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(54) **Air conditioning system for dwelling house**

(57) The invention concerns an air conditioning system for cooling or heating, dehumidifying and humidifying dwelling wherein houses with several rooms or areas that lead onto at least one intermediate room by means of their respective doors. In the intermediate room (11) a false ceiling (18) is provided forming a pressurized air duct (19); the air duct is placed in communication with

each room or area by means of an opening (23, 23') provided in the masonry work on a level with the duct; the internal air conditioning unit is placed in said false ceiling so as to intake air from below and emit a flow of air in said duct (19) to send air to each room or area through said openings; and in line with at least some rooms or areas a passage is provided to recycle the air from these rooms or areas towards the internal unit.

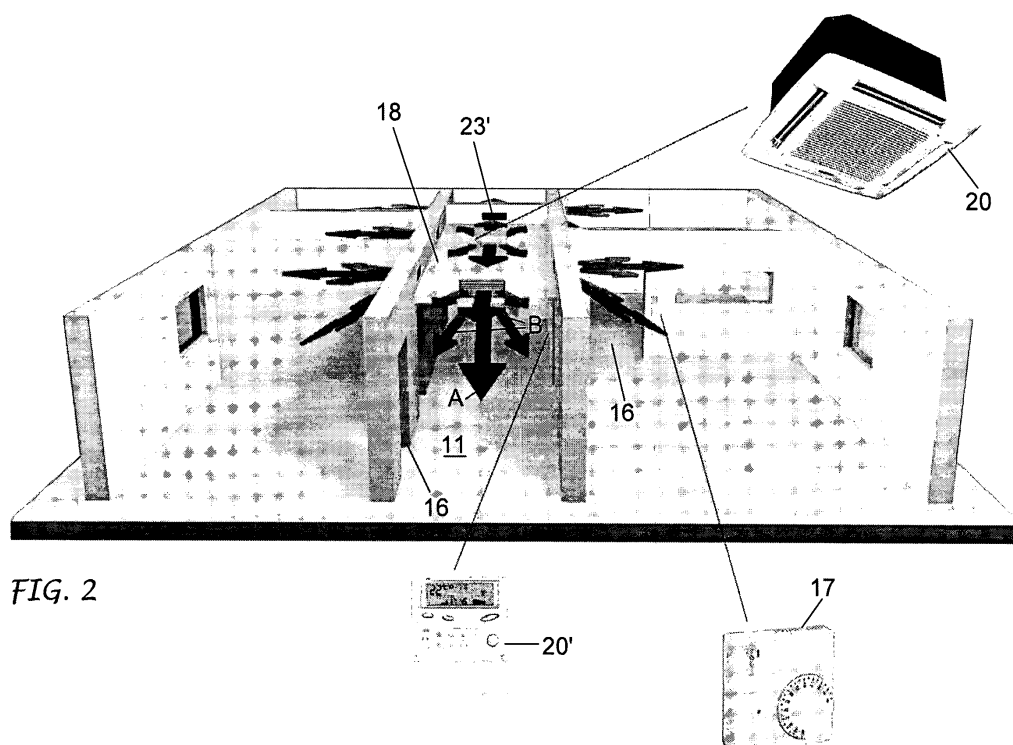


FIG. 2

Description

Field of the Invention

[0001] The present invention concerns air conditioning systems in general, and refers in particular to an innovative heating, cooling, dehumidification and humidification system for dwelling house.

State of the Technique

[0002] An air conditioning system is basically made up of an external condensation unit, named condensing or motor-condensing unit, and of at least one internal or evaporating unit, connected, besides to an electric feed circuit, also to tubes designed for the circulation of a cooling fluid.

[0003] The function of an air conditioning system is in itself well known: the external unit usually comprises a compressor, a heat exchanger and a ventilator and a cooling fluid, which, in the cooling mode of an environment, it being at a high temperature, releases heat to the external atmosphere, and consequently cools down.

[0004] In every internal unit, the cooling fluid, which is at a low temperature, absorbs the heat from the room to be conditioned, thus cooling it.

[0005] If the cooling fluid flows are inverted the equipment functions as a heating pump and the opposite effect of heating the internal area is created caused by the absorption of the heat from the external air.

[0006] The internal units can have different configurations and prearrangements in order to be positioned against or recessed in a wall or installed in a false ceiling. However, when an ambient such as an apartment which has several rooms or separated areas requires air conditioning, at least one internal unit for each area and relative fluid connections with the external condensing unit is required, resulting in the need for a relatively complex and costly system with high consumptions. Even if at least in newly built buildings its installation can be facilitated by the preparation of tubes, conduits and/or recess containers for the internal units, an air conditioning system always keeps to the general configuration described above and installing it in already existing buildings becomes very problematic and costly.

Objective and Summary of the Invention

[0007] The present invention is however intended for an air conditioning system, both for cooling and heating, very simple to produce, that substantially integrates with the masonry work which a single internal unit is connected to and serves several separate areas to be air conditioned, as is the case in an apartment with several rooms. In addition and to its advantage, besides newly built buildings, the air conditioning system proposed herein can be installed without difficulty also in existing apartments where they do not exist, using simple and minimally in-

vasive procedures, which give efficient results and considerable saving, also doing away with the traditional heating system.

[0008] To meet this objective, the invention proposes an automatic air conditioning system for dwelling houses according to the characterizing part in claim 1 and that will be described in detail making reference to the attached, purely exemplifying, drawings.

Brief Description of the Drawing

[0009] In said drawings:

Fig. 1 is a cross-section that shows the air conditioning system applied in an apartment with several separate rooms and areas; and

Figs. 2, 3 and 4 show as many cross-sections taken from different angles to view better the configuration and function of the air conditioning system.

Detailed Description of the invention

[0010] The air conditioning system lends itself in particular for installation in dwelling houses where, as shown, a first area is provided 11 such as an entrance, an anteroom, a corridor or the like, leading to other rooms or differing areas such as, a kitchen 12, living room 13, a bedroom or bedrooms 14, a bathroom or bathrooms 15 etc., each with its respective door 16 and each one provided with a thermostat 17, in particular a room radio thermostat.

[0011] According to the invention, in the first room 11 a false ceiling 18 is provided so that it forms with the lateral walls and the ceiling of said room, an air duct 19 that extends at least above the doors 16 and however in line with the other rooms 12-15.

[0012] On a level with the false ceiling 18 is assembled an internal air conditioning unit 20 (or evaporator) that can be of a known type, but however equipped with an induction grille 21 facing downwards and with at least one side opening 22 to emit a flow of air in said duct 19, above the false ceiling, so as to create pressurization. The internal unit 20 will of course be connected, what is more in the traditional way, to an external condensing unit, not shown, and can be managed by a relative programmable controller 20' and comprises means for dehumidifying and humidifying.

[0013] In the masonry work of each room 12-14 an opening is provided associated with a respective inlet 23 so as to put the pressurized air duct 19 in communication with the inside of the room. The inlets 23 are powered to distribute the air into the respective rooms, commanded by room radio-thermostats 17 to control autonomously the temperatures in each room.

[0014] At the base of the door of each of said rooms is provided a slot for the circulation of the air from the inside of each room towards the internal air conditioning unit 20 installed in the false ceiling of the first room 11.

Otherwise, as an alternative or in addition to the slot under the door, a passage between each room and the room in which the internal air conditioning unit is installed can be provided.

[0015] Likewise, on a level with the or each bathroom 15 an opening with a powered and remote controlled inlet 23' is provided for the flow of air from the pressurized air conduit 19 to the inside of the bathroom. However, at the bottom of said door no slot is provided, whereas the inside of each bathroom is placed in communication with the external atmosphere by means of an exhaust fan 24, for example an electric type, by gravity or over pressure, to expel the foul air.

[0016] The group will also be provided with at least one opening 25 for automatic intake of external air in relation to the volumes of air circulating in the system, said opening being connected to the internal air conditioning unit 20. Furthermore in the false ceiling an inlet can be provided to act as a by-pass should the inlets correlated to the various rooms be or remain closed.

[0017] As stated above, this air conditioning system can be switched from a cooling to a heating function. It simply requires an electric feed, and the heating function enables connections to the traditional thermal energy sources to be removed with the advantage of not requiring a boiler and relative fuel supply.

[0018] Furthermore, the system can be connected up to a photovoltaic system for its electric power feed.

[0019] In practice, the air flow generated by the internal air conditioning unit 20 passes through the pressurized duct 19 above the false ceiling 18 and is uniformly distributed to the various rooms 12-15 by means of the respective inlets 23, 23'. By regulating the opening/closing of these inlets it will therefore be possible to vary the flow of air to each room as required and based on the temperature set on the local thermostat. In the drawings, the A arrows are to indicate the flow of cool air when the system is in the cooling mode, the B arrows indicate the flow of hot air when the system is in the heating mode, the C arrows indicate the recycling of air under the doors of all the rooms, with the exclusion of the bathroom or bathrooms, whereas the external air feed flow for a progressive exchange of the internal air is carried out by means of the opening or openings 25 towards the outside.

munication with each room or area by means of an opening (23, 23') provided in the masonry work on a level with the duct, the internal air conditioning unit is placed in said false ceiling so as to intake air from below and emit a flow of air in said duct (19) to send air to each room or area through said openings, and in line with at least some rooms or areas a passage is provided to recycle the air from these rooms or areas towards the internal unit.

2. System according to claim 1, wherein each inlet has an adjustable opening/closing, and in which each room or area is provided with a thermostat to set the room temperature and used to manage the opening/closing of the inlet associated with said room or area.
3. System according to claims 1 or 2, wherein said passage for recycling the air is formed by a gap left below each door or by an opening between each room or area and the intermediate room.
4. System according to claims 1-3, wherein are also envisaged at least an opening as an inlet for external air connected to the internal air conditioning unit.
5. System according to any one of the previous claims, wherein an opening is envisaged to expel the air externally at least from a bathroom.
6. System according to any one of the previous claims, wherein a duct functioning as a by-pass for when the air input ducts in the various rooms and areas are all closed is provided in the false ceiling.

Claims

1. An air conditioning system for cooling or heating, dehumidifying and humidifying dwelling houses with several rooms or areas that lead onto at least one intermediate room through respective doors, a system comprising an internal air conditioning unit (20) connected to an external condensing unit and **characterized in** the fact that in said intermediate room (11) a false ceiling (18) is provided forming a pressurized air duct (19), said air duct is placed in com-

