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CONTROLLING DEVICE

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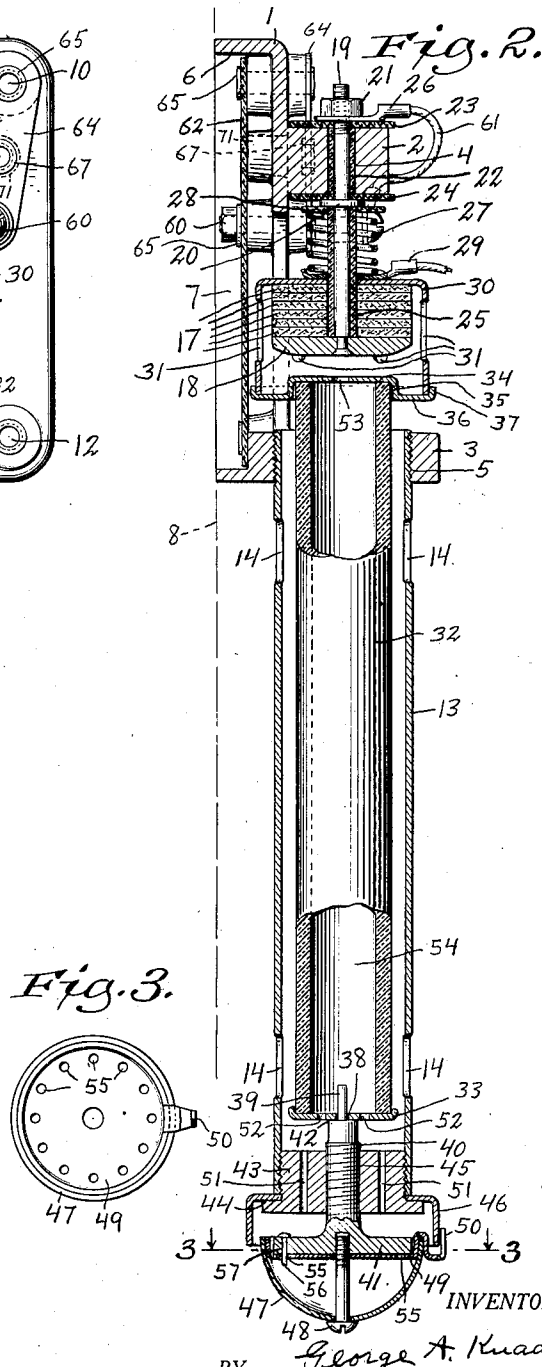
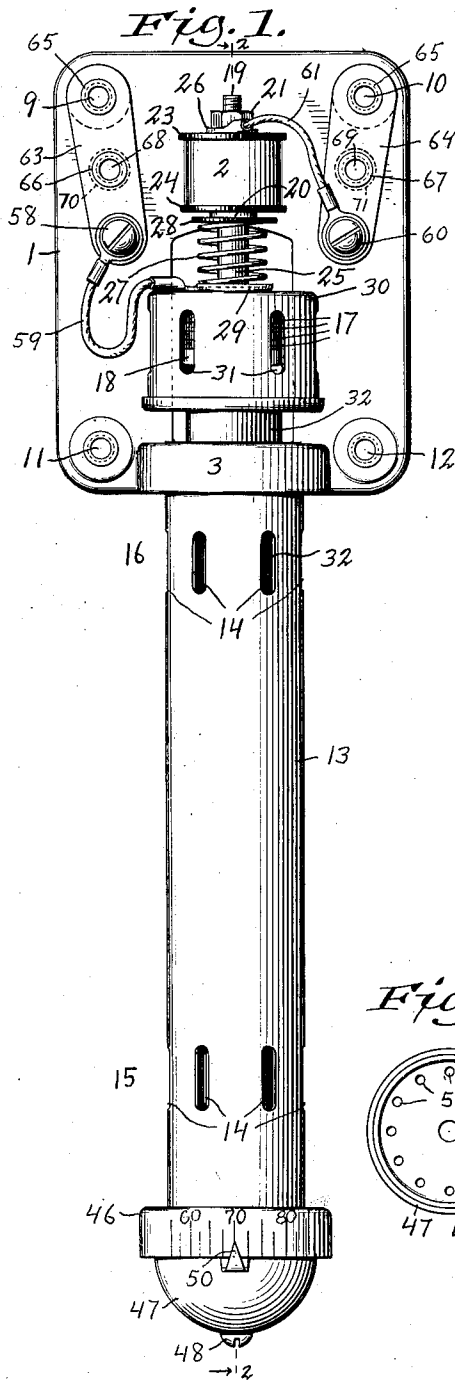
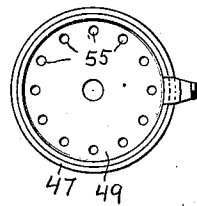


Fig. 3.



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CONTROLLING DEVICE

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This invention relates to controlling devices, and the object of the invention is to improve the construction and operation of controlling devices in the manner to be hereinafter described and claimed.

Referring to the drawings, which accompany this specification and form a part hereof, which drawings illustrate an embodiment of this invention, and on which drawings the same reference characters are used to designate the same parts wherever they may appear in each of the several views, Fig. 1 is a front elevation of a controlling device; Fig. 2 is a section taken on the line 2—2 on Fig. 1, looking in the direction indicated by the arrows; and Fig. 3 is a plan view of parts of the controlling device taken on the line 3—3 on Fig. 2, looking in the direction indicated by the arrows.

The principal object of my invention is to produce a controlling device, for electric current, which will automatically effect such variations in an electric current, whether the electric current be the so-called direct current or the so-called alternating current, that some electrical apparatus which is adapted to be operated, or actuated, by the electric current can and will be controlled by the controlling device without interrupting the continuity of an electrical circuit and thereby obviate the necessity of using make or break devices in the electrical circuit.

The underlying principle of my invention is the utilization of the known properties of carbon, and possibly some other material or materials with which I am not now acquainted, to offer less resistance to the passage of a so-called electric current when pressure is applied thereto.

My invention is capable of wide use under various conditions and may be embodied in many specific forms of apparatus, as will be readily understood from the following description of the construction and operation of a type of apparatus which is quite generally known as a thermostat.

Referring to the drawings, the reference numeral 1 designates a support which is provided with apertured lugs 2 and 3, the apertures through these lugs being designated by

the reference numerals 4 and 5 and being shown by the drawings as concentric with each other though differing in size. The support 1 should preferably be made as rigid as possible to retain parts in fixed positions of adjustment and, for this purpose, the support 1 is illustrated as provided with an integral and continuous flange 6 on what may be termed the back side thereof and the space 7 provided by this flange 6 affords a convenient place for attaching electric wires, not shown, to the thermostat and concealing them from view. The thermostat may be attached to a wall 8, or other support, by screws, not shown, passed through screw holes 9, 10, 11, and 12 in the support 1. The aperture 5 in the lug 3 is screwthreaded to receive the screwthreaded end of a support member 13. This support member 13 may be made from any suitable material and in any suitable manner. The drawings show it as a steel tube which is screwthreaded on the outside at one end and which is screwthreaded on the inside at its other end and it is shown as provided with air passages or draft holes 14 which are arranged in series, some of which are arranged in series 15 circularly around the lower end of the support member 13 and some of which are arranged in series 16 circularly around the upper end of the support member 13, as clearly shown by the drawings.

The thermostat is shown as provided with a plurality of carbon members 17 which are illustrated by the drawings as disks with holes through their centers, this specific construction being adopted merely as a matter of convenience in constructing and assembling the thermostat and for the security of the thermostat after its parts have been assembled. The lowermost of these carbon members rests upon a fixed abutment or unyieldable member which is illustrated by the drawings as a metal disk 18, so as to provide an electrical connection between the metal disk 18 and the lowermost carbon member and the several carbon members are in contact to provide an electrical connection between them. The metal disk 18 is shown by the drawings as secured to a bolt 19 which is

provided with a shoulder 20 and a nut 21 on its upper screwthreaded end. The bolt 19 passes through the aperture 4 in lug 2 but is insulated from the lug 2 by insulating material 22 and insulating material 23 is applied between the lug 2 and the nut 21, and insulating material 24 is also applied between the lug 2 and the shoulder 20 on the bolt 19. Insulating material 25 is also applied around the bolt 19 between the shoulder 20 and the metal disk 18 and extends through the apertures in the carbon members 17. A conductor terminal 26 may be placed in electrical connection with the bolt 19, metal disk 18, and the carbon members 17, by being clamped between the nut 21 and the insulating material 23. A pressure member, which is preferably some suitable kind of resilient or yieldable means and which is illustrated by the drawings as a spiral spring 27, is shown as interposed between an insulating washer 28 and a connection terminal 29 which is in metallic contact with an inverted metallic cup 30. The metallic cup 30 may be provided with air passages or draft holes 31, and it will be readily understood from the construction so far described, that the carbon members 17 are pressed together by the power exerted by the spiral spring 27, thereby presenting less resistance to the passage of an electric current, than if the carbon members 17 were not pressed together. It will be understood, of course, that the metallic cup 30 serves to make an electrical connection between the terminal 29 and the carbon members 17, metallic disk 18, bolt 19, and conductor terminal 26, but it also serves as a pressure diminishing member for diminishing the pressure, to which the carbon members 17 are subjected, in the manner to be now described. The metallic cup 30, as shown by the drawings, projects sufficiently beyond the metallic disk 18 to accommodate the predetermined possible movement of a release device 32. The release device 32 is illustrated by the drawings as a hard rubber tube which rests against a flange plate 33 and enters at its other end and abuts against the bottom 34 of a depression 35 in a plate 36 which is provided with a flange 37 inside of which the open end of the metallic cup 30 is assembled. The flange plate 33 is provided with an aperture 38 through which extends a pin 39. The pin is illustrated by the drawings as integral with a screwthreaded stem 40, formed with head 41, and this construction provides a shoulder 42 against which the flange plate 33 can rest. A screwthreaded plug 43, which is provided with a shoulder 44, is engaged with the interior screwthreads of the support member 13 and is provided with a screwthreaded aperture 45 through which the screwthreaded stem 40 is passed. A dial plate 46 is secured between the end of the support 13 and the shoulder 44 and is pro-

vided with graduation marks, for example, to indicate degrees of temperature. A shell cup 47 is secured to the head 41 by a screw 48, as a simple mechanical expedient for giving a well finished appearance to the thermostat, and a cup 49 is pressed into the top of the shell cup 47 and is provided with a projecting pointer 50 to be observed in connection with the graduations on the dial plate 46. In order to permit the air to circulate within the release device or hard rubber tube 32, draft holes 51 may be provided in the plug 43, draft holes 52 may be provided in the flanged plate 33, and one or more draft holes 53 may be provided in the plate 36 to communicate with the bore 54 of the release device or hard rubber tube 32. The function of the several draft holes, referred to, is simply to permit a free circulation of air in contact with the inside and the outside of the hard rubber tube, or release device, 32 so that the release device 32 will be readily responsive to variations in temperatures. The air passages or draft holes 31 in the metallic cup 30 are to provide for free circulation of air to dissipate the heat which may be generated in the carbon members 17 when the passage of electric current is being resisted by what may be termed low pressures upon the carbon members.

The principle of construction and operation of the controlling device will be readily understood from the foregoing description and the following explanation. As before stated, the principle of the operation of the controlling device consists in producing a variable electric current or a variation in an electric current by resistance mechanism which is subject to change in its total resistance. The invention may be embodied in different forms and constructions of apparatus without, however, departing from the principle of operation of my invention. The specific construction of controlling device illustrated by the drawings will operate to increase resistance to the passage of an electric current either by an increase in temperature or by a decrease in temperature according to the initial setting or adjusting of the device. Assuming that the controlling device is set to shut off or decrease the supply of heat when the temperature of a room, for example, has reached 70 degrees the release device, or hard rubber tube 32, which expands, with a rise of temperature, more than the support member 13, has pressed against the plate 36 and lifted the metallic cup 30 against the tension of the pressure member or spiral spring 27 so that the pressure exerted upon the carbon members 17 by said pressure member or spiral spring 27 is diminished and the resistance to the passage of the electric current is increased whereby the action of mechanism, not shown, is properly and predeterminedly controlled.

On a lowering of the room temperature, the contraction of the release device or hard rubber tube 32 is greater than the contraction of the support member 13, with the result that the pressure member or spiral spring 27 can exert greater pressure upon the carbon members 17 thereby diminishing the resistance to the passage of electric current.

By adjusting the release device 32 to a higher position, it will be readily seen that the initial resistance of the carbon members 13 to the flow of electric current is high and that the resistance is reduced as the temperature falls. It will also be readily understood that the positions of the pressure member or spiral spring 27 and the release device 32 can be transposed without affecting the principle of the construction and operation of the controlling device as it is only necessary to have a pressure member and a release device to increase or diminish the resistance of the carbon members 17.

While it is not necessary or desirable to have extreme movements take place so that there will be an actual breaking of the otherwise continuous electric circuit, the lowermost carbon member 17 may be cemented or otherwise secured to the metal disk 18 and the uppermost carbon member 17 may be cemented or otherwise secured to the metallic cup 30, so that if the range of movement of the metallic cup 30 with respect to the metal disk 18 was sufficient to cause actual separation of members, the separation would be between carbon members and not between a metallic member and a carbon member. The reason for this is that if, for example, the metallic cup 30 were to be separated from the uppermost carbon member 17, there might be a slight arcing which would tend to roughen the metal surface and prevent good contact again while such a result would not occur as the result of the same amount of arcing between carbon members.

The cup 49 is provided with a plurality of apertures 55 and a pin 56, which extends through a hole 57 in the head 41, may be engaged in any one of the several holes 55 so that the pointer 50 will closely approximate the graduation on the dial plate 46 at which the controlling device will effect a sufficient variation in the electric current to perform the function desired. By unscrewing the screw 48 the shell cup 47 and the cup 49 can be dropped sufficiently to disengage the pin 56 from one of the apertures 55 to engage the pin 56 with another of said apertures, in a manner which will be readily understood, and the screw 48 can then be screwed back to retain the shell cup 47 and the cup 49 in proper assembled relation with the head 41.

The reference numeral 58 designates a binding post for a wire to afford an electrical connection through the wire 59 to the con-

ductor or connection terminal 29, and the reference numeral 60 designates a binding post for a wire to afford an electrical connection through the wire 61 to the conductor or connection terminal 26.

It will be understood, of course, that the adjustment of the thermostat or the setting of it to operate at a predetermined temperature is obtained by rotating the head 41 to move the release device 32 towards or away from the plate 18 and that the adjustment of the pointer 50 to correspond with the graduation at which the thermostat is set to operate is made after the adjustment or setting of the thermostat and without disturbing the adjustment of the thermostat.

The drawings illustrate insulation 62 secured within the space 7 and this insulation may be secured in position in any suitable manner.

The reference characters 63 and 64 designate strips of insulating material which are secured to the support 1 by metal eyelets 65 which are passed through the screw holes 9 and 10 and through the holes for the binding posts 58 and 60. The eyelets which pass through the screw holes 9 and 10 require no insulation, but the binding posts 58 and 60 are properly insulated from the eyelets through which they pass. The metal eyelets 66 and 67 merely pass through the strips of insulating material 63 and 64 to serve as bushings for the holes 68 and 69 through which the connecting wires are passed from the back to be attached to the binding posts 58 and 60. Large holes 70 and 71 are provided in the support 1 for the passage of such wires. The drawings show the insulation 62 as secured by the metal eyelets 65.

The great objection to the existing controlling devices is that they are of a make and break type and are unreliable at the time of making and breaking contact due to jars and vibrations of buildings or structures where they are mounted. My invention overcomes the unreliability and uncertainty of existing controlling devices by rendering the action of the device positive and reliable.

What I claim is:

1. The combination in a controlling device, of a support provided with lugs, the said lugs being provided with apertures in line with each other, a metallic plate secured to one of said lugs but insulated therefrom, a plurality of carbon disks forming a pile which rests against said metallic plate, a metallic cup resting against the opposite end of the pile of carbon disks, a conductor terminal in electrical connection with said metallic plate, a conductor terminal in electrical connection with said metallic cup, a spring tending to force said metallic cup towards said metallic plate to apply pressure to said carbon disks, a support member, and a release device adapted to move said metallic

cup in opposition to the tension of said spring to diminish pressure exerted by said spring upon the said carbon disks.

2. The combination in a controlling device, of a support, a lug thereon, a metallic plate suspended from said lug, a plurality of carbon disks forming a pile which rests on and against said metallic plate, a metallic contact member of inverted cup-shape resting on and against the opposite end of the pile of carbon disks, means for providing electrical connections to said metallic plate and said metallic contact member, a spring tending to force said metallic contact member toward said metallic plate to apply pressure to said carbon disks, and a release device arranged to exert pressure against the rim of said metallic contact member and to move it in opposition to said spring to diminish the pressure exerted by said spring upon the carbon disks.

In witness whereof I hereto affix my signature.

GEORGE A. KNAAK.

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