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(54) **VENTILATION SYSTEM FOR A ROOM**

(57) **ABSTRACT**

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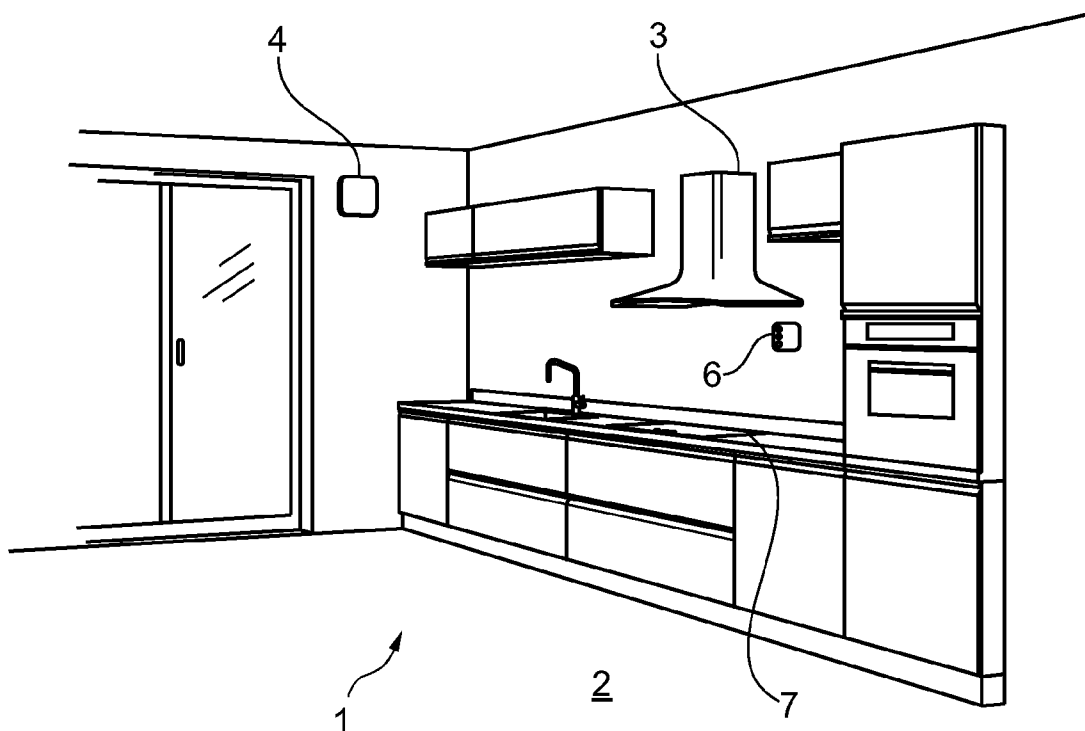
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The present invention relates to a ventilation system for a room which comprises a hood for domestic use located in said room, a wall fan located in said room, a plurality of transducers configured to detect a respective plurality of characteristic parameters of the gases in said room; processing and control means in signal communication with said plurality of transducers and in signal communication with said first control means, processing and control means electrically connected with said plurality of transducers and in signal communication with said first control means, said processing and control means comprising firmware configured to process said detected characteristic parameters and to transmit a first control signal to control said hood for domestic use. The characterizing feature is that said hood for domestic use is in signal communication with said wall fan via a first transmitter module, located in said hood, and configured to transmit a second signal, said wall fan comprising a first receiver module configured to receive said second signal; said second radio frequency signal being generated by said hood according to said first signal to instruct said second control means to turn on said wall fan and keep it in this state for a first predetermined ON-time when one or more of said characteristic parameters detected by said plurality of sensors exceed respective predetermined threshold values.



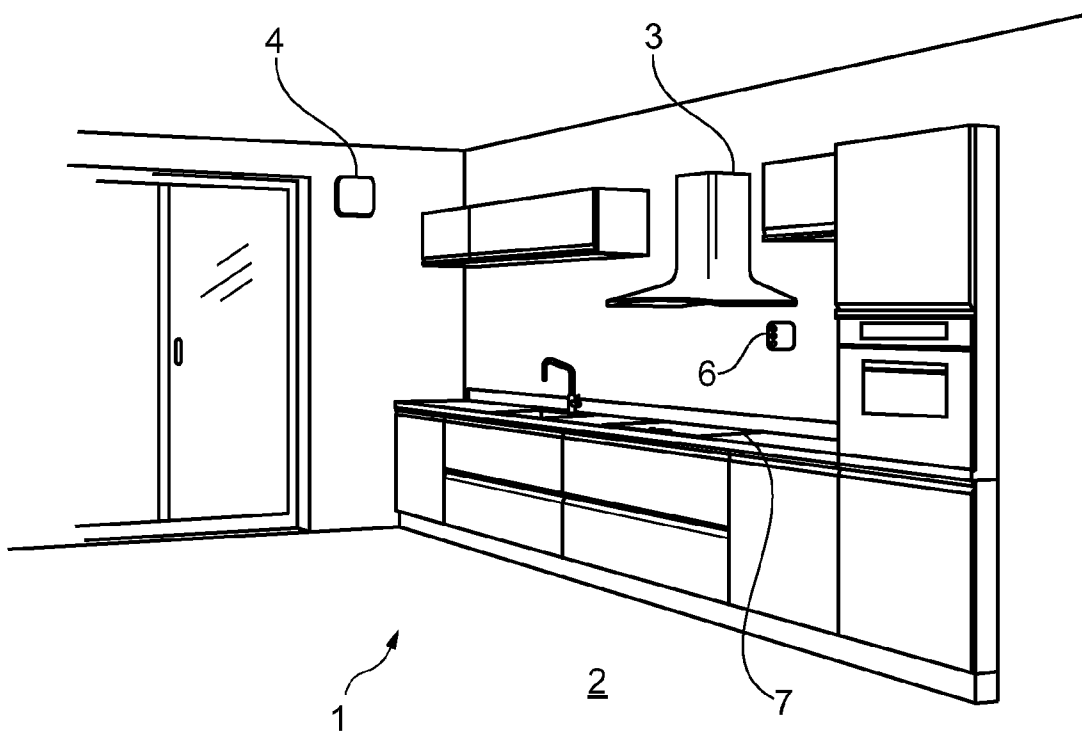


Fig. 1

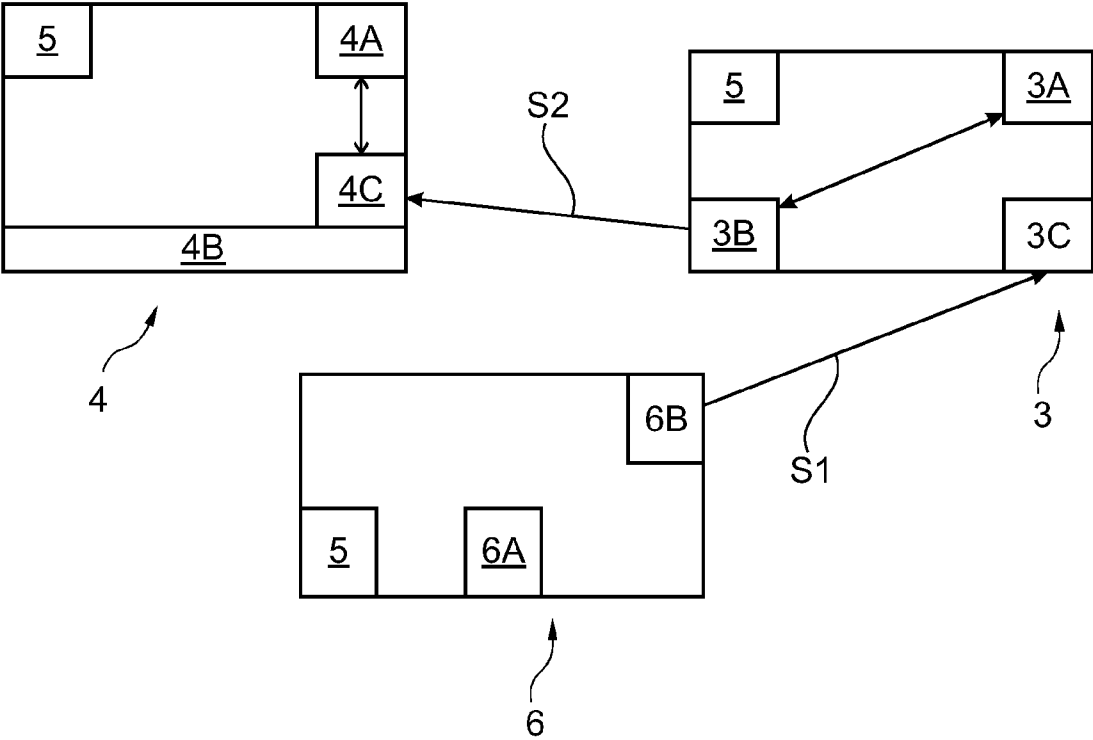


Fig. 2

VENTILATION SYSTEM FOR A ROOM

DETAILED DESCRIPTION

TECHNICAL FIELD

[0001] The present invention relates to a ventilation system for a room as defined in the preamble of claim 1.

BACKGROUND ART

[0002] Hoods can be divided into two large classes: filter hoods and extractor hoods.

[0003] As compared with filter hoods, extractor hoods have the characteristic of exhausting gases from the room in which the hood is installed.

[0004] Particularly, in extractor hood designs, air is extracted by an electric fan located above the cooktop, flows through a filter system and is finally exhausted out of the room through a duct.

[0005] Nevertheless, these extractor hoods may not always be installed in existing rooms, as they may require masonry works for gas exhaust duct installation.

[0006] In view of obviating this drawback, filter hoods exist in the art which have achieved satisfactory filtering efficiency, but do not provide the gas treatment results that may be achieved with extractor hoods.

[0007] Wall fans are also known, i.e. those types of fans that can extract gases from a room and exhaust them outside.

[0008] Particularly, these wall fans include an electric motor that drives an impeller such that air is exhausted out of the room through a duct that extends through the thickness of the wall or the thickness of a window pane or the like.

[0009] These wall fans require low-impact masonry works, that may be easily carried out by unskilled personnel.

[0010] Furthermore, the extraction efficiency of these fans is comparable to that obtained by an extractor hood.

[0011] Nevertheless, hoods and fans as described above are stand-alone devices, i.e. designed for autonomous operation.

[0012] Therefore, the user is required to learn the operation of two distinct apparatuses, and control two devices according to particular requirements, which will involve obvious and imaginable consequences.

[0013] One object of the present invention is to provide a ventilation system for a room, such as a kitchen, that allows efficient filtering of the substances contained in the gases derived from preparation/cooking of food and the like.

[0014] One task of the present invention is to provide a ventilation system for a room that does not require costly masonry works for installation.

[0015] Another task of the present invention is to provide a ventilation system for a room that has a low cost and may be easily used by the user.

[0016] According to the present invention, these and other objects, as better understood hereinafter, are achieved by a ventilation system for a room that has the characteristic of comprising a filter hood and a wall fan as defined by the features of claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying figures show exemplary embodiments of the present disclosure by way of illustration and without limitation, in which:

[0018] FIG. 1 shows a perspective view of the ventilation system for a room according to the present invention;

[0019] FIG. 2 shows a block diagram of the ventilation system of FIG. 1.

[0020] Referring to the accompanying figures, the present disclosure relates to a ventilation system 1 for a room 2, comprising a hood for domestic use 3, preferably a filter hood, located in the room, and a wall fan 4, also located in such room.

[0021] The room 2 may be, for example, the kitchen of a home or a public space, such as a coffee bar, a restaurant, and the like.

[0022] As used herein, the term filter hood 3 will designate an apparatus having a frame that contains the devices required for:

- [0023] extracting the gases in the room,
- [0024] filtering them and
- [0025] reintroducing them into the room, once they have been filtered.

[0026] Particularly, the filter hood 3 comprises control means 3A that are suitably controlled to change the operating state of the filter hood 3.

[0027] For example, the control means 3A may actuate particular features of the hood 3 and/or switch from an ON state (in which the hood extracts gases, filters them and reintroduces them into the room, once they have been filtered) to an OFF state, or vice versa.

[0028] For example the control means 3A consist of an electrically controllable switch.

[0029] Otherwise, the switch may be manually controlled.

[0030] As used herein, the term wall fan 4 will designate an apparatus having a frame that contains the devices required for:

- [0031] - extracting the gases in the room,
- [0032] - exhausting them out of the room through an appropriate exhaust duct which extends, for instance, through the thickness of a perimeter wall of the room 2 or a window pane or the like of the room 2.

[0033] Particularly, the wall fan 4 comprises control means 4A that are suitably controlled to change the operating state of the fan 4.

[0034] For example, the control means 4A are configured to switch the fan 4 from an ON state (in which the fan extracts gases from the room 2 and exhausts them out of the room 2, or vice versa) to an OFF state or vice versa.

[0035] For example the control means 4A consist of an electrically controllable switch.

[0036] It shall be noted that the wall fan 4 may also be of reversible type, i.e. adapted to withdraw air from outside and introduce it into the room 2.

[0037] In case of reversible operation, an appropriate filter 4B is provided to filter the incoming air, e.g. a HEPA.

[0038] The ventilation system 1 comprises a plurality of transducers 5, which are configured to detect a respective plurality of characteristic parameters of gases in said room 2.

[0039] For example, the plurality of transducers 5 comprises transducers (or sensors) able to detect temperature, humidity, smoke, odors and the like.

[0040] These transducers are of known type and will not be described in detail.

[0041] The ventilation system 1 comprises processing and control means 6, which are in signal communication with the plurality of transducers 5.

[0042] Preferably, the processing and control means 6 are electrically connected with the plurality of transducers 5, e.g. by means of a cable connection.

[0043] For example, the processing and control means 6 consist of an electronic processing device such as a micro-controller.

[0044] The processing and control means 6 comprise a memory 6A which contains firmware.

[0045] The firmware comprises one or more algorithms, i.e. sequences of operations coded by an appropriate program code and developed to accomplish particular tasks, as described in greater detail below.

[0046] These processing and control means 6 are configured to receive the values of the plurality of characteristic parameters as detected by the plurality of transducers 5 and to process such values to determine whether the hood 3 only, the fan 4 only or both have to be actuated, and the operating time of the fan 4 and/or the hood 3.

[0047] The processing and control means 6 are also in signal communication via an electric signal S1 that can be transmitted via cable or radio frequency using the control means 3A of the hood 3.

[0048] Particularly, the algorithms implemented in the firmware allow the values of the characteristic parameters as detected by the transducers 5 to be assessed against appropriate threshold values V_{th} . This comparison provides ON-times (or ON-time intervals) for the fan 4 and/or the hood 3.

[0049] For this purpose, the hood 3 is in signal communication with the wall fan 4 via a cable or radio frequency transmitter module 3B included in such hood 3, and configured to transmit a signal S2 via cable or radio frequency.

[0050] Advantageously, the wall fan 4 comprises a first cable or radio frequency receiver module 4C, which is configured to receive the cable signal S2 or the radio frequency signal S2 generated by the transmitter module 3B of the hood 3.

[0051] The cable or radio frequency signal S2 is particularly generated by the hood 3 to control the control means 4A when one or more of said characteristic parameters as detected by the transducers 5 exceed a respective predetermined threshold value V_{th} .

[0052] In other words, the signal S2 is generated according to the information contents in the signal S1 generated by the processing and control means 6.

[0053] Therefore, the signal S2 is representative of the ON/OFF information for the fan 4 and the information about the ON-time interval T1 for the wall fan 4 and/or the hood 3.

[0054] It shall be noted that the ON-time T1 for the fan 4 is determined by the processing and control means 6, which process the values detected by the transducers 5.

[0055] In other words, when the transducers 5 assess that one or more characteristic parameters exceed respective threshold values, the processing and control means 6, based on firmware algorithms, actuate the control means 3A, which in turn instruct the transmitter module of the hood 3 to emit the signal S2. This signal S2 is received by the receiver means 4C of the fan 4, such that the control means 4A switch the fan 4 on for the time period T1. For example, if the transducers detect odors, the processing and control means 6, based on firmware algorithms, determine the ON-time interval for the fan 4 and instruct to turn on the control means 3A of the hood 3. The latter instruct in turn the transmitter module of the hood 3 to emit the signal S2. This signal S2 is received by the receiver means 4C of the fan 4, such that the control means 4A switch the fan 4 on for the time period T1.

[0056] When the value/s detected by the transducers 5 fall back below their respective predetermined threshold values,

the control means 6 instruct the control means 3A of the hood 3 to emit the signal S2 to turn off the fan 4.

[0057] However, when the values of the characteristic parameters as detected by the transducers 5 (such as odors, odors and smoke, or smoke and temperature, or any combination of smoke, odor and temperature) exceed one or more of their respective threshold values, in addition to turning on the fan 4, the firmware of the control means 6 may also instruct the control means 3A to turn on the filter hood 3 and keep it in this state for a predetermined ON-time T2.

[0058] By this arrangement, the filter hood 3 and the wall fan 4 will join their filtration and extraction features for maximized operational efficiency in terms of comfort, consumption and air quality.

[0059] Once again the ON-time T2 is determined by the processing and control means 6, which process the values detected by the transducers 5.

[0060] It shall be noted that the ON-time T1 for the fan 4 may differ in duration from the ON-time T2 for the hood 3.

[0061] Advantageously, with the present ventilation system, the hood 3 will act as a hub or handling center for the ON/OFF signals for the fan 4 and/or the hood.

[0062] Furthermore, with the present ventilation system, the user is not required to separately control the filter hood 3 and the wall fan 4 for filtration and extraction of the gases in the room 2, but either or both (i.e. the fan 4 only, the filter hood 3 only or both the hood 3 and the fan 4) will be actuated for respective predetermined intervals T1, T2 according to the particular conditions of the gases in the room 2, as detected by the transducers 5.

[0063] According to preferred embodiments, one, more or all of the plurality of transducers 5 may be placed outside and/or inside the hood 3, the wall fan 4 and/or the processing and control means 6, which means that they may be placed remote from and/or incorporated in each respective frame of the fan 4, the hood 3 or the processing and control means 6.

[0064] The processing and control means 6, as shown in FIGS. 1 and 2, may be also disposed as a remote or built-in device relative to the frames of the hood 3, the fan 4 and/or a cooktop 7.

[0065] If the processing and control means 6 are placed remote from the frame of the hood 3, then these processing and control means 6 may comprise a radio frequency transmitter module 6B which is configured to transmit the signal S1, i.e. a radio frequency signal, to the control means 3A of the hood 3.

[0066] For this purpose the hood 3 comprises a radio frequency receiver module 3C, which is configured to receive such second radio frequency signal S1.

[0067] This radio frequency signal S1 is always generated by the processing and control means 6 to control the change of the operating states of the hood 3 when one or more of said detected characteristic parameters exceed respective predetermined threshold values.

[0068] According to a preferred embodiment, the radio frequency transmitter modules 3B, 3C, 4B and 6B comply with the specifications of Bluetooth, IR, Zigbee standards or the like.

[0069] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the arrangements as described hereinbefore to meet incidental and specific needs. All of these variants and changes fall within scope of the invention, as defined in the following claims.

1. A ventilation system for a room comprising:
 a hood for domestic use located in said room and having first control means;
 a wall fan located in said room and having second control means;
 a plurality of transducers configured to detect a respective plurality of characteristic parameters of the gases in said room;
 processing and control means electrically connected with said plurality of transducers and in signal communication with said first control means, said processing and control means comprising firmware configured to process said characteristic parameters detected by one or more of said plurality of transducers and to transmit a first control signal to control said filter hood;
 wherein:
 said hood for domestic use is in signal communication with said wall fan via a first transmitter module, located in said hood, and configured to transmit a second signal, said wall fan comprising a first receiver module, located in said wall fan, and configured to receive said second signal; and
 said second signal being generated by said hood according to said first signal to instruct said second control means to turn on said wall fan and keep it in this state for a first predetermined ON-time when one or more of said characteristic parameters detected by said plurality of sensors exceed respective predetermined threshold values.

2. A ventilation system for a room as claimed in claim 1, wherein said first signal also instructs to turn on said hood for domestic use and keeps it in said ON-state for a second predetermined ON-time according to said first signal.

3. A ventilation system for a room as claimed in claim 1, wherein said first transmitter module is a radio frequency transmitter module and said first receiver module is a radio frequency receiver module.

4. A ventilation system for a room as claimed in claim 1, wherein said processing and control means comprise a second radio frequency transmitter module configured to transmit said first radio frequency signal to the first control means of said hood, the latter comprising a second radio frequency receiver module configured to receive said first radio frequency signal, said second radio frequency signal being generated by said processing means to turn on said first control means when one or more of said detected characteristic parameters exceed respective predetermined threshold values.

5. A ventilation system for a room as claimed in claim 1, wherein said processing and control means are external to said hood for domestic use and/or said wall fan.

6. A ventilation system for a room as claimed in claim 1, wherein said processing and control means are incorporated in said hood for domestic use and/or said wall fan.

7. A ventilation system for a room as claimed in claim 1, wherein said plurality of transducers are external to said hood, said wall fan, and/or said processing and control means.

8. A ventilation system for a room as claimed in claim 1, wherein one or more of said plurality of transducers are incorporated in said hood for domestic use, said wall fan and/or said processing and control means.

9. A ventilation system for a room as claimed in claim 1, wherein said first and second radio-frequency transmitter modules and said first and second radio-frequency receiver modules comply with Bluetooth, IR or Zigbee specifications.

10. A ventilation system for a room as claimed in claim 1, wherein said plurality of transducers are selected from the group of smoke-, odor-, temperature-sensing transducers.

11. A ventilation system for a room as claimed in claim 1, wherein said hood for domestic use is a filter hood.

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