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71 Applicant: **SCOTT PAPER COMPANY**
Scott Plaza 2
Philadelphia, PA 19113(US)

72 Inventor: **Bogart, Larry**
1221 Greentree Lane
Penn Valley, Pennsylvania 19072(US)
Inventor: **Hipkins, James J.**
933 11th Avenue
Prospect Park, Pennsylvania 19076(US)
Inventor: **Edelson, Nathan A.**
3, West Amherst Road
Bala Cynwyd, Pennsylvania 19004(US)
Inventor: **Mitchell, Joseph**
303, South Hampshire Drive
Deptford, New Jersey 08096(US)
Inventor: **Smith, Morris L.**
307 Tillman Avenue
Lawnside, New Jersey 08045(US)

74 Representative: **Taylor, Phillip Kenneth et al**
W.P. THOMPSON & CO. Coopers Building
Church Street
Liverpool L1 3AB(GB)

54 **Improvements in cellulosic fibrous webs.**

57 The invention relates to a web of cellulosic fibres characterised in that it comprises as a water-soluble emollient an agent selected from:

- (A) Lauroamphoglycinate
- (B) A high molecular weight cationic quaternary homopolymer or copolymer derived from dimethyl ammonium salt
- (C) A tri-quaternary phospholipid complex derived from a fatty acid and
- (D) Glucose glutamate said agent being present in an amount from 0.1 to 2 percent by weight of the web.

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IMPROVEMENTS IN CELLULOSIC FIBROUS WEBS

The present invention relates to improvements in cellulosic fibrous webs and more particularly to those webs intended for use as towels, toilet tissue and facial tissue.

In many environments such as hospitals and clinics, persons are required to frequently wash and dry their hands. This can produce skin irritation, particularly in cold weather. Furthermore, a person suffering from the common cold must frequently apply facial tissues. Again, people suffering from diarrhoea must use large quantities of toilet tissue. The constant application of detergent solutions (e.g. soap and water) to the hands and the constant wiping of body fluids from specific areas of the skin can give rise to a loss of water soluble constituents from the skin which in turn gives rise to dry skin and the deleterious effects which can result from such a condition. This is exacerbated by the constant application of cellulosic fibrous webs to these restricted areas of the skin.

With a view to ameliorating such effects it has been suggested to treat cellulosic fibrous webs with lanolin to impart a feeling of softness to the webs. See, for example, U.S. Patents Nos. 2,877,115 and 2,944,931. The use of other fatty solids for the same purpose has also been described in U.S. Patent 3,305,392. However, such a treatment with lanolin or other fatty solids has the disadvantage that the water absorbancy of the cellulosic web is dramatically reduced by the application of these materials, so that the web can no longer satisfactorily perform its essential function of wiping or drying in reference to moist skins. It is therefore clear that the provision of cellulosic fibrous webs which, whilst executing their primary function which is to wipe or dry the skin, could concomitantly ameliorate the above-mentioned affects, is highly desirable.

It has now been surprisingly found that if cellulosic fibrous webs are treated with certain water-soluble materials that the water absorbancy of the webs can essentially be retained but that the so treated webs have the property of imparting to the skin a soothing effect which ameliorates the deleterious effects referred to above. Thus repeated wipings with toilet tissue treated with the said water soluble materials has been found to condition the perineal region so that it maintains a non-irritating condition. Likewise the nasal skin is left with a velvety soft feeling even after repeated wipes with facial tissue which has been treated with the said water soluble compounds. It has surprisingly been found that products made from webs treated with the said water-soluble compound exhibit the ability to transfer such compounds from the cellulosic fibrous web to the skin and to generate emollient benefits whilst concomitantly successfully executing the primary function of the product, i.e. to wipe or dry the skin.

According to the present invention, there is provided a web of cellulosic fibres characterised in that it comprises as a water-soluble emollient an agent selected from:-

(A) Lauroamphoglycinate

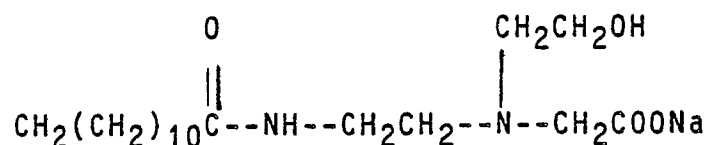
(B) A high molecular weight cationic quaternary homopolymer or copolymer derived from a dimethyl diallyl ammonium salt.

(C) A tri-quaternary phospholipid complex derived from a fatty acid

(D) Glucose glutamate said agent being present in an amount from 0.1 to 2 percent by weight of the web.

The invention also includes towels, toilet tissue and facial tissue characterised by being made from such a cellulosic fibrous web.

Lauroamphoglycinate is the amphotenic organic compound that conforms generally to the formula:



Lauroamphoglycinate is sold in the form of a proprietary product under the name Alcolac DV-1995 which contains principally Lauroamphoglycinate together with phosphoric acid and a nonionic surfactant.

High molecular weight cationic quaternary homopolymers or copolymers derived from a dimethyl diallyl ammonium salt are disclosed and described in detail in U.S. Patents 3,288,770 and 3,412,019. Although such polymers have been disclosed for use in cosmetic products such as shampoos (U.S. patent 3,996,146), for bleaching compositions (U.S. patent 4,027,008), for hair colouring compositions (U.S. patent 3,986,825) and for hair waving compositions (U.S. patent 3,912,808), they have not hitherto been recognised

as skin moisturisers. High molecular weight polymers of this type are commercially available from Calgon Corporation, a wholly-owned subsidiary of Merck and Co. under the brand name Merquat.

Triquatary phospholipid complexes are described in detail in U.S. Patent 4,209,449. They are derived from fatty acids such as stearic, lauric, linoleic and myristic acids. Whilst such phospholipid complexes have been recognised as possessing skin moisturising properties, they have never hitherto been employed or incorporated in cellulosic fibrous webs. Furthermore, it could not have been predicted that such water soluble compounds would transfer from tissue made from such webs during the drying of water from the skin or in the wiping of bodily fluids from the skin. Such phospholipid complexes are commercially available from Mona Industries Inc. under the brand name Monoquat and Monaterge. The stearic based complex bears the CTFA designation stearamidopropyl PG-Dimonium Chloride Phosphate.

Glucose glutamate is a condensation product of an amino acid with a reducing sugar. Such condensation products are disclosed and described in detail in U.S. patent 3,231,472. They are commercially available from Wickhen Products Inc. a wholly owned subsidiary of Dow Corning, under the brand name Wickenol. It has been found that the presence of small residual amounts of glucose glutamate on the skin, after hand drying, materially aids in restoring and maintaining the moisture balance necessary for healthy skin. It is surprising however that this material will transfer from a tissue containing it in the act of drying water from the skin and particularly when it is present in the tissue in an amount of only from .1 to 2 percent by weight of the tissue.

When the products produced from the cellulosic fibrous webs of the invention are compared with products produced from prior art materials treated with lanolin, the prior art materials are found to be markedly inferior in producing the desired benefits in that their water absorbance is markedly reduced and they are even perceived in some cases as causing irritation and/or itching.

The invention will be further illustrated by reference to the following specific examples:-

In the following Examples 1 and 2, the general method of treating the cellulosic fibrous webs with the active agents is as follows:-

Paper webs having a basis weight of 54 g/m² (32 pounds per ream of 2,800 square feet) were treated in the finishing process at a point after the paper has been unwound from the parent roll and embossed, but before the slitting, folding, cut off stacking and wrapping processes. The treating fluid, comprising the active ingredients dissolved in water, is applied at a rate to yield the addition of between 0.034 to 1.086 g/m² (0.02 to 0.64 pounds per ream) of lauroamphoglycinate or triquatary phospholipid (0.1 to 2.0% by weight of the web). For toilet tissue such as Scott COTTONELLE or 2-ply facial another example illustrating the present invention could be paper webs having basis weight of 27 g/m² (16 lbs. per ream) of 2,880 square feet were treated at location similar to that disclosed above. The treating fluid comprising the active ingredients dissolved in water is applied at a rate to yield an addition of between 0.017 to 0.543 g/m² (0.01 to 0.32 lbs./ream of the compound) (0.1 to 2% by weight of web).

Any application technique known in the art which does not unduly compact the web and which evenly distributes the fluid at the desired rate onto the paper web may be employed. These application techniques include spraying, transfer roll coating and gravure printing. If compaction caused by gravure printing is considered too great to the finished product, this step may be carried out prior to the step of bulking by embossing. The amount of compaction which can be suffered is influenced by numerous variables such as the original bulk of the web, consumer expectations regarding bulk and the perceived need for patterned printing which can be achieved by gravure roll methods. The present applicants have found that the benefits perceived by users are best achieved by spraying the treating fluid onto the web. In the examples which follow a method is employed which may be described as a doctored kiss roll method. In this process, the path of the paper web is directed over an application roll which rotates in the same direction as the travel of the paper. This roll, which has a smooth surface, for example polished chrome, rotates partially submerged in a bath of the fluid to be applied. As the roll rotates, it picks up a layer of liquid on its surface. The thickness of this layer is determined by the viscosity of the fluid. This layer is then metered to the desired thickness by doctoring the excess off of the roll. The paper, moving faster than the surface of the roll, then wipes the doctored layer of fluid from the roll.

The rate of application for a given paper speed and fluid is controlled by adjustment of the speed of rotation of the coating roll; the angle of wrap (contact with the roll) of the paper over the coating roll; and the type of and setting of the doctor. These adjustments are made as required to deliver the desired quantity of fluid to the web for a given speed and fluid.

EXAMPLE 1

A sheet was prepared as follows:

To paper web having a basis weight of 32.8 pounds per ream of 2880 square feet (55.6 grams per square meter) was applied in the above described manner a quantity of alcolac DV-1995 containing principally lauroamphoglycinate with phosphoric acid and a nonionic surfactant to yield a lotionized sheet containing 0.64% lauroamphoglycinate by weight of web.

This example illustrates the ability of people to discern differences and benefits from towels treated in accordance with this invention as compared to untreated towels and to appreciate that the functional properties of the treated towels remain unchanged. These products exhibit the ability to transfer chemicals from the cellulosic fibrous web to the skin generating emollient benefits while concomitantly successfully executing the primary function of the product which is to wipe or dry the skin.

The methodology employed involved choosing a panel of normal, healthy individuals and observing whether this panel (which consisted eleven members¹₃) would be able to perceive beneficial differences amongst treated towels and untreated Scott Brand 150 C-fold towels, the towels were presented to the panel with a code number so that the sample identifications were unknown to each panelist. The investigation was carried out privately by each panelist so that there was no interaction with other panelists. Each panelist was to wash their hands with luke warm tap water and a mild liquid soap and then their hands were dried with an untreated towel. The subjects knew specifically that these towels were normal untreated towels and that these towels were utilized as a reference standard. The subjects were then asked to rewash their hands using an identical procedure and this time they were asked to dry their hands with a coded unknown towel. Included amongst the coded samples was a placebo sample containing untreated towel. After the eleven panelists had completed their evaluation, the scores were totaled and are herein shown in the Table 1. Each sample was rated on a scale of zero to ten so that the maximum score would have been 110. The panelists were asked to rate the treated and untreated sample with regard to skin benefit.

Besides a subjective functional evaluation of treated verses untreated towel (especially with regard to the key towel properties of strength and absorbency) an objective laboratory test evaluation of the sample was undertaken. These results show that the treated towel remained essentially unchanged in physical properties when compared to the untreated control.

Table 1

Evaluation of Treated Towels	
Sample Designation	Rating
Untreated towel used as placebo	22
Lauroamphoglycinate	46

This sample clearly shows that the unknown placebo sample is rated significantly lower than either of the treated variants when considered with respect to skin comfort and functionality.

EXAMPLE 2

Two sheets were prepared as follows:

(a) to a paper web having a basis weight of 32.8 pounds per ream of 2880 square feet (55.6 grams per square meter) was applied in the above described manner a quantity of Monaterge B-328 which comprises a triquaternary phospholipid complex derived from lauric acid to yield a lotionized sheet containing 0.81% of said complex by weight of web. The sheets were then converted to C-fold towels.

(B) To a paper web having a basis weight of 32.8 pounds per ream of 2880 square feet (55.6 dgrams per square meter) was applied in the above described manner a quantity of Monaterge B-321 which comprises a triquaternary phospholipid complex derived from lauric acid to yield a lotionized sheet containing 0.40% of said complex by weight of web. The sheets were then converted to C-fold towels.

This example illustrates the ability of people to discern differences and benefits from towels treated in accordance with this invention as compared to untreated towels and to appreciate that the functional properties of the treated towels remain unchanged. These products exhibit the ability to transfer chemicals from the cellulosic fibrous web to the skin generating emollient benefits while concomitantly successfully

executing the primary function of the product which is to wipe or dry the skin.

The methodology employed involved choosing a panel of normal healthy individuals and observing whether this panel (which consisted of eleven members) would be able to perceive beneficial differences amongst treated towels and untreated Scott Brand 150 C-fold towels. The towels were presented to the panel with a code number so that the sample identifications were unknown to each panelist. The investigation was carried out privately by each panelist so that there was no interaction with other panelists. Each panelist was to wash their hands with luke warm tap water and a mild liquid soap and then their hands were dried with an untreated towel. The subjects knew specifically that these towels were normal untreated towels and that these towels were utilized as a reference standard. The subjects were then asked to rewash their hands using an identical procedure and this time they were asked to dry their hands with a coded unknown towel. Included amongst the coded samples was a placebo sample containing untreated towel. After the eleven panelists had completed their evaluation, the scores were totaled and are herein shown in the Table 1. Each sample was rated on a scale of zero to ten so that the maximum score would have been 110. The panelists were asked to rate the treated and untreated sample with regard to skin benefit.

Besides a subjective functional evaluation of treated verses untreated towel (especially with regard to the key towel properties of strength and absorbency) an objective laboratory test evaluation of the sample was undertaken. These results show that the treated towel remained essentially unchanged in physical properties when compared to the untreated control.

Table 1

Evaluation of Treated Towels	
Sample Designation	Rating
Untreated towel used as placebo	22
Monaterge B-328	32
Monaterge B-321	44

This sample clearly shows that the unknown placebo sample is rated significantly lower than either of the treated variants when considered with respect to skin comfort and functionality.

In the following examples 3 and 4 the application technique is changed to one where the treating fluid is sprayed onto the web. Otherwise the general considerations in application referred to in the passage immediately prior examples 1 and 2 applies to the following examples also.

EXAMPLE 3.

Three sheets were prepared as follows:

EXAMPLE 3a.

A paper web having a basis weight of 33.5 pounds per ream of 2880 square feet (56.8 grams per square meter) was sprayed on one side of the sheet with Merquat 100 containing 4% by weight of the high molecular weight polymers of the present invention in solution to yield a lotionized sheet containing 0.2% of said polymers by weight of web.

EXAMPLE 3b.

A paper web having a basis weight of 32.1 pounds per ream of 2880 square feet (54.5 grams per square meter) was sprayed on one side of the sheet with Merquat 100 containing 2.4% by weight of the high molecular weight polymers of the present invention in solution to yield a lotionized sheet containing 0.17% of said polymers by weight of web.

COMPARATIVE EXAMPLE.

A paper web having a basis weight of 33.1 pounds per ream of 2880 square feet (56.2 grams per square meter) was sprayed on one side of the sheet with Alcohol lanolin (RRT-1-200A) containing 5% lanolin in solution to yield a lotionized sheet containing 0.27% lanolin by weight of web.

Towels fabricated from sheets made in accordance with the proceeding Examples 3a and 3b and the Comparative Example and a control towel were tested by a panel of nurses to evaluate the condition of their hands after repeated drying of their hands. Sensory perceptions are, of course, subjective; however, the results it is believed, validly rank to towels in relation to on another. The testing procedure asked participants to compare the condition of their hands after four dryings with a control towel against four dryings with a test towel. The control towel consisted of untreated paper towels, commercially available as SCOTT Brand 150 C-fold towels. All test towels were kinder to participants' hands than the control towel, as evidenced by the percentage stating their hands felt the same or better after dryings. The length of time it took to dry hands with the control towel and the test towel was the same. On average, the drying time was sixteen seconds. The testing procedure comprised a wash and dry sequence as follows: one wash and dry with control towel, followed by one with test towel; four wash and dry sequences with control towel followed by four with test towel; and finally five with test towel. In the test of towels made in accordance with Example 3a at the end of the test, two-thirds of the participants said their hands felt better, one-third said they felt the same and none said their hands felt worse. In the test of a towel made in accordance with Example 3b 46% of the participants said their hands felt better, 38% said their hands felt the same and 15% said their hands felt worse. In the test of towels made in accordance with the Comparative Example (lanolin) at the end of the test, 27% of the participants said their hands felt better, 9% said they felt the same and 64% said their hands felt worse.

Two sheets were prepared as follows:

EXAMPLE 4

A paper web having a basis weight of 31.2 pounds per ream of 2880 square feet (52.9 grams per square meter) was sprayed on one side of the sheet with a Wickenol formulation containing 3.755 glucose glutamate in solution to yield a lotionized sheet containing 0.27% glucose glutamate by weight of the web.

(Comparative Example)

A paper web having a basis weight of 33.1 pounds per ream of 2880 square feet (56.2 grams per square meter) was sprayed on one side of the sheet with Alcolac lanolin (RRT-1-200A) containing 5% lanolin solution to yield a lotionized sheet containing 0.27% lanolin by weight of web.

Towels fabricated from sheets made in accordance with the preceding Example 4 and the Comparative Example and a control towel were tested by a panel of nurses to evaluate the condition of their hands after repeated drying of their hands. Sensory perceptions are, of course, subjective; however, the results, it is believed, validly rank the towels in relation to one another. The testing procedure asked participants to compare the condition of their hands after four dryings with a control towel against four dryings with a test towel. The control towel consisted of untreated paper towels, commercially available as SCOTT Brand 150 C-fold towels. All test towels were kinder to participants' hands than the control towel, as evidenced by the percentage stating their hands felt the same or better after the dryings. The length of time it took to dry hands with the control towel and the test towels was the same. On average, the drying time was sixteen seconds. The testing procedure comprised a wash and dry sequence as follows: one wash and dry with control towel, followed by one with test towel; four wash and dry sequences with control towel followed by four with test towel; and finally five with test towel. In the test of towels made in accordance with Example 4 (Wickenol), at the end of the test, 58% of the participants said their hands felt better, 17% said they felt the same and 25% said their hands felt worse. In the test of towels made in accordance with the Comparative Example (lanolin) at the end of the test, 27% of the participants said their hands felt better, 9% said they felt the same and 64% said their hands felt worse.

Claims

1. A web of cellulosic fibres characterised in that it comprises as a water-soluble emollient an agent selected from:

(A) Lauroamphoglycinate

(B) A high molecular weight cationic quaternary homopolymer or copolymer derived from dimethyl ammonium salt

(C) A tri-quaternary phospholipid complex derived from a fatty acid and

(D) Glucose glutamate

said agent being present in an amount from 0.1 to 2 percent by weight of the web.

2. A web as claimed in claim 1, characterised in that the agent (A) comprises phosphoric acid and a nonionic surfactant.

3. A web as claimed in claim 1 or 2, characterised in that in agent (C) the fatty acid is stearic acid or lauric acid.

4. Towels for drying skin made from the web claimed in any of claims 1 to 3.

5. Toilet tissue made from the web claimed in any of claims 1 to 3.

6. Facial tissue made from the web claimed in any of claims 1 to 3.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	US-A-3 288 770 (G.R. BUTLER) * Column 10, lines 70-75 * ---	1	D 21 H 21/14 A 47 K 10/16 //
A	FR-A-2 399 433 (CIBA-GEIGY AG) * The whole document * -----	1	D 21 H 17:14 D 21 H 17:45 D 21 H 17:10 D 21 H 17:65 D 21 H 17:74
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D 21 H A 47 K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 09-06-1989	Examiner SONGY O.M-L.A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			