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(54) **Process and use of composition for steam ironing**

Prozess und Verwendung einer Zusammensetzung zum Dampfbügeln

Procédé et utilisation d'une composition pour le repassage à vapeur

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(56) References cited:
EP-A- 0 292 909 **GB-A- 743 944**
US-A- 5 409 619 **US-A- 5 439 609**

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DescriptionTechnical Field

5 **[0001]** The present invention relates to a method of ironing clothes, use of an aqueous composition in a steam iron to carry out the method, and to use of a concentrate, following dilution by water to produce an aqueous composition, in the method.

Background Art

10 **[0002]** Compositions which are diluted with water to give a aqueous product for addition to the water reservoirs of steam irons are commercially available in a number of countries. These compositions are used to prevent the formation of lime scale in the iron if water containing dissolved calcium and magnesium salts is used and to give a pleasant fragrance to the cloth being ironed.

15 **[0003]** US 5 409 619 discloses a composition for use in the steam chamber of a steam iron which comprises propylene glycol, glycerine, and optionally a volatile fragrance in deionized water. The composition is said to provide improved glide characteristics.

20 **[0004]** The presence of glycerine on the fabric which has been ironed is likely to leave a sticky residue. It would be desirable to provide a method of ironing fabrics which did not require the use of glycerine but which gave some improvement in ease of ironing compared with the use of water alone in a steam iron.

25 **[0005]** EP-A-0 292 909 discloses an aqueous composition for removing wrinkles from a fabric or garment comprising an alcohol, glycerine and a nonionic surfactant. The composition preferably contains a silicone compound to reduce any tackiness imparted by said glycerine to said fabric. The de-wrinkling composition is sprayed on the wrinkled fabric or garment and allowed to dry.

30 **[0006]** GB-A-0 743 944 discloses a method of treating textile fabric or garments to improve the characteristics thereof by a pressing or ironing operation with steam, characterised by the steps of introducing into the steam a small amount of a composition having a liquid lubricant (oil) as the base, whereby the composition becomes diffused with the steam, and introducing the steam containing the composition diffused therein into the fabric during the pressing or ironing operation, whereby the composition is carried with the steam into the fabric and deposited onto the fibers to improve the body and finish thereof. A water repellent, e.g. an organo-silicon compound or Werner complex, may be incorporated into the lubricant.

Disclosure of Invention

35 **[0007]** According to one aspect of the present invention, there is provided a process for ironing cloth which comprises directing steam on to the surface of the cloth to deliver a lubricant to the cloth in the steam directed on to the cloth while applying heat and pressure to the cloth, wherein the lubricant is a steam-volatile silicone and the steam is generated from an aqueous composition comprising said steam-volatile silicone and a sequestering agent.

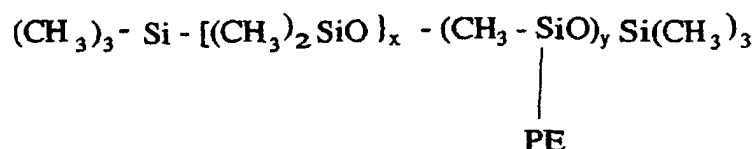
40 **[0008]** According to a further aspect of the present invention, there is provided the use of an aqueous composition in the water reservoir of a steam iron wherein the aqueous composition comprises a steam-volatile lubricant, which is a steam-volatile silicone, and a sequestering agent.

45 **[0009]** According to a further aspect of the present invention, there is provided the use of a concentrate following dilution with water to give an aqueous composition, in the water reservoir of a steam iron, wherein the concentrate comprises a steam-volatile lubricant, which is a steam-volatile silicone, and a sequestering agent.

50 **[0010]** The process of the present invention may be carried out using a conventional domestic steam iron having a reservoir for water communicating with openings in the sole (base) plate of the iron through which steam can be directed on to cloth which is being ironed. The reservoir may be incorporated in the iron or may be a separate component connected to the iron by a flexible tube.

55 **[0011]** The lubricant is a silicone which is volatile in steam so that it can be carried to the cloth in the steam generated by the steam iron. Preferably the lubricant will not adversely affect the appearance or the feel of the cloth. It is preferred for the lubricant to be dispersible in water. If the lubricant is not itself dispersible in water, then a surfactant may be used to keep it dispersed.

60 **[0012]** It is particularly preferred to use polydimethyl siloxanes modified by incorporation of polyoxyalkylene groups. These are also known as dimethicone polyols. Such compounds having surfactant properties are commercially available. Two types of block co-polymers are available. One type is a linear polydimethylsiloxane to which polyethers have been grafted (by a hydrosilation reaction) to give an alkyl pendant (AP) polymer with the polyalkylene groups linked to the siloxane backbone by Si-C bonds, which are hydrolytically stable. The preferred polymers have the formula



where PE is a pendant group which is $-\text{CH}_2\text{CH}_2\text{CH}_2\text{O}(\text{EO})_m(\text{PO})_n\text{Z}$ and Z is lower alkyl, e.g. $\text{C}_1\text{-C}_4$.

[0013] Materials of this type are commercially available, for example from OSi Specialities of Harefield, Middlesex, UK under the trade name "Silwet". The ethoxy and propoxy groups may be present in a ratio corresponding to an ethylene oxide to propylene oxide molecular ratio of 40/60 to 100/0 and molecular weights in the range 4000 to 81000. It is preferred to use dimethicone polyols with molecular weights in the range 10000 to 30000, e.g. 10000 to 22000.

[0014] Another class of block co-polymer silicone surfactants are those obtained by condensing polyethers at the ends of the siloxane backbone through Si-O-C bonds.

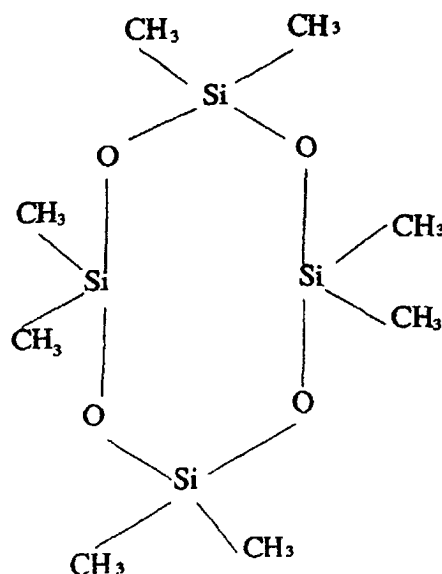
[0015] These products have the general formula



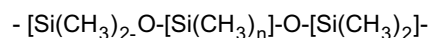
where PE is $-(\text{CH}_2)_3(\text{EO})_m(\text{PO})_n\text{R}$

where EO is an ethoxy group and PO is a propoxy group and R is a lower alkyl group e.g. $\text{C}_1\text{-C}_4$. These alkoxy end-blocked (AEB) copolymers have less resistance to hydrolysis than the AP polymer and are thus less preferred.

[0016] Another preferred class of silicone compounds are the cyclic polydimethyl siloxanes, which are also known as cyclomethicones. The cyclic compounds are commercially available as the tetramers or pentamers. They may be obtained from Dow Corning under the designations Dc 244, 245, 344, and 345. These materials are water-insoluble and but may be emulsified with surfactants to give oil-in-water emulsions. The formula of the tetramer is given below.



[0017] Another class of silicones which may be used in the invention are the lower molecular weight polydimethyl silicones



which are available in a range of molecular weights and viscosities. It is preferred to use polydimethyl silicones with a molecular weight in the range 1000 to 20000.

[0018] The aqueous composition contains a sequestering agent. The purpose of the sequestrant is to prevent the deposition of scale in the iron. Examples of suitable sequestering agents are diethylene triamine penta-acetate.

[0019] The aqueous composition may contain a fragrance, as is used in known additives for steam irons.

[0020] If the fragrance is not miscible with water as is the case with many fragrance oils, then a fragrance solubilizer may be included in the composition. This may for example be a nonionic surfactant, for example sorbitan monolaurate 20EO, i.e. the product of reacting 20 molecules of ethylene oxide with each molecule of the sorbitan monolaurate.

[0021] The composition preferably contains a preservative to protect it against microbial attack. Suitable preservatives are well-known. Thus 4,4-dimethyl oxazolidine may be used.

[0022] The amounts of lubricant in the liquid which is vapourized to give the steam required in the ironing process may be in the range 0.001 to 5 % w/w of the total composition, preferably 0.001 % to 0.4% w/w.

[0023] The amount of sequestering agent present may be, for example, in the range 0.003% to 5% w/w, preferably 0.003% to 0.2% w/w

[0024] The concentrate which is mixed with water to give the aqueous composition used to deliver the lubricant in the ironing process, may be a liquid, e.g. an aqueous liquid. Alternatively it may be a gel or a powder.

[0025] The amount of lubricant in the concentrate may be 0.05% to 20%, preferably 2 to 8%, e.g. 5% w/w.

[0026] The amount of sequestering agent in the concentrate may be 0.2 to 10.00 % w/w, preferably 0.3 to 0.7% w/w.

[0027] The amount of any fragrance present in the concentrate may be in the range 0.05% to 0.3%, e.g. 0.10% w/w.

[0028] The amount of any fragrance solubilizer in the concentrate may be from 0.1 to 0.3% w/w, e.g. 0.2%.

[0029] In the case of a liquid concentrate, the remainder of the liquid may be water, preferably deionized water.

Best Mode of Carrying Out the Invention

Example 1

[0030] A composition was prepared from the following ingredients.

Ingredient	%wt/wt
Deionized water	96.10
Preservative	0.10
Perfume	0.10
Sequestering agent	1.00
Lubricant	2.5
Surfactant	0.2

[0031] The preservative was 4,4-dimethyl oxazolidine, commercially available under the trade name "Bioban CS 1135".

[0032] The sequestering agent was diethylene triamine penta-acetate, commercially available under the trade name "Dissolvine D50".

[0033] The lubricant was a polyalkylene oxide silicone copolymer surfactant commercially available under the trade name "Silwet L7200" from OSi Specialities of Harefield, Middlesex, UK. The polymer was an alkyl-pendant (AP) polymer as described above. It had a molecular weight of about 19000 and the polyoxyalkylene oxide component was derived from a mixture of ethylene oxide and propylene oxide in the molecular ratio 75:25.

[0034] The composition was prepared by mixing the ingredients together.

Example 2

[0035] A composition was prepared as in Example 1 except that the lubricant was a cyclic polydimethyl silicone pentamer commercially available from Dow Coming as DC 245.

Comparative Test A

[0036] A composition was prepared as in Example 1 except that it contained no lubricant.

Ironing Tests

[0037] The compositions of Examples 1, 2, and comparative Test A were subjected to a test with a panel of users

who tested them in random order using a separate ironing board and iron for each product. The products of Examples 1, 2 and Test A were tested at two different dilutions with tap water, namely 1:60 and 1:120 by volume. The composition of Comparative Test A was tested at a dilution of 1:60. The testers were then asked questions about the products tested. The higher the score reported, the greater the agreement with the proposition put to the testers.

[0038] The proposition that "the product makes the iron glide easily over the fabric" received the following scores:

Example 1 (1:120)	5.92
Example 1 (1:60)	5.83
Example 2 (1:60)	5.75
Test A	a low score was obtained

[0039] The proposition that "the product makes ironing easier" received the following scores:

Example 1 (1:120)	5.96
Example 1 (1:60)	5.89
Test A	5.14

[0040] The proposition that "the product removes wrinkles well" received the following scores:

Example 1 (1:120)	6.00
Example 1 (1:60)	6.05
Test A	5.13

Claims

1. A process for ironing cloth which comprises directing steam on to the surface of the cloth to deliver a lubricant to the cloth in the steam directed on to the cloth while applying heat and pressure to the cloth, wherein the lubricant is a steam-volatile silicone and the steam is generated from an aqueous composition comprising said steam-volatile silicone and a sequestering agent.
2. A process according to claim 1 wherein the silicone is a polydimethyl siloxane modified by incorporation of polyoxyalkylene groups.
3. A process according to claim 2 wherein the silicone is a linear polydimethylsiloxane to which polyethers have been grafted to give an alkyl pendant polymer with the polyalkylene groups linked to the siloxane backbone by Si-C bonds.
4. A process according to claim 3 wherein the silicone has a ratio of ethoxy to propoxy groups corresponding to an ethylene oxide to propylene oxide molecular ratio of 40/60 to 100/0.
5. A process according to claim 3 or claim 4 wherein the silicone has a molecular weight in the range 10000 to 30000.
6. A process according to claim 5 wherein the molecular weight is 10000 to 22000.
7. A process according to claim 1 or claim 2 wherein the silicone is a cyclic polydimethyl siloxane.
8. A process according to claim 7 wherein the cyclic polydimethyl siloxane is a tetramer or pentamer.
9. Use of an aqueous composition comprising a steam-volatile lubricant, which is a steam-volatile silicone, and a sequestering agent, in the water reservoir of a steam iron.
10. Use of a concentrate, following dilution to give an aqueous composition, in the water reservoir of a steam iron, wherein the concentrate comprises a steam-volatile lubricant, which is a steam-volatile silicone, and a sequestering agent.

Patentansprüche

1. Verfahren zum Bügeln von Textilien, umfassend die Abgabe von Dampf auf die Oberfläche der Textilien, um in dem Dampf, der auf die Textilien gerichtet wird, unter gleichzeitiger Anwendung von Hitze und Druck ein Gleitmittel abzugeben, wobei das Gleitmittel ein dampfflüchtiges Silicon ist, und der Dampf aus einer wässrigen Zusammensetzung erzeugt wird, die das dampfflüchtige Silicon und ein Maskierungsmittel umfasst.
2. Verfahren nach Anspruch 1, worin das Silicon ein Polydimethylsiloxan ist, welches durch Einbau von Polyoxalkylengruppen modifiziert ist.
3. Verfahren nach Anspruch 2, worin das Silicon ein lineares Polydimethylsiloxan ist, auf das Polyether gepfropft wurden, um ein Polymer mit anhängenden Alkylgruppen zu ergeben, bei dem die Polyalkylengruppen über Si-C-Bindungen an die Siloxanhauptkette gebunden sind.
4. Verfahren nach Anspruch 3, worin das Silicon ein Verhältnis von Ethoxy zu Propoxygruppen aufweist, das einem molekularen Verhältnis von Ethylenoxid zu Propylenoxid von 40/60 bis 100/0 entspricht.
5. Verfahren nach Anspruch 3 oder Anspruch 4, worin das Silicon eine Molmasse im Bereich von 10000 bis 30000 hat.
6. Verfahren nach Anspruch 5, worin die Molmasse 10000 bis 22000 beträgt.
7. Verfahren nach Anspruch 1 oder Anspruch 2, worin das Silicon ein cyclisches Polydimethylsiloxan ist.
8. Verfahren nach Anspruch 7, worin das cyclische Polydimethylsiloxan ein Tetramer oder Pentamer ist.
9. Verwendung einer wässrigen Zusammensetzung, umfassend ein dampfflüchtiges Gleitmittel, bei dem es sich um ein dampfflüchtiges Silicon handelt, sowie ein Maskierungsmittel, im Wasserreservoir eines Bügeleisens.
10. Verwendung eines Konzentrats, das anschließend verdünnt wird, um im Wasserreservoir eines Bügeleisens eine wässrige Zusammensetzung zu erhalten, wobei das Konzentrat ein dampfflüchtiges Gleitmittel, bei dem es sich um ein dampfflüchtiges Silicon handelt, und ein Markierungsmittel umfasst.

Revendications

1. Processus de repassage d'un tissu qui comprend l'envoi d'une vapeur vers la surface du tissu afin de délivrer un lubrifiant pour le tissu dans la vapeur dirigée sur le tissu pendant l'application de la chaleur et de la pression sur le tissu, dans lequel le lubrifiant est un silicone volatil dans la vapeur et la vapeur est générée à partir d'une composition aqueuse comprenant ledit silicone volatil dans la vapeur et un agent séquestrant.
2. Processus selon la revendication 1 dans lequel le silicone est un polydiméthyle siloxane modifié par incorporation de groupements polyoxyalkylène.
3. Processus selon la revendication 2 dans lequel le silicone est un polydiméthylsiloxane auquel ont été greffés des polyéthers pour donner un polymère aux greffons alkyles avec les groupements polyalkylène liés au squelette siloxane par des liaisons Si-C.
4. Processus selon la revendication 3 dans lequel le silicone a un rapport des groupements éthoxy sur propoxy correspondant à un rapport moléculaire de l'oxyde d'éthylène sur l'oxyde de propylène de 40/60 à 100/0.
5. Processus selon la revendication 3 ou la revendication 4 dans lequel le silicone a un poids moléculaire dans la gamme de 10000 à 30000.
6. Processus selon la revendication 5 dans lequel le poids moléculaire est de 10000 à 22000.
7. Processus selon la revendication 1 ou la revendication 2 dans lequel le silicone est un polydiméthyl siloxane cyclique.

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8. Processus selon la revendication 7 dans lequel le polydiméthyl siloxane cyclique est un tétramère ou un pentamère.
9. Utilisation d'une composition aqueuse comprenant un lubrifiant volatil dans la vapeur, qui est un silicone volatil dans la vapeur, et un agent séquestrant, dans le réservoir d'eau d'un fer à vapeur.
10. Utilisation d'un concentré, dilué par la suite pour donner une composition aqueuse, dans le réservoir d'eau d'un fer à vapeur, dans lequel le concentré comprend un lubrifiant volatil dans la vapeur, qui est un silicone volatil dans la vapeur, et un agent séquestrant.

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