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(54) PRODUCTION METHOD FOR GARMENT, DYED CLOTH, AND CHEMICAL AGENT

(57) The present invention addresses the problem of providing: a method for producing garments that use dyed cloth on which whiteness easily emerges due to heating by irradiation with laser or the like and which can be efficiently decolorized; dyed cloth used in production of decolorized garments; and a chemical agent used in decolorization of dyed cloth. [Solution] This production method for garments is characterized by using a heat treatment to decolorize garments which use dyed cloth containing an alkanolamine. The temperature of the heat treatment is preferably 160-180°C, and the heat treatment is more preferably a laser machining treatment.

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Description

TECHNICAL FIELD

[0001] The present invention relates to a production method for a decolorized garment, and a dyed cloth and a chemical agent to be used in the production of such a garment.

BACKGROUND ART

[0002] One example of a dyed fiber product is a fiber product using a denim cloth, typified by jeans, etc. For jeans, etc., the feeling of a new product that has just been dyed is sometimes desired, but consumers widely prefer a fabric that has been nicely faded due to use, or a fabric that has a vintage feel that comes with age. However, it takes too much time to impart a fabric with a vintage feel by means of actual use, and with used clothing, the fabric might actually be damaged, or there may be no demand from customers that do not like used clothing. Therefore, many methods for imparting a vintage feel by subjecting a new cloth, etc. to a decolorization treatment in advance have been widely researched.

[0003] Some conventionally used decolorization methods include a method of blurring or scraping the dye in the fiber product to be decolorized through physical friction such as a stonewashing method, a sandpaper and grinding method, and a sandblasting method, as well as a method of chemically decolorizing the fiber product by submerging a pair of jeans, etc., in a prescribed chemical liquid of an electrolytic bath, and the like.

[0004] However, in the methods for physically decolorizing a fiber product, there has been a problem in that removing any stones, etc. which have become embedded in the fibers after decolorization requires time and effort. Further, in the methods for chemical decolorization, there has been a problem in that treating the used chemical liquid requires time and effort. In addition, in all of the conventional methods, there has been a problem in that it is difficult to impart a vintage feel accurately and with a natural texture at the desired locations of the cloth.

[0005] As a means for solving the problems found in these physical and chemical methods, a method of irradiating a laser onto a location to be decolorized has been disclosed (for example, see Patent Document 1 below).

[0006] A method achieved by laser irradiation imparts whiteness to a denim cloth by decomposing the indigo dye on the surface of the cloth with the laser.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0007] Patent Document 1: JP H10-102386 A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0008] However, in the conventional method achieved by laser irradiation as disclosed in Patent Document 1, etc., the laser is irradiated only on the surface of the denim cloth, and thus only the surface of the cloth was able to be decolorized. Therefore, there was a problem in that upon washing after the decolorization by laser irradiation, the layer that was irradiated with the laser is removed and an underlying layer which was not fully decolorized appears, and thus the whiteness does not readily emerge.

[0009] Thus, the present invention addresses the problem of providing a method for producing garments that use dyed cloth on which whiteness easily emerges due to heating by irradiation with a laser or the like and which can be efficiently decolorized, a dyed cloth to be used in the production of decolorized garments, and a chemical agent to be used in the decolorization of dyed cloth.

SOLUTION TO PROBLEM

[0010] As a result of earnest research in order to solve the above-described problem, the present inventors discovered that a dyed cloth can be decolorized from the depths thereof while preventing deterioration of the cloth by performing a heat treatment with a means such as a laser on the dyed cloth which comprises a specific chemical agent, and thereby the present invention was completed.

[0011] The present invention is specified by the matters shown below.

(1) A garment production method characterized by decolorizing a garment which uses a dyed cloth containing an alkanolamine with a heat treatment.

(2) The garment production method according to (1), wherein the temperature of the heat treatment is from 150°C to 200°C.

(3) The garment production method according to (1), wherein the temperature of the heat treatment is from 160°C to 180°C.

(4) The garment production method according to any one of (1) to (3), wherein the heat treatment is a laser machining treatment.

(5) The garment production method according to any one of (1) to (4), wherein the garment which uses a dyed cloth containing an alkanolamine is a garment which uses a dyed cloth obtained by contacting with a solution containing an alkanolamine, or a garment obtained from a dyed cloth obtained by contacting with a solution containing an alkanolamine.

(6) The garment production method according to (5), wherein the solution containing an alkanolamine further comprises a pH adjusting agent.

(7) The garment production method according to (5)

or (6), wherein the solution containing an alkanolamine further comprises an organic acid.
(8) A dyed cloth containing an alkanolamine.
(9) The dyed cloth according to (8) for performing decolorization by means of a heat treatment.
(10) The dyed cloth according to (8) or (9), wherein the heat treatment is a laser machining treatment.
(11) The dyed cloth according to any one of (8) to (10), further comprising a pH adjusting agent.
(12) The dyed cloth according to any one of (8) to (11), further comprising an organic acid.
(13) A chemical agent containing an alkanolamine, wherein the chemical agent is used for decolorizing, by means of a heat treatment, a garment produced using a dyed cloth into which an alkanolamine has been incorporated using the chemical agent, or a garment resulting from incorporating, with chemical reagent, an alkanolamine into a garment which uses a dyed cloth.
(14) The chemical agent according to (13), wherein the chemical agent containing an alkanolamine further comprises a pH adjusting agent.
(15) The chemical agent according to (13) or (14), wherein the chemical agent containing an alkanolamine further comprises an organic acid.
(16) The chemical agent according to any one of (13) to (15), wherein the heat treatment is a laser machining treatment.

EFFECTS OF INVENTION

[0012] By using the method of the present invention, an effect is achieved in that a dyed cloth can be easily decolorized to a high degree of whiteness, and garments which use a dyed cloth with a vintage feel can be efficiently produced.

BRIEF DESCRIPTION OF DRAWINGS

[0013]

FIG. 1(a) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Example 1. FIG. 1(b) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Comparative Example 1. FIG. 2(a) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Example 2. FIG. 2(b) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Comparative Example 2. FIG. 3(a) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Example 3. FIG. 3(b) illustrates a pair of jeans which have been subjected to decolorization processing as obtained in Comparative Example 3.

DESCRIPTION OF EMBODIMENTS

[0014] The garment production method of the present invention is characterized by decolorizing a garment which uses a dyed cloth containing an alkanolamine with a heat treatment.

[0015] The "garment which uses a dyed cloth containing an alkanolamine" is a garment which uses a dyed cloth obtained by contacting with a solution containing an alkanolamine (i.e. a chemical agent containing an alkanolamine; the same meaning will apply hereinafter in the specification of the present application), or a garment obtained from a dyed cloth obtained by contacting with a solution containing an alkanolamine.

[0016] The former garment (the garment which uses a dyed cloth obtained by contacting with a solution containing an alkanolamine) indicates a garment obtained by incorporating an alkanolamine into a garment produced by cutting and sewing, etc. a dyed cloth that does not contain an alkanolamine.

[0017] The latter garment (garment obtained from a dyed cloth obtained by contacting with a solution containing an alkanolamine) indicates a garment produced by cutting and sewing, etc. a dyed cloth that contains an alkanolamine.

[0018] The dyed cloth which is a textile of a garment to be used in the production method of the present invention generally indicates a thick woven fabric of a cotton material obtained by twill weaving warp yarns of at least 10-count, which have been dyed by a natural or synthetic indigo dye or a sulfur dye, and non-dyed unbleached yarns as the weft yarns.

[0019] As the fibers used for the above-mentioned yarns, mention may be made of cellulose-based natural fibers such as cotton, cellulose-based semi-synthetic fibers such as acetate, cellulose-based regenerated fibers such as rayon and cupra, and mixtures of these fibers with synthetic fibers, etc.

[0020] The type of the denim cloth is not particularly limited, and mention may be made of right-hand twill, left-hand twill, broken twill, dungaree, colored denim, coated denim, and stretch denim, etc.

[0021] The garment to be used in the production method of the present invention is not particularly limited as long as it is worn by a person to partially or fully cover the body, and mention may be made of a top such as a shirt and a blouse, and a bottom such as denim pants and jeans, etc. The garment may also include accessories and goods such as a bag, a purse, etc.

[0022] The alkanolamine to be used in the production method of the present invention is not particularly limited as long as it is a compound which has an alkane structure having a hydroxy group and an amino group in the molecule, and the amino group may be substituted. As such alkanolamines, mention may be made of monoethanolamine, 1,1-dimethylethanolamine, diethanolamine, triethanolamine, N-methylethanolamine, N,N-dimethylethanolamine, N-methyldiethanolamine, 2-aminoethox-

yethanol, N-aminoethylethanolamine, heptaminol, propanolamine, methanolamine, alaninol, serinol, cysteinol, threoniol, prolinol, valinol, leucinol, isoleucinol, methioninol, phenylalaninol, tyrosinol, tryptophanol, asaraginol, alapaltol, glutaminol, glutamol, ricinol, histidinol, argininol, ornithol, canalinol, etc.

[0023] As the method for incorporating an alkanolamine into the garment which uses a dyed cloth, mention may be made of a method in which the garment which uses a dyed cloth is contacted with a solution containing an alkanolamine, or a method in which a dyed cloth (a so-called *tanmono*) is contacted with a solution containing an alkanolamine and then the obtained dyed cloth is used to produce a garment.

[0024] The method for contacting the garment or dyed cloth (hereinafter referred to as "garment, etc.") with an alkanolamine is not particularly limited, and a method in which the garment, etc. is submerged in a solution containing an alkanolamine, a method in which the garment, etc. is dipped in a solution containing an alkanolamine and then further wrung out, a method in which a solution containing an alkanolamine is coated onto the garment, etc. by spraying, by a doctor-type coating machine, etc., a method in which the garment, etc. is stirred in a solution containing an alkanolamine, a method in which the garment, etc. is placed in or passed through a shower of a solution containing an alkanolamine, and a method in which a solution containing an alkanolamine is padded onto the garment, etc. Further, a solution tank in which the garment, etc. has been dipped can be vibrated with ultrasonic waves in order to impregnate a solution containing an alkanolamine into the fibers of the garment, etc.

[0025] In the above methods, after the garment, etc. has been contacted with a solution containing an alkanolamine, a drying step may be provided as appropriate. The drying temperature is not particularly limited as long as the temperature is equal to or lower than the boiling point of the alkanolamine, but the drying temperature should be a temperature at which a solvent included in the solution containing an alkanolamine can be vaporized (may be a temperature equal to or lower than the boiling point of the solvent).

[0026] The solution containing an alkanolamine may be a 100% alkanolamine solution, but is preferably a solution in which an alkanolamine is diluted with a solvent. As a solvent to be used for the solution containing an alkanolamine, a solvent which can dissolve the alkanolamine and which does not damage the dyed cloth material is preferable. Specifically, mention may be made of water, methanol, ethanol, and ammonia water, etc., but water is particularly preferred.

[0027] The content of the alkanolamine in the solution containing an alkanolamine is not particularly limited as long as the alkanolamine is dissolved in the solvent, but an amount of alkanolamine sufficient to enable decolorization by means of a heat treatment should be incorporated in the dyed cloth. The content of the alkanolamine in the solution containing an alkanolamine is preferably in the range of 0.01 to 0.3% by mass, and most preferably in the range of 0.1 to 0.3% by mass.

[0028] Normally, the solution containing an alkanolamine is preferably prepared by diluting a highly-concentrated solution containing an alkanolamine and other components (a pH adjusting agent, an organic acid, an oxidizing agent, a metal salt, a surfactant, an acidic substance, a basic substance, a thickening agent, etc.) (hereinafter referred to as a "highly-concentrated alkanolamine solution") with a solvent before use.

[0029] The content of the alkanolamine in the highly-concentrated alkanolamine solution is preferably in the range of 1 to 15% by mass, and more preferably in the range of 10 to 15% by mass.

[0030] A pH adjusting agent is preferably included in the solution containing an alkanolamine. The pH adjusting agent is not particularly limited as long as the pH can be adjusted to a prescribed pH range. As the pH adjusting agent, mention may be made specifically of an acetate buffer solution (acetic acid + sodium acetate), a phosphate buffer solution (phosphoric acid + sodium phosphate, sodium dihydrogenphosphate + sodium hydrogenphosphate), a citrate buffer solution (citric acid + sodium citrate), a tartrate buffer solution (tartaric acid + sodium tartrate), a borate buffer solution (boric acid + sodium hydroxide or potassium hydroxide), an ethanolamine acetate buffer solution (acetic acid + ethanolamine), a phosphate-citrate buffer solution (citric acid + sodium dihydrogenphosphate), a Tris buffer solution, a phosphate buffer physiological saline, an EDTA buffer solution (EDTA disodium salt + sodium hydroxide), a Tris EDTA buffer solution (Tris hydrochloric acid buffer solution + EDTA) , a Tris acetate EDTA buffer solution (Tris base + acetic acid + EDTA), a Tris borate EDTA buffer solution (Tris base + boric acid + EDTA), a concentrated SSC buffer solution (NaCl + trisodium citrate + sodium hydroxide), and a concentrated SSPE buffer solution (NaCl + sodium dihydrogenphosphate + EDTA + sodium hydroxide), etc.

[0031] Among the above, the pH adjusting agent is preferably added to the solution containing an alkanolamine so that the pH of the dyed cloth containing the alkanolamine is between 4 to 6 (the pH value is measured as follows based on "JIS L 1096: Testing methods for woven and knitted fabrics": 50 ml of distilled water is placed in a glass flask and boiled for two minutes; 5.0 g of finely cut test pieces (denim cloth) are loaded therein, and then the glass flask is corked and left as is for 30 minutes; an extraction liquid thereof is adjusted to 25°C±2°C; and the pH of the extraction liquid is measured with a pH meter).

[0032] The content of the pH adjusting agent is not particularly limited as long as it is in a range in which the pH can be adjusted to the above-mentioned pH range, but the content is preferably in the range of 5 to 40% by mass, and more preferably in the range of 10 to 25% by mass, with respect to the total amount of the highly-concentrated alkanolamine solution.

[0033] An organic acid is preferably further included in the solution containing an alkanolamine. As the organic acid to be included in the solution containing an alkanolamine, mention may be made specifically of acetic acid, propionic acid, citric acid, lactic acid, tartaric acid, and malic acid, etc. In particular, water-soluble organic acids are preferred examples.

[0034] The content of the organic acid is not particularly limited, but the content is preferably in the range of 1 to 30% by mass, more preferably in the range of 2 to 25% by mass, and even more preferably in the range of 10 to 20% by mass in the highly-concentrated alkanolamine solution.

[0035] An oxidizing agent, a metal salt, a surfactant, an acidic substance, a basic substance, a thickening agent, etc. may also be included, as necessary, in the solution containing an alkanolamine.

[0036] As the oxidizing agent to be included in the solution containing an alkanolamine, mention may be made of oxygen-based oxidizing agents such as hydrogen peroxide and sodium persulfate, or halogen-based oxidizing agents such as hypochlorites such as sodium hypochlorite, potassium hypochlorite, and calcium hypochlorite, hypoiodite and hypobromite, etc.

[0037] As the metal salt to be included in the solution containing an alkanolamine, mention may be made of alkali metal salts such as sodium chloride and potassium chloride, alkaline earth metal salts such as magnesium chloride and calcium chloride, and aluminum salts such as aluminum oxide, aluminum sulfate, and aluminum nitrate, etc.

[0038] As the surfactant to be included in the solution containing an alkanolamine, mention may be made of anionic surfactants such as a long-chain alkyl fatty acid salt, linear alkylbenzene sulfonate, α-sulfo fatty acid methyl ester salt, α-olefin sulfonate, dialkyl succinate, naphthalene sulfonic acid-formaldehyde condensate, and alkyl sulfate ester salt, etc., and nonionic surfactants such as glycerin fatty acid ester, sorbitan fatty acid ester, sucrose fatty acid ester, polyoxyethylene alkyl ether, polyoxyethylene alkyl phenyl ether, polyoxyethylene polyoxypropylene glycol, etc.

[0039] As the acidic substance to be included in the solution containing an alkanolamine, mention may be made of inorganic acids such as phosphoric acid and sulfamic acid, etc. As the basic substance, mention may be made of sodium silicate and caustic soda, etc.

[0040] As the thickening agent to be included in the solution containing an alkanolamine, mention may be made of a methyl cellulose-based thickening agent and a methyl starch-based thickening agent, etc. A thickening agent is suitably used in the case that the solution containing an alkanolamine is to be coated by a doctor-type coating machine, etc.

[0041] In the production method of the present invention, the garment, etc. obtained as described above is decolorized by performing a heat treatment.

[0042] The heat treatment method is not particularly limited as long as it is a method with which heat can be applied to the cloth containing an alkanolamine, but, for example, the garment, etc. is preferably heated by laser irradiation.

[0043] The heating temperature can be arbitrarily determined depending on the type of the alkanolamine and the type of the dyed cloth, and is preferably from 150°C to 200°C, more preferably from 160°C to 180°C.

[0044] The method for irradiating a laser beam is not particularly limited, but normally mention may be made of a method in which a laser beam is irradiated on the surface of the dyed cloth by scanning a narrowed beam.

[0045] The method for scanning a laser beam is not particularly limited, but mention may be made of a method in which an object to be irradiated is immobilized in advance and then a laser beam is two-dimensionally scanned onto the object, a method in which the object to be irradiated is moved and the laser beam is one-dimensionally operated in a direction intersecting the movement direction of the object, a method in which scanning is performed using a reflective mirror, etc. capable of rotary movement, and a method in which a laser beam is irradiated on only a portion corresponding to a desired irradiation pattern by opening and closing a shutter in an optical path, etc.

[0046] The laser irradiation duration and frequency are not particularly limited, but, for example, the laser may be irradiated once or multiple times for from 0.1 seconds to 5 minutes at a time.

[0047] The wavelength of the laser beam is not particularly limited, but is preferably a wavelength that is absorbed by a dye.

[0048] The type of laser is not particularly limited, but any of a gas laser, a solid-state laser, or a semiconductor laser can be used. A carbon dioxide gas laser which is a high-output infrared laser is particularly suitable for use.

[0049] The output of the laser is normally selected according to the use within the range of 1 to 1000 W.

[0050] If the diameter of the laser beam to be irradiated on the dyed cloth is narrowed, then decolorization can be easily formed with high precision. The diameter of the laser beam to be irradiated on the dyed cloth is not particularly limited, but specifically, the diameter is preferably no more than 2 mm, more preferably no more than 1.5 mm, and even more preferably no more than 1 mm when calculated as a $1/e^2$ value.

[0051] A decolorized product of a garment or a bag, etc. can be obtained by performing the laser irradiation and then performing washing, soaping, etc. as necessary.

[0052] In the present invention, the dyed cloth containing an alkanolamine can be prevented from becoming fragile even in its original state by retaining the dyed cloth in an appropriate pH range, and then distributed as a dyed cloth to which a chemical agent has been applied.

EXAMPLES

[0053] In the following, the present invention shall be explained in detail using examples, but the scope of the present invention should not be construed as limited to these examples.

[0054] [EXAMPLE 1]

17 parts by mass of anhydrous citric acid, 17 parts by mass of sodium hydrogenphosphate, 25 parts by mass of sodium dihydrogenphosphate, and 8 parts by mass of monoethanolamine (content of 90%) was dissolved in 100 parts by mass of water to prepare a denim cloth treatment liquid.

99 parts by mass of water was added to 1 part by mass of the denim cloth treatment liquid to prepare a denim cloth treatment diluted solution.

[0055] A sulfur-dyed denim cloth was dipped in the denim cloth treatment diluted solution for 5 minutes, and then the denim cloth was lifted out from the solution and the moisture was wrung out using a wringer. The denim cloth was subsequently air-dried by at room temperature.

[0056] The dried denim cloth was cut and sewn to produce a pair of jeans.

[0057] Using a laser irradiation device with an irradiation temperature of approximately 1000°C, the laser irradiation port was brought to about 1500 mm from the cloth and the laser was irradiated thereon while moving the laser at a speed of about 150 mm/sec. After irradiation, the jeans were washed, and thus a pair of jeans which was subjected to the decolorization processing of the present invention was produced.

[EXAMPLE 2]

[0058] A pair of jeans which was subjected to the same decolorization processing as Example 1 was produced, except that the denim cloth treatment liquid was prepared by dissolving 3.5 parts by mass of anhydrous citric acid, 17 parts by mass of sulfamic acid, 5 parts by mass of 85% phosphoric acid, 3 parts by mass of sodium hydrogenphosphate, 7 parts by mass of sodium dihydrogenphosphate, and 12 parts by mass of monoethanolamine (content of 90%) in 52.5 parts by mass of water, and that an indigo-dyed denim cloth was used.

[EXAMPLE 3]

[0059] A pair of jeans which was subjected to the same decolorization processing as Example 2 was produced, except that an indigo-dyed denim cloth of a lighter color than the cloth of Example 2 was used as the dyed cloth.

[COMPARATIVE EXAMPLE 1]

[0060] A denim cloth identical to that of Example 1 was used, except that the denim cloth was not treated with the denim cloth treatment liquid, and a pair of jeans which was subjected to the same decolorization processing as Example 1 was produced, except that the above-mentioned denim cloth was used.

[COMPARATIVE EXAMPLE 2]

[0061] A denim cloth identical to that of Example 2 was used, except that the denim cloth was not treated with the denim cloth treatment liquid, and a pair of jeans which was subjected to the same decolorization processing as Example 2 was produced, except that the above-mentioned denim cloth was used.

[COMPARATIVE EXAMPLE 3]

[0062] A denim cloth identical to that of Example 3 was used, except that the denim cloth was not treated with the denim cloth treatment liquid, and a pair of jeans which was subjected to the same decolorization processing as Example 3 was produced, except that the above-mentioned denim cloth was used.

[0063] FIGS. 1(a) and 1(b) illustrate the pairs of jeans which were subjected to decolorization processing as obtained in Example 1 and Comparative Example 1. FIGS. 2(a) and 2(b) illustrate the pairs of jeans which were subjected to decolorization processing as obtained in Example 2 and Comparative Example 2. FIGS. 3(a) and 1(b) illustrate the pairs of jeans which were subjected to decolorization processing as obtained in Example 3 and Comparative Example 3.

[0064] Upon comparing FIGS. 1(a) and 1(b), FIGS. 2(a) and 2(b), and FIGS. 3(a) and 3(b), it can be seen that the decolorization in the laser-irradiated portions is more vivid and the degree of whiteness is higher in the pairs of jeans obtained in Examples 1, 2, and 3 shown in FIGS. 1(a), 2(a), and 3(a) compared to the pairs of jeans obtained in Comparative Examples 1, 2, and 3 shown in FIGS. 1(b), 2(b), and 3(b).

INDUSTRIAL APPLICABILITY

[0065] The production method of the present invention is more environmentally friendly, offers a better working environment, and can more efficiently decolorize denim cloth compared to conventional methods, and thus is applicable across the apparel industry.

Claims

1. A garment production method **characterized by** using a heat treatment to decolorizing a garment which uses a dyed cloth containing an alkanolamine with a heat treatment.

2. The garment production method according to claim 1, wherein the temperature of the heat treatment is

from 150°C to 200°C.

3. The garment production method according to claim 1, wherein the temperature of the heat treatment is from 160°C to 180°C.

4. The garment production method according to any one of claims 1 to 3, wherein the heat treatment is a laser machining treatment.

5. The garment production method according to any one of claims 1 to 4, wherein the garment which uses a dyed cloth containing an alkanolamine is a garment which uses a dyed cloth obtained by contacting with a solution containing an alkanolamine, or a garment obtained from a dyed cloth obtained by contacting with a solution containing an alkanolamine.

6. The garment production method according to claim 5, wherein the solution containing an alkanolamine further comprises a pH adjusting agent.

7. The garment production method according to claim 5 or 6, wherein the solution containing an alkanolamine further comprises an organic acid.

8. A dyed cloth containing an alkanolamine.

9. The dyed cloth according to claim 8 for performing decolorization by means of a heat treatment.

10. The dyed cloth according to claim 8 or 9, wherein the heat treatment is a laser machining treatment.

11. The dyed cloth according to any one of claims 8 to 10, further comprising a pH adjusting agent.

12. The dyed cloth according to any one of claims 8 to 11, further comprising an organic acid.

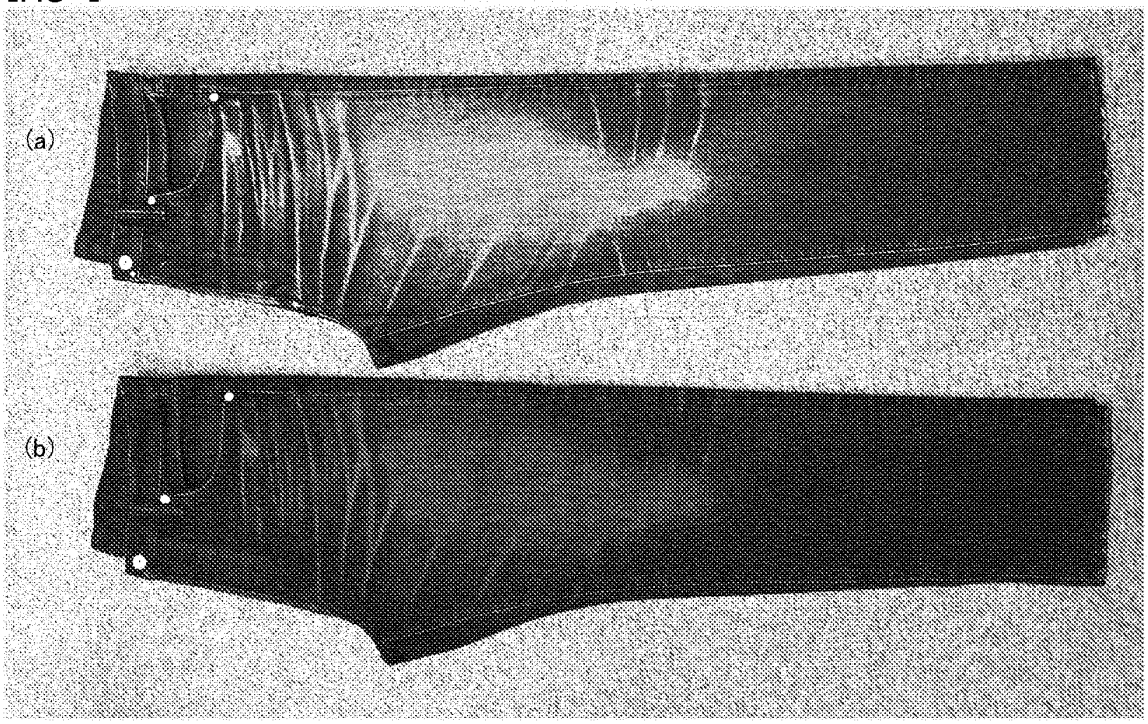
13. A chemical agent containing an alkanolamine, wherein the chemical agent is used for decolorizing, by means of a heat treatment, a garment produced using a dyed cloth into which an alkanolamine has been incorporated using the chemical agent, or a garment resulting from incorporating, with the chemical reagent, an alkanolamine into a garment which uses a dyed cloth.

14. The chemical agent according to claim 13, wherein the chemical agent containing an alkanolamine further comprises a pH adjusting agent.

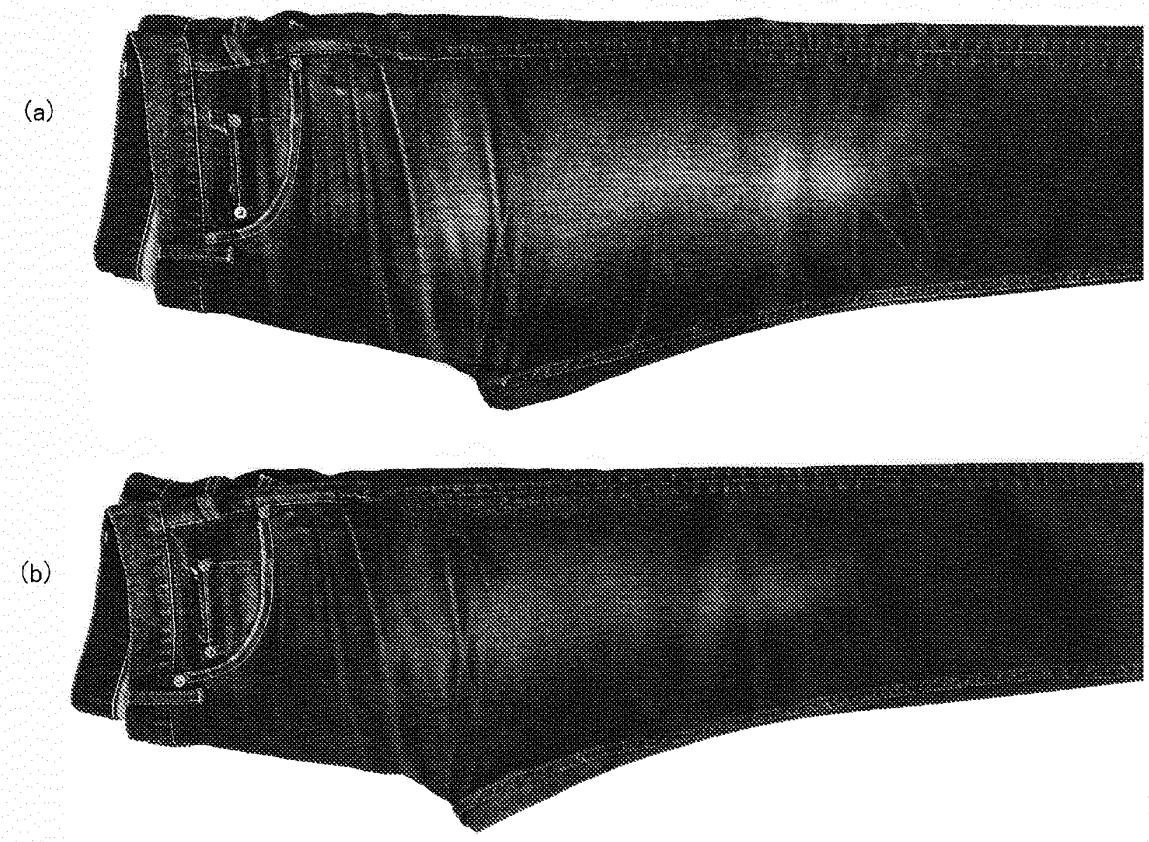
15. The chemical agent according to claim 13 or 14, wherein the chemical agent containing an alkanolamine further comprises an organic acid.

16. The chemical agent according to any one of claims 13 to 15, wherein the heat treatment is a laser machining treatment.

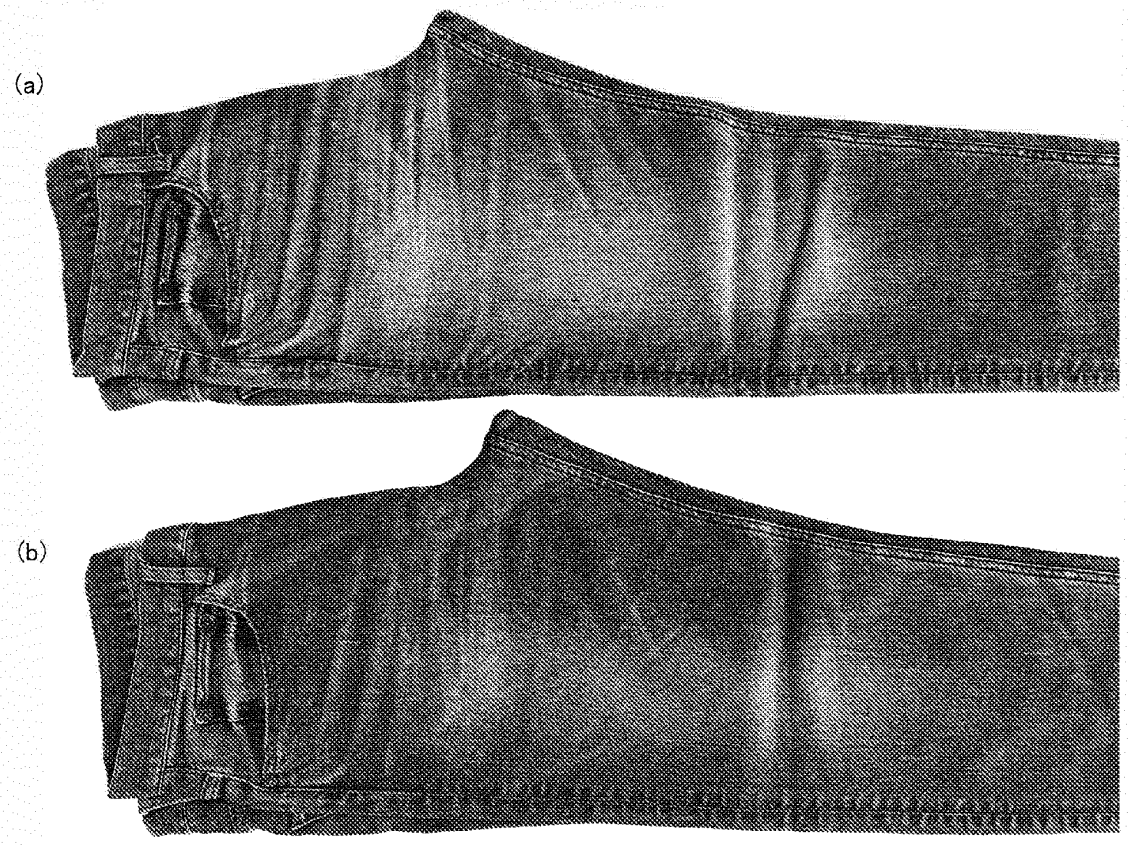
[FIG 1]



[FIG 2]



[FIG 3]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/045252

A. CLASSIFICATION OF SUBJECT MATTER
D06M 10/00(2006.01)i; D06P 5/13(2006.01)i; D06P 5/20(2006.01)i; D06C 23/00(2006.01)i; D06M 13/325(2006.01)i; D06Q 1/00(2006.01)i
FI: D06P5/13 A; D06M13/325; D06C23/00; D06M10/00 K; D06P5/20 C; D06Q1/00

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)
D06M10/00; D06P5/13; D06P5/20; D06C23/00; D06M13/325; D06Q1/00

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2021
Registered utility model specifications of Japan	1996-2021
Published registered utility model applications of Japan	1994-2021

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 Y	JP 56-118985 A (DAINIPPON INK AND CHEMICALS, INCORPORATED) 18 September 1981 (1981-09-18) in particular, claims, page 2, lower right column, line 7 to page 3, upper right column, line 8, examples	1-3, 5-16 4
Y	JP 2012-197533 A (KAWASHIMA SELKON TEXTILES CO., LTD.) 18 October 2012 (2012-10-18) in particular, claim 8	4

☐ 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	Date of mailing of the international search report
12 February 2021 (12.02.2021)	22 February 2021 (22.02.2021)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/045252

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
JP 56-118985 A	18 Sep. 1981	(Family: none)	
JP 2012-197533 A	18 Oct. 2012	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H10102386 A **[0007]**