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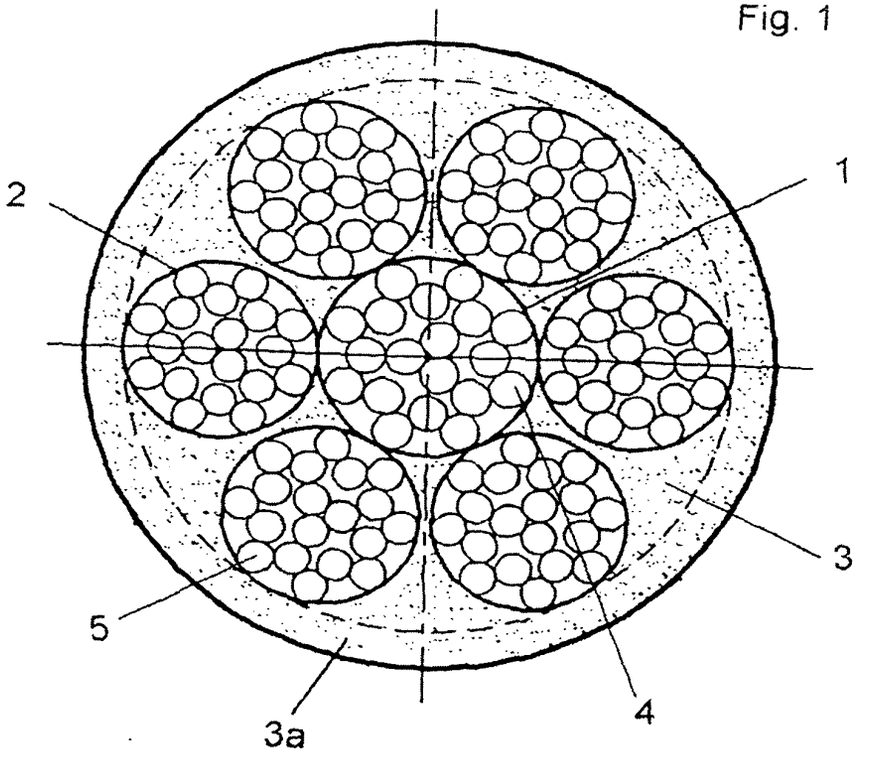
(54) CABLE FOR ELEVATING DEVICES

(57) A cable for hoisting apparatuses, made up of a twisted cable bundle incased in polyurethane (3) forming a constant circular outer section, wherein the central or inner cable (1) is thicker than the remaining cables (2) located peripherally around the former, and all of them are in turn formed by twisted pearlitic steel filaments (4-5), those filaments making up the central or inner cable (1) being of a larger section than those forming the peripheral cables (2).

Fig. 1



EP 1 564 326 A1

Description

[0001] As indicated by the title, the present invention refers to a cable for elevators and hoists which are joined to the passenger car at one end and to a counterweight at the other end, passing through an upper drive pulley.

[0002] Elevator or hoist cables are usually made up of a central steel or natural organic fiber core around which a series of cable bundles, usually of steel also, are arranged. A mixed solution with a central core separated from surrounding bundles by an insulating layer is represented in patent document EP 0 444 245.

[0003] Patent document EP 0 633 350 discloses a cable formed by a central core with a series of steel cable bundles, which is surrounded by a series of cable bundles, the outer filaments of which are metal and surround a central core of greater diameter, formed by a synthetic material, such as polyethylene, polypropylene, polyamide or other similar substances.

[0004] Patent document ES 2 141 851 discloses a cable comprising a central cable bundle, surrounded by a sheath, around which a second group of cables is arranged, also externally protected by another synthetic sheath. In both cases, in the inner and outer layer, the cables are of aramide and the sheath of the inner cables is of polyester, plastic or silicone, whereas the outer sheath layer is of polyurethane.

[0005] Patent document DE 1 904 468 refers to a process for manufacturing a wire cable with a synthetic material sheath protecting the cable from moisture, and accordingly from oxidation; wires of synthetic material that are melted and fused to the final sheath are inserted among the metal cables, thus perfectly incasing the inner metal cables.

[0006] Given that a failure in cables from which the passenger car of the elevator hangs could have terrible consequences for the people who use it, the safety factors required of elevator and hoist cables are very high. In Spain, elevator cables must be of steel and the ratio between the diameter of the pulleys and the diameter of the cables must be at least 40. The reason for these large pulleys is to minimize fatigue and wear of the steel cables in their continuous swaying on the pulleys.

[0007] However, if an elevator machinery occupying lesser volume, particularly in height, is desired, it is necessary to reduce the diameter of the pulleys, and accordingly the diameter of the cable bearing the passenger car; to do this, the use of pearlitic steel filament cables similar to those used in the reinforcement of automotive tires is resorted to, having a very small diameter and being particularly flexible and fatigue resistant with alternating loads.

[0008] The solution proposed in the present invention consists of a cable having a twisted cable bundle, wherein a central or inner cable is thicker than those located peripherally around the former. Each one of these cables is in turn formed by a constant number of twisted pearlitic steel filaments, the filaments making up the central or inner cable having a greater section. The strand thus formed is incased in polyurethane, forming a constant circular section.

[0009] These filament bundles forming each one of the components of the main cable are very thin and therefore flexible pearlitic steel filaments of high mechanical resistance.

[0010] According to an important feature of the present invention, the twist direction of the main cable bundle is opposite to the twist direction of the filaments making up each one of these cables.

[0011] The cable bundle it forms is made up of an inner cable and six cables twisted around this central cable, and the twist pitch of this bundle is comprised between 25 and 55 mm.

[0012] Both the central cable and the cables twisted around it are formed by an identical number of pearlitic steel filaments, comprised between 15 and 25.

[0013] With the mentioned specifications and adjusting the twist pitch of the filaments of the central cable or strand and of the filaments of the outer cables or strands, while at the same time also adjusting the twist pitch of the outer cables on the central cable and carrying out the twisting of the central cable with respect to the peripheral cables in opposite directions, the diameter of the section of a standard cable of this type is reduced, sheathed with a material that is between 35 and 40% synthetic, maintaining, however, the breaking load adjusted to the standards for hoisting apparatuses.

[0014] The object of the invention will be better understood with the aid of the following description made based on a practical embodiment; this description is made based on the attached drawings, wherein:

Figure 1 shows a cross sectional view of a cable for hoisting apparatuses carried out according to the present invention.

Figure 2 shows a schematic view of a cable in order to show the twist direction of its cable bundle and of the filaments making up each one of the cables.

[0015] The cable for hoisting apparatuses object of the invention is made up of a twisted cable bundle (1-2) incased in polyurethane (3) forming a constant circular outer section. The central or inner cable (1) is thicker than the remaining cables (2) located peripherally around the former, and as can be observed in the figures, the inner cable (1) is surrounded by six twisted cables (2), all of them with a twist pitch (P) comprised between 25 and 55 mm, preferably 50 mm.

[0016] Each one of the main cables (1-2) is in turn formed by a constant number of twisted pearlitic steel filaments (4-5), those making up the central or inner cable (1) being of a larger section than those making up the peripheral cables (2). The number of filaments of each one of these cables (1-2) is comprised between

15 and 25, preferably 19, and the twist pitch (p) of the filaments (4-5) upon forming the cables (1-2) is comprised between 25 and 55 mm, preferably 50 mm.

[0017] As can be observed in Figure 2, the twist direction of the main cable bundle (1-2) is opposite to the twist direction of the filaments (4-5) making up each one of these cables.

[0018] The cable bundle (1-2) is incased in polyurethane forming a sheath (3) of circular section having an outer surface (3a) over the outer cables (2).

[0019] It is not considered necessary to extend this description so that a person skilled in the art may understand the scope of the invention and the advantages derived therefrom.

[0020] The materials, shape and arrangement of the elements will be susceptible of variation provided that this implies no alteration of the essential features of the invention, which are claimed below.

Claims

1. A cable for hoisting apparatuses, made up of a cable bundle (1-2) twisted in opposite directions and incased in polyurethane (3a) externally forming a constant circular section, wherein the central or inner cable (1) is thicker than the remaining cables (2) located peripherally around it, and all of them are in turn formed by a constant number of twisted pearlitic steel filaments (4-5), those filaments making up the central or inner cable (1) being of a larger section than those forming the peripheral cables (2), and wherein the cable bundle forming the cable is made up of an inner cable (1) and six cables (2) twisted around this central cable, **characterized in that** both the central cable (1) and those cables (2) twisted around it are formed by an identical number of pearlitic steel filaments, comprised between 15 and 25, and the twist pitch of the cable bundle (1-2) forming the cable, and the twist pitch of the filaments (4-5) upon forming the cables (1-2), is comprised between 25 and 55 mm.

Fig. 1

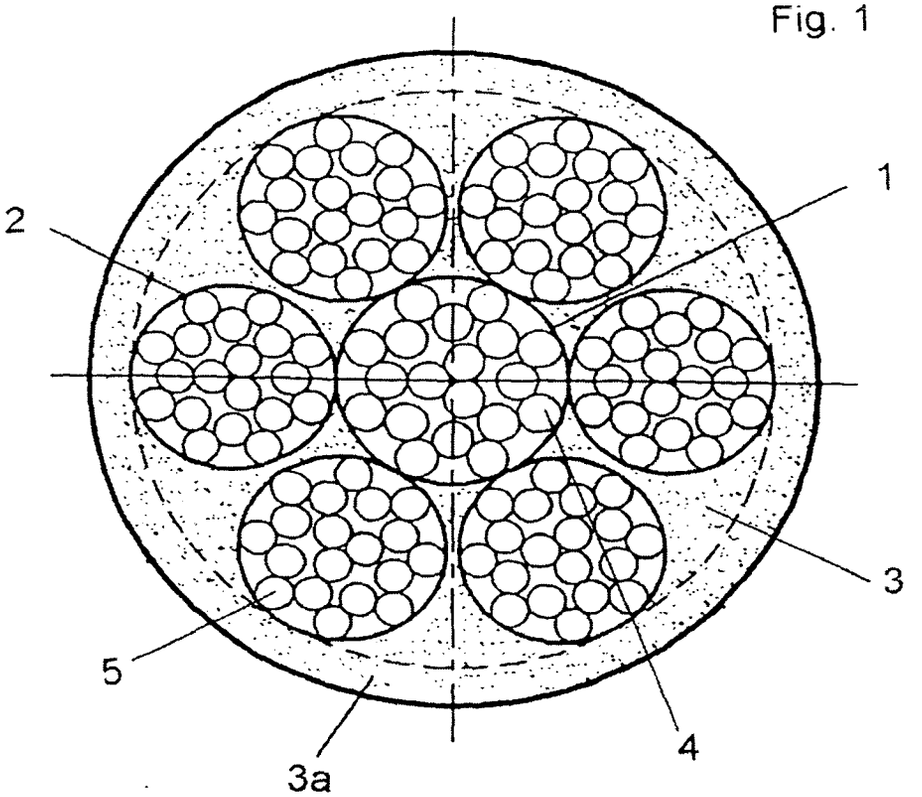
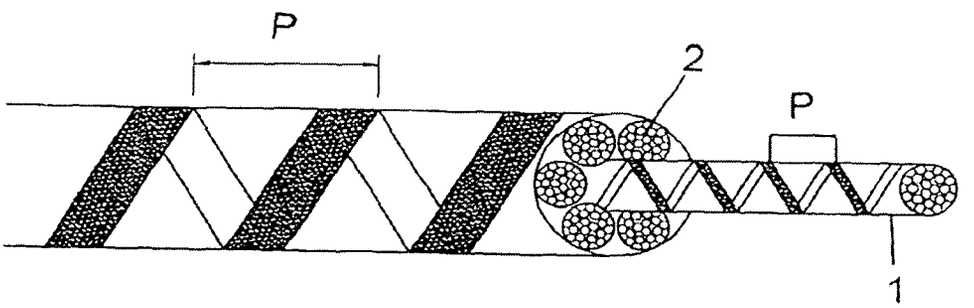


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 03/00473

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 D07B 1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 D07B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 1904468 A (BERKENHOFF & DREBES A.G.) 27.08.1970, **the whole document**	1, 2
A	ES 2029640 A6 (N.V. BRIDON ROPES S.A.) 16.08.1992, **the whole document**	1-4
A	ES 275168 U (ESTEL NL DRAADIND. B.V.) 01.03.1984, **claims 1 and 3**	3
A	US 4344278 A (JAMISON et al) 17.08.1982, **the whole document**	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 October 2003 (31.10.2003)	**01 December 2003 (01.12.2003)**
Name and mailing address of the ISA/ **S.P.T.O**	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/ES 03/00473

Patent document cited in search report	Publication date	Patent familiy member(s)	Publication date
DE 1904468 A	27.08.1970	NONE	
ES 2029640 A	16.08.1992	NONE	
ES 275168 U	01.03.1984	NO 822545 ABC	26.01.1983
		EP 0071292 AB	09.02.1983
		NL 8200195 ABC	16.08.1983
		AT 13324 T	15.06.1985
		DE 3263527 D	20.06.1985
US 4344278 A	17.08.1982	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)