United States Patent
Morieras et al.

[15] 3,653,197

[45] Apr. 4, 1972

[54] NONCIRCULAR CABLE AND METHOD OF MAKING THE SAME

[72] Inventors: Gilbert Morieras; Michel Sere De Lanauze, both of Lyon, France

[73] Assignee: CTA-Compagnie Industrielle de Textiles Artificiels et Synthetiques

[22] Filed: Aug. 24, 1970

[21] Appl. No.: 66,491

[30] Foreign Application Priority Data

Sept. 1, 1969 France....................................6929773

[52] U.S. Cl.......................................57/139, 57/149, 57/162, 174/117

[51] Int. Cl.......................D07b 1/10, D07b 1/16, H01b 7/18

[58] Field of Search......................57/139, 140 R, 140 C, 144, 57/149, 153, 149, 156, 157, 160, 162, 164, 167; 174/117

[56] References Cited

UNITED STATES PATENTS

1,030,426	6/1912	Parsons et al.	57/139 X
1,955,024	4/1934	Rohs	57/145 X
2,262,861	11/1941	Rugeley et al.	57/153 X
2,275,019	3/1942	Peterson	57/145 UX
2,488,527	11/1949	Dutcher	57/152 UX
3,067,569	12/1962	Kelley	57/139
3,406,514	10/1968	Hanlon et al.	57/139 X
3,498,038	3/1970	Shulver	57/140 C

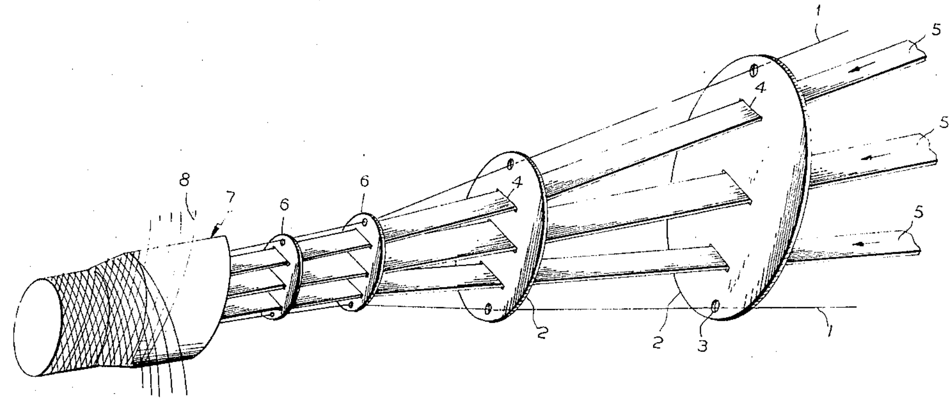
Primary Examiner—Donald E. Watkins
Attorney—Sherman and Shalloway

[57] ABSTRACT

A cable or cord of a noncircular cross-section composed of a multiplicity of substantially parallel core yarns covered with a textile sheath, the core yarns being bound together and the sheath being bound to the core yarns by means of an adhesive or binder, such cord or cable being characterized in that the noncircular cross-section has at least one axis of symmetry and that, along the entire length of the cord or cable, at least one reinforcing element is present normal to the axis or one of the axes of symmetry, extending over the entire width of the core.

Such cables or cords are produced by cross-section, a sheet of parallel core yarns with a binder, disposing the core yarns in the position that they will occupy in the finished noncircular cross-section cable or cord, and covering the core thus formed of parallel core yarns with a sheath, and thereafter vulcanizing the entire assembly, such process being characterized in that the core yarns provide a noncircular cross-section with at least one axis of symmetry and, at the time of formation of the core, reinforcing elements are introduced between the core yarns, such reinforcing elements also being impregnated with a binder, the elements being disposed along the entire length of the cable normal to the axis of symmetry or to one of the axes of symmetry of the core and extending over the entire width of the core at their point of introduction.

9 Claims, 3 Drawing Figures



PATENTED APR 4 1972 3,653,197

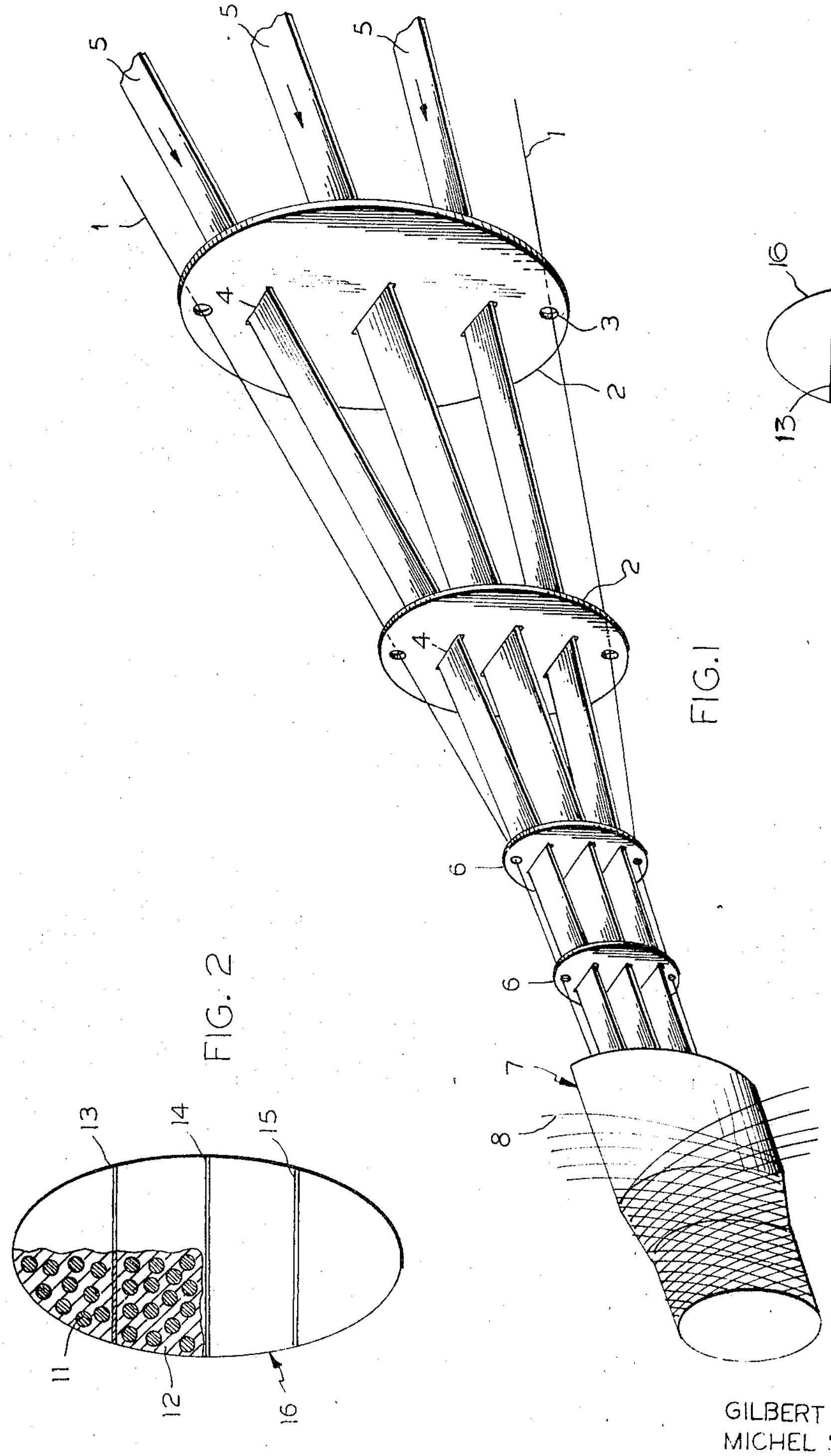


FIG. 1

FIG. 2

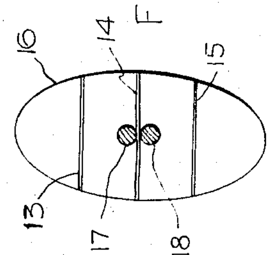


FIG. 3

INVENTORS
GILBERT MORIERAS
MICHEL SERE de LANAUZE

BY *Sherman & Shalloway*
ATTORNEYS

NONCIRCULAR CABLE AND METHOD OF MAKING THE SAME

The present invention relates to a novel cord or cable structure and to a process of producing the same; more particularly, the present invention relates to such a novel article and process of producing the same wherein the cord or cable is one which has a noncircular cross-sectional configuration.

To overcome the various drawbacks of ordinary twisted cables, it has been previously proposed to produce cables or cords of core yarns which are substantially parallel, with a sheath surrounding such a core, the cohesion of the cord or the cable being effected by a binder or adhesive which binds the core yarns to one another while joining the sheath to the core. Such cables produced by the use of substantially parallel core yarns and a sheath covering the core are generally circular in cross-section and at present have found a number of uses as a replacement of ordinary twisted cables.

While such cables are particularly advantageous in a number of environments, such cables of a generally circular cross-section are disadvantageous in a number of environments, e.g., in oceanography, since their resistance to forward movement in water is still too great. Thus, in spite of the fact that such cords and cables produced from substantially parallel core yarns covered by a sheath have provided certain advantages from the standpoint of weight and handling, such cords and cables are not particularly satisfactory for all purposes, particularly oceanography environments set forth above.

It is quite well known that cables with a noncircular cross-section, e.g., those with an elliptical cross-section, would behave better for oceanographic purposes in that they have reduced resistance to forward movement in water, but, in the course of their passage under tension over a pulley, such noncircular cross-sectional cables have a tendency to be crushed and to resume their circular configuration. Accordingly, until the development of the present invention it has not been possible to produce noncircular cross-sectional cables which have good resistance to deformation.

It is additionally known that metallic cables can be produced having a noncircular cross-sectional configuration, e.g., a trapezoidal cross-section. In this regard, such metallic cables have a core, the form of which determines the final configuration of the cable. Such metallic cables, however, have the same drawbacks as cables which are made from twisted elements, such as a reduction in resistance to traction, as a consequence of transverse stresses undergone by the strands, as well as a reduction to the kilometric resistance to rupture due to the increase in the weight of the cable per unit length due to saturation. Moreover, it should be quite obvious that the production of metallic cables in noncircular cross-sectional forms, e.g., trapezoidal shapes, is very difficult and costly. Accordingly, such use of metallic cables of noncircular cross-sections has not been completely satisfactory to date and, the industry has long sought an improvement over those conventional circular and noncircular cross-sectional cables used heretofore.

All of the foregoing disadvantages of previously produced cables including cables of circular and noncircular cross-section have been obviated in accordance with the present invention whereby a cable has been developed having a noncircular cross-section, e.g., elliptical, having the advantages of cables with parallel strands and in addition possessing a diminished resistance toward forward movement in water, as well as rigorous antispinning properties. Such properties are particularly important in cables that must be submerged and/or towed for use in oceanographic environment.

The cords or cables of the present invention are composed of core yarns which are substantially parallel and covered with a textile sheath, preferably a braided sheath, wherein cohesion between the cores and between the cores and sheath is provided with a binder or adhesive, the cable being particularly characterized in that the same has a noncircular cross-sectional configuration with at least one axis of symmetry and, at least one reinforcing element is present along the length of the cord normal to the axis or one of the axes of symmetry, extending over the entire width of the core at such point or points.

The novel cables of the present invention are produced by a process which comprises impregnating a sheet of parallel yarns with a binder or adhesive, disposing the yarns in the position that they will occupy in the finished cable, covering the core thus formed of parallel yarns with a sheath, preferably a braided textile sheath, and vulcanizing the assembly, such process being characterized in that at the time of the formation of the core, reinforcing elements are introduced between the yarns, the same being also impregnated with a binder, the reinforcing elements being disposed along the entire length of the cable normal to the axis of symmetry or to one of the axes of symmetry of the core and extending over the entire width of the core at their point of introduction.

Accordingly, it is a principal object of the present invention to provide an improved product and method of producing the same wherein such product and method have eliminated and obviated the inherent deficiencies of previously developed prior art cables and cords.

It is yet a further object of the present invention to provide such an improved cable having a noncircular cross-section and comprising a core of substantially parallel yarns, the core being covered with a sheath, such cable being characterized in that at least one reinforcing element is present normal to the axis of symmetry of the noncircular cross-section cable or to one of the axes of symmetry, extending over the entire width of the core at its point of introduction.

It is still a further object of the present invention to provide a novel method for producing a noncircular cross-section cable having the advantages of cables with parallel strands and providing diminished resistance toward forward movement in water as well as rigorous antispinning properties, such method comprising disposing core yarns in a substantially parallel position and in the position that the same will occupy in the finished cable, and covering the core thus formed with a sheath, the method being characterized in that the core is formed into a noncircular cross-section configuration with at least one axis of symmetry and, the core has introduced therein between the yarns at the time of the formation of the core at least one reinforcing element disposed along the entire length of the cable normal to the axis of symmetry of the noncircular cross-section or to one of the axes of symmetry of the core.

Still further objects of the novel article and method of producing the same in accordance with the present invention will become more apparent in the following more detailed description of the present invention.

As indicated previously, the foregoing objects and advantages of the present invention are provided through a cable of noncircular cross-section, e.g., elliptical cross-section, possessing all of the advantages of cables of parallel yarns or strands by eliminating the disadvantages of previously developed circular cross-section cables. Thus, for example, in comparison with a circular cross-section cable, the noncircular cross-section cables of the present invention possess a diminished resistance to forward movement in water as well as rigorous antispinning properties. This make the cables particularly adaptable for oceanographic environments wherein the cables must be submerged and/or towed for use.

The cables of the present invention are composed of a core of yarns which are substantially parallel and covered with a textile sheath, preferably a braided textile sheath, the adhesion of the core yearns to each other and the adhesion of the textile sheath to the core yarns being provided by a binder or adhesive. With regard to the above characteristics of the cable of the present invention, therefore, the same is substantially identical in structure to conventional circular cross-section cables produced from a multiplicity of parallel stands.

The cable of the present invention can be distinguished from such conventional circular cross-sectional cables, however, in that the cross-section of the core is not circular, such noncircular having at least one axis of symmetry. Moreover, the cable of the present invention is particularly characterized in that at least one reinforcing element is provided along the entire length of the cable normal to the axis of symmetry of the non-circular cross-section or to one of the axes of symmetry, such reinforcing element or elements extending over the entire width of the core at their point of introduction. Accordingly, it is the introduction of such reinforcing elements in the manner set forth above which allows the production of a noncircular cross-sectional cable having a reduced tendency toward deformation and the advantages described above when compared, for example, with conventional cables of circular cross-section.

Such a cable in accordance with the present invention is prepared by a process which comprises impregnating a sheet of parallel yarns with a binder or adhesive, disposing the yarns in the position that they will occupy in the finished cable so as to produce a core of substantially parallel yarns, covering the core so formed of parallel yarns with a sheath, preferably a braided textile sheath, and thereafter vulcanizing the assembly, such process being characterized in that the core of substantially parallel yarns is formed into a noncircular configuration having at least one axis of symmetry and, at the time of the formation of the core, at least one reinforcing element, also preferably impregnated with a binder is introduced between the parallel core yarns and disposed along the entire length of the cable normal to the axis of symmetry of the core or to one of the axes of symmetry and extending over the entire width of the core at the point of introduction.

In accordance with one embodiment of the present invention, the cross-sectional configuration of the core of the cable is elliptical and the reinforcing elements are normal to the major axis of symmetry with reference to the minor axis of the cross-section of the cable. When the reinforcing elements are normal to the major axis, one of the reinforcing elements may possibly be identical with the minor axis of the cross-section. In addition to such elliptical cross-section, which is specifically illustrated herein, it should be obvious that any noncircular cross-sectional configuration can be provided in accordance with the present invention and the present invention is not in any way deemed limited to elliptical cross-sections. In this regard the cross-sectional configuration of the cable can be trapezoidal, square, trilobal, etc.

In addition, it is pointed out that while it has heretofore been proposed to produce noncircular cross-sectional cables from metallic wires, the core yarns utilized in the construction of the present invention are generally any natural, artificial or synthetic fiber, synthetic fibers being particularly preferred. Preferably in accordance with the present invention, the core yarns are prepared from very high strength yarns with slight elongation such as, for example, linear polyamides, linear polyesters, polyolefins, polyvinyl alcohol, etc. Here again is to be understood that the present invention is not limited to any particular core yarn and, the cables of the present invention can be prepared from any conventional natural, artificial or synthetic fibrous material.

As previously indicated, the cables of the present invention are produced by first impregnating a sheet of parallel yarns with a binder or adhesive to thereby form the core of noncircular cross-section and at the same time introducing the reinforcing element or elements also impregnated with the binder. Moreover, as previously indicated, the textile sheath which surrounds the core of substantially parallel yarns and reinforcing elements is bound to the core structure also by means of the binder. Accordingly, the binder which can be employed in accordance with the present invention can be any conventional material which is compatible with the textile elements making up the novel cable of the present invention. Thus, for example, when the core yarns of the cable are of a polyester material, e.g., polyethylene terephthalate, and the reinforcing elements are made of a fabric of a polyamide and polyester, e.g., polyhexamethalene adipamide and polyethylene terephthalate, the binder which can be utilized to bind the core yarns and reinforcing elements and the textile sheath to the core can comprise a conventional rubber latex containing the usual catalyst and vulcanization adjuvants. Here again, the present invention is not predicated upon the use of any particular binder in that those binders which have been conventionally utilized to produce circular cross-sectional cables from parallel strands or yarns can be advantageously utilized in accordance with the article and method of the present invention.

In preparing the core yarns and reinforcing elements for assembly in the production of the noncircular cross-sectional cable of the present invention, the binder, preferably a synthetic rubber or natural rubber latex, is deposited on the yarn and on the reinforcing elements in a proportion of from about 3% to about 25% dry binder based upon the weight of the cable. Accordingly, in the final assembly the binder will comprise a minor proportion of the entire article although the same is applied to bind the core yarns and reinforcing elements to one another as well as the textile sheath, preferably a braided textile sheath, to the core.

As indicated previously, the reinforcing elements which are employed in accordance with the present invention are preferably produced from a fabric so as to retain and conserve the flexibility of the cable. In this regard, such reinforcing elements can be made from any fabric produced from natural or synthetic yarns, mechanical characteristics of which are suitable for the desired use of the reinforced cables of the present invention. Preferably, in accordance with the present invention, the reinforcing fabric comprising the reinforcing elements of the present invention is positioned in the cable so that the warp of the fabric is parallel to the longitudinal axis of the cable. Similarly, it is preferred in accordance with the present invention to utilize a woven reinforcing element, the warp elongation of which is as great as possible and the weft elongation of which is preferably slight. Accordingly, pursuant to a preferred embodiment of the present invention, the reinforcing element comprises a fabric having a warp with an elongation between 10 and 30 percent and a weft with an elongation of less than 10 percent.

As indicated previously, the cable of the present invention is generally prepared having a cross-sectional configuration with a major axis and a minor axis of symmetry with the reinforcing element or elements normal to the major axis, i.e., parallel to the minor axis as in a cable of elliptical cross-section. It should be quite obvious, however, that the present invention is not to be limited to such cables wherein the reinforcing element or elements are normal to the major axis, but, cables falling within the scope of the present invention can be provided wherein such reinforcing element or elements are normal to the minor axis of the cable cross-section.

It is again noted that the noncircular cross-sectional core of the cable of the present invention is covered with a sheath, preferably a braided textile sheath of the type normally utilized to cover cables of circular cross-section. Here again it is to be noted that the present invention is not predicated upon the use of any particular type of sheath and, all of these previously utilized in the preparation of conventional cables and more particularly cables composed of parallel strands or yarns can be advantageously utilized in accordance with the product and method of the present invention. Preferably, however, the braided textile sheath utilized to cover the core of parallel yarns in accordance with the present invention is one which has sufficiently great elongation and a high enough strand titre to have the required flexibility and resistance to abrasion for use in connection with the cable.

In accordance with the method of the present invention, after formation of the core and before and after covering the same with the braid, the cable preferably passes through a bath of a binding agent which is intended to assist the binding of the braid onto the core. Here again, the use of such a binding agent is conventional in the production of sheath-covered cables and, any conventional binder or adhesive can be advantageously utilized in accordance with the present invention. It has been found advantageous, however, to employ as the binder a solution, e.g., toluene solution, of a mixture formed from a synthetic rubber such as "Neoprene" and an adhesive such as a block isocyanate. Here again, however, it must be recognized that the present invention is not predicated on and is not limited to any particular type of binder or adhesive.

The novel article and method of producing the same in accordance with the present invention will now be illustrated by reference to the following specific examples wherein:

FIG. 1 is the schematic illustration of the method utilized in accordance with the present invention to produce the noncircular cross-section cables;

FIG. 2 is a view showing in partial cross-section a cable of the present invention, illustrating the presence of three reinforcing elements;

FIG. 3 is an end view of the cable in accordance with the present invention illustrating the presence of electric conductors, the core not being shown.

In the various views, like numerals represent like elements throughout. The method of producing the cables of the present invention illustrated in FIG. 1 is as follows. The yarns 1, of which only two are shown for the sake of clarity, and which are intended to form the core through the substantially parallel assembly and which are preliminarily impregnated with a binder, pass through disks 2, having holes 3 therein. The holes 3 in the disks 2 guarantee the placement of the yarns 1 with respect to each other in the finished core of the cable. In this regard, by having the yarns 1 pass through the holes 3 of disks 2, the yarns can be arranged in a substantially parallel form and can be arranged with the general cross-sectional configuration desired for the finished cable.

In addition to the holes 3 in disks 2 for the passage of yarns 1, the disks 2 provide passages 4 for the reinforcing elements 5 which are also preferably impregnated with a binder. Here again, therefore, the reinforcing elements 5 are aligned in the position which they will take in the final cable by passing through the passages 4 in disks 2. After positioning by means of disks 2, the yarns 1 and reinforcing elements 5 pass through calibrating spinnerets 6 the orifices of which have a form and dimensions corresponding substantially to the cross-section of the core of the yarn that is desired. Accordingly, by passing through the calibrating spinnerets 6 the cable is given its final shape, i.e., a noncircular cross-section, e.g., an elliptical shape.

The core which is shaped by passing through calibrating spinnerets 6 may then again be impregnated with the binder and, thereafter, the core, preferably impregnated with the binder, passes through the axis of a braiding mechanism, preferably having a braiding mandril 7 on which the yarns 8 of the braid are deposited. The end of this braiding mandril 7 has the configuration and the dimensions substantially the same as the cross-section of the cable. The braid formed on braiding mandril 7 is applied to the core with a minimum of tension, impregnated with binder, and joined to the core. While not illustrated, it is then possible for the unit to pass into an additional binder bath whereby the cable surface is smoothed by passage through an elastic sleeve, also not illustrated, the outlet of which has a form and dimensions of the final cross-section of the cable. The shaped cable may then be passed through a tunnel furnace or any similar equivalent heating device, also not illustrated, which dries the binder and effects the necessary vulcanization of the same. This therefore allows for the preparation of a final cable having vigorous antispinning properties while possessing a lower resistance to forward movement through water than circular cables of the same diameter. Accordingly, the cables produced by the method described above are particularly advantageous in oceanography, although the same have found further utility in aeronautics, in the manufacture of barriers, etc. Thus these cables can be employed in any environment where conventional circular cross-section cables prepared from parallel yarns or strands have been previously utilized.

The final cable produced by the above method is shown in partial cross-section in FIG. 2, FIG. 2 illustrating a cable having an elliptical cross-sectional configuration. As seen in FIG. 2, the core of the cable is made up of yarns or strands 11 arranged in a substantially parallel form with the binder 12 surrounding the yarns 11. In addition, three reinforcing elements 13, 14 and 15 are illustrated, the same being normal to the major axis of the elliptical cross-section and parallel to the minor axis of the same. While only three reinforcing elements are illustrated, it should be quite obvious that the cable in accordance with the present invention may contain many more reinforcing elements normal to the axis of symmetry of the cable or to one of the axes of symmetry of the cable.

It can be additionally seen from FIG. 2 that the cable has been illustrated wherein one of the reinforcing elements 14 is on the minor axis of the elliptical cross-section. As shown in FIG. 2, the reinforcing element 14 on the minor axis of the elliptical cross-section extends over the entire width of the core at that point. Similarly the reinforcing elements above and below the minor axis, reinforcing elements 13 and 15, also extend over the entire width of the core at their point of introduction. As indicated previously, this is an essential characteristic of the novel cables of the present invention. As can be seen from FIG. 2, the core comprising the yarns 11, binder 12, and reinforcing elements 13, 14 and 15 is covered with a textile sheath 16 as previously described.

A further embodiment of the present invention is illustrated in FIG. 3. FIG. 3 is an end view showing a similar cable as in FIG. 2, the core not being illustrated. In accordance with FIG. 3, however, it will be noted that while the cable is still represented as containing three reinforcing elements 13, 14 and 15, normal to the major axis of the elliptical cross-section, the cable further contains two electric connectors 17 and 18. Accordingly, by including electrical connectors 17 and 18 within the cable, the novel cable of the present invention can be employed in those environments wherein electrical connection is required. Because of the presence of the reinforcing element, however, the noncircular cross-sectional cable containing the electrical connectors 17 and 18 is free from permanent deformation and, has those advantages enumerated above when compared with conventional cables of circular cross-section.

The novel method and article of the present invention will now be illustrated by reference to the following specific examples, It is to be understood, however, that such examples are presented for purposes of illustration only and the present invention is not in any way to be deemed as limited thereto.

EXAMPLE 1

According to the process described above, the cable illustrated in FIG. 2 was formed having a cross-section which is in the form of an ellipse, the major axis of which is 80 mm. long and the minor axis 40 mm.

The core of this cable was formed of 108 yarns (strands). Each of these yarns had a titre of 100,000 dtex (90,000 deniers) formed of polyethylene terephthalate filaments whose unit titre was 5.6 dtex (5 deniers). These yarns were distributed symmetrically on either side of the axes of the cable.

Moreover, three reinforcing strips were inserted and extended over the whole length of the cable. One strip 40 mm. wide was placed in the plane of the minor axis of the transverse section of the cable and the two others which were 35 mm. wide were placed on either side of the first reinforcing strip, parallel thereto and substantially equidistant from the same at the crests of the ellipse which form the cross-section of the cable.

The reinforcing elements were made of a fabric whose composition was as follows:

weft: polyethylene terephthalate yarn - titre:
1,100 dtex (1,000 deniers)/200 strands — 11 picks to the cm.,
warp: polyhexamethylene adipamide yarns - titre:
940 dtex (840 deniers)/140 strands — 6 yarns to the cm.

The fabric has a rupture strength on a sample 5 cm. wide of 350 kg. in the weft and 180 kg. in the warp, elongation to rupture of the fabric being 25 percent in the warp and 8 percent in the weft.

The yarns which constitute the core as well as the reinforcing textile elements were impregnated with an adhesive material deposited in a proportion of 12 percent dry material with reference to the weight of the material, having a rubber latex base containing the customary catalysts and vulcanization adjuvants.

The core thus formed was covered with a braid prepared by means of a braiding mechanism with 36 spindles, 18 thereof being fed with a polyhexamethylene adipamide yarn, 44,000 dtex (40,000 deniers), 60 strands, S twist 45 turns/meter, and 18 others with a yarn of the same kind in a Z twist with 45 turns/meter.

After smoothing, the cable which is formed had a cross-section approximately 25 $cm.^2$, weighed 2,650 g. to the meter, had a rupture strength of 7.1 tons, and elongation of about 6 percent under 50 percent of the rupture load, the tests of strength and elongation being made on samples presenting a tip at each end.

Such a cable did not have the tendency to deform in the course of use and it preserved its elliptical form. It could therefore be used successfully as a marine cable.

EXAMPLE 2

In the same manner as in Example 1 and using the same binders, a cable was formed whose cross-section was elliptical with the major axis measuring 42 mm. and the minor 18 mm.

The core of the cable was formed of 91 yarns (strands) of polyethylene terephthalate, titre 33,000 dtex (30,000 deniers), form of filaments of titre 5.6 dtex (5 deniers), the strands being divided symmetrically with reference to the axes. The core was reinforced by means of strips of fabric identical to that of Example 1, one of the strips being 18 mm. wide and being disposed on the minor axis and the other 14 mm. wide disposed substantially at equal distance from the crest of the ellipse and the minor axis.

The cable had two electric conductors situated on either side of the central reinforcing element, near the longitudinal axis of the cable. The core was covered with a braided sheath of polyhexamethylene adipamide yarn, titre 33,000 dtex (30,000 deniers).

This cable weighed 660 g./m., had a rupture strength of 21 tons, elongation of 5.8 percent under 50 percent of the rupture load, and did not deform permanently upon traction. It could therefore be used successfully in oceanography to tow measuring apparatus and to transmit data therefrom.

The foregoing examples clearly illustrate the advantages of the method and article of the present invention. In this regard, in accordance with the present invention, a cable has been developed which has a noncircular cross-section but, in a manner completely contrary to prior art products, is free from the tendency towards deformation. In addition, the novel cables of the present invention eliminate the inherent deficiencies of circular cross-sectional cables in that they have reduced resistance to forward movement in water. Accordingly, this allows the cables to be very effectively utilized for oceanographic and similar purposes.

While the novel method and article of the present invention have been described primarily with regard to the foregoing exemplification, the present invention is in no way to be deemed as limited thereto, but must be construed as broadly as all or any equivalents thereof.

We claim:

1. A novel cable comprising a multiplicity of substantially parallel core yarns constituting a core of a noncircular cross-section, said core being covered by a textile sheath, the bond between the core yarns and said core and sheath being imparted by a binder, said cable being characterized in that said noncircular cross-section has at least one axis of symmetry and said cable contains at least one reinforcing element normal to the axis of symmetry and extending over the entire width of said core at its point of introduction, said reinforcing element extending the entire length of said cable.

2. The cable of claim **1** wherein said reinforcing element is composed of a fabric.

3. The cable of claim **2** wherein said fabric is located in said cable so that its warp is parallel to the longitudinal axis of the cable, elongation to rupture of said fabric being 10–30 percent in the warp and less than 10 percent in the weft.

4. The cable of claim **1** wherein the noncircular cross-section is elliptical.

5. The cable of claim **4** wherein said reinforcing elements are normal to the major axis of symmetry of said elliptical cross-section and parallel to the minor axis of symmetry.

6. The cable of claim **5** wherein one reinforcing element is disposed on the minor axis of symmetry.

7. A process for the production of a cable composed of a multiplicity of parallel core yarns which comprises:

a. impregnating a sheet of parallel yarns with a binder;

b. disposing said yarns in the position that they will occupy in the finished cable in a manner so as to produce a core of noncircular cross-section having at least one axis of symmetry;

c. at the time of formation of said core introducing between the yarns at least one reinforcing element normal to the axis of symmetry of said core or one of the axes of symmetry of said core and extending over the entire length of said core and over the entire width of said core at the point of introduction;

d. covering the core thus formed in step (c) with an outer sheath; and

e. vulcanizing the assembly of step (d).

8. The process of claim **7** wherein the core produced in step (c) and assembly of step (d) are impregnated with a binder both before and after covering said core with said sheath.

9. The process of claim **7** wherein at the time of formation of the core electrical conductor elements are introduced so as to extend the entire length of said core.

* * * * *