(19) DANMARK

(10) DK/EP 3082430 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *A 01 N 59/16 (2006.01)* *A 01 N 25/34 (2006.01)* *B 05 D 5/00 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2018-05-07**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2018-02-14**

(86) Europæisk ansøgning nr.: **14821626.0**

(86) Europæisk indleveringsdag: **2014-12-19**

(87) Den europæiske ansøgnings publiceringsdag: **2016-10-26**

(86) International ansøgning nr.: **EP2014078830**

(87) Internationalt publikationsnr.: **WO2015091998**

(30) Prioritet: **2013-12-19 DE 102013114573**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **Fritz Egger GmbH & Co. OG, Weiberndorf 20, 6380 St. Johann in Tirol, Østrig**

(72) Opfinder: **GUGGENBICHLER, Josef-Peter, Leitweg 23a, A-6345 Kössen, Østrig**
SCHIEGL, Walter, Apfeldorf 20, A-6380 St. Johann / Tirol, Østrig

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

(54) Benævnelse: **Fremgangsmåde til fremstilling af en antimikrobielt virksom møbel- og/eller saneringskomponent**

(56) Fremdragne publikationer:
EP-A2- 2 428 118
WO-A1-2013/153124
WO-A2-2007/079210
WO-A2-2008/131985
WO-A2-2008/136866

Description

The invention relates to a method for producing an antimicrobial furniture part and/or interior fitting part. The invention further relates to an antimicrobial furniture part and/or interior fitting part and the use of such a furniture part and/or interior fitting part for producing a piece of furniture and/or an interior fitting.

An antimicrobial furniture part and/or interior fitting part is known, for example, from EP 2 146 571 B1 and comprises a substrate which is impregnated with a resin composition which contains a biocide composition. The biocide composition consists of an organic biocide compound which can be selected, for example, from the isothiazolione group, and a nanoscale metal oxide such as ZnO, MgO or Al_2O_3 for example. The furniture part and/or interior fitting part can, for example, be used for producing laminates for work surfaces for kitchens, floor covering, doors, wet rooms and similar.

The document EP 2 428 118 A2 discloses the use of molybdenum and tungsten compounds which react with water to produce molybdic or tungstic acid and thus can reduce the pH value.

The document WO 2013/153124 A1 deals with antimicrobial composite materials and suggests the use of molybdenum compounds and hydrophilic agents to improve the antimicrobial efficacity.

The document WO 2007/079210 A2 deals with the protection of wood and other materials containing cellulose by combatting insects, in particular termites and shipworms. In this case, soluble complexes of molybdenum or tungsten with ammonia or ethanolamine are applied for pest control.

The document WO 2008/136866 A2 deals with the vapour deposition of various metal compounds on surfaces through arc evaporation, in order to obtain an antimicrobial effect. For this purpose MoO_3, WO_2, WO_3, MoS_x and molybdenum carbosilicide and tungsten, among others, are listed as possible reactants.

The document CN 101 891 252 A discloses a specific manufacturing method for zinc molybdate.

The document CN 101 268 784 A discloses the production of Ag_2MoO_4 and uses this compound for producing ceramic materials.

The document CN 101 268 784 A discloses the common precipitation of Ag_2MoO_4, $ZnMoO_4$ and $CuMoO_4$ and uses this mixture for manufacturing sanitary ceramics at sintering temperatures of 1260°C.

However, a disadvantage of the know furniture and/or interior fitting part is the circumstances in which the used organic biocide is leached and degraded over time, where on the one hand, the antimicrobial effect subsides, and on the other, increased environmental pollution occurs. Furthermore, with organic biocides, the fundamental risk of resistance developments and allergisations exists. In addition, the used inorganic compounds had only a comparably low antimicrobial effect, which is also heavily reliant on the presence of light, as the listed combinations must be photoactivated.

The object of the present invention is to specify a method for producing an antimicrobial furniture and/or interior fitting part which has a longer lasting and broader antimicrobial effect which is not reliant on the presence of light. Further objects of the invention include specifying a corresponding antimicrobial furniture and/or interior fitting part and a use of such a furniture and/or interior fitting part.

The objects are achieved according to the invention through a method with features of claim 1, an antimicrobial furniture and/or interior fitting part with the features of claim 22 and through the use of such a furniture and/or interior fitting part according to claim 25. Advantageous embodiments with expedient further developments of the invention are specified in the subclaims, wherein advantageous embodiments of the method are to be considered as advantageous embodiments of the furniture and/or interior fitting part and of the use. Conversely, advantageous embodiments of the furniture and/or interior fitting part and the use of this furniture and/or interior fitting part are provided as advantageous embodiments of the method.

A first aspect of the invention relates to a method for producing an antimicrobial furniture and/or interior fitting part for a piece of furniture and/or interior fitting. A longer lasting and broader antimicrobial effect which is also not reliant on the presence

of light is achieved by arranging at least one molybdenum-containing inorganic compound at least in the region of a surface of the furniture and/or interior fitting part. To produce the furniture and/or interior fitting part, a cellulose-containing substrate is provided, impregnated and/or pre-impregnated and/or coated with a resin and/or resin-like substance and the at least one molybdenum-containing inorganic compound is arranged at least in the region of the surface of the substrate. At least one molybdate with the molecular formula $M^{n+}{}_zMoO_4$ is used as the molybdenum-containing inorganic compound, in which n*z=+2 and M is selected from a group comprising Mg, Ca, Ag, Cu, Bi, V, Ti and Zn, wherein the mass content of the at least one molybdenum-containing compound in relation to the solid resin content of the resin is between 0.10% and 10%. In other words, according to the invention it is provided that a substrate is provided with an antimicrobial effect by means of the at least one molybdenum compound which contains cellulose and is preferably made of at least predominantly, i.e. at least 51%, in particular at least 75% and preferably of at least 90% cellulose, wherein within the scope of the present invention, unless otherwise stated, the percentage amounts are to be understood as weight percentages. Thus, a furniture and/or interior fitting part with a particularly good antimicrobial effect that can be used for furniture and/or interior fittings is obtained which can be formed as a semi-finished or finished part. In addition, the cellulose substrates can have a moisture retaining and regulating effect. The cellulose part of the substrate which can also be described as a carrier substance or carrier material can generally be composed of fresh fibre or recycled fibre.

Within the scope of the present invention, resins and resin-like substances are generally understood as being polymers, prepolymers and raw materials for organic plastics. Resins and resin-like substances are usually soluble in common organic solvents, but are difficult to dissolve or are insoluble in water. The resins and resin-like substances can fundamentally comprise naturally occurring and/or synthetic compounds. In this way, the furniture and/or interior fitting part is particularly easily produced as a laminate, impregnated and/or resin-coated substrate, whereby it is particularly well suited for furniture and interior fittings. The coating of the substrate can occur independently of the concrete arrangement and later intended purpose of the furniture and/or interior fitting part as fundamentally one-sided or two or more-sided.

Through the use of one or a plurality of the listed molybdenum-containing inorganic compounds, surprisingly, apart from a good antimicrobial effect, a particularly high light stability, in particular in relation to UV light, is achieved. Thus, the emergence of undesired discolouring on the surface of the furniture and/or interior fitting part or piece of furniture or interior fitting produced therefrom according to the invention is avoided. In addition, such molybdate have a particularly low water solubility and are at least substantially colourless or white. Because of this, the furniture and/or interior fitting part produced according to the invention is particularly well suited for furniture and interior fittings, for example in hospitals, care homes and similar, as no additional dyes or colourings are required to provide a neutral, white surface. Conversely, due to the natural white colour of the surface, it can be easily dyed with the addition of suitable dyes or colourings. Furthermore, the solubility, colour and antimicrobial effect of the furniture and/or interior fitting part can be optimally adapted to the respective purpose. By means of the listed compounds, individually or in any combination, the adhesion of microorganisms to the surface of the furniture and/or interior fitting part can additionally be impeded. This particularly effectively prevents colonisation of the surface of the furniture and/or interior fitting part.

While the mass content of the at least on molybdenum-containing compound in relation to the solid resin content of the resin amounts to between 0.10% and 10%, the respective substance use of the molybdenum-containing compound(s) can be optimally adapted to the concrete execution of the method and the later use or required antimicrobial effect of the furniture and/or interior fitting part produced according to the invention.

It has surprisingly been shown that molybdenum-containing inorganic compounds show a high antimicrobial effect independent of the presence of light and even in very low amounts if they are arranged in the region of a surface of a furniture and/or interior fitting part.

Apart from a reduced adherence of germs, a reduction in the strength of the adherence, an inhibition of proliferation, an inhibition of biofilm formation and an antimicrobial effect on biofilm that has already successfully formed are also achieved. This is of particular importance for furniture and interior fittings in hospitals, care homes, etc., for

example, as microorganisms in biofilm are not or at least not permanently removable using antibiotics, organic biocides, disinfectant agents and similar. As these molybdenum compounds are generally at least in normal environmental conditions practically insoluble in water, a leaching or degradation of the inorganic molybdenum compounds remains so that the antimicrobial efficiency, in contrast to in the prior art, is maintained over the entire service life of the furniture and/or interior fitting part. On the other hand, over time active biocides are removed from furniture and/or interior fitting parts or from their surfaces and incorporated in the bacteria metabolism. Thus, with active biocides there exists a high tendency towards development of resistances and cross-resistances. On the other hand, the antimicrobial surface of a piece of furniture and/or interior fitting, which is produced by means of the produced furniture and/or interior fitting part, works as a passive bioproduct, whereby apart from a long-term efficiency also ensures a lack of resistance development or resistance induction. As is further known, molybdenum-containing compounds are not toxic to people or animals and therefore have an excellent biocompatibility. Thus, the method according to the invention can, in contrast to the prior art, fundamentally be implemented without the use of additional antimicrobial compounds such as, for example, silver, in particular nanosilver or silver compounds, in particular soluble silver compounds such as silver nitrate and similar, copper, titanium oxide, organic biocides, zeolites, photocatalysts or similar, whereby apart from an improved environmental compatibility of the produced furniture and/or interior fitting part according to the invention, considerable cost savings are also made. Fundamentally, it can be provided that the at least one molybdenum-containing compound is arranged at least substantially exclusively in the region of the surface of the furniture and/or interior fitting part, as this is where the antimicrobial effect is to be achieved. The molybdenum-containing compound can, for example, be applied to a substrate or carrier material of the furniture and/or interior fitting part as a layer or integral part of a layer. Fundamentally, only one or a plurality of regions of the surface or the whole surface of the furniture and/or interior fitting part can be provided with an antimicrobial effect. Alternatively or additionally, the at least one molybdenum-containing compound is also arranged within the furniture and/or interior fitting part or be distributed across the furniture and/or interior fitting part. In

this way, the antimicrobial effect can also be maintained over time even if there is surface wear to the furniture and/or interior fitting part, for example if this is used as a table covering, floor covering or similar. Within the scope of the present invention, the furniture and/or interior fitting part can fundamentally be formed as a finished component which can be used as furniture and/or an interior fitting without further processing steps. Non-exhaustive examples for such a finished piece of furniture and/or interior fitting are furniture precast, flooring panels, front elements, windowsills or similar furnished with the at least one molybdenum-containing compound which can be used as furniture and/or interior fittings in inside spaces of buildings without further processing steps. Alternatively, the furniture and/or interior fitting part can within the scope of the present invention be formed as a type of semi-finished product, which must first undergo further processing steps to be used as a piece of furniture and/or an interior fitting. Non-limited examples of semi-finished furniture and/or interior fitting parts are impregnates, overlay paper, decorative paper, edges, strip material or similar furnished with the at least one molybdenum-containing compound which must first undergo corresponding further processing, for example after being placed on a carrier for the production of furniture or so that it can used as an interior fitting in buildings or provide furniture and/or interior fitting parts with an antimicrobial effect.

Fundamentally, the furniture and/or interior fitting part produced according to the invention represents a type of material compound in which in addition to the at least one molybdenum-containing compound at least one other material is present which holds the molybdenum-containing compound in the region of its surface, or into which said other material the molybdenum-containing compound(s) is/are applied. Depending on the concrete design of the furniture and/or interior fitting part this can for example be formed as a laminate composite and/or particle composite, wherein fundamentally alternative designs could be provided.

In an advantageous design of the invention it is provided that at least one molybdenum-containing inorganic compound is used which is doped or undoped and anhydrous or monohydrous. In the scope of the present invention, doped is meant as the introduction of foreign atoms in the molybdenum-containing compound, whereby an optimal adaptability of the antimicrobial effect is possible for different purposes and

requirement profiles. The amount of foreign atoms is fundamentally between approximately 0.1 and 1,000 ppm, preferably between 100 ppm and 600 ppm, in particular between 300 and 550 ppm. Alternatively or additionally, anhydrous molybdenum compounds, as well as hydrates, i.e. according to the compound of monohydrate, dihydrate, trihydrate, etc. of the inorganic molybdenum compounds, can also be used individually or in any combination. The at least one inorganic molybdenum compound can also be provided in any crystal configuration or crystal lattice structure as a solid solution or amorphously.

In a further advantageous design of the invention it is provided that a further molybdenum-containing inorganic compound is selected from a group which comprises MoO_2, MoO_{3-2}, in particular $MoO_{2.35}$ to $MoO_{2.97}$, MoO_3, molybdenum oxide hydrate, molybdenum hydroxide, molybdenum oxide hydroxide, molybdenum sesquioxide, molybdenum carbide, molybdenum nitride, molybdenum silicide, molybdenum sulphide, cyanomolybdate, molybdenum hexacarbonyl, molybdenum acetylacetonate, polyoxomolybdate. By means of these compounds, individually or in any combination, in particularly simple and cost-effective ways a surface pH value that is as low as possible and thus a particularly good antimicrobial effect is achieved as all listed compounds at least in contact with water convert to molybdenum acid and/or high acid oligo molybdate. In addition, at least some of the listed compounds also have a comparably high oxidation potential, magnetic properties and/or electric conductivity, whereby additional antimicrobial effects can be achieved.

In a further advantageous design of the invention it is provided that ammonium dimolybdate and/or ammonium heptamolybdate and/or at least one compound with the molecular formula $M^{n+}{}_zMoO_4$ is used as further molybdate compounds, where $n*z=+2$ and M is selected from a group comprising Na and K. Through the use of one or more listed compounds, surprisingly apart from a good antimicrobial effect, a particularly high light stability, in particular in relation to UV light is achieved. Thus, the occurrence of unwanted discolouration on the surface of the furniture and/or interior fitting part produced according to the invention or a piece of furniture and/or interior

fitting produced therefrom is reliably avoided. In addition, such molybdates are at least substantially colourless or white. Thus, the furniture and/or interior fitting part is particularly well suited for furniture and interior fittings in hospitals, care home and similar as no additional dyes or colourings are required to provide a neutral, white surface. Conversely, due to the natural white colour of the surface, it can be easily dyed with the addition of suitable dyes or colourings. In the listed compound classes molybdenum can fundamentally be partially or completely replaced by tungsten. Furthermore, the solubility, the colour and the antimicrobial effect of the furniture and/or interior fitting part can be optimally adapted to the respective use. Using the listed compound individually or in any combination, the adhesion of microorganisms to the surface of the furniture and/or interior fitting part can also be impeded. This particularly effectively prevents colonisation of the surface of the furniture and/or interior fitting part.

In a further advantageous design of the invention it is provided that that a molybdenum-containing or tungsten-containing inorganic mixed compound is used as a further molybdenum-containing inorganic compound and/or that in addition to the molybdenum-containing inorganic compound at least one tungsten-containing compound is used. In other words, according to the invention it is provided that in addition to the at least one molybdenum-containing compound a tungsten-containing compound is also used for producing the furniture and/or interior fitting part and is arranged in the region of the surface. Thus, an advantageous increase to the antimicrobial effect can also be achieved. The at least one additional tungsten compound can for example be selected from a group comprising ammonium metatungstate ($(NH_4)_6[\alpha\text{-}H_2W_{12}O_40] * 3H_2O$, AMT), tungsten acid, tungsten oxihydrate, tungsten oxide, tungsten suboxide, in particular $WO_{2.35}$ to $WO_{2.95}$, and polyoxotungstate. Alternatively or additionally, it is provided that a molybdenum-containing and tungsten-containing inorganic mixed compound is used. Due to the similar atomic radii of molybdenum and tungsten, the two elements can often be partially exchanged with one another. Such molybdenum-tungsten mixed compounds generally have a significantly lower water solubility that the respective pure molybdenum or tungsten compounds, without the antimicrobial effect being reduced. In this way, leaching of the antimicrobial material is

particularly effectively prevented so that the furniture and/or interior fitting part produced according to the invention is particularly well suited for the production of furniture and/or interior fittings which need to be cleaned often or come into frequent contact with water.

In a further advantageous design of the invention it is provided that the molybdenum-containing and tungsten-containing mixed compound is doped with a fluorine compound, in particular with an oxyfluoride, WOF_4, WO_2F_2, calcium fluoride and/or fluorapatite. In this way the antimicrobial effect can also be advantageously improved and optimally adapted to the respective use of the furniture and/or interior fitting part. Doping with a fluorine compound provides the addition advantage that the adhesion of microorganisms to the surface of mixed oxide is additionally impeded. This thus prevents the colonisation of surfaces furnished with mixed oxides and thus additionally improves the antimicrobial effect. Preferably fluorine compounds with as low water solubility as possible are thus used in order to prevent or at least slow down leaching. Non-exhaustive examples of suitable compounds are calcium fluoride (CaF_2) and fluorapatite ($Ca_5[F|(PO_4)_3]$). The use of WOF_4, WO_2F_4 and/or corresponding molybdenum oxyfluorides provide the additional advantage at the same time this contributes to the production of mixed oxide and its doping with fluoride ions or fluoride compounds.

Alternatively or additionally it is provided that a mixed oxide with the molecular formula $Mo_xW_{1-x}A_yO_z$ where $0<x<1$, $0\leq y\leq 2$ and $2.0\leq z\leq 3.0$ and A indicates a different metal ion of Mo and W and/or NH_4^+ is used as a molybdenum-containing and wolfram-containing inorganic mixed compound. The production of such a mixed oxide is as already mentioned possible due to the similar atomic radii of molybdenum and tungsten. The inventors have established that the antimicrobial effect of such mixed oxides is more marked than a pure additive effect of mixtures of molybdenum oxides and tungsten oxides would be. In addition, the mixed oxides have a significantly lower water solubility than the corresponding molybdenum and tungsten oxides, whereby their antimicrobial effect is also maintained for a long time in humid environments and in use under water. In a simple design ($y=0$), the mixed oxide can only contain Mo, W, O and if necessary gaps in the crystal lattice and be undoped. Alternatively, the mixed

oxide can be doped. As already mentioned, apart from Mo, W and O, the mixed oxide can also contain one or a plurality of metal ions different to Mo and W and/or ammonium ions within the limits defined by y. Furthermore, it can be provided that a plurality of different mixed oxides or a heterogenous mixed oxide can be used with varying components within the provided molecular formula.

Further advantages are achieved if A is selected from a group comprising Na, K, Mg, Ca, Ag, Cu, Bi, V, Ti and Zn. Thus, the solubility, colour and antimicrobial effect of the furniture and/or interior fitting part can be optimally adapted to the respective purpose. By means of the listed compounds, individually or any combination, the adhesion of microorganisms to the surface of the furniture and/or interior fitting part can additionally be impeded. This particularly effectively prevents colonisation of the surface of the furniture and/or interior fitting part.

In a further advantageous design of the invention it is provided that the at least one molybdenum-containing inorganic compound is used in the form of particles with an average particle size between 0.1 µm and 200 µm. Preferably average particle diameters are between 0.1 µm and 5 µm. Thus, a particularly high antimicrobial effect is ensured with the lowest possible material use on molybdenum-containing compounds. Additionally, the implementation of the method can be optimally adapted to the later use of the furniture and/or interior fitting part. The use of particles with the listed average particle sizes provide the particular advantage that on the one hand a particularly high antimicrobial effect can be realised and the furniture and/or interior fitting part produced according to the invention can, on the other hand, be produced without nanoparticles.

Further advantages are achieved in that in addition to the at least one molybdenum-containing inorganic compound at least one hydrophilising and/or hygroscopicising agent is arranged at least in the region of the surface of the furniture and/or interior fitting part. Thus, the antimicrobial effect of the furniture and/or interior fitting part produced according to the invention is advantageously increased in particularly dry spaces, i.e. with very low air humidity and correspondingly low available amounts of water which are important for the forming of an acidic surface barrier. The hydrophilising and/or hygroscopicising agent can fundamentally be processed together

with or separately from the at least one molybdenum-containing compound. Furthermore, it can be provided that the at least one molybdenum-containing compound is coated with the hydrophilising and/or hygroscopicising agent and/or is used as an agglomerate. Thus, a physical proximity of the two compound classes is ensured in a simple way so that the molybdenum compound is also provided in particularly dry conditions directly with moisture, which is necessaryto lower the pH value. Examples of suitable hydrophilising and/or hygroscopicising agents are organic acids such as abietic acid, arachidonic acid, arachidic acid, behenic acid, capric acid, caproic acid, cerotic acid, erucic acid, fusaric acid, fumaric acid, bile acid, icosenoic acid, isophthalic acid, lactone acid, lauric acid, lignoceric acid, linolenic acid, levopimaric acid, linoleic acid, margaric acid, melissic acid, montanic acid, myristic acid, neoabietic acid, nervonic acid, nonadecylic acid, oleic acid, palmitic acid, palmitoleic acid, pelargonic acid (nonanoic acid), pimaric acid, palustric acid, palmitic acid, ricinoleic acid, stearic acid, sorbic acid, tannic acid, tridecanoic acid, undecanoic acid and vulpinic acid. Furthermore, malonic acid, maleic acid, maleic anhydride, lactic acid, acetic acid, citric acid, salicylic acid and ascorbic acid (vitamin C) and the salts of these have shown to be advantageous. Acid anhydrides, ampholytic substances, buffer systems, polymer acids, ion exchange resins, as well as acid sulfonates and acid halides can also be provided. The use of acids as hydrophilising and/or hygroscopicising agents provides the additional advantage that the conversion of the at least one molybdenum compound to molybdenum acid is carried out. It should, however, be noted that fundamentally all other hydrophilising and/or hygroscopicising agent could be used. For example, silica gel, fumed silica and zeolite individually or in any combination are also suited as hydrophilising and/or hygroscopicising agents as these form a type of moisture buffer. Preferably, micronized silica gel with a particle size distribution in the region of between 0.1 µm and 25 µm average particle diameter is used. Thus, a minimum moisture in products can be varied and set over a wide range. Further suitable hydrophilising and/or hygroscopicising agents include compounds under the trade names Cordamide ER/BR (fatty acid amide), Hostastat (ethoxylated alkylamine), Crodafos MCA-SO (solid cetyl phosphate ester), Lubrophos LM-400E (ethoxylated nonylphenol phosphate), Pluronic PE 8100 (non-ionic surfactant, block copolymer, in which the central

polypropylene glycol group is flanked by two polyethylene glycol groups), Surfynol 440 (ethoxylated wetting agent), Orevac PP CA100 (chemically functionalised polypropylene with high grafted maleic anhydride content), Crodamol OHS (propylene glycol polyethylene glycol-3-isocetyl ether acetate), Pluronic PE 8100 (non-ionised surfactant), Flerol KFC (polyglycol ether), BYK P4100 (copolymer with acid groups, which is free from silicons and waxes), Disperplast 1150 (polar acid ester from long-chain alcohols), Disperplast 1018 (copolymer with pigment affinic groups), Atmer 129MB (vegetable glycerine) and Palsgaard DMG0093 (emulsifier based on distilled monoglycerides from vegetable fatty acids) which can be used individually or in any combination.

In a further advantageous design of the invention it is provided that the cellulose-containing substrate is selected from a group comprising paper, in particular decorative pater and overlay paper, card, in particular core card, paperboard, semi-chemical pulp and mechanical pulp, in particular chipboard and fibreboard. The use of a decorative paper and/or an overlay paper as a substrate provides the particular benefit that apart from the surface of the furniture and/or interior fitting part being provided with an antimicrobial effect, the visual appearance can also be optimally adapted. In addition, by using furniture and/or interior fitting parts formed as decorative paper and/or overlay paper different carrier materials and already available furniture, interior fitting elements and similar can be provided with extensive antimicrobial protection, in that the decorative paper and/or overlay paper is applied to the relevant surface of the antimicrobial carrier material for example by laminating, adhesively bonding, and/or pressing on. Correspondingly, furniture and/or interior fitting parts produced according to the invention in particular with cellulose-containing substrates made of paper or paper-based are generally rather seen as semi-finished parts, while furniture and/or interior fitting parts with cellulose-containing substrates made of wood composite can generally rather be seen as finished products which correspondingly can be used as furniture and/or interior fittings without further processing steps.

A particularly quick and flexible production of the antimicrobial furniture and/or interior fitting part is achieved in further designs of the invention in that the substrate is at least regionally lacquered with lacquer, wherein the lacquer contains the at least one molybdenum-containing inorganic compound and/or wherein the at least one

molybdenum-containing inorganic compound is incorporated in the lacquer coat and/or applied on the lacquer coat. By means of such a lacquer almost any substrate and carrier material can also be provided with antimicrobial protection. Furthermore, already available furniture and/or interior fitting parts can later quickly and cost-effectively be provided with antimicrobial protection. Worn furniture and/or interior fittings can also be provided with antimicrobial properties again using a simple lacquer. The respectively used lacquer can also optimally be adapted to the desired use of the furniture and interior fitting part. For example, a lacquer can be used which as well as being a binding agent additionally contains fillers, pigments, solvents, resins and/or other additives, in order to, as well as providing an antimicrobial effect, also achieve a protective and/or decorative effect and/or to provide the furniture and interior fitting part with particular addition surface properties.

Further advantages are achieved in that the substrate is cleaned and/or cut and/or primed before lacquering. Thus, a reliable adhesion of the lacquer to the substrate is guaranteed. Alternatively or additionally, it is provided that the lacquer is applied to the substrate using a gravure printing and/or digital printing method. The use of a gravure printing methods allows for particularly economical production of the furniture and/or interior fitting part, while the use of a digital printing method in particular allows a great degree of design freedom as no static printing plate is required.

A particularly high mechanical capacity and surface finish quality are achieved in further designs of the invention in that a UV-curable lacquer and/or an acrylic lacquer and/or a silicon-containing lacquer and/or a lacquer containing at least one thermoplastic elastomer, and/or a reactive lacquer, is used. When using a UV-curable lacquer, the use of light-stable and UV-stable molybdenum-containing compounds has proved to be advantageous in preventing discolouring. In contract, light-unstable and UV-unstable molybdenum-containing compounds can also be used and converted at the same time as the lacquer cures. Due to their low content of inorganic groups, silicon-based lacquers have the advantage of a very low change to their film volume during curing. Thus, very dense coats with high film strength can be achieved, in which the at least one molybdenum-containing compound is received or provided. In addition, silicon lacquers have a high thermal resistance and are therefore suited to coatings of furniture and/or

interior fitting parts which are intended to be used in the proximity of kitchens, oven or other heat sources. The use of thermoplastic elastomers allows the production of surfaces with rubber-elastic properties in which the at least one molybdenum-containing compound is received or provided. The thermoplastic elastomer(s) can for example belong to classes TPO, TPV, TPU, TPC, TPS or TPA or any mixture of them, wherein in particular urethane-based thermoplastic elastomers (TPUs) have been shown to be advantageous. The use of a reactive lacquer allows the production of particularly mechanically resistant surfaces, wherein the reactive lacquer cures by chemical reaction already at room temperature. The reactive lacquer can fundamentally be available or used as a single- or multicomponent lacquer.

In a further advantageous design of the invention it is provided that the mass content of the at least one molybdenum-containing compounds in relation to the solid resin content of the lacquer is between 0.15% and 5% and preferably between 0.2% and 3%, for example 1.5%, 2% or 2.5%. In other words, according to the invention it is provided that the substrate is coated with a lacquer which in relation to its solid resin or solid material content, i.e. undependently on the type and volume of a possible solvent or dispersing agent, contains between 0.15% and 5% of the at least one molybdenum-containing compound. If within the scope of the method according to the invention a plurality of molybdenum-containing compounds are used, the amount of all used molybdenum-containing compounds in relation to the solid resin content is preferably between 0.1% and 10%, wherein in this case higher amounts can also be provided. The same applies in the case that the molybdenum part in the used inorganic compound(s) is exchanged for tungsten or tungsten is added to it.

Further advantages are achieved in that a mass content of the hydrophilising and/or hygroscopicising agent in relation to the solid resin content of the lacquer is between 0.1% and 15%. For example, a mass content can be selected which is between 1% and 5%, in particular in the range of 2% to 4%. Furthermore, the mass content of the hydrophilising and/or hygroscopicising agent can be selected in such a way that it corresponds to the mass content of the molybdenum compound. For example, 2% hydrophilising and/or hygroscopicising agent can be used if the mass content of the molybdenum-containing compound in relation to the sold resin content of the lacquer is

also 2%. Alternatively, the mass content of the hydrophilising and/or hygroscopicising agent can be approximately twice the mass content of the molybdenum-containing compound. For example, 4% hydrophilising and/or hygroscopicising agent can be used if the mass content of the molybdenum-containing compound in relation to the sold resin content of the lacquer is 2%.

In a further advantageous design of the invention it is provided that the resin is used as a solution, suspension and/or dispersion with a solid resin content between 40 wt% and 70 wt%, in particular between 50 wt% and 60 wt%. This allows a particularly quick impregnation or coating of the substrate with as short drying times as possible.

Alternatively or additionally, it is provided that the resin is selected from a group comprising phenol resin, phenol formaldehyde resin, melamine resin, melamine formaldehyde resin, urea resin, urea formaldehyde resin and polymeric diphenylmethane diisocyanate as well as any combination thereof. The listed polycondensation resins are, on the one hand, particularly well-suited for the impregnation and/or coating of cellulose-containing substrates and, on the other hand, release water during setting, which is advantageously available for the at least one molybdenum-containing compound to convert into molybdenum acid.

In a further design of the invention the method can be implemented particularly economically and quickly if the substrate is impregnated with 30 wt% to 600 wt% resin in relation to its dry weight, in particular with 100 wt% to 180 wt% for decorative paper and/or in particular with 350 wt% to 550 wt% for overlay paper.

Furthermore, it can be provided that the substrate is coated with a quantity of resin between 10 g/m^2 and 150 g/m^2, in particular between 70 g/m^2 and 120 g/m^2 for decorative paper and/or in particular between 15 g/m^2 and 35 g/m^2 for overlay paper.

In a further advantageous design of the invention it is provided that the resin contains the at least one molybdenum-containing inorganic compound and/or that the at least one molybdenum-containing inorganic compound is incorporated into and/or applied to the resin. This represents a particularly flexible option for providing antimicrobial properties to at least the surface of the furniture and/or interior fitting part. In the case

that a furniture and/or interior fitting part is formed as an impregnate, the entire furniture and/or interior fitting part can in this way advantageously be provided with the antimicrobial resin and thus be saturated with the at least one molybdenum-containing compound. Alternatively or additionally, according to the invention it is provided that the mass content of the at least one molybdenum-containing compound in relation to the solid resin content of the resin is between 0.10% and 10%, in particular between 0.15% and 5% and preferably between 0.2% and 3%. Thus, the respective material use of molybdenum-containing compound can be optimally adapted to the concrete execution of the method and the later use or required antimicrobial effect of the furniture and/or interior fitting part produced according to the invention.

In a further advantageous design of the invention it is provided that a mass content of the hydrophilising and/or hygroscopicising agent in relation to the solid resin content of the resin is between 0.1% and 15%. For example, a mass content can be selected which is between 1% and 5%, in particular in the range of 2% to 4%. Furthermore, the mass content of the hydrophilising and/or hygroscopicising agent can be selected in such a way that it corresponds to the mass content of the molybdenum compound. For example, 2% hydrophilising and/or hygroscopicising agent can be used if the mass content of the molybdenum-containing compound in relation to the sold resin content of the lacquer is also 2%. Alternatively, the mass content of the hydrophilising and/or hygroscopicising agent can be approximately twice the mass content of the molybdenum-containing compound. For example, 4% hydrophilising and/or hygroscopicising agent can be used if the mass content of the molybdenum-containing compound in relation to the sold resin content of the lacquer is 2%.

Further advantages are achieved if the impregnated and/or coated substrate is dried and/or cut and/or rolled, in particular at 100°C to 220°C and/or by means of a flotation dryer. Thus, the furniture and/or interior fitting part can be optimally stored and transported according to the desired further processing. A drying temperature between 100°C and 220°C has been shown to be advantageous in particular for resin-coated and/or resin-impregnated substrates or furniture and/or interior fitting parts. If required, polymerisation or curing of the resin can occur at the same time as the drying.

Alternatively, a temperature can be selected at which polymerisation reactions are completely or at least predominantly stopped. Flotation dryers are particularly well-suited for drying flat surface substrates or furniture and/or interior fitting parts and particularly reliably prevent damage to the antimicrobial surface(s). Alternatively or additionally, the substrate or furniture and/or interior fitting part can be pressed with at least a further substance, in particular a wooden composite and/or a pre-impregnate, whereby complex laminate composites are obtained.

In a further advantageous design of the invention it is provided that the furniture and/or interior fitting part is formed as an edge, in particular as a thin chipboard supporting edge or melamine edge, wherein the at least one molybdenum-containing inorganic compound is arranged at least in the region of one surface of the edge. Thus, the furniture and/or interior fitting part produced according to the invention can be used in particular for covering and laminating sides, narrow edges and/or cut surfaces of further components, whereby as well as providing an antimicrobial effect for the relevant components, penetration of dirt and microorganisms into the component is also reliably prevented. In addition, the visual appearance of the edge can particularly easily be adapted to the visual appearance of the component to be laminated so that by means of the furniture and/or interior fitting part produced according to the invention virtually any design concept for furniture and/or interior fittings can be implemented. The furniture and/or interior fitting part formed as an edge can for example comprise a plastic in which the at least one molybdenum-containing compound is integrated. Furthermore, the furniture and/or interior fitting part formed as an edge can be formed as laminate, for example multiplex edges and comprise various material stores. The edge can also be formed as an antimicrobial veneer edge, solid wood edge, real wood edge, soft edge, chipboard support edge, web edge, blind edge, primer edge, etc.

A second aspect of the invention relates to an antimicrobial furniture and/or interior fitting part in which it is provided that said furniture and/or interior fitting part comprises a cellulose-containing substrate which is impregnated, pre-impregnated and/or coated with a resin and/or a resin-like substance, wherein at least one molybdenum-containing inorganic compound is arranged at least in the region of the surface of the substrate. The at least one molybdenum-containing inorganic compound

comprises at least one molybdate with the molecular formula $M^{n+}_zMoO_4$ where n*z=+2 and M is selected from a group comprising Mg, Ca, Ag, Cu, Bi, V, Ti and Zn, wherein the mass content of the at least one molybdenum-containing compound in relation to the solid resin content of the resin is between 0.10% and 10%.

In other words, according to the invention it is provided that a substrate is provided with an antimicrobial effect by means of the at least one molybdenum compound which contains cellulose and is preferably made of at least predominantly, i.e. at least 51%, in particular at least 75% and preferably of at least 90% cellulose, wherein within the scope of the present invention, unless otherwise stated, the percentage amounts are to be understood as weight percentages. Thus, a furniture and/or interior fitting part with a particularly good antimicrobial effect that can be used for furniture and/or interior fittings is obtained which can be formed as a semi-finished or finished part. In addition, the cellulose substrates can have a moisture retaining and regulating effect. The cellulose part of the substrate which can also be described as a carrier substance or carrier material can generally be composed of fresh fibre or recycled fibre.

Within the scope of the present invention, resins and resin-like substances are generally understood as being polymers, prepolymers and raw materials for organic plastics. Resins and resin-like substances are usually soluble in common organic solvents, but are difficult to dissolve or are insoluble in water. The resins and resin-like substances can fundamentally comprise naturally occurring and/or synthetic compounds. In this way, the furniture and/or interior fitting part can be particularly easily produced as a laminate, impregnated and/or resin-coated substrate, whereby it is particularly well suited for furniture and interior fittings. The coating of the substrate can occur in dependence of the concrete arrangement and later intended purpose of the furniture and/or interior fitting part as fundamentally one-sided or two or more-sided.

Through the use of one or a plurality of the listed molybdenum-containing inorganic compounds, surprisingly, apart from a good antimicrobial effect, a particularly high light stability, in particular in relation to UV light, is achieved. Thus, the emergence of undesired discolouring on the surface of the furniture and/or interior fitting part or piece of furniture or interior fitting produced therefrom according to the invention is avoided. In addition, such molybdate have a particularly low water solubility and are at

least substantially colourless or white. Because of this, the furniture and/or interior fitting part produced according to the invention is particularly well suited for furniture and interior fittings, for example in hospitals, care homes and similar, as no additional dyes or colourings are required to provide a neutral, white surface. Conversely, due to the natural white colour of the surface, it can be easily dyed with the addition of suitable dyes or colourings. Furthermore, the solubility, colour and antimicrobial effect of the furniture and/or interior fitting part can be optimally adapted to the respective purpose. By means of the listed compounds, individually or in any combination, the adhesion of microorganisms to the surface of the furniture and/or interior fitting part can additionally be impeded. This particularly effectively prevents colonisation of the surface of the furniture and/or interior fitting part.

While the mass content of the at least on molybdenum-containing compound in relation to the solid resin content of the resin amounts to between 0.10% and 10%, the respective substance use of the molybdenum-containing compound(s) can be optimally adapted to the concrete execution of the method and the later use or required antimicrobial effect of the furniture and/or interior fitting part according to the invention.

In addition, the furniture and/or interior fitting part has a particularly long-lasting and broad antimicrobial effect which is not reliant on the presence of light. Further resulting features and their advantages are to be drawn from the description of the first aspect of the invention, wherein advantageous designs of the first aspect of the invention are viewed as advantageous designs of the second aspect of the invention and vice versa.

In an advantageous design of the invention it is provided that the furniture and/or interior fitting part is obtainable or obtained by means of a method according to the first aspect of the invention.

In a further advantageous design of the invention, the furniture and/or interior fitting part is formed as a laminate, impregnate, laminate composites, raw particleboard, thin chipboard, MDF board, MDF coating plate, oriented strand board (OSB board), melamine resin-coated board, HDF board, furniture precast, lightweight board, countertop, laminated plastic, in particular high-pressure laminate (HPL) and/or continuous pressure laminate (CPL), laminate bonded board, front element, compact panel,

windowsill, acoustic panel, edge, in particular thin chipboard edge, melanin edge, ABS-edge, PVC edge and/or PP edge, tongue and/or groove board, raw chipboard, wooden soft fibreboard, wood fibreboard, thin chipboard, cladding panel, direct coat laminate flooring board, direct print laminate floor board, skirting board, floorboard, backing, core paper, core board, overlay paper decorative paper, decorative card, decorative board, film, non-woven material and/or as a combination of two or more of the listed materials. Thus, by means of the furniture and/or interior fitting part according to the invention all possible furniture and/or interior fitting production methods can be implemented so that completely antimicrobial interior spaces can be provided.

Further advantages are achieved if the furniture and/or interior fitting part is connected, particularly pressed, with a support plate made of a wooden material, particularly made of a chipboard, fibreboard and/or OSB board, and/or has at least one lacquer coat. Thus, the mechanical and/or chemical resilience of the furniture and/or interior fitting part can be optimally adapted to its respective use.

A third aspect of the invention relates to the use of obtainable and/or obtained furniture and/or interior fitting parts and/or at least one furniture and/or interior fitting part according to the second aspect of the invention for producing a piece of furniture and/or interior fitting by means of a method according to the first aspect of the invention. Thus, the resulting piece of furniture and/or the resulting interior fitting part has a particularly long-lasting and wide antimicrobial effect which is not reliant on the presence of light. The piece of furniture or interior fitting part can fundamentally comprise a plurality of the same or differently formed furniture and/or interior fitting parts according to the invention. Alternatively, the piece of furniture or interior fitting can consist of just one furniture and/or interior fitting part according to the invention.

Further resulting features and their advantages are to be drawn from the description of the first and second aspects of the invention, wherein advantageous designs of the first and second aspects of the invention are viewed as advantageous designs of the third aspect of the invention and vice versa.

Further features of the invention are produced from the claims, the exemplary embodiments and through the drawings. The features and combinations of features listed above in the description as well as the features and combinations of features listed

in the exemplary embodiments in the following cannot only be used in the combinations provided, but also in other combinations, without departing from the scope of the invention.

Fig. 1 shows a principle representation of a first section of a device for producing a furniture and/or interior fitting part according to the invention formed as decorative and/or overlay paper;

Fig. 2 shows a principle representation of a second section of the device for producing the furniture and/or interior fitting part according to the invention; and

Fig. 3 shows a perspective view of a furniture and/or interior fitting part formed as edges.

Fig. 1 shows a principle representation of a first section of a device for producing a furniture and/or interior fitting part 10 according to the invention and will be described in the following with the combined view with Fig. 2 which shows a principle representation of a second section of the device subsequent to the first section. In the shown exemplary embodiment, decorative paper or overlay paper provided with an antimicrobial effect is produced as a furniture and/or interior fitting part 10. In a first device section A, appropriate paper substrates 18 are initially delivered on known rolls and unwound. The grammage selected for the paper substrates 18 when formed as decorative paper furniture and/or interior fitting parts 10 is between approximately 70 g/m^2 and approximately 120 g/m^2, whereas when formed as overlay paper furniture and/or interior fitting parts 10, a grammage of between approximately 15 g/m^2 and approximately 35 g/m^2 is selected. However, fundamentally, diverging grammages can also be used.

In a second device section B, the unwound band-shaped or planar paper substrates 18 are transported through a vat 12 which is filled with a resin in order to impregnate the substrates 18 with the resin. The amounts of resin applied to the substrate 18 or absorbed by the substrate 18 in step B, each in relation to the dry weight of the untreated paper (air-dry), are approximately 100% to 180% for decorative paper, while they are approximately 350% to 550% for overlay paper. These amounts are based on the respective masses after drying, wherein in general remaining moisture of between approximately 5% and 9% remains.

In the third device section C, a first drying of the impregnated substrates 18 is carried out at temperatures between 100°C and 220°C and an average feed rate of between approximately 30 m/min and approximately 90 m/min. So-called flotation dryers 14 are used, by means of which contactless drying of the material line or impregnated substrate 18 is possible. The drying temperature is selected in the present exemplary embodiment such that at least substantially no polymerisation reaction can occur in the resin, as otherwise a later pressing or adhesion with a carrier substance would not be possible or only possible with the application of an additional adhesive film.

In the fourth device section D, between approximately 15 g/m^2 and approximately 20 g/m^2 of resin is applied to the substrates 18 for both decorative and overlay paper using a grid 16. Thus, the same or a different resin or resin mixture can fundamentally be used as in device section B. The resins used in the vat 12 and on the grid 16 each have a solid resin content of between approximately 50% and approximately 60%. The mass content of the at least one molybdenum-containing compounds in relation to the solid resin content of the resin is selected as between 0.10% and 10%, wherein mass contents from approximately 1.8% to approximately 3.5% have, in general, been shown to be particularly advantageous.

Depending on the design of the furniture and/or interior fitting part 10 according to the invention, it can fundamentally also be provided that the mass content of the at least one molybdenum-containing compound in relation to the total mass of the furniture and/or interior fitting part 10 is between 0.1% and 10%, in particular between 0.15% and 5%, preferably between 0.2% and 3%.

In the present exemplary embodiment, there is also the addition in the fourth device section D of at least one molybdenum-containing compound in order to coat the impregnated substrate 18 with an antimicrobial surface and to produce it as a semi-finished furniture and/or interior fitting part 10. The addition of the at least one molybdenum-containing compound and the coating with the at least one molybdenum-containing compound can fundamentally be performed on a single side or both sides. A single-sided addition is preferably carried out on the future top side of the furniture and/or interior fitting part 10. The at least one molybdenum-containing compound can thus fundamentally already be mixed into the resin and/or applied to the surface of the

substrate 18 independently of resin. Alternatively or additionally, it can be provided that at least one molybdenum-containing compound is already applied to the substrate 18 in an earlier device section, for example device section B, and/or is applied to the said substrate 18 in a later device section. If the at least one molybdenum-containing compound is already applied to the substrate 18 in device section B or earlier, device sections D and E in particular are considered to be optional.

$CaMnO_4$, $ZnMoO_4$, $BiMoO_4$ or $VMoO_4$ for example can be used as molybdenum-containing compounds individually or in any combination. MoO_3, molybdenum oxide hydrate, MoO_{3-2} compounds such as $MoO_{2.35}$ to $MoO_{2.97}$, mixed oxides with the molecular formula $Mo_xW_{1-x}O_3$ where $0<x<1$, for example $Mo_{0.5}W_{0.5}O_3$, or mixed oxides with the molecular formula $Mo_xW_{1-x}(Cu/Bi/V/Zn)_yO_z$, where $0<x<1$, $0\leq y\leq 2$ and $2.0\leq z\leq 3.2$, can be used as further molybdenum-containing compounds individually or in any combination. The at least one molybdenum-containing compound can fundamentally be doped or undoped. For example, the doping of approximately 500 ppm Bi and/or 500 ppm V has been shown to be advantageous in certain uses in order to improve antimicrobial efficiency. Particle sizes from 0.1 to 150 µm measured with laser diffraction/laser scattering have generally been shown to have a particularly good antimicrobial effect. Average particle sizes between approximately 1 µm and approximately 5 µm are particularly advantageous as on the one hand these have an excellent antimicrobial effect; on the other hand, however, unlike nanoparticles, they are considered to be unproblematic for higher organisms. As opposed to antibiotics and biocides, the inorganic molybdenum-containing compounds used within the scope of the present invention have a high thermal and chemical stability so that even temperatures well over 200°C are entirely unproblematic and neither lead to impairment of the antimicrobial effect nor to discoloration or other optical impairments.

If the furniture and/or interior fitting part 10 is to be used in particularly dry inside spaces in future, it has been shown to be advantageous to apply or introduce, in addition to the at least on molybdenum-containing compound, at least one hydrophilising and/or hygroscopicising agent to the substrate 18 in order to ensure a minimum moisture content of the composite furniture and/or interior fitting part 10 at least in the region of the surface. This represents one of the measures deviating from the traditional school of

thought as it has previously been assumed that surfaces must be designed as hydrophobically as possible in order to be antimicrobial. Preferably, the molybdenum-containing compound and the hydrophilising and/or hygroscopicising agent are applied together in order to ensure physical proximity. Alternatively or additionally the molybdenum-containing compound can be coated with the hydrophilising and/or hygroscopicising agent, wherein the coating can be formed as microporous and/or ion-conducting in order to ensure water or proton throughflow. For possible regeneration of the antimicrobial effect it is sufficient to moisten the furniture and/or interior fitting part 10, for example by wiping with a damp cloth and/or installing in an inside space with air humidity of at least 10%.

The mass content of the hydrophilising and/or hygroscopicising agent in relation to the solid resin content of the resin can also be between 0.1% and 10%, in particular between 0.15% and 5% and preferably between 0.2% and 4%. Alternatively, the mass content of the hydrophilising and/or hygroscopicising agent in relation to the total mass of the furniture and/or interior fitting part 10 can for example be between 0.01% and 10%. The mass content should fundamentally be selected in such a way that depending on its later use the finished furniture and/or interior part 10 has or can provide a determined minimum residual moisture. Silica gel and Atmer (vegetable glycerine) for example can be used as hydrophilising and/or hygroscopicising agents with respective mass contents of approximately 2%, whereby a total mass content of 4% hydrophilising and/or hygroscopicising agent is provided. Alternatively, only 2% silica gel or 2% Atmer could also be used, for example. Alternative hydrophilising and/or hygroscopicising agents and differing mass amounts of hydrophilising and/or hygroscopicising agents could also be used.

Using the hydrophilising and/or hygroscopicising agent, the finished furniture and/or interior fitting part 10 can also be reliably used in particularly dry environments with air humidity below 20%. To activate or regenerate the antimicrobial effect in particular in very dry environments it can fundamentally be provided for the antimicrobial surface of the furniture and/or interior fitting part 10 to be dampened at certain time intervals, for example wiped with a damp cloth on a weekly basis, in order to ensure a desired

minimum residual moisture in the region of the surface of the furniture and/or interior fitting part 10.

The aim is that the furniture and/or interior fitting part 10 receives or can provide moisture at least on its surface or in the regions in proximity to the surface. For example, in environments with <10% relative air humidity the furniture and/or interior fitting part 10 should receive between approximately 0.01 and 10 wt% moisture. Equilibrium moisture of 0.1 to 3% is particularly advantageous at least in the regions of their surfaces which in general disappear after a few minutes to hours.

In the device section E (Fig. 2) following device section D a further drying occurs which can be carried out in the same way as step C at approximately 100-220°C or at a feed rate of 30-90 m/min in a flotation dryer 14. Here too the temperature is preferably adjusted to a value at which polymerisation reactions in resin are completely or at least substantially stopped.

In device section F the furniture and/or interior fitting part 10 is rolled, cut to length and/or stacked according to the design and later intended use.

The decorative or overlay paper 10 formed as impregnate or semi-finished product is principally used for the coating of wood materials, preferably of chipboard and fibreboard in order to produce a laminate composite material which can then be directly used as a finished component for the production of furniture and/or interior fittings of buildings. For this purpose, the decorative or overlay paper 10 can for example be further processed through direct pressing by way of a laminate. The direct coating can for example be carried by means of short-cycle pressing (discontinuous) or by means of double-belt pressing (continuous). With laminates, the decorative or overlay paper 10 is pressed with one or a plurality of core papers, which themselves are impregnated with a resin, for example a phenolic resin. This is carried out using isobar double-belt pressing, for example.

However, it should be emphasised that the furniture and/or interior fitting part 10 according to the invention can not only be produced as a laminate or impregnate, but also as laminate composite material, particle composite, fibre composite, pre-impregnate, raw particleboard, thin chipboard, MDF board, MDF coating plate, melamine resin-coated board, HDF board, oriented strand board (OSB board), furniture

precast, lightweight board, worktop, laminated plastic, in particular high-pressure laminate (HPL) and/or continuous pressure laminate (CPL), laminate bonded board, front element, compact panel, windowsill, acoustic panel, edge, tongue and/or groove board, raw chipboard, wooden soft fibreboard, wood fibreboard, thin chipboard, cladding panel, direct coat laminate flooring board, direct print laminate floor board, skirting board, floorboard, backing, core paper, core board, decorative board, decorative paper, film, non-woven material, or any combination of the listed parts or can be combined with similar parts.

Alternatively or additionally, the furniture and/or interior fitting part 10 can be printed. Thus, the substrate 18 or furniture and/or interior fitting part 10 is provided with a primer coat which produces the basic colour, for example after a pre-treatment which can include the cleaning, cutting and/or primer application. Alternatively, the respectively used molybdenum-containing compound(s) can act as a primer coat. Then a desired decoration is applied thereon using gravure printing or digital printing. Preferably acrylic-based and UV-curable sealing lacquer provide the required gloss and the necessary mechanical properties such as wear and scratch resistance as well as chemical and thermal resistance. In order to equip the furniture and/or interior fitting part 10 with an antimicrobial effect, the at least one molybdenum-containing compound is applied in or on the lacquer coat. Preferably, a lacquer is used which already contains a molybdenum-containing compound. Thus, any design of furniture and/or interior fitting part 10 can easily later still be made antimicrobial using a simple lacquer.

As already explained, not only do molybdates such as $CaMoO_4$, $ZnMoO_4$, $BiMoO_4$, $VMoO_4$ or $CuMoO_4$ and similar have a particularly good antimicrobial effect, they also have a particularly high light and UV stability. The testing of UV resistance of the furniture and/or interior fitting part 10 can be carried out following DIN EN 438-2, section 27. Thus, a sample of the furniture and/or interior fitting part 10 according to the invention is implemented with exposure for 60 minutes. The same is carried out with a similarly produced compare sample, but without the addition of molybdenum compounds ("standard product"). The evaluation is then carried out by means of a visual comparison of the sample with antimicrobial effect and the sample not provided with an antimicrobial effect and is evaluated as follows, for example:

1. No noticeable difference to the standard product
2. Barely noticeable difference to the standard product
3. Clearly noticeable difference to the standard product
4. Barely acceptable difference to the standard product
5. Unacceptable difference to the standard product

For the listed molybdates vales of 1 or 2 at the highest were always obtained.

Fig. 3 shows a perspective view of a further exemplary embodiment of the furniture and/or interior fitting part 10 according to the invention which is formed as a band-shaped edge which is wound in a ring. In a design not according to the invention the furniture and/or interior fitting part 10 only comprises a preferably thermoplastic material such as melamine, ABS, TPU, PVC, PP, etc. which comprise at least on the surface the at least one molybdenum-containing compound. Here the at least one molybdenum-containing compound can be incorporated into the plastic or applied to the plastic. The edge 10 can for example be used for narrow surface coating of all wood-based materials, wherein as well as the thickness and width, the visual appearance can also be precisely adapted to the respective use. In this respect, this embodiment of the furniture and/or interior fitting part 10 can also be understood as edge and as a semi-finished product. To facilitate further processing, the rear side of the edge 10 can for example be partially ground or comprise an additional hot melt coating.

It can also be provided that the edge or furniture and/or interior fitting part 10 according to the invention is formed as layered composite and for example comprises the layer sequence decorative paper-core paper-backing, wherein the individual layers initially – for example as described above – coated or impregnated with a resin, for example melamine resin and then pressed together. Thus, it can be provided that the edge or furniture and/or interior fitting part 10 is only provided with an antimicrobial effect by means of the at least one molybdenum compound on its front side, i.e. on the decorative paper layer. Alternatively, the resin used for coating or impregnation can already contain the at least one molybdenum-containing compound, whereby the entire layered composite and also the rear side of the edge 10 can be provided with an antimicrobial effect.

The parameter values provided in the documents for defining the process and measurement conditions for the characterisation of specific features of the object of the invention are also included within the scope of deviations – for example due to measurement errors, system errors, weighing errors, DIN tolerances and similar – as well as within the scope of the invention.

Patentkrav

1. Fremgangsmåde til fremstilling af en antimikrobielt virksom møbel- og/eller indvendig saneringskomponent (10),
kendetegnet ved, at,
der til fremstilling af møbel- og/eller saneringskomponenten (10) tilvejebringes et cellulose-holdigt substrat (18), det imprægneres og/eller forimprægneres og/eller coates med en harpiks og/eller en harpikslignende substans, og der anbringes mindst en molybdænholdig uorganisk forbindelse i det mindste i området ved substratets (18) overflade, hvor den mindst ene molybdænholdige uorganiske forbindelse omfatter mindst et molybdat med sumformlen $M^{n+}_zMoO_4$, i hvilken n*z=+2 og M udvælges fra en gruppe, som omfatter Mg, Ca, Ag, Cu, Bi, V, Ti og Zn, og hvor masseindholdet af den mindst ene molybdænholdige forbindelse i forhold til harpiksens fastharpiksmasse udgør mellem 0,10 % og 10 %.

2. Fremgangsmåde ifølge krav 1,
kendetegnet ved, at
der udvælges en yderligere molybdænholdig uorganisk forbindelse fra en gruppe, som omfatter MoO_2, MoO_{3-2}, MoO_3, molybdænoxid-hydrater, molybdænhydroxider, molybdænoxidhydroxider, molybdænsesquioxider, molybdænkarbid, molybdænnitrid, molybdænsilizid, molybdænsulfid, cyanomolybdater, molybdænhexacarbonyl, molybdænacetylacetonat og polyoxomolybdater.

3. Fremgangsmåde ifølge krav 1 eller 2,
kendetegnet ved, at
der som yderligere molybdat anvendes ammoniumdimolybdat og/eller ammoniumheptamolybdat og/eller mindst en forbindelse med sumformlen $M^{n+}_zMoO_4$, i hvilken n*z=+2 und M udvælges fra en gruppe, som omfatter Na og K.

4. Fremgangsmåde ifølge et af kravene 1 til 3,
kendetegnet ved, at
der som yderligere molybdænholdig uorganisk forbindelse anvendes en molybdæn- og wolframholdig uorganisk blandingsforbindelse, og/eller at der ud

over den molybdænholdige uorganiske forbindelse anvendes mindst en wolframholdig forbindelse.

5. Fremgangsmåde ifølge krav 4,
kendetegnet ved, at den molybdæn og wolframholdige blandingsforbindelse doteres med en fluorforbindelse, især med et oxyfluorid, WOF_4, WO_2F_2, calciumfluorid og/eller fluorapatit, og/eller der som molybdæn- og wolframholdig uorganisk blandingsforbindelse anvendes et blandingsoxid med sumformlen $Mo_xW_{1-x}A_yO_z$, i hvilken $0<x<1$, $0\leq y\leq 2$ og $2{,}0\leq z\leq 3{,}0$, og A betegner en metalion, der forskellig fra Mo og W, og/eller NH_4^+, hvor A fortrinsvis udvælges fra en gruppe, som omfatter Na, K, Mg, Ca, Ag, Cu, Bi, V, Ti og Zn.

6. Fremgangsmåde ifølge et af kravene 1 til 5,
kendetegnet ved, at
den mindst ene molybdænholdige uorganiske forbindelse anvendes i form af partikler med en gennemsnitlig kornstørrelse på mellem 0,1 µm og 200 µm.

7. Fremgangsmåde ifølge et af kravene 1 til 6,
kendetegnet ved, at
der ud over den mindst ene molybdænholdige uorganiske forbindelse anbringes mindst et hydrofilerings- og/eller hygroskoperingsmiddel i det mindste i området ved møbel- og/eller saneringskomponentens (10) overflade.

8. Fremgangsmåde ifølge et af kravene 1 til 7,
kendetegnet ved, at
det celluloseholdige substrat (18) udvælges fra en gruppe, som omfatter papir, især dekorationspapir og overlaypapir, karton, især kernekarton, pap, halvkemiske masser og træmaterialer, især spånplader og fiberplader.

9. Fremgangsmåde ifølge et af kravene 1 til 8,
kendetegnet ved, at
substratet (18) i det mindste områdevist coates med en lak, hvor lakken indeholder den mindst ene molybdænholdige uorganiske forbindelse, og/eller hvor den mindst ene molybdænholdige uorganiske forbindelse indarbejdes i laklaget og/eller påføres på laklaget.

10. Fremgangsmåde ifølge krav 9,
kendetegnet ved, at
der som lak anvendes en UV-hærdbar lak og/eller en akryllak og/eller en siliciumholdig lak og/eller en lak, som indeholder mindst en termoplastisk elastomer, og/eller en reaktiv lak.

11. Fremgangsmåde ifølge krav 9 eller 10,
kendetegnet ved, at
masseindholdet af den mindst ene molybdænholdige forbindelse i forhold til lakkens fastharpiksindhold udgør mellem 0,10 % og 10 %, især mellem 0,15 % og 5 % og fortrinsvis mellem 0,2 % og 3 %.

12. Fremgangsmåde ifølge krav 7 og et af kravene 9 til 11,
kendetegnet ved, at
et masseindhold af hydrofilerings- og/eller hygroskoperingsmidlet i forhold til lakkens fastharpiksindhold udgør mellem 0,1 % og 15 %.

13. Fremgangsmåde ifølge et af kravene 1 til 12,
kendetegnet ved, at
harpiksen anvendes som opløsning, suspension og/eller dispersion med et fastharpiksindhold på mellem 40 vægt-% og 70 vægt-%, især mellem 50 vægt-% og 60 vægt-%.

14. Fremgangsmåde ifølge et af kravene 1 til 13,
kendetegnet ved, at
harpiksen udvælges fra en gruppe, som omfatter phenol-harpikser, phenol-formaldehyd-harpikser, melamin-harpikser, melaminformaldehyd-harpikser, urinstof-harpikser, urinstofformaldehyd-harpikser og polymert diphenylmethandiisocyanat samt vilkårlige blandinger deraf.

15. Fremgangsmåde ifølge et af kravene 1 til 14,
kendetegnet ved, at
substratet (18) i forhold til dets tørvægt imprægneres med 30 vægt-% til 600 vægt-% harpiks, især med 100 vægt-% til 180 vægt-% og/eller med 350 vægt-% til 550 vægt-%.

16. Fremgangsmåde ifølge et af kravene 1 til 15,
kendetegnet ved, at
substratet (18) coates med en harpiksmængde på mellem 10 g/m^2 og 150 g/m^2, især mellem 70 g/m^2 og 120 g/m^2 og/eller især mellem 15 g/m^2 og 35 g/m^2.

17. Fremgangsmåde ifølge et af kravene 1 til 16,
kendetegnet ved, at
harpiksen indeholder den mindst ene molybdænholdige uorganiske forbindelse, og/eller at den mindst ene molybdænholdige uorganiske forbindelse indarbejdes i harpiksen og/eller påføres på harpiksen.

18. Fremgangsmåde ifølge et af kravene 1 til 17,
kendetegnet ved, at masseindholdet af den mindst ene molybdænholdige forbindelse i forhold til harpiksens fastharpiksindhold udgør mellem 0,15 % og 5 % og fortrinsvis mellem 0,2 % og 3 %.

19. Fremgangsmåde ifølge et af kravene 1 til 18,
kendetegnet ved, at
et masseindhold af hydrofilerings- og/eller hygroskoperingsmidlet i forhold til harpiksens fastharpiksindhold udgør mellem 0,1 % og 15 %.

20. Fremgangsmåde ifølge et af kravene 1 til 19,
kendetegnet ved, at
det imprægnerede og/eller coatede substrat (18) sammenpresses med mindst et yderligere materiale, især et træmateriale og/eller et forimprægneret materiale.

21. Fremgangsmåde ifølge et af kravene 1 til 20,
kendetegnet ved, at
møbel- og/eller saneringskomponenten (10) udformes som en kant, især som tyndspån-støttekant eller melaminkant, hvor den mindst ene molybdænholdige uorganiske forbindelse anbringes i det mindste i området ved en overflade af kanten.

22. Antimikrobielt virksom møbel- og/eller saneringskomponent (10), **kendetegnet ved, at** denne omfatter et cellulose-holdigt substrat (18), som er imprægneret og/eller forimprægneret og/eller coatet med en harpiks og/eller en harpikslignende substans, hvor der er anbragt mindst en molybdænholdig uorganisk forbindelse i det mindste i området ved substratets (18) overflade, hvor den mindst ene molybdænholdige uorganiske forbindelse omfatter mindst et molybdat med sumformlen $M^{n+}_zMoO_4$, i hvilken n*z=+2 og M udvælges fra en gruppe, som omfatter Mg, Ca, Ag, Cu, Bi, V, Ti og Zn, og hvor masseindholdet af den mindst ene molybdænholdige forbindelse i forhold til den faste harpiksmasse udgør mellem 0,10 % og 10 %.

23. Møbel- og/eller saneringskomponent (10) ifølge krav 22, **kendetegnet ved, at** denne er udformet som laminat, imprægneret materiale, forimprægneret materiale, lagkompositmateriale, råspånplade, tyndspånplade, MDF-plade, MDF-lakplade, grovspånplade, melaminharpikscoatet plade, HDF-plade, møbelfærdigdel, letkonstruktionsplade, arbejdsplade, lagmateriale, især HPL-lagmateriale og/eller CPL-lagmateriale, lagmaterialekompositplade, frontelement, kompaktplade, vinduesplade, akustikplade, kant, især tyndspån-støttekant eller melaminkant, not- og/eller ferplade, råspånplade, træblødfiberplade, træfiberplade, tyndspånplade, lægningsplade, direkte coatet laminatgulvplade, direkttryk-laminatgulvplade, sokkelliste, gulvbræt, modtræk, kernepapir, kernekarton, overlaypapir, dekorationspapir, dekorationskarton, dekorationspap, fleecemateriale og/eller som et kompositmateriale af to eller flere af de nævnte materialer.

24. Møbel- og/eller saneringskomponent (10) ifølge krav 22 eller 23, **kendetegnet ved, at** denne er forbundet, især sammenpresset, med en bæreplade af et træmateriale, især en spån-, fiber- og/eller OSB-plade og/eller har mindst et laklag.

25. Anvendelse af en møbel- og/eller saneringskomponent (10), der kan tilvejebringes eller er tilvejebragt ved hjælp af en fremgangsmåde ifølge et af kravene 1 til 21, og/eller mindst en møbel- og/eller saneringskomponent (10) ifølge et af kravene 22 til 24 til fremstilling af et møbel og/eller en indendørsindretning.

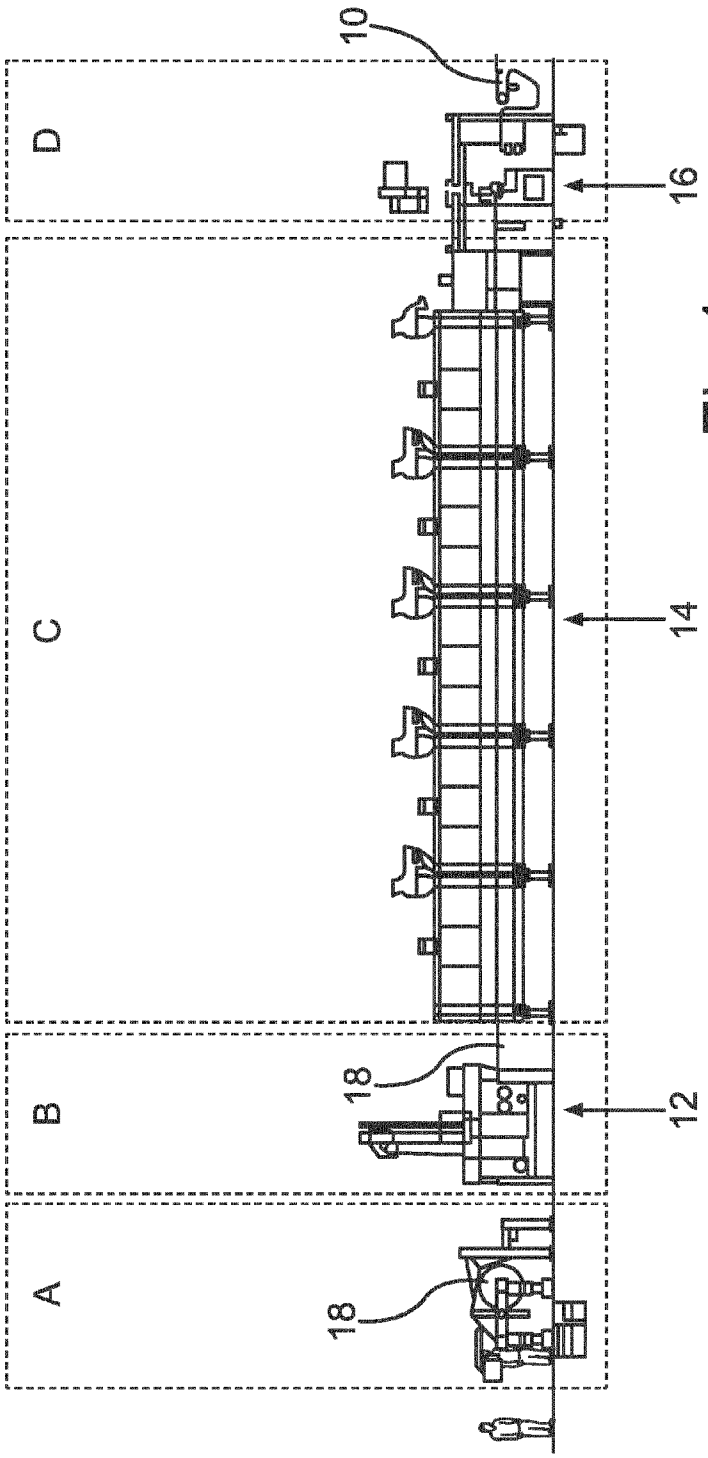

Fig.1

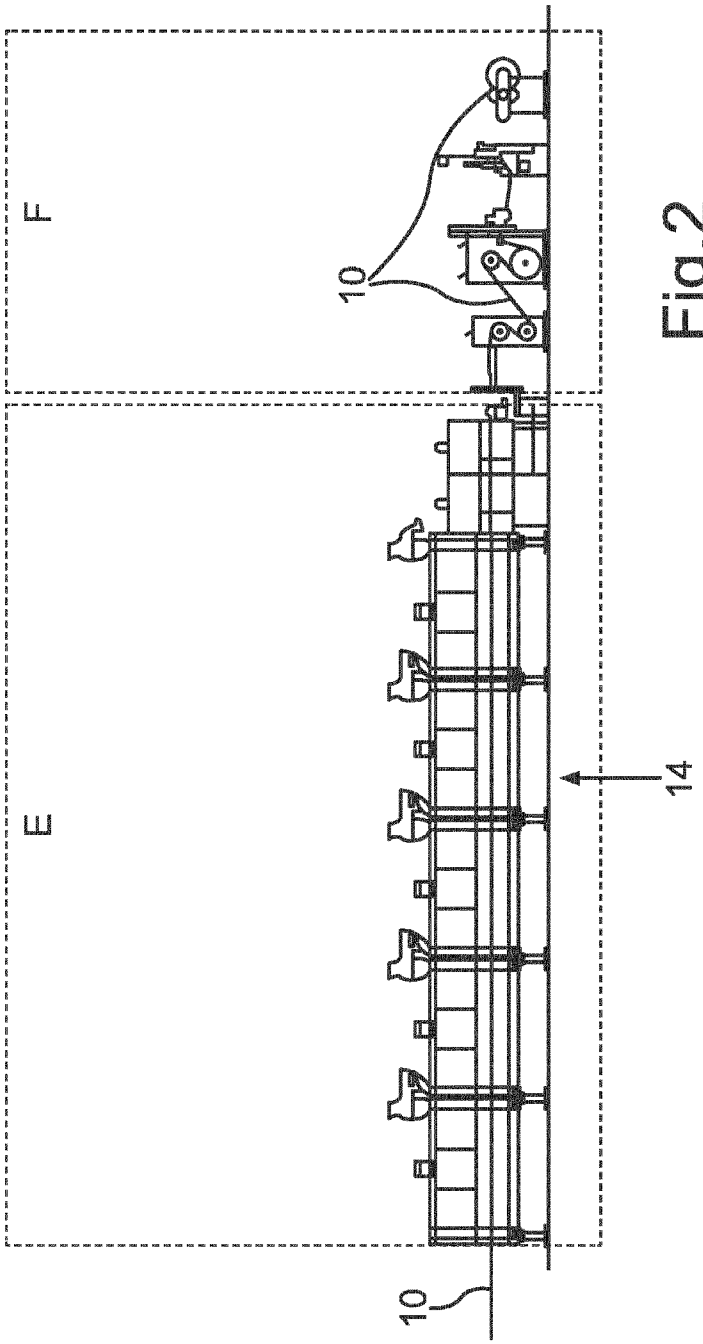

Fig.2

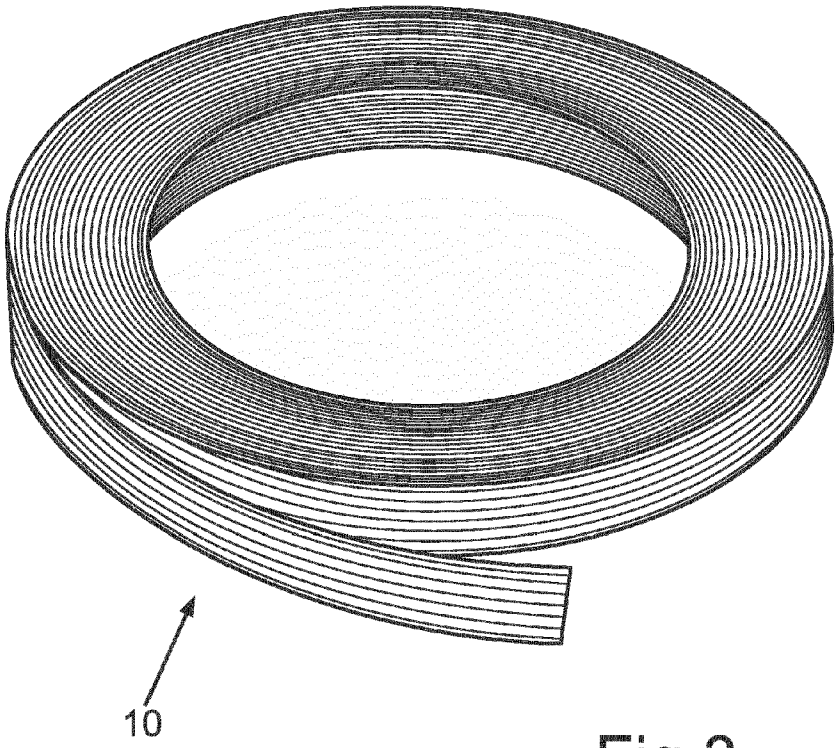

Fig.3