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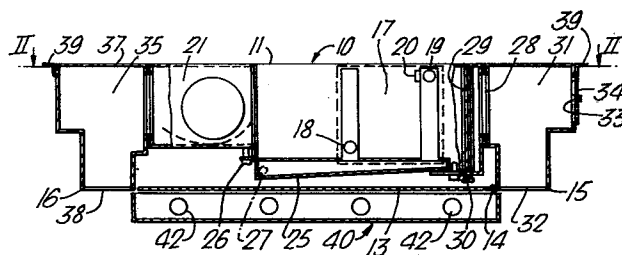
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⑤④ **A room heating and/or cooling device.**

⑤⑦ A room heating and/or cooling device which includes a housing which can be mounted on a ceiling, at least one heat exchanger being located in the housing and having an inlet connection whereby heating water or cooling water can be circulated through the heat exchanger. A room light fitting, such as a fluorescent fitting, is mounted directly below the housing and a fan is provided to draw air through the chamber over the heat exchanger. For this purpose an air inlet plenum chamber is mounted to one side of the housing and draws air through an inlet immediately adjacent the side of the lighting fitting and a similar air outlet plenum is provided on the other side whereby air flows out immediately adjacent the lighting fitting.



DESCRIPTION -TITLE: A ROOM HEATING AND/OR COOLING DEVICE

The present invention relates to a room heating and/or cooling device.

Various heating and cooling devices have been proposed, whereby air is drawn in by a fan over a heat exchanger through which water is passed. Water is either heated water or cooled water to give a heating or air conditioning effect respectively. These are normally installed to the side of the room and this reduces the floor area available. In recent years, due to the cost of building and the cost of rents in office buildings in particular, considerable advantage could be achieved if the heating and/or cooling unit could be positioned so that it does not, in effect, take up any floor space.

It is now proposed, according to the present invention, to provide a room heating and/or cooling device comprising a housing, means for mounting the housing on a ceiling, at least one heat exchanger in said housing, the or each heat exchanger having an inlet and outlet connection, whereby heating water or cooling water can be circulated through the heat exchanger, a room lighting

fitting mounted directly below said housing, and completely covering the bottom of the housing, an air inlet and an air outlet positioned in the margin of the light fitting, to the side of the lighting fitting, the base of the light fitting
5 forming the lower wall of the housing, which is removable to obtain access to the interior of the housing and a fan adapted to draw air in to said inlet over said heat exchanger or exchangers and to pass the air out through said outlet.

10 Such a unit is significantly space saving. It can be mounted, for example, in a false ceiling, as is nowadays quite conventional in office buildings, and it can be positioned, according to the invention, immediately above a light fitting so that it does not, in effect, take up any
15 more space than the light fitting. Furthermore, it does not require any additional installation costs. With this in mind, in a preferred arrangement, for example when the light fitting is a fluorescent one, the fan and the light fitting are connected to a common electric supply.

20 In order to adapt the device to a particular requirement the fan, which may for example be a tangential flow fan, is one in which the speed is controllable so that the flow rate can be adjusted to suit the particular heating or air conditioning requirement of the room in
25 which the device is being installed.

 The lighting fitting completely covers the bottom of the housing and thereby obscures it from view and the air

inlet and the air outlet are then positioned in the margins of the light fitting. In order to give access to the chamber for maintenance work on the fan, its controls and the heat exchanger, the base of the lighting fitting, which preferably
5 for cheapness also, comprises the bottom wall of the housing, is removable and may in fact simply be pivotally mounted so that it can be hinged down.

In a preferred construction, the air inlet and the air outlet are positioned one on each side of the lighting
10 fitting so that the air flows directly from one side to the other, thus improving the air flow and reducing the noise. To facilitate the air flow further, the inlet and outlet are preferably formed in inlet and outlet plenum chambers respectively, the plenum chambers themselves being positioned
15 on each side of the housing. The plenum chambers will then each have a downwardly directed opening through which air may be drawn into the inlet plenum and passed out of the outlet plenum on its way to and from the housing. Advantageously, the air filter is positioned in the plenum chamber at the
20 location of its connection to the housing and this can advantageously be removable to enable the filter to be cleaned or replaced.

While the device of the invention can simply be used for recirculation of air from the room space, a fresh
25 air inlet may be provided in the inlet plenum chamber and this can have an adjustable baffle so that the amount of fresh air

-3a-

can be altered from no fresh air to almost entirely complete fresh air.

It is contemplated that either one or two heat exchangers would be provided in the housing. If one heat
5 exchanger is provided this could simply be used for heating or cooling, or a remote valve could be provided so that hot water or cold water could alternatively be supplied.

-4-

A further arrangement is that if one has two heat exchangers, one which may be supplied with hot water and the other which may be supplied with cold water.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:-

Figure 1 is a section on I-I of Figure 2, of one embodiment of device according to the invention;

10 Figure 2 is a section on line II-II of Figure 1 with the light fitting removed, of the device of the invention; and

Figure 3 is a section on line III-III of Figure 2.

The device illustrated in the drawings comprises 15 a generally rectangular chamber indicated by the general reference numeral 10 having a top wall 11, side walls 12 (Figure 2) and a base 13 which is pivotally mounted by a hinge 14 to a margin plate 15. A further margin plate 16 is provided on the other side of the base 13.

20 Mounted within the chamber 10 is a heat exchanger 17 which is only shown schematically in Figure 1 and is shown in slightly more detail in Figure 2. The heat exchanger includes a water inlet 18 and a water outlet 19, closable vent port 20 being provided to allow displacement air to

bleed off when the heat exchanger is being filled. The heat exchanger is of a conventional coiled pipe type having heat exchanger baffles thereon, as shown schematically in Figure 2.

5 Also mounted within the chamber 10 is a tangential flow fan 21 driven by a motor 22, the speed of which may be controlled by a conventional controller 23 mounted on a junction box 24.

 Immediately below the heat exchanger is a drip tray 25
10 which is held in place by set screws 26 and is provided with an overflow outlet pipe 27 which transmits condensed water to a remote location.

 On the righthand side, as seen in Figure 1, the chamber 10 is provided with an inlet port 28 and
15 immediately within the port is mounted an air filter 29 which can be removed by unscrewing a wing nut 30 and removing a small cover (not shown).

 Outboard of the inlet port 28 is an inlet plenum chamber 31 having an inlet grill 32 facing downwardly, this
20 being formed in the plate 15. The inlet plenum 31 also has an adjustable fresh air inlet 33 having an adjustable baffle 34 controlling the amount of fresh air which may enter.

 A similar plenum 35 is mounted adjacent an outlet port
25 36 on the lefthand side of the chamber adjacent the exit to the tangential fan 21. The outlet plenum 35 is insulated

with suitable sound and heat-absorbing material, such as polystyrene, indicated at 37. A downwardly directed outlet grill 38 is formed in the plate 16.

The two plenum chambers are each provided with four
5 fixing brackets 39 which enable the whole device to be mounted, for example, in a false ceiling. The arrangement will normally be such that the lower plate 16 will be approximately flush with the ceiling tiles.

The pivotally mounted base 13 forms the base plate of
10 a fluorescent tube indicated by the general reference numeral 40 comprising a preferably conventional diffuser 41 and four fluorescent tubes 42. The mounting of these fluorescent tubes is not shown, but suffice it to say that the electrical connections are made to the junction box 24.

15 In use, when the lights are switched on, the fan motor 22 is energized causing the fan to rotate so that air is drawn in through the inlet grill 32 into the inlet plenum chamber 31 and passes via the port 28 and the filter 29 over the heat exchanger 17. The air is then blown by the
20 fan 21 through the outlet port 36 into the outlet plenum 35 and is discharged through the grill 38. The construction is relatively compact and can easily be positioned in a false ceiling which has a small clearance, for example of the order of 200 millimetres.

25 If cold water is passed through the heat exchanger, then an air conditioning effect will be achieved.

Similarly if hot water is passed through these tubes then a room heating effect can be achieved.

The construction of the present invention enables one to take up no more space than is normally necessary for
5 mounting a fluorescent tube, an air conditioning or heating unit.

If desired, one can place two heat exchangers within the chamber 10, one being connected via external pipe work (not shown) to a source of hot water and the other being
10 similarly connected to a source of cold water and by switching in the correct source one can provide the cooling or heating effect as desired.

If the unit is used for cooling, then there will necessarily be some measure of condensation and this will
15 be caught by the drip tray 25 and led away through the pipe 27.

-8-

C L A I M S

1. A room heating and/or cooling device comprising a housing (10), means (39) for mounting the housing on a ceiling, a room light fitting (40) mounted directly below said housing, an air inlet (28) and an
5 air outlet (38) to said housing, formed in the margin of of said light fitting, a fan (21) for passing air into and out of the housing via said inlet and outlet so as to be heated or cooled, characterised in that the heater or cooler comprises at least one heat exchanger
10 (12) in said housing, the or each heat exchanger having an inlet and outlet connection (18, 19), whereby heating water or cooling water can be circulated through the heat exchanger, in that the room lighting fitting (40) completely covers the bottom of the housing, the base (13)
15 of the light fitting forming the lower wall of the housing and extending below said at least one heat exchanger, and in that the light fitting (40) is removable to obtain access to the interior of the housing and thereby to the fan and to said at least one heat exchanger.

20 2. A device according to claim 1, characterised in that the inlet (28) and outlet (38) are formed in inlet and outlet plenum chambers (31, 35) respectively, the plenum chambers each being positioned to the side of the housing, and each having a downwardly directed opening
25 (32, 38) through which air may be drawn into the inlet

-9-

plenum and passed out of the outlet plenum on its way to and from the housing.

3. A device according to claim 2, characterised in that an air filter (29) is positioned in the inlet
5 plenum chamber (31) at the location of its connection to the housing.

4. A device according to claim 2 or 3 characterised in that an adjustable supplementary fresh air inlet (33,34) is provided in said air inlet
10 plenum (31).

5. A device according to any preceding claim, characterised in that the base (12) of the lighting fitting is in the form of a hinged panel provided with a hinge (14) so that the panel can be hinged down.

15 6. A device according to any preceding claim characterised in that the light fitting (40) is a fluorescent light fitting.

7. A device according to any preceding claim, characterised in that two heat exchangers (17) are
20 located in said housing, one connectable to a source of hot water and the other to a source of cold water.

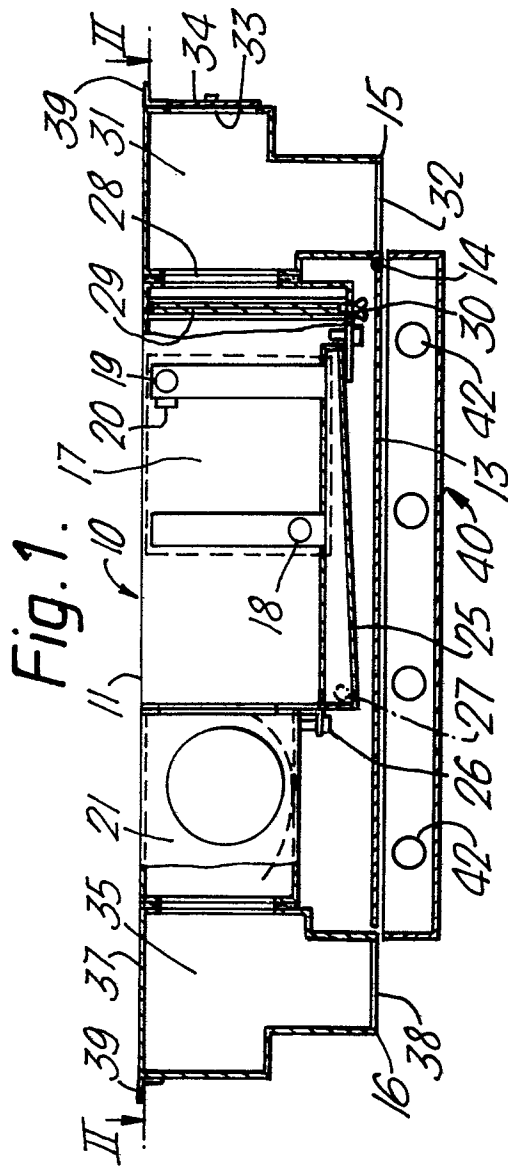
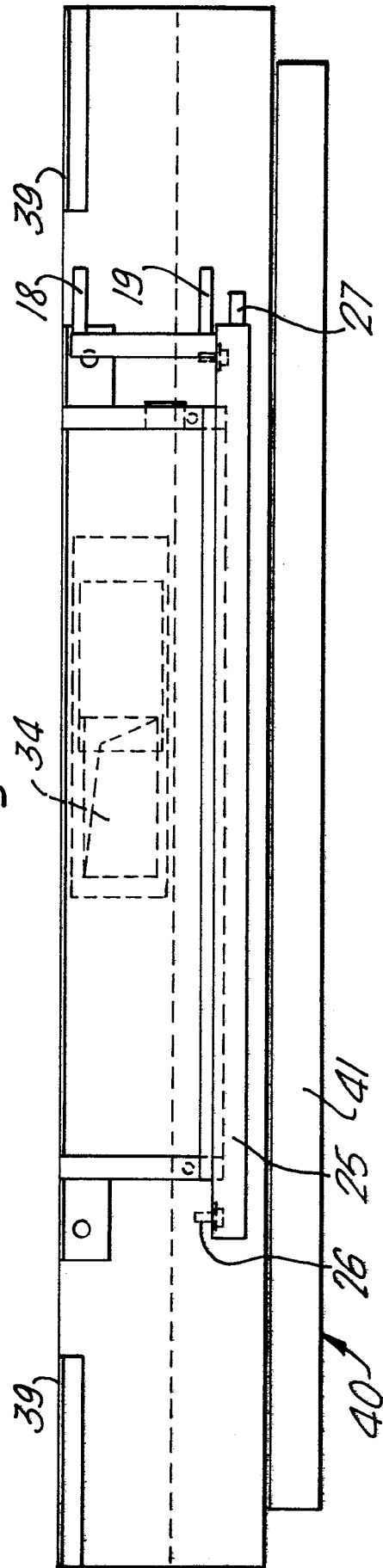
8. A device according to any preceding claim, characterised in that the fan (21) is a tangential flow fan, the speed of which is controllable.

25 9. A device according to any preceding claim, characterised in that the fan (21) and light fitting (40) are connected to a common electric supply.

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-10-

10. A device according to any preceding claim,
characterised in that the mounting means (39) are
designed to mount the device in a false ceiling, such
that the housing is fully recessed in the false ceiling
5 and the light fitting is flush with, or projects only
slightly below, the false ceiling.

**Fig. 3.**

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Fig. 2.