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Señor

Jefe de la División de Nuevas Creaciones

Superintendencia de Industria y Comercio

Ministerio de Desarrollo Económico

E. S. D.

Re.: Expediente No. **05.069.332**

Solicitud de Patente de Invención para:

**"FIBRA DE POLIOLEFINA DE REFUERZO, SU USO Y PRODUCTOS QUE
COMPRENDEN LA FIBRA"**

Solicitante: **SAINT-GOBAIN MATERIAUX DE CONSTRUCTION S.A.S.**

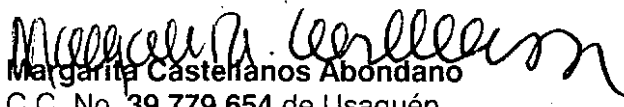
RESPUESTA AL EXAMEN DE BUSQUEDA DE ANTERIORIDADES

Yo, **MARGARITA CASTELLANOS ABONDANO**, mayor de edad, identificada y domiciliada como aparece al pie de mi firma, en atención a su oficio No. **11524** Notificado por fijación en lista del 22 de julio de 2011, atentamente me permito dar repuesta al mismo de la siguiente manera:

Presento texto completo de los documentos requeridos por ese Despacho como resultado de la búsqueda de anterioridades:

- Vol. 1998, No. 14, 31 December 1998, & JP 10 236855 A (HAGIWARA KOGYO KK), 8 September 1998, **Abstract**, & JP 10 23855 A (HAGIWARA KOGYO KK) 8 September 1998.
- Vol. 2000, No. 26, 1 July 2002, & JP 2001 253737 A (TAISEI CORP), 18 September 2001, **Abstract**. & JP 2001 253737 A (TAISEI CORP) 18 September 2001.

Del Señor Jefe,


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P1213/Memorial Artículo 46

[JP,10-236855,A]

<http://www4.ipdl.inpit.go.jp/Tokujitu/PAJdetail.ipdl?N0000=60&N0120=01&N2001=2&N3001=H10-236855> (Consultado el 18 de octubre de 2011)

Publication No. JP 10-236855 A published on 08-Sep-1998

Application No. JP 09-45285 filed on 28-Feb-1997

Polypropylene fiber for reinforcing cement

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the polypropylene fiber for cement strengthening which strengthens a cement molded product.

[0002]

[Description of the Prior Art] To blend the staple fiber which cut plastic fiber instead of the asbestos currently used for years as a reinforcing member of a cement molded article is tried widely. Although it has been thought that what has the only high tensile strength as fiber raises the intensity of a cement Plastic solid conventionally as for fiber for cement reinforcement, Contributing to improvement in the impact strength of a cement molded product or flexural strength is also known raising the compatibility in the interface of a fiber surface and cement, and preventing interfacial peeling, and by raising the dispersibility of fiber and cement. Although it is effective to make moderate tangling and convergence nature give a staple fiber as a concrete means for that at the time of a cement mull, When convergence nature was too strong, fiber solidified, the dispersibility to cement became insufficient, when convergence nature ran short, rigidity was not obtained by fiber but there was a problem that the intensity of a cement molded product did not come out. When a staple fiber is hydrophobicity, it is known that the float kind phenomenon in which a staple fiber surfaces in cement slurry etc. will arise, but. It is well known by giving hydrophilic nature to a staple fiber that it is that from which good sedimentation nature is obtained and the predetermined fiber reinforcement effect is acquired by dispersibility's improving more and mixing fiber and cement homogeneously etc. However, the reinforcing effect was not [that it is fully / compatibility with cement / easy to escape to stress so easily since the form of a polypropylene fiber of a staple fiber is simple] enough when the polypropylene fiber was used as plastic fiber. A polypropylene fiber is hydrophobicity and also had the problem that a surfacing phenomenon arose at the time of a cement mull, and sufficient dispersibility was not acquired. These problems are solved, further, in order to improve tangling and convergence nature of a staple fiber, the surface treatment is performed by various surface-active agents etc., but the finishing agent which can still be satisfied is not obtained.

[0003]

[Problem to be solved by the invention] This invention gives hydrophilic nature to a polypropylene fiber, by giving moderate convergence nature, it solves the surfacing phenomenon in the case of cement and a mull, and an object of this invention is to provide the polypropylene fiber for cement strengthening which raises the impact strength and flexural strength of a cement molded product.

[0004]

[Means for solving problem] In order to solve an aforementioned problem technically, the specific surface-active agent was used for this invention as a finishing agent by specific

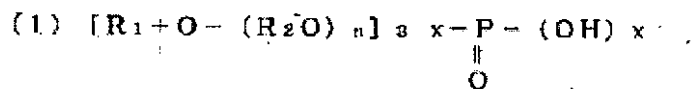
combination to the polypropylene fiber, and it reached the invention in this application. Namely, it consists of polyoxyalkylene alkylphenyl ether phosphoric ester (A) and polyoxyalkylene fatty acid ester (B), (A) The weight ratio of / (B) makes a summary the polypropylene fiber for cement strengthening which adheres the fiber processing agent which are 60 / 40 - 40/60 0.1 to 10weight % to the total fiber.

[0005]

[Mode for carrying out the invention]The polyoxyalkylene alkylphenyl ether phosphoric ester (A) used in this invention can be expressed with a general formula (1). R1 in a formula is an alkylation phenyl group, and carbon numbers of an alkyl group are usually 8-12. R2 is ethylene or a 1,2-propylene group, and is ethylene preferably. x is [monoester and x] diester 1 2.

[0006]

[Chemical formula 1]

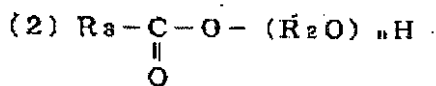


[0007]As an example of polyoxyalkylene alkylphenyl ether phosphoric ester (A), polyoxyethylene nonylphenyl ether phosphoric ester, polyoxyethylene dodecylphenyl ether phosphoric ester, etc. are mentioned.

[0008]The polyoxyalkylene fatty acid ester (B) used in this invention can be expressed with a general formula (2). R3 in a formula is the alkyl group or allyl group of the carbon numbers 12-20, and is the alkyl group or allyl group of the carbon numbers 16-18 preferably.

[0009]

[Chemical formula 2]



[0010]Polyoxyethylene oleate, polyoxyethylene stearate, etc. are mentioned as an example of polyoxyalkylene fatty acid ester (B).

[0011]As for the above-mentioned polyoxyalkylene alkylphenyl ether phosphoric ester (A) and polyoxyalkylene fatty acid ester (B), it is preferred that the HLB values calculated by the following formula are 8-14.

[0012]

[Mathematical formula 1]

$$HLB = E / 5$$

(E = ポリオキシアルキレン部分の重量分率)

[0013]In the HLB value of a mentioned range, since the molecular weight of the polyethylene glycol is adjusted moderately, while excelling in the compatibility over resin, it excels also in hydrophilic nature.

[0014]In this invention, polyoxyalkylene alkylphenyl ether phosphoric ester (A) and polyoxyalkylene fatty acid ester (B) are mixed, and it is used as a finishing agent to a polypropylene fiber. As for the weight ratio of (A) and (B) to be used, it is important that (A)/(B) is 60 / 40 - 40/60. That is, the polypropylene fiber processed in cement slurry as the weight ratio of (A)/(B) is outside this range causes a surfacing phenomenon, and dispersibility gets worse.

[0015]the coating weight to fiber of the above-mentioned finishing agent receives the total fiber -- 0.1 to 10 weight % -- this -- better -- ** is 1 to 5 weight %. If hydrophilic nature is not enough given to a polypropylene fiber at less than 0.1 weight % to the total fiber but coating weight exceeds 10 weight %, the convergence nature of polypropylene fibers

becomes strong, the dispersibility in the inside of cement slurry is inferior, and it is not desirable.

[0016] Although publicly known polypropylene copolymers or those mixtures, such as a propylene homopolymer, an ethylene propylene block copolymer, or a random copolymer, can be used for the polypropylene which forms the fibrous body used for this invention, As an object for cement strengthening of which high intensity and heat resistance are required also in these, a propylene homopolymer is desirable, and it is desirable to choose a with a rate [of 0.95 or more] of an isotactic pentad thing especially. An isotactic pentad molar fraction means here the isotactic molar fraction in the pentad unit in the polypropylene molecule measured by A.Zambelli etc. using ¹³C-NMR announced by Macromolecules 6925 (1973). the melt flow rate (it abbreviates to MFR hereafter) of the above-mentioned polypropylene -- 0.1-50g/10min. -- it is preferably good 1-40g/10min., and to choose from the range of 5-30g / 10min. still more preferably.

[0017] In the range which does not deviate from the main point of this invention by the purpose of use, additive agents, such as an antioxidant, lubricant, an ultraviolet ray absorbent, a spray for preventing static electricity, an inorganic filler, an organic filler, a cross linking agent, a foaming agent, and a nucleating additive, may be blended with the above-mentioned polypropylene.

[0018] A publicly known melt spinning method can be adopted as a manufacturing method of a polypropylene fiber, and the fibrous form is not restricted. for example, the split fiber (JP,5-87460,B.) which cleft the polypropylene film JP,H4-59644,A and the thing which consists of low fineness multifilament, That (JP,58-18343,B, JP,62-28106,B) to which the cross-section area of the thread which carried out spinning was irregularly changed to the extension direction, the fiber which performed spinning using the possible string form dice of the stretching treatment of high magnification, and the filament connected disengageable, etc. are mentioned.

[0019] These polypropylene fibers are made preferred [tensile strength / 4 or more g/d] in the reinforcing effect of cement. It is assumed that the thing of the range whose single yarn fineness is 2-70d is suitable from the dispersibility to the inside of cement, namely, if fiber is too thin, and distribution becomes uneven and exceeds 70 d in less than 2d, a touch area with cement will decrease, and a reinforcing effect is inferior.

[0020] A polypropylene fiber is processed using said finishing agent. Before a surface treatment, corona treatment etc. may be performed if needed. After adhering the finishing agent of the specified quantity, it converges and dries and is cut into prescribed length. The fiber length cut is 5-15 mm more preferably 3-30 mm. If the omission from cement arises and fiber length exceeds 30 mm in less than 3 mm, dispersibility becomes poor and is not preferred.

[0021] As cement which can mix the polypropylene fiber of this invention, cement, such as non-hydraulic cement, such as hydraulic cement, such as portland cement, white PPORUTO land cement, and alumina cement, or gypsum fibrosum, and lime, can be mentioned. The loadings of the above-mentioned polypropylene fiber are generally made into 0.1 to 10 weight % to cement. For example, 0.2 to 0.5 weight % is blended with siding, and 1 to 1.5 weight % is blended with the tile.

[0022] As a method of mixing the polypropylene fiber of this invention with cement, Publicly known methods, such as a spray up method which sprays simultaneously the method of distributing a polypropylene fiber on a cement powder object, the premix method which distributes a polypropylene fiber in cement slurry, cement, a polypropylene fiber, and water, can be used. The cement slurry obtained by these methods by a use A paper-milling molding method, It fabricates in accordance with publicly known molding methods, such as an extrusion method and an injection-molding method, cure is carried out by the autoclave-curing method processed at the temperature of 100-200 °C after neglect by the natural method of curing or two to three-day ordinary temperature neglected to the

inside of the atmosphere, or underwater for tens of days at ordinary temperature, and it is considered as a cement molded article.

[0023]As a use of the cement molded article manufactured using the polypropylene fiber of this invention, although all cement products are covered, For example, the wallplate of a building, flooring concrete, finishing mortar, a waterproofing concrete, As roofing or an engineering-works relation component, it can be used for pipes, such as road components, such as pavement of a road, a runway, etc., a road sign, and a sewer, a drain pipe, and a cable duct, a rocky place under the water where fish tend to gather, a bulkhead block, a tetrapod, etc., and can be used for a tie, a bench, a flower pot, etc. as various structures.

[0024]

[Working example]

test-method (1) flexural strength: -- JIS-A1408 conformity (2) Charpy-shock-strength: -- JIS-B7722 conformity (3) fiber surfacing rate evaluation: -- a polypropylene fiber and cement were mulled, cement slurry was created, and the polypropylene fiber which surfaced was computed to the input after standing for 30 minutes.

(4) Dispersibility evaluation : a polypropylene fiber and cement were mulled, cement slurry was created, and viewing estimated the surface state.

[0025]50 weight % of working-example polyoxyethylene nonylphenyl ether phosphoric ester (HLB=8.0) and 50 weight % of polyoxyethylene oleate (HLB=9.0) were mixed, and finishing agent solution was created. Polypropylene (MFR=1.0g/10min.) was supplied to the extrusion machine, it extruded from the string form nozzle of 0.6-mm phix25 holes, and after cooling, it extended to one 12 times the draw magnification of this. The single yarn fineness of the obtained full oriented yarn was 25d. It cut so that it might be made to dry and mean fiber length might turn into 6-mm length after immersing the above-mentioned full oriented yarn in the finishing agent solution created previously, and the polypropylene fiber of the working example was obtained. Although the partial section of this fiber is shown in drawing 1, the single yarn filament 2 has connected by the articulated section 3, and it has composition which this connection can divide into about 3-5 strings with external force, such as a mull at the time of cement combination.

[0026]Shaping of the cement molded article using this polypropylene fiber was performed based on JIS-R5201. Namely, portland cement 100 weight section and standard sand 200 weight section are mixed enough, After having added five weight sections of the above-mentioned compounds, having slushed into the 40mmx40mmx160mm mold after mulling so that water 65 weight section may be added and the whole may become uniform, and neglecting it at the ordinary temperature in the atmosphere for 48 hours, 165 ** and 20-hour care of health were performed in autoclave. 6.5kg-cm/cm² and the fiber surfacing rate of the flexural strength of the obtained molded product were 190 kg/cm², Charpy shock strength was 0%, and the dispersibility of fiber was good.

[0027]70 weight % of comparative example 1 polyoxyethylene nonylphenyl ether phosphoric ester (HLB=8.0) and 30 weight % of polyoxyethylene oleate (HLB=9.0) were mixed, finishing agent solution was created, and others fabricated the cement molded article like the working example 1. 3.5kg-cm/cm² and the fiber surfacing rate of the flexural strength of the obtained molded product were 165 kg/cm², Charpy shock strength was 20%, and the dispersibility of fiber was poor.

[0028]30 weight % of comparative example 2 polyoxyethylene nonylphenyl ether phosphoric ester (HLB=8.0) and 70 weight % of polyoxyethylene oleate (HLB=9.0) were mixed, finishing agent solution was created, and others fabricated the cement molded article like the working example 1. 2.8kg-cm/cm² and the fiber surfacing rate of the flexural strength of the obtained molded product were 175 kg/cm², Charpy shock strength was 16%, and the dispersibility of fiber was slightly poor.

[0029]

[Effect of the Invention]The specific surface-active agent was used for the polypropylene

fiber for cement strengthening of this invention as a finishing agent by specific combination to the polypropylene fiber, and it reached the invention in this application. Namely, by using polyoxyalkylene alkylphenyl ether phosphoric ester (A) and polyoxyalkylene fatty acid ester (B) by a specific weight ratio, Give hydrophilic nature and moderate convergence nature to a polypropylene fiber, and the surfacing phenomenon of a polypropylene fiber is prevented for cement slurry at the time of creation, Since the outstanding compatibility in the interface of a polypropylene fiber and cement can be given for moderate convergence nature, the polypropylene fiber whose manufacture of the cement molded product excellent in flexural strength and impact strength is attained can be obtained.

[Brief Description of the Drawings]

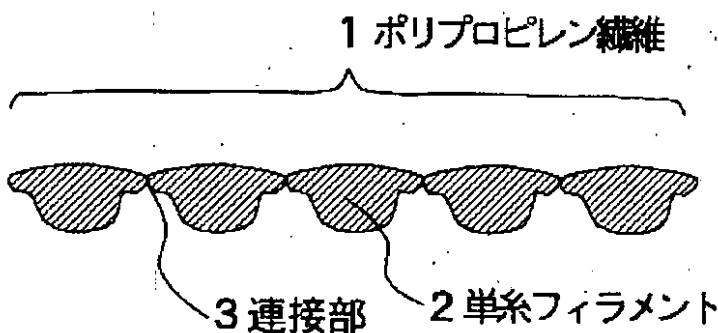
[Drawing 1] It is a fragmentary sectional view showing the polypropylene fiber of this example.

[Explanations of letters or numerals]

1 Polypropylene fiber

2 Single yarn filament

3 Articulated section



[Claim(s)]

[Claim 1] It consists of polyoxyalkylene alkylphenyl ether phosphoric ester (A) and polyoxyalkylene fatty acid ester (B), (A) A polypropylene fiber for cement strengthening which adheres a fiber processing agent whose weight ratios of / (B) are 60 / 40 - 40/60 0.1 to 10weight % to the total fiber.

[JP,2001-253737,A]

<http://www4.ipdl.inpit.go.jp/Tokujitu/PAJdetail.ipdl?N0000=60&N0120=01&N2001=2&N3001=2001-253737> (Consultado el 18 de octubre de 2011)

Publication No. JP 01-253737 A published on 11-Oct-1989
Application No. JP 63-81353 filed on 04-Apr-1988

Silver halide color photographic sensitive material

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the execution method of the mortar which mixed the polypropylene fiber, or a concrete structure thing.

[0002]

[Description of the Prior Art] [Description of the Prior Art]. the structure in which mortar and concrete were comes out as a Plastic solid.

If a sex is size and physical properties, such as tensile strength, flexural strength, and flexural toughness, are not enough, a leak, an exfoliation accident of an outer wall, etc. by the crack of a wall surface will arise, and it is **.

In order to solve the problem of such a murbruk structure thing or a concrete structure thing, the method of mixing steel materials in mortar or concrete is performed conventionally, but. In recent years, in order to obtain the same mechanical strength as steel materials, a steel fiber, Vinylon fibers, etc. are mixed in mortar or concrete.

[0003] Although the shotcrete construction method which forms the mortar layer and concrete layer of a thin layer by spraying of mortar and concrete is also known, When performing this construction method, as a measure which solves problems, such as a leak and an exfoliation accident, the method of laying a wire gauze under mortar or the concrete is performed. However, since the method of mixing steel materials in mortar or concrete has the specific gravity of (1) steel materials as heavy as 7.8, it is inferior in conveyance of material, workability, etc., (2) steel materials rust easily, corrosion advances and the fault of the endurance of a structure falling easily is pointed out.

[0004] The method of mixing a steel fiber in mortar or concrete, (1) If the concrete which corrosion advanced like steel materials, and the endurance of the structure fell easily, and mixed (2) steel fiber is used as an object for the concrete pavement of a road, The danger that the blowout of vehicles will occur is large, and if (3) steel fiber is mixed in mortar, it will be easy to generate a fiber ball (lump), and a fault, like the homogeneity of quality is inferior is pointed out.

[0005] The method of mixing Vinylon fibers in mortar or concrete is bent compared with steel materials, its tenacity coefficient is small, and moreover, since it is a vinyl chloride system, problem occurs in respect of the dioxin of an environmental problem. If a wire gauze is used when performing a shotcrete construction method, it is difficult to secure the fogging from the surface to a wire gauze. And if a crack occurs on the surface, a wire gauze will rust, corrosion will advance and the endurance of a structure will fall easily.

[0006] Although a shotcrete construction method may be performed using a steel fiber or Vinylon fibers, in this case, a rebound ratio is as large as 40 to 50%, and the loss of material

is large. In order to dispose of this, a steel fiber and Vinyon fibers must be separated from mortar or concrete, but this work is very difficult.

[0007]

[Problem to be solved by the invention] This invention is made in light of the above-mentioned circumstances, and its dispersibility and physical association to mortar or cement are good. It bends, tenacity and crack resistance increase, the rebound ratio at the time of spraying of mortar or cement is decreased, workability is good, and it aims at providing the execution method of the mortar in which quality mixed tensile strength, flexural strength, and a good and economical polypropylene fiber, or a concrete structure thing.

[0008]

[Means for solving problem] In order to solve an aforementioned problem, according to the execution method of the mortar which used the polypropylene fiber according to claim 1, or a concrete structure thing. In the execution method which mixes a polypropylene fiber in mortar or concrete, and builds a murbruk structure thing or a concrete structure thing by placing and spreading, It is the method of using what a section considered it as the form where the surface was extracted selectively rather than was flat in said polypropylene fiber, and was 10-350 deniers in thickness, was 3-12 mm in fiber length, and added hydrophilic nature to the surface.

[0009] According to the execution method of mortar using the polypropylene fiber according to claim 2, or a concrete structure thing. In the execution method which mixes a polypropylene fiber in mortar or concrete, and builds a murbruk structure thing or a concrete structure thing by spraying, It is the method of using what a section considered it as the form where the surface was extracted selectively rather than was flat in said polypropylene fiber, and was 10-350 deniers in thickness, was 3-12 mm in fiber length, and added hydrophilic nature to the surface.

[0010] In the execution method of the mortar in which the invention according to claim 3 mixed the polypropylene fiber according to claim 1 or 2, or a concrete structure thing, The flexural strength of said mortar which mixed said polypropylene fiber, or said concrete, Based on "the flexural strength and the flexural toughness test method of steel fiber reinforcing concrete" (JSCE-G 552-1983: Japan Society of Civil Engineers standard concrete standard specification [volume on standard]), The bending test by 3rd grade equinox load was done using the testing machine specified to JIS-B-7733, and the bending tenacity coefficient which measured displacement of the load of a vertical axis and the center point of a horizontal axis, and the curve calculated from the value to 1/150 displacement of a span set up become a value more than 0.1N/mm^2 .

[0011] In the execution method of the mortar in which the invention according to claim 4 mixed the polypropylene fiber according to any one of claims 1 to 3 further again, or a concrete structure thing, It was made to the surface of said mortar or said concrete, applying the pushing force more than 0.005kgf/cm^2 to from 1 hour before the first train in said mortar or said setting before the first train.

[0012]

[Mode for carrying out the invention] Hereafter, the embodiment concerning the execution method of mortar using the polypropylene fiber of this invention or a concrete structure thing is described. Polypropylene is a raw material in which it excels in chemical resistance, such as acid resistance and alkali resistance, and dioxin is not contained, either. It does not rust and specific gravity is a raw material with 0.91 and the features, like it is very small.

[0013] The form of the polypropylene fiber of this embodiment has added hydrophilic nature to the surface while making it the fiber form where the surface was extracted selectively rather than it having a flat section. As additional means of hydrophilic nature, the polypropylene fiber is immersed in the tub which accumulated the hydrophilicity of an

alkali system, for example. The thickness of the polypropylene fiber of this embodiment is set as 10-350 deniers (denier: what expressed the mass per 900 m with the number of grams), and the fiber length is set as 3-12 mm.

[0014]In the polypropylene fiber by which thickness is less than 10 deniers, and a fiber length is also less than 3 mm. The omission from cement arises and bends, and tenacity is not acquired, but if thickness exceeds 350 deniers (for example, 6000 deniers) and a fiber length exceeds 12 mm conversely (for example, 30 mm), it will be generated by the fiber ball (lump) and the dispersibility of a polypropylene fiber will fall. Thickness is less than 10 deniers, and also when a fiber length also exceeds 12 mm, it is easy to generate a fiber ball (lump).

[0015]Here, if a polypropylene fiber with a thickness of 350 deniers and a fiber length of 6-12 mm is mixed when constructing mortar or the concrete structure thing of a thick layer (not less than 30 mm) by placing and spreading, it will bend and tenacity and the resistance of the surface crack at the time of desiccation will improve. If a polypropylene fiber with a thickness of 10-20 deniers and a fiber length of 3-12 mm is mixed when constructing mortar or the concrete structure thing of a thin layer (less than 30 mm) by spraying, the rebound ratio at the time of spraying and the resistance of the surface crack at the time of desiccation will improve.

[0016]On the other hand, when the mixing method of a polypropylene fiber constructs a murbruk structure thing, after having been scoured by simultaneous or mortar, it mixes and stirs a polypropylene fiber with cement, a fine aggregate, water, and optimum dose of chemical admixtures. When constructing a concrete structure thing, after having been scoured by simultaneous or concrete, a polypropylene fiber is mixed and stirred with cement, a fine aggregate, coarse aggregate, water, and optimum dose of chemical admixtures.

[0017]and the between from 1 hour before the first train [in / as surface finish of mortar or a concrete structure thing / at this embodiment / the coagulation of mortar or concrete] to the first train -- gold -- a trowel and a tree -- the method of pushing a trowel against the surface of mortar or concrete is performed. here -- gold -- a trowel and a tree -- the pushing force which pushes a trowel against the surface of mortar or concrete is set up more than 0.005kgf/cm^2 .

[0018]

[Working example]Next, based on the evaluation test shown below, the validity of the execution method of mortar using the polypropylene fiber of this invention or a concrete structure thing is explained.

(1) Bending test evaluation drawing 1 is the bending test result (load-deflection curve) of having applied to "the flexural strength and the flexural toughness test method of steel fiber reinforcing concrete" (JSCE-G 552-1983: Japan Society of Civil Engineers standard concrete standard specification [volume on standard]) correspondingly.

The bending test was done according to 3rd grade equinox load using the testing machine specified to JIS-B-7733.

[0019][0019]. The test piece of ** is that [10cmx10cmx40cm].

Mortar (the working example 1 is called hereafter) of this invention which has the material which is a direction object and is shown in Table 1, conventional mortar (the comparative example 1 is called hereafter), and the plain mortar (the comparative example 2 is called hereafter) that is not mixing the reinforcing fiber, Four kinds which consist of plain mortars (the comparative example 3 is called hereafter) embedding a wire gauze.

The surface is not extracted selectively but having indicated that the shape of surface type of a polypropylene fiber is straight as used in the test piece of the comparative example 1 of Table 1 means the smooth thing.

[0020]

[Table 1]

(表1) 供試体の種類

供試体	ポリプロピレン繊維の形状	ポリプロピレン 繊維の混入量	セメント量	水セメント比 [W/C]	その他
実施例 1 (本発明のモルタル)	断面が扁平でない 表面を部分的に絞っている 親水性を付加している 太さ350デニール、繊維長さ12mm	1.0容積%	600kg/m ³	58%	φ6.0mm 50cm×50cm の金網を使用
比較例 1 (従来のモルタル)	断面が扁平である 表面形状はストレート 太さ350デニール 繊維長さ12mm	1.0容積%			
比較例 2 (プレーンモルタル)	————	————			
比較例 3 (金網を埋め込んだ プレーンモルタル)	————	————			

[0021]And from the bending test result of drawing 1, each test piece bent using the formula shown below, and the tenacity coefficient was compared.

[0022]

[Mathematical formula 1]

$$\sigma_b = (T_b / \sigma_{tb}) \times (L / b h^2) \dots\dots (1)$$

ここで、 σ_b : 曲げじん性係数 [N/mm²]
L : スパン[mm]=300mm
 σ_{tb} : スパンLの1/150たわみ[mm]=2mm
T_b : 荷重-たわみ曲線下で σ_{tb} = 2までの面積[N・mm]
b : 破壊断面の幅 [mm]
h : 破壊断面の高さ [mm]

[0023]In drawing 1, when the test piece of the comparative example 2 reached maximum load, displacement was divided into two at about 0.1 mm. The bending tenacity coefficient of this is 0. That is, there is no stickiness and it breaks into POKITSU easily. The omission of a straight polypropylene fiber with the flat shape of surface type bends the test piece of the comparative example 2 early, and a tenacity coefficient is less than 0.1N/mm². On the other hand, the displacement curve as the test piece of the comparative example 3 with same test piece of the working example 1 is obtained, and a test piece does not become comparatively for 2 minutes. That is, the test piece of the working example 1 is bent like the test piece of the comparative example 3, and a tenacity coefficient serves as a numerical value of 0.8N/mm². Thus, since the polypropylene fiber which the test piece of the working example 1 was 350 deniers in thickness, and was 12 mm in fiber length, a section extracted the surface selectively rather than was flat, and added hydrophilic nature to the surface is mixed, Adhesion force with cement increased and bent, the value (more than 0.1N/mm²) with a high tenacity coefficient was shown, and the effect that the resistance of a crack increased was checked. Simultaneously, since flexural strength became large compared with the comparative example 1 or the comparative example 2, the resistance over external load and the effect which becomes large were checked.

[0024]Although drawing 1 estimated mortar, the same effect was checked even if it was concrete.

(2) The form of a drying shrinkage crack test object is shown in the drying shrinkage examination evaluation table 2. This test method is the "drying shrinkage crack test method of concrete" specified in the quality evaluation test-method Study Group report (December, 1998) of Japan Concrete Institute.

[0025]The 1st case where this examination consists of plain mortar which is not mixing the reinforcing fiber, The 2nd case that consists of plain mortar embedding a wire gauze

(phi6.0mm, 50 cm x 50 cm), Thickness was 10-350 deniers, the fiber length was 3-12 mm, it was not flat, and the polypropylene fiber which extracted the surface selectively and added hydrophilic nature to the surface was mixed, and the section compared the 3rd case and the 4th case which consist of mortar to which the mixing amount of the polypropylene fiber was changed. In the 3rd case, the mixing amount of the polypropylene fiber was 0.5 volume %, and the mixing amount of the polypropylene fiber was 1.0 volume % in the 4th case.

[0026]

[Table 2]

(表 2) 乾燥収縮ひび割れ試験結果

		種 別	ひび割れ 発生日
比較例	第 1 ケース	補強繊維を混入していないプレーンモルタル	14
	第 2 ケース	金網を埋め込んだプレーンモルタル	17
実施例	第 3 ケース	0.5容積%のポリプロピレン繊維を混入したモルタル	23
	第 4 ケース	1.0容積%のポリプロピレン繊維を混入したモルタル	31

[0027][0027]. ***** of ** of the 3rd case and the 4th case concerning this invention is 2.

The crack accrual date of the 1st case that is one day and consists of plain mortars, and the 2nd case that consists of plain mortar embedding a wire gauze is 14 days.

From this result, like [it is ***** and], the 3rd case and the 4th case, Thickness was 10-350 deniers, the fiber length was 3-12 mm, a section was not flat, and since the polypropylene fiber which extracted the surface selectively and added hydrophilic nature to the surface was mixed and bent and the value with a high tenacity coefficient was shown, the effect that the crack resistance at the time of drying shrinkage became large was also checked.

[0028]Although mortar was evaluated in Table 2, the same effect was checked even if it was concrete.

(3) In the surface of pushing force test evaluation mortar of the prevention from a surface crack, and concrete, by the time cement paste hardens, in early stages, a self-shrinkage and a plastic shrinkage will occur very much from the chemical reaction of cement and water. The effective method of preventing this is not yet established.

[0029]until now -- a tree -- a trowel or gold -- a trowel -- although finished, there is no pushing force which levels the surface of the time and mortar, and concrete by whether it is **, and it is not necessarily recognized as an effective method, and the surface crack cannot be abolished. Plastic shrinkage (a self-shrinkage and a drying shrinkage crack are included) by a hydration reaction when water reacts to cement and this is solidified It is for generating chemically.

[0030]then, a plastic shrinkage -- gold -- a trowel -- finishing and a tree -- a trowel -- in order to lose by pushing according to finishing, it examined paying attention to the pushing force and the stage in that case. The result is shown in Table 3.

[0031]

[Table 3]

(表3) 押し力と凝結の始発までの時間と表面ひび割れ結果

ケース	押し力 [kgf/cm ²]	仕上げの時期	ひび割れ 発生の有無
1	0.003	始発の2時間前から始発までの時間	有
2	0.005以上	始発の2時間前から始発までの時間	有
3	0.003	始発の1時間前から始発までの時間	有
4	0.005以上	始発の1時間前から始発までの時間	無

注) 本発明のポリプロピレン繊維1.0容積%、コンクリート厚さ150mm、
1ケースの形状1×1m、コンクリート温度20.5℃、外気温度23℃

[0032] It is a stage which is the pushing force more than 0.005kgf/cm² and to which loses the plastic contraction which went into the pole surface like [it is ***** and] from the case 4 of this result, namely, pushing force is applied in order to abolish a surface crack 1 of the first train. It is the optimal if it carries out from before time before the first train. A crack cannot be abolished if it passes over first train time. If 2 hours before the 1-hour forward of the first train apply pushing force, a plastic shrinkage will occur again.

[0033] Although mortar was evaluated in Table 3, the same effect was checked even if it was concrete.

The recoil test evaluation thickness of a shotcrete (4) 10-20 deniers, The concrete concerning this invention which mixed the polypropylene fiber by which the fiber length was 3-12 mm, and a section extracted the surface selectively rather than was flat, and added hydrophilic nature to the surface, The rebound ratio of the shotcrete which consists of concrete which mixed the steel fiber, and concrete which mixed Vinylon fibers was examined.

[0034] The polypropylene fiber of the rebound ratio of fiber itself to which Vinylon fibers spend 50.5% for a steel fiber to this invention 45.9% was 24.3% as a result of the examination. The shotcrete in which the shotcrete in which the shotcrete which mixed the polypropylene fiber which the rebound ratio of the whole including materials other than fiber requires for this invention mixed the steel fiber 10.8% mixed Vinylon fibers 34.7% was 32.6%. The mixing rate of each fiber is 3 m in 1.0 volume % and imitation tunnel radius, and cement content is 400 kg / m³.

[0035] Thus, thickness is 10-20 deniers, a fiber length is 3-12 mm, and a section is not flat, The thing with a low rebound ratio of the shotcrete which mixed the polypropylene fiber which extracted the surface selectively and added hydrophilic nature to the surface, It is because a polypropylene fiber does not generate a fiber ball (soul) easily in concrete, dispersibility is excellent and it is uniformly mixed into concrete.

[0036] Although this examination estimated the shotcrete, the same effect was checked even if it was spray mortar.

[0037]

[Effect of the Invention] As explained above, according to the execution method of mortar using the polypropylene fiber according to claim 1, or a concrete structure thing. The polypropylene fiber by which it was not flat and was considered as the form where the surface was extracted selectively, and thickness was 10-350 deniers, and the section was 3-12 mm in fiber length, and added hydrophilic nature to the surface, The physical association to mortar or concrete can be raised remarkably, since the separation over mortar or concrete is prevented, the drawing of the polypropylene fiber after hardening can be controlled, and a reinforcing effect comparable as steel materials or a steel fiber can be expected. Since a polypropylene fiber does not rust, the endurance of mortar or a concrete structure thing improves. Since specific gravity is small, the polypropylene fiber can improve workability, such as conveyance and an injection.

[0038] According to the execution method of mortar using the polypropylene fiber according to claim 2, or a concrete structure thing. A rebound ratio can be reduced if spray

mortar or concrete which mixes the polypropylene fiber by which it was not flat and was considered as the form where the surface was extracted selectively, and thickness was 10-350 deniers, and the section was 3-12 mm in fiber length, and added hydrophilic nature to the surface is used. Thereby, shortening of spray working hours and the cost cut of recoil material can be aimed at. Since a polypropylene fiber raises the physical association to mortar or concrete remarkably, exfoliation and exfoliation of a murbruk structure thing or a concrete structure thing are prevented.

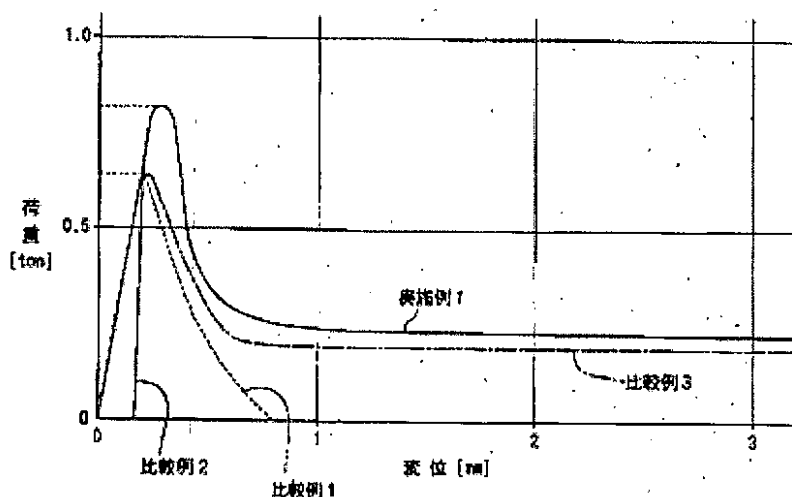
[0039] Since mortar or concrete which mixed the polypropylene fiber gives high bending tenacity according to the execution method of mortar using the polypropylene fiber according to claim 3, or a concrete structure thing, to load, it can be advantageous and crack resistance can be increased. In this invention, the work which installs the wire gauze for preventing a crack can be abolished.

Therefore, time can be shortened and it is that the cost is cut down compared with the material and execution cost of a wire gauze further.

[0040] From 1 hour before the first train [according to the execution method of mortar using the polypropylene fiber according to claim 4, or a concrete structure thing] in mortar or setting before the first train. By finishing the surface of mortar or concrete, applying the pushing force more than 0.005kgf/cm^2 , the crack of the surface of a murbruk structure thing or a concrete structure thing can be prevented. The crack of a field can be abolished.

[Brief Description of the Drawings]

[Drawing 1] It is a figure showing the bending test result of various kinds of mortar test pieces.



[Claim(s)]

[Claim 1] In an execution method which mixes a polypropylene fiber in mortar or concrete, and builds a murbruk structure thing or a concrete structure thing by placing and spreading, In said polypropylene fiber, a section is not flat, and it is considered as form where the surface was extracted selectively, An execution method of mortar using a polypropylene fiber using what was 10-350 deniers in thickness, was 3-12 mm in fiber length, and added hydrophilic nature to the surface, or a concrete structure thing.

[Claim 2] In an execution method which mixes a polypropylene fiber in mortar or concrete, and builds a murbruk structure thing or a concrete structure thing by spraying, In said polypropylene fiber, a section is not flat, and it is considered as form where the surface was extracted selectively, An execution method of mortar using a polypropylene fiber using

what was 10-350 deniers in thickness, was 3-12 mm in fiber length, and added hydrophilic nature to the surface, or a concrete structure thing.

[Claim 3] Flexural strength of said mortar which mixed said polypropylene fiber, or said concrete, Based on "flexural strength and a flexural toughness test method of steel fiber reinforcing concrete" (JSCE-G 552-1983: the Japan Society of Civil Engineers standard concrete standard specification [volume on standard]), A bending test by 3rd grade equinox load is done using a testing machine specified to JIS-B-7733, A bending tenacity coefficient which measured displacement of load of a vertical axis and the center point of a horizontal axis, and the curve calculated from a value to 1/150 displacement of a span, An execution method of mortar which mixed the polypropylene fiber according to claim 1 or 2 setting up become a value more than 0.1N/mm^2 , or a concrete structure thing.

[Claim 4] From 1 hour before the first train in said mortar or said setting before the first train. An execution method of mortar which mixed the polypropylene fiber according to any one of claims 1 to 3 finishing the surface of said mortar or said concrete applying pushing force more than 0.005kgf/cm^2 , or a concrete structure thing.