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(54) Regulator

(57) A temperature regulation device (10) has a housing (11) from which protrudes a plug part (12), adapted to be received in an electrical socket to which an electrical supply is provided, and in which at least one socket part (16), adapted to receive an electrical plug connected to an electrical apparatus, is provided. The temperature regulation device (10) has a thermostat device (23) operable to make electrical connections (20, 21) between the plug part (12) and the socket part (16) when the ambient temperature in the vicinity of the temperature regulation device (10) is within a predetermined range, and to break the connections (20, 21) when the ambient temperature in the vicinity of the temperature regulation device (10) is outside that range. The thermostat device (23) may be operable to make the connections (20, 21) when the ambient temperature falls below a predetermined value, above a predetermined value, or both. The predetemined value may be set mechanically or electronically and may be shown on a display 35, and an indicator (28) indicates when the connections (20, 21) are made.

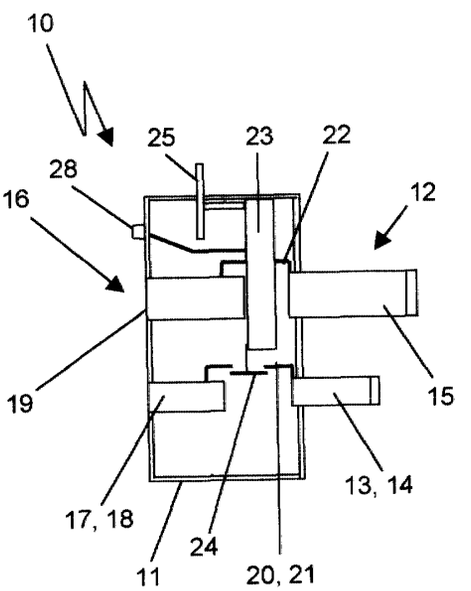

Fig. 2

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Description

[0001] This invention relates to regulators, and in particular to devices for the regulation of the temperature of a premises or another device.

[0002] it is known to include, in the electrical circuit to a heating or cooling device, a thermostat device that is operable to cause the heating or cooling device to be energised when he temperature of a premises or of another device falls outside a predetermined range. For example, a in house a frost thermostat may be operable to energise a water and/or a central heating boiler if the temperature in the vicinity of the thermostat drops to some predetermined temperature at or near to 0°C. Similarly a greenhouse may have a thermostat wired into a heating system such that the heating system is energised when the inside temperature drops to a predetermined value, or wired into a roof opening system such that the roof is opened when the inside temperature rises to a predetermined level. These temperature regulation devices are satisfactory for permanent arrangements, but add considerably to the cost of installation of the arrangement. In addition, the range of operation of each device is tailored to the arrangement in which it is installed.

[0003] It is also known, from US-A-5930097, to provide an electrical adapter for insertion between an electrical appliance and an electrical supply, in which a thermostat device is sensitive to the temperature generated in the electrcal contacts of the adapter such that if dangerous overheating occurs in those contacts, the circuit is broken to protect the electrical appliance. However, operation of this adapter is dependent on the current flowing through the contacts and is independent of the ambient temperature. In consequence, this adapter does not address the matter of the operation of an electrical appliance in response to the ambient temperature.

[0004] It is an object of the invention to provide a temperature regulation device that is simple, inexpensive and is adaptable for alternative arrangements requiring temperature regulation.

[0005] The invention provides a temperature regulation device comprising a housing, a plug part adapted to be received in an electrical socket to which an electrical supply is provided, a socket part adapted to receive an electrical plug connected to an electrical apparatus, and a thermostat device operable to complete an electrical circuit between the plug part and the socket part when the ambient temperature in the vicinity of the temperature regulation device is within a predetermined range, and to break the circuit when the ambient temperature in the vicinity of the temperature regulation device is outside that range.

[0006] The thermostat device may be operable to complete an electrical circuit between the plug part and the socket part when the ambient temperature fails below a predetermined value. The predetermined temperature value may be 0°C. Alternatively, the thermostat device may be operable to complete an electrical circuit between the plug part and the socket part when the ambient temperature rises above a predetermined value.

[0007] The predetermined temperature value may be adjustable. The predetermined temperature value may be set mechanically, and may be set by rotating an adjusting member. The adjusting member may be a knob or a dial. Alternatively the temperature regulation device may comprise a programmable device whereby the predetermined temperature value may be set electronically, and may be set by pressing numbered keys on a keypad. A display may be provided to display the set temperature value.

[0008] The temperature regulation device may have an indicator thereon to indicate when the electrical circuit between the plug part and the socket part is completed. The indicator may be a lamp, and may be an LED. The indicator may be red.

[0009] The thermostat device may have a sensitivity such that the operation of the thermostat device occurs within a predetermined range of the predetermined temperature value. The range may be +/- 5°C.

[0010] The thermostat device may have a plurality of socket parts each adapted to receive an electrical plug connected to an electrical apparatus, in which case the thermostat device is operable to complete an electrical circuit between the plug part and the socket parts when the ambient temperature in the vicinity of the temperature regulation device is within a predetermined range, and to break the circuit when the ambient temperature in the vicinity of the temperature regulation device is outside that range.

[0011] The invention will now be described with reference to the accompanying drawing, in which:-

Fig.1 is a perspective view of one embodiment,

Fig. 2 is a sectional view of the embodiment of Fig. 1,

Fig. 3 is a perspective view of a second embodiment, and

Fig. 4 is a sectional view of the embodiment of Fig. 3.

Figs. 5 and 6 are perspective views of multi-socket versions of the embodiment of Figs. 1 and 2

[0012] Referring now to Figs. 1 and 2, there is shown a temperature regulation device 10 having a housing 11. A plug part 12 comprises live, neutral and earth pins 13, 14, 15 and a socket part 16 comprises corresponding receiving sockets 17, 18, 19. The socket part 16 is configured in standard manner to receive a plug (not shown) attached to an electrical apparatus such as a heater, fan, roof opening device or the like. Similarly the plug part 12 is also configured in standard manner to be inserted in a socket (not shown) to which an electrical supply is provided. When the temperature regulation device 10 is plugged into a socket to which an electrical supply is connected, and is in operation, the pins 13, 14, 15 are

connected by electrical wires 20, 21, 22 to the corresponding receiving sockets 17, 18, 19. By this means an electrical apparatus, the plug of which is inserted in the socket part 16, is connected to the electrical supply.

[0013] Within the housing 11 is a thermostat device 23. The thermostat device 23 senses the ambient temperature in the vicinity of the temperature regulation device 10. When that temperature is within a predetermined range, e.g if it drops to 0°C or below, the electrical connections between the pins 13, 14, 15 and the receiving sockets 17, 18, 19 is complete as described above. If a heater is connected to the socket part 16, it will be brought into operation to raise the ambient temperature out of that range. When the ambient temperature is outside that range, e.g if it rises above 0°C, the thermostat device 23 opens a switch 24 to break the connection 20 at least, and possibly 21 also, as shown in Fig. 2. By this means the electrical apparatus such as a heater is disconnected from the electrical supply. When the connections 20, 21 are made, an indicator 28 in the form of a red LED is illuminated to warn people that the temperature regulation device 30 is in operation and the electrical apparatus connected to it should be working.

[0014] Such an arrangement is useful for certain applications in which it is desired that the ambient temperature in the vicinity of the temperature regulation device 10 does not fall below freezing, e.g. greenhouses, houses having water heating boilers or the like. In other applications the predetermined temperature at which the temperature regulation device 10 operates may be other than 0°C, for example it may be required to facilitate cooling of a greenhouse, office, conservatory or home if the ambient temperature rises above a certain level. In this case the thermostat device 23 may be configured to operate to make the connections 20, 21 when the ambient temperature rises to the predetermined level, and to break the connections when the ambient temperature falls below that level, as shown in Fig. 4. In such a case, a window or roof opening device or a fan may be plugged into the temperature regulation device 10 so as to be brought into operation to cool the premises. In an alternative arrangement, the thermostat device 23 may be configured to make the connections 20, 21 when the ambient temperature drops below a first, low value or rises above a second, higher value, and to break the connections 20, 21 when the temperature is between those values.

[0015] Instead of a pre-set temperature regulation device 10, the device of Figs. 1 and 2 may be adjustable as shown. In this case the temperature at which the thermostat device 23 operates to make or break the connections 21, 21 may be varied by rotating the dial 25. On the dial 25 are graduations 26 which may be set against a marker 27 on the housing 11 to adjust the operating temperature of the temperature regulation device 10.

[0016] In Figs. 3 and 4 there is shown an alternative embodiment of temperature regulation device 30 in which corresponding parts to those shown in Figs. 1 and 2 are identified by the same reference numerals. In the case of temperature regulation device 30, a programmable device 31 is mounted in the housing 11 and is connected to the thermostat device 23 by an electrical connection 32. Numbered keys 33 on a keypad 34 are used to pre-set the temperature at which the temperature regulation device 30 operates. The temperature chosen is indicated on a display 35.

[0017] Figs. 5 and 6 illustrate multi-socket versions of the embodiment of Figs. 1 and 2. In these versions corresponding parts to those shown in Figs. 1 and 2 are identified by the same reference numerals. However, in the case of the version shown in Fig. 5, the temperature regulation device 50 has a second socket part 16' provided on a side face of the housing 11. The receiving sockets 17', 18', 19' of the second socket part 16' are respectively connected to the receiving sockets 17, 18, 19. In the case of the version shown in Fig. 6, the temperature regulation device 60 has a second socket part 16' provided on the front face of the housing 11. The receiving sockets 17', 18', 19' of the second socket part 16' are respectively connected to the receiving sockets 17, 18, 19. In this way two, or more if further socket parts are provided, electrical apparatuses may be connected to the electrical supply and controlled by the thermostat device 23.

[0018] By means of the invention a simple and inexpensive temperature regulation device is provided that can be used in various circumstances and for control of the operation of differing items of electrical equipment. The cost of installation of a permanent arrangement is avoided. The embodiments shown are suitable for use in the United Kingdom, but alternative arrangements of the plug and socket parts 12, 16 with differently shaped and spaced pins and sockets may be provided for use of the temperature regulation device in other countries. The thermostat device 23 may have a sensitivity such that the operation of the thermostat device 23 occurs within a predetermined range of the predetermined temperature value, the more accurate it is the more expensive it will be to manufacture. The range may be +/- 5°C, which is probably sufficiently accurate for most domestic purposes.

Claims

1. A temperature regulation device comprising a housing (11), a plug part (12) adapted to be received in an electrical socket to which an electrical supply is provided, a socket part (16) adapted to receive an electrical plug connected to an electrical apparatus, and a thermostat device (23), **characterised in that** the thermostat device (23) is operable to complete an electrical circuit between the plug part (12) and the socket part (16) when the ambient temperature in the vicinity of the temperature regulation device

(10) is within a predetermined range, and to break the circuit when the ambient temperature in the vicinity of the temperature regulation device (10) is outside that range.

2. A temperature regulation device according to claim 1, **characterised in that** the thermostat device (23) is operable to complete an electrical circuit between the plug part (12) and the socket part (16) when the ambient temperature falls below a predetermined value.

3. A temperature regulation device according to claim 1, **characterised in that** the thermostat device (23) is operable to complete an electrical circuit between the plug part (12) and the socket part (16) when the ambient temperature rises above a predetermined value.

4. A temperature regulation device according to any one of claims 1 to 3, **characterised in that** the predetermined temperature value is adjustable.

5. A temperature regulation device according to claim 4, **characterised in that** the predetermined temperature value is set mechanically.

6. A temperature regulation device according to claim 4, **characterised by** comprising a programmable device (31) whereby the predetermined temperature value is set electronically.

7. A temperature regulation device according to claim 6, **characterised in that** a display (35) is provided to display the set temperature value.

8. A temperature regulation device according to any one of claims 1 to 7, **characterised in that** the temperature regulation device (10) has an indicator (28) thereon to indicate when the electrical circuit between the plug part (12) and the socket part (16) is completed.

9. A temperature regulation device according to claim 12, **characterised in that** the indicator (28) is a lamp.

10. A temperature regulation device (50, 60) according to any one of claims 1 to 9, comprising a housing (11), a plug part (12) adapted to be received in an electrical socket to which an electrical supply is provided, a plurality of socket parts (16, 16') each adapted to receive an electrical plug connected to an electrical apparatus, and a thermostat device (23), **characterised in that** the thermostat device (23) is operable to complete an electrical circuit between the plug part (12) and the socket parts (16, 16') when the ambient temperature in the vicinity of the temperature regulation device (50, 60) is within a predetermined range, and to break the circuit when the ambient temperature in the vicinity of the temperature regulation device (50, 60) is outside that range.

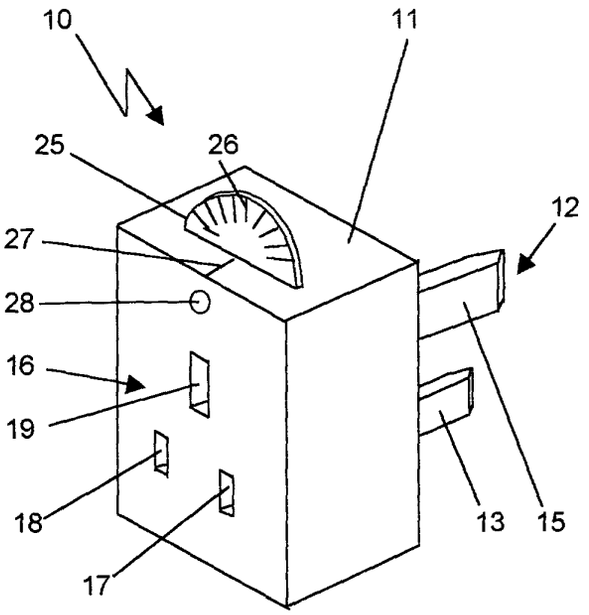

Fig. 1

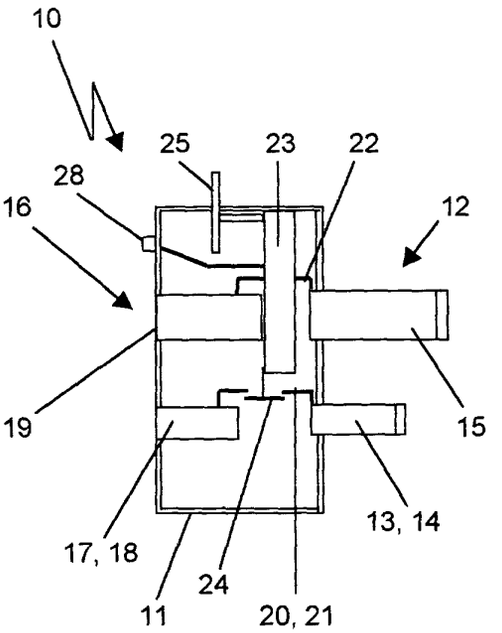

Fig. 2

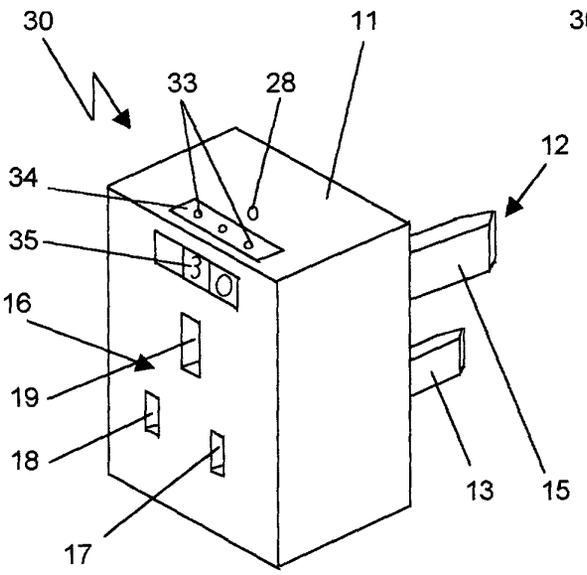

Fig. 3

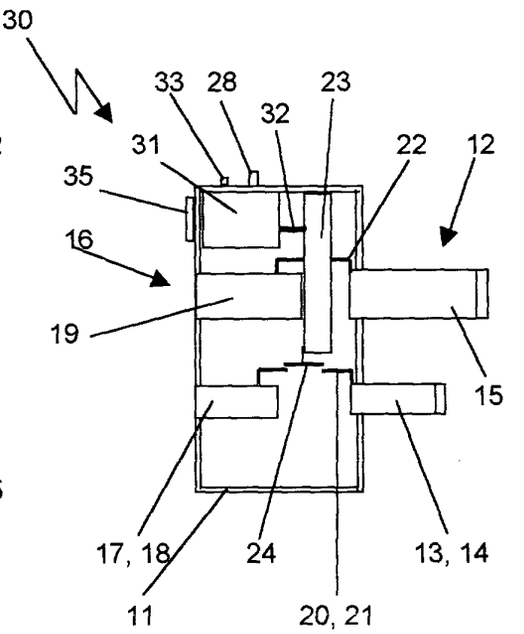

Fig. 4

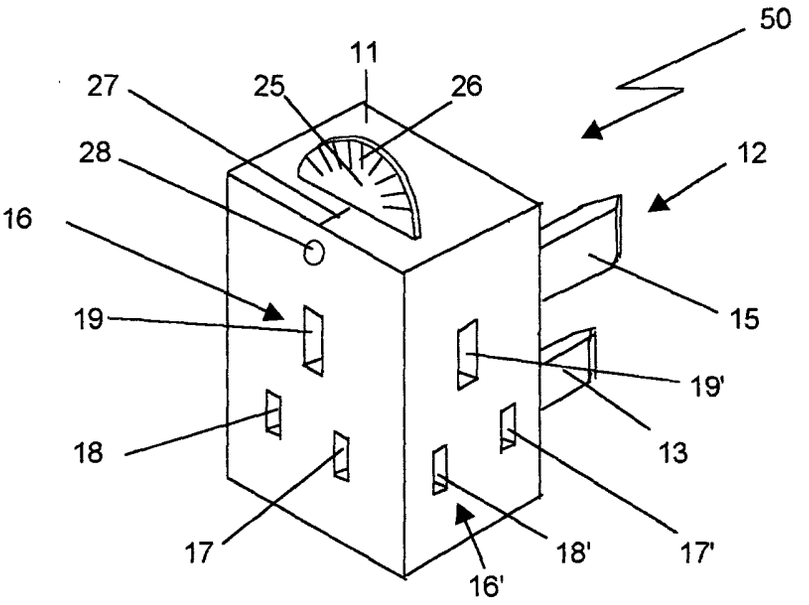
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Fig. 5

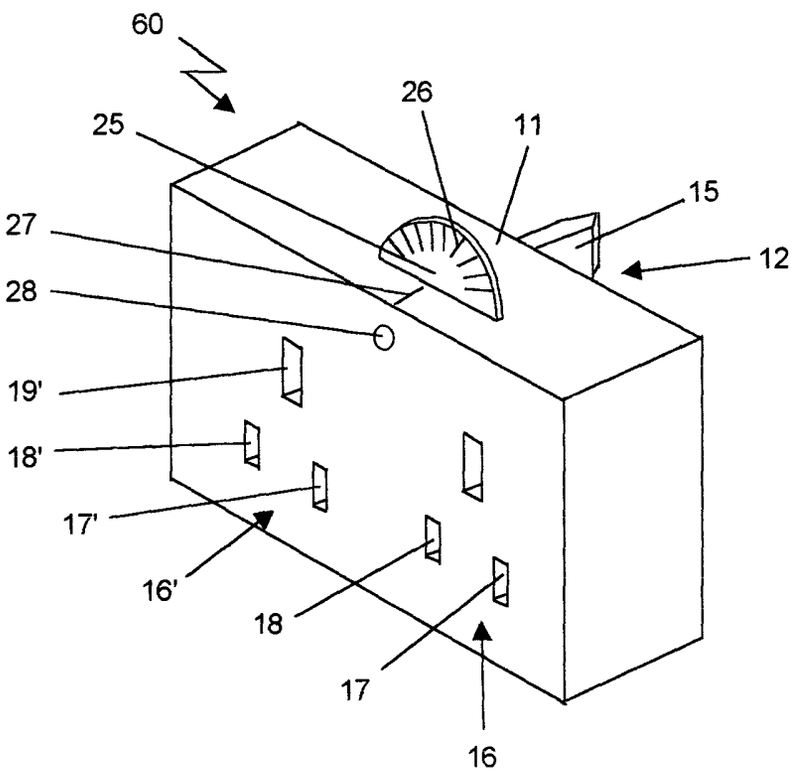
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 5952

DOCUMENTS CONSIDERED TO BE RELEVANT

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 October 2001	Bertin, M

CATEGORY OF CITED DOCUMENTS

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03-10-2001

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