(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 725 127 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
30.04.2014 Bulletin 2014/18

(21) Application number: **12802261.3**

(22) Date of filing: **22.06.2012**

(51) Int Cl.:
D03D 15/12 *(2006.01)* ***D03D 15/00*** *(2006.01)*
D03D 25/00 *(2006.01)* ***D06C 11/00*** *(2006.01)*
D06C 27/00 *(2006.01)*

(86) International application number:
PCT/JP2012/065943

(87) International publication number:
WO 2012/176859 (27.12.2012 Gazette 2012/52)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **22.06.2011 JP 2011138835**

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(54) SUEDE-TONE FLAME-RETARDANT UNION CLOTH

(57) The present invention provides, at a low cost, a suede-like flame-retardant union fabric which exhibits excellent design and texture, which is comfortable, and which has high flame retardance. The suede-like flame-retardant union fabric is formed of warps and wefts, in which the warps are raised on at least one face of the fabric. In the suede-like flame-retardant union fabric, the warps include a polyester-based yarn, and the wefts include a spun yarn (A) that contains at least 70 wt% of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers. The spun yarn (A) and the spun yarn (B) used as the wefts are alternately interweaved.

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Description

Technical Field

[0001] The present invention relates to a suede-like flame-retardant union fabric having excellent texture.

Background Art

[0002] Recently, there has been more demand for ensuring safety of food, clothing and shelter, and it enhances the demand for flame-retardant materials. Under the circumstances, the demand for interior decoration materials provided with flame retardance compatible with its design has been increased.

[0003] Conventional tanned leather that is produced by raising the back face of leather with sandpaper or the like is not reasonable in price. Furthermore, as it is a natural product, the quality tends to vary, and the design other than the color is poor. For these reasons, suede-like cloths that are called artificial leather or synthetic leather have been used for the interior decoration materials. The suede-like cloths are produced by forming fine naps on the surface of a woven fabric, a knitted fabric or a nonwoven fabric so as to resemble leather.

[0004] Since many of such cloths are formed by raising synthetic fibers such as polyester so as to provide a suede-like appearance, the cloths are considerably inflammable.

[0005] Conventionally, flame retardance has been provided to a combustible cloth by applying a resin that contains a flame retardant onto the back face of the cloth (Patent document 1). However, in a case of adhering a flame retardant to the surface of the cloth for the purpose of improving flame retardance, the surface becomes whitened or tacky. Further, even when the surface or the back face is subjected to the process, the textile is discolored and cured or the bulkiness of the raised part is reduced due to the heat applied during the process. Examples of other deficiencies are as follows. The flame-retardant performance is degraded over time due to the sunlight, moisture absorption and the like. The flame-retardant effect is lost due to removal of the flame retardant by water washing or dry cleaning. And for example, for ensuring the flame retardance of a chair using urethane foam, a large quantity of flame retardant is required. As a result, the design and the comfort are restricted and the cost cannot be suppressed, and thus, it has been impossible to attain a satisfactory effect.

[0006] In another example, a flame-retardant polyester-based fiber may be used to improve the flame retardance (Patent documents 2, 3). However, a cloth using the flame-retardant polyester-based fiber tends to develop a larger bore due to the melting of the polyester-based fiber at the time of combustion. When the cloth is applied to a chair using urethane foam, it causes ignition of the urethane foam. That is, the flame-retardant polyester-based fiber alone is insufficient to ensure flame retardance of a textile for upholstering a chair.

[0007] In other examples, flame-retardant acrylic fibers may be used for improving the flame retardance (Patent documents 4-6). Even in such a case, in a fabric using for the warps a yarn of the polyester-based fiber that is the most advantageous and used widely from the viewpoint of cost, design and productivity, the texture was degraded due to the shrinkage in the fabric weft direction during the process. Furthermore, the fabric easily bores during the combustion due to the melt of the polyester-based fiber and shrinkage and/or thermal decomposition of the flame-retardant acrylic fiber. As a result, the flame retardance is insufficient, or it is required to use polyester-based fiber for the conjugated fiber for the blended yarn. Namely, the flame-retardant acrylic fiber cannot be used for general purpose in the textile for upholstering a chair.

[0008] In another example, a crosslinked high flame-retardant acrylic fiber may be used. The acrylic fiber is prepared by adding a thermal crosslinking polymer and antimony oxide to a flame-retardant acrylic fiber (Patent document 7). The crosslinked high flame-retardant acrylic fiber is effective in a case where the cloth is loosened. However, when it is burned in a state upholstering the urethane foam or the like of a chair, it easily bores due to shrinkage of the fiber similarly to other acrylic fibers, which causes ignition of the urethane foam. Namely, the crosslinked high flame-retardant acrylic fiber alone cannot ensure sufficient flame retardance.

[0009] Further, with regard to suppression of shrinkage during laundering, there is an invention of using alternately yarns of polyester and cellulose for both the warps and the wefts in order to solve the problem of washing shrinkage that is caused by an increase in apparent volume of the cellulose fiber during water absorption (Patent document 8). However, since the cloth has insufficient flame retardance, it is not suitable for application to an interior decoration material.

Prior Art Documents

Patent documents

[0010]

Patent document 1: JP 2005-522532 A
Patent document 2: JP 2003-166121 A
Patent document 3: JP H10(1998)-72743 A
Patent document 4: JP H10(1998)-259542 A
Patent document 5: JP H11(1999)-1842 A
Patent document 6: JP 2003-201642 A
Patent document 7: JP 2005-179876 A
Patent document 8: JP H07(1995)-042044 A

Disclosure of Invention

Problem to be Solved by the Invention

[0011] Therefore, with the foregoing in mind, it is an object of the present invention to provide at a low cost a suede-like flame-retardant union fabric exhibiting excellent design and texture, being comfortable and having high flame retardance.

Means for Solving Problem

[0012] The inventors of the present invention have made earnest studies in order to solve the above-described problems. As a result, they found that a suede-like flame-retardant union fabric exhibits excellent design and texture, it is comfortable, and it has a high flame retardance when the suede-like flame-retardant union fabric is formed of warps and wefts where the warps are raised on at least one face of the fabric. The warps include a polyester-based yarn and the wefts include a spun yarn (A) that contains at least 70 weight parts of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers, and the spun yarn (A) and the spun yarn (B) used as the wefts are alternately interweaved, and the inventors have completed the present invention on the basis of this finding. The suede-like flame-retardant union fabric of the present invention can be provided at a low cost. Shrinkage in the fabric weft direction can be suppressed. The fabric has high flame retardance even if it contains also a polyester-based fiber.

[0013] That is, the suede-like flame-retardant union fabric according to the present invention is formed of warps and wefts, where the warps are raised on at least one face of the fabric. The warps in the union fabric include a polyester-based yarn and the wefts include a spun yarn (A) that contains at least 70 wt% of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers, and the spun yarn (A) and the spun yarn (B) used as the wefts are alternately interweaved.

[0014] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the cellulosic fiber is contained to be 15 to 45 wt% in the total weight of the union fabric.

[0015] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the flame retardant-containing halogen-containing fiber is contained to be 15 to 45 wt% in the total weight of the union fabric.

[0016] The suede-like flame-retardant union fabric according to the present invention is characterized further in that at least one of the halogen-containing fibers is a fiber including a copolymer obtained by polymerizing a composition including 30 to 70 wt% of acrylonitrile, 70 to 30 wt% of a halogen-containing vinyl-based monomer, and 0 to 10 wt% of a vinyl-based monomer copolymerizable with the acrylonitrile and the halogen-containing vinyl-based monomer so as to be 100 wt% in total.

[0017] The suede-like flame-retardant union fabric according to the present invention is characterized further in that at least one of the halogen-containing fibers is a fiber including a copolymer obtained by polymerizing a composition including 30 to 70 wt% of acrylonitrile, 70 to 30 wt% of a vinylidene chloride, and 0 to 10 wt% of a vinyl-based monomer copolymerizable with the acrylonitrile and the vinylidene chloride so as to be 100 wt% in total.

[0018] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the flame retardant-containing halogen-containing fiber is a flame retardant-containing halogen-containing fiber containing 8 to 50 weight parts of the flame retardant with respect to 100 weight parts of the halogen-containing fibers.

[0019] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the flame retardant includes at least one selected from the group consisting of a Sb compound, a Sn compound, a Zn compound, a Mg compound and a P compound.

[0020] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the flame retardant includes at least one selected from the group consisting of the Sb compound, the Sn compound and the Zn compound.

[0021] The suede-like flame-retardant union fabric according to the present invention is characterized further in that the flame retardant includes at least the Sb compound.

[0022] Further the present invention relates to a method for producing a suede-like flame-retardant union fabric. The method includes the steps of: interweaving alternately the spun yarn (A) and the spun yarn (B) during preparation of a flame-retardant union fabric from the warps and the wefts; relaxing the union fabric by 5 to 20% in a fabric warp direction length in pressurized hot water at a temperature in a range of 105°C to 140°C; and drying the union fabric while stretching in the weft direction so as to cancel wrinkles that appear in parallel to the fabric warp direction and raising the warps that have risen on the surface due to the relaxation at the time of the treatment in the pressurized hot water.

Effects of the Invention

[0023] The suede-like flame-retardant union fabric according to the present invention exhibits excellent design and favorable texture. It is comfortable and has high flame retardance. In particular, in a case where the suede-like flame-retardant union fabric of the present invention is used as an upholstery fabric for a product such as a chair covering of an inflammable cushioning such as urethane foam, since the suede-like flame-retardant union fabric of the present invention is self-extinguishing and it forms a carbonized film, even when the product is exposed to flame, ignition of the internal filling can be prevented.

Description of the Invention

[0024] The present invention relates to a suede-like flame-retardant union fabric formed of warps and wefts, where the warps are raised on at least one face of the fabric. In the suede-like flame-retardant union fabric, the warps include polyester-based yarn, and the wefts include a spun yarn (A) that contains at least 70 weight parts of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers. The spun yarn (A) and the spun yarn (B) used as the wefts are alternately interweaved.

[0025] In the present invention, the term "suede-like flame-retardant union fabric" denotes a flame-retardant union fabric exhibiting a texture similar to that of suede leather. In the market, any flame-retardant union fabric that can be regarded as a substitute for suede leather is included in the "suede-like flame-retardant union fabric".

[0026] In the present invention, "flame-retardant" indicates that the flame-retardant performance is superior to that of a corresponding suede-like union fabric manufactured by using a polyester fiber. The flame retardance can be assessed by a method in conformity with BS 5852:1990 Source 1, which refers to a test for flame retardance of seating for household use in England. The Source 1 is described in No. BS 5852:1990 "Methods of test for assessment of the ignitability of upholstered seating by smouldering and flaming ignition sources" of the British Standards.

[0027] In the present invention, "fiber" denotes a single fiber, and the examples include a long fiber (filament) and a short fiber (staple). And "yarn" denotes a slender and linear fiber bundle formed by putting the fibers together. The examples include a spun yarn formed by paralleling, joining and twisting the short fibers, and a paralleled yarn formed simply by arranging the long fibers in parallel. Further, "fabric" denotes a fiber composite textile weaved with a loom by use of yarns for fabrics, such as spun yarn. The "union fabric" denotes a fabric including warps and wefts intersecting orthogonally each other.

[0028] In the present invention, "raising" refers to a structure achieved for example, by preparing a cloth of a fiber bundle having ultrafine fibers of not more than 1 denier or a fiber such as a sea-island fiber that is divided by an external force or a process with a solvent so as to develop ultrafine fibers, and by subjecting the cloth to a mechanically raising step using sandpaper, a brush or the like. The suede-like flame-retardant union fabric according to the present invention is a fabric that has developed a suede-like appearance as a result of the raising.

[0029] The method for raising the fabric in the present invention is not limited in particular, but any commonly-applied methods using a teazel raising machine, a wire raising machine, an emery raising machine and the like, can be applied.

[0030] In the present invention, the wefts in the union fabric are exposed on the surface and the back face of the textile. By controlling the exposure of the wefts, it is possible to provide a weaving pattern on the surface of the textile. The weave structures include plain weave, satin weave, twill weave and the like, though there is no particular limitation thereto. It is also possible to use a Jaquard loom, a Dobby loom or the like. It is also possible to coat the back face of the fabric with an acrylic resin or the like in order to stabilize the form of the fabric and to enhance the friction of the backside of the fabric, or to treat the fabric surface in order to improve the wear resistance, water repellency, antifouling property, antibacterial activity, weather resistance and the like, in a range not sacrificing considerably the texture and the flame retardance of the fabric.

[0031] In the present invention, the polyester-based yarn is formed of the following fibers. For example, a fiber including as the main component a long chain synthetic polymer including at least 85 wt% of an ester unit of terephthalic acid and an ester unit of dihydric alcohol at the mass ratio in the fiber weight can be used preferably. Examples of such fibers

include a polyethylene terephthalate fiber, a polytrimethylene terephthalate fiber, a polybutylene terephthalate fiber and the like. It is also possible to use a polyester-based fiber provided with flame retardance through a post process or the like using a flame retardant, or a polyester-based fiber to which a flame retardant has been added. As required, it is also possible to add various additives such as a delustrant, a thermal stabilizer, a defoamer, an orthochromatic agent, an antioxidant, an ultraviolet absorbent, an infrared absorbent, a crystal nucleating agent, a fluorescent brightener and the like to the polyester-based fiber. These additives can be used alone or in a combination of two or more.

[0032] Furthermore, for the polyester-based yarn of the present invention, it is possible to use preferably a yarn containing the polyester-based fiber in a state of a filament or a staple. It is also possible to use any yarn that is formed of a polyester-based fiber and used generally for fabrics, such as a regular yarn, processed yarn, and further, a blended yarn and a processed yarn each of which contains the polyester-based fiber and a natural or synthetic fiber such as cotton, rayon and the like. These yarns can be used alone or in a combination of two or more. From the viewpoint of the yarn strength for the warps of the fabric, it is preferable that the content of the polyester-based fiber is at least 30 wt%. From the viewpoint of availability, it is more preferable that the content is 100 wt%.

[0033] An example of the yarn particularly suitable for the polyester-based yarn used in the present invention is a yarn prepared by twisting ultrafine polyester-based fibers of not more than 1.2 deniers. Another example is called a sea-island fiber. This is a fiber formed to have on its cross section a sea component and an island component. In the steps after the fiber-forming step, either the sea component or the island component is removed or separated by washing or dissolving so as to obtain an ultrafine fiber. Any yarn can be used in the present invention as long as a suede-like appearance can be obtained by fabricating a cloth and then raising the surface of the cloth.

[0034] In the present invention, the flame retardant-containing halogen-containing fiber is a fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers.

[0035] In the present invention, an example of the halogen-containing fibers is a fiber formed of a polymer of monomers containing halogens. Another example may be a fiber formed of a copolymer of a monomer containing a halogen and a monomer containing no halogen. Further examples include a fiber formed of a polymer blend of a polymer containing a halogen and a polymer containing no halogen, and a halogen-containing polymer to which a halogen has been added by a post process. Another example is a fiber obtained by adding a halogen by a post process to a fiber formed of a polymer containing no halogen.

[0036] Examples of particularly preferred halogen-containing fiber include a homopolymer and a copolymer of halogen-containing monomers such as vinyl chloride, a vinylidene chloride and the like. Another example is a copolymer of the halogen-containing monomer and any copolymerable monomer such as acrylonitrile, styrene, vinyl acetate, acrylic ester and the like. A further example is a fiber formed of a graft polymer where a halogen-containing monomer is grafted to a PVA-based polymer, though these examples do not limit the present invention.

[0037] An example of a most preferred halogen-containing fiber is a modacrylic fiber, which is a fiber formed of a copolymer of a halogen-containing monomer and acrylonitrile.

[0038] Into the above-described halogen-containing fiber, various additives such as a delustrant, a thermal stabilizer, a defoamer, an orthochromatic agent, a flame retardant, an antioxidant, an ultraviolet absorbent, an infrared absorbent, a fluorescent brightener and the like can be added as required. These additives can be used alone or in a combination of two or more.

[0039] In the present invention, it is preferable that the flame retardant is at least one selected from the group consisting of a Sb compound, a Sn compound, a Zn compound, a Mg compound, a Mo compound, a Ti compound, a P compound, an Al compound, a Zr compound, and a Si compound.

[0040] Specific examples of the Sb compound include antimony trioxide, antimony pentoxide, antimonic acid, antimony oxychloride and the like. Specific examples of the Sn compound include stannic oxide, metastannic acid, stannous oxyhalide, stannic oxyhalide, stannous hydroxide, stannic tetrachloride and the like. Specific examples of the Zn compound include zinc oxide and the like. Specific examples of the Mg compound include magnesium oxide, magnesium hydroxide and the like. Specific examples of the Mo compound include molybdenum oxide and the like. Specific examples of the Ti compound include titanium oxide, barium titanate and the like. Specific examples of the P compound include ammonium polyphosphate, dibutylaminophosphate and the like. Specific examples of the Al compound include aluminum hydroxide, aluminum sulfate, aluminum silicate and the like. Specific examples of the Zr compound include zirconium oxide and the like. And specific examples of the Si compound include silicate, glass and the like. Natural or synthetic compounds based on metallic minerals containing these flame retardants can be used also favorably, and the examples include kaolin, zeolite, montmorillonite, talc, pearlite, bentonite, vermiculite, diatomaceous earth, graphite and the like. Alternatively, it can be a conjugated compound such as magnesium stannate, zinc stannate, zirconium stannate and the like.

[0041] Among these examples, from the viewpoint of availability and the effect of providing flame retardance, it is preferable that the flame retardant is at least one selected from the group consisting of a Sb compound, a Sn compound, a Zn compound, a Mg compound and a P compound. Further preferably, it is at least one selected from the group consisting of a Sb compound, a Sn compound and a Zn compound. Most preferably, it is a Sb compound. These

compounds can be used alone or as a mixture of two or more.

[0042] Examples of the cellulosic fiber include cotton, linen, rayon, polynosic, cupra, acetate, and triacetate. It is also possible to use a cellulosic fiber provided with flame retardance by a post process or the like using a flame retardant, or a silicic acid-containing cellulosic fiber obtained by adding silicic acid and/or aluminum silicate as a flame retardant to a cellulosic fiber. These can be used alone or in a combination of two or more.

[0043] Examples of the flame retardants used for providing flame retardance by the above-mentioned post process or the like include a phosphate ester-based compound, a halogen-containing phosphate ester-based compound, a condensed phosphate ester-based compound, a polyphosphate-based compound, a polyphosphate ester-based compound and the like.

[0044] Examples of the phosphate ester-based compound include triphenylphosphate, tricresyl phosphate, trixylenyl phosphate, trimethyl phosphate, triethyl phosphate, cresyl phenylphosphate, xylenyl diphenylphosphate, resorcinol bis(diphenylphosphate), 2-ethylhexyl diphenylphosphate, dimethylmethyl phosphate, triallyl phosphate (REOFOS), aromatic phosphate ester, phosphonocarboxylic acid amid derivative, tetrakis•hydroxymethyl phosphonium derivative, N-methylol dimethylphosphono propionamide and the like. Examples of the halogen-containing phosphate ester-based compound include tris(chloroethyl) phosphate, trisdichloropropyl phosphate, tris-β-chloropropyl phosphate, chroloalkyl phosphate, tris(tribromoneopentyl) phosphate, diethyl-N,N-bis(2-hydroxyethyl) aminomethyl phosphate, tris(2,6-dimethylphenyl) phosphate and the like. Examples of the condensed phosphate ester-based compound include aromatic condensed phosphate ester, halogen-containing condensed phosphate ester and the like. Examples of the polyphosphate-based compound include ammonium polyphosphate amide, polychlorophosphonate and the like. Examples of the polyphosphate ester-based compound include carbamate polyphosphate and the like. Examples of other flame retardants include red phosphorus, an amine compound, boric acid, a halogenated compound, bromide, a urea-formaldehyde compound, a phosphate-urea compound like phosphorus-containing aminoplast, ammonium sulfate, guanidine-based condensate and the like. These flame retardants used for providing flame retardance by a post process or the like can be used alone or in a combination of two or more.

[0045] It is also possible to add various additives such as a delustrant, a thermal stabilizer, a defoamer, an orthochromatic agent, an antioxidant, an ultraviolet absorbent, an infrared absorbent, a fluorescent brightener and the like to the cellulosic fiber as required.

[0046] The fabric of the present invention uses a spun yarn that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers and a spun yarn that contains at least 70 weight parts of a cellulosic fiber. The fabric provides an effect of preventing boring during combustion even in a union fabric using a polyester-based yarn for the warps. Thereby, the flame retardance of the fabric can be improved.

[0047] Furthermore, by interweaving the spun yarns alternately, favorable texture can be maintained even after processes such as a raising-pretreatment and dyeing. The reason is as follows. A spun yarn containing at least 70% of the cellulosic fiber has a low rate of shrinkage caused by heating. As such a spun yarn with a low shrinkage rate is present homogeneously in the fabric, it is possible to obtain an effect of suppressing shrinkage in the fabric weft direction at the time of processes such as raising-pretreatment and dyeing. Therefor, it is preferable that the cellulosic fiber-containing spun yarn contains at least 70% of the cellulosic fiber. More preferably, the content of the cellulosic fiber is at least 75%, further preferably at least 80%, and even further preferably 100%.

[0048] In the present invention, it is preferable to add the flame retardant-containing halogen-containing fiber so as to be 15 to 45 wt% in the total weight of the union fabric. When the content of the flame retardant-containing halogen-containing fiber in the total weight of the union fabric is less than 15 wt%, the flame retardance is insufficient, and thus it is difficult to maintain the flame retardance of the fabric. When the content exceeds 45 wt%, the heat resistance of the fabric deteriorates, causing deterioration of the processability and degradation of the flame retardance, and thus it is not preferable. It is particularly preferable to add the flame retardant-containing halogen-containing fiber so as to be 20 to 40 wt%, and most preferably, 25 to 40 wt%, in the total weight of the union fabric.

[0049] In the present invention, it is preferable to add the cellulosic fiber so as to be 15 to 45 wt% in the total weight of the union fabric. When the content of the cellulosic fiber in the total weight of the union fabric is less than 15 wt%, the effect of preventing boring at the time of combustion is inferior. When the content exceeds 45 wt%, the fabric does not bore but the combustion tends to continue. That is, in any case, the flame retardance of the fabric is insufficient and thus not favorable. It is particularly preferable that the content of the cellulosic fiber in the total weight of the union fabric is 20 to 40 wt%, and most preferably, 25 to 40 wt%.

[0050] In the present invention, it is preferable that the flame retardant-containing halogen-containing fiber contains 3 to 50 weight parts of the flame retardant with respect to 100 weight parts of the halogen-containing fibers. It is more preferable that the lower limit of the content of the flame retardant is 8 weight parts, and further preferably, 9 weight parts. It is more preferable that the upper limit of the content of the flame retardant is 30 weight parts, and further preferably, 25 weight parts. When the content is less than 3 weight parts, the flame retardance is insufficient and thus it becomes difficult to maintain the flame retardance of the fabric. When the content exceeds 50 weight parts, the physical

properties such as strength deteriorate to cause degradation in weaving processability, and thus it is not preferable.

[0051] In the present invention, it is preferable from the viewpoint of providing heat resistance that the halogen-containing fiber is a fiber including a copolymer obtained by polymerizing a composition including 30 to 70 wt% of acrylonitrile, 70 to 30 wt% of a halogen-containing vinyl-based monomer, and 0 to 10 wt% of a vinyl-based monomer that is copolymerizable with them so as to be 100 wt% in total. It is preferable that the halogen-containing vinyl-based monomer in the composition is 35 to 60 wt%, and more preferably, 40 to 55 wt%. When the content of the halogen-containing vinyl-based monomer is less than 30 wt%, the flame retardance is insufficient and thus it will be difficult to maintain the flame retardance of the fabric as the final product. When the content exceeds 70 wt%, the heat resistance deteriorates to cause deterioration of the processability and degradation of the flame retardance of the fabric, and thus it is not preferable. It is preferable that the halogen-containing vinyl-based monomer is a halogen-containing vinylidene-based compound, and from the viewpoint of providing a flame retardance to a fabric, vinylidene chloride is preferred in particular.

[0052] The suede-like flame-retardant union fabric according to the present invention is a flame-retardant union fabric formed of warps and wefts, and it can be produced by: preparing a union fabric by using the warps of a polyester-based yarn and the wefts that includes a spun yarn (A) that contains at least 70 wt% of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers and that are weaved into the warps; relaxing the fabric by 5 to 20% in the fabric warp direction length in pressurized hot water at a temperature in a range of 105°C to 140°C; drying the fabric while stretching in the weft direction in order to cancel the wrinkles that appear in parallel to the fabric warp direction; and, raising the warps that have risen on the surface of the fabric due to the relaxation at the time of treatment in the pressurized hot water. By relaxing in the pressurized hot water, the polyester-based yarn used for the warps is loosened and frayed, and thus the raising can be performed easily. At a temperature lower than 105°C, sufficient loosening or fray of the polyester-based yarn does not occur due to the low temperature. At a temperature higher than 140°C, the wefts become influential to cause deterioration of the texture, which is not preferable. When the relaxation is less than 5%, the polyester-based yarn is not loosened sufficiently and the raising becomes difficult. When the relaxation exceeds 20%, productivity of the textile deteriorates, and it is not preferable. It is further preferable that the temperature for the relaxation treatment is 110 to 135°C, and particularly preferably 120 to 130°C. It is further preferable that the relaxation rate is 5 to 15%, and particularly preferably, 5 to 10%.

[0053] The flame-retardant union fabric of the present invention has excellent flame retardance, and the reason is considered as follows. At the time of combustion of the fabric, the halogen and the flame retardant contained in the fabric are gasified so as to generate an incombustible gas and at the same time, carbonization of the cellulosic component contained in the fabric is accelerated. Thereby, a carbonized strong skeleton is formed so as to serve to prevent formation of a large bore even in a fabric containing a polyester-based fiber.

[0054] The suede-like flame-retardant union fabric of the present invention has a shrinkage rate of less than 20% in the fabric weft direction, which also contributes to exhibiting a favorable texture. The shrinkage rate in the fabric weft direction can be assessed by using the shrinkage rates taken before and after the treatment in the pressurized hot water and the drying operation.

Examples

[0055] Hereinafter, the present invention will be described in detail by way of Examples. It should be noted, however, that the Examples given below are not intended to limit the scope of the present invention. Before describing the Examples, the evaluation methods for the respective properties are indicated. A method for producing a halogen-containing fiber is also illustrated.

(Example 1): Shrinkage rate in fabric weft direction

[0056] A shrinkage rate in the weft direction for each fabric was calculated through the equation below (Equation 1). Here, "C" indicates that the shrinkage rate in the fabric weft direction is at least 20%; "B" indicates that the shrinkage rate is not less than 10% and less than 20%; and "A" indicates that the shrinkage rate is less than 10%. If the shrinkage is great, the weight of the textile per unit area is increased due to the shrinkage, and textile becomes stiff to touch.

[Shrinkage rate (%) in fabric weft direction] = ([fabric greige width (150 cm)] − [fabric width after treatment in pressurized hot water and drying]) × 100 / [fabric greige width (150 cm)]

(Equation 1)

(Example 2): Evaluation of flame retardance

[0057] Apolyurethane foam 7.5 cm in thickness and 22 kg/m^3 in density (Model 360S manufactured by TOYO TIRE & RUBBER CO., LTD.) was covered with a fabric mentioned below so as to be subjected to a test for flame retardance of seating for household use in England, in conformity with BS 5852:1990 Source 1. The Source1 is described in standard No. BS 5852:1990 "Methods of test for assessment of the ignitability of upholstered seating by smouldering and flaming ignition sources" of the British Standards.

[0058] In the flame retardance assessment, the size of the bores formed due to the combustion in the test was measured twice in the fabric warp direction. "A" indicates that the size of the bore did not exceed 2 cm in any of the measurements. "B" indicates that the size of the bore exceeded 2 cm, but the urethane foam did not catch fire. "C" indicates that the size of the bore exceeded 2 cm, and the urethane foam caught and spread fire.

(Production Example 1): Production of flame retardant-containing halogen-containing fibers <B1-B5>

<B1-B5>

[0059] 49.5 wt% of acrylonitrile, 49.5 wt% of vinylidene chloride, and 1.0 wt% of sodium of styrenesulfonate were polymerized to obtain a halogen-containing copolymer. This halogen-containing polymer was dissolved in acetone so as to obtain a polymer concentration of 27 wt%. To the polymer in the thus obtained polymer solution, 3 weight parts of antimony trioxide <B1>, 10 weight parts of antimony trioxide <B2>, 30 weight parts of antimony trioxide <B3>, 3 weight parts of zinc stannate <B4>, and 8 weight parts of antimony pentoxide <B5> were added respectively to prepare dopes. Each of these dopes was extruded out through a nozzle 0.08 mm in caliber and having 300 holes into a 30 wt% aqueous solution of acetone, washed with water and dried. Subsequently, the extruded filament was stretched to be tripled at 120°C, and treated with heat at 150°C for 5 minutes, to which a finishing oil for spinning was applied. The stretched filament was crimped, cut into 51 mm, thereby a fiber of 2 deniers / 51 mm was obtained. The obtained fibers are shown in Table 1 below.

[Table 1]

Flame retardant-containing halogen-containing fiber	Flame retardant	
	Type	Amount to be added to 100 weight parts of halogen-containing fiber (weight part)
B1	Antimony trioxide	3
B2	Antimony trioxide	10
B3	Antimony trioxide	30
B4	Zinc stannate	3
B5	Antimony pentoxide	8

(Examples 1-7, and Comparative Examples 1-4)

[0060] A composite false-twisted processed yarn of 105 deniers /156 filaments was produced by false-twisting a core

yarn of a highly-shrinkable polyester multi-filament of 30 deniers / 12 filaments, which was manufactured by Jiangsu Xinmin Textile Science & Technology, and a sheath yarn of a polyester multi-filament of 75 deniers / 144 filaments of the same manufacturer. This false-twisted yarn was used as the warps. The weft 1 and the weft 2 described in Table 2 were used for the wefts. For the rayon used as the wefts, HOPE (registered trade name) of 2 deniers / 51 mm manufactured by OmiKenshi Co., Ltd. was used. For the polyester used as the wefts, Tetron (registered trade name) of 2 deniers / 51 mm manufactured by TORAY Industries, Inc. was used, so that respective spun yarns were obtained. The wefts 1 and 2 were arranged alternately in parallel to each other, orthogonally to the warps. The warps were weaved so that the pick number of the warps in the transverse direction of the fabric was 94/cm, and the wefts were weaved so that the pick number of the wefts in the longitudinal direction of the fabric was 36/cm, thereby a 2/1 twill fabric having a fabric width of 150 cm was produced. Later, the fabric was treated in 130°C pressurized hot water for 30 minutes by using a jet dyeing machine, and relaxed by 10% in the fabric warp direction length. Then, the fabric was dried while being stretched in the weft direction by heating for 5 minutes at 130°C with a tenter dryer, so as to cancel the wrinkles that appeared in parallel to the fabric warp direction. Due to the relaxation at the time of the above-mentioned treatment in the pressurized hot water, the warps had risen on the surface of the fabric. The warps were raised with No. 400 emery paper by use of an emery processor. The fabric was passed twice through five emery rolls at a paper surface rotational speed of 500 m/min., a cloth speed of 10 m/min., and at a contact pressure of 1.0 kg, thereby raising the surface side and thus a suede-like union fabric was produced. The results are shown in Table 2.

[Table 2]

	Weft*1		Fiber content in union fabric (wt%)		Assessment	
	Weft 1 (type/fineness/ pick numbers)	Weft 2 (type/fineness/ pick numbers)	Flame retardant-containing halogen-containing fiber	Cellulosic fiber	Shrinkage rate in fabric weft direction	Flame retardance assessment
Ex.1	<B1> 34 meter count 18/cm	<Rayon> 34 meter count 18/cm	25	25	A	B
Ex.2	<B2> 34 meter count 18/cm	<Rayon> 34 meter count 18/cm	25	25	A	A
Ex.3	<B3> 34 meter count 18/cm	<Rayon> 34 meter count 18/cm	25	25	A	A
Ex.4	<B4> 34 meter count 18/cm	<Rayon> 34 meter count 18/cm	25	25	A	B
Ex.5	<B3> 34 meter count 18/cm	<Rayon> 17 meter count 18/cm	20	39	A	A
Ex.6	<B3> 17 meter count 18/cm	<Rayon> 34 meter count 18/cm	39	20	B	A
Ex.7	<B5> 34 meter count 18/cm	<Rayon> 34 meter count 18/cm	25	25	A	A
Co.1	<Blended yarn of B3 and rayon 50wt%/50wt%> 34 meter count 18/cm	Identical to weft 1	25	25	C	A
Co.2	<B3> 34 meter count 18/cm	Identical to weft 1	49	0	B	c

(continued)

	Weft*1		Fiber content in union fabric (wt%)		Assessment	
	Weft 1 (type/fineness/ pick numbers)	Weft 2 (type/fineness/ pick numbers)	Flame retardant-containing halogen-containing fiber	Cellulosic fiber	Shrinkage rate in fabric weft direction	Flame retardance assessment
Co.3	<Rayon> 34 meter count 18/cm	Identical to weft 1	0	49	A	c
Co.4	<Polyester> 34 meter count 18/cm	Identical to weft 1	0	0	A	C
*1: The greige was created by interweaving alternately the weft 1 and the weft 2 having the described material and fineness so as to obtain the pick number described in the Table, in the orthogonal direction with respect to the warps. Note: in Table 2 above, Ex. and Co. indicate respectively "Example" and "Comparative Example".						

[0061] As shown above, the fabric in Comparative Example 1 had a great shrinkage rate in the fabric weft direction, and thus it had an inferior touch. The fabrics in Comparative Examples 2-4 had insufficient flame retardance. The reasons therefor are considered to be as follows. Namely in Comparative Example 1, the content of the cellulosic fiber in the spun yarn was insufficient. In Comparative Example 2, the amount of the cellulosic fiber in the fabric was insufficient. In Comparative Examples 3 and 4, the flame retardance was insufficient due to the insufficient amounts of halogens and flame retardant.

Claims

1. A suede-like flame-retardant union fabric formed of warps and wefts, where the warps are raised on at least one face of the fabric,
wherein the warps in the union fabric comprise a polyester-based yarn and the wefts comprise a spun yarn (A) that contains at least 70 wt% of a cellulosic fiber and a spun yarn (B) that contains a flame retardant-containing halogen-containing fiber containing 3 to 50 weight parts of a flame retardant with respect to 100 weight parts of halogen-containing fibers, and the spun yarn (A) and the spun yarn (B) used as the wefts are alternately interweaved.

2. The suede-like flame-retardant union fabric according to claim 1, wherein the cellulosic fiber is contained to be 15 to 45 wt% in the total weight of the union fabric.

3. The suede-like flame-retardant union fabric according to claim 1 or 2, wherein the flame retardant-containing halogen-containing fibers is contained to be 15 to 45 wt% in the total weight of the union fabric.

4. The suede-like flame-retardant union fabric according to any one of claims 1 to 3, wherein at least one of the halogen-containing fibers is a fiber comprising a copolymer obtained by polymerizing a composition comprising 30 to 70 wt% of acrylonitrile, 70 to 30 wt% of a halogen-containing vinyl-based monomer, and 0 to 10 wt% of a vinyl-based monomer copolymerizable with the acrylonitrile and the halogen-containing vinyl-based monomer so as to be 100 wt% in total.

5. The suede-like flame-retardant union fabric according to claim 4, wherein at least one of the halogen-containing fibers is a fiber comprising a copolymer obtained by polymerizing a composition comprising 30 to 70 wt% of acrylonitrile, 70 to 30 wt% of a vinylidene chloride, and 0 to 10 wt% of a vinyl-based monomer copolymerizable with the acrylonitrile and the vinylidene chloride so as to be 100 wt% in total.

6. The suede-like flame-retardant union fabric according to any one of claims 1 to 5, wherein the flame retardant-containing halogen-containing fiber is a flame retardant-containing halogen-containing fiber containing 8 to 50 weight parts of the flame retardant with respect to 100 weight parts of the halogen-containing fibers.

7. The suede-like flame-retardant union fabric according to any one of claims 1 to 6, wherein the flame retardant comprises at least one selected from the group consisting of a Sb compound, a Sn compound, a Zn compound, a Mg compound and a P compound.

8. The suede-like flame-retardant union fabric according to claim 7, wherein the flame retardant comprises at least one selected from the group consisting of the Sb compound, the Sn compound and the Zn compound.

9. The suede-like flame-retardant union fabric according to claim 8, wherein the flame retardant comprises at least the Sb compound.

10. A method for producing the suede-like flame-retardant union fabric according to any one of claims 1 to 9, comprising:

interweaving alternately the spun yarn (A) and the spun yarn (B) during preparation of a flame-retardant union fabric from the warps and the wefts;
relaxing the union fabric by 5 to 20% in a fabric warp direction length in pressurized hot water at a temperature in a range of 105°C to 140°C; and
drying the union fabric while stretching in the weft direction so as to cancel wrinkles that appear in parallel to the fabric warp direction and raising the warps that have risen on the surface due to the relaxation at the time of the treatment in the pressurized hot water.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/065943

A. CLASSIFICATION OF SUBJECT MATTER
D03D15/12(2006.01)i, *D03D15/00*(2006.01)i, *D03D25/00*(2006.01)i, *D06C11/00*(2006.01)i, *D06C27/00*(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D03D1/00-27/18, D06C3/00-29/00, A47C7/00, A47C17/00

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 2007/116938 A1 (Kaneka Corp.), 18 October 2007 (18.10.2007), claims; paragraphs [0001], [0033], [0036] to [0038], [0041], [0043] to [0045], [0078]; examples & JP 4274289 B & US 2010/0047513 A1 claims; paragraphs [0001], [0039], [0042] to [0044], [0047], [0049] to [0051], [0094]; examples & EP 2009159 A1 & CN 101410562 A	1-9 10
A	JP 2003-201642 A (Kaneka Corp.), 18 July 2003 (18.07.2003), entire text (Family: none)	1-10

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

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Date of the actual completion of the international search 03 September, 2012 (03.09.12)	Date of mailing of the international search report 11 September, 2012 (11.09.12)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/065943

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 63-159584 A (Toshio TAKADA), 02 July 1988 (02.07.1988), entire text (Family: none)	1-10

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2003201642 A **[0010]**
- JP 2005179876 A **[0010]**
- JP H071995042044 A **[0010]**