Title: BED EQUIPED WITH STERILIZING AND DISINFECTING MEANS

Abstract: The present invention relates to a bed equipped with sterilizing and disinfecting means. Objects of the present invention are to provide a bed equipped with means for sterilizing and disinfecting the bed itself by means of ozone so that harmful microorganisms or noxious insects which inhabit the bed mattress can be sterilized and disinfected thereby accomplishing the sanitary use of the bed, and to provide a bed equipped with sterilizing and disinfecting means which is convenient to use at home.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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TITLE
BED EQUIPED WITH STERILIZING AND DISINFECTING MEANS

TECHNICAL FIELD

The present invention relates to a bed equipped with sterilizing and disinfecting means.

BACKGROUND ART

Generally, a bed is an article for daily use, which keeps in touch with people every day. The bed is contaminated by sweat and secretion (for example, horny substance of a skin, dandruff, hair, etc.) secreted or separated from the body of the people. Accordingly, harmful microorganisms or noxious insects inhabit the bed to threaten people's sanitation.

In particular, a bedroom is a place where a great number of harmful bacteria and harmful insects are lived since the temperature and the humidity are maintained constantly in the bedroom.

For these reasons, disease, such as allergic rhinitis, allergic asthma, atopic dermatitis, conjunctivitis, etc., become increased suddenly recently.

The harmful bacteria and the harmful insects which cause occurrence of the disease as mentioned above may be exterminated by sterilization and disinfection of the bed. In the home, bedclothes, which are movable freely as they are light and small in size, may be exposed to the sun for a long time in order that they may be sterilized and disinfected. However, it is difficult to expose a bed mattress to the sun, because it is heavy and large in size.

Especially, modern people who are harassed with burdensome business
matters cannot afford to transport and expose the bed mattress to the sun for a long time.

Accordingly, it is required to provide means for sterilizing and disinfecting the bed by means of a simple operation without regard to time.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a bed equipped with means for sterilizing and disinfecting the bed itself by means of ozone so that harmful microorganisms or noxious insects which inhabit the bed mattress can be sterilized and disinfected thereby accomplishing the sanitary use of the bed.

It is a further object of the present invention to provide a bed equipped with sterilizing and disinfecting means which is convenient to use at home.

The foregoing objects are accomplished by providing a bed equipped with sterilizing and disinfecting means in which ozone is generated from an ozone generator attached to the bed if a start switch is operated when sterilizing and disinfecting of the bed is required during the use of the bed, and then the ozone generated from the ozone generator applies to the interior and the exterior of the bed mattress, thereby the bed mattress being sterilized and disinfected.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is an illustrative exploded perspective view of a bed equipped with sterilizing and disinfecting means according to one embodiment of the present
invention;

Fig. 2 is a lateral cross-sectional view in the middle of the bed equipped with sterilizing and disinfecting means shown in Fig. 1;

Fig. 3 is an illustrative exploded perspective view of a bed equipped with sterilizing and disinfecting means according to another embodiment of the present invention;

Fig. 4 is a lateral cross-sectional view in the middle of the bed equipped with sterilizing and disinfecting means shown in Fig. 3;

Fig. 5 is an illustrative exploded perspective view of a bed equipped with sterilizing and disinfecting means according to still another embodiment of the present invention;

Fig. 6 is a longitudinal cross-sectional view in the middle of the bed equipped with sterilizing and disinfecting means shown in Fig. 5; and

Fig. 7 is a graph showing the relations between rate of sterilization and ratio of surviving colonies obtained from the sterilization of a microorganism according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention will be now described in detail.

Generally a bed comprises a bed frame 100 and a bed mattress 200. The bed according to the present invention includes sterilizing and disinfecting means which comprises an ozone generator 20, and a cover 10 with an opening and closing member 12. The bed mattress 200 is opened or closed by the opening and closing member 12. A sterilizing and disinfecting room 11 is defined in the cover 10 closed by the opening and closing member 12. The
ozone can not be discharged from the sterilizing and disinfecting room 11 if the cover 10 is closed by the opening and closing member 12.

In a preferred embodiment of the present invention, an ozone lamp (UV/O3 lamp), an arc discharged ozone generator or an air-cooled ozone generator may be used as the ozone generator 20.

The cover 10 is separated up and down by the opening and closing member 12. The cover 10 is made of an airtight synthetic resin sheet or a waterproof fabric sheet. The opening and closing member 12 is made in the form of a magic tape or a zipper.

In the drawings, reference numeral 30 indicates a controller, reference numeral 31 indicates a power switch, reference numeral 32 indicates a lamp for indicating the operation, reference numeral 33 indicates a timer switch, reference numeral 50 indicates a fan provided for facilitating the smooth flow of the ozone, and reference numeral 51 indicates a fan switch.

In a preferred embodiment of the present invention as shown in Fig. 1 and Fig. 2, the ozone generator 20 is mounted in a mounting room 101 of the bed frame 100. A lower cover portion 10B of the cover 10 is attached around the upper end of the ozone generator 20. the lower cover portion 10B is fixed to the ozone generator 20 by means of a fixing member 21. When sterilizing and disinfecting of the bed is required during the use of the bed, a upper cover portion 10A is joined with the lower cover portion 10B by means of the opening and closing member 12, thereby the bed mattress being isolated. At this time, the ozone generated from the ozone generator 20 flow along the circumferential wall from the bottom of the bed mattress so that the bed mattress is sterilized and disinfected.
In another preferred embodiment of the present invention as shown in Fig. 3 and Fig. 4, the ozone generator 20 is mounted in a mounting room 201 which is formed in the lower part of the bed mattress 200. A lower cover portion 10B of the cover 10 is fixed to the bed mattress 200. The bed mattress 200 is isolated by the junction of the upper cover portion 10A and the lower cover portion 10B.

In this case, since the ozone generated from the ozone generator 20 has a high penetration level, the ozone can penetrate directly the bed mattress, that is, flow from the interior of the bed mattress toward the upper surface of the bed mattress, or the ozone can flow along ventilation holes 202 formed conventionally around the sides of the bed mattress toward the upper surface of the bed mattress, and then the ozone comes into contact with the surface of the bed mattress in the sterilizing and disinfecting room 11 defined between the cover 10 and the ozone generator 20. As a result, the bed mattress is sterilized and disinfected.

In still another preferred embodiment of the present invention as shown in Fig. 5 and Fig. 6, the ozone generator 20 is mounted in a mounting room 102 of the bed frame 100. The mounting room 102 is provided at one end thereof with a compartment 103 for storing the cover which is opened or closed by a lid 104. The ozone generator 20 is connected to the cover 10 via a flexible hose 40 so that the ozone generated from the ozone generator 20 is supplied to the sterilizing and disinfecting room 11.

In use, when the cover 10 is developed, the developed cover 10 is engaged with the opening and closing member 12 fixed around the bed mattress 200. As a result, the bed mattress is isolated and the ozone is supplied
into the sterilizing and disinfecting room 11 defined therein.

Preferably, the ozone generator 20 is provided with a fan 50 for facilitating the smooth flow of the ozone.

When the sterilizing and disinfecting of the bed is required during the bed constructed as mentioned above according to the present invention is used, the opening and closing member 12 of the cover 10 which is stored separately is engaged with the opening and closing member 12 provided around the bed mattress, and then the power switch 31 is turned on so that the ozone generator 20 is operated. The ozone generated from the ozone generator 20 is supplied into sterilizing and disinfecting room 11 defined between the surface of the bed mattress and the cover 10 to come into contact with the bed mattress and penetrate the mattress. As a result, harmful microorganisms or noxious insects which inhabit the bed are sterilized and disinfected.

[Experimental example 1: Test for sterilizing microorganisms]

The microorganisms used for the sterilization test were Escherichia coli DH12S, Staphylococcus aureus KCTC 1621 and Candida albicans KCTC 7965, which are known as pathogenic microorganisms. An UV/O3 lamp (184.9 nm) was used as the generator for generating ultraviolet rays and ozone.

Each of the microorganisms was cultivated on appropriate culture medium used commonly: Escherichia coli was cultivated on LB culture medium; Staphylococcus aureus was cultivated on Tryptic Soy culture medium; and Candida albicans was cultivated on YM culture medium. A sample of the microorganism was prepared as follows: After each of the microorganisms was cultivated on agar culture medium, one colony was taken. And then the colony was inoculated into broths of 5 ml, which was cultivated for two hours. The
sample prepared as mentioned above was kept in cold storage for the following use. The broths used for cultivation were diluted gradually from an undiluted solution to 10−8, and then they were painted over the agar culture medium. One control was obtained from each of the diluted samples, and seven samples for test were obtained from each of the diluted samples. The control and samples were subject to pre-incubation in the incubator with the temperature of 37°C for 30 minutes, which was used for sterilization test.

The concentration of the ozone in the sterilizing and disinfecting room reached 50 ppm within two or three minutes. And the concentration of the ozone was adjusted so that it was maintained to 70 ppm.

The humidity was maintained to 50%. The agar culture medium was placed on several position where it was not exposed to the ultraviolet rays and it had good ventilation. One agar culture medium corresponding to the bed mattress as a test sample was taken every ten minutes after the generator for generating the ultraviolet rays and the ozone was operated. The agar culture medium was cultivated together with the control sample in the incubator with the temperature of 37°C for 48 hours. And then the culture medium diluted such that it had a appropriate number of the colony to check the number of the microorganisms, from which the number of the colony was counted. The number of the real microorganisms and the number of the surviving microorganisms were added together taking the number of the colony and the dilution rate of each sample into account. The test as mentioned above was repeated three times for the purpose of obtaining the statistical effectiveness. The results are shown in Table 1 and Fig. 7.

[Table 1: Number of surviving microorganisms in ozone of 70 ppm]
Surviving colonies  | Time of exposure |
<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>0 min.</td>
</tr>
<tr>
<td>S. aureus</td>
<td>46,700,000 (±92,000)</td>
</tr>
<tr>
<td>E. coli</td>
<td>140,000 (±3,100)</td>
</tr>
<tr>
<td>C. albicans</td>
<td>112,000 (±1,100)</td>
</tr>
</tbody>
</table>

[Experimental example 2: Test for killing mites]

Mites used for test was the house dust mites (samples containing Dermatophagoides farinae, Dermatophagoides pteronyssinus and Tyrophagus putrescentiae mixed up one another were used) which were generally known as primary cause of allergy, which was distributed from the parasitology class of the medical college of Yonsei University in Korea. After the opening the lid of the tube containing twenty mites, the mites were exposed to the environment with the ozone of 50 ppm and the humidity of 72% for 2 hours while the mites were not exposed directly to the ultraviolet rays. After exposition of the mites to the ozone for a given time period, the number of the surviving mites and the number of the dead mites were counted by means of a microscopic examination. The examination revealed that most of the mites (for example, seventeen mites) were killed. Especially, all of the young mites were killed, and a few surviving large mites were not able to be active normally, which were dead as times went by.

INDUSTRIAL APPLICABILITY

With the bed which has sterilizing and disinfecting means according to the present invention, the contaminated bed mattress can be sterilized and disinfected easily by the ozone. Therefore, the sterilization and disinfection of
the bed is very convenient, and the effect of the sterilization and disinfection is satisfactory. In addition, any harmful substance is not left in the bed because the used ozone can be dissolved easily and simply in the air.

Furthermore, since the opening or closing of the cover can be carried out by means of the operation of the power switch, it is easy to use a bed equipped with sterilizing and disinfecting means and it is possible to sterilize and disinfect the bed mattress simply when people have time to spare.
WHAT IS CLAIMED IS:

1. A bed equipped with sterilizing and disinfecting means comprising a bed frame (100) and a bed mattress (200) characterized in that said bed includes sterilizing and disinfecting means which comprises an ozone generator (20) and a cover (10) with an opening and closing member (12), said bed mattress (200) being opened or closed by said opening and closing member (12), that a sterilizing and disinfecting room (11) is defined in said cover (10) closed by said opening and closing member (12), and that said ozone can not be discharged from said sterilizing and disinfecting room (11) if said cover (10) is closed by said opening and closing member (12).

2. The bed equipped with sterilizing and disinfecting means as claimed in claim 1 wherein said ozone generator (20) is mounted in a mounting room (101) of said bed frame (100), and a lower cover portion (10B) of said cover (10) is attached to said ozone generator (20) by means of a fixing member (21).

3. The bed equipped with sterilizing and disinfecting means as claimed in claim 1 wherein said ozone generator (20) is mounted in a mounting room (201) which is formed in the lower part of said bed mattress (200), and a lower cover portion (10B) of said cover (10) is fixed around said bed mattress.

4. The bed equipped with sterilizing and disinfecting means as claimed in claim 1 wherein said ozone generator (20) is mounted in a mounting room (102) of said bed frame (100), said mounting room (102) is provided at one end thereof with a compartment (103) for storing said upper cover portion (10A), said ozone generator (20) is connected to said upper cover portion (10A)
via a flexible hose (40) so that the ozone generated from said ozone generator (20) is supplied to said sterilizing and disinfecting room (11), and a lower cover portion (10B) is fixed around said bed mattress (200).

5. The bed equipped with sterilizing and disinfecting means as claimed in any of claims 1 to 4 further comprising a timer for controlling the operation time of said ozone generator (20).

6. The bed equipped with sterilizing and disinfecting means as claimed in any of claims 1 to 4 further comprising a fan (50) for feeding the ozone generated by said ozone generator (20) to said sterilizing and disinfecting room (11).
FIG 3