

The invention concerns a method and a device for air conditioning and/or heating dwellings, notably blocks of flats.

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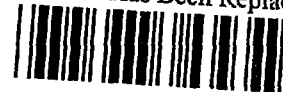
Devices suitable for air conditioning and heating dwellings are of four types differentiated by the external energy source, air or water, used, and by the fluid, air or water, used to restore this energy in the dwellings.

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The first type of device consists of air/water systems consisting generally of a centralised installation composed of an outdoor unit installed on a terrace, and fan convector units disposed in the rooms to be heated and cooled and
20 supplied from the outdoor unit by means of insulated hydraulic pipes.

In addition to their high cost, such installations have several drawbacks. In the first place, they make it
25 necessary to pre-equip the entire building without judging beforehand whether or not the occupants require the air conditioning option. In addition, they require the fitting of an energy metering system meeting specific standards, the cost price of which is relatively high. In addition, such
30 installations present a flexibility problem when, in mid-season, certain rooms which are well exposed require to be cooled whilst other rooms require to be heated. It should be noted that this last problem can be resolved by installing two outdoor units, one per facade, south and
35 north. However, this solution leads to a not insignificant increase in investment cost. Lastly, any failure in the outdoor unit results in depriving all the dwellings of heating or air conditioning.

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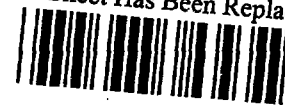
maintained at the desired temperature by a loop heater and a
5 cooling tower using the evaporation of 15% of the water in
the circuit in order to cool it.

This system makes it possible to mitigate some of the
drawbacks of the air/water systems described above. This is
10 because it is possible to heat or air condition different
dwellings in the building at the same time. In addition,
except for a failure of one of the components of the cooling
tower, any operating defect concerns only one dwelling
rather than the entire building. On the other hand, this
15 system also presents drawbacks. In the first place, the
noise level in the dwellings is high since the compressors
are disposed inside the heat pumps installed in these
dwellings. In addition, although pre-equipping is less
expensive than in the case of an air/water system (the
20 cooling tower is less expensive than the outdoor unit of
this air/water system, and the pipes are not insulated) the
total cost of the installation is greater than that of
air/water systems.

25 The third type of device consists of water/water systems
consisting of fan convactor units disposed in the dwellings,
and fed by means of a water loop provided with a cooling
tower. Such a system can be compared to the air/water
systems with however the drawback of not allowing change-
30 over of the cycle.

Finally, the fourth type of device consists of air/air
systems produced by means of split systems, that is to say
appliances including the condenser part and evaporator part
35 and consisting of an outdoor unit and an indoor unit
connected by a "Freon" pipe, the outdoor unit comprising a

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Such split systems can be designed to treat an entire dwelling. The indoor unit is then connected to a network of ducts enabling the air to be distributed in the various rooms in this dwelling. Such a system has the advantage of being of lower cost compared with the aforementioned three systems. In addition, the different dwellings are treated in a totally independent manner. On the other hand, the cost price of the installation still remains relatively high. In addition, the noise level at the air intake of the indoor unit is high. Finally, the regulation of the temperature in the different rooms is very uncertain.

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These split systems can also be used individually, by installing one appliance per room. This solution offers great flexibility in use but its cost is high.

20 The present invention aims to mitigate the above-mentioned drawbacks of the various devices for air conditioning and heating dwellings, and its main objective is to provide an air conditioning and/or heating device consisting of an air/air system with low cost price and noise level and enabling the dwellings to be treated individually.

To this end, the invention relates to a method of air conditioning and/or heating dwellings, notably in a block of flats, of the type consisting of:

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- using an outdoor unit and an indoor unit linked by fluid and electrical connections, the outdoor unit comprising a compressor, ventilation means and an exchanger, the indoor unit comprising ventilation means and an exchanger,

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- producing a circulation of air inside the dwelling using the ventilation means of the indoor unit, and

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5 According to the invention, this method is characterised in that it consists of:

- using a low-pressure indoor unit able to deliver air at a pressure of at most 8 mm, and

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- delivering this air in bulk in a false ceiling forming a sealed plenum chamber able to serve as an expansion chamber, the said plenum chamber having blower grilles opening out into each of the rooms to be treated.

15

According to this method, the air conditioning of a dwelling with several rooms is provided by means of an assembly consisting of an indoor unit and an outdoor unit originally designed to treat a single room (wide-vent blowing because
20 of the low pressure of the indoor appliance).

Consequently it is notably possible according to the method of the invention to air condition an apartment with a relatively small area but having several rooms, by using an
25 assembly originally designed to air condition a single room.

This air conditioning is also provided by means of an installation which has no blowing duct and whose sound level is lower on the one hand because of the low pressure of the
30 indoor unit and on the other hand because of the expansion chamber phenomenon given by the plenum chamber.

The originality of the technique used according to the invention lies therefore in its extreme simplicity, which
35 makes it possible to effect the air conditioning of a dwelling by means of an installation whose cost is very much less than that of current installations.

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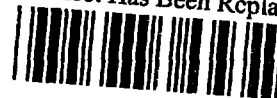


over means and an indoor unit equipped with a supplementary
5 electrical battery controlled by an external thermostat.

In addition, according to one preferential embodiment:

- use is made, for one of the rooms in the dwelling,
10 referred to as the master room, of a blowing grille having
ventilation characteristics suitable for allowing
fluctuations in the output of the said grille with respect
to its nominal output, and for the other rooms in the
dwelling, referred to as the ancillary rooms, blowing
15 grilles provided with adjustment dampers enabling the output
of the said grilles to be varied with respect to their
nominal output, in a range such that the blowing grille of
the master room can absorb these variations in output, and
- 20 - the temperature in the various ancillary rooms in the
dwelling is regulated by modifying, by means of the
adjustment dampers, the flow of air delivered into the said
ancillary rooms.
- 25 According to this preferred embodiment, the regulation of
the temperature in an ancillary room can be refined very
simply by modifying, by means of the adjustment damper, the
flow of air blown into the said room.
- 30 This is because the variation in flow brought about by the
closure or opening of one of the blowing grilles in one or
more of the ancillary rooms has repercussions in the master
room through the blowing grille therein, which on the one
hand does not have an adjustment damper and on the other
35 hand is designed so as to be able to absorb these
fluctuations in flow.

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nuisance, even when the output of the said outlets is
5 minimal.

In addition, the operation of the compressor is
advantageously controlled by means of a temperature
monitoring device disposed so as to read the temperature of
10 the air taken in by the indoor unit ventilation means.

The temperature monitoring device is thus disposed so as to
read the temperature of all the air taken in, which
corresponds to the mean temperature in the dwelling, and
15 this then reacts to the fluctuations in output of the
different blowing grilles so as to readjust the temperatures
in the dwelling.

In addition, the dampers for regulating the blowing grilles
20 in the ancillary rooms are preferably controlled by means of
thermostatic control devices.

According to another characteristic of the invention, the
top face of the false ceiling is covered with a layer of
25 sound and heat insulating material.

The essential function of such a material is to prevent any
condensation resulting from a temperature difference between
the inside of the plenum chamber and the ambient air. It
30 also has the function of attenuating the noise level,
firstly of the indoor unit and secondly between the rooms.

In addition, the indoor unit is advantageously integrated in
the false ceiling, and the said false ceiling is separated,
35 by means of a cheek, into two parts forming an intake plenum
chamber, provided with an intake grille able to serve as an
inspection hatch, and the blowing plenum chamber.

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5 - Figure 1 is a plan view of a dwelling with a balcony, equipped with a device according to the invention,

- Figure 2 is a diagrammatic view in elevation through a vertical plane in this apartment.

10

The installation according to the invention includes an indoor unit 1 and an outdoor unit 2 with direct expansion connected together by refrigerant pipes and electrical lines such as 3 protected by an ICT and embedded in the floor
15 screed. The characteristics of these units given below by way of example correspond to an apartment with a floor area of around 50 m².

The outdoor unit 2 consists of a direct-expansion heat pump
20 with a refrigerating capacity of 3600 W and a heat output of 3800 W.

It includes, in a conventional manner, a hermetic refrigeration compressor equipped with a casing resistance,
25 a direct-expansion exchanger made of copper with aluminium fins, a refrigerating circuit and a low-speed axial fan. The refrigerating circuit also includes, essentially, a pressure reducer, a four-way cycle change-over valve, an impact-resistant liquid bottle and a de-humidifier.

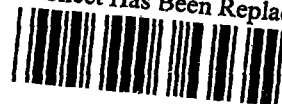
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This outdoor unit 2 also includes a defrosting system able to monitor the temperature at the exchanger and periodically demand cycle change-over when this temperature is below a predetermined threshold.

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As for the indoor unit 1, this consists of a fan convector unit without a casing, with a nominal output of 650 m³/hr at

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4 battery is controlled by an external thermostat, which
5 allows it to be triggered below a predetermined set point.

This indoor unit 1 is connected to a prewired control box including a thermostat, disposed in the apartment so that the said thermostat reads the temperature of the air taken
10 in by the said unit. This control box 4 also has a stop/start button, a ventilation speed selector and a winter/summer cycle change-over switch.

The refrigeration connections linking the two units, indoor
15 1 and outdoor 2, include a gas tube and a liquid tube sheathed in a sleeve made from insulating material.

The electrical connections connecting these two units 1, 2 for their part include electrical cables bringing the power
20 delivered to the circuit breaker as far as the outdoor unit 2, and enabling the thermostat control signal to be delivered to this outdoor unit 2.

In the example, the outdoor unit 2 is installed on the
25 balcony of the apartment close to the guardrail on this balcony, and has an external grille 5 integrated in this guardrail. It should be noted that, because of the small depth (around 25 cm) of this outdoor unit 2, it is easy to design an architectural solution enabling it to be
30 integrated directly into the guardrail.

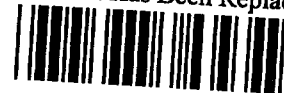
As for the indoor unit 1, this is disposed above a false ceiling 6 consisting of a sheet of BA 13 gypsum plasterboard, extending in the apartment passageways, and
35 adapted to form a blowing plenum chamber 7 for distributing air in all the rooms to be heated or cooled. In order to discharge the condensates, this indoor unit 1 is connected

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- 4 The volume delimited by the false ceiling 6 is also
- 5 separated in two by a vertical cheek 10 disposed in line with the indoor unit 1, so as to form two separate volumes constituting the blowing plenum chamber 7 extending at the front of the indoor unit 1, and an intake plenum 11 extending to the rear of this indoor unit 1.
- 10
- 15 In order to provide the air intake, this false ceiling 6 is provided with a grille 12 disposed in line with the indoor unit 1 so as to communicate with the intake plenum chamber 11. This grille 12, for example fixed by means of screws, advantageously has dimensions (for example 600 mm x 600 mm) which, by virtue of its positioning in line with the indoor unit 1, enable this indoor unit to be maintained or repaired.
- 20 In addition, in order to allow circulation of air between the rooms to be heated and cooled, and circulation, the access doors to these rooms are relieved so as to form a slot 13 underneath the said doors.
- 25 It should be noted, finally, concerning this air intake, that the control box 4 incorporating the thermostat is disposed in the circulation and therefore reads the temperature of the air taken in by the indoor unit 1.
- 30 With regard to the distribution of air, and in the first place, the false ceiling 6 is covered, in its part delimiting the blowing plenum chamber 7, with a layer 14 of sound and heat insulating material, such as rockwool.
- 35 This blowing plenum chamber 7 is also equipped with blowing grilles for distributing air in the various rooms:

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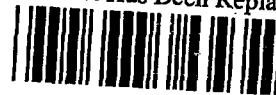


output of the said grille of plus or minus 40% with respect
5 to its nominal output,

- the blowing grilles 16, 17 supplying the other rooms being
provided with adjustment dampers suitable for making it
possible to vary the output of the said grilles by plus or
10 minus 30% with respect to their nominal output.

In addition, the adjustment dampers of the blowing grilles
16, 17 are controlled by a thermostatic control device (not
shown) enabling the temperature of these rooms to be
15 regulated independently.

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1. Method of air conditioning and/or heating dwellings,
5 notably in a block of flats, of the type consisting of:

- using an outdoor unit (2) and an indoor unit (1) linked by
fluid and electrical connections (3), the outdoor unit (2)
comprising a compressor, ventilation means and an exchanger,
10 the indoor unit (1) comprising ventilation means and an
exchanger,

- producing a circulation of air inside the dwelling using
the ventilation means of the indoor unit (1), and
15

- controlling the operation of the compressor of the outdoor
unit (2) by means of a device (4) monitoring the temperature
inside the dwelling and determining a set temperature,

20 the said method being characterised in that it consists of:

- using a low-pressure indoor unit (1) able to deliver air
at a pressure of at most 8 mm, and
25 - delivering this air in bulk in a false ceiling (6) forming
a sealed plenum chamber (7) able to serve as an expansion
chamber, the said plenum chamber having blower grilles (15-
17) opening out into each of the rooms to be treated.

30 2. Method according to Claim 1 for air conditioning and
heating dwellings, in which use is made of an outdoor unit
(2) provided with cycle change-over means, and an indoor
unit (1) equipped with an auxiliary electrical battery
controlled by an external thermostat.

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5 4. Method according to one of Claims 1 to 3, characterised
in that:

- use is made, for one of the rooms in the dwelling,
referred to as the master room, of a blowing grille (15)
10 having ventilation characteristics suitable for allowing
fluctuations in the output of the said grille with respect
to its nominal output, and for the other rooms in the
dwelling, referred to as the ancillary rooms, blowing
grilles (16, 17) provided with adjustment dampers enabling
15 the output of the said grilles to be varied with respect to
their nominal output, in a range such that the blowing
grille (15) of the master room can absorb these variations
in output, and

20 - the temperature in the various ancillary rooms in the
dwelling is regulated by modifying, by means of the
adjustment dampers, the flow of air delivered into the said
ancillary rooms.

25 5. Method according to Claim 4, characterised in that the
adjustment dampers of the blowing grilles (16, 17) in the
ancillary rooms are controlled by means of thermostatic
control devices.

30 6. Method according to one of Claims 4 or 5, characterised
in that the operation of the compressor is controlled by
means of a temperature monitoring device (4) disposed so as
to read the temperature of the air taken in by the indoor
unit ventilation means (1).

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7. Method according to one of the preceding claims,
characterised in that the top face of the false ceiling (6)

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8. Method according to one of the preceding claims,
5 characterised in that the indoor unit (1) is integrated in
the false ceiling (6), and in that the said false ceiling is
separated by a cheek (10) into two parts forming an intake
plenum chamber (11) provided with an intake grille (12) able
to serve as an inspection hatch, and the blowing plenum
10 chamber (7).

9. Device for air conditioning and/or heating dwellings,
notably blocks of flats, of the type comprising:

15 - an indoor unit (1) and an outdoor unit (2) connected by
fluid and electrical connections (3), the outdoor unit (2)
comprising ventilation means and an exchanger, and the
indoor unit (1) comprising ventilation means and an
exchanger,

20

- means of blowing out and taking in air connected to the
indoor unit (1),

- a device (4) for monitoring the temperature inside the
25 dwelling able to control the operation of the compressor in
the outdoor unit (2),

the said device being characterised in that:

30 - the indoor unit (1) is a low-pressure unit able to deliver
air at a pressure of at most 8 mm,

- the blowing means comprise a false ceiling (6) forming a
sealed plenum chamber (7) able to serve as an expansion
35 chamber, the said plenum chamber having blowing grilles (15-
17) for each of the rooms in the house.

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an electrical battery controlled by an external thermostat.

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11. Device according to one of Claims 9 or 10, in which the indoor unit (1) and the outdoor unit (2) are of the direct-expansion type.

10 12. Device according to one of Claims 9 to 11, characterised in that:

- one of the blowing grilles (15) is adapted to have ventilation characteristics suitable for allowing

15 fluctuations in the output of the said grille with respect to its nominal output,

- the other blowing grilles (16, 17) are provided with adjustment dampers suitable for making it possible to vary

20 the output of the said grilles with respect to their nominal output, in a range such that the blowing grille (15) can absorb the variations in output.

13. Device according to Claim 12, characterised in that it

25 comprises, for each blowing grille (16, 17) provided with an adjustment damper, a thermostatic control device for controlling the said damper.

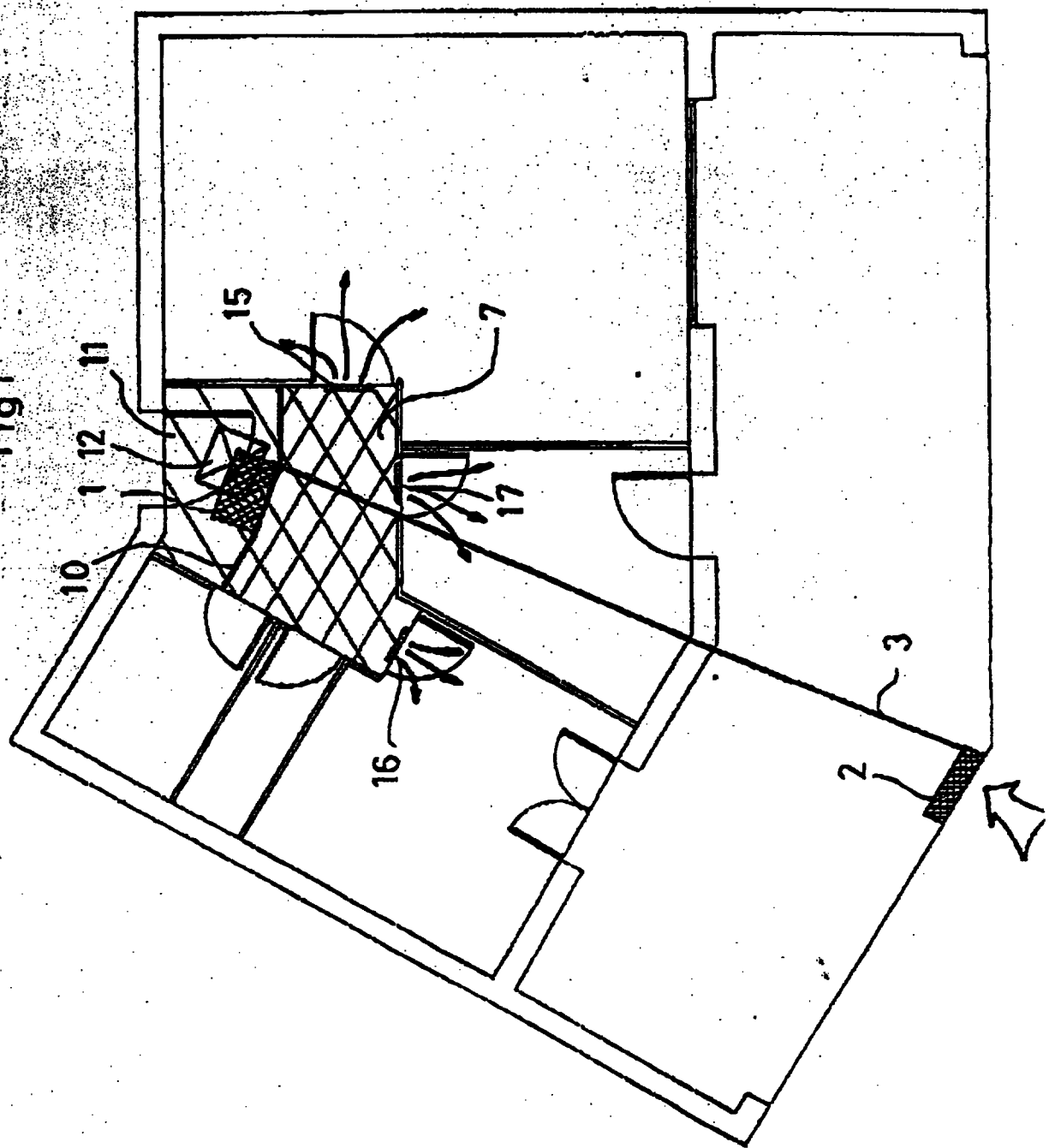
14. Device according to one of Claims 9 to 13,

30 characterised in that the false ceiling (6) is covered with a layer (14) of sound and heat insulating material.

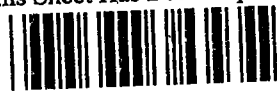
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Fig 1



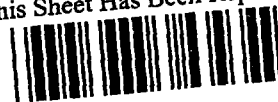
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Abstract



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The invention concerns a method and a device for air conditioning and/or heating dwellings, notably blocks of flats.

Devices suitable for air conditioning and heating dwellings are of four types differentiated by the external energy source, air or water, used, and by the fluid, air or water, used to restore this energy in the dwellings.

The first type of device consists of air/water systems consisting generally of a centralised installation composed of an outdoor unit installed on a terrace, and fan convactor units disposed in the rooms to be heated and cooled and supplied from the outdoor unit by means of insulated hydraulic pipes.

In addition to their high cost, such installations have several drawbacks. In the first place, they make it necessary to pre-equip the entire building without judging beforehand whether or not the occupants require the air conditioning option. In addition, they require the fitting of an energy metering system meeting specific standards, the cost price of which is relatively high. In addition, such installations present a flexibility problem when, in mid-season, certain rooms which are well exposed require to be cooled whilst other rooms require to be heated. It should be noted that this last problem can be resolved by installing two outdoor units, one per facade, south and north. However, this solution leads to a not insignificant increase in investment cost. Lastly, any failure in the outdoor unit results in depriving all the dwellings of heating or air conditioning.

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supplied by means of a constant temperature water loop, maintained at the desired temperature by a loop heater and a cooling tower using the evaporation of 15% of the water in the circuit in order to cool it.

This system makes it possible to mitigate some of the drawbacks of the air/water systems described above. This is because it is possible to heat or air condition different dwellings in the building at the same time. In addition, except for a failure of one of the components of the cooling tower, any operating defect concerns only one dwelling rather than the entire building. On the other hand, this system also presents drawbacks. In the first place, the noise level in the dwellings is high since the compressors are disposed inside the heat pumps installed in these dwellings. In addition, although pre-equipping is less expensive than in the case of an air/water system (the cooling tower is less expensive than the outdoor unit of this air/water system, and the pipes are not insulated) the total cost of the installation is greater than that of air/water systems.

The third type of device consists of water/water systems consisting of fan convactor units disposed in the dwellings, and fed by means of a water loop provided with a cooling tower. Such a system can be compared to the air/water systems with however the drawback of not allowing change-over of the cycle.

Finally, the fourth type of device consists of air/air systems produced by means of split systems, that is to say appliances including the condenser part and evaporator part and consisting of an outdoor unit and an indoor unit connected by a "Freon" pipe, the outdoor unit comprising a

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Such split systems can be designed to treat an entire dwelling. The indoor unit is then connected to a network of ducts enabling the air to be distributed in the various rooms in this dwelling. Such a system has the advantage of being of lower cost compared with the aforementioned three systems. In addition, the different dwellings are treated in a totally independent manner. On the other hand, the cost price of the installation still remains relatively high. In addition, the noise level at the air intake of the indoor unit is high. Finally, the regulation of the temperature in the different rooms is very uncertain.

These split systems can also be used individually, by installing one appliance per room. This solution offers great flexibility in use but its cost is high.

The present invention aims to mitigate the above-mentioned drawbacks of the various devices for air conditioning and heating dwellings, and its main objective is to provide an air conditioning and/or heating device consisting of an air/air system with low cost price and noise level and enabling the dwellings to be treated individually.

To this end, the invention relates to a method of air conditioning and/or heating dwellings, notably in a block of flats, of the type consisting of:

- using an outdoor unit and an indoor unit linked by fluid and electrical connections, the outdoor unit comprising a compressor, ventilation means and an exchanger, the indoor unit comprising ventilation means and an exchanger,
- producing a circulation of air inside the dwelling using the ventilation means of the indoor unit, and

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the dwelling and determining a set temperature.

According to the invention, this method is characterised in that it consists of:

- using a low-pressure indoor unit able to deliver air at a pressure of at most 8 mm, and
- delivering this air in bulk in a false ceiling forming a sealed plenum chamber able to serve as an expansion chamber, the said plenum chamber having blower grilles opening out into each of the rooms to be treated.

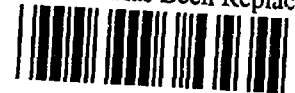
According to this method, the air conditioning of a dwelling with several rooms is provided by means of an assembly consisting of an indoor unit and an outdoor unit originally designed to treat a single room (wide-vent blowing because of the low pressure of the indoor appliance).

Consequently it is notably possible according to the method of the invention to air condition an apartment with a relatively small area but having several rooms, by using an assembly originally designed to air condition a single room.

This air conditioning is also provided by means of an installation which has no blowing duct and whose sound level is lower on the one hand because of the low pressure of the indoor unit and on the other hand because of the expansion chamber phenomenon given by the plenum chamber.

The originality of the technique used according to the invention lies therefore in its extreme simplicity, which makes it possible to effect the air conditioning of a dwelling by means of an installation whose cost is very much less than that of current installations.

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this purpose, of an outdoor unit provided with cycle change-over means and an indoor unit equipped with a supplementary electrical battery controlled by an external thermostat.

In addition, according to one preferential embodiment:

- use is made, for one of the rooms in the dwelling, referred to as the master room, of a blowing grille having ventilation characteristics suitable for allowing fluctuations in the output of the said grille with respect to its nominal output, and for the other rooms in the dwelling, referred to as the ancillary rooms, blowing grilles provided with adjustment dampers enabling the output of the said grilles to be varied with respect to their nominal output, in a range such that the blowing grille of the master room can absorb these variations in output, and
- the temperature in the various ancillary rooms in the dwelling is regulated by modifying, by means of the adjustment dampers, the flow of air delivered into the said ancillary rooms.

According to this preferred embodiment, the regulation of the temperature in an ancillary room can be refined very simply by modifying, by means of the adjustment damper, the flow of air blown into the said room.

This is because the variation in flow brought about by the closure or opening of one of the blowing grilles in one or more of the ancillary rooms has repercussions in the master room through the blowing grille therein, which on the one hand does not have an adjustment damper and on the other hand is designed so as to be able to absorb these fluctuations in flow.

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which prevents any overpressure at the outlets and any noise nuisance, even when the output of the said outlets is minimal.

In addition, the operation of the compressor is advantageously controlled by means of a temperature monitoring device disposed so as to read the temperature of the air taken in by the indoor unit ventilation means.

The temperature monitoring device is thus disposed so as to read the temperature of all the air taken in, which corresponds to the mean temperature in the dwelling, and this then reacts to the fluctuations in output of the different blowing grilles so as to readjust the temperatures in the dwelling.

In addition, the dampers for regulating the blowing grilles in the ancillary rooms are preferably controlled by means of thermostatic control devices.

According to another characteristic of the invention, the top face of the false ceiling is covered with a layer of sound and heat insulating material.

The essential function of such a material is to prevent any condensation resulting from a temperature difference between the inside of the plenum chamber and the ambient air. It also has the function of attenuating the noise level, firstly of the indoor unit and secondly between the rooms.

In addition, the indoor unit is advantageously integrated in the false ceiling, and the said false ceiling is separated, by means of a cheek, into two parts forming an intake plenum chamber, provided with an intake grille able to serve as an inspection hatch, and the blowing plenum chamber.

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into an intake plenum chamber and a blowing plenum chamber, constitutes a highly advantageous embodiment, on the one hand with regard to the cost of the installation and on the other hand from the maintenance point of view.

The invention extends to a device for air conditioning and/or heating dwellings, notably blocks of flats, of the type comprising:

- an indoor unit and an outdoor unit connected by fluid and electrical connections, the outdoor unit comprising ventilation means and an exchanger, and the indoor unit comprising ventilation means and an exchanger,
- means of blowing out and taking in air connected to the indoor unit,
- a device for monitoring the temperature inside the dwelling able to control the operation of the compressor in the outdoor unit.

According to the invention, this device is characterised in that:

- the indoor unit is a low-pressure unit able to deliver air at a pressure of at most 8 mm,
- the blowing means comprise a false ceiling forming a sealed plenum chamber able to serve as an expansion chamber, the said plenum chamber having blowing grilles for each of the rooms in the house.

Other characteristics, aims and advantages of the invention will emerge from the detailed description which follows with reference to the accompanying drawings, which depict, by way

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- Figure 1 is a plan view of a dwelling with a balcony, equipped with a device according to the invention,

- Figure 2 is a diagrammatic view in elevation through a vertical plane in this apartment.

The installation according to the invention includes an indoor unit 1 and an outdoor unit 2 with direct expansion connected together by refrigerant pipes and electrical lines such as 3 protected by an ICT and embedded in the floor screed. The characteristics of these units given below by way of example correspond to an apartment with a floor area of around 50 m².

The outdoor unit 2 consists of a direct-expansion heat pump with a refrigerating capacity of 3600 W and a heat output of 3800 W.

It includes, in a conventional manner, a hermetic refrigeration compressor equipped with a casing resistance, a direct-expansion exchanger made of copper with aluminium fins, a refrigerating circuit and a low-speed axial fan. The refrigerating circuit also includes, essentially, a pressure reducer, a four-way cycle change-over valve, an impact-resistant liquid bottle and a de-humidifier.

This outdoor unit 2 also includes a defrosting system able to monitor the temperature at the exchanger and periodically demand cycle change-over when this temperature is below a predetermined threshold.

As for the indoor unit 1, this consists of a fan convector unit without a casing, with a nominal output of 650 m³/hr at

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exchanger and a 1 kW electric heater. This indoor unit battery is controlled by an external thermostat, which allows it to be triggered below a predetermined set point.

This indoor unit 1 is connected to a prewired control box including a thermostat, disposed in the apartment so that the said thermostat reads the temperature of the air taken in by the said unit. This control box 4 also has a stop/start button, a ventilation speed selector and a winter/summer cycle change-over switch.

The refrigeration connections linking the two units, indoor 1 and outdoor 2, include a gas tube and a liquid tube sheathed in a sleeve made from insulating material.

The electrical connections connecting these two units 1, 2 for their part include electrical cables bringing the power delivered to the circuit breaker as far as the outdoor unit 2, and enabling the thermostat control signal to be delivered to this outdoor unit 2.

In the example, the outdoor unit 2 is installed on the balcony of the apartment close to the guardrail on this balcony, and has an external grille 5 integrated in this guardrail. It should be noted that, because of the small depth (around 25 cm) of this outdoor unit 2, it is easy to design an architectural solution enabling it to be integrated directly into the guardrail.

As for the indoor unit 1, this is disposed above a false ceiling 6 consisting of a sheet of BA 13 gypsum plasterboard, extending in the apartment passageways, and adapted to form a blowing plenum chamber 7 for distributing air in all the rooms to be heated or cooled. In order to discharge the condensates, this indoor unit 1 is connected

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The volume delimited by the false ceiling 6 is also separated in two by a vertical cheek 10 disposed in line with the indoor unit 1, so as to form two separate volumes constituting the blowing plenum chamber 7 extending at the front of the indoor unit 1, and an intake plenum 11 extending to the rear of this indoor unit 1.

In order to provide the air intake, this false ceiling 6 is provided with a grille 12 disposed in line with the indoor unit 1 so as to communicate with the intake plenum chamber 11. This grille 12, for example fixed by means of screws, advantageously has dimensions (for example 600 mm x 600 mm) which, by virtue of its positioning in line with the indoor unit 1, enable this indoor unit to be maintained or repaired.

In addition, in order to allow circulation of air between the rooms to be heated and cooled, and circulation, the access doors to these rooms are relieved so as to form a slot 13 underneath the said doors.

It should be noted, finally, concerning this air intake, that the control box 4 incorporating the thermostat is disposed in the circulation and therefore reads the temperature of the air taken in by the indoor unit 1.

With regard to the distribution of air, and in the first place, the false ceiling 6 is covered, in its part delimiting the blowing plenum chamber 7, with a layer 14 of sound and heat insulating material, such as rockwool.

This blowing plenum chamber 7 is also equipped with blowing grilles for distributing air in the various rooms:

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characteristics suitable for allowing the output of the said grille of plus or minus 40% with respect to its nominal output,

- the blowing grilles 16, 17 supplying the other rooms being provided with adjustment dampers suitable for making it possible to vary the output of the said grilles by plus or minus 30% with respect to their nominal output.

In addition, the adjustment dampers of the blowing grilles 16, 17 are controlled by a thermostatic control device (not shown) enabling the temperature of these rooms to be regulated independently.

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1. Method of air conditioning and/or heating dwellings, notably in a block of flats, of the type consisting of:

- using an outdoor unit (2) and an indoor unit (1) linked by fluid and electrical connections (3), the outdoor unit (2) comprising a compressor, ventilation means and an exchanger, the indoor unit (1) comprising ventilation means and an exchanger,

- producing a circulation of air inside the dwelling using the ventilation means of the indoor unit (1), and

- controlling the operation of the compressor of the outdoor unit (2) by means of a device (4) monitoring the temperature inside the dwelling and determining a set temperature,

the said method being characterised in that it consists of:

- using a low-pressure indoor unit (1) able to deliver air at a pressure of at most 8 mm, and

- delivering this air in bulk in a false ceiling (6) forming a sealed plenum chamber (7) able to serve as an expansion chamber, the said plenum chamber having blower grilles (15-17) opening out into each of the rooms to be treated.

2. Method according to Claim 1 for air conditioning and heating dwellings, in which use is made of an outdoor unit (2) provided with cycle change-over means, and an indoor unit (1) equipped with an auxiliary electrical battery controlled by an external thermostat.

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used.

4. Method according to one of Claims 1 to 3, characterised in that:

- use is made, for one of the rooms in the dwelling, referred to as the master room, of a blowing grille (15) having ventilation characteristics suitable for allowing fluctuations in the output of the said grille with respect to its nominal output, and for the other rooms in the dwelling, referred to as the ancillary rooms, blowing grilles (16, 17) provided with adjustment dampers enabling the output of the said grilles to be varied with respect to their nominal output, in a range such that the blowing grille (15) of the master room can absorb these variations in output, and

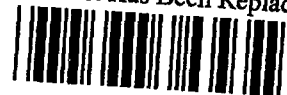
- the temperature in the various ancillary rooms in the dwelling is regulated by modifying, by means of the adjustment dampers, the flow of air delivered into the said ancillary rooms.

5. Method according to Claim 4, characterised in that the adjustment dampers of the blowing grilles (16, 17) in the ancillary rooms are controlled by means of thermostatic control devices.

6. Method according to one of Claims 4 or 5, characterised in that the operation of the compressor is controlled by means of a temperature monitoring device (4) disposed so as to read the temperature of the air taken in by the indoor unit ventilation means (1).

7. Method according to one of the preceding claims, characterised in that the top face of the false ceiling (6)

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8. Method according to one of the preceding claims, characterised in that the indoor unit (1) is integrated in the false ceiling (6), and in that the said false ceiling is separated by a cheek (10) into two parts forming an intake plenum chamber (11) provided with an intake grille (12) able to serve as an inspection hatch, and the blowing plenum chamber (7).

9. Device for air conditioning and/or heating dwellings, notably blocks of flats, of the type comprising:

- an indoor unit (1) and an outdoor unit (2) connected by fluid and electrical connections (3), the outdoor unit (2) comprising ventilation means and an exchanger, and the indoor unit (1) comprising ventilation means and an exchanger,

- means of blowing out and taking in air connected to the indoor unit (1),

- a device (4) for monitoring the temperature inside the dwelling able to control the operation of the compressor in the outdoor unit (2),

the said device being characterised in that:

- the indoor unit (1) is a low-pressure unit able to deliver air at a pressure of at most 8 mm,

- the blowing means comprise a false ceiling (6) forming a sealed plenum chamber (7) able to serve as an expansion chamber, the said plenum chamber having blowing grilles (15-17) for each of the rooms in the house.

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change-over means, and the indoor unit (1) is equipped with an electrical battery controlled by an external thermostat.

11. Device according to one of Claims 9 or 10, in which the indoor unit (1) and the outdoor unit (2) are of the direct-expansion type.

12. Device according to one of Claims 9 to 11, characterised in that:

- one of the blowing grilles (15) is adapted to have ventilation characteristics suitable for allowing fluctuations in the output of the said grille with respect to its nominal output,

- the other blowing grilles (16, 17) are provided with adjustment dampers suitable for making it possible to vary the output of the said grilles with respect to their nominal output, in a range such that the blowing grille (15) can absorb the variations in output.

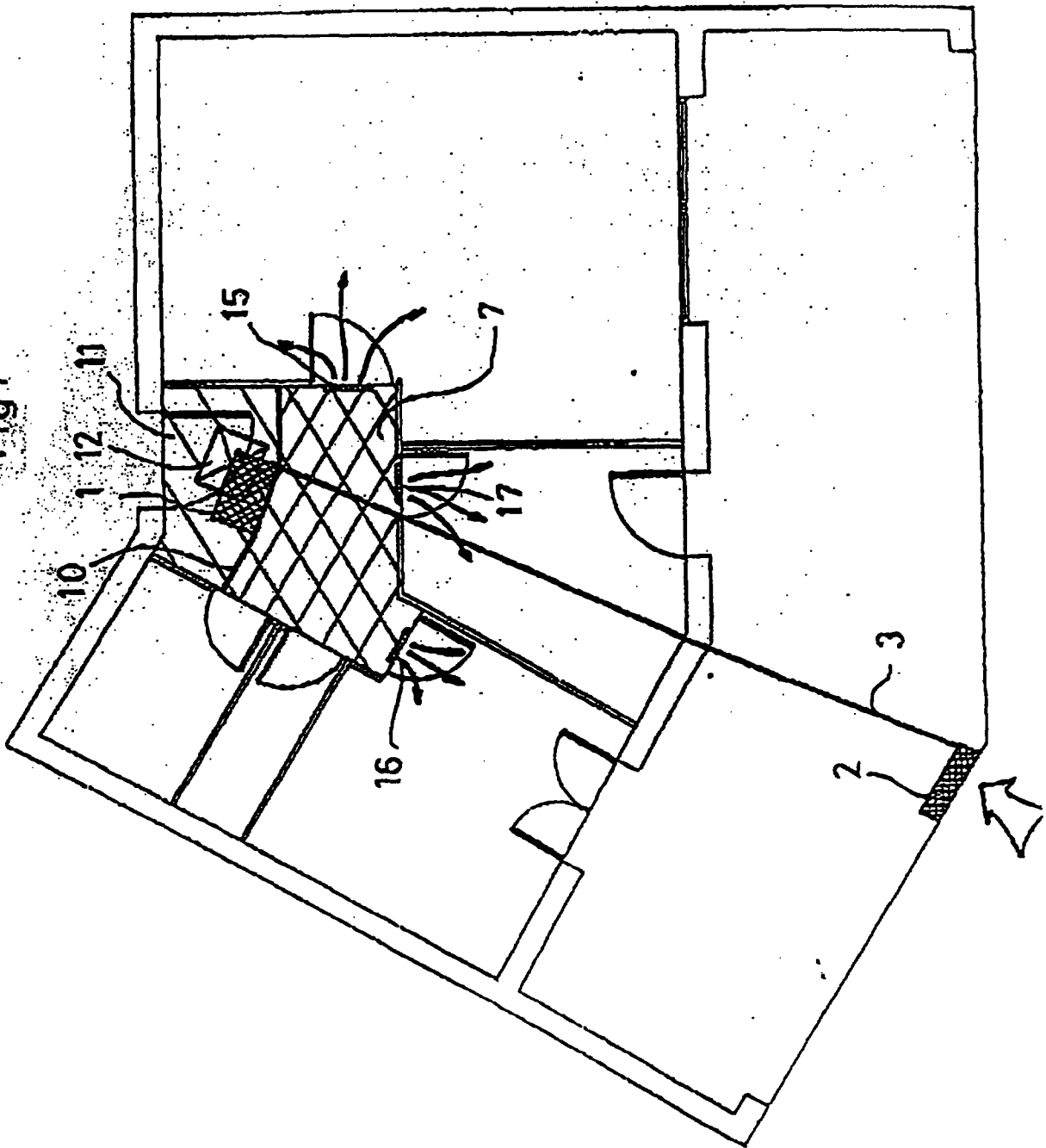
13. Device according to Claim 12, characterised in that it comprises, for each blowing grille (16, 17) provided with an adjustment damper, a thermostatic control device for controlling the said damper.

14. Device according to one of Claims 9 to 13, characterised in that the false ceiling (6) is covered with a layer (14) of sound and heat insulating material.

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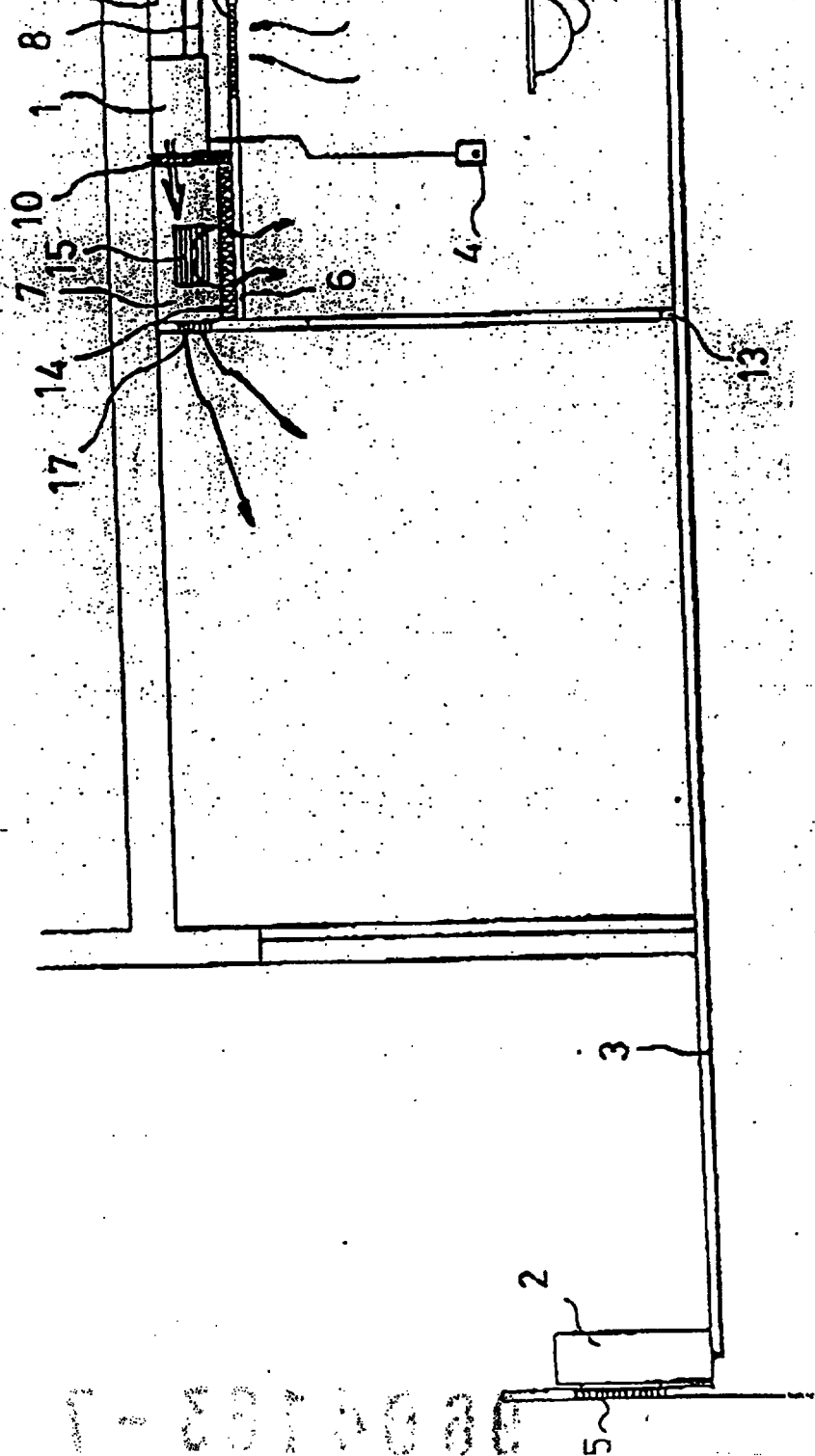
Fig 1



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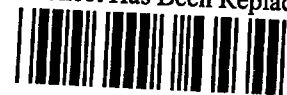
Fig 2



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The invention concerns a method and a device for air conditioning and/or heating dwellings, notably blocks of flats.

Devices suitable for air conditioning and heating dwellings are of four types differentiated by the external energy source, air or water, used, and by the fluid, air or water, used to restore this energy in the dwellings.

The first type of device consists of air/water systems consisting generally of a centralised installation composed of an outdoor unit installed on a terrace, and fan convector units disposed in the rooms to be heated and cooled and supplied from the outdoor unit by means of insulated hydraulic pipes.

In addition to their high cost, such installations have several drawbacks. In the first place, they make it necessary to pre-equip the entire building without judging beforehand whether or not the occupants require the air conditioning option. In addition, they require the fitting of an energy metering system meeting specific standards, the cost price of which is relatively high. In addition, such installations present a flexibility problem when, in mid-season, certain rooms which are well exposed require to be cooled whilst other rooms require to be heated. It should be noted that this last problem can be resolved by installing two outdoor units, one per facade, south and north. However, this solution leads to a not insignificant increase in investment cost. Lastly, any failure in the outdoor unit results in depriving all the dwellings of heating or air conditioning.

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preamble of Claims 1 and 7, respectively (see US-A-3,267,995).

There are four types of device by means of which apartments can be air conditioned and heated, differing according to which source of external energy, i.e. air or water, is used and according to the fluid, i.e. air or water, used to release this energy in the apartments.

The first type of device comprises air/water systems generally constituted by a centralised installation composed of an external aggregate installed on a terrace and of ventilator/convectors arranged in the rooms to be heated and to be cooled, said ventilator/convectors being supplied by the external aggregate with the aid of insulated hydraulic lines.

Apart from their high cost, such installations are subject to several disadvantages. In the first place, they have to be pre-installed throughout the building irrespective of whether the occupants require air conditioning or not. Moreover, they necessitate the provision of an energy-metering system complying with specific standards, the procurement costs of which are relatively high. Furthermore, the versatility of such installations is problematic if, between seasons, it is necessary to cool certain highly exposed premises while other premises need to be heated. The latter problem can indeed be resolved by installing two external aggregates, one on the south side and one on the north side of the building. However, this solution entails a not insignificant additional investment. Lastly, any failure of the external aggregate will cause all the apartments to be deprived of heating or air conditioning.

The second type of device comprises water/air systems constituted by heat pumps arranged within the apartments and supplied with the aid of a circuit transporting water

This system makes it possible to overcome certain disadvantages of the air/water systems described above. It is, in fact, possible to heat or to condition different apartments in the building at the same time. Moreover, unless one of the elements of the cooling tower fails, an operational failure affects only one apartment and not all parts of the building. On the other hand, this system also suffers from disadvantages. In the first place, the noise level in the apartment is high since the compressors are arranged within heat pumps installed in the apartments. Furthermore, although the initial expenditure is less high than in the case of an air/water system (since the cooling tower is less costly than the external aggregate of said air/water system and the pipelines are not insulated), the total cost of the installation is higher than that of air/water systems.

The third type of device comprises water/water systems constituted by ventilator/convectors arranged within the apartments and supplied with the aid of a water circuit comprising a cooling tower. Such a system can be compared to the air/water systems but is subject to the disadvantage that cycle inversion is not possible.

Lastly, the fourth type of device comprises air/air systems based on split systems, i.e. apparatus comprising both the condensing stage and the evaporating stage and constituted by an external unit and an internal unit linked by a "Freon" line, whereby the external unit comprises a ventilator, a compressor and a heat-exchanger and the internal unit comprises a ventilator and a heat-exchanger.

Such split systems can be designed for treating the totality of an apartment. The internal unit is in this case linked to a network of shafts enabling distribution of the air to different rooms of said apartment. Such a system has

high. Furthermore, the loudness level in the region of the air intake of the internal unit is high. Lastly, regulation of the temperature in the different rooms is very haphazard.

These split systems can also be used in individual manner by installing an apparatus in each room. This solution is characterised by being very versatile in use but is very costly.

The present invention aims to alleviate the aforementioned disadvantages of the various devices for the air conditioning and heating of apartments and its principal object is to provide an air-conditioning and/or heating device in the form of an air/air system the procurement cost and the loudness level of which are low while making it possible for the apartments to be treated in individual manner.

To this end, the invention provides a process for the air conditioning and/or heating of apartments, particularly in apartment buildings, which consist:

- in utilising an external unit and an internal unit linked by means of fluidic and electrical connecting lines, whereby said external unit comprises a compressor, ventilating means and a heat-exchanger whereas the internal unit is of low-pressure type and comprises ventilating means and a heat-exchanger,

- in producing, with the aid of the ventilating means pertaining to the internal unit, air circulation within the apartments,

- in regulating the operation of the external unit by means of a temperature-controlling device within the apartment, whereby said temperature-controlling device determines an aggregate temperature,

master room, an air-delivery grating without an adjusting damper but possessing pneumatic characteristics capable of bringing about, in relation to the nominal output of the grating, fluctuations in the output of said grating, and, in respect of the other room(s) of the apartment, the so-called subsidiary rooms, air-delivery gratings equipped with adjusting dampers which make it possible to vary the output of said gratings in relation to their nominal output within a range such that the air-delivery grating of the master room can absorb said variations in output,

- in regulating the temperature in each subsidiary room of the apartment by modifying, with the aid of adjusting dampers, the output of air delivered into each of said subsidiary rooms,

- and in absorbing the output fluctuations by deflecting them into the master room through the air-delivery grating that is not equipped with an adjusting damper.

According to this process air conditioning of an apartment comprising several rooms is ensured by means of a complex combining an internal unit with an external unit, said complex being originally designed for treating a single room (unimpeded air delivery in view of the low pressure of the internal apparatus).

Hence, it is in particular possible with the process according to the invention to effect air conditioning of an apartment having a relatively small area while comprising several rooms, by making use of a complex originally designed for conditioning the air in a single room.

Such air conditioning is, moreover, ensured by means of an installation which does not comprise any air-delivery shaft and which has a very low noise level owing, on the one hand, to the low pressure of the internal unit and, on

simplicity which makes it possible to achieve air conditioning of an apartment by means of an installation, the cost of which is very considerably lower than that of installations currently available.

Furthermore, regulation of the temperature in each subsidiary room can be refined in very simple manner by modifying, with the aid of an adjusting damper, the output of air delivered into said room.

In fact, the variation in output resulting from the closing or opening of one of the air-delivery gratings pertaining to one or more subsidiary rooms is deflected into the master room through the air-delivery grating of the latter, whereby, on the one hand, said grating does not comprise an adjusting damper and is, on the other hand, so designed as to be able to absorb said output fluctuations.

It should be noted that utilisation of such dampers is possible thanks to the fact that use is made of low-pressure air thus avoiding any excess pressure in the region of the outlets as well as any noise pollution, even if the output from said outlets is minimal.

Preferably, the object of this process is to enable the air conditioning and heating of apartments and to this end use is made of an external unit equipped with cycle-inverting means and an internal unit equipped with a complementary electrical battery controlled by an external thermostat.

Moreover, the operation of the compressor is advantageously controlled by means of a temperature-controlling device so arranged as to measure the temperature of air drawn in by the ventilating means of the internal unit.

The temperature-controlling device is accordingly so arranged as to measure the temperature of the total intake

the apartment.

Moreover, the adjusting dampers of the air-delivery gratings pertaining to the subsidiary rooms are preferably controlled by means of thermostatically controlled devices.

According to another characteristic of the invention, the upper face of the false ceiling is lined with a layer of acoustically and thermally insulating material.

Such a material is essentially intended to prevent any condensation resulting from a difference in temperature between the inside of the plenum and the ambient air. It also serves to attenuate the acoustic level of the internal unit on the one hand and between the rooms on the other hand.

Moreover, the internal unit is advantageously integrated into the false ceiling and said false ceiling is separated, by means of a lateral wall, into two sections constituting an intake plenum which is endowed with an intake grating capable of serving as an inspection flap, and the air-delivery plenum.

This arrangement of the internal unit within the false ceiling in which a lateral wall is provided, separating the false ceiling into an intake plenum and an air-delivery plenum, constitutes a highly advantageous embodiment as regards both the procurement costs of the installation and in terms of maintenance.

The invention extends to a device for the air conditioning and/or heating of apartments, in particular in apartment buildings, of the type comprising:

- an internal unit of low-pressure type and an external unit linked by means of fluidic and electrical connecting lines, whereby the external unit comprises a compressor, ventilating means and a heat-exchanger, whereas

- a device for controlling the temperature within the apartment, said device being capable of regulating the operation of the external unit,

- whereby the air-delivery means comprise a false ceiling, constituting a sealed plenum serving by way of expansion chamber and said plenum comprises air-delivery gratings in respect of each of the rooms of the apartment.

According to the invention, said device is characterised in that:

. one of the air-delivery gratings which is in communication with one of the rooms of the apartment, the so-called master room, is devoid of an adjusting damper and so designed as to possess pneumatic characteristics enabling the output of said grating to vary in relation to the nominal output of said grating,

. the other air-delivery gratings which are in communication with the other room(s) of the apartment are equipped with adjusting dampers making it possible to vary the output of said gratings in relation to the nominal output of the latter, within a range such that the air-delivery grating of the master room is capable of absorbing the output variations.

It should be noted that Patent US 3,267,995 describes a device, the design of which is very similar to that of the device defined in the preamble of Claim 7 of the present application. However, this device does not comprise any regulating means making it possible to fine-tune the temperature in the various rooms in an effective manner.

Other characteristics, aims and advantages of the invention will be apparent from the following detailed description with reference to the attached drawings which represent, by way of non-restricting example, a preferred

according to the invention,

- Fig. 2 is a schematic elevation through a vertical plane of said apartment.

The installation according to the invention comprises an internal unit.1 and an external unit 2 for direct expansion linked to one another by means of cooling conduits and electrical lines such as 3 protected by means of an ICT and embedded within the upper layer of the floor. The characteristics of these units listed below by way of example correspond to an apartment with a floor area covering about 50 m².

The external unit 2 comprises a heat pump with direct expansion, having a cooling power of 3600 W and a calorific power of 3800 W.

It comprises, in conventional manner, a hermetically sealed compressor equipped with a casing resistor, a heat-exchanger with direct expansion made from copper and provided with aluminium fins, a cooling circuit and a low-speed screw ventilator. Moreover, the cooling circuit comprises essentially an expansion valve, a four-way cycle-inverting valve, an anti-slugging flask and a dehydrator.

This external unit 2 comprises moreover a defrosting system capable of controlling the heat-exchanger temperature while bringing about periodically cycle inversions whenever this temperature falls below a predetermined threshold.

As for the internal unit 1, it comprises a casing-less ventilator-convector having a nominal output of 650 m³/h at a pressure of less than 6 mm and of the order of 5 mm. It comprises a three-speed ventilating unit, a copper/aluminium heat-exchanger with direct expansion and a 2 Kw electrical battery. This electrical battery is

in such a way as to ensure that said thermostat measures the temperature of the air drawn in by said unit. This control box 4 comprises, in addition, an on/off button, a ventilation-speed selector and a winter/summer cycle inverter.

The cooling lines connecting the internal unit 1 to the external unit 2 comprise a gas pipe and a liquid pipe ensheathed in a sleeve of insulating material..

As for the electrical lines linking the two units 1 and 2, they comprise electrical cables conducting the power supplied at the circuit-breaker as far as the external unit 2 while making it possible for the control signal of the thermostat to be supplied to said external unit 2.

In the example the external unit 2 is installed on the terrace of the apartment close to the guard-rail of said terrace and comprises an external grating 5 integrated into said guard-rail. Bearing in mind the low depth (of the order of 25 cm) of said external unit 2, it is, of course, easy to conceive an architectural solution enabling its integration directly into the guard-rail.

As for the internal unit 1, it is located above a false ceiling 6 constituted by a plate of "Placoplâtre" BA 13 which extends into the circulation areas of the apartment and is so designed as to constitute an air-discharge plenum 7 enabling air to be distributed into all the rooms to be heated or cooled. With a view to evacuating condensates, this internal unit 1 is connected to a drainage line 8, the latter being connected to a wastewater line by means of a syphon 9.

The space delimited by the false ceiling 6 is, moreover, separated into two sections by means of a vertical lateral wall 10 arranged at a right angle to the internal unit 1 so as to form two separate spaces

6 is provided with a grating 12 arranged at a right angle to the internal unit 1 so as to communicate with the intake plenum 11. The dimensions (e.g. 600 mm x 600 mm) of this grating 12, which may for instance be secured with the aid of screws, are advantageously such as to permit, due to its location at a right angle to the internal unit 1, maintenance or repair of said internal unit.

Moreover, with a view to enabling air circulation between the rooms to be heated and cooled, and the circulation area, the access doors of said rooms are undercut so as to provide an opening 13 at the bottom of said doors.

Lastly, it should be noted in respect of said air intake that the control box 4 incorporating the thermostat is located in the circulation area and accordingly measures the temperature of the air drawn in by the internal unit 1.

As regards the distribution of air, the false ceiling 6 is in the first place lined, in its section delimiting the air-delivery plenum 7, with a layer 14 of acoustically and thermally insulating material such as rock wool.

This air-delivery plenum 7 is also equipped with air-delivery gratings for the distribution of air to the various rooms:

- the air-delivery grating 15 supplying the master room, generally the living room, being so designed as to possess pneumatic characteristics capable of bringing about, in relation to the nominal output of the grating, fluctuation in the output of said grating by approximately 40 %,

- the air-delivery gratings 16, 17 supplying the other rooms being equipped with adjusting dampers which make it possible to vary the output of said gratings in relation to their nominal output by approximately 30 %.

temperature in these rooms.

buildings, which consists:

- in utilising an external unit (2) and an internal unit (1) linked by means of fluidic and electrical connecting lines (3), whereby said external unit (2) comprises a compressor, ventilating means and a heat exchanger whereas the internal unit (1) is of low-pressure type and comprises ventilating means and a heat exchanger,

- in producing, with the aid of the ventilating means pertaining to the internal unit (1), air circulation within the apartment,

- in regulating the operation of the external unit (2) by means of a temperature-controlling device (4) within the apartment, whereby said temperature-controlling device determines a set temperature,

- in delivering low-pressure air in non-regulated manner into a false ceiling (6) constituting a sealed plenum (7) serving as an expansion chamber, said plenum comprising, in respect of one of the rooms of the apartment, the so-called master room, an air-delivery grating (15) without an adjusting damper but possessing pneumatic characteristics capable of bringing about, in relation to the nominal output of the grating, fluctuations in the output of said grating, and, in respect of the other room(s) of the apartment, the so-called subsidiary rooms, air-delivery gratings (16, 17) equipped with adjusting dampers which make it possible to vary the output of said gratings in relation to their nominal output within a range such that the air-delivery grating (15) of the master room can absorb said variations in output,

- in regulating the temperature in each subsidiary room of the apartment by modifying, with the aid of adjusting dampers, the output of air delivered into each of said subsidiary rooms,

2/ - A process according to Claim 1 for the air conditioning and heating of apartments, in which use is made of an external unit (2) endowed with cycle-inverting means and of an internal unit (1) equipped with a complementary electrical battery controlled by an external thermostat.

3/ - A process according to one of Claims 1 or 2, in which use is made of an internal unit (1) and an external unit (2) subject to direct expansion.

4/ - A process according to one of Claims 1 to 3, characterised in that the adjusting dampers of the air-delivery gratings (16, 17) pertaining to the subsidiary rooms are regulated by means of devices for thermostatic control.

5/ - A process according to one of the preceding claims, characterised in that the upper face of the false ceiling (6) is lined with a layer (14) of acoustically and thermally insulating material.

6/ - A process according to one of the preceding Claims, characterised in that the internal unit (1) is integrated within the false ceiling (6) and in that said false ceiling is separated, by means of a lateral wall (10), into two sections constituting an intake plenum (11) which is endowed with an intake grating (12) capable of serving as an inspection flap and the air-delivery plenum (7).

7/ - A device for the air conditioning and/or heating of apartments, in particular in apartment buildings, with a view to implementing the process according to one of Claims 1 to 6, comprising:

- an internal unit (1) of low-pressure type and an external unit (2) linked by means of fluidic and electrical connecting lines (3), whereby the external unit

(1) for the delivery and intake of air,

- a device (4) for controlling the temperature within the apartment, said device being capable of regulating the operation of the external unit (2),

- whereby the air-delivery means comprise a false ceiling (6) constituting a sealed plenum (7) serving by way of expansion chamber and said plenum comprises air-delivery gratings (15 - 17) in respect of each of the rooms of the apartment,

said device being characterised in that:

. one of the air-delivery gratings (15), which is in communication with one of the rooms of the apartment, the so-called master room, is devoid of an adjusting damper and so designed as to possess pneumatic characteristics enabling the output of said grating to vary from the nominal output of said grating,

. the other air-delivery gratings (16, 17) which are in communication with the other room(s) of the apartment are equipped with adjusting dampers making it possible to vary the output of said gratings in relation to the nominal output of the latter, within a range such that the air-delivery grating (15) of the master room is capable of absorbing the output variations.

8/ - A device for air conditioning and heating according to Claim 7, in which the external unit (2) is endowed with cycle-inverting means and the internal unit (1) is equipped with an electrical battery controlled by an external thermostat.

9/ - A device according to one of Claims 7 or 8, in which the internal unit (1) and the external unit (2) are subject to direct expansion.

10/ - A device according to one of Claims 7 to 9, characterised in that it comprises, in respect of each

to 10, characterised in that the false ceiling (6) is lined with a layer of acoustically and thermally insulating material.

Fig 1

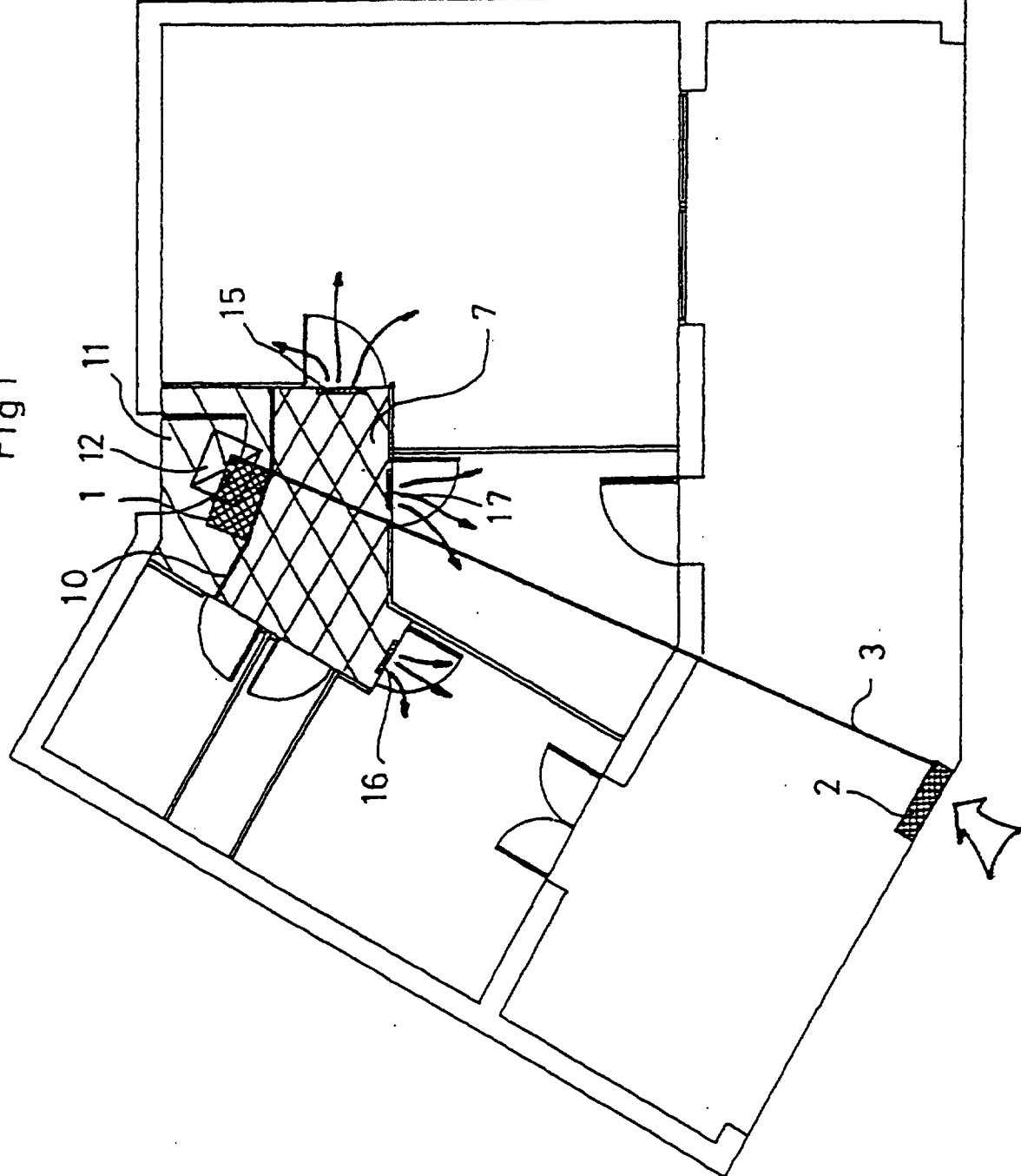
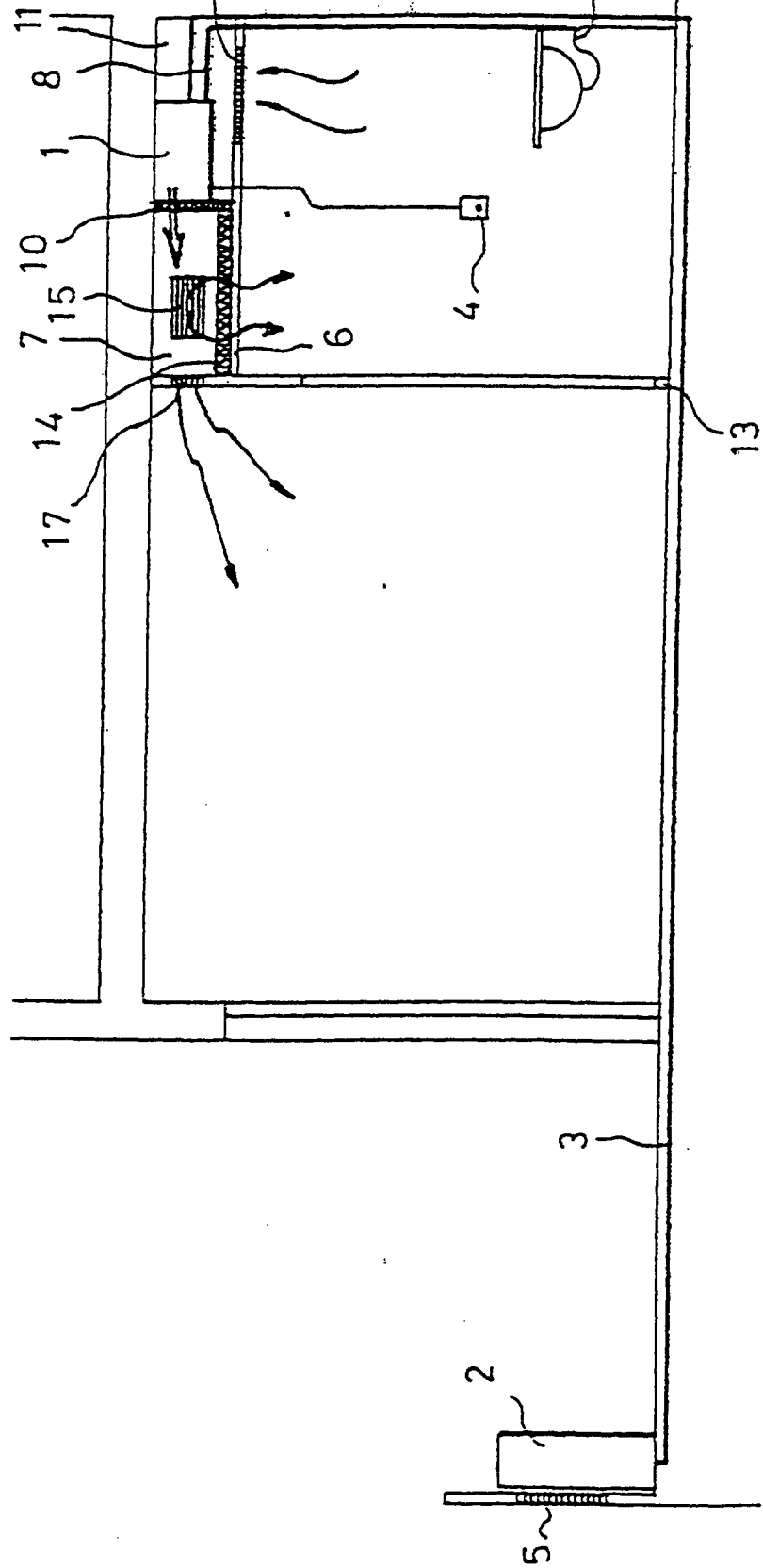


Fig 2



METHOD AND DEVICE FOR AIR CONDITIONING AND/OR HEATING
DWELLINGS, NOTABLY BLOCKS OF FLATS

A domestic air conditioning and/or heating method, particularly for apartment buildings, using an outside unit (2) and an inside unit (1) connected to one another via fluid and electrical lines (3). The outside unit (2) includes a compressor, a ventilation system and an exchanger while the inside unit (1) includes a ventilation system and an exchanger. A low pressure inside unit (1) supplies pressurized air at a pressure no higher than 8 mm and the air is bulk-fed into a false ceiling (6) forming a sealed plenum (7) which acts as a decompression chamber and comprises supply grills (15-17) for blowing air into each of the rooms to be served.

FIGURE 1.