

[54] **METHOD AND APPARATUS FOR AIR-CONDITIONING**

[76] Inventor: **Toshio Yoshida**, 34
Tsukudshachiman, Shinjuku-ku,
Tokyo, Japan

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[51] Int. Cl. **G05d 7/00**

[58] Field of Search **21/74 R; 62/78; 128/191 R, 191 A; 98/39, 11; 236/49**

[56] **References Cited**

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Primary Examiner—William E. Wayner
Assistant Examiner—William E. Tapolcai, Jr.
Attorney—James E. Armstrong et al.

[57] **ABSTRACT**

When air is introduced for heating, cooling or ventilation of rooms in building, for example in a hotel located in a polluted air district, oxygen in an amount calculated to meet the requirements of the number of inmates is continuously supplied to the room together with air through an oxygen supply passage opening into the air inlet of the room. At the same time negative-ions generated by a negative-ion generator installed at the air inlet are supplied to the air-oxygen mixture. In the event of a fire occurring in the building, the oxygen supply is automatically cut off. In the rooms of a hotel located in polluted air districts, such as urban areas or industrial zones, a salubrious pleasant air can be supplied, with oxygen and negative-ions present in the air kept at an optimum level and at the same time, the aggravation of fire by oxygen can be prevented.

2 Claims, 2 Drawing Figures

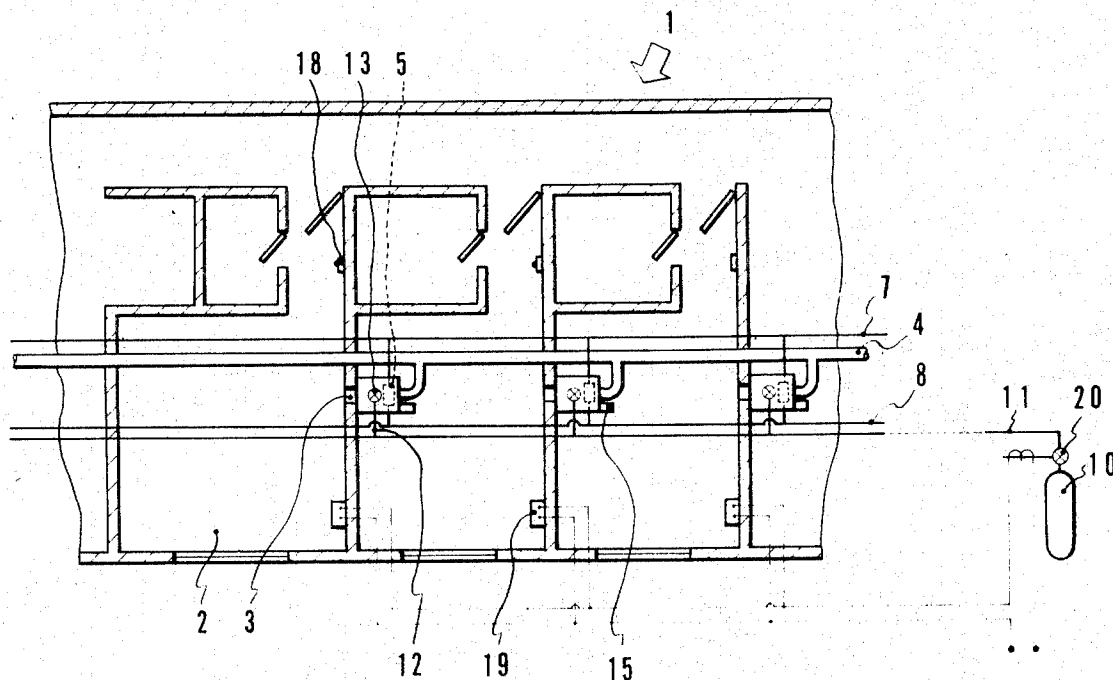


FIG. 1

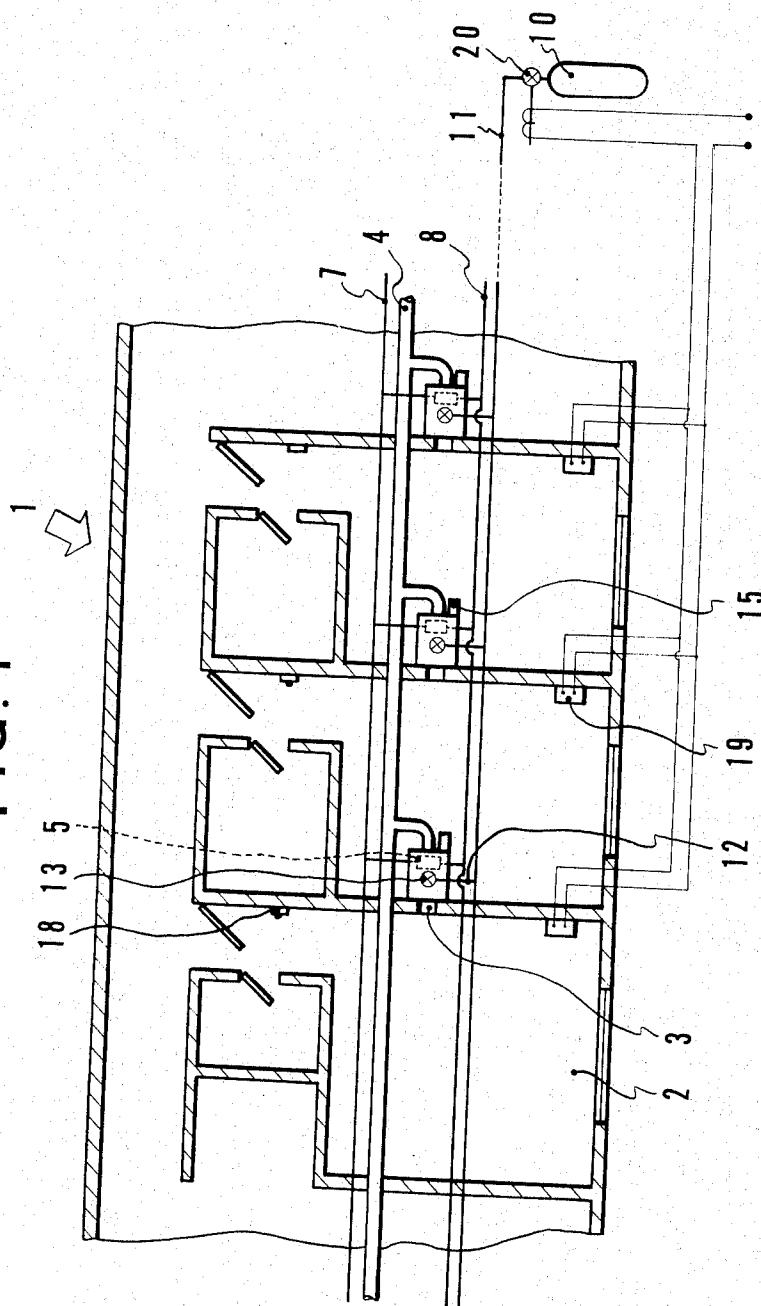
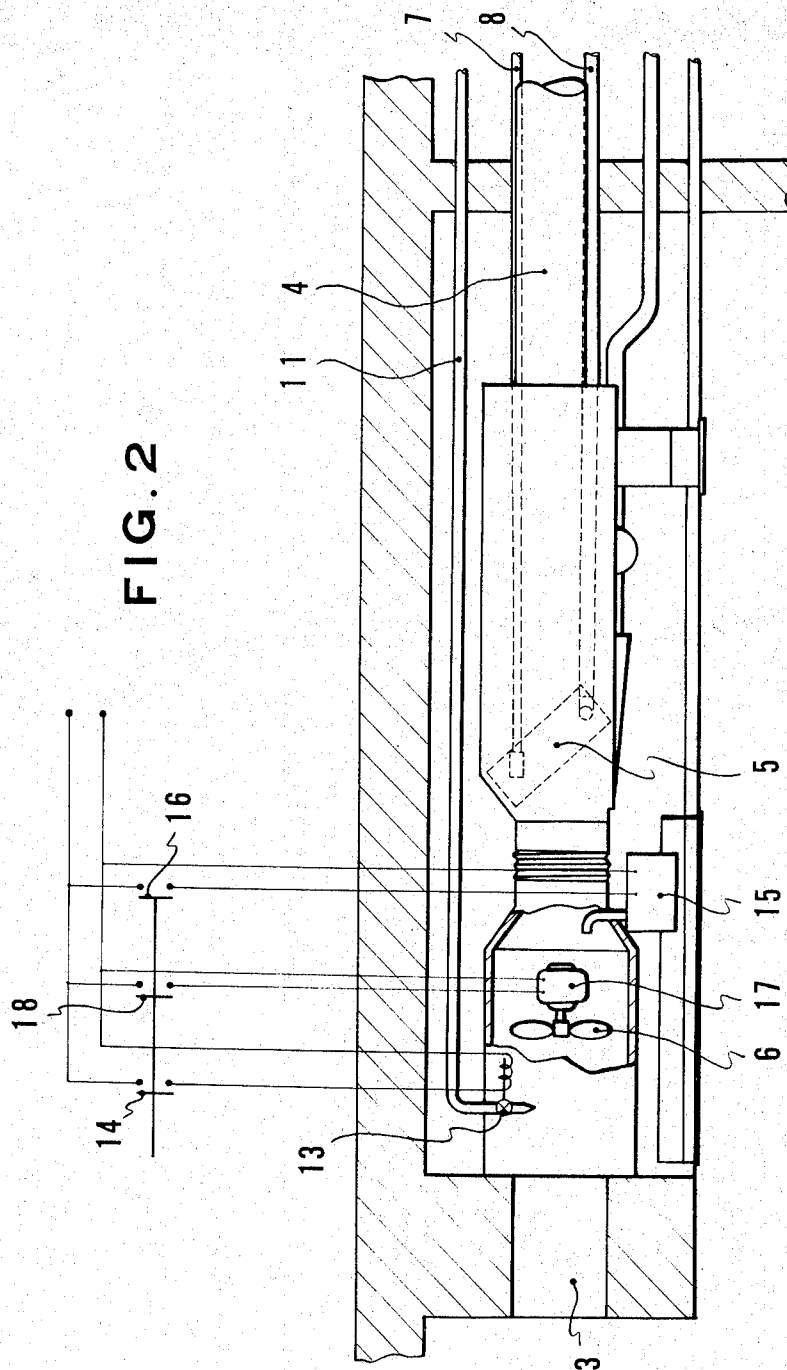


FIG. 2



METHOD AND APPARATUS FOR AIR-CONDITIONING

BACKGROUND OF THE INVENTION

Recently in urban and industrial zones the air has become heavily polluted with soot, smoke or poisonous fumes such as hydrogen sulfide gas emitted from chimneys connected with the heating systems of office buildings, department stores, theatres, movies, hotels and entertainment sites such as bowling alleys; and with auto exhaust emissions containing carbon monoxide gas. The oxygen content of such polluted air is said to be lower than that of normal air and particularly the quantities of negative-ions claimed to be effective for human health are extremely reduced.

The following is a table comparing the quantities of positive- and negative ions in the air.

Sites	Number of + ions/cc	Number of - ions/cc
Suburbs	670	695
Urban centers	150	100
Offices, buildings	44	45
Department stores	72	67

In hotels such polluted air is introduced after removal of dust and soot, cooled in summer or heated in winter and supplied through ducts to each room; thereby 50 percent of the air is recirculated, so that the amount of carbonic gas in the room reaches about 0.15 percent, whereas the corresponding percentage in the unpolluted air is 0.03-0.04.

The primary object of the present invention is to provide a method and apparatus for supplying a salubrious, pleasant air to buildings, with the oxygen consumed by the inmates being replenished and at the same time negative-ions being added to the air supply.

Another object is to provide, in combination with the method and apparatus of the invention, means for preventing an increased intensity of a fire because of the presence of oxygen by detecting the breakout of the fire by a fire sensor and automatically shutting of the oxygen valve to cut off the oxygen supply.

SUMMARY OF THE INVENTION

The present invention provides air-conditioning apparatus for buildings comprising: a heat-exchanger and a motor driven electric fan positioned at the air outlet; an electromagnetic valve to control the oxygen supply pipe; a negative-ion generator installed behind said oxygen supply pipe; the switches for said electromagnetic valve, said negative-ion generator, and the motor to drive said electric fan being interconnected; and fire-sensors whose output terminal is connected to the electromagnetic valve of said oxygen supply pipe.

There is also provided an air-conditioning method for rooms of buildings such as hotel located in a polluted air district, characterized by continuously introducing oxygen in an amount calculated to meet the requirements of the number of inmates to each of the rooms through an oxygen supply passage opening into the air inlet, said oxygen being introduced together with the air used to heat, cool or ventilate the room; and at the same time releasing negative-ions from a negative-ion generator positioned at the air inlet. In case of a fire breaking out in the hotel the oxygen supply is automatically cut off.

BRIEF DESCRIPTION OF THE DRAWINGS

The attached drawings illustrate the method of the invention and an embodiment of the apparatus of the invention. FIG. 1 being a general view and FIG. 2 being a lateral view of the air inlet section.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, in each room (2) of the hotel (1), an air supply pipe (4) opens into air inlet (3) and also a heat-exchanger (5) and an electric fan (6) are positioned at each inlet (3), heat-exchanger (5) being connected to a cold water or hot water supply pipe (7) and to recirculation pipe (8).

A passage (12) leading from pipe (11), which pipe is connected to an oxygen cylinder (10), opens into inlet (3). Each passage (12) is equipped with an electromagnetic valve (13), which is connected to switch (14).

Meanwhile, a negative-ion generator (15) is provided in association with air inlet (3); said generator (15) being positioned deeper in inlet (3) than said passage (12) which releases oxygen. This location is required, because great volumes of ozone are generated if oxygen is passed through said ion-generator and the effect on the ions would be harmful to the human body.

Switch (16) of ion-generator (15) are interconnected with switch (18) of motor (17) used to drive fan (6).

Meanwhile, fire-sensors (19) provided at appropriate locations within the hotel have their output terminals connected to the main electromagnetic valve (20) attached to pipe (11).

The operation of the apparatus is explained as follows. Depending on whether a particular room (2) is a single-bed room, a twin-bed room or a double-bed room, the necessary consumption of oxygen is calculated. For this calculation, the necessary oxygen supply per person is assumed to the 25 l per hour and the electromagnetic valve (13) is set to the maximum degree of opening that assumes an oxygen supply per person in this amount. The degree opening of the main valve (20) is fixed to make the oxygen supply pressure constant. Normally, valve (13) is shut and the generator (15) is not working.

Now, when inmates occupy room (2) and air-conditioning switch (18) is turned ON, motor (17) begins to drive the fan (6) and thereby the air cooled or heated by heat-exchanger (5) begins to enter room (2).

When switches (14)(16) interconnected with switch (18) are closed, valve (13) opens and the oxygen in cylinder (10) is released into the room through pipe (11), passage (12) and valve (13), together with the air introduced through inlet (3). On the other hand, generator (15) acts to release negative-ions into the room together with the introduced air. Next, in the event of a fire breaking out in the hotel, an output occurs at the fire-sensor (19); this output, being amplified, is applied to main valve (20), which is thus closed, thereby cutting off the oxygen supply to all rooms and automatically preventing the fire from being energized by oxygen supply.

According to the present invention, in hotel rooms located in a polluted air area then the rooms are occupied by inmates and the air-conditioning switch is closed, a cold or hot air is introduced to regulate the temperature and ventilate the room. At the same time the valve of the oxygen supply pipe is opened and automatically the amount of oxygen meeting the require-

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ments of the number of guests is replenished, while the negative-ion generator acts to release negative-ions, thereby assuming a healthy, comfortable environment to the guests.

In case of a fire occurring in the hotel, the fire-sensors react to the fire and thereby the valve of the oxygen supply pipe is automatically shut to cut off the oxygen supply and prevent the fire from being energized by oxygen supply.

What is claimed is:

1. Air-conditioning apparatus for rooms comprising; a heat-exchanger and an electric fan positioned at the air inlet of a room of a building; an electromagnetic valve through which an oxygen supply passage is opened; a negative-ion generator positioned deeper within said inlet than the oxygen supply passage; the switches of said electromagnetic valve, said ion genera-

4

tor and the motor to drive said fan being interconnected with each other; and fire-sensors whose output terminal is connected to said valve of the oxygen supply passage.

2. Air-conditioning method for rooms of buildings located in a polluted-air area, characterized by introducing oxygen in an amount matching the requirements of continuously the number of inmates of each room through oxygen supply passage opening into the air inlet of each room, said oxygen being introduced together with the air introduced for heating, cooling or ventilation; and at the same time releasing negative-ions from the negative-ion generator positioned within the air inlet at a greater depth than the oxygen supply passage; and in case of a fire breaking out in the hotel, the oxygen supply being cut off by automatic control.

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