting sheathing of stranded wires having a long lay; a multi-stranded non-supporting core having flexible characteristics and a relatively short lay, the lays of the sheathing and the core extending in the same direction, the core being malleable and being compacted in said sheathing to fill the interstitial spaces of adjacent strands thereof, the component strands of the core being twisted about one another and each having an axis which is helical in form that is displaced from the center of the core, at least one of the core strands being composed of an electric conductor helically extended through the centre portion thereof with the axis of its helix coinciding with the axis of the strand which contains it, a yarn lapped about the conductor to fill the spaces of the helix thereof so as to form a core strand base with the conductor for precluding collapse of the conductor under compressive stresses, and a series of individual yarns lapped contiguously around the base and extending parallel to one another so as to compose a tubular sheathing therefor.

4. A supporting and conducting cable comprising a weight supporting sheathing of stranded wires having a long lay; a multi-stranded non-supporting core having flexible characteristics and a relatively short lay, the lays of the sheathing and the core extending in the same direction, the core being malleable and being compacted in said sheathing to fill the interstitial spaces of adjacent strands thereof, the component strands of the core being twisted about one another and each having an axis which is helical in form that is displaced from the centre of the core, each core strand being composed of an insulated conductor wire helically extended through the center portion thereof, said wire having the axis of its helix coinciding with the axis of the strand which contains it, a yarn lapped helically about the conductor to fill the voids thereof produced by the helical formation, said yarn providing a core strand base with the conductor for precluding collapse of the conductor under compressive stresses, and a series of individual yarns lapped contiguously around said base and extended parallel to one another so as to compose a tubular sheathing therefor.

5. A structure in accordance with claim 4 and in which the core consists of three strands.

ARTHUR W. J. BROMLEY.