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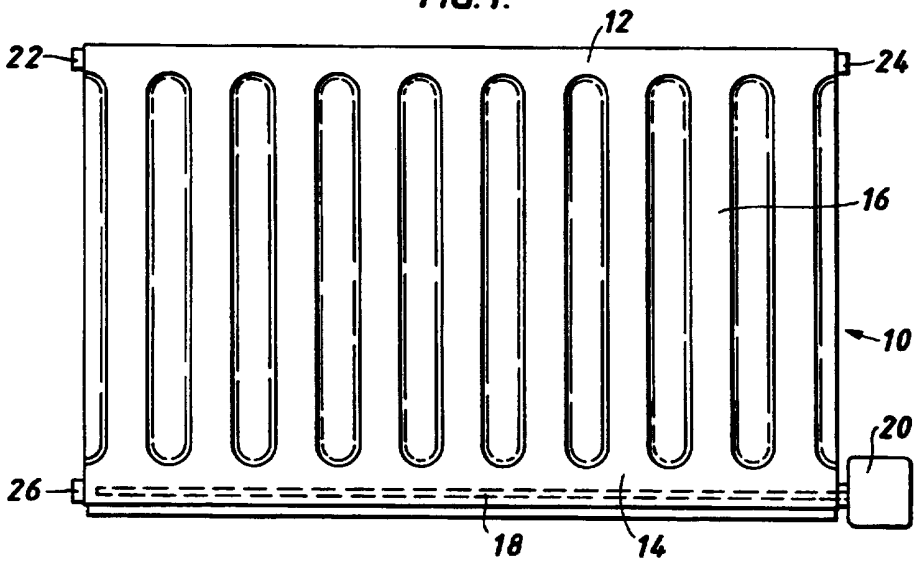
# (54) Central heating radiators

(57) A radiator heater (10) has upper, lower and connecting passageways (12, 14, 16) and contains a heating element (18) in the lower passageway coated with an oil-based oxygen scavenger. Control means (20) serves to cycle the input power supplied to the element (18) dependent on the air temperature and the temperature of the radiator itself and these temperatures can be pre-selected. A thermostat which shuts off power in the event of overheating and which is manually resettable may be provided.

FIG. 1.

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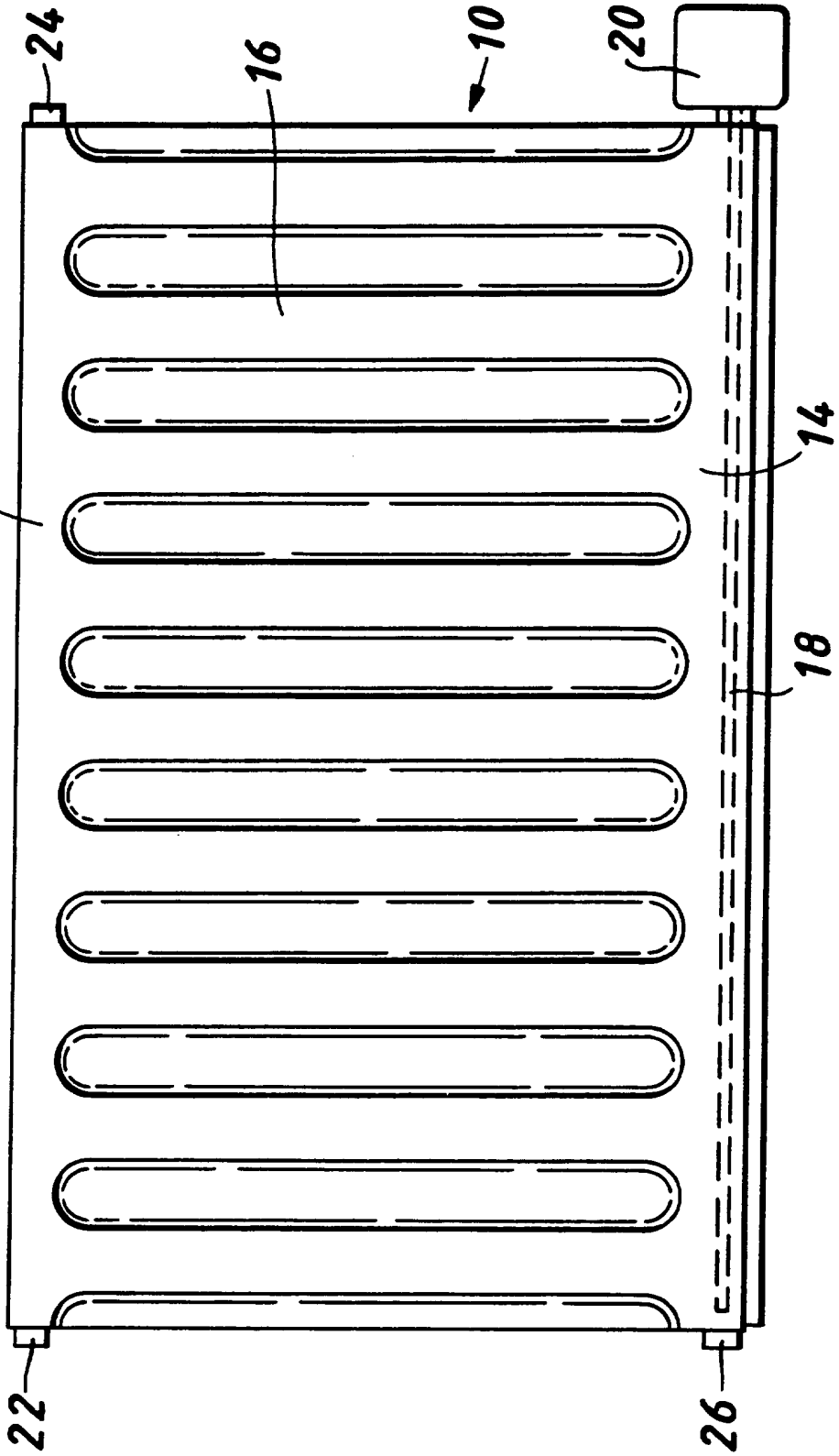
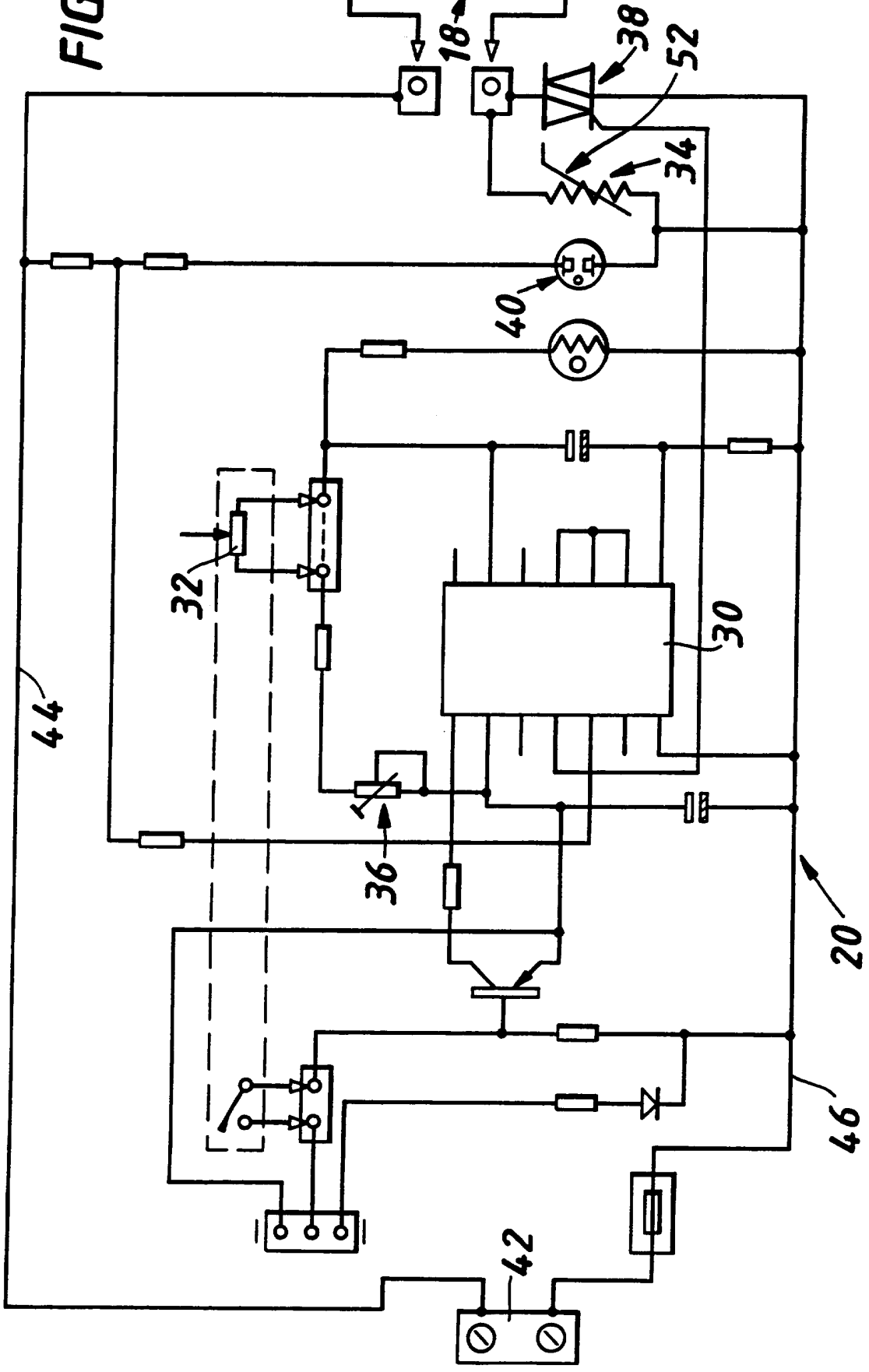



FIG.1.

FIG.2.



TITLE: Central Heating Radiators.

DESCRIPTION

This invention concerns water filled central heating radiators.

Electrically heated radiators are a well known form of heating but they can be expensive to use. Water filled central heating radiators are available, in which the water is heated by an electric element and the radiator has a power input cycling mode to reduce the power required to maintain the radiator at a reasonable temperature.

The object of this invention is to provide improved electrically heated water filled radiators.

According to a first aspect of this invention there is provided a radiator heater having an upper passageway, a lower passageway and connecting passageways and containing water and an oxygen scavenger, the radiator having an electric heating element therein.

According to a second aspect of this invention there is provided a radiator heater having an upper passageway, a lower passageway and connecting passageways and containing water and optionally an oxygen scavenger, the radiator having an electric

heating element therein, wherein power input for the electric heating element is controlled by temperature control means in respect to a selectable air temperature around the radiator and to radiator temperature itself, whereby power input is cycled to maintain a selectable radiator temperature once a predetermined said air temperature is reached.

The preferred oxygen scavenger is an oil based liquid, possibly based on lanolin. The oxygen scavenger is preferably introduced into the radiator before the water. The amount of oxygen scavenger introduced into the radiator is preferably sufficient to coat the electric heating element, so that oxygen may be prevented from attaching itself to the element, thereby eliminating hot spots and preventing kettling.

Preferably after introduction of the water into the radiator, the radiator is heated and bled whilst hot, so that the radiator is under negative pressure when cool.

The temperature control means is preferably arranged to permit variable heat level settings. The selectable radiator temperature, that is the radiator surface temperature, is preferably in the range of from 43 to 72$^{o}$C. The selectable air temperature is preferably in the range of from 13 to 21$^{o}$C.

Thus, in a preferred embodiment of the invention,

the radiator has an input load cycle (which draws only half the power input requirement in a full hour while maintaining a selected radiator panel temperature) that operates in ambient room temperature of from 13 to 21°C with a capability of maintaining a radiator panel temperature of from 43 to 72°C.

The control means preferably includes a thermostat which can shut off power supply in the event of the radiator overheating. The thermostat is preferably manually resettable only, so that investigation into triggering of the thermostat has to be carried out before resetting.

This invention will now be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a central heating radiator of the invention; and

Figure 2 shows a circuit diagram of central means for the radiator of Figure 1.

Referring to the accompanying drawings, a control heating radiator 10 has an upper passageway 12, a lower passageway 14 and connecting passageways 16. The lower passageway contains an electric heating element 18 connectable to mains electricity supply via control means 20 at one end of the lower passageway.

At one end of the upper passageway 12 is a safety

valve 22 and at its other end is a vent valve 24. At the opposite end of the lower passageway to the control means is a radiator plug 26.

The radiator is filled with water and contains an oxygen scavenger. The oxygen scavenger is oil based and was added before the water. Sufficient scavenger was added to coat the electric heating element. After introduction of the water the radiator was heated and bled, so that it is under negative pressure when cool.

The control means 20 is arranged to cycle power input. Once the area to be heated has reached an air temperature of from 13 to 21°C the radiator input load will start to cycle, drawing only half the power input requirement in a full hour while maintaining the radiator panel temperature in the range of from 43 to 72°C. The design of radiator of the invention may be such as to provide heat levels at costs below those of other electric radiators of equivalent size.

The radiator must be correctly sized to the area to be heated so that the power input cycling mode can operate correctly.

A formula to establish radiator size is:-

For living areas

Length in metres x width in metres x height in metres.

x 175 = BTU - 3412 = KW

For other areas

Length in metres x width in metres x height in metres

x 156 = BTU - 3412 = KW

A living area 4.5 metres long x 3.5 metres wide and having a ceiling height of 2.4 metres x 175 = 6615 BTU - 3412 = 1.9 KW output.

The correct size of radiator for this area is a 600mm single convector of 34 panels fitted with an electric element rated at 2.0 KW input.

The control means further includes a manually re-settable safety cut-out thermostat. Ideally re-setting of the thermostat is only possible once some effort has been put into finding out why the thermostat has operated, in order to avoid repeated overheating, which is possible with automatically re-setting thermostats.

With reference to Figure 2, a circuit incorporating a temperature control unit is shown. The temperature control means 20 comprises an integrated circuit 30, external temperature sensor 32, thermistor 34, potentiometer 36 and switch 38. The control means also comprises a light source 40 which indicates whether or not the unit is in operation.

A mains power supply 42 is connected via lines 44, 46 to the heating element 18. The switch 38 is

positioned in line 46 between the supply and heating element. The heating element 48 has an external surface 50 which is connected to the thermistor 34 via a connector 52 thereby enabling the thermistor 34 to sense the surface temperature of the radiator.

The operation of the circuit will now be described. Initially power is supplied to the heating element via lines 44, 46 and the surface temperature of the radiator increases. The thermistor 34 senses the temperature and sends a corresponding electrical signal to the integrated circuit 30. As the surface temperature of the radiator increases so does the room temperature which is sensed by external temperature sensor 32 which converts the temperature to a corresponding electrical signal which is sent to the integrated circuit. The power supplied to the heating element raises the surface temperature to a predetermined value e.g. 71$^{o}$C which is detected by the integrated circuit. The integrated circuit also detects when the room temperature reaches a predetermined value via temperature sensor 32. This value can be varied between 13 to 21$^{o}$C by potentiometer 36. Upon detecting the two predetermined temperatures the integrated circuit 30 cycles the power supply to the heating element by controlling switch 38.

## CLAIMS

1. A water-filled radiator heater having an upper passageway, a lower passageway and connecting passageways, an electrical heating element in the lower passageway and temperature control means for controlling the input power supplied to the heating element, said temperature control means being responsive to both the temperature of the radiator and the temperature of the air surrounding the radiator and serving both to control the power input to cycle once a predetermined air temperature is detected and to maintain a selectable radiator temperature.

2. A heater according to claim 1 and further containing an oxygen scavenger coating the heating element.

3. A heater according to claim 1 or 2, wherein the temperature control means also permits selection of the air temperature.

4. A heater according to any one of claims 1 to 3 and further comprising a thermostat which serves to shut off the power supply in the event of overheating.

5. A heater according to claim 4 wherein the thermostat is manually resettable.

6. A radiator heater substantially as described with reference to and as illustrated in the accompanying drawings.

The Patent Office

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|---|---|---|---|
| **Application No:** | GB 9519829.7 | **Examiner:** | Tim James |
| **Claims searched:** | 1-6 | **Date of search:** | 10 December 1996 |

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F4S (S41F1, S41F2 )

Int Cl (Ed.6): F24H (3/00)

Other: On-line: WPI

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X, Y | GB2211593A | (Middleton & Fell) see page 2 lines 14-17 | X: 1, 3<br>Y:4, 5 |
| Y | US4567351 | (Matsushita) see column 9 lines 61-64 | 4, 5 |

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
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