PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Method for Cleaning Linen and products for Executing said method

We, CARL KIRCHNER, a Citizen of Germany, of 13, Feldstrasse, Bübingen, Saar Territory, and ALBERT KIRCHNER, a Citizen of Germany, of 13, Am Staden, Saarbrücken, Saar Territory, both trading as SEIFEN- UND GLYZERINFABRIK C. HARTUNG, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for cleaning soiled textile material which, compared with the processes hitherto generally used, is more simple and more efficient inasmuch as the usual cleaning steps of soaking and the usual boiling with subsequent mechanical working of the fabric are reduced to a single operation.

According to the present invention a process for cleaning soiled textile material comprises immersing the dry material in a hot aqueous cleaning solution and allowing the material to remain so immersed for a period of time until clean, said solution being allowed to cool gradually throughout said immersion period and comprising a surface-active detergent, oxygen-yielding material at least equivalent in oxygen-yielding capacity during said immersion period to that due to the presence of 10 g. of sodium perborate for each 10 litres of water present in said solution, and stabilising material effective in limiting the generation of oxygen from said oxygen-yielding material. The material after removal from the solution, may be rinsed and dried in the normal way.

According to a preferred embodiment of the invention for each kilogram of soiled material to be cleaned there is used a cleaning solution comprising around 10 litres of water, from 60 to 150 g. of detergent and an amount of oxygen-yielding material equivalent to from 10 to 40 g. of sodium perborate. Suitable surface active detergents are soaps and synthetic anionic or non-ionic surface active compounds such as the sulphates and sulphonates of fatty alcohols.

Stabilisers of particular value for use in the process of the invention are the water soluble salts of molecularly dehydrated orthophosphoric acids, examples being sodium pyrophosphate, sodium hexametaphosphate (a mixture of 90 parts of the latter with 10 parts of sodium pyrophosphate is sold under the Registered Trade Mark "Calgon"), sodium tripolyphosphate and sodium tetrapolyphosphate. These phosphates are hereinafter referred to generically as "special phosphates."

Immersion periods of at least two hours starting at temperatures between 100° C. and 70° C. are normally preferred.

In the presence of high degrees of alkalinity, stabilisers such as magnesium silicate are preferred. Special phosphates in fact accelerate the destruction of the carrier of active oxygen in the presence of high degrees of alkalinity.

Specification No. 435,861 describes washing compositions which contain per-compounds, water soluble salts of phosphoric acids which contain less water than orthophosphoric acid, and alkaline reacting substances, the mixture being characterised by the inclusion of magnesium silicate. Similar compositions are described in Specifications Nos. 436,235, 437,128 and 438,063 where the characteristic features are the inclusion of aluminium hydroxide, sparingly soluble tin compounds and alkaline earth metal or zinc or cadmium silicates.

The proportion of sodium perborate or similar material has been generally kept to a low level in the prior art procedures because experiments have shown that proportions higher than 10% cause damage to the fabric, for example by the formation of oxycellulose when cellulosic fabrics are treated. This is also the case when special phosphates are included in the washing compositions and arises from the fact that in the rather alkaline solutions hitherto employed the special phosphates lose practically all their stabilising effect when the solutions are boiled and indeed under such conditions sometimes actually activate the spontaneous generation of oxygen.

It has been found during extensive experimentation that it is possible without any further difficulty to increase, without any chemical damage being exerted by oxygen, the

physical action of the minute gaseous bubbles of nascent atomic oxygen, in a manner such that it is possible to avoid the continued heating applied hitherto and possibly also the mechanical treatment of the linen in washing machines or wash-beaters. The condition for this consists, however, in a reliable control of the generation of oxygen over a sufficiently long period. We will designate hereinafter as "automatizing agents" the compositions introduced into a standard washing solution for rendering the washing process automatic in accordance with such principles.

In addition, the washing solution may contain one or more substances also known per se and acting as dispersing or solubilising agents for alkaline earth soaps, such for example as special phosphates and active auxiliary agents that inhibit the production of ions and are based upon natural or synthetic fats, provided of course that they do not affect adversely the washing process.

Such dispersing agents include condensation products of oleic acid with isethionic acid (or oxyethansulphonic acid), and in particular the condensation product of oleic acid with N - methylaminoethansulphonic acid (methyltaurine).

The washing solution may also contain one of the numerous dyestuffs known in the art as white colouring agents or optical bleaching agents, together with a sufficient amount of sodium sulphate or the like for producing a levelling effect insofar as this levelling effect is not already provided through the above-mentioned substances that serve for solubilising or dispersing the alkaline earth soaps.

Although it is in practice advantageous to introduce the whole of the ingredients referred to above into the washing solution in the form of a single mixture of salts, or of a paste or the like, a solution may first be provided that contains the usual substances exerting the desired cleaning action, and there may then be incorporated into said solution, preferably within the temperature range of between 70 and 100° C., the other above-mentioned components forming the automatizing agent, said components being introduced singly or as a suitable formulated mixture. The last-mentioned substances are those that produce the automatizing action on the progress of the washing process, and in fact it is the presence of these which permits all the washing steps used heretofore, requiring a preliminary soaking, continued heating, a high degree of alkalinity and if desired mechanical working, to be avoided.

The optical bleaching agent may be incorporated with the substance used for levelling purposes, or may be added together with a sufficient amount of the substance used for dispersing the alkaline earth soap to the water used for rinsing the cleaned material taken out of the washing solution.

A suitable washing composition for use in the process of the invention comprises, on a weight basis, 40—80% of an anion-active or non-ionic surface active detergent, 12—54% of sodium perborate, 2—12% of a water-soluble salt of a molecularly dehydrated orthophosphoric acid, 1—5% of stabilising material other than salts of molecularly dehydrate orthophosphoric acids, 1—5% of sodium sulphate and 0.5—0.25% of optical bleaching agent.

A suitable automatizing agent comprises, on a weight basis, 25—90% sodium perborate, 0—70% special phosphate, 0—15% stabiliser other than special phosphate, e.g. magnesium silicate, 0—15% sodium sulphate and 0—1% optical bleaching agent.

Instead of adding the optical bleaching agent to the washing liquor, the textile material removed therefrom may be rinsed in a solution prepared by dissolving in water a solution comprising, on a weight basis, 80—99% dispersing agent for alkaline earth metal soap, 0—20% levelling agent and 0.5—2% optical bleaching agent.

The following examples will serve to illustrate the invention but are not to be regarded as limiting it in any way. The percentages given are on a weight basis.

EXAMPLE I.

A washing solution for the treatment of 1 kg. of soiled linen comprises 10 litres of water containing 160 g. of a composition formulated as follows:—

	%
Anion-active or non-ionic surface active compound	63
Sodium perborate	27
Special phosphates	5.5
Stabilisers (other than special phosphates)	2.7
Sodium sulphate	2.2
Optical bleaching agent	0.1

The said solution is employed at 70—100° C., the linen being steeped therein for 2 to 4 hours during which period the solution is allowed to cool substantially to room temperature, removed, rinsed and dried.

EXAMPLE II.

To a conventional aqueous washing solution containing soap and optionally in addition any or all of the following: Soda, water glass, orthophosphates, sodium metasilicate and fatty alcohol sulphonates, is added a mixture-acting as an automatizing agent of the following composition:

	%
Sodium perborate	72.5
Special phosphates	15
Stabiliser (magnesium silicate)	6

physical action of the minute gaseous bubbles of nascent atomic oxygen, in a manner such that it is possible to avoid the continued heating applied hitherto and possibly also the mechanical treatment of the linen in washing machines or wash-beaters. The condition for this consists, however, in a reliable control of the generation of oxygen over a sufficiently long period. We will designate hereinafter as "automatizing agents" the compositions introduced into a standard washing solution for rendering the washing process automatic in accordance with such principles.

In addition, the washing solution may contain one or more substances also known per se and acting as dispersing or solubilising agents for alkaline earth soaps, such for example as special phosphates and active auxiliary agents that inhibit the production of ions and are based upon natural or synthetic fats, provided of course that they do not affect adversely the washing process.

Such dispersing agents include condensation products of oleic acid with isethionic acid (or oxyethansulphonic acid), and in particular the condensation product of oleic acid with N - methylaminoethansulphonic acid (methyltaurine).

The washing solution may also contain one of the numerous dyestuffs known in the art as white colouring agents or optical bleaching agents, together with a sufficient amount of sodium sulphate or the like for producing a levelling effect insofar as this levelling effect is not already provided through the above-mentioned substances that serve for solubilising or dispersing the alkaline earth soaps.

Although it is in practice advantageous to introduce the whole of the ingredients referred to above into the washing solution in the form of a single mixture of salts, or of a paste or the like, a solution may first be provided that contains the usual substances exerting the desired cleaning action, and there may then be incorporated into said solution, preferably within the temperature range of between 70 and 100° C., the other above-mentioned components forming the automatizing agent, said components being introduced singly or as a suitable formulated mixture. The last-mentioned substances are those that produce the automatizing action on the progress of the washing process, and in fact it is the presence of these which permits all the washing steps used heretofore, requiring a preliminary soaking, continued heating, a high degree of alkalinity and if desired mechanical working, to be avoided.

The optical bleaching agent may be incorporated with the substance used for levelling purposes, or may be added together with a sufficient amount of the substance used for dispersing the alkaline earth soap to the water used for rinsing the cleaned material taken out of the washing solution.

A suitable washing composition for use in the process of the invention comprises, on a weight basis, 40—80% of an anion-active or non-ionic surface active detergent, 12—54% of sodium perborate, 2—12% of a water-soluble salt of a molecularly dehydrated orthophosphoric acid, 1—5% of stabilising material other than salts of molecularly dehydrate orthophosphoric acids, 1—5% of sodium sulphate and 0.5—0.25% of optical bleaching agent.

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Sodium sulphate	2.2
Optical bleaching agent	0.1

The said solution is employed at 70—100° C., the linen being steeped therein for 2 to 4 hours during which period the solution is allowed to cool substantially to room temperature, removed, rinsed and dried.

EXAMPLE II.

To a conventional aqueous washing solution containing soap and optionally in addition any or all of the following: Soda, water glass, orthophosphates, sodium metasilicate and fatty alcohol sulphonates, is added a mixture-acting as an automatizing agent—of the following composition:

	%
Sodium perborate	72.5
Special phosphates	15
Stabiliser (magnesium silicate)	6

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	%
Sodium sulphate - - -	6
Optical bleaching agent - -	0.3

The resulting solution is applied to linen, wool, silk, rayon or cotton fabrics. When treating wool, silk or rayon the initial temperature is 50—60° C. and when treating linen or cotton the initial temperature may be higher, e.g. 70—100° C. In both cases the solutions are allowed to cool substantially to room temperature over a period of about 2 to 4 hours.

EXAMPLE III.

A composition suitable for the washing of fine textile fabrics is prepared from:

	%
Sodium lauryl sulphate (100%)	20
Sodium perborate - - -	40
Sodium sulphate - - -	19.7
Sodium pyrophosphate - -	20
Optical bleaching agent - -	0.3

About 30 to 50 g. of this mixture is employed, per kilogram of dry linen, dissolved in 10 litres of water. The initial temperature is 70—100° C. and the solution is allowed to cool substantially to room temperature over a period of 2 to 4 hours.

In all the foregoing examples the washing treatment may be stopped at a point before the temperature has fallen to room temperature, this depending on the extent of soil of the articles treated.

The washing process of the present invention may be advantageously used in mechanical laundries where it enables the washing to be effected in a single step, reduces the amount of washing media necessary for a given weight of material to be washed, shortens the time necessary, reduces the percentage of material requiring to be re-washed and produces fabrics of improved colour.

What we claim is:—

1. A process for cleaning soiled textile material which comprises immersing the dry material in a hot aqueous cleaning solution and allowing the material to remain so immersed for a period of time until clean, said solution being allowed to cool gradually throughout said immersion period and comprising a surface-active detergent, oxygen-yielding material at least equivalent in oxygen-yielding capacity during said immersion period to that due to the presence of 10 g. of sodium perborate for each 10 litres of water present in said solution, and stabilising material effective in limiting the generation of oxygen from said oxygen-yielding material.

2. A process according to Claim 1 wherein for each kilogram of soiled material to be cleaned there is used a cleaning solution comprising around 10 litres of water, from 60 to 150 g. of detergent and an amount of oxygen-yielding material equivalent to from 10 to 40 g. of sodium perborate.

3. A process according to Claim 1 or 2 wherein the temperature of said cleaning solution lies between 100° C. and 70° C. at the commencement of said immersion period.

4. A process according to any one of the preceding claims wherein said immersion period is at least 2 hours.

5. A process according to any one of the preceding claims wherein said oxygen-yielding material comprises sodium perborate.

6. A process according to any one of the preceding claims wherein said stabilising material comprises a water-soluble salt of a molecularly dehydrated orthophosphoric acid.

7. A process according to any one of Claims 1 to 5 wherein said stabilising material comprises magnesium silicate.

8. A process according to Claim 6, wherein said solution also contains a dispersing agent, other than a water-soluble salt of a molecularly dehydrated orthophosphoric acid, for alkaline earth metal soaps.

9. A process according to Claim 7 wherein said solution also contains a water-soluble salt of a molecularly dehydrated orthophosphoric acid in an amount effective to disperse any alkaline earth metal soap formed in said solution.

10. A process according to any one of the preceding claims wherein said cleaning solution also contains an optical bleaching agent.

11. A process according to Claim 10 wherein said cleaning solution also contains a levelling agent.

12. A process according to Claim 1 wherein the cleaned textile material is rinsed in a solution containing, for approximately each kilogram of dry material cleaned, 10 g. of a composition consisting of 80—99% by weight of a dispersing agent for alkaline earth metal soap, 0—20% by weight of levelling agent and 0.5—2% by weight of optical bleaching agent.

13. A process for cleaning soiled textile material substantially as hereinbefore described.

14. A washing composition for use in any of the processes of Claims 1—13 comprising, on a weight basis, 40—80% of an anion-active or non-ionic surface active detergent, 12—54% of sodium perborate, 2—12% of a water-soluble salt of a molecularly dehydrated orthophosphoric acid, 1—5% of magnesium silicate, 1—5% of sodium sulphate and 0.5—0.25% of optical bleaching agent.

15. A textile cleaning solution for use in any of the processes of Claims 1—13 formed by dissolving 120—200 g. of a composi-

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tion according to Claim 14 in 10 litres of water.

For the Applicants,
J. A. KEMP & CO.,
Chartered Patent Agents,
Bank Chambers, 329, High Holborn,
London, W.C.1.

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