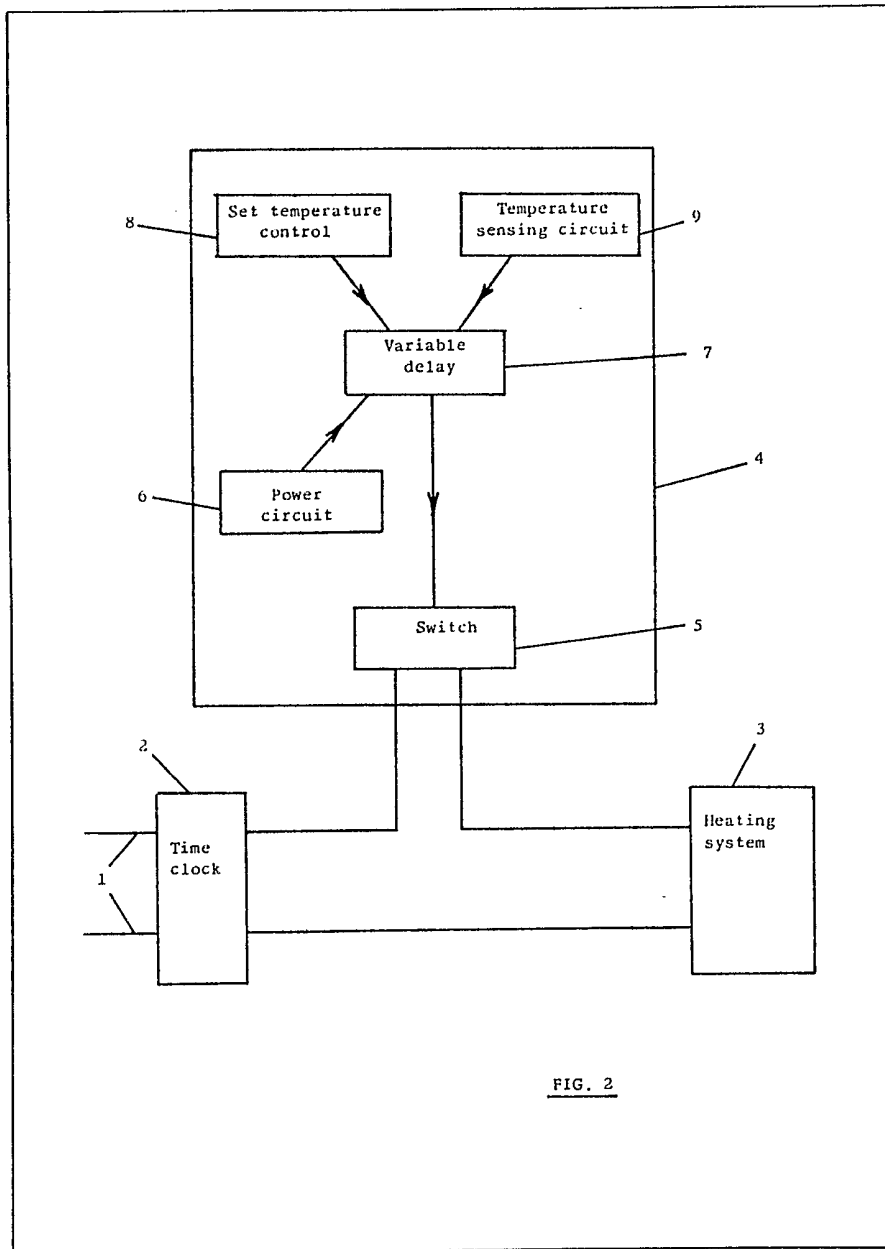


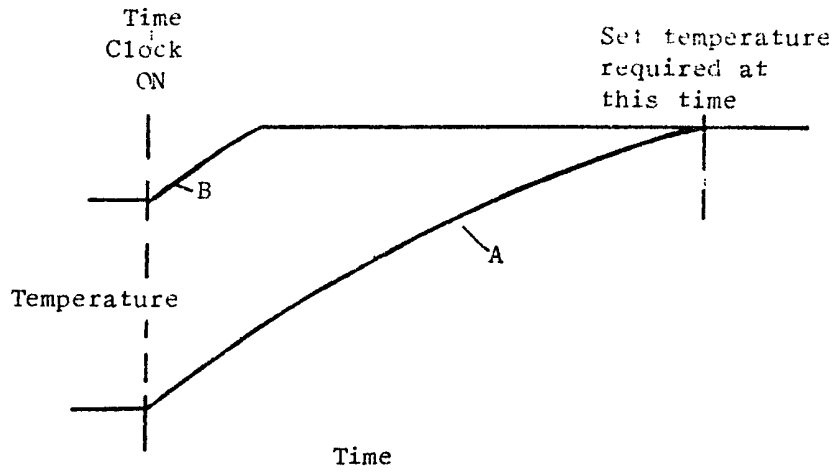
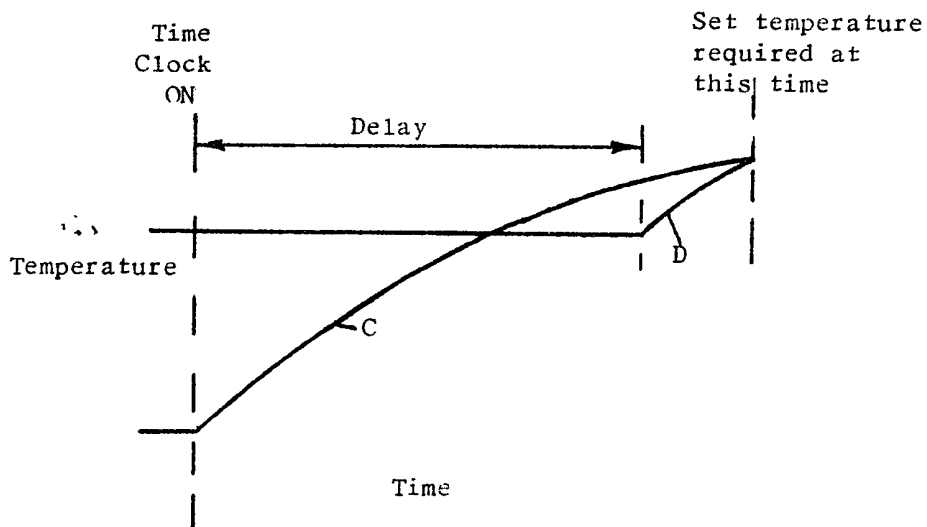
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(54) Space heating control device

(57) An electronic control device 4 is for use in conjunction with a time switch 2 to control a space heating system 3. The time switch is set to operate such that the heated space can be heated to the required temperature at a pre-determined time in extreme cold conditions. The invented device 4 delays the supply of heat in all less cold conditions such

that the required temperature is reached at the pre-determined time and not before. Energy is thereby saved. The said device is essentially powered directly from the circuit being controlled and thus replaces the usual thermostat in the control system. The device 4 determines a variable delay before turning on the heating system 3, on the basis of set and actual temperature in the heated space.



FIG. 1 (a)FIG. 1 (b)

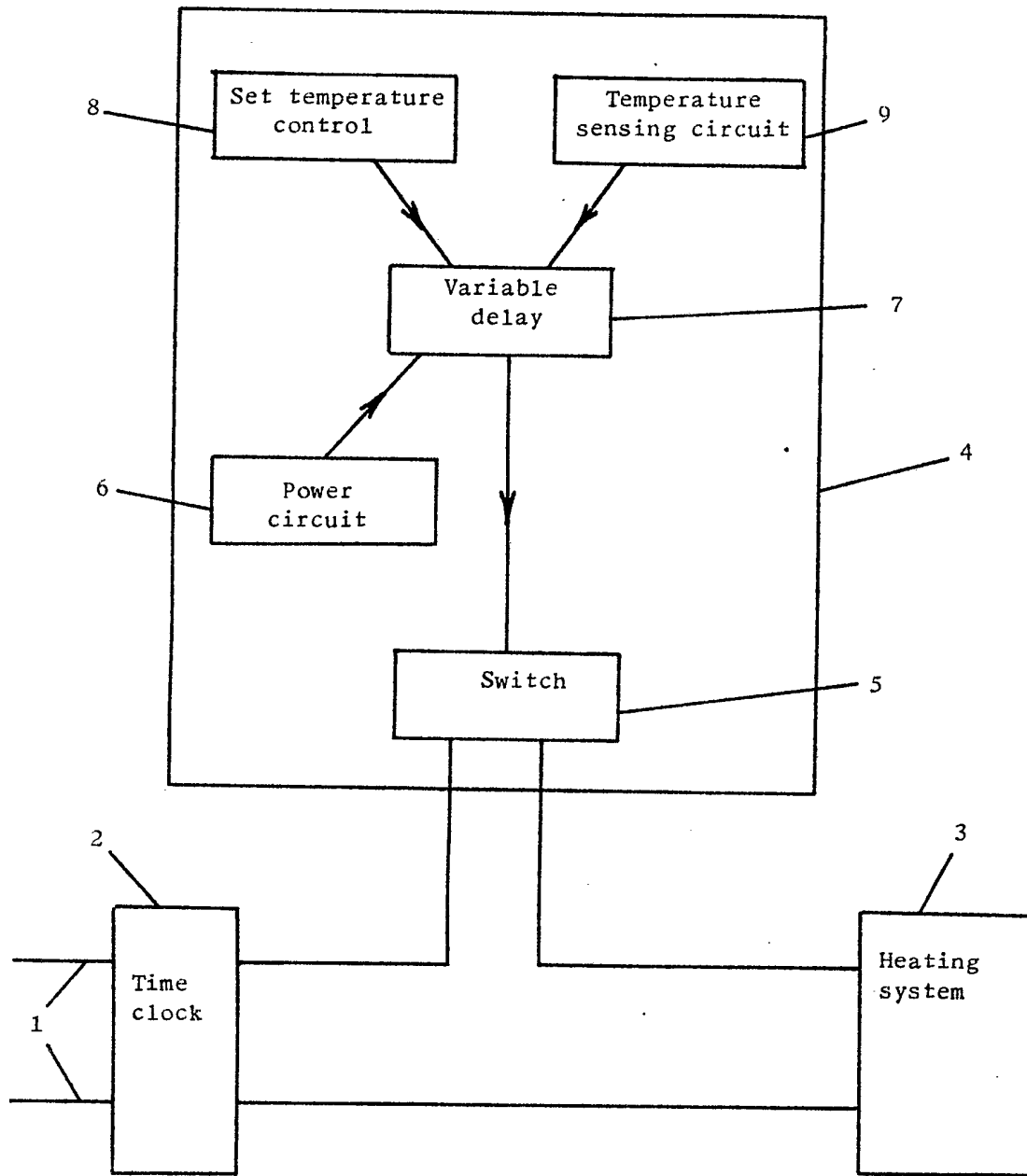


FIG. 2

## SPECIFICATION

## Space heating control device

This invention relates to an electronic system or device used to control a central heating or other space heating system. Such a system in common use is controlled by a time clock and a thermostatic switch in order to switch on the heating at a pre-determined time and raise the temperature of the heated space to the required level at some later time. The arrangement is wasteful since the time between the heating being switched on and the required temperature being reached varies and is largely dependent on the difference between the required temperature and the temperature to which the heated space has fallen. The time allowed to raise the temperature is fixed by the time clock and on most occasions the heating is switched on sooner than necessary in order to allow adequate time to raise the temperature to the required level by the required time in extreme cases.

From one aspect of this invention a delay is introduced which is varied according to the required temperature and the temperature of the space to be heated. This delay prevents the time clock switching on the heating sooner than is necessary to raise the temperature to the required level at the required later time.

Fig 1 (a) shows graphically the way in which the temperature rises to the required level with a system in common use. Curve A shows the temperature rising from an extreme low level to the required level at the required time. Curve B shows the effect when the temperature difference is smaller and the required temperature is reached too soon and energy is wasted.

Fig. 1 (b) shows the performance of a system employing this invention. Curve C is significantly the same as Curve A since when the temperature difference is large no significant delay is introduced. Curve D shows the effect when the temperature difference is small and a large delay is introduced so that the temperature does not reach the required level before the required time and energy is saved.

From a second aspect this invention performs the function of the normal thermostatic switch and controls the temperature of the heated space.

From a third aspect the invented device replaces the normal thermostatic switch in a heating system and derives the power for the electronic circuit within it from the circuit which it controls. By this means the device can replace the normal thermostatic switch in a heating system without modification to the wiring.

One example of the invention is described with reference to Fig. 2. The device 4 embodying this invention replaces the normal thermostatic switch in the system shown. Power from supply lines 1 is controlled by a time clock 2 and then by invented

device 4 before reaching the controlled heating system 3. In combination with time clock 2 the switch 5 switches on and off the heating system as required. The switch 5 may be a semiconductor switch such as a triac or an electro mechanical relay and is controlled by a variable delay circuit 7. The variable delay circuit 7 is itself controlled by a power circuit 6, a set temperature control 8 and a temperature sensing circuit 9.

When the power is switched on by the time clock 2 power circuit 6 derives a suitable supply for the electronic circuit and starts the variable delay circuit 7 operating. The duration of the delay is controlled by the set temperature control and the temperature sensing circuit in combination. The set temperature control 8 is adjusted manually to the required temperature and the temperature sensing circuit 9 monitors the actual temperature of the space or room. At the end of the variable delay period the switch 5 is turned on and the heating system 3 is caused to raise the temperature to that which is required. When the required temperature is reached switch 5 is repeatedly turned off and on as required to maintain this temperature under the control of the set temperature control 8 and the temperature sensing circuit 9 until such time as the time clock 2 switches off the power. When the time clock 2 again switches on, the delay will be initiated and the sequence will be repeated with a delay suitable for the new conditions.

## CLAIMS

1. A control device for inclusion in a space heating system in combination with a time switch which delays the supply of heat after operation of the time switch such that the pre-set required temperature is always reached substantially at a pre-determined time. The said device being operated by power drawn directly from the circuit being controlled.

2. A device as in claim 1 wherein the time for which the supply of heat is delayed is controlled by the pre-set required temperature and the initial temperature from which the space must be heated such that the required temperature is reached at a predetermined time regardless of the initial temperature.

3. A device as in claim 1 which, after an initial heating period, maintains the temperature of the heated space close to the pre-set required temperature by alternately switching the heating on and off for suitable periods.

4. A device as in claims 1, 2 and 3 which is connected essentially by only two wires to the system being controlled.

5. A device as in claims 1, 2, 3 and 4 wherein the delay period is initiated by the application of power to the system by the operation of a time switch.