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(54) Cleaning and scouring product.

(57) A cleaning and scouring product comprises a body member formed from a flexible material such as fibrous wadding impregnated with a moisture cured prepolymer of a synthetic resinous material, preferably polyurethane, and with a soap and/or detergent composition. Advantageously the soap and/or detergent composition is impregnated in a form containing water which effects curing of the resin prepolymer.

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Cleaning and Scouring Product

This invention relates to cleaning and scouring products and is especially, but not exclusively applicable to products for domestic use.

Soap impregnated wire wool products have been available for many years as domestic cleaning and scouring products to remove grease, dirt and the like from cooking utensils or for general domestic application. Such products while generally satisfactory suffer from a number of disadvantages and in particular the wire wool base can cause excessive scratching of articles being scoured and can also scratch the user, especially towards the end of its useful life. Such products also tend to rust when the impregnated soap is removed and are relatively expensive.

Various attempts have been made to produce substitutes for the wire wool type of cleaning and scouring pad but hitherto these have generally been commercially unsuccessful. Such proposals include impregnation of resinous materials into fibrous body members but this requires subsequent heating to effect curing of the resin and in many instances toxic fumes are given off so that production of products by such techniques becomes complex and expensive, and the time taken for the resinous material to cure renders such processes impractical for rapid mass production.

It is an object of the present invention to obviate or mitigate at least some of the disadvantages of previously proposed products of the kinds referred to above.

In its broader aspect the invention provides a cleaning and scouring product comprising a body member formed from flexible material impregnated with a moisture cured pre-polymer of a synthetic resinous material and with a soap and/or detergent composition.

The body member is preferably formed from fibrous material, examples being the thermoplastic polymeric materials such as polyolefins, polyethenes, polypropene, polyphenylethene, polychlorethene, polyesters, polyurethanes, polyamides and polyacrylates or combinations of these materials. Alternatively, the fibrous material can be of natural occurrence such as wool, hair, animal fur, cotton, linen, silk, hemp, hessian, jute, calico, rock wool or glass wool. Reconstituted natural fibres such as rayon can also be used. It has been found that polyamide and polyester fibres are most useful with polyester fibres based on terephthalic acid and diethylene glycol being most preferred.

The thickness and cross-sectional nature of the fibres may also be varied to alter the performance of the product. Fibres of 1.5 decitex upwards may be employed and preferably upwards of 15 decitex.

Where the body member is fibrous, the fibres are preferably in the form of a wadding. Preferably the wadding is produced from cross-laid fibres.

The moisture cured resinous material impregnated into the body member preferably comprises a urethane based resin. Suitable prepolymer polyurethanes subsequently curable by addition of moisture may be prepared by reacting an excess of an isocyanate with a high molecular weight hydroxyl polyester polyol or hydroxyl polyether polyol, the resulting prepolymer then being dissolved in an organic solvent for each of use.

The employment of a prepolymer resin which is moisture curable is a significant feature of the invention. Prepolymer resins suitable for use in the invention are stable intermediate products produced by a reaction in which toxic fumes are emitted and which require a further reactant to bring about final curing without the emission of fumes. The invention employs moisture curable prepolymers and in the preferred embodiments attains substantial acceleration of the curing cycle by utilising moisture present in the soap and/or detergent composition to initiate curing as described hereafter.

Impregnation is advantageously effected by dipping of the body member in the prepolymer solution but may alternatively be applied by spraying or by curtain coating. Where introduction is by spraying the material may also incorporate a methylene chloride or other solvent to effect dilution to spraying consistency. Preferably the resin is impregnated in an amount from 250-1000 gm/m^2 and preferably around 500 gm/m^2.

It has been found that the resin impregnation imparts a degree of abrasiveness to the body member by stiffening of the fibres and obviates the need to incorporate particulate abrasive particles. This is a significant and unexpected result since incorporation of abrasives complicates production and has attendant problems in ensuring adequate adherence of the abrasive and removal of released particles from surfaces which have been cleaned.

The hardness and resiliency of the coated fibre may be varied by the addition of isocyanates, polyols or cross-linking agents to the prepolymer solution before application to the fibrous wadding. For example it has been found that the hardness of the coated fibre wadding can be increased by the incorporation of 5-20% by weight of diphenyl methane di-isocyanate (MDI) to the prepolymer solution.

The moisture cured urethane prepolymer may be cured by the action of moisture in the atmosphere. Alternatively following impregnation the body member may be sprayed with water or water

vapour to accelerate curing and may then be dried after curing if necessary.

According to a preferred feature of the invention the soap and/or detergent composition is applied in a form containing water which effects or initiates curing of the prepolymer. The water content preferably ranges from 0.5-80% by weight. In tests good results have been achieved with water contents in the region of 50% by weight.

Thus according to a further aspect of the invention there is provided a method of producing a cleaning and scouring product comprising providing a body member of flexible material, and impregnating the body member with a moisture curable prepolymer of a synthetic resinous material and simultaneously or subsequently with a soap and/or detergent composition containing water whereby impregnation with the soap and/or detergent composition effects curing the resin prepolymer.

Advantageously the soap and/or detergent composition is heated, for example to a temperature in the range 40-70 °C whereby to apply both heat and moisture to the prepolymer thereby producing very rapid curing.

By use of a moisture curable prepolymer it is possible to impregnate the body member without the need for a post heating process and without giving rise to the production of toxic fumes thereby simplifying production and reducing health hazards.

Advantageously both the urethane prepolymer and the soap and/or detergent composition are coloured by incorporation of suitable contrasting pigments or dyes. In this way the colour of the product changes as the soap/detergent is leached out during use and the user can then readily determine when the useful life of the product is at an end.

If desired abrasive material may also be incorporated. Advantageously the abrasive is incorporated in and introduced with the prepolymer. Alternatively the abrasive material may be introduced after impregnation with the prepolymer but before the resin has cured. In a further alternative the abrasive may be incorporated in and introduced with the soap/ detergent composition.

The soap and/or detergent impregnated into the body member may be any suitable composition which will be only slowly leached out when in contact with hot water. The composition may be impregnated in hot melt form or as an aqueous solution. The detergent can be a pure substance but will normally be a mixture of detergents, each ingredient being present to perform individual cleaning functions. A mixture of soap and detergent can be used in certain instances. Application in hot melt form incorporating water is preferred as the water effects or initiates the final cure of the prepolymer.

In one embodiment of the invention, described by way of example only, cleaning and scouring products for domestic use in the cleaning of cooking vessels or similar utensils were produced from a sheet of cross-laid polyester fibre wadding of the type sold under the name Portex by British Vita of 28 decitex weight and 3 inches in thickness.

The sheet was impregnated with 500 grammes per square metre of a urethane adhesive prepolymer sold under the code name A84 by Apollo Chemicals of Tamworth, England which is moisture curable. Impregnation was effected by dipping the sheet in the prepolymer composition and squeezing to remove excess urethane.

The product was then impregnated in a similar fashion with a a liquid soap and/or detergent composition in hot melt form incorporating 50% by weight of water which accelerates curing in conjunction with moisture extracted from the atmosphere. The soap/ detergent composition is water soluble so as to be releasable when brought into contact with wash water during subsequent use.

The urethane prepolymer contained between 5 and 20% by weight of MDI in order to increase its hardness following curing and was coloured yellow by addition of a suitable pigment. The soap/detergent composition was coloured pink such that when both had been impregnated, the sheet was orange in colour. The impregnated sheet was then cut or stamped to form a plurality of individual pads of the required shape.

The product is used by rubbing it over the surface of articles to be cleaned in the presence of water which releases the soap/detergent composition and also results in abrasion due to the stiffness of the fibre structure produced by the cured urethane impregnant. As the product is used and soap/ detergent is leached out the product gradually changes in colour. In the case of the above example the colour changes from orange to yellow thereby giving the user an indication when the product has reached the end of its useful life. The product is then discarded and replaced by a fresh pad.

The arrangement described produces an extremely effective cleaning and scouring product which is easy to use and although suitably abrasive by virtue of the incorporation of the urethane impregnant, and additional abrasive if present, is not excessively abrasive or likely to damage the user's hands following leaching out of the soap or detergent composition. Substantial manufacturing benefits are also provided. By virtue of the use of a moisture curable prepolymer as referred to previously, subsequent heat curing and emission of toxic fumes is avoided. By the incorporation of water together with the soap/detergent composition

the curing process can be substantially accelerated thereby enabling the product to be rapidly mass produced in quantity. Reduction in cure times of around 50% have been achieved in this way.

Various modifications may be made without departing from the invention. For example resinous prepolymers other than urethane may be employed. Various alternative materials may be used to form the body of the product and a variety of different soap and/or detergent compositions and additional abrasives may be incorporated as desired. One alternative fibrous material is Portways Insulator Grade polyester fibre wadding of 7-17 decitex produced by British Vita . In some instances the cut edges of the individual pads may be welded down to produce a single joined edge during or after cutting or stamping.

In a further modification the prepolymer and the soap/detergent composition may be impregnated into the body member simultanteously. This produces certain advantages in that the detergent becomes encapsulated in the prepolymer and leaches out more slowly during subsequent use of the product. This extends the life of the product compared with the case where the soap/detergent composition is impregnated subsequent to the prepolymer. Certain detergent compositions are slightly reactive to urethane resins and produce an element of chemical bonding further enhancing this effect.

While the cleaning material incorporated may either be solely detergent or solely soap it is preferred that a combination of both is employed. The inclusion of a quantity of soap in the detergent composition produces two advantages. It affects the degree of tack of the resin and thereby assists subsequent handling of the product, impregnated sheets of which may be rolled and stored before cutting into individual pads. The soap also increases the degree of sudsing when the product is in use compared with products impregnated with detergent alone. A material may also be incorporated to impart a desired fragrance to the product.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been place thereon.

Claims

1. A cleaning and scouring product characterised by a body member formed from flexible material impregnated with a moisture cured prepolymer of a synthetic resinous material and with a soap and/or detergent composition.

2. A product according to claim 1 characterised in that said body is formed from fibrous wadding.

3. A product according to claim 2 characterised in that said wadding comprises cross-laid fibres.

4. A product according to claim 2 or 3 characterised in that said wadding is formed from polyamide or polyester fibres.

5. A product according to any of claims 2 to 4 characterised in that said fibres have a thickness in excess of 15 decitex.

6. A product according to any preceding claim characterised in that said prepolymer comprises a polyurethane prepolymer.

7. A product according to claim 6 characterised in that said prepolymer is the product of the reaction between an isocyanate and a high molecular weight hydroxyl polyester or polyethyl polyol dissolved in an organic solvent.

8. A product according to any preceding claim characterised in that said prepolymer is incorporated in an amount of 25-1000 gm/m^2.

9. A product according to any preceding claim characterised in that said prepolymer incorporates 5-20% by weight of diphenyl methane diisocyanate.

10. A product according to any preceding claim characterised in that curing of said prepolymer is effected or initiated by moisture introduced with said soap and/or detergent composition.

11. A product according to claim 10 characterised in that said soap and/or detergent composition incorporates from 0.5-80% water.

12. A product according to any preceding claim characterised in that it incorporates abrasive material.

13. A product according to any preceding claim characterised in that said prepolymer and said soap and/or detergent composition are differently coloured, whereby to produce a change in colour of the product as the soap and/or detergent composition is leached out during use.

14. A method of producing a cleaning and scouring product characterised by providing a body member of flexible material, and impregnating the body member with a moisture curable prepolymer of a synthetic resinous material and with a soap and/or detergent composition containing water whereby impregnation with the soap and/or detergent composition effects curing of the resin prepolymer.

15. A method according to claim 14 characterised in that said moisture curable prepolymer and said soap and/or detergent composition are impregnated into said body member simultaneously.

16. A method according to claim 14 or 15 characterised in that said soap/detergent composition is heated prior to impregnation.

17. A method according to any of claims 14 to 16 characterised in that said soap and/or detergent composition is incorporated in a hot melt form incorporating water.

18. A method according to any of claims 14 to 17 characterised in that said soap and/or detergent composition comprises a mixture of soap and detergent.

19. A method according to any of claims 14 to 18 characterised in that said body member is a fibrous wadding formed from cross-laid polyamide or polyester fibres.

20. A method according to claim 19 characterised in that said fibres have a thickness in excess of 15 decitex.

21. A method according to any of claims 14 to 20 characterised in that said prepolymer is a polyurethane prepolymer.

22. A method according to any of claims 14 to 21 characterised in that said prepolymer is incorporated in an amount of 250-1000 gm/m^2.

23. A cleaning and scouring product produced by the method according to any of claims 14 to 22.

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EUROPEAN SEARCH REPORT

Application Number

EP 88 30 4657

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	FR-A-2 137 027 (BRENNAN DEVELOPMENTS LTD.) * page 1, lines 3-20; page 2, lines 17,18,25; claims *	1-4,10-12	C 11 D 17/04 A 47 L 17/08
A	US-A-3 175 331 (J.J. KLEIN) * whole document *	1-4,12	
A	US-A-3 112 584 (J.A. CAMERON) * column 3, lines 37-43; column 4, lines 18-22,54-61 *	1	
A	US-A-3 148 404 (C.N. JENSEN) * column 1, lines 42-47; column 2, lines 40-44,60-63 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

C 11 D 7/04
A 47 L 17/08

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	28-07-1988	PELLI B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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