Air distribution method

طريقة مبتكرة لتوزيع الهواء الهواء النقي في المبنى

إعداد : م. أسامة صالح الضيف

- **عضو هيئة التدريب بالهيئة العامة للتعليم التطبيقي والتدريب.**

Abstract

The present invention relates to an improved method of distributing fresh air into a building. The method comprises the steps of providing the fresh air; subjecting the fresh air to pre-cooling; channeling the pre-cooled fresh air into an air conditioning unit; and transferring the fresh air into the building's rooms. The fresh air displaces air within the rooms, which is exhausted out of the building without being channeled back to the cycle. The present invention aims to distribute fresh air into the building using an open air cycle to improve the indoor air quality (IAQ) at less energy consumption

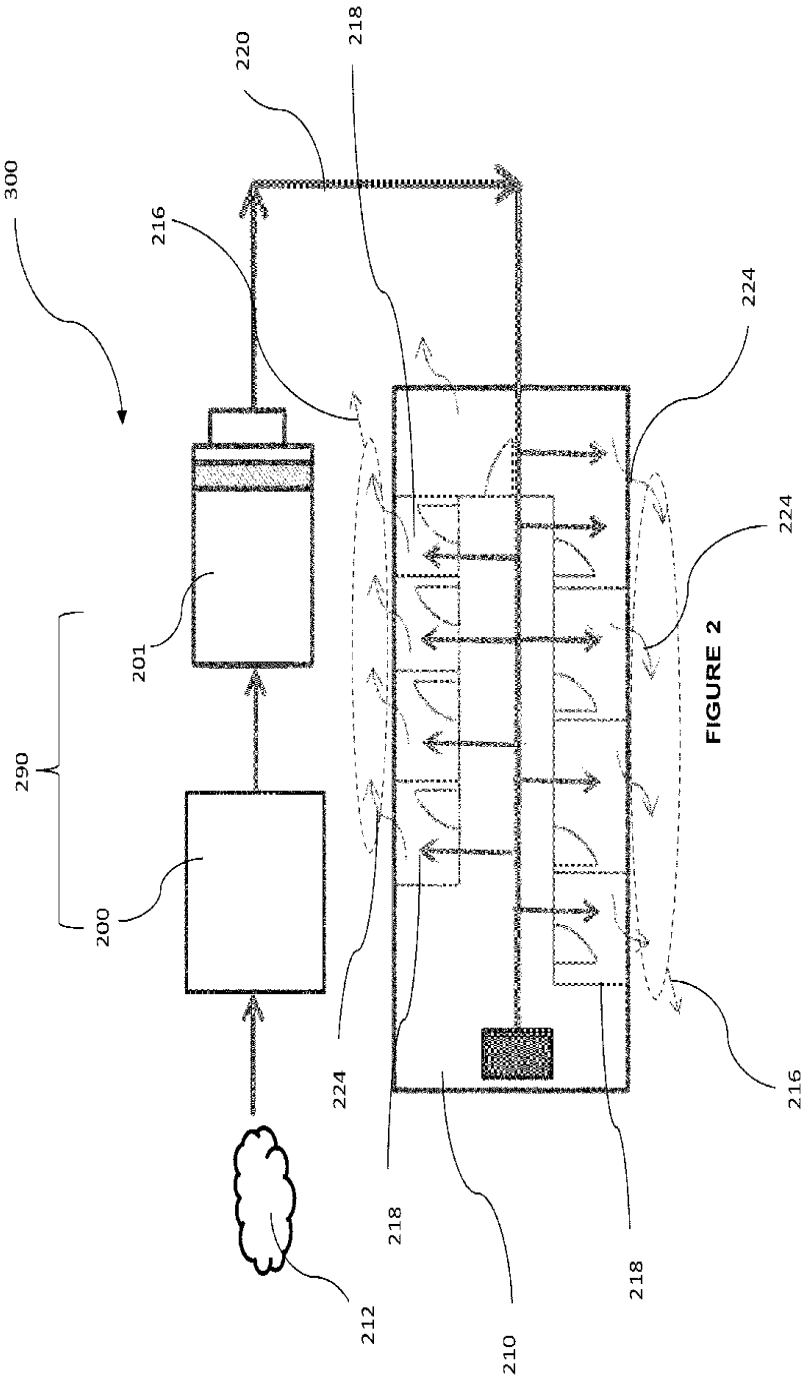

FIGURE 2

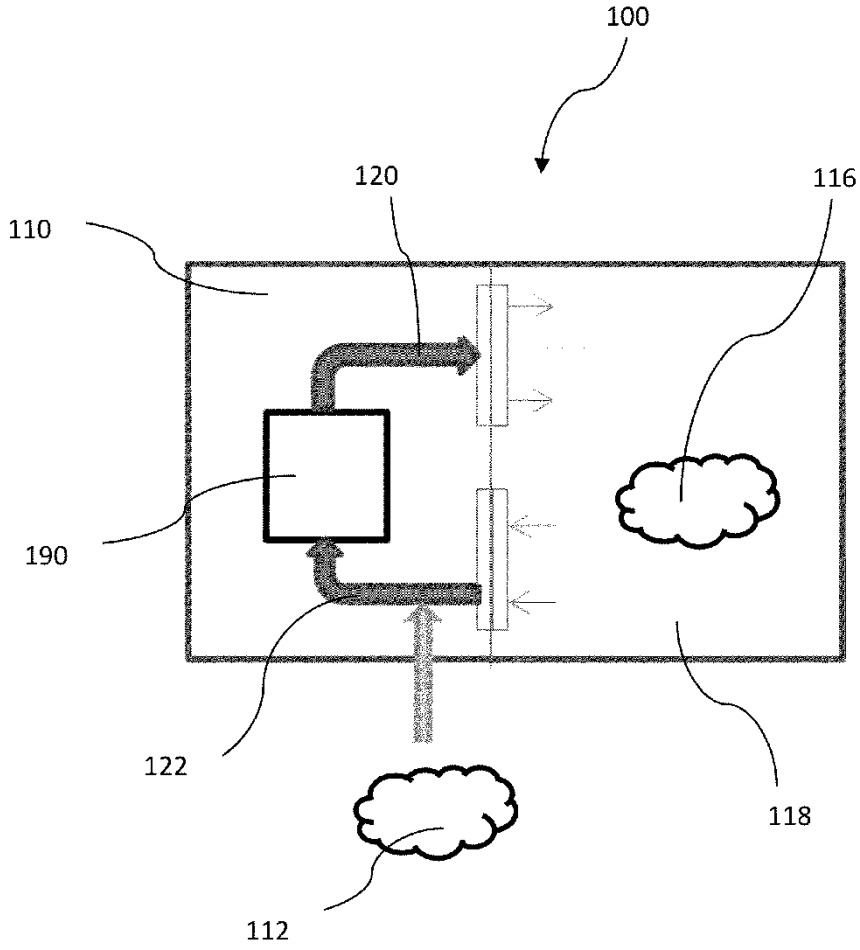

FIGURE 1A

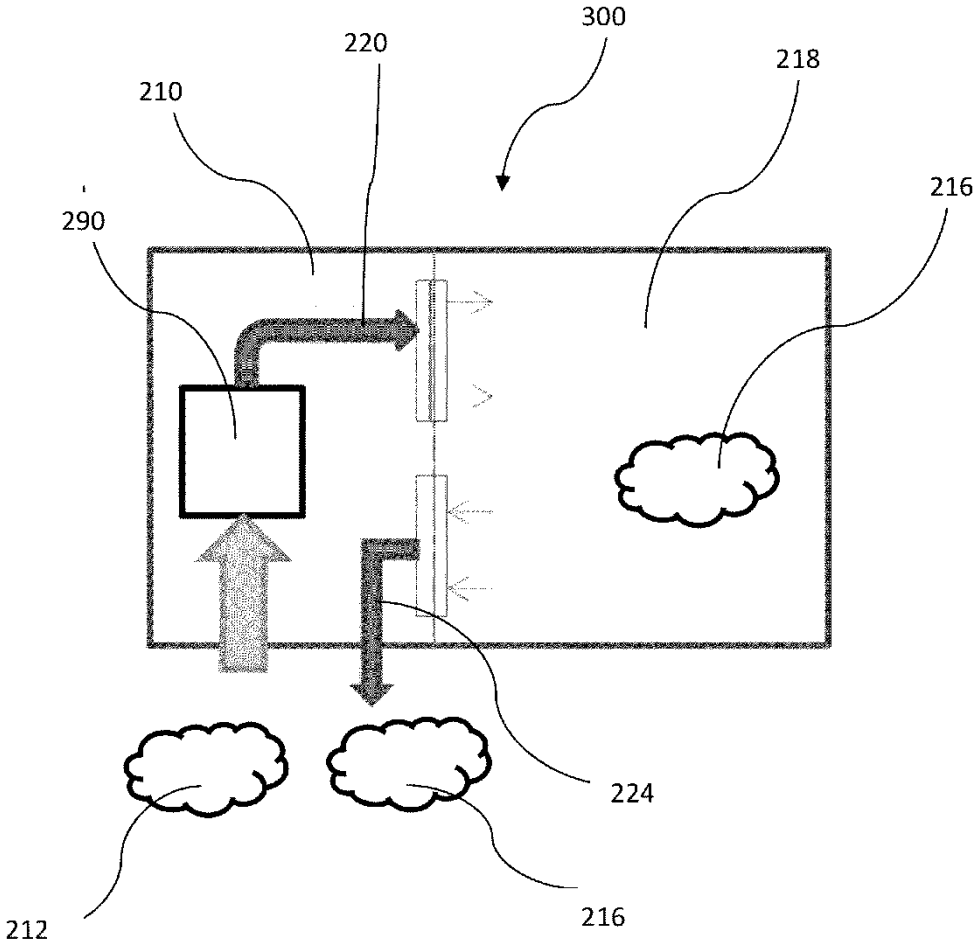

FIGURE 1B

FIELD OF THE INVENTION

The present invention relates to a method of distributing air. More particularly, the present invention relates to an improved method of distributing fresh air into a building.

BACKGROUND OF THE INVENTION

[0002]

In the past few years, many systems have been developed to circulate air in the building. It is also found that, in the prior art, a wide variety of systems are made available for the purpose of improving air distribution within the buildings. In order to comply with some international or national regulations and guidelines, a minimum amount of fresh air is required to make-up in the building such that it reduces accumulation of carbon dioxide CO2 in stale air or constituents which may causes inhalation difficulties incur a mishap and spread contagious diseases. CO2 produced when people breath may accumulate in the building to an unacceptable level if the amount of outdoor air brought into and distributed throughout the building is insufficient. Basically, a chain of processes that includes bringing in outdoor air, conditioning and mixing the outdoor air with indoor air, distributing and exhausting some portion of the indoor air to outside, is important and no deterioration is tolerable at any situation. A process that does not consider the minimum requirement of ventilation as per standard such as an indoor AC unit which circulates the

room air without any make-up of an outdoor air is a disadvantage.

[0003]

As such, adequate ventilation for a healthy environment is crucial and must be provided and maintained in buildings where people live and work. However, in some cases, particularly in the case of a conventional variable air volume (VAV) system when it is in shutoff position, it is difficult to maintain a flow of fresh air into the building. In the design of effective ventilation system for buildings, the objective is normally to attain a steady state condition. Accordingly, fresh air should be controlled during the process of volumetric air flow to satisfy desired rooms and zones' setting conditions while keeping minimum required flow of fresh air for proper ventilation.

[0004]

A heating, ventilating and air conditioning system, or HVAC as it is sometime referred to, for example, provides solutions for some of the problems in the prior art. The HVAC comprises, to condition air for cooling, an air conditioning (AC) unit which forces conditioned air to building so as to satisfy demands called by thermostat switch in rooms. It is found that the AC unit suffers from many drawbacks such as an increase in utility billing rate at this stage of minimum air flow where at least 30% air flow is required for all rooms to maintain the required flow of fresh air. In the case of buildings with

many rooms for mix use, i.e. hospitals, hotels and any shared room's buildings, the HVAC standards & regulations require the installation multiple AC unit equivalent to the number of rooms and zones to prevent mixing of room air which results in high maintenance and an increase in utility bill charges. Despite compliance with the international American Society of Heating and Air-Conditioning Engineers (ASHRAE), the conventional design of HVAC system for buildings still delivers poor indoor air quality and increases utility demand.

[0005]

U.S. Pat. No. 3,982,583 describes an optimized conditioning system which is useful in a variable volume air conditioning system where assures a predetermined amount of fresh air taken into a building. Also, described in the patent is an air property sensor adapted for regulating a damper means to maintain the minimum outdoor air at a predetermined value.

[0006]

U.S. Pat. No. 5,862,982, on the other hand, describes optimal ventilation control strategy for multi zones ventilation systems which integrates flow rate standards with the concept of age of air. The later patent also describes the strategy to minimize the amount of outdoor air required to maintain the age of the zone air.

[0007]

Taking into consideration of the above, the present invention aims to improve indoor air quality (IAQ) provided by the conventional AC unit for public buildings such as hospitals, schools and hotels with less energy consumption and which complies with international standards. The present invention aims to provide a solution to improve the indoor air quality (IAQ) by way of providing fresh air intake while exhausting accumulated carbon dioxide in the building with lesser energy consumption. It is important to note that the solution provided by the present invention is contradicted to the conventional art which describes a ventilation system with more fresh air but higher energy consumption.

[0008]

Accordingly, it is desired to provide an improved method of distributing fresh air supplied into a building that involves less energy and provides efficient heat recovery. Although the teachings of the prior art disclose methods of distributing air into buildings, none specifically relates to an improved method of distributing fresh air as claimed in the present invention. Therefore, a need for the aforementioned features of the present invention is desired.

SUMMARY OF THE INVENTION

[0009]

The following presents a simplified summary of the invention in order to provide a basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention. Its sole purpose is to present some concepts of the invention in a simplified form as a prelude to the more detailed description that is presented later.

[0010]

It is an object of the present invention is to provide a method of distributing air for comfort conditioning by way of introducing absolute fresh air into a building.

[0011]

It is another object of the present invention to provide a method of distributing fresh air that is capable of reducing the energy required to operate an air conditioning unit.

[0012]

Accordingly, the present invention provides a method of distributing fresh air into a building that utilizes an open air cycle. The method comprises the steps of providing the fresh air; subjecting the fresh air to pre-cooling;

channeling the pre-cooled fresh air into an air conditioning unit; and transferring the fresh air into the building's rooms. The fresh air displaces air within the rooms, which is exhausted out of the building without being channeled back to the cycle.

[0013]

The fresh air increases the pressure in the room due to offset of more fresh air than the displaced air which reduces energy across the air-conditioning cooling coil. The increase of pressure in the room increases the temperature of the fresh air supplied to the room, wherein the increase of temperature reduces the temperature drop required for the pre-cooling.

[0014]

It is an advantage of the present invention to provide an improved indoor air quality (IAQ) for ventilation of a building. The present invention is adapted to supply fresh air into the building and no recirculated air or return air will be channeled back to the cycle. It is an advantage that the present invention consumes less energy although the recirculated air is not utilized, and it is completed by way of engaging an improved heat recovery strategy to the cycle.

[0015]

It is another advantage of the present invention to provide a uniformly air supply distribution in the

building. The method involves an induction variable air volume valve damper which operates in accordance with the desired temperature and fan blow configured by a user. The induction variable air volume valve damper is configured to supply air flow comprises at least about 30% room air present in the building and eliminates cold air damping as well as regularly flushes the room air to cause comfort conditioning.

It is yet another advantage of the present invention to provide an improved method of distributing air which involves less number of unit operations such as air conditioning unit compared to conventional ventilation system. As a result, reliability of the unit upon installation and maintenance is substantially increased. It is also an advantage of the present invention to significantly reduce operation and installation costs, maintenance costs and utility billing rates to as higher as about 90% margin.

[0017]

The foregoing and other objects, features, aspects and advantages of the present invention will become better understood from a careful reading of a detailed description provided herein below with appropriate reference to the accompanying drawings.

المصدر والمراجع:

: US20140370800A1 / patents / united states