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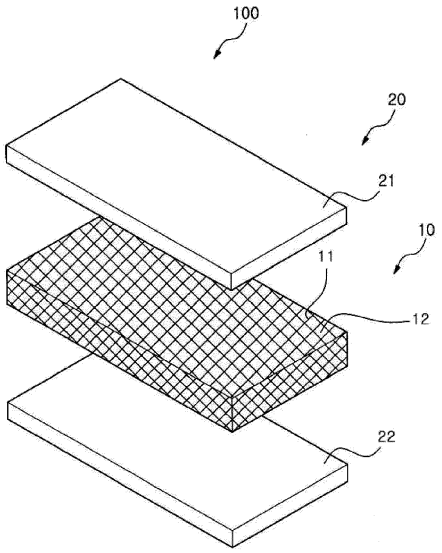
(54) WATER-REPELLENT TARPAULIN FABRIC AND WATER-REPELLENT TARPAULIN USING IT

(57) The present invention relates to a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions in a yarn state of a tarpaulin fabric used for industrial membrane structures including tent fabric, sheet fabric, outdoor structures, and handbills; and a water-repellent tarpaulin using the same. In particular, the present invention relates to 'a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions,' wherein the waterproofing and water-repellent functions of a water-repellent tarpaulin fabric woven with a yarn with enhanced waterproofing and water-repellent functions are enhanced; wherein the antifouling properties and weather resistance are also enhanced by a functional coating layer provided on the outside of the water-repellent tarpaulin fabric; and wherein the manufacturing of the same is easy and the workability of the same is improved.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same.

[0002] Specifically, the present invention relates to a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions in a yarn state of a tarpaulin fabric used for industrial membrane structures including tent fabric, sheet fabric, outdoor structures, and handbills; and a water-repellent tarpaulin using the same.

[0003] The present invention relates to a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same, wherein a water-repellent resin is added to a spinning oil of a composition of the present invention, and a yarn constituting a tarpaulin fabric passes through the spinning oil into which the water-repellent resin is added to be configured as a yarn with enhanced waterproofing and water-repellent functions; a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions formed by weaving the yarn as a tarpaulin fabric; and a water-repellent tarpaulin provided on the outside of the water-repellent tarpaulin fabric with a functional coating layer to enhance weather resistance, antifouling properties, and durability.

[0004] In particular, the present invention relates to a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same, wherein the water-repellent tarpaulin fabric woven with a yarn with enhanced waterproofing and water-repellent functions has enhanced waterproofing and water-repellent functions; wherein the weather resistance, antifouling properties, and durability are also enhanced by a functional coating layer provided on the outside of the water-repellent tarpaulin fabric; and wherein the manufacturing of the same is easy and the workability of the same is improved.

Background Art

[0005] Hereinafter, the background art of the present invention will be described. The background art of the present invention is: Republic of Korea Patent Gazette Patent Registration No. 10-0284773 (registered on December 22, 2000) "Polyester Water repellent Yarn Having Low Shrinkage and Method for Production Thereof"; and Patent Publication No. 10-1998-0044972 (published on September 15, 1998) "Method for Manufacturing Water-Repellent/Flame-Resistant Polyester Fabric." Citing these, the additional problems of the background arts of the present invention and those of the prior arts are described.

[0006] In general, yarns having water repellency have not only water repellency but also excellent antifouling properties, and thus their use continues to grow as yarns for clothing and industrial purposes.

[0007] In particular, it has recently been used in various products exposed to an external environment, such as outdoor structures, advertisements, and wire sheaths for industrial purposes, and various attempts have been made to develop other outdoor tents and products.

[0008] However, until these applications become possible, not only must it have water repellency performance in the state of yarn that is equal to or higher than that of a fabric that has undergone water repellency treatment, but also its water repellency performance must not be deteriorated through post-processing processes such as twisting, weaving, and coating.

[0009] In order to solve this problem, most manufacturers apply a large amount of water-repellent coating material on the surface of a yarn or immerse a yarn therein and dry the same, resulting in the generation of a large amount of residue due to the friction during post-processing, which causes additional problems such as deterioration of post-processibility and abnormality in the final products.

[0010] Moreover, to solve these problems, a water repellent containing a large amount of fluorine, such as a C8 organic fluorine compound (C8 series) in which eight fluorine atoms and eight carbon atoms are combined, is used, resulting in the generation of perfluorooctanoic acid (PFOA) or perfluorooctance sulfonates (PFOS), wherein PFOA is accumulated in the body of mammals, raising safety issues.

[0011] In addition, since the tarpaulin yarn and fabric (woven & knit) of the prior arts do not have a water-repellent function, when a tarpaulin product, including tent fabric, is installed outdoors, in case of rain or flooding, a tarpaulin fabric provided inside the tarpaulin product absorbs moisture, causing fouling on the tarpaulin fabric, or the absorbed moisture is not easily discharged to the outside, increasing its own weight, or the long-term coating adhesion is reduced due to foreign matters such as dust contained in the moisture. As a result, the unique functions of a tarpaulin product, such as waterproofing, packaging, rain protection, were not smoothly performed, and visual anxiety was caused to the users.

[0012] In particular, problems have been caused such that the waterproofing and water-repellent functions of the tarpaulin product are significantly deteriorated; when tarpaulin, which is a processed product, is installed and used outdoors, it is contaminated by dust or pollutants in the air and thus its antifouling properties are deteriorated, and when it is used for a long time, the color is changed and the weather resistance is deteriorated; and the manufacturing thereof

is so complicated that the workability is significantly deteriorated.

Disclosure of Invention

Technical Problem

[0013] The purpose and the technical problem of the present invention are to, by means of a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same, solve the problems of the prior arts; and in particular, provide a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same, wherein the water-repellent tarpaulin fabric woven with a yarn with enhanced waterproofing and water-repellent functions has enhanced waterproofing and water-repellent functions; wherein the weather resistance, antifouling properties, and durability are also enhanced by a functional coating layer provided on the outside of the water-repellent tarpaulin fabric; and wherein the manufacturing of the same is easy and the workability of the same is improved.

Technical Solution

[0014] The technical problems will be solved by means of a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same, wherein a water-repellent resin is added to a spinning oil of a composition of the present invention, and a yarn constituting a tarpaulin fabric passes through the spinning oil into which the water-repellent resin is added to be configured as a yarn with enhanced waterproofing and water-repellent functions provided with a water-repellant impregnation layer; a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions formed by weaving the yarn provided with the water-repellant impregnation layer as a tarpaulin fabric; and a water-repellent tarpaulin provided on the outside of the water-repellent tarpaulin fabric with a functional coating layer to enhance weather resistance, antifouling properties, and durability; wherein the water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same are manufactured by

S1: manufacturing a spinning oil;
S2: mixing a water-repellent resin and the spinning oil;
S3: passing a yarn, which is a polypropylene filament yarn or a polyester fiber yarn, through the mixture of the water-repellent resin and the spinning oil to impregnate an impregnation layer inside and outside the yarn;
S4: drying the yarn in which the impregnation layer is impregnated;
S5: weaving a water-repellent tarpaulin fabric of the dried yarn in which the impregnation layer is impregnated;
S6: drying the water-repellent tarpaulin fabric; and
S7: coating a functional coating layer on the outside of the water-repellent tarpaulin fabric to manufacture a water-repellent tarpaulin as a final product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a reference perspective view illustrating a water-repellent tarpaulin of the present invention. FIGURES 2a and 2b show test results from example and comparative example.

Best Mode for Carrying Out the Invention

[0016] Hereinafter, "a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same" of the present invention will be described in detail with reference to the accompanying drawings.

[0017] In addition, the features of "a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same" of the present invention are features of "the present invention to solve the problems of the prior arts; and in particular, to enhance the waterproofing and water-repellent functions of a water-repellent tarpaulin fabric woven with a yarn with enhanced waterproofing and water-repellent functions provided with a water-repellent impregnation layer; and to enhance the weather resistance, antifouling properties, and durability by a water-repellent tarpaulin provided with a functional coating layer provided on the outside of the water-repellent tarpaulin fabric; wherein the manufacturing of the same is easy and the workability of the same is improved," and are further specified by the embodiments and properties measurement results of the present invention, and it is ensured that these are not simple numerical limitations.

[0018] In addition, it is ensured that the embodiments described below are preferred embodiments and the presented

invention is not limited thereto, and "a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same" configured by technical principles of the same scope is included in the present rights.

[0019] FIG. 1 is a reference perspective view illustrating a water-repellent tarpaulin of the present invention.

[0020] As illustrated in FIG. 1, 'a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 of the present invention is configured as 'a water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 comprising:

1) a yarn 11 consisting of either polypropylene (PP) filament yarn or polyester fiber yarn;
2) a spinning oil, through which the yarn 11 passes through to enhance waterproofing and water-repellent functions of the yarn 11, wherein a first spinning oil composition is composed of, based on 100% by weight of the first spinning oil composition, 15 to 48% by weight of fatty alkylene ester, 15 to 20% by weight of glyceride ester, 5 to 10% by weight of polyolefin elastomer alkyl amine ether, 3 to 7% by weight of alkyl amide, 15 to 20% by weight of polyolefin elastomer alkyl ester, 5 to 10% by weight of polyolefin elastomer alkyl ether, 3 to 6% by weight of polyolefin elastomer castro oil ether, 3 to 6% by weight of polyolefin elastomer/polyolefin plastomer copolymer, 3 to 6% by weight of polyolefin elastomer alkyl phosphate K, and wherein the spinning oil is formed by mixing 80 to 150 parts by weight of water based on 100 parts by weight of the first spinning oil composition and formed as a liquid phase within a pH range of 7.5 to 8.5;
3) a water-repellent resin mixed with the spinning oil to further enhance waterproofing and water-repellent functions of the yarn 11, wherein a water-repellent resin composition is composed of, based 100% by weight of the water-repellent resin composition, 5 to 34% by weight of dipropylene glycol resin, 1 to 5% by weight of dodecyl alcohol polyoxyethylene ether, and 65 to 90% by weight of water, and wherein the water-repellent resin is formed by mixing 2 to 10 parts by weight of the water-repellent resin composition based on 100 parts by weight of the spinning oil and formed as a liquid phase within a pH range of 2.5 to 3.5 and a specific gravity of 1.08;
4) a water-repellent impregnation layer 12 passing through the spinning oil mixed with the water-repellent resin and impregnated inside and outside the yarn 11; and 5) a water-repellent tarpaulin fabric 10 woven with the yarn 11 provided with the water-repellent impregnation layer 12, wherein a functional coating layer 20 is provided on the top 21 and bottom 22 of the water-repellent tarpaulin fabric 10.

[0021] The yarn 11 is configured as a yarn 11 made of either a polypropylene (PP) filament yarn or a polyester fiber yarn, wherein a water-repellent impregnation layer 12 is easily impregnated inside and outside of the yarn 11, and tensile strength and tear strength properties against long-term thermal deformation and waterproofing properties are primarily improved in the yarn 11.

[0022] The spinning oil, wherein a first spinning oil composition is composed of, based on 100% by weight of the first spinning oil composition, 15 to 48% by weight of fatty alkylene ester, 15 to 20% by weight of glyceride ester, 5 to 10% by weight of polyolefin elastomer alkyl (POE) amine ether, 3 to 7% by weight of alkyl amide, 15 to 20% by weight of polyolefin elastomer (POE) alkyl ester, 5 to 10% by weight of polyolefin elastomer (POE) alkyl ether, 3 to 6% by weight of polyolefin elastomer (POE) castro oil ether, 3 to 6% by weight of polyolefin elastomer(POE)/polyolefin plastomer (POP) copolymer, 3 to 6% by weight of polyolefin elastomer (POE) alkyl phosphate K, is formed by mixing 80 to 150 parts by weight of water based on 100 parts by weight of the first spinning oil composition and formed as a liquid phase within a pH range of 7.5 to 8.5, wherein the yarn 11 passes through the spinning oil to enhance waterproofing and water-repellent functions of the yarn 11.

[0023] The water-repellent resin, wherein a water-repellent resin composition is composed of, based 100% by weight of the water-repellent resin composition, 5 to 34% by weight of dipropylene glycol resin, 1 to 5% by weight of dodecyl alcohol polyoxyethylene ether, and 65 to 90% by weight of water, and wherein the water-repellent resin is formed by mixing 2 to 10 parts by weight of the water-repellent resin composition based on 100 parts by weight of the spinning oil and formed as a liquid phase within a pH range of 2.5 to 3.5 and a specific gravity of 1.08, is mixed with the spinning oil of the present invention to further enhance waterproofing and water-repellent functions of the yarn 11.

[0024] The water-repellent impregnation layer 12 passing through the spinning oil mixed with the water-repellent resin and impregnated inside and outside the yarn 11 is configured as a water-repellent impregnation layer 12 with enhanced waterproofing and water-repellent functions of the water-repellent tarpaulin fabric 10 woven with the yarn 11 provided with the water-repellent impregnation layer 12 of the present invention.

[0025] The functional coating layer 20 is composed of a composite resin composition composed of 10 to 15% by weight of polyethylene (PE) and 85 to 90% by weight of polypropylene (PP), wherein the functional coating layer is configured as a functional coating layer on SOL in which 1.5 to 5 parts by weight of titanium dioxide (TiO_2), which is as an antioxidant, and 0.5 to 3 parts by weight of a bis-sebaceate-based or poly-tetra methylbutyl-amino-based UV stabilizer, which is a UV absorbent, are mixed based on 100 parts by weight of the composite resin composition, and wherein the

top and bottom 21, 22 of the water-repellent tarpaulin fabric 10 are each coated with the functional resin composition in the functional coating layer 20 in a thickness of 0.15 to 0.3 mm.

[0026] Therefore, by means of the functional coating layer provided to the outside (top and bottom 21, 22) of the water-repellent tarpaulin fabric 10, the antifouling properties and weather resistance of the water-repellent tarpaulin fabric 10 are enhanced, and the durability properties, including tensile strength and tear strength, and waterproofing functions are further enhanced.

[0027] In addition, the water-repellent tarpaulin fabric 10 of the present invention is configured as a fabric having a thickness of 0.1 to 0.8 mm, and this is a preferred embodiment and of course, the thickness range may be modified.

[0028] According to the need, the 'water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 may be configured,

wherein the functional coating layer 20 may be configured as a functional coating layer 20 in which a functional resin composition on SOL is molded in the shape of a sheet to be bonded to the top and bottom 21, 22 of the water-repellent tarpaulin fabric;

the resin contained in the composite resin composition of the functional coating layer may be made of one type of thermoplastic resin selected from polyvinyl chloride (PVC), acrylic, and polyethylene terephthalate (PET), which are thermoplastic resins;

the functional coating layer 20 may be configured by adding to the composite resin composition of the functional coating layer 0.01 to 0.05 part by weight of a coloring agent, including carbon black, or 2 to 5 parts by weight of calcium stearate (Ca-st), which is a thermal stabilizer, and 5 to 10 parts by weight of a filler, including calcium carbonate;

in the functional coating layer 20, only one side of the top 21 or bottom 22 of the water-repellent tarpaulin fabric 10 may be coated with a functional coating layer on SOL, or only one side of the top 21 or bottom 22 of the water-repellent tarpaulin fabric coated with a functional coating layer on SOL which is molded in the shape of a sheet; and

a surface layer is further provided to the top 21 or bottom 22 of the functional coating layer 20.

[0029] In addition, the 'water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 of the present invention is manufactured by manufacturing steps described below (about features and compositions: see FIG. 1):

S1: manufacturing a spinning oil;

S2: mixing a water-repellent resin and the spinning oil;

S3: passing a yarn, which is a polypropylene filament yarn or a polyester fiber yarn, through the mixture of the water-repellent resin and the spinning oil to impregnate an impregnation layer inside and outside the yarn;

S4: drying the yarn in which the impregnation layer is impregnated;

S5: weaving a water-repellent tarpaulin fabric of the dried yarn in which the impregnation layer is impregnated;

S6: drying the water-repellent tarpaulin fabric; and

S7: coating a functional coating layer on the outside of the water-repellent tarpaulin fabric to manufacture a water-repellent tarpaulin as a final product.

[0030] In addition, the drying temperature of the yarn in which the impregnation layer is impregnated is 60 to 90°C in S4, and the drying temperature of the water-repellent tarpaulin fabric is room temperature in S6.

[0031] Therefore, the 'water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 of the present invention can solve problems that the waterproofing and water-repellent functions of the tarpaulin of the prior arts are significantly deteriorated; when tarpaulin, which is a processed product, is installed and used outdoors, it is contaminated by dust or pollutants in the air and thus its antifouling properties are deteriorated, and when it is used for a long time, the color is changed by the sunlight and the weather resistance is deteriorated; and the manufacturing thereof is so complicated that the workability is significantly deteriorated; and provide the technical features that the waterproofing and water-repellent functions of the water-repellent tarpaulin fabric 10 woven with the yarn 11 provided with a water-repellent impregnation layer 12 of the present invention are enhanced; the weather resistance, antifouling properties, and durability are also enhanced by a functional coating layer 20 provided on the outside of the water-repellent tarpaulin fabric 10; and the manufacturing of the same is easy and the workability of the same is improved by the manufacturing process of S1 to S7.

[0032] Hereinafter, the 'water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same' 100 of the present invention are described in more detail with Examples.

(Example)

[0033] Based on 100 parts by weight of a first spinning oil composition composed of 35% by weight of fatty alkylene ester, 20% by weight of glyceride ester, 8% by weight of polyolefin elastomer alkyl amine ether, 3% by weight of alkyl amide, 20% by weight of polyolefin elastomer alkyl ester, 5% by weight of polyolefin elastomer alkyl ether, 3% by weight of polyolefin elastomer castro oil ether, 3% by weight of polyolefin elastomer/polyolefin plastomer copolymer, and 3% by weight of polyolefin elastomer alkyl phosphate K, 100% parts by weight of the first spinning oil composition was mixed with 135 parts by weight of water to prepare a spinning oil of a liquid phase at pH 7.5. After that, a liquid mixed solution was generated by mixing 4.5 parts by weight of a water-repellent resin composition with the spinning oil, and a yarn made of a polypropylene filament yarn was passed through the liquid mixed solution of the spinning oil and the water-repellent resin so that a water-repellent impregnation layer was impregnated inside and outside the yarn. Then, the yarn was dried at 90°C, and the yarn provided with the water-repellent impregnation layer was woven into a water-repellent tarpaulin fabric in a thickness of 0.5 mm and dried at room temperature. Thereafter, based on 100 parts by weight of the composite resin composition composed of 15% by weight of polyethylene and 85% by weight of polypropylene outside the water-repellent tarpaulin fabric, 2.5 parts by weight of titanium dioxide (TiO_2), which is as an antioxidant, and 1.5 parts by weight of bis-sebaceate, which is a UV absorbent, were further added to produce a functional resin composition, and then to manufacture the water-repellent tarpaulin of the present invention provided with a functional coating layer 20 each coated in a thickness of 0.15 mm on the top and bottom of the water-repellent tarpaulin fabric.

(Comparative Example 1)

[0034] A tarpaulin made in China was purchased, wherein the tarpaulin was produced by coating each of the top and bottom of a polyester fabric, which is a membrane structure circulated in South Korea and which has a thickness of 0.5 mm, with polyvinylchloride resin in a thickness of 0.2 mm, and the entire thickness of the tarpaulin was 0.90 mm.

(Comparative Example 2)

[0035] A tarpaulin made in Japan was purchased, wherein the tarpaulin was produced by coating each of the top and bottom of a polyester fabric, which is a membrane structure circulated in South Korea and which has a thickness of 0.5 mm, with polyvinylchloride resin in a thickness of 0.2 mm, and the entire thickness of the tarpaulin was 0.90 mm.

(Comparative Example 3)

[0036] A tarpaulin having an entire thickness of 0.90 mm was manufactured by performing two-side knife coating of the top and bottom of a polyester fabric having a thickness of 0.5 mm with a polyvinylchloride mixture composed of 70 parts by weight of polyvinylchloride, 15 parts by weight of a plasticizer, 8.5 parts by weight of a filler, 3.5 parts by weight of a flame retardant, 2.5 parts by weight of a stabilizer, and 0.5 part by weight of a pigment.

Test method and comparison results

A. Weather resistance

[0037] Test method: To measure the deterioration of the product, the specimen was tested in the QUV TEST machine (Q-lab) by using ASTM D 4434, and the specimen was pulled out of the TEST machine and then put into the Ultra Scanpro spectrophotometer (Hunter), which is a machine for measuring color difference compared to the initial color (ΔE (color difference value); the larger the value, the greater the color difference from the initial color).

[0038] As shown in Table 1, the Example provided with the functional coating layer and the water-repellent impregnation layer of the present invention exhibited good results, as the discoloration discontinued after a certain period of time. Comparative Examples 1 and 2 exhibited similar results up to 1,500 hr, after which they continuously underwent discoloration. Comparative Example 3 exhibited very poor results as time passed.

[Table 1]

Item	Example	Comparative Example 1	Comparative Example 2	Comparative Example 3
500 hr	0.6	0.8	0.9	0.95
1000 hr	1.3	1.65	1.41	2.18
1500 hr	1.9	2.17	1.96	2.75

(continued)

Item	Example	Comparative Example 1	Comparative Example 2	Comparative Example 3
2000 hr	1.95	2.75	2.35	3.65

B. Antifouling properties

[0039] Test method: To measure the anti-fouling properties of the product, the products were subject to 6 months of outdoor weathering according to the KS D0060 test method, and then the specimens of the corresponding products are taken. The color difference compared to the initial color was measured by using the Ultra Scanpro spectrophotometer (Hunter), which a machine for measuring the color difference. As shown in Table 2, the Example provided with the functional coating layer and the water-repellent impregnation layer of the present invention exhibited the best results. The antifouling properties of Comparative Examples 1 and 2 were significantly lower than those of the Example of the present invention, and Comparative Example 3 exhibited poor results due to the item configuration.

[Table 2]

Item	Example	Comparative Example 1	Comparative Example 2	Comparative Example 3
Results	0.9	1.7	1.5	1.9

C. Durability

- Tensile strength and elongation

[0040] Five warps and five wefts were taken from 5 cm x 20 cm cut strip specimens by the DIN 53354 method, and the properties were measured by using the Universal Testing Machine (UTM) at a rate of 100 mm/min. The measurement results are shown in Table 3.

- Tear strength

[0041] The products were cut out into 5 cm x 12 cm specimens by the DIN 53363 method, and the specimens were cut in the vertical direction at the center of the 5 cm edge into 2.5 cm to take five warps and five wefts. Then, the property was measured by using the Universal Testing Machine (UTM) at a rate of 100 mm/min. The measurement results are shown in Table 3.

[Table 3]

Item	Example	Comparative Example 1	Comparative Example 2	Comparative Example 3
Tensile strength (Kgf/5Cm)	385	290	295	285
Elongation (%)	30	42	39	38
Tear strength trapezoid (Kgf)	95	48	49	47

[0042] As shown in Table 3, although the Example provided with the functional coating layer and the water-repellent impregnation layer of the present invention had a thinner thickness of 0.1 mm compared to Comparative Examples 1 and 2, the tensile strength and tear strength properties were the best, indicating that the durability was enhanced. In addition, despite having a thicker item thickness of 0.1 mm compared to the Example, Comparative Examples 1 and 2 exhibited lower tensile strength and tear strength, indicating that they have a problem in use (Item thickness of Example: 0.8 mm; item thickness of Comparative Examples 1 and 2: 0.9 mm). Comparative Example 3 showed poor tensile strength and tear strength properties due to the item configuration.

- Water repellency and waterproofing

[0043] According to the method of ASTM D5726, the specimen of the tarpaulin fabric without a functional coating layer of Example 1 and the specimens of the tarpaulin fabric made of a polyester fabric of Comparative Examples were immersed in an ink container in the longitudinal direction in the depth of 3 to 5 cm and kept for 24 hours. The tarpaulin

fabric specimen was determined as "accepted" when the ink rose up less than 2 cm to the surface and as "rejected" when the ink rose 2 cm or more to the surface.

(Test results from Example)

[0044] The results are shown in FIG. 2a.

[0045] As shown in the test results described above, in the Example of the tarpaulin fabric provided with the water-repellent impregnation layer of the present invention, when the tarpaulin fabric specimen was immersed in an ink container in the longitudinal direction in the depth of 3.5 cm (ink staking height) and kept for 24 hours, the ink did not infiltrate into the tarpaulin fabric specimen above the ink staking height of 3.5 cm, indicating that the water repellency and waterproofing were excellent to be "accepted."

(Test results from Comparative Examples)

[0046] The results are shown in FIG. 2b.

[0047] As shown in the test results described above, in Comparative Examples 1-3, when the tarpaulin fabric specimen made of a polyester fabric was immersed in an ink container in the longitudinal direction in the depth of 3.5 cm (ink staking height) and kept for 24 hours, the ink infiltrated into the tarpaulin fabric specimen made of a polyester fabric up to the infiltration height of 12.5 cm above the ink staking height of 3.5 cm, indicating that the water repellency and waterproofing were "rejected" with a problem in use.

[0048] Therefore, the Example showed that the water-repellent tarpaulin fabric manufactured with the yarn provided with the water-repellent impregnation layer with enhanced waterproofing and water-repellent functions had enhanced waterproofing and water-repellent functions, and that by means of the functional coating layer provided outside the water-repellent tarpaulin fabric, the item was configured to have enhanced antifouling properties, whether resistance, and durability as well.

[0049] In the above, the present invention has been described in detail through specific embodiments, but the present invention is not limited to the embodiments above, and various modifications are possible by those skilled in the art within the scope of the technical principles of the present invention.

Advantageous Effects

[0050] The present invention, which is water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and water-repellent tarpaulin using the same, is a very useful invention that brings an effect of solving the problems of the prior arts; and in particular, an effect of enhancing the waterproofing and water-repellent functions of a water-repellent tarpaulin fabric woven with a yarn with enhanced waterproofing and water-repellent functions provided with a water-repellent impregnation layer; an effect of enhance the weather resistance, antifouling properties, and durability by a water-repellent tarpaulin provided with a functional coating layer provided on the outside of the water-repellent tarpaulin fabric; and an effect that the manufacturing of the same is easy and the workability of the same is improved.

[Reference numerals]

[0051]

100: water-repellent tarpaulin with enhanced waterproofing and water-repellent functions (water-repellent tarpaulin)
10: water-repellent tarpaulin fabric
11: yarn
12: water-repellent impregnation layer
20: functional coating layer
21: top
22: bottom

Claims

1. A water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100, used as industrial membrane structures, comprising:

    a yarn 11 consisting of either polypropylene filament yarn or polyester fiber yarn;

a spinning oil, through which the yarn 11 passes through to enhance waterproofing and water-repellent functions of the yarn 11,
wherein a first spinning oil composition is composed of, based on 100% by weight of the first spinning oil composition, 15 to 48% by weight of fatty alkylene ester, 15 to 20% by weight of glyceride ester, 5 to 10% by weight of polyolefin elastomer alkyl amine ether, 3 to 7% by weight of alkyl amide, 15 to 20% by weight of polyolefin elastomer alkyl ester, 5 to 10% by weight of polyolefin elastomer alkyl ether, 3 to 6% by weight of polyolefin elastomer castro oil ether, 3 to 6% by weight of polyolefin elastomer/polyolefin plastomer copolymer, 3 to 6% by weight of polyolefin elastomer alkyl phosphate K, and
wherein the spinning oil is formed by mixing 80 to 150 parts by weight of water based on 100 parts by weight of the first spinning oil composition and formed as a liquid phase within a pH range of 7.5 to 8.5;
a water-repellent resin mixed with the spinning oil to further enhance waterproofing and water-repellent functions of the yarn 11,
wherein a water-repellent resin composition is composed of, based 100% by weight of the water-repellent resin composition, 5 to 34% by weight of dipropylene glycol resin, 1 to 5% by weight of dodecyl alcohol polyoxyethylene ether, and 65 to 90% by weight of water, and
wherein the water-repellent resin is formed by mixing 2 to 10 parts by weight of the water-repellent resin composition based on 100 parts by weight of the spinning oil and formed as a liquid phase within a pH range of 2.5 to 3.5 and a specific gravity of 1.08;
a water-repellent impregnation layer 12 passing through the spinning oil mixed with the water-repellent resin and impregnated inside and outside the yarn 11; and
a water-repellent tarpaulin fabric 10 woven with the yarn 11 provided with the water-repellent impregnation layer 12, wherein a functional coating layer 20 is provided on the top and bottom 21, 22 of the water-repellent tarpaulin fabric 10.

2. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the water-repellent impregnation layer 12 is a water-repellent impregnation layer 12 passing through the spinning oil mixed with the water-repellent resin and impregnated inside and outside the yarn 11, wherein the waterproofing and water-repellent functions of the water-repellent tarpaulin fabric 10 woven with the yarn 11 provided with the water-repellent impregnation layer 12 are enhanced.

3. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the functional coating layer 20 is composed of a composite resin composition composed of 10 to 15% by weight of polyethylene and 85 to 90% by weight of polypropylene, wherein the functional coating layer is configured as a functional coating layer on SOL in which 1.5 to 5 parts by weight of titanium dioxide, which is as an antioxidant, and 0.5 to 3 parts by weight of a bis-sebaceate-based or poly-tetra methylbutyl-amino-based UV stabilizer, which is a UV absorbent, are mixed based on 100 parts by weight of the composite resin composition.

4. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein in the functional coating layer 20, the functional resin composition on SOL is molded in the shape of a sheet to be bonded to the top and bottom 21, 22 of the water-repellent tarpaulin fabric 10.

5. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the functional coating layer 20 is made of one type of thermoplastic resin selected from polyvinyl chloride, acrylic, and polyethylene terephthalate, which are thermoplastic resins

6. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the functional coating layer 20 is configured by adding to the composite resin composition of the functional coating layer 0.01 to 0.05 part by weight of a coloring agent, including carbon black, or 2 to 5 parts by weight of calcium stearate (Ca-st), which is a thermal stabilizer, and 5 to 10 parts by weight of a filler, including calcium carbonate.

7. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the functional coating layer 20 is provided to only one side of the top 21 or bottom 22 of the water-repellent tarpaulin fabric 10 or a surface layer is further provided to the top 21 or bottom 22 of the functional coating layer 20.

8. The water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same 100 according to claim 1, wherein the water-repellent tarpaulin fabric with enhanced waterproofing and water-repellent functions and a water-repellent tarpaulin using the same are manufactured by

S1: manufacturing a spinning oil;
S2: mixing a water-repellent resin and the spinning oil;
S3: passing a yarn, which is a polypropylene filament yarn or a polyester fiber yarn, through the mixture of the water-repellent resin and the spinning oil to impregnate an impregnation layer inside and outside the yarn;
S4: drying the yarn in which the impregnation layer is impregnated;
S5: weaving a water-repellent tarpaulin fabric of the dried yarn in which the impregnation layer is impregnated;
S6: drying the water-repellent tarpaulin fabric; and
S7: coating a functional coating layer on the outside of the water-repellent tarpaulin fabric to manufacture a water-repellent tarpaulin as a final product.

FIG. 1

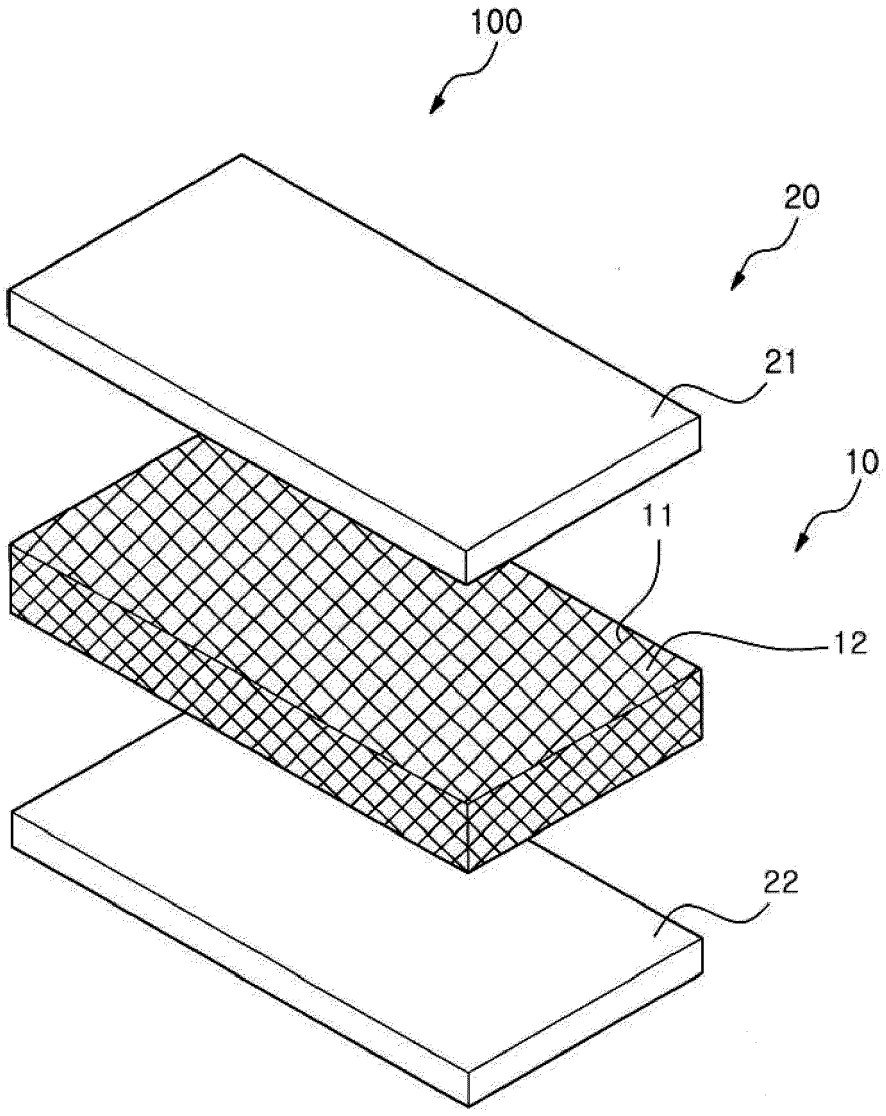


FIG. 2a

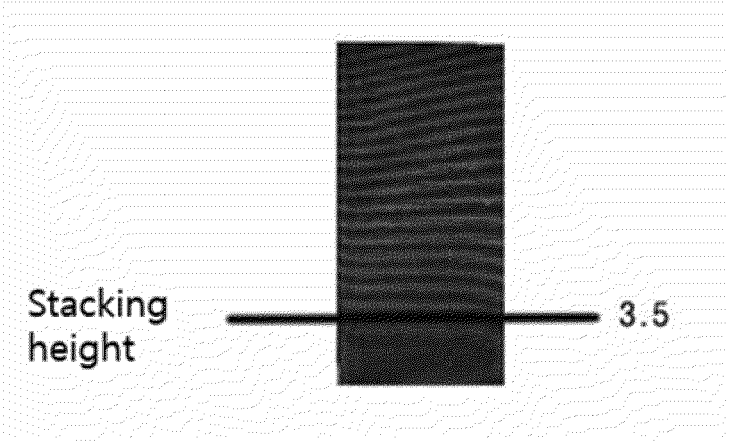
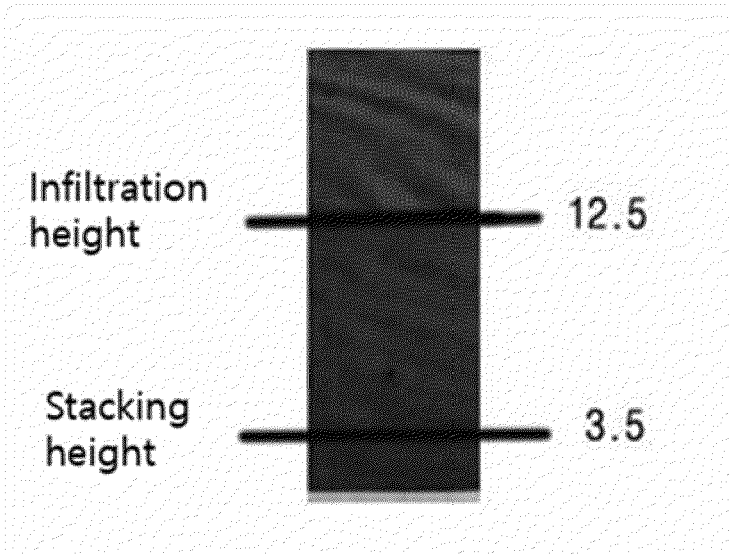

Stacking
height
3.5

FIG. 2b


Infiltration
height
12.5
Stacking
height
3.5

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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 2113

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	JP 2014 151635 A (HIRAOKA & CO LTD) 25 August 2014 (2014-08-25) * the whole document * -----	1-8	INV. D06M15/53 D01F6/46 D06M13/00 D06M15/227 D06M13/17 D06M13/224 D06M13/292

TECHNICAL FIELDS SEARCHED (IPC)

D01F
D06Q
D06M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 May 2024	Beyazit, Selim

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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14-05-2024

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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