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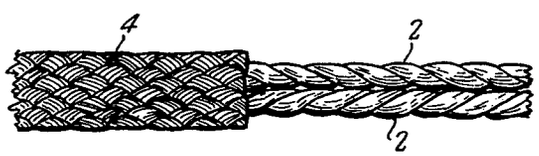
(54) Ropes.

(57) A rope assembly comprises a plurality of ropes encased in a braided sheath, in which each rope is formed of at least two strands.

One rope assembly of the invention comprises 18 3-strand laid ropes encased in a sheath of 24 millimetres nominal diameter. This sheath consists of 16 plaits each having 18 yarns per plait. Each sheath yarn is made of 4.5 lea staple which is spun at a twist of 3.0 turns per inch. Each of the encased ropes forming the core is made of yarns which are based on I.C.I. fibres Type 125 continuous filament polyester yarn. The rope assembly has an average breaking load of 15.34 tonnes and a flex angle of 60°. The weight of the finished rope at check load is 41.6 kilogrammes per 100 metres.

In another rope assembly of the invention four 3-strand laid ropes 2 are encased in a braided sheath 4.



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TITLE

"Ropes"

TECHNICAL FIELD

The present invention relates to ropes.

In this specification by "rope" is meant an elongate member formed by twisting, laying, weaving or otherwise entwining a plurality of strands.

The invention provides a rope assembly comprising a plurality of ropes encased in a braided sheath, in which each rope is formed of at least two strands.

DESCRIPTION

In one rope assembly of the invention, eighteen 3-strand laid ropes are encased in a sheath of 24 millimetres nominal diameter consisting of 16 plaits each having 18 yarns per plait. Each sheath yarn is made of 4.4 lea staple which is spun at a twist of 3.0 turns per inch. Each of the encased ropes forming the core is made of yarns which are based on ICI fibres Type 125 continuous filament polyester yarn. The rope assembly of the embodiment has an average breaking load of 15.34 tonnes and a flex angle of 60^{o}. The weight of the finished rope at check load is 41.6 kilogrammes per 100 metres.

The rope assembly has a stitch length of 80 millimetres at zero load, and of 84.6 millimetres at check load.

The following table 1 sets out the data for 24 millimetre and 32 millimetre diameter rope assemblies constituting examples of the invention.

TABLE 1

CORE	24mm Polyester MET3	32mm Polyester MET3
Number of ropes per core	8	8
Number of strands per rope	3	3
Length of 10 lays of rope (mm)	363	511
Helix angle of rope	20°	20°
Length of 10 rope strand turns (mm)	366	509
Number of yarns per strand	4.5	8
Denier of rope yarn	20,000	20,000
Basic yarn denier	1,000	1,000
Denier per filament	5.1	5.1
Yarn type	I.C.I. 125	I.C.I. 125
Twist in rope yarn	40 T.P.M.	40 T.P.M.

SHEATH	24mm Polyester MET3	32mm Polyester MET3
Number of plaits	16	16
Number of yarns per plait	18	24
Plaits per 100mm	10	8.5
Yarn denier	3375 (=4.4 Lea)	3375 (=4.4 Lea)
Yarn type	Spun staple Polyester	Spun staple Polyester
Yarn twist	120 T.P.M.	120 T.P.M.
ROPE PROPERTIES		
Breaking load	15060 kg	23440 kg
Flex angle	60^{o}	85^{o}
Weight kg/100m at check load	46.5	62.34
Stretch of worked and rested rope at:		
10% of break load	2	3
30% of break load	5.3	5.7
100% of break load	13.9	14.1

The encased ropes forming the core of rope assemblies of the invention can be based on a wide range of man-made, synthetic and natural fibres. Because the core ropes according to this invention are laid rather than twisted there is only a low variation of tension between the constituent yarns of each core rope. This method of construction is thus particularly suitable for constituent yarns having low extensibility such as organic polyamids.

In a further embodiment of the invention the core ropes are constructed from "Aramid" organic polyamid yarns each covered with a polyester cover. One example of such a yarn is that sold under the trade name Du Pont Kevlar PC.

The following table 2 sets out the data for 8mm and 24mm diameter rope assemblies constituting further examples of the invention.

TABLE 2

CORE	24mm Kevlar MET3	8mm Kevlar MET3,
Number of ropes per core	12	4
Number of strands per rope	3	3
Length of 10 lays of rope (mm)	716	226
Helix angle of rope	10^{o}	10^{o}
Length of 10 rope strand turns (mm)	400	125
Number of yarns per strand	10	3
Denier of rope yarn	6,000	2,000
Basic yarn denier	2,000	2,000
Denier per filament	-	-
Yarn type	Kevlar 29 PC	Kevlar 29 PC
Twist in rope yarn	23.6 T.P.M.	-

SHEATH	24mm Kevlar MET3	8mm Kevlar MET3
Number of plaits	16	16
Number of yarns per plait	18	9
Plaits per 100mm	12	30
Yarn denier	3,000	2,000
Yarn type	I.C.I. 125	Kevlar 29 PC
Yarn twist	120 T.P.M.	-
ROPE PROPERTIES		
Breaking load	27500 kg	2520 kg
Flex angle	-	-
Weight kg/100m at check load	38.93	4.33
Stretch of worked and rested rope at:		
10% of break load	0.85	0.7
30% of break load	1.50	1.5
100% of break load	3.30	3.6

The accompanying sketch illustrates one rope assembly of the invention; this assembly comprises four three-strand laid ropes 2 encased in a braided sheath 4.

It is to be understood that the invention includes within its scope a rope assembly including two or more ropes encased in a braided sheath, and that each encased rope may be formed by entwining two or more strands.

Advantages of the aforementioned embodiment of the invention include:-

(1) Alternate encased core ropes of the rope assembly may be of opposite hand; i.e. alternative ropes may be formed of strands of S and Z twists. This reduces the tendency for the rope assembly to rotate when extended.

(2) The construction of the rope assembly provides it with improved flexibility.

(3) Rope is stored by being wound on reels of standard size. Consequently the greater the rope diameter the shorter the length of rope that can be stored on a reel of any given size. Because the rope assembly of the invention includes a plurality of core ropes, each core rope is of smaller diameter than previously proposed constructions in which only a single core rope is used. Consequently, the rope assembly of the invention can be constructed in considerably longer lengths than previously proposed rope assemblies using a single core rope, and

(4) The plurality of core ropes included in the rope assembly of the invention ensures that the rope assembly possesses a greater strength and breaking load than previously proposed single core rope assemblies.

CLAIMS

1. A rope assembly comprising a braided sheath and a plurality of ropes encased in the sheath, in which each rope is formed of at least two strands.

2. A rope assembly as claimed in Claim 1, in which each rope is a 3-strand laid rope.

3. A rope assembly as claimed in Claim 1 or Claim 2, in which the ropes are encased in a sheath consisting of 16 plaits, each having 18 yarns per plait.

4. A rope assembly as claimed in any preceding Claim, in which 18 ropes are encased in a sheath of 24 millimetres nominal diameter.

5. A rope assembly as claimed in any preceding Claim in which each sheath yarn is made of 4.4 lea staple spun at a twist of 3.0 turns per inch.

6. A rope assembly as claimed in any preceding Claim, having an average breaking load of 15.34 tonnes, and a flex angle of 60°.

7. A rope assembly as claimed in any preceding Claim, having a weight at check load of 41.6 kilogrammes per 100 metres.

8. A rope assembly as claimed in any preceding Claim, having a stitch length of 80 millimetres at zero load, and of 84.6 millimetres at check load.

9. A rope assembly as claimed in any preceding Claim, in which each core rope is made of "Aramid" organic polyamid yarns with a polyester cover.

FIG.1

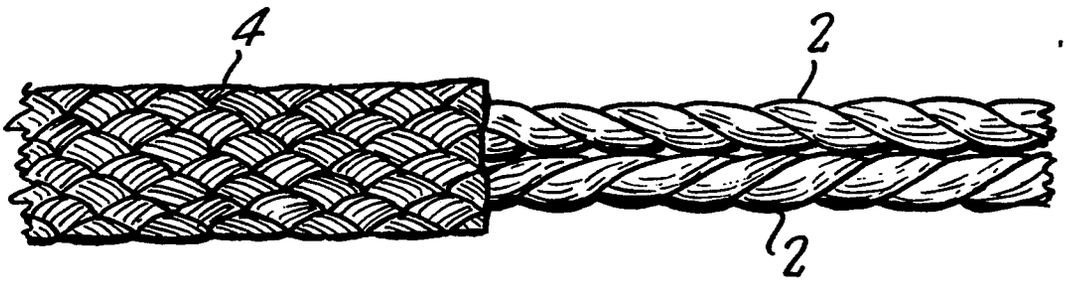
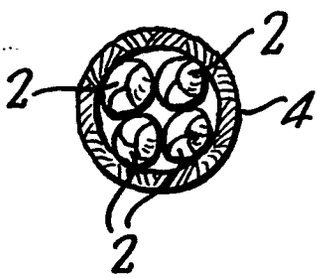


FIG.2



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EUROPEAN SEARCH REPORT

Application number
0020130
EP 80 30 1757

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	US - A - 1 690 846 (TURNER) * Entirely *	1-5
	CH - A - 410 724 (SCHMIED) * Entirely *	1-5
	US - A - 3 911 785 (HOOD) * Column 3, lines 38-68; column 4, lines 1-12,25-29; column 10, lines 35-50; claims 1,8, 9,10 *	1,4-9
	US - A - 2 737 075 (POIRIER) * Column 1, lines 63-71, column 2, lines 14-25 *	1-5
	FR - A - 1 248 273 (HUNTER DOUGLAS) * Abstract *	1-3
	DE - U - 7 423 933 (HOECHST) * Claim 1 *	1,9
	FR - A - 2 292 071 (FELTEN & GUILLEAUME CARLSWERK) * Page 4, lines 34-40; page 5 *	1,4,6, 9
	US - A - 3 968 725 (HOLZHAUER) * Column 4, lines 9-32; claims *	1,9

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

D 07 B 1/02
D 04 C 1/12

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

D 07 B
D 04 C

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28-07-1980	D'HULSTER

EPO Form 1503.1 06.78

EINSCHLÄGIGE DOKUMENTE			KLASSIFIKATION DER ANMELDUNG (Int.Cl. 3)
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	betrifft Anspruch	
A	FR - A - 1 460 732 (COUSIN FRERES) * Page 1, left-hand column, lines 24-30 * --	1	
A	GB - A - 825 627 (HOECHST) * Page 2, lines 75-95; page 3, lines 1-44 * --	1	
A	FR - A - 1 428 243 (VER. GLANZSTOFF) * Page 3, left-hand column, line 26 - end, right-hand column, lines 1-37; abstract 1 * ----	1	RECHERCHIERTE SACHGEBIETE (Int. Cl. 3)