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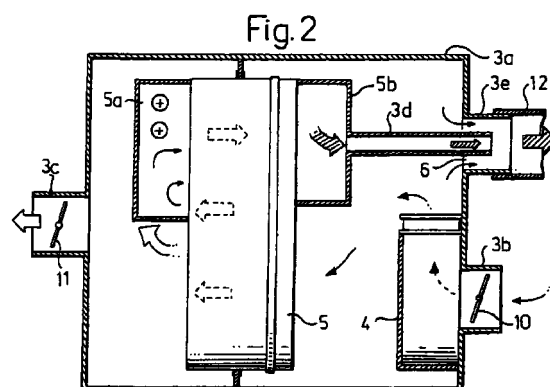
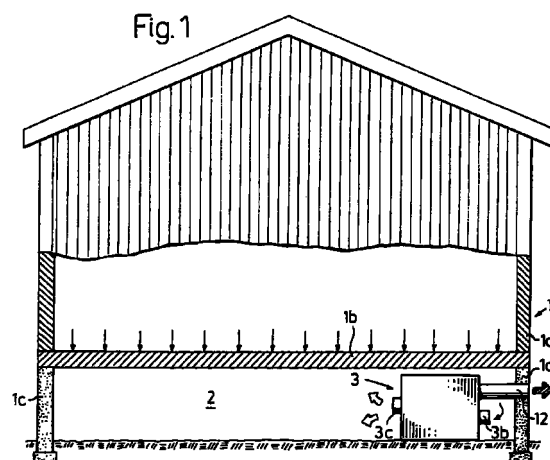
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(54) **A method and a device to reduce or avoid formation and smell of mildew in a building**

(57) In a method of reducing or avoiding the formation of mildew and its associated malodours in a building that includes a floor over crawl space structure and that rests on a foundation (1c) a rotor-equipped dehumidifier is provided in the crawl space situated beneath the floor structure and delimited by the foundations. A subpressure is maintained in the crawl space, so that air will be drawn from the building interior and through the floor structure and into said space by suction. This is achieved by leading part of the process air delivered to the dehumidifier away from the dehumidifier and out from said space, after said air has been pressurized by the fan (4) of the dehumidifier and prior to dehumidifying said air. This enables the pressurized process air to be led away through conduit means (3e, 12) that extends at least initially in connection with the moist air exhaust conduit (3d) of the dehumidifier (3). The inventive method obviates the need for a separate fan to sustain a subpressure in said space. The invention also relates to a device that operates in accordance with the inventive method.



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Description

Field of invention

[0001] The present invention relates to a method for reducing or avoiding the formation and smell of mildew in buildings and being of the kind defined in the preamble of Claim 1.

[0002] The invention also relates to a device for carrying out the method.

[0003] The problem of mildew and the malodors caused thereby has become increasingly more noticeable in recent times. This problem applies particularly to so-called "cottage foundations", by which is meant foundations that include a crawl space that is situated beneath a wooden floor and enclosed by walls comprised of stone, cement, or concrete.

[0004] Such structures are subjected to high humidities, particularly in summer, when the warm outdoor air is cooled by the colder ground and foundations, as the air flows into the crawl space between ground and floor. This causes the wooden structure to be affected with mildew and other forms of fungus, resulting in strong smells that spread within the building.

Background art

[0005] One approach in solving this serious problem has been to install a dehumidifier in the crawl space with the intention of keeping the air in said space dry and warm, and also to use fans to suck air from said space and therewith create a subpressure that prevents air from rising into the building. Instead, air will flow downwards from the building as a result of the subpressure created in the crawl space.

[0006] At present, both an dehumidifier and a fan are required to achieve a satisfactory function, due to the fact that the moist air capacity of the dehumidifier, a typical value of which is $50 \text{ m}^3/\text{h}$, is not large enough to generate a satisfactory subpressure.

Object of the invention

[0007] One object of the present invention is to provide a method and a device with which the aforesaid problem can be solved at low cost.

Summary of the invention

[0008] The inventive features set forth in the characterizing clause of claim 1 solve the aforesaid problem in a surprisingly simple manner. The invention thus obviates the need of a separate fan to maintain the subpressure in said space, provided that it is ensured that part of the process air delivered to the dehumidifier and pressurized by its fan is led away from the dehumidifier and out of said space, without passing the rotor of said dehumidifier.

[0009] In practice, a normal air flow of $600 \text{ m}^3/\text{h}$ delivered to a "standard" size dehumidifier may be divided so that $350 \text{ m}^3/\text{h}$ of air is allowed to pass the rotor of the dehumidifier during an air heating and dehumidifying phase while $50 \text{ m}^3/\text{h}$ of moist air passes through the moist air outlet and is conducted to atmosphere outside the crawl space together with $200 \text{ m}^3/\text{h}$ of process air that has been pressurized by the fan of the dehumidifier, this pressurized process air passing to atmosphere in the form of "leakage or seepage air" through one or more leakage openings in the dehumidifier casing, without passing the rotor of the dehumidifier.

[0010] This is achieved conveniently by leading away the pressurized leakage air through a conduit that extends at least initially in connection with the moist air exhaust conduit of the dehumidifier.

[0011] According to one preferred embodiment of the invention, the method enables the subpressure in the crawl space to be readily adjusted with the aid of a throttle valve or similar valve means in the dehumidifier outlet for dry and warm air. Actuation of the throttle valve in its closing direction will cause a relatively large volume of leakage air to be passed to atmosphere, therewith resulting in a higher subpressure in said space.

[0012] The volume of process air delivered may also be adjusted in a typical fashion, with the aid of a throttle valve or similar valve means in the process air inlet of the dehumidifier.

[0013] The invention also relates to device that operates in accordance with the described method and that has the characteristic features set forth in Claim 4.

[0014] Further characteristic features of the invention and the advantages afforded thereby will be apparent from the following description made with reference to the accompanying drawings.

Brief description of the drawings

[0015]

Figure 1 is a partially cut-away side view of a building that includes beneath its bottom floor a crawl space in which an inventive device has been installed.

Figure 2 is a cross-sectional view of a dehumidifier which is included in said device and which is designed for use with the inventive method.

Figure 3 is cross-sectional view which illustrates a modified design of the dehumidifier outlet and which corresponds to a part of Figure 2.

Detailed description of preferred embodiments

[0016] Figure 1 shows a building 1 that includes

side walls 1a and wooden floor structure 1b, said building resting on a cement or concrete foundation 1c (so-called small cottage foundation) that surrounds a crawl space 2 beneath the floor structure 1b.

[0017] For the purpose of creating a subpressure in the crawl space 2 so that air will be drawn down from the building and into said space, there is arranged in the vicinity of a wall 1c of the crawl space 2 a dehumidifier 3 that includes a housing or casing 3a, an inlet pipe 3b, a warmed and dried air outlet pipe 3c, and a connection with an outlet pipe intended for moist air separated in the dehumidifier and located in the ambient atmosphere. A throttle valve 10 for adjusting the volume of process air delivered to the fan 4 of the dehumidifier is disposed in the inlet pipe 3b.

[0018] A major part of the process air delivered to the dehumidifier and pressurized by the fan 4 is allowed to pass the rotor 5 of said dehumidifier. Arranged on the other side of the rotor is a casing 5a that houses heat emitting devices (not shown) so that dried and heated air leaves the dehumidifier via the outlet pipe 3c. Moist air separated in the rotor 5 leaves the dehumidifier via a collecting vessel 5b provided on the primary side of the rotor and having a moist air outlet pipe 3d.

[0019] The moist air outlet pipe 3d opens into the outlet pipe 3e. This latter pipe 3e is encircled by a ring-shaped opening in the casing 3a, such as to form a dehumidifier exhaust opening for leakage or seepage air that has been pressurized by the fan 4. This enables the dehumidifier fan 4 to sustain the requisite subpressure in the crawl space 2, therewith obviating the need for a separate fan to this end as distinct from known systems.

[0020] Connected to the dehumidifier outlet pipe 3a is an outlet conduit 12 through which moist air exiting from the pipe 3d and said leakage air are both conducted to atmosphere outside the space 2, through the opening 6.

[0021] The subpressure in the crawl space can be readily adjusted with the aid of a throttle valve or butterfly valve 11 provided in the dehumidifier outlet pipe 3c. Actuation of the valve 11 in its valve closing direction will thus increase the volume of leakage air that departs through the ring-shaped opening 6 and therewith also increase the subpressure in the space 2.

[0022] Figure 3 is a cross-sectional view of part of the dehumidifier shown in Figure 2, and illustrates a variant of the moist air outlet. In this case, the moist air outlet pipe 3d conveniently extends concentrically inside the outlet conduit 12 for pressurized leakage air, and terminates in the ambient atmosphere outside the foundations 1c.

[0023] It will be understood that the inventive method and inventive device can be expressed in other ways within the scope of the accompanying claims. For instance, the moist air outlet pipe 3d need not extend concentrically inside the outlet conduit 12. Furthermore, pressurized leakage air can alternatively be led from the

dehumidifier to the atmosphere outside the crawl space 2 through a completely separate conduit means.

Claims

1. A method of reducing or avoiding the formation of mildew and its associated malodours in a building (1) which includes a space (2) that is situated beneath a bottom floor structure (1b) and delimited by a surrounding foundation (1c), wherein air is blown out of said space (2) such as to maintain therein a subpressure by means of which air is sucked from the building and down into said space, and wherein the air in said space is dehumidified and dried by means of a fan-equipped dehumidifier (3) from which moist air separated therein is conducted away to the ambient atmosphere outside said space,

characterized by

blowing out air from said space (2) in a manner in which the subpressure is sustained in said space (2) by leading part of the process air delivered to the dehumidifier (3) away from said dehumidifier and out from said space, after said air has been pressurized by the dehumidifier fan (4) and prior to dehumidifying said air.

2. A method according to Claim 1, **characterized by** leading away the pressurized leakage air through conduit means (3e, 12) that extends initially in connection with the dehumidifier exhaust conduit (3d).
3. A method according to either Claim 1 or Claim 2, **characterized by** adjusting the subpressure in the space (2) with the aid of a throttle valve (11) in the dehumidifier outlet conduit means (3c) for dried and heated air.
4. A method according to any one of Claims 1-3, **characterized by** adjusting the subpressure in said space with the aid of a throttle valve (10) in the inlet (3b) of the dehumidifier (3).

5. A device for reducing or eliminating the formation of mildew and malodours associated therewith in a building (1) which includes a space (2) that is situated beneath a bottom floor structure (1b) and delimited by a surrounding foundation or like structure (1c), wherein said device includes

- a) means for maintaining a subpressure in said space,
- b) a dehumidifier (3) having a fan or blower (4) and a rotor (5) for delivered process air, and
- c) exhaust conduit means (3d, 3e, 12) for leading moist air away from the dehumidifier and extending through an opening in the founda-

tions (1c) or like structure,

characterized in that

the dehumidifier (3) has an exhaust or leakage opening (6) through which a part of the process air pressurized by the fan (4) of said dehumidifier can pass and which communicates with the surroundings externally of the space (2), wherewith the subpressure in said space is sustained at least to a substantial extent by blowing out said part of said delivered process air, without said part having passed the rotor (5) of the dehumidifier (3).

6. A device according to Claim 5, **characterized in that** the leakage opening (6) of the dehumidifier is connected to an exhaust conduit means (3e, 12) which extends at least initially in connection with the moist air exhaust conduit (3d) of the dehumidifier (3).
7. A device according to Claim 5, **characterized by** a conduit which is separate relative to the moist air exhaust conduit means (3d) and through which the pressurized air is blown into the atmosphere outside the space (2).
8. A device according to any one of Claims 5-7, **characterized by** a throttle valve (11) arranged in the dried and heated air outlet of the dehumidifier (3) for adjustment of the subpressure in said space.
9. A device according to any one of Claims 5-8, **characterized by** a throttle valve (10) in the process air inlet (3b) of the dehumidifier for adjustment of the subpressure in said space.

Fig. 1

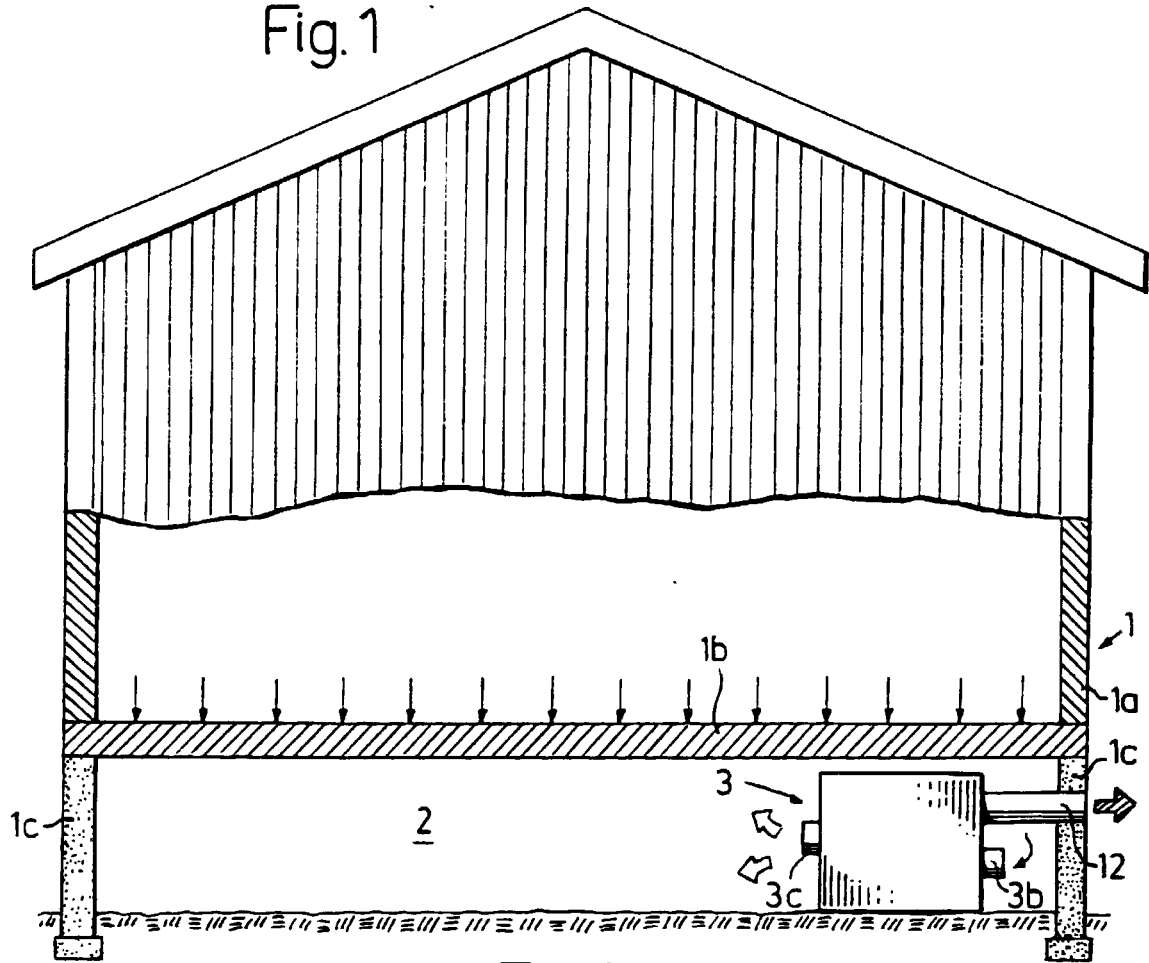


Fig. 2

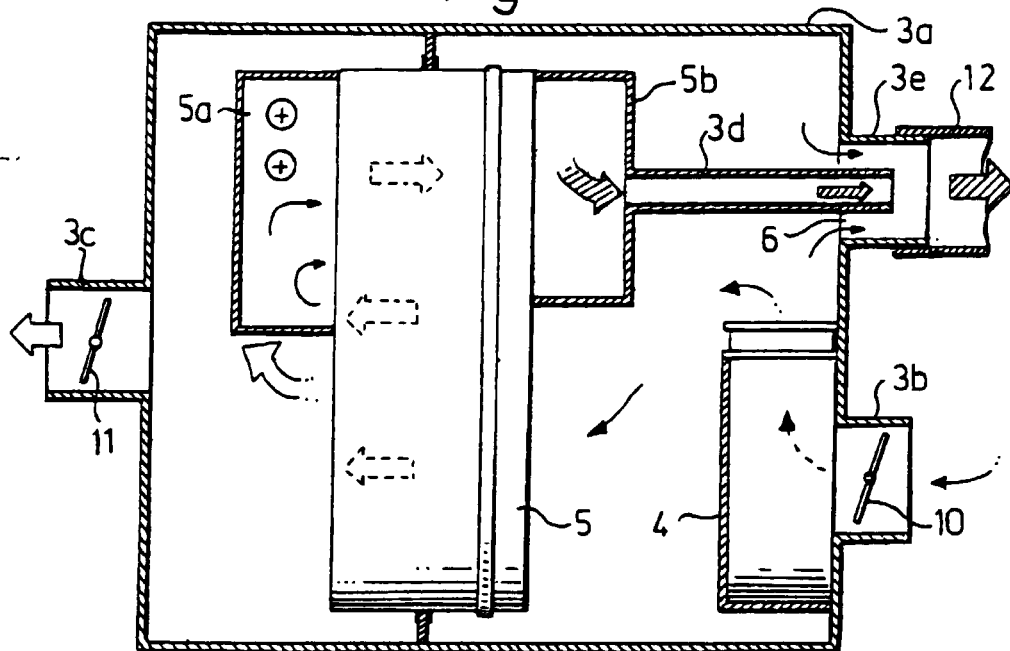


Fig. 3

