A ventilation device and the method of use thereof for dehumidification of residential attached or detached garages, sheds, greenhouses, RVs, motorhomes and other similar structures. This device and method uses an extraction ventilator to dry out the structure’s environment, and reduce the interior humidity using a motorized fan to expel moisture latent air out of the structure. The fan continuously runs at minimal speeds to continuously exhaust interior air and ventilate the structure, thereby controlling the garage environment, while eliminating backdrafts, and preventing animals, snow and rain from entering the structure. The device uses a dehumidistat control to activate the fan to maximum ventilation capacity when the humidity reaches the set point, exhausting ambient air and extracting excess humidity from the structure. Once the humidity drops below the set point, the dehumidistat deactivates and returns the ventilator to minimum speed operator.
FIG. 3

White  AC  Black

-23 Dehumidistat

25 Capacitor

Motor 22

22 Fan
VENTILATOR DEVICE FOR DEHUMIDIFICATION

TECHNICAL FIELD

[0001] The present invention relates to a humidity control device and to controlled humidity transfer during ventilation of a structure.

BACKGROUND OF THE INVENTION

[0002] New and better construction methods and materials have resulted in more air tight construction, to the point where ventilation has become a necessity for humidity control in annex structures such as newer built or newly renovated garages, pool or garden structures or in similar structures.

[0003] Furthermore, normal usage of these structures (garages, sheds, greenhouses, pool houses) enhances and naturally creates humidity issues. Introduction of wet and humid equipment to these structures is common (snow blowers in winter, cars anytime of the year, pool houses in general, sprinklers in greenhouses in hot days makes them to hot and humid for plants . . . ) creating excess humidity which can damage contents and the structure itself if not resolved.

[0004] These structures are often open in the daytime for use and closed overnight, which lets in humidity in the daytime and traps it in overnight causing humidity and excess moisture or condensation issues. Summertime movement or infiltration of air from outside can result in condensation, which can lead to mold formation and odors, as well as structural damage and rust formation on tools and equipment.

[0005] Current household ventilation systems do not address the issues of these auxiliary structures in view of the risk of air contamination into living areas. De-humidifiers with condensate coils address localized indoor humidity problems, however they are very costly to operate and do not address indoor air quality. Consequently, a system which controls humidity in annex structures such as listed above is currently required in all seasons.

OBJECTS AND SUMMARY

[0006] The disclosed device provides a humidity control ventilation system for use in annex structures having a degree of air permeability, such as residential attached or detached garages, sheds, greenhouses, RVs, motorhomes and other similar structures. The system is usable in most climates, including temperate climates.

[0007] The present device uses a structure's natural air permeability characteristics in order to control its environment by eliminating excess humidity resulting from changes in environment from added moisture in the structure, such as parking a wet car in a garage structure or wet pool accessories in a pool shed.

[0008] The device is equally effective to regulate a structure’s environment by eliminating possible condensation and preventing corrosion due to outside environmental changes such as rain, snow, cold mornings, hot humid afternoons and the like.

[0009] In order to achieve the desired effect, the humidity control and ventilation system comprises a duct and fan for collecting and conveying the interior air from inside the structure near the floor and ventilating it outside. More particularly the device includes duct means extending between the interior and exterior of the structure, a fan means adapted to transfer ambient air from the interior of the structure to the exterior, and a motor with associated speed and dehumidistat controls, whereby the motor operates the fan continuously at controlled low speeds, but with elevated humidity in the interior of the structure, as determined by the dehumidistat, the speed controller bypassed such that the fan and motor operate at an increased speed.

[0010] The interior air withdrawn from the structure is exhausted outside into the atmosphere, removing the stalest and dampest air. Normally external ambient air is drier (lower relative humidity) than moisture laden indoor air. The present system forces air circulation of drier outside air into the structure while exhausting moist interior air, and thereby reduces humidity in the structure for humidity control. Nonetheless, even where there is high exterior humidity, continuous circulation of air in the structure is desirable to minimize condensation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention, in terms of a preferred embodiment, is illustrated in the attached drawings, wherein:

[0012] FIG. 1 shows the environment of the system and the airflow of a typical installation;

[0013] FIG. 2 shows an exploded view of the components of the system;

[0014] FIG. 3 shows the electrical diagram of the system.

DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0015] As may be seen from FIG. 1, an enclosed structure, such as a garage, pool shed or similar annex or out building, is represented, in part, by wall structure 10. The ventilation and dehumidification device is generally indicated at 20, located a distance D above the floor of the structure. Although the distance D is not fixed, it is preferable to be in proximity to the floor.

[0016] It is to be understood that the present device may be located at any height on an exterior wall of a structure. However, the device works more efficiently in general proximity to the floor level of the structure where accumulated moisture will collect, and where cooler damp air is present. Warmer air, at higher points within the structure, will then be drawn downwardly to replace exhausted air, thereby interacting with floor level moisture, and absorbing same prior to being exhausted. As the device is located higher from the floor of the structure, its efficiency is reduced, but it will still remove humid air, and assist in prevention or reduction of dampness, corrosion, and mold build-up.

[0017] Locating the device at actual floor level is not desirable as it would then be susceptible to blockage by interior dirt or exterior environmental conditions including leaves, grass, snow and the like. Rather, a preferred location would be approximately 12 inches from the floor where it is still adjacent cool, damp air at the floor level as well as being
relatively adjacent any condensation or moisture, such as water dripping from cars or from pool equipment.

[0018] As may be seen in FIG. 2, the dehumidification device 20 includes a fan enclosure 21 which contains an axle tube fan 22. The fan with integral motor 27 is electrically powered, such as by a power cord and plug connected to the municipal electric system. Also contained in the enclosure is a dehumidistat or humidity control 23, which is controlled by knob 24, and a fan speed reduction controller 25 and related circuit connections which will be understood by a person skilled in the art. A backing plate and collar 26 is connected to a duct means (not shown) which extends between the interior of a normally unheated structure and the exterior environment 12. The fan and associated duct means conveys ambient air from the structure's interior to the exterior.

[0019] The fan 22 speed is controlled by the dehumidistat 23 and the fan speed controller 25, which in a preferred embodiment is a motor run capacitor. When the dehumidistat is open (i.e. when humidity in the structure is lower than the level set on the dehumidistat), the capacitor maintains the fan speed at a minimum level (low speed) as may be seen from the circuit diagram of FIG. 3. When the dehumidistat is closed (i.e. when humidity is higher in the structure), the capacitor is bypassed and full power is supplied the fan resulting in fan operation at high speed.

[0020] In another embodiment, the fan speed controller may be a low power "triac" control, or alternatively, it may be an induction coil or a transformer, tapped at different voltages.

[0021] In a preferred embodiment of the device, the unit has 5"×7½"×4½" exterior dimensions, with a 4" collar in the back that is passed through the wall of the structure, and attached to an outside vent via a flexible 4" duct. In a 110 volt device, a 2.7 microfarad capacitor was used with a United Pro tube axle fan, model A 1238 11B-T (X1N) rated 36 watts, and a Ranco model J10-1035-357 dehumidistat. A power cord was situated on the bottom of the unit to be plugged into a 120VAC 60 Hz wall socket. The front of the unit incorporated the intake vents and the adjustable control knob 24 for the dehumidistat. The total enclosure was built in fire rated plastic unit. The device was attached to the wall, approximately a foot off the floor on an outside wall at a section remote from the main door of the structure. The airflow moved from within the structure and was exhausted outside through the unit. In normal operation air was exhausted continuously either at low speed, or high speed when humidity is high.

[0022] An optional on/off switch may be used when it is desired not to operate the device, such as when the exterior air also has high humidity.

[0023] Although the present dehumidification/ventilator device would normally be used in an unheated auxiliary structure separate from a residence, it may also be used in a heated auxiliary structure.

[0024] It will be understood that, although the device and method of use have been described in terms of preferred embodiments, departures from those embodiments may be made without departing from the scope of the invention as claimed hereafter.

1. A ventilation device for dehumidification of an annex structure includes a duct extending between the interior and exterior of the structure, a fan adapted to transfer ambient air from the interior of the structure to the exterior, and a motor with associated speed and dehumidistat controls, whereby the motor operates the fan continuously at controlled low speeds, but with elevated humidity in the interior of the structure, as determined by the dehumidistat, the speed control is bypassed such that the fan and motor operate at an increased speed.

2. The device of claim 1, wherein the speed control is a capacitor, an induction coil, a transformer or a triac.

3. The device of claim 2, further including an on/off switch.

4. The use of the device of claim 2 at an elevation adjacent a floor level of the structure.

5. The use of the device of claim 2 at an elevation in proximity to a floor level of the structure.

6. The use of the device of claim 2 within a floor level of the structure.

7. A method of reducing humidity in an annex structure utilizing a ventilation device as set out in claim 1 including the steps of running the device continuously at:

   i) low speed when humidity is below a set point on the dehumidistat, and

   ii) higher speed when the humidity exceeds the set point.