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(54) **Arrangement for regulating the room humidity**

Einrichtung zum Regulieren der Zimmerfeuchtigkeit

Dispositif pour réguler l'humidité d'une pièce

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EP 1 610 066 B1

Description

[0001] The present invention relates to a humidity regulator apparatus in rooms of buildings.

[0002] It is known that rooms of buildings to be used as habitations or at all events to be designed to house persons and/or materials that are particularly sensitive to the moisture degree of the air contained in said rooms can be equipped with true conditioning apparatus or merely with air humidifiers to be used in winter combined with the heating plants and/or or with dehumidifiers to be used in summer to reduce sultriness.

[0003] It is known from US2004/020220 a "one-way" humidifier system, wherein cooling of an enclosed space is effected by means of a plurality of cooling units forming ducts having an internal surface on which a layer of liquid is developed (e.g. by means of a wicking material). Environmental air from the enclosed space is passed in contact with the liquid layer, so that the liquid is exposed to the air itself and evaporates into the air-flow, with consequent cooling of the duct wall on which the liquid layer is developed.

In this system, each cooling unit is just capable of releasing humidity in the environmental air, but it is not capable of taking it back from the air itself: in other words, the cooling units do not present elements made of a material which is simultaneously capable of absorbing and releasing humidity.

[0004] It is also known from JP58051921 a sheet-like material for adjusting humidity. Such a material is obtained by uniformly bonding a powdery humidity-adjusting agent and a suitable fiber, to form an integral structure. In a preferred embodiment, the powdery humidity-adjusting agent is modified montmorillonite clay, which is uniformly coated to Japanese paper and thin leaf paper; also beaten kraft pulp is present in such an embodiment. This sheet-like material is molded into a strip-like or plate-like shape, so as to be used in a case for cultural assets, as a packing material for transportation of cultural assets, as a building material or an interior material. In this prior art reference, a complete lack of means for actively supplying of water to the sheet-like material (and so to cause the releasing of that water in the air), and at the same time it is not evident if the material itself is capable to absorb and simultaneously release humidity.

[0005] However in particular the above mentioned humidifiers, in addition to having sometimes rather expensive costs for installation and management, are not generally able, above all in rooms maintained to high temperature in winter periods, to reduce the air dryness and to bring the relative air moisture to percentage values acceptable to the human beings, usually about 50%, that are also judged as indispensable for a correct conservation of furniture, wooden structures and coverings, such as parquets and the like.

[0006] It is also known that the walls of a building can be made or plastered with clayey materials or crude earth materials that not only offer particular aesthetic natural

solutions, but also offer advantageous properties due both to their full compatibility with the living organisms and suitability to neutralise odours and noxious substances, and to their capability of absorbing or releasing humidity also in important amounts without being submitted to structural alterations or losing their characteristics.

[0007] It is to be pointed out at all events that the beneficial suitability to adjustment of the humidity rates performed by clayey materials finds a limitation above all in the presence of very dry air over extended periods because under these circumstances said clayey materials completely dry and are no longer able to return water to the environmental air in which they are inserted.

[0008] Under this situation the technical task underlying the present invention is to conceive a humidity regulator apparatus capable of substantially obviating the limits of the above mentioned known apparatus and of the walls or other structural elements made up of or coated with clayey materials or crude earth materials at least partly.

[0009] Within the scope of this technical task it is an important aim of the invention to devise a humidity regulator apparatus in rooms of buildings enabling suitable relative humidity rates to be maintained above all in winter periods when the air has a tendency to remain particularly dry due to the heating action of radiators, stoves and the like.

[0010] Another important aim of the invention is to devise a humidity regulator apparatus based on use of natural and non-polluting materials which is able to ensure full bio-compatibility of the rooms in which it is set.

[0011] The technical task mentioned and the aims specified are substantially achieved by a humidity regulator apparatus in rooms of buildings, one said room having walls or other elements such as stoves, columns, panels, pillars, at least partly consisting of crude earth or other suitable material, characterised in that it comprises water supplying means designed to moisten said material and means for controlled conveyance to the material of the water fed by said supplying means.

[0012] Description of two preferred but not exclusive embodiments of an apparatus in accordance with the invention are now given by way of non-limiting examples and depicted in the accompanying drawings, in which:

- Fig. 1 diagrammatically shows a first embodiment of the apparatus in accordance with the invention; and
- Fig. 2 diagrammatically shows a second embodiment of the apparatus in accordance with the invention.

[0013] With reference to the drawings, the apparatus in accordance with the invention is generally identified by reference numeral 1.

[0014] It can be advantageously carried out in rooms of buildings having walls at least partly consisting of a material capable of absorbing and releasing humidity without suffering from structural decay, such as clayey

or clay-based materials that can be used as coatings or plaster for said walls.

[0015] In addition, the apparatus can be also used either through exploitation of surfaces of columns or pillars coated with the same materials adapted to absorb and release humidity (clay-based or clay-containing materials, crude earth materials, clayey crude earth or silty crude earth materials or others), or through exploitation of surfaces of other elements such as stoves or the like.

[0016] Obviously the invention can be also carried out in the presence of rooms fully made of said bio-compatible materials having the mentioned properties of absorbing/releasing humidity from and to the air.

[0017] Said apparatus comprises means 3 for supplying the water designed to moisten the clayey material 2 and means 4 for controlled conveyance of the water fed by said supplying means 3.

[0018] By way of example only, in a first embodiment of the apparatus in accordance with the invention and diagrammatically shown in Fig. 1, the water supplying means 3 can consist of one or more containers external to the wall in which storage of the water itself is possible by connection with suitable pipelines or directly through pouring off from other vessels.

[0019] In this first embodiment the means 4 for controlled conveyance of the water to the clayey material 2 can be obtained from simple elements adapted to cause water flow by capillary attraction, such as strips of suitable textile material or other similar materials.

[0020] Obviously, it will be also possible to use suitable tubular elements adapted to convey the water from the container, located on or in an upper part of the clayey wall, to a lower region thereof.

[0021] In the example shown in Fig. 1 provision is made for use of one or more strips of fibrous material that have a first end 4c plunged in the water held in the container 3 and the other end 4b incorporated into the wall to be humidified.

[0022] In this connection it is to be pointed out that the crude earth material easily lends itself to operations of inserting such elements without requiring finishing interventions by qualified persons for digging the housing of the strips and then partly incorporating them into the wall.

[0023] In a second embodiment diagrammatically shown in Fig. 2 the controlled-conveyance means 4 for the water is advantageously obtained by use of at least one panel of the same type as, or a type similar to those already known and utilised in wall heating. Said panel has a pipe, a pipe coil 4a for example, incorporated thereinto and in communication with the clayey material 2 through a plurality of small apertures.

[0024] In the last-mentioned embodiment the water supplying means 3 consists of feeding ducts in which the water flow running therethrough can be suitably controlled or programmed by the user depending on requirements.

[0025] In other words, by intervening on a simple command, a predetermined amount of water is caused to be

poured out into the wall and therefore to be released therefrom to the environment to be humidified.

[0026] Still alternatively, the controlled-conveyance means 4 can comprise a valve or similar device capable of selectively enabling passage of water from the water supplying means 3 to the material susceptible of absorbing humidity.

[0027] It will be therefore possible to use a panel made of a material capable of absorbing water (by capillary attraction, for example) and releasing it to the concerned environment without suffering from structural decay, which panel is directly and partly plunged in a water-holding container (that will at the same time act as a water supplying means 3 and a controlled-conveyance means 4). It is the panel itself that will absorb and release water in a controlled manner.

[0028] The invention achieves important advantages.

[0029] In fact, first of all, the apparatus in accordance with the invention enables achievement of a healthy and comfortable humidity level in every type of room and under any situation, in particular in the presence of heating elements that by themselves would tend to bring the air to very reduced humidity rates, which humidity level is particularly suitable to the presence of humans and useful also for a correct conservation of wooden artefacts.

[0030] Furthermore, the apparatus being the object of the invention has a quite independent operation and adjusting action because humidity exchange between the crude earth material and the concerned environment will be greater or smaller depending on the air dryness or humidity, for a natural balance.

[0031] An environment with a correct humidity is recommended by physicians above all in rooms assigned to children to obviate some types of problems to the respiratory tract.

[0032] The apparatus being the object of the invention, in some more elementary forms thereof, can be also a creative and amusement element, in addition to being healthy.

[0033] It will be finally recognised that the apparatus in accordance with the invention allows an important energy saving as compared with the apparatus of the known art and in addition the installation costs are very reduced. In fact it exploits the properties of absorbing/releasing humidity of the material forming the wall and also exploits the surface sizes to increase efficiency of the adjusting action.

Claims

1. A humidity regulator apparatus with a room of a building, one said room having walls or structural elements at least partly made up of or coated with a material (2) capable of absorbing humidity and releasing it into the concerned environment without suffering from structural decay, said apparatus (1) comprising:

- Water supplying means (3) designed to moisten said material; and
 - Means (4) for controlled conveyance to the material, of the water fed by said supplying means (3).
2. A humidity regulator apparatus as claimed in claim 1, **characterised in that** said elements at least partly made up of or coated with a material capable of absorbing humidity and releasing it into the concerned environment without suffering from structural decay are walls, columns, pillars, panels, stoves or other components or movable or immovable accessories that are adapted to allow an absorbing/releasing function.
3. A humidity regulator apparatus in rooms of buildings as claimed in claim 1, one said room having walls at least partly made of clayey material (2), **characterised in that** it comprises:
- water supplying means (3) designed to moisten said clayey material, and
 - means (4) for controlled conveyance to the clayey material of the water fed by said supplying means (3).
4. A humidity regulator apparatus as claimed in claim 3, **characterised in that** said water supplying means (3) consists of at least one container in which storage of said water is possible.
5. A humidity regulator apparatus as claimed in claim 4, **characterised in that** said means (4) for controlled conveyance of the water from said container to the clayey material (2) consists of at least one element adapted to enable water flowing by capillary attraction.
6. A humidity regulator apparatus as claimed in claim 5, **characterised in that** the element adapted to enable water flowing by capillary attraction has a first end located within the container carrying the water and a second end plunged in the wall of clayey material.
7. A humidity regulator apparatus as claimed in claim 3, **characterised in that** said means (4) for water conveyance from said container to the clayey material (2) consists of at least one tubular element suitable to enable water flowing.
8. A humidity regulator apparatus as claimed in claim 3, **characterised in that** said means (4) for controlled conveyance of the water to the clayey material (2) consists of at least one panel inserted into a wall of the room.

9. A humidity regulator apparatus as claimed in claim 8, **characterised in that** the room wall has at least one pipe coil incorporated therein and in communication with said clayey material (2) by a plurality of apertures, and **in that** said water supplying means (3) comprises ducts for feeding said panel.

Patentansprüche

1. Einrichtung zum Regulieren der Zimmerfeuchtigkeit eines Gebäudes, wobei das Zimmer die Wände oder Bauteile zumindest teilweise aus einem Material (2) bestehen oder damit verkleidet sind, das fähig ist Feuchtigkeit aufzunehmen und sie dem betroffenen Raum abzugeben ohne einen Abbau in der Struktur zu erfahren, wobei die Einrichtung (1) umfasst:
- Mittel (3) zur Abgabe von Wasser, das zur Befeuchtung des Materials bestimmt ist, und
 - Mittel (4) zur kontrollierten Leitung des von den Abgabemitteln (3) abgegebenen Wassers zum Material.
2. Einrichtung zum Regulieren der Feuchtigkeit nach Anspruch 1, **dadurch gekennzeichnet, dass** die strukturellen Teile mindestens teilweise aus einem Material bestehen oder damit verkleidet sind, das fähig ist Feuchtigkeit aufzunehmen und sie dem betroffenen Raum abzugeben, ohne einen Abbau zu erfahren, die Wände, Säulen, Pfeiler, Paneele, Öfen oder andere Bestandteile oder bewegliche oder unbewegliche Zusatzteile sind, welche die Aufnahme-/Abgabefunktion ermöglichen können.
3. Einrichtung zum Regulieren der Zimmerfeuchtigkeit von Gebäuden nach Anspruch 1, wobei das Zimmer Wände aufweist, die mindestens teilweise aus tonartigem Material (2) bestehen, **dadurch gekennzeichnet, dass** sie umfasst:
- Abgabemittel (3) von Wasser, das dazu bestimmt ist, den tonartige Material zu befeuchten, und
 - Mittel (4) zur kontrollierten Leitung zum tonartigen Material des von den Abgabemitteln (3) abgegebenen Wassers.
4. Einrichtung zum Regulieren der Zimmerfeuchtigkeit nach Anspruch 3, **dadurch gekennzeichnet, dass** die Wasserabgabemittel (3) aus mindestens einem Behälter bestehen, in dem das Speichern des Wassers selbst möglich ist.
5. Einrichtung zum Regulieren der Zimmerfeuchtigkeit nach Anspruch 4, **dadurch gekennzeichnet, dass** die Mittel (4) zum kontrollierten Leiten des Wassers vom Behälter zum tonartigen Material (2) aus min-

destens einem Element bestehen, das für das Fließen des Wassers durch Kapillarität geeignet ist.

6. Einrichtung zum Regulieren der Zimmerfeuchtigkeit nach Anspruch 5, **dadurch gekennzeichnet, dass** das für das Fließen von Wasser durch Kapillarität geeignete Element ein erstes Ende, das innerhalb des das Wasser tragenden Behälters angeordnet ist, und ein zweites Ende aufweist, das in der Wand aus tonartigem Material eingebettet ist.
7. Einrichtung zum Regulieren der Zimmerfeuchtigkeit nach Anspruch 3, **dadurch gekennzeichnet, dass** die Leitungsmittel (4) des Wassers vom Behälter zum tonartigen Material (2) aus mindestens einem Rohrteil bestehen, das für das Fließen des Wassers geeignet ist.
8. Einrichtung zum Regulieren der Zimmerfeuchtigkeit nach Anspruch 3, **dadurch gekennzeichnet, dass** die Leitungsmittel (4) zum kontrollierten Leiten des Wassers zum tonartigen Material (2) aus mindestens einem Paneel bestehen, das innerhalb einer Zimmerwand eingebracht ist.
9. Einrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die Wand des Zimmers in ihr eingebaut eine schlangenartige Rohrleitung aufweist, die mit dem tonartigen Material (2) über eine Vielzahl von Öffnungen in Verbindung steht, und **dadurch**, dass die Wasserabgabemittel (3) Leitungen zur Versorgung des Paneels umfassen.

Revendications

1. Dispositif pour réguler l'humidité d'une pièce dans un bâtiment, ladite une pièce présentant des parois ou éléments structurels au moins partiellement fabriqués ou revêtus d'une matière (2) en mesure d'absorber l'humidité et la distribuer dans le milieu intéressé sans subir aucune dégradation structurale, ledit dispositif (1) comprenant:
 - des moyens de fourniture de l'eau (3) destinée à humecter ladite matière; et
 - des moyens (4) destinés à contrôler le transport à la matière de l'eau alimentée par lesdits moyens de fourniture (3).
2. Dispositif pour réguler l'humidité selon la revendication 1, **caractérisé en ce que** lesdits éléments au moins partiellement fabriqués ou revêtus d'une matière en mesure d'absorber l'humidité et la distribuer dans le milieu intéressé sans subir aucune dégradation structurale sont des parois, colonnes, piliers, panneaux, poêles ou autres éléments composants ou accessoires mobiles ou immobiles qui sont aptes

à permettre la fonction d'absorption/distribution.

3. Dispositif pour réguler l'humidité dans des pièces de bâtiments selon la revendication 1, ladite une pièce ayant des parois au moins partiellement fabriquées en matière argileuse (2), **caractérisé en ce qu'il** comporte:
 - des moyens de fourniture de l'eau (3) destinée à humecter ladite matière argileuse; et
 - des moyens (4) destinés à contrôler le transport à la matière argileuse de l'eau alimentée par lesdits moyens de fourniture (3).
4. Dispositif pour réguler l'humidité selon la revendication 3, **caractérisé en ce que** lesdits moyens de fourniture de l'eau (3) comportent au moins un conteneur dans lequel est possible l'emmagasinement de ladite eau.
5. Dispositif pour réguler l'humidité selon la revendication 4, **caractérisé en ce que** lesdits moyens (4) destinés à contrôler le transport de l'eau dudit conteneur à la matière argileuse (2) comportent au moins un élément apte à permettre l'écoulement de l'eau par capillarité.
6. Dispositif pour réguler l'humidité selon la revendication 5, **caractérisé en ce que** l'élément apte à permettre l'écoulement de l'eau par capillarité présente une première extrémité placée dans le conteneur portant l'eau et une deuxième extrémité plongée dans la paroi de matière argileuse.
7. Dispositif pour réguler l'humidité selon la revendication 3, **caractérisé en ce que** lesdits moyens (4) pour le transport de l'eau depuis ledit conteneur jusqu'à la matière argileuse (2) se composent d'au moins un élément tubulaire apte à permettre l'écoulement de l'eau.
8. Dispositif pour réguler l'humidité selon la revendication 3, **caractérisé en ce que** lesdits moyens (4) destinés à contrôler le transport de l'eau vers la matière argileuse (2) se composent d'au moins un panneau inséré dans une paroi de la pièce.
9. Dispositif pour réguler l'humidité selon la revendication 8, **caractérisé en ce que** la paroi de la pièce a au moins un tuyau à serpentin incorporé dans celle-ci et en communication avec ladite matière argileuse (2) par l'intermédiaire d'une pluralité d'ouvertures, et **en ce que** lesdits moyens de fourniture de l'eau (3) comportent des conduits pour alimenter ledit panneau.

