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Fresh Air Intake System

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**ENGLISH-ABST:**

For use in residential buildings, a device to draw in outside air and have it mix with the air inside the building to improve indoor air-quality through dilution and building pressurization. Pressurizing a building even slightly inhibits air infiltration of pollutants such as pollen, mold spores, and seasonal allergens from entering penetrations ie, poor door and window seals, chimney, bathroom, dryer and stove exhaust ducts from entering the building.

**NO-OF-CLAIMS:** 11

**NO-DRWNG-PP:** 2

**SUMMARY:**

FIELD OF THE INVENTION

[0001] The present invention is an air intake system for use within residential buildings in conjunction with the existing air duct system.

## BACKGROUND OF THE INVENTION

[0002] Today residential homes are equipped with heating, ventilation and air conditioning units (HVAC units) that condition the air within the home tailored to the user's needs. Air is drawn from within the house into the HVAC unit where it is then heated or cooled and through the air ducts delivered back to the house. Using and re-using the air within the home becomes a problem when entities such as pollen, mold spores and other seasonal allergens are introduced into the air. Re-using the air only re-circulates these entities.

[0003] Moreover, homes that have recently been constructed typically have a "new home smell" which is essentially chemical pollutants in the air. There is a need to remove the chemical pollutants.

[0004] Additionally pressurizing a building even slightly inhibits air infiltration of pollutants such as pollen, mold spores, and seasonal allergens from entering penetrations areas, i.e. poor door and window seals, chimney, bathroom, dryer and stove exhaust ducts. Very similar to vacuum packaging, pressurizing a building creates suction or a seal. This suction can be noticed when in a pressurized house by opening a door; the door will pull itself shut. Or opening a window will create a whistling sound. This is caused by the difference in pressure between the inside of the building and the outside, when a window or door is opened, the higher pressure will escape to the lower pressure area much like when the air is let out of a balloon.

[0005] There is a need for a system that avoids re-circulating air within a home. Further, there is a need for a system that prevents air infiltration of pollutants.

[0006] U.S. Pat. No. 6,484,712 B1 issued to Lyons et al. on Nov. 26, 2002 shows a vent cover assembly. Unlike the present invention Lyons' invention is merely a means for ventilation and is not intended for use with a building's HVAC unit.

[0007] U.S. Pat. No. 6,312,327 B1 issued to Hachman et al. on Nov. 6, 2001 shows a vandal resistant fresh air filter housing. Unlike the present invention Hachman's invention is for use with a motor vehicle and is directed towards providing fresh air with out compromising the security of the vehicle.

[0008] U.S. Pat. No. 3,901,135 issued to Nilsson et al. on Aug. 26, 1975 shows a device for distributing ventilating air. Unlike the present invention Nilsson's invention is not intended for use with a buildings' HVAC unit.

[0009] U.S. Pat. No. 3,722,539 issued to Wilmes on Apr. 17, 1973 shows a fresh air vent. Unlike the present invention Wilmes' invention is merely a ventilation device and is not intended for use with a buildings' HVAC unit.

[0010] Thus, a need has been established for a device that can introduce fresh air into the home to be circulated. Additionally there is a need for a device that will pressurize a building to inhibit air pollutants such as pollen and other allergens from entering the building, thus keeping the air within the building cleaner.

## SUMMARY OF THE INVENTION

[0011] The present invention is intended for use in residential buildings to draw in outside air and have it mix with the air inside the building to improve indoor air-quality through dilution and building pressurization. Pressurizing a building even slightly inhibits air infiltration of pollutants such as pollen, mold spores, and seasonal allergens from entering penetrations ie, poor door and window seals, chimney, bathroom, dryer and stove exhaust ducts from entering the building.

[0012] By adding a six-inch duct from the inlet side of the central air duct to the fresh air intake, filtered outside air can be introduced while air pressurizing and ventilating the building.

[0013] The present invention can introduce up to 100 CFM of outside air providing for 72,000 to 144,000 cubic feet of air into the home or indoor environment per day. This approach allows for pressurization of the home or indoor environment which eliminates the entry of fine particles, gasses and odors whenever the buildings' HVAC unit fan is running.

[0014] The introduction of 50 CFM of outside air (3000 ft.<sup>3</sup> per hour) has no negative effect on the performance of the HVAC system as it represents approximately 3 to 5% of total air volume going through the HVAC unit. To increase the air ventilation and pressurization, a larger connecting air duct or an induct booster fan can be installed.

[0015] The present invention can be adjusted to provide desired air changes to dilute pollutants and boaters and maintain high oxygen content in the air. The amount of fresh air ventilation can be regulated by dampers located on the fresh air intake system.

[0016] The present invention connects an external filter return grill to the return side of the central air heating and cooling system by an air duct and specialized housing/connectors. When the central air is on it will draw-in filtered outside air, which improves air quality through filtration, serialization, dilution, and pressurization.

[0017] The present invention is configured to enhance its efficiency and sterilization properties. A pre-filter which is made of polyester and carbon is used to arrest a 85% of the particles [GreaterFullEqual]5 micron and absorb gasses, such as ozone and auto exhaust, and chemicals from landscape fertilizers and pesticides. The second filter is a reusable electrostatic filter. It has anti-microbial properties combined with low airflow resistance and high particle capture ability. An optional third filter, which is a high efficiency filter or High Efficiency Particulate Arrestance (HEPA) and traps 99.97% of particles at 0.3 microns or larger is available.

[0018] Next the volume of the air is regulated by a manual or mechanized damper. Simply closing an opening the damper will control the amount of fresh air being introduced. The damper is followed by a one-way valve that prevents house air from going outside when the fan is not operational.

[0019] After the one-way valve there is a germicidal ultraviolet lamp. The lamps stay cleaner longer due to the air filters, this helps maintain the lamps' intensity. The 6[Doubleprime] round galvanized duct which houses the lamps also assist in the lamps intensity by the reflectance properties of the galvanized sheet metal duct. Also the lamps are placed parallel to the air flow which increases dwell or exposure time to the ultraviolet light increasing its effectiveness and longevity.

[0020] When the central air is in operation it will draw/suck in outside air through the present invention. Once the filtered outside air enters the return box it mixes with the return air from the house. The mixed air (house and filter outside air) is then heated or cooled and dehumidified as usual prior to distribution through the existing air ducts.

[0021] The present invention has one exterior filter return grill that is installed through the buildings wall or foundation. The size of the present invention is tailored to fit into standard preexisting foundation vents.

[0022] These together with other objects of the invention, along with the various features of novelty, which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

**DRWDESC:**

## BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

[0024] FIG. 1 is an environmental view of the filter components of the present invention.

[0025] FIG. 2 is an environmental view of the duct components of the present invention.

[0026] FIG. 3 is an environmental view of the present invention in communication with a building and its HVAC unit.

## DETDESC:

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] FIG. 1 shows the filter components of the present invention in order of assembly. Exterior aluminum grill (10) is the outer most component. The fresh air flow is directed into the exterior aluminum grill (10) between the numerous vented slats (15) horizontally placed in the exterior aluminum grill (10). Just behind the exterior aluminum grill (10) is the carbon pre filter (20) which is made of polyester and carbon is used to arrest a 85% of the particles [GreaterFullEqual]5 micron and absorb gasses, such as ozone and auto exhaust, and chemicals from landscape fertilizers and pesticides. Next is the electrostatic filter cloth (30). The electrostatic filter cloth (30) is reusable and has anti-microbial properties combined with low airflow resistance and high particle capture ability. A wire mesh (40) is then placed behind the electrostatic filter cloth (30) to secure the carbon pre filter (20) and the electrostatic filter cloth (30) in place. A metal aluminum frame (50) secures the metal mesh (40) in place. A HEPA filter (60) is located just beyond the metal aluminum frame (50). The High Efficiency Particulate Arrestance (HEPA) filter (60) is an optional filter and can only improve the thoroughness of the filtration process. Located just past the metal aluminum frame (50) the HEPA filter (60) blocks 99.97% of particles 0.3 and larger. All of the aforementioned components are all housed in the square to round adaptor (70) and the exterior aluminum grill (10) is secured to it via conventional screws (not shown). Optionally, the square to round adapter (70) has a gasket adhered to its inner side walls to create an air tight seal between the HEPA filter (60) and the square to round adapter (70), thereby controlling filter air bypass. A round collar (80) is then fitted to the back side of the square to round adaptor (70). To control the amount of air flow that will enter the building a damper (90) is attached to the end of the collar (80). The damper (90) may be manually adjusted or a mechanized damper (90) may be installed for easier control.

[0028] To prevent the inside air from going out, a backflow valve (100) is installed as shown in FIG. 2. The backflow valve (100) is then connected to a galvanized hard duct (110) that will direct the air flow to the buildings' HVAC unit. Within the galvanized hard duct (110) is the germicidal ultraviolet lamp (120) that will essentially sterilize the air that passes by. The germicidal ultraviolet lamp (120) is positioned parallel to the direction of the air flow to increase the time of exposure. Once the galvanized hard duct (110) reaches the HVAC unit's return box (140) and second collar (130) is attached to allow the galvanized hard duct (110) to attach to the return box (140). The FAIS housing is then covered with an insulation jacket (150) as well as other associated hard duct. Once the air has reached the return box (140), the air is then heated or cooled by the HVAC unit and is distributed throughout the building.

[0029] FIG. 3 shows the full diagram of the present invention (150) while attached to the buildings' HVAC unit (160) and the duct system (170) that will distribute the air throughout the building (180).

[0030] It is important to recognize that the present invention works if the proper relationship between pressure

inside the home and outside the home is maintained. Ideally, the difference in pressure between the outside and inside of the home should be 1-10 Pascals. If the difference in pressure is greater than 10 Pascals, then either the outside air will enter the home too quickly or the outside air will not enter the home fast enough. Adverse effects from being greater than 10 Pascals would be not enough air pulled by the present invention into the home, or too much air being pulled from the outside into the home. If not enough air enters the home, the present invention will not achieve its goal of pressurization and desired airflow; however, the other features of the present invention will be unaffected. If too much air enters the home, then the temperature and humidity level of the air entering the home will shift the temperature and humidity in the home.

[0031] A conventional detection means for determining when more than a 10 Pascal difference in pressure between the inside and the outside of the home is contemplated as part of the present invention. When more than a 10 Pascal difference is reached, any conventional means of alerting the user can be employed, from sounding audible or visual alarms, to making alerting telephone calls, to even auto correcting the pressure problem by any conventional mechanical means of increasing or decreasing fan speed or opening or closing the damper (90) to achieve the 1 to 10 Pascal desired range.

[0032] Manometers are used to detect the pressure changes. and the pressure differential will be displayed. There are many variables which affect the pressure differential in a house: building envelope leakage, temperature, wind. Providing and maintaining more incoming air than exhaust air will maintain the pressure differentials. At this stage of the development the FAIS is used to counter-act the exhausting air and provide the home with an inexpensive means for drawing fresh, filtered, conditioned air into the home. If the manometer were installed, and the home were tight enough, this unit could be a possible means for delivering the necessary amount of air to pressurize the house.

[0033] It is also desirable to ensure that unconditioned air flow into the home remains approximately 10 percent or less of the air handler's air moving capacity. This is because too much unconditioned air entering the home will incur the disadvantages aforementioned; that is, too much unconditioned air entering the home. For example, for with an air handling unit with 1000 cubic feet per minute air handling capacity, you would not want to exceed 100 cubic feet per minute of unconditioned air.

[0034] With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention. Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

#### **ENGLISH-CLAIMS:**

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What is claimed is:

1. A fresh air intake system for a structure, for moving air from the outside to the inside of the structure, comprising: an exterior grill; a pre filter in communication with said exterior grill; a electrostatic filter cloth in communication with said pre filter; a wire mesh in communication with said electrostatic filter cloth; a frame in communication with said wire mesh; a high efficiency particulate arrestance filter in communication with said frame; a square to round adaptor in communication with said high efficiency particulate arrestance filter; a first collar in communication with said square to round adaptor; a damper in communication with said first collar; a backflow valve in communication with said damper; a hard duct in communication with said backflow valve; a lamp in communication with said hard duct; and a second collar in communication with said hard duct.

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2. The device of claim 1, wherein said exterior grill is made of aluminum.
3. The device of claim 1, wherein said pre filter is made of carbon and polyester.
4. The device of claim 1, wherein said damper controls the amount of air that is taken in.
5. The device of claim 1, wherein said hard duct is galvanized metal.
6. The device of claim 1, wherein said lamp is a germicidal ultraviolet lamp.
7. The device of claim 1, wherein said second collar attaches to the structure's heating, ventilation and air conditioning unit.
8. The device of claim 1, wherein said square to round adaptor and said second collar are covered with an insulation jacket.
9. The device of claim 1, further comprising a manometer in communication with the exterior grill.
10. The device of claim 9, wherein said manometer is configured to create an alert when there is more than 10 Pascals of difference in pressure between the outside and inside of the structure.
11. A fresh air intake system, comprising: an air flow system, recycling air within a closed environment; a fresh air intake in communication with said air flow system; a first manometer in communication with and determining the air pressure in said air flow system; and a second manometer in communication with and determining air pressure in exterior of said fresh air intake.

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