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ELECTRIC HEATING SYSTEM

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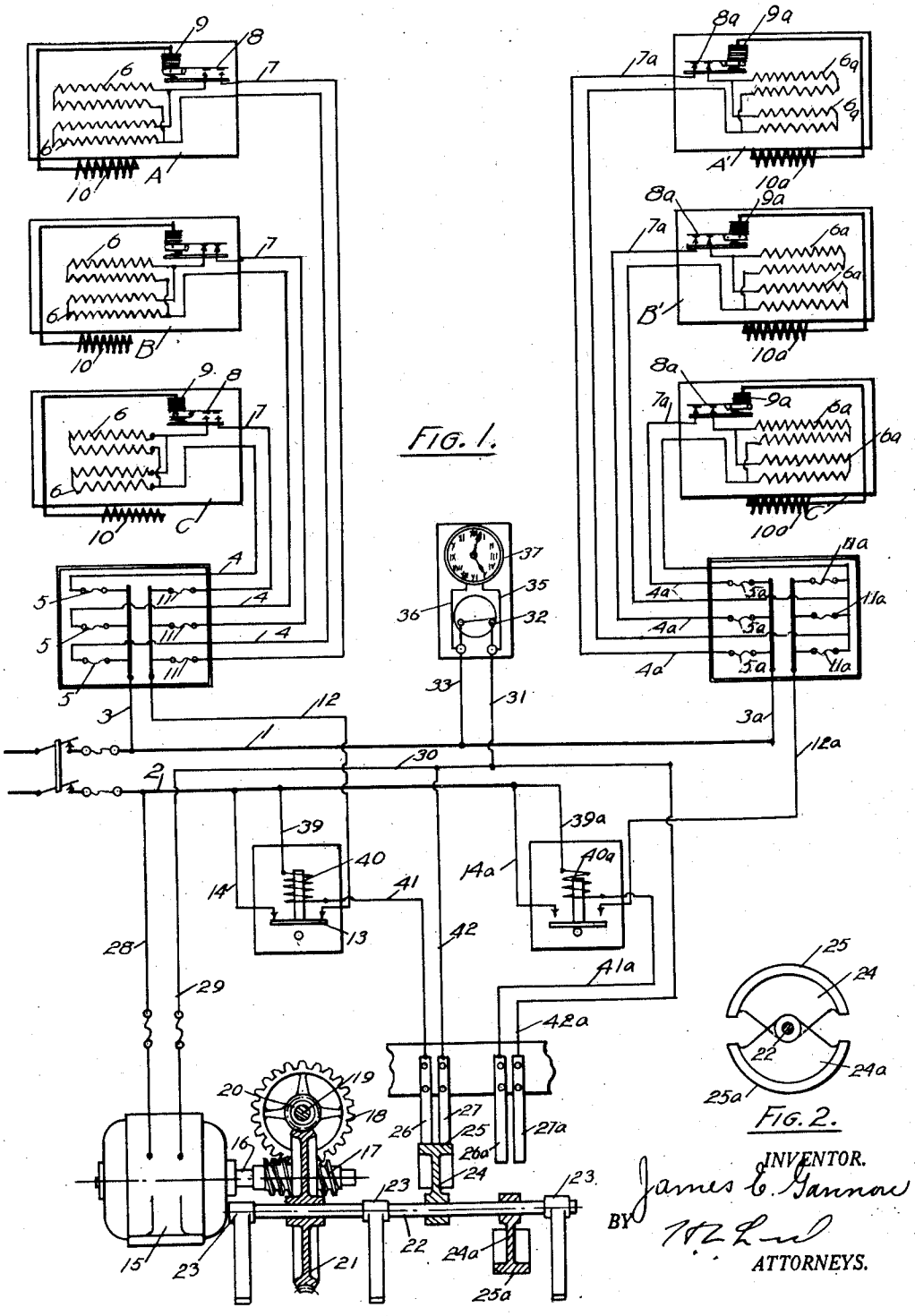


FIG. 1.

FIG. 2.

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ELECTRIC HEATING SYSTEM

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2 Claims. (Cl. 219—20)

Where current is used for heating it is very desirable to accomplish this with a comparatively small demand. Most companies producing current have what is termed a "demand charge" in their rates which adds very materially to the cost of current where the amount for any period is large although the total consumption may be comparatively small. A further consideration also influences the use of a comparatively small maximum quantity of current and, that is, the ability of the line, or wiring to deliver large charges. The present invention is designed to heat a plurality of units, or groups of units, in sequence so that they may be operated the required amount of time to supply the desired amount of heat, but at no time are all the units operating at one and the same time so that the demand charge is thus materially reduced. I have heretofore attempted to accomplish this purpose, but the present invention is designed to simplify such control. One of the principal features that makes such simplification possible is a continuously operated motor-controlled switch which successively controls the delivery of current to the units, or groups. Other features and details of the invention will appear from the specification and claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing as follows:—

Fig. 1 shows the controlling switch in elevation and a schematic drawing of the system.

Fig. 2 an end view of the switch.

The heating system is made up of two groups of radiators, A, B and C in one group and A', B' and C' in the other group. Line wires 1 and 2 lead from, or form a source of supply. The wire 1 leads by a wire 3 into a fuse box and branches 4 lead from the line 3, each branch being supplied with fuses 5. Each of these branches leads to a heating unit 6 of a radiator. A return wire 7 from the radiator is controlled by a switch 8. This switch is controlled by a pressure element 9 and this pressure element is connected with a thermal tube 10 preferably arranged at the intake to the radiator and consequently being responsive to the room temperature adjacent to the radiator. If the temperature is at, or above the desired normal, the pressure is such as to open the switch. If it is below the desired normal, it closes the switch. Each of the radiators is similarly arranged and each has a local, or individual thermal control. The return wires 7 extend through the fuse box which is provided with a fuse 11 for each branch and are collected and connected with a wire 12. The wire 12 extends to a relay switch 13. A wire 14 leads from the relay switch back to the wire 2 so that when the relay switch is closed current is delivered to the units A, B, or C that may have the local switch 8 closed.

A motor 15 has its operating shaft 16 connected with a worm 17. The worm operates on a worm gear 18 and the worm gear is carried by a shaft 19. A worm 20 is arranged on the shaft 19 and meshes with a worm 21. The worm 21 is fixed on a shaft 22. The shaft 22 is mounted in bearings 23 carried by posts, or similar supports. A switch arm 24 is fixed on the shaft 22 and is provided with a segmental contact plate 25 operating on contact fingers 26 and 27. A wire 28 leads from the wire 2 to the motor and a line 29 leads from the motor to a wire 30. The wire 30 is connected by a wire 31 with a master thermally controlled switch 32 and a wire 33 leads from the switch 32 to the wire 1, thus completing the circuit through the motor. Wires 35 and 36 connect the wires 31 and 33 with a time-controlled switch 37. These switches 32 and 37 are in parallel, the intention being that the system as a whole may be locked out during the time interval that the time switch may be set, or the entire system may be locked out at a comparatively low temperature at some control point as in a hall-way, but is adapted to close in regardless of the time setting of the switch 37 to prevent a dangerous reduction in temperature.

The relay switch 13 is controlled by the switch comprising the fingers 26 and 27 so that current is on the radiators A, B and C that may be closed at intervals and inasmuch as the motor 15 runs continuously these intervals are controlled by the speed at which the shaft 22 turns and the length of the segments 25. The reductions as indicated give to the shaft a very slow motion. In order that the relay switch may be operated by the switch 26—27 a wire 39 leads from wire 2 to a solenoid 40 actuating the switch 13 and by a wire 41 to the switch finger 26 and by wires 42 from the switch finger 27 to the wire 30. This is a shunt circuit and is closed by the switch 26 and 27 and remains closed during that period so that during that period any of the radiators A, B, or C that may have its local switch closed has current delivered to it.

A second group of units exactly similar to the group A, B and C is provided in the radiators A', B' and C' and they have exactly the same

wiring and parts numbered exactly the same with the addition of the suffix "*a*" for each part. Thus the spring finger **26***a* corresponds to the spring finger **26** and the other reference letters designate the parts accordingly. A switch segment **25***a* carried by the arm **24***a* is staggered with relation to the switch plate **25** so that current is delivered to the groups alternately.

While I have shown but two of such groups it is obvious that as many groups as there are segment plates and wiring systems may be used without a material change in the structural features.

In the operation of the device, the motor runs continuously, thus continuously running the control switch and alternating from group to group. As the current is turned into each group through the action of the relay switch **13**, or **13***a* under the influence of the control switch actuated by the motor, the radiators in the group to which current is delivered which at the moment have their local thermally controlled switches closed receive current and thus deliver heat for the period that the line is closed by the contact effected by the control plates **25** and **25***a*.

Assuming that a house is heated with this apparatus and it is desired to cut out the system during the night the clock operates to turn on the system so that it may run normally beginning at some time in the morning. From then on the device operates in its normal manner. Each radiator has its thermally controlled switch that prevents any over-heating, particularly as each radiator when its thermally operated switch is closed is thrown in and out by the continuously operated switch. The master thermally operated switch is assumed to be set at quite a low temperature. Ordinarily it would not operate during the night, but if the house temperature as a whole drops below the desired low temperature this thermally controlled switch closes and the apparatus goes into operation until the house reaches the temperature which will lock out the thermally controlled switch. During the day-time when a normal temperature is desired, as controlled by the thermally actuated switches at each radiator the clock has closed the main circuit so that the total response to local temperature is through the thermal switches at the radiator.

What I claim as new is:—

1. In an electric heating system, the combination of a source of current; a plurality of heating units; thermally controlled unit switches one for each unit controlling the current delivery to the individual units; a normally continuously operating motor controlled switch controlling the delivery of current to the units successively; a master switch controlling the motor and the units collectively and a thermally responsive switch opening and closing the master switch.

2. In an electric heating system, the combination of a source of current; a plurality of heating units; thermally controlled unit switches one for each unit controlling the current delivery to the individual units; a normally continuously operating motor controlled switch controlling the delivery of current to the units successively; a master switch controlling the motor and the units collectively and a time responsive switch opening and closing the master switch.

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