The invention relates to a method of making wire ropes, cables and the like (for convenience hereinafter referred to simply as ropes) from strands, to strands for making the ropes and to ropes so made. It is desirable that preferably all the wires in a strand and/or preferably all the strands in a rope are intentionally spaced apart at least portions of their length to permit the ingress of a plastics material. The spaces not only facilitate penetration of the plastics between the wires and strands but they also ensure that the plastics is properly keyed in place. The walls of plastics material formed between the wires and strands minimize abrasion between the wires and prevent the intrusion of dirt and corrosive substances, thereby increasing the life of the rope.

In one form of the present invention, the strand for a rope comprises a core and a number of equal diameter wires twisted around the core together with a larger-diameter wire, the number of wires and the diameters of the wires and core being chosen such that at least some and preferably all the wires are spaced from each other, plastics material being located in the spaces between the wires. The plastics materials may also be continued radially beyond the outside diameter of the strand so as to provide an outer protecting sheath. The core will usually be of larger diameter than the equal-diameter wires to achieve the desired spacing of wires. However, in some circumstances it may be smaller; this depends on the diameter and the number of wires that are twisted around the core. The material of the core can be chosen according to need but it is usually simply another wire, termed the king wire.

For a multi-stranded rope, a plurality of the above-described strands can themselves be twisted about a further core, with a spacing being formed between the strands along most of their length and preferably also between each strand and the said further core. In this case, the said further core may again be of any desired material, for example hemp, manila or plastics or a strand of twisted wires and the plastics material may terminate flush with the outside wires or be continued to form a sheath. To achieve the spacing between the strands, it will be understood that at least one outside wire is made larger than the remaining outside wires in each strand. In this way, as the strands are twisted around the core, neighboring strands can be in contact at least with their outside wires at intervals along the length of the rope but spaced apart elsewhere. This can also achieve a spacing between each strand and the core except where the outside diameter of each strand touches the core. Where the said further core is itself constituted by a strand, at least one outside wire of the core may likewise be made oversize.

The invention has particular application to ropes for earth moving, mining and haulage equipment where dirt and corrosive substances are encountered in extreme quantities. Ropes according to the invention can be made much more economically than conventional ropes.

An example of the invention is illustrated in the accompanying drawings wherein:

The illustrated rope comprises an enlarged cross-section through a multi-stranded rope. Each strand comprises five outside wires 1 of 0.020 inch diameter laid so that, when viewed in cross-section, they are in tangential contact with a common imaginary enveloping circle, and one outside wire 1a of 0.025 inch diameter all projecting beyond said enveloping circle, twisted about a core or king wire 2 also of 0.025 inch diameter. Wire 2.

By virtue of the over-sized King wire, a spacing 3 is obtainable between the adjacent wires 1 and 1a and this spacing is utilized for the ingress, by any suitable method such as extrusion, of plastics materials such as PVC to provide a protecting wall between the wires 1, 1a. Of course, in practice it may not be feasible to ensure uniform spacing of the helically twisted wires and they may in fact be in contact at some places along the length of the rope but one should strive to keep the wires 1 at a separation wherever possible.

The multi-stranded rope comprises six outside strands twisted about a core shown as formed by a strand, of the same construction as the outside strands, but it need not be; nor need it be of metal. The overall rope diameter is about 9/32 inch.

The spaces 3 between the outside wires 1 in each strand are, as already mentioned, obtained by virtue of the king wire 2 being oversize. The spaces 3a between the adjacent outside strands and between the strands and the core are obtained by virtue of the oversize outside wire 1a in each strand. Naturally, since the outside wires in each strand and the outside strands in the rope are twisted, the cross-sectional appearance will be different at different points along the length of the rope. Also, laying of the wires and strands may not be uniform so that adjacent strands and the core could be in contact at points other than where the oversize wires 1a touch adjacent strands or the core. However, it will be evident that ample spaces 3 and 3a are available to permit entry of the plastics material. If adjacent strands touch each other only with their oversize wires 1a, the maximum available spacing will be 0.010 inch.

I claim:

1. A method of making a multi-stranded rope from multi-wire strands, wherein the strands contain at least one wire which is of larger diameter than the other wires, comprising the steps of twisting the strands about a core, whereby to form a spacing between the strands and between each strand and the core over portions of their length, and intruding plastics material into the spaces thus formed between the strands and the core.

2. A method of making a multi-stranded rope from multi-wire strands laid about a multi-wire core, wherein the core contains at least one outside wire which is of larger diameter than the other outside wires of said core, comprising the steps of twisting the strands about the core with a spacing left between at least some of the strands over at least portions of their length, whereby such twisting also forms a spacing between each strand and the core over portions of their length, and intruding plastics material into the spaces thus formed between the strands and between the strands and the core.

3. A method of making a multi-stranded wire rope comprising the steps of forming a plurality of strands, each such strand being made by twisting a plurality of outside wires of equal diameter and one oversize outside wire about a king wire of the same diameter as the oversize outside wire so as to form spaces between the individual outside wires in each strand over at least portions of their length, twisting the strands about an identical strand constituting the core of the rope whereby to form spaces between the individual strands and between the strands and the core over portions of their length, and intruding plastics material into all the spaces thus formed.

4. A multi-stranded plastics impregnated wire rope, wherein the strands are twisted about a core formed by an identical such strand, each strand comprising a plurality.
of outside wires of equal diameter and one outside wire of larger diameter, all such wires being intentionally spaced apart from each other over at least portions of their length and twisted about a king wire.

5. A rope according to claim 4 wherein the king wire is of the same diameter as the said larger diameter outside wire.

6. A method of making a multi-stranded wire rope, comprising the steps of forming a plurality of strands, each such strand being made by twisting a plurality of outside wires of equal diameter and at least one oversize outside wire about a core so that most of the outside wires are, as viewed in cross-section, in tangential contact with a common imaginary enveloping circle but the said oversize outside wire projects beyond the said circle, twisting the strands about a further core, whereby to form a spacing between the strands and between each strand and the said further core over portions of their length, and intruding a plastics material into the spaces thus formed between the strands and between the strands and the said further core.

7. A strand for a rope, comprising an outer lay of twisted wires, wherein most of said twisted wires are of substantially equal diameter and, as viewed in cross-section, are in tangential contact with a common imaginary enveloping circle, but wherein at least one of said twisted wires is of larger diameter and projects beyond said enveloping circle.

8. A strand according to claim 7, wherein said twisted wires are intentionally spaced apart over at least portions of their length to permit the ingress of a plastics material.

9. A strand according to claim 8, including plastics material intruded in the spaces to form walls between the wires.

10. A strand according to claim 9, wherein the plastics material extends radially outwardly to provide an outer protecting sheath.

11. A strand according to claim 7, wherein the said wires in the outer lay are twisted about a core.

12. A strand according to claim 11, wherein the said core is of the same size as the said larger diameter twisted wire.

13. A rope comprising a plurality of strands, each such strand having an outer lay of twisted wires, most of said twisted wires being of substantially equal diameter and, as viewed in cross-section, being in tangential contact with a common imaginary enveloping circle but at least one of said twisted wires being of larger diameter and projecting beyond said enveloping circle, wherein all said strands are twisted about a further core.

14. A rope according to claim 13, including plastics material intruded into spaces formed between the strands and between each strand and the said further core.

15. A rope according to claim 14, wherein the said further core is itself a strand comprising an outer lay of twisted wires of substantially equal diameter and at least one wire of larger diameter.

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