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(54) WIRE-ROPE WITH LOAD-CARRYING CORE FIBRES

(71) We ELKEM-SPIGERVERKET A/S, a Company incorporated under the laws of Norway of, Elkemhuset, Middelthunsgate 27, Oslo 3, Norway, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention relates to steel-wire-ropes with load-carrying core fibres.

A steel-wire-rope consists as known of several parts (or strands) which are laid helically around a central part (the core). The parts (or strands) of which the steel-wire-rope is built up, consist of wires and/or fibres or fibre yarns which are also laid helically around a central part or core. The cores as well as a number of the strands can consist of steel wire alone, or of fibre or fibre yarns, possibly also a combination of steel wire and fibre or fibre yarns.

Fibre or fibre yarns in the above mentioned combination is used in wire-rope where there is desired a flexible rope combined with lower weight as compared with a rope which is built up of only steel wires. The fibre material which has been used up till now, that is natural fibre, e.g. sisal, manila, jute, hemp, cotton, etc., of man-made fibre, e.g. propylene, nylon 6 and 6.6, polyester, poly vinyl chloride and similar fibres of thermoplastic and/or thermosetting material, have physical properties, (breaking strength, elongation etc.) which are far below those of the steel wire, and these types of fibres can therefore not be used as load-carrying elements. Their function has up till now been to carry the lubricants and/or impregnants which are necessary to prevent the penetration of moisture; which will cause corrosion, into the rope, and at the same time to prevent excessive friction between the fibres, and lubricate the steel wires from inside as the steel-wire-rope is used. The fibre core give important support to the cross-section crush resistance of the rope.

Accordingly the present invention provides a steel-wire-rope incorporating a core of aromatic polyamide fibres, which fibres act as load carrying elements. The polyamide fibres may be formed of material such as that known under the trade name "ARENCA" or "KEVLAR", which materials have proved to have sufficient strength to be utilized as load-carrying elements together with the steel elements. In this way there is obtained a flexible steel-wire-rope with low weight and high breaking strength, in which at the same time the fibres may be lubricated and/or impregnated with lubricant.

With certain so-called spring lay ropes produced according to the invention, there was obtained an increase in the breaking load of 113%, whilst the weight of the rope is increased by only 17% in relation to the ISO-standard.

In other types of steel wire rope which have been produced according to the invention there was obtained an increase in breaking load of 40–100% while the weight of the rope was only increased by 3–5% in relation to the ISO-standards.

The advantages derived from the invention are:

1. Considerable increase of the breaking load for most wire-rope constructions.
2. Higher flexibility, use of smaller winch drums, and saving of space.
3. Lower weight in relation to the breaking load as compared with known constructions.
4. Great advantages in use of steel-wire-rope for anchorlines for off-shore drilling rigs, ships etc., on the deep sea, as the breaking length of the ropes will be considerably improved.
5. The invention can lead to a considerable simplification in the production of steel wire ropes using a lower number of wires, in constructions where this new fibrecore act as a load-carrying member.

The load-carrying fibre elements in the rope may be made of aramids such as poly-*p*-benzamide, poly-*p*-phenylene terephthalamide and their copolymers.

WHAT WE CLAIM IS:

1. A steel-wire-rope incorporating a core of aromatic polyamide fibres, which fibres act as load-carrying elements.

2. A steel-wire-rope according to Claim 1 in which the fibres are lubricated and/or impregnated with lubricant.

3. A steel-wire-rope according to Claim 1 or Claim 2 in which the fibres are made of poly-*p*-benzamide, poly-*p*-phenylene terephthalamide or their copolymers.

4. A steel-wire-rope substantially as herein described.

KILBURN & STRODE,
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