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(54) DECORATIVE CORK BOARD AND METHOD OF MANUFACTURING THE SAME.

(57) A decorative cork board obtained by molding crushed cork with a resin binder into a plate type product is disclosed. This decorative cork board contains at least one of a far infrared radiation ceramic material and an inorganic antibacterial agent. These far infrared radiation ceramic material and inorganic antibacterial agent are added to a raw cork board material in advance and mixed in a decorative cork board, or they are turned into paint, which is then applied to the surface of a cork board. In order to apply this paint to a cork board, for example, a roll coater is used, by which the paint, in which a far infrared radiation ceramic material or an inorganic antibacterial agent is contained, is pressure permeated into the surface of the cork board.

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Technical Field

This invention relates to a cork decorative sheet useful as flooring, walling or other construction materials, and the method for producing the same.

Background

A cork sheet, produced by hardening the cork material with resin and molding, features unique feeling, thermal insulation, flexibility, sound-proofing properties and bore-proofness, and has come to be utilized in the field of interior work, as an interior construction material or furniture.

For example, the present Assignee proposed in JP Patent Kokai A-2-117831 a decorative sheet in which a coating containing radiation-proof opaque pigments having various color tones is applied on the surface of a cork base plate to form a fading preventative coating film and in which a moire pattern unique to the cork is produced in the color fading preventative coating film based upon the difference in absorption of the coating by the cork base plate for maintaining the moire pattern or the color tone proper to the cork and for suppressing color fading by UV rays.

Such decorative board has the appearance proper to the cork and excellent durability so that it is expected to be used as e.g., flooring material.

In order for the cork sheet to come into widespread use as the interior construction material, it is essential not only to exploit the properties unique to the cork, but also to impart some added value to the cork to raise its commercial value. Of course, the feeling proper to the cork needs to be maintained at any rate.

Disclosure of the Invention

It is an object of the present invention to impart the added value hitherto not conceived to the above-mentioned cork decorative sheet to raise its commercial value to improve its distribution as the interior construction material, such as flooring material.

It is a more specific object of the present invention to provide a novel cork decorative sheet having the feeling proper to the cork and excellent heat insulating properties, flexibility, sound-proofing properties and bore-proofness and promoting health of the tenant on being employed as an interior construction material, such as flooring material.

A cork decorative sheet according to a first subject-matter of the present invention contains far-infrared radiating ceramics, and is produced by molding a crushed cork material into a sheet using a resin binder.

If the cork decorative sheet containing far-infrared radiating ceramics is employed as an interior construction material, far-infrared rays are routinely radiated to promote health of the tenant.

Above all, if a coating material containing far-infrared radiating ceramics is coated by a roll coater on the surface of a cork base sheet and permeated therein under pressure, the coating material not only promotes health of the tenant, but acts as a surface protective layer to improve radiation-proofness.

With the cork decorative sheet according to the second subject-matter of the present invention, a crushed or granulated cork material is molded into a sheet using a resin binder and the inorganic anti-bacterial agent and/or the far-infrared radiating ceramics is contained therein.

The inorganic anti-bacterial agent contained in the cork decorative sheet acts on cells of bacteria in general or fungi by ionic effects to cause their extinction.

The cork decorative according to the first subject-matter of the present invention, containing far-infrared radiating ceramics, has the feeling proper to the cook and exhibits not only heat insulating properties, flexibility, bore-proofness, sound-proofness or air permeability but also thermal and circulation promoting effects, so that the cork decorative sheet promotes health of the tenant simply on being employed as the interior construction material, such as a flooring material.

On the other hand, the cork decorative sheet according to the second subject-matter of the present invention contains the inorganic anti-bacterial agent and hence is able to cause extinction of fungi or bacteria, such as E. Colis or yellow staphylococci, in order to maintain a sanitary environment. The cork decorative sheet of the present invention is free from fungi or bacteria, while it is not afflicted with mites or termites, so that it is advisably employed by those suffering from allergic constitution, atopic dermatitis, infantile asthma, rhinitis or hives.

If, by using fluorine or silicon resins as the resins for the coating material, the cork decorative sheet of the present invention is surface-treated with the fluorine or silicon resin, the surface thus treated not only serves for promoting health but also acts for promoting pollution-proofness, radiation-proofness and

durability, thereby significantly improving surface properties. That is, treatment with fluorine or silicon resins improves pollution resistance, radiation-proofness or durability, thereby further prohibiting intrusion of fungi or bacteria.

Best Mode for Carrying out the Invention

Among a variety of ceramics, the far-infrared radiating ceramics radiates far-infrared rays with a wavelength of 5 to 15 μm with high efficiency. In general, such far-infrared radiating ceramics is known which radiates far infrared rays on heating or absorption of solar beams. Although these well-known far infrared radiating ceramics may be employed in the present invention, non-heated type far-infrared radiating ceramics, radiating far infrared rays to some extent even at ambient temperature, is most preferred. The non-heated type far-infrared radiating ceramics is formed of a ceramic material consisting mainly of, for example, amorphous silica or amorphous amino silicate and having the composition of 52.5 to 70 wt% of SiO_2, 20 to 47 wt% of Al_2O_3 and not more than 3 wt% of Fe_2O_3. A specific example of the non-heated type far-infrared radiating ceramics is "Radi-Echo", a kind of amorphous ceramics manufactured by NIPPON PLATE GLASS CO. LTD.

On the other hand, inorganic anti-bacterial agents generate active oxygen by ionic effects which in turn acts on cells of bacteria in general or fungi to cause their extinction.

According to the present invention, any of commercially available inorganic anti-bacterial agents may be employed. Specific examples of these agents include. "Radi-Echo Anti-Bacterial Powders" manufactured by NISSHO RADI-ECHO CO. LTD.

The "Radi-Echo Anti-Bacterial Powders" manufactured by NISSHO RADI-ECHO CO. LTD is mainly composed of basic ceramics having the schematic composition of $SiO_2 > 50\%$, $Al_2O_3 < 30\%$, MgO or CaO $< 10\%$ and Na_2O or $K_2O < 5\%$ and peculiarly tends to absorb bacteria such as E-coli because of its pore size. In addition, the anti-bacterial powders contain a small amount of anti-bacterial metal (silver) which acts on the cells of bacterial in general or fungi to cause their extinction.

The cork decorative sheet of the present invention is formed of the crushed or pulverized cork material, optionally admixed with colored pigments, which crushed or pulverized cork material is molded into a plate shape by a resin binder, such as phenolic resin, urethane resin adhesive, epoxy urethane resin adhesive or vinyl acetate adhesive, optionally admixed with glycol. The aforementioned far-infrared radiating ceramics and inorganic anti-bacterial agent may be previously mixed, either alone or as a mixture, into another starting material, such as a resin binder, during manufacture of the cork sheet. Alternatively, they may be coated in the form of a coating on the surface of the molded cork sheet. What is crucial is that the aforementioned far-infrared radiating ceramics and inorganic anti-bacterial agents be contained in the cork sheet and it does not matter in what form they are present therein.

In the former case, that is if the ceramics or the anti-bacterial agent is added during preparation of the cork sheet, it is preferred that the far-infrared radiating ceramics and the inorganic anti-bacterial agent be contained in amounts of 5 to 30 wt% and 0.5 to 3 wt%, based on the total weight of the cork sheet, respectively. If the amounts of the far-infrared radiating ceramics and the inorganic anti-bacterial agent are lower than the above range, sufficient effects cannot be expected, whereas, if the amounts are in excess of the above range, the risk is high that the feeling or flexibility proper to the cork be lost.

In the latter case, that is if the ceramics or the anti-bacterial agent are added during preparation for the cork sheet, it is preferred that the far-infrared radiating ceramics and the inorganic anti-bacterial agent be contained in amounts of 20 to 40 wt% and 2 to 4 wt%, based on the total weight of the cork sheet, respectively, and that the coating be applied so that the amount of the inorganic anti-bacterial agent per each process be 0.05 g/m^2 to 2 g/m^2 and above all 0.3 g/m^2 to 0.7 g/m^2, while the amount of the far-infrared radiating ceramics per each process be ten times as much as that of the inorganic anti-bacterial agent, that is 0.5 g/m^2 to 20 g/m^2 and above all 3 g/m^2 to 7 g/m^2.

The amounts of the far-infrared radiating ceramics and the inorganic anti-bacterial agent in the cork sheet are determined by the content amounts and the coating amounts of the far-infrared radiating ceramics and the inorganic anti-bacterial agent in the coating. For achieving desired results, it is preferred that the inorganic anti-bacterial agents be present on the surface of the cork sheet in an amount of 0.1 g/m^2 to 4 g/m^2 and more desirably in an amount of 0.6 g/m^2 to 1.4 g/m^2, and that the far-infrared radiating ceramics be present in an amount ten times as much as that of the inorganic anti-bacterial agent, that is 1 g/m^2 to 40 g/m^2 and more desirably in an amount of 6 g/m^2 to 14 g/m^2.

In general, the cork base sheet presents a serious problem that it is markedly susceptible to color fading. Thus the technique of applying an opaque coating on the surface of the cork base sheet in order to prevent color fading by the UV rays is useful. If the far-infrared radiating ceramics and the inorganic anti-

bacterial agent is admixed into the opaque coating, improvement in the radiation-proofness of the cork sheet and promotion of human health may be achieved simultaneously.

However, since the far-infrared radiating ceramics and the inorganic anti-bacterial agent are not sufficiently effective in improving radiation-proofness, it is desirable that the inorganic pigments exhibiting color fading preventative properties be added effectively in the coating material.

The pigments employed are preferably less permeable to UV rays and excellent in radiation-proofness, and may be enumerated by chrome yellow, carbon, iron oxide red and rutile titanium. Although organic pigments, such as benzine yellow, or organic transparent iron oxide red, lead white, zinc flower or anase titanium are usable, they are somewhat inferior in radiation-proofness to the aforementioned pigments. If desired, pigments of color tones different from those of the conventional cork, such as white, pink, orange or red, may be selected and employed to produce cork decorative sheets of various color tones.

The resin components used in the coating material may be any resins commonly employed for the coating material. Although urethane or acrylic resins may be used in view of pliability, fluorine or silicon resins are most preferred because these resins are excellent in resistance against pollution, water-proofness, radiation-proofness or durability.

If these fluorine or silicon resins are employed as the resins for coating, the surface of the cork decorative sheet is treated with these resins, so that water-proofness, resistance against pollution, radiation-proofness or durability may be afforded to the decorative sheet. Consequently, the fluorine resins or the silicon resins may be selectively employed according to the usage and application.

The fluorine resins or the silicon resins may be employed only for surface treatment. For example, the urethane reins or the acrylic resins may be employed as the resins for the coating material, while the fluorine resins or silicon resins may be coated to a thin thickness on the surface. In such case, the far-infrared radiating ceramics and the inorganic anti-bacterial agent may be mixed into the fluorine or silicon resins coated on the surface for utmost effects.

Although any of well-known coating techniques, such as roll coating, spray coating or flow coating, may be employed for applying the above coating material on the cork sheet surface, it is most preferred that the coating material be permeated under pressure into the cork sheet surface with the aid of a roll coater because it becomes possible in this manner to maintain the texture, air permeability and feeling proper to the natural cork sheet surface.

The cork base sheet is prepared by mixing an adhesive (resin binder) to cork powders produced on crushing and granulating the starting cork material (bark of cork oak) with a granulator and molding the resulting mixture under application of pressure and heating. Consequently, extremely small pores proper to the bark of the cork oak exist on the cork sheet surface. In addition, since the cork base sheet is a molded product of numerous cork granules, as discussed above, there exist numerous small-sized pits and recesses looking like worm-eaten spots.

If the coating material containing the far-infrared radiating ceramics and the inorganic anti-bacterial agent as well as various pigments is applied to and permeated under pressure into such cork base sheet, the above-mentioned small-sized pits and recesses are left unaltered on the surface, while air permeability is also maintained. Thus the texture and the feeling may be maintained on the cork sheet surface in such a manner that the cork sheet can hardly be distinguished from the untreated cork sheet. Such surface conditions may be achieved only with the use of the roll coater, while such effect can hardly be achieved with any other coating method since the coating film is then produced on the cork sheet surface.

Of course, the coating conditions need to be selected suitably for roll coating in order to produce the above-mentioned surface conditions. To this end, it is desirable that the coating quantity per coating operation be 22 g/m^2 to 44 g/m^2 and the viscosity of the coating material be 15 to 30 seconds in terms of the viscosity cup.

For maintaining the moire-like pattern proper to he cork on the cork base sheet surface, the proportion of the pigment contained in the coating material is crucial, such that, if the pigment quantity is excessive, the appearance of the cork sheet surface becomes monotonous in its entirety. Consequently, the proportion of the pigments in their entirety, that is the sum of the quantities of the various pigments, is set to 5 to 65 wt%, and the proportion of the inorganic pigments exhibiting the color fading preventative properties, is set to 5 to 20 wt%, with the remainder being the resin components.

If the pigment proportion exceeds the above range, the ground pattern of the cork base sheet is hidden such that it becomes difficult to maintain the texture and feeling of the cork. On the contrary, if the pigment proportion is short of the above range, the color fading preventative effect becomes insufficient such that the product becomes inferior in radiation-proofness.

The coating material may be applied by the roll coater once for all or in plural fractions. In the latter case, the number of times of fractional coating may be judiciously selected for finely changing the color

tones of the resulting cork decorative sheet.

The above-mentioned techniques of previously mixing the far-infrared radiating ceramics and the inorganic anti-bacterial agent into the resin binder during fabrication of the cork sheet or applying them in the form of a coating material on the surface of the molded cork sheet may be performed separately or in combination on the cork base sheet. Alternatively, a coating material containing the pigment exhibiting color fading preventative properties may be applied on the surface of the cork base sheet produced by previously mixing the far-infrared radiating ceramics and the inorganic anti-bacterial agent into the resin binder.

The present invention will be explained in more detail with reference to several Examples which are given only by way of illustration.

Example 1

In the present Example 1, a cork base sheet was prepared by previously introducing the far-infrared radiating ceramics into the resin binder.

First, the cork oak was freed of bark and dried to a starting cork material which was then crushed and granulated by a granulator. The resulting granulated material was admixed with the resin binder (urethane resin adhesive) and far-infrared radiating ceramics sold under the trade name of "Radi-Echo". The resulting mixture was agitated and pressed to a compacted mass. The starting components were used in the following proportions:

starting cork material	70 wt%
resin binder	20 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	10 wt%

The compacted mass was cut into a sheet the surface of which was ground to a cork decorative sheet. The resulting cork decorative sheet, which was in the form of a molded product made up of numerous granulated cork grains, had the appearance in no way different from that of the natural cork sheet despite that the far-infrared radiating ceramics were contained therein.

Cork decorative sheets were prepared in the similar manner with addition of colored pigments of various color tones besides the far-infrared radiating ceramics. Thus the cork decorative sheets containing the far-infrared radiating ceramics and colored in various color tones were obtained.

Example 2

In the present Example, a coating material containing far-infrared radiating ceramics was applied on the surface of a usual cork base sheet.

First, the cork oak was freed of bark and dried to a starting cork material which was then granulated by a granulator. The resulting crushed material was admixed with the resin binder (urethane resin adhesive) and the resulting mixture was agitated and pressed to a compacted cork base sheet.

On the other hand, the resin component and the far-infrared radiating ceramics were mixed by the following ratio to prepare a coating material.

urethane resin coating material	55 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
additive (curing agent)	14 wt%
solvent	13 wt%

Then, using a roll coater, the above coating material was applied on the surface of the above cork base sheet in two portions so that the total coated amount was 66 g/m^2. The viscosity of the coating material was 25 seconds in terms of the viscosity cup.

With the produced cork decorative sheet, fine pores and pits on the sheet surface were maintained unchanged. In addition, the cork decorative sheet exhibited air permeability and maintained the texture and feeling proper to cork, such that it could hardly be distinguished from the natural cork sheet which was not processed with surface treatment.

Example 3

In the present Example, similarly to the previous Example 2, a coating material containing far-infrared radiating ceramics was applied on the surface of a usual cork base sheet. However, in the present Example, various pigments were admixed in addition to the far-infrared radiating ceramics to produce cork decorative sheets having various color tones.

The cork decorative sheets were produced in the same way as in Example 2. However, the composition of the coating material was now changed to the following:

(i) Natural Color

urethane resin coating	45 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	10 wt%
additive (curing agent)	14 wt%
solvent	13 wt%

(ii) Brown Color

urethane resin coating	45 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	10 wt%
additive (curing agent)	14 wt%
solvent	13 wt%

(iii) White Color

urethane resin coating	35 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	20 wt%
additive (curing agent)	14 wt%
solvent	13 wt%

With the produced cork decorative sheets, similarly to the product of the previous Example 2, fine pores and pits on the sheet surface were maintained unchanged. In addition, the cork decorative sheets were colored in various color tones, besides exhibiting air permeability and maintaining the texture and feeling proper to cork.

Example 4

A coating material containing far-infrared radiating ceramics was coated in the same way as in Example 2 on the surface of the cork decorative sheet containing the far-infrared radiating ceramics prepared in Example 1.

In this manner, a cork decorative sheet which maintained the texture and feeling proper to the cork and which contained the far-infrared radiating ceramics on the surface and in the inside thereof could be produced.

Example 5

In the present Example, a color fading preventative coating material was applied on the surface of the cork decorative sheet of Example 1.

A coating material A and a curing agent B were mixed at a ratio of 4:1 and a solvent C was then added to the resulting mixture until the viscosity cup of 15 to 20 seconds was reached in order to prepare an opaque coating material. The following compositions were used for the coating material A, curing agent B and the solvent C.

Coating Material A

acryl urethane resin	28 wt%
cork color toning pigment	3 wt%
additive	0.3 wt%
aromatic hydrocarbons	32 wt%
acetic acid ester	33 wt%
ketone	3.7 wt%

curing agent B

polyisocyanate	75 wt%
aromatic hydrocarbons	12.5 wt%
acetic acid ester	12.5 wt%

solvent C

aromatic hydrocarbons	55 wt%
acetic acid ester	35 wt%
methylethylketone	10 wt%

In the above coating material A, the following three compositions of the cork color toning pigment were employed.

(i) Cork Color Toning Pigment (Natural Color)

yellow lead	30 wt%
carbon	4 wt%
iron oxide red	6 wt%
rutile titanium	60 wt%

(ii) Cork Color Toning Pigment (Brown Color)

yellow lead	45 wt%
carbon	33 wt%
iron oxide red	22 wt%

(iii) Cork Color Toning Pigment (Dark Brown Color)

yellow lead	22 wt%
carbon	46 wt%
iron oxide red	22 wt%

Then, using a flow coater, the prepared opaque coating material was uniformly coated on the entire surface of a cork decorative sheet (305 mm × 305 mm) prepared in Example 1 in two portions each of 6 g, and the sheet thus coated was dried by a far infrared drier.

Then, using a flow coater, a photoreactive urethane resin, consisting of 54 wt% of acryl urethane resin, 40 wt% of a reactive diluent and 6 wt% of a suspension agent was further coated in an amount of 70 g/m^2 and the resulting product was cured by UV irradiation to produce a cork decorative sheet.

The resulting cork decorative sheets contained far infrared radiating ceramics and exhibited superior radiation-proofness while maintaining the moire-like pattern unique to the cork. The produced sheets were exposed to the solar beam by way of color fading tests. It was found that the tested sheets scarcely showed color fading.

Example 6

In the present Example, cork base sheets were prepared by previously mixing far-infrared radiating ceramics and an inorganic anti-bacterial agent into a resin binder.

First, the cork oak was freed of bark and dried to a starting cork material which was then crushed and granulated by a granulator. The resulting granulated material was admixed with a resin binder (urethane resin adhesive), an inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders" and far-infrared radiating ceramics having the trade name of ("Radi-Echo") and the resulting mixture was agitated and pressed to a compacted mass. The starting material had the following composition:

starting cork material	70 wt%
resin binder	19 wt%
inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders"	1 wt%
far-infrared radiating ceramics having the trade name of ("Radi-Echo")	10 wt%

The compacted mass was cut into a sheet the surface of which was ground to a cork decorative sheet. The resulting cork decorative sheet, which was in the form of a molded product made up of numerous crushed cork grains, had the appearance in no way different from that of the natural cork sheet despite that the far-infrared radiating ceramics were contained therein.

Cork decorative sheets were prepared in the similar manner with addition of colored pigments of various color tones besides the inorganic anti-bacterial agent and the far-infrared radiating ceramics. Thus the cork decorative sheets containing the far-infrared radiating ceramics and colored in various color tones were obtained.

Example 7

In the present Example, a coating material containing an inorganic anti-bacterial agent and far-infrared radiating ceramics was applied on the surface of a usual cork base sheet.

First, the cork oak was freed of bark and dried to a starting cork material which was then crushed and granulated by a granulator. The resulting granulated material was admixed with the resin binder (urethane resin adhesive) and the resulting mixture was agitated and pressed to a compacted cork base sheet.

On the other hand, the resin component and the far-infrared radiating ceramics were mixed in the following ratio to prepare a coating material.

urethane resin coating material	55 wt%
inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders"	1.8 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
additive (curing agent)	12.2 wt%
solvent	13 wt%

Then, using a roll coater, the above coating material was applied on the surface of the above cork base sheet in two portions so that the total coated amount was 66 g/m^2. The viscosity of the coating material was 25 seconds in terms of the viscosity cup. With the produced cork decorative sheet, fine pores and pits on the sheet surface were maintained unchanged. In addition, the cork decorative sheet exhibited air permeability and maintained the texture and feeling proper to cork, such that it could hardly be distinguished from the natural cork sheet which was not processed with surface treatment.

Then, a fluorine resin coating material containing a fluorine resin coating material containing the inorganic anti-bacterial agent and the far-infrared radiating ceramics was applied to and permeated under pressure into the surface of the produced cork decorative sheet. In this manner, resistance against pollution, radiation-proofness an durability of the cork decorative sheet could be improved further.

Example 8

In the present Example, similarly to the previous Example 7, a coating material containing an inorganic anti-bacterial agent and far-infrared radiating ceramics was applied on the surface of a usual cork base sheet. However, in the present Example, various pigments were admixed in addition to the far-infrared radiating ceramics to produce cork decorative sheets having various color tones.

The cork decorative sheets were produced in the same way as in Example 7. However, the composition of the coating material was now changed to the following:

(i) Natural Color

urethane resin coating	45 wt%
inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders"	1.8 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	10 wt%
additive (curing agent)	12.2 wt%
solvent	13 wt%

(ii) Brown Color

urethane resin coating	45 wt%
inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders"	1.8 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	10 wt%
additive (curing agent)	12.2 wt%
solvent	13 wt%

(iii) White Color

urethane resin coating	35 wt%
inorganic anti-bacterial agent having the trade name of "Radi-Echo Anti-Bacterial Powders"	1.8 wt%
far-infrared radiating ceramics marketed under the trade name of "Radi-Echo"	18 wt%
toning pigment	20 wt%
additive (curing agent)	12.2 wt%
solvent	13 wt%

With the produced cork decorative sheets, similarly to the product of the previous Example 7, fine pores and pits on the sheet surface were maintained unchanged. In addition, the cork decorative sheets were colored in various color tones, besides exhibiting air permeability and maintaining the texture and feeling proper to cork.

Example 9

The coating material containing an inorganic anti-bacterial agent and far-infrared radiating ceramics was coated in the same way as in Example 7 on the surface of the cork decorative sheet containing the far-infrared radiating ceramics prepared in Example 6.

In this manner, a cork decorative sheet which maintained the texture and feeling proper to the cork and which contained the inorganic anti-bacterial agent and far-infrared radiating ceramics on the surface and in the inside thereof could be produced. The cork decorative sheet thus produced also showed excellent resistance against contamination, excellent radiation-proofness and durability.

Example 10

In the present Example, a color fading preventative coating material was applied on the surface of the cork decorative sheet of Example 6.

A coating material D and a curing agent E, having the following compositions, were mixed at a ratio of 4:1 and a solvent F was then added to the resulting mixture until the viscosity cup of 15 to 20 seconds was reached in order to prepare an opaque coating material. The following compositions were used for the coating material D, curing agent E and the solvent F.

Coating Material A

acryl urethane resin	28 wt%
cork color toning pigment	3 wt%
additive	0.3 wt%
aromatic hydrocarbons	32 wt%
acetic acid ester	33 wt%
ketone	3.7 wt%

curing agent E

polyisocyanate	75 wt%
aromatic hydrocarbons	12.5 wt%
acetic acid ester	12.5 wt%

solvent C

aromatic hydrocarbons	55 wt%
acetic acid ester	35 wt%
methylethylketone	10 wt%

In the above coating material D, the following three compositions of the cork color toning pigment were employed.

(i) Cork Color Toning Pigment (Natural Color)

yellow lead	30 wt%
carbon	4 wt%
iron oxide red	6 wt%
rutile titanium	60 wt%

(ii) Cork Color Toning Pigment (Brown Color)

yellow lead	45 wt%
carbon	33 wt%
iron oxide red	22 wt%

(iii) Cork Color Toning Pigment (Dark Brown Color)

yellow lead	22 wt%
carbon	46 wt%
iron oxide red	22 wt%

Then, using a flow coater, the prepared opaque coating material was uniformly coated on the entire surface of a cork decorative sheet (305 mm × 305 mm) prepared in Example 1 in two portions, each in an amount of 6 g, and the sheet thus coated was dried by a far infrared drier.

Then, using a flow coater, a photoreactive urethane resin, consisting of 54 wt% of acryl urethane resin, 40 wt% of a reactive diluent and 6 wt% of a suspension agent was further coated in an amount of 70 g/m^2 and the resulting product was cured by UV irradiation to produce a cork decorative sheet.

The resulting cork decorative sheets contained the inorganic anti-bacterial agent and the far infrared radiating ceramics and exhibited superior radiation-proofness while maintaining the moire-like cork pattern. The produced sheets were exposed to the solar beam by way of color fading tests. It was found that the tested sheets scarcely suffered from color fading.

Claims

1. A cork decorative sheet containing a far-infrared radiating ceramics, wherein a granulated cork material is molded into a sheet using a resin binder.

2. The cork decorative sheet as claimed in claim 1 wherein the granulated cork material is molded into a sheet using a resin binder containing far-infrared radiating ceramics.

3. The cork decorative sheet as claimed in claim 1 wherein a coating material containing far-infrared radiating ceramics is applied on the surface thereof.

4. The cork decorative sheet as claimed in claim 3 wherein a coating material containing far-infrared radiating ceramics is permeated therein under pressure.

5. A cork decorative sheet containing an inorganic anti-bacterial agent, wherein a granulated cork material is molded into a sheet using a resin binder.

6. The cork decorative sheet as claimed in claim 5 further containing far-infrared radiating ceramics.

7. The cork decorative sheet as claimed in claim 1 wherein the granulated cork material is molded into a sheet using a resin binder containing an inorganic anti-bacterial agent.

8. The cork decorative sheet as claimed in claim 7 wherein the granulated cork material also contains far-infrared radiating ceramics.

9. The cork decorative sheet as claimed in claim 5 wherein a coating material containing an inorganic anti-bacterial agent is applied on the surface thereof.

10. The cork decorative sheet as claimed in claim 9 wherein a coating material containing an inorganic anti-bacterial agent is permeated therein under pressure.

11. The cork decorative sheet as claimed in claims 10 or 11 wherein the coating material also contains far-infrared radiating ceramics.

12. The cork decorative sheet as claimed in claims 1 or 5 having its surface processed with fluorine resin or silicon resin treatment.

13. A method for producing a cork decorative sheet comprising applying a coating material containing at least one of far-infrared radiating ceramics and an inorganic anti-bacterial agent on the surface of a cork base sheet using a roll coater for permeating the coating material under pressure into the cork base plate produced by molding a granulated cork material into a sheet with the aid of a resin binder.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP94/01005

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl^5 B32B21/00, B29C67/02, B27N3/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl^5 B32B21/00, B29C67/02, B32B27/04, B27N3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the written application of Japanese Utility Model Application No. 9982/1991 (Laid-Open No. 95905/1992) (Mokuzai Hozon Center K.K.), August 19, 1992 (19. 08. 92), (Family: none)	1-13
Y	Microfilm of the specification and drawings annexed to the written application of Japanese Utility Model Application No. 111924/1971 (Laid-Open No. 79874/1973) (Senri Kikaku Sogo K.K.), October 1, 1973 (01. 10. 73), (Family: none)	12
Y	JP, B1, 48-8351 (Sherllar Andre), March 13, 1973 (13. 03. 73) & GB, A, 1187452 & DE, B, 1646119 & FR, A, 1530710	13
Y	Microfilm of the specification and drawings annexed to the written application of Japanese	1-4, 8, 11-13

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
August 30, 1994 (30. 08. 94)	September 27, 1994 (27. 09. 94)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP94/01005

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Utility Model Application No. 189187/1987 (Laid-Open No. 148335/1989) (Shin Fuji Seishi K.K.), October 13, 1989 (13. 10. 89), (Family: none)	
Y	Microfilm of the specification and drawings annexed to the written application of Japanese Utility Model Application No. 20509/1974 (Laid-Open No. 111021/1975) (Jard K.K.), September 10, 1975 (10. 09. 75), (Family: none)	1-4, 8, 11-13