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SERIES SWITCH CONTROL

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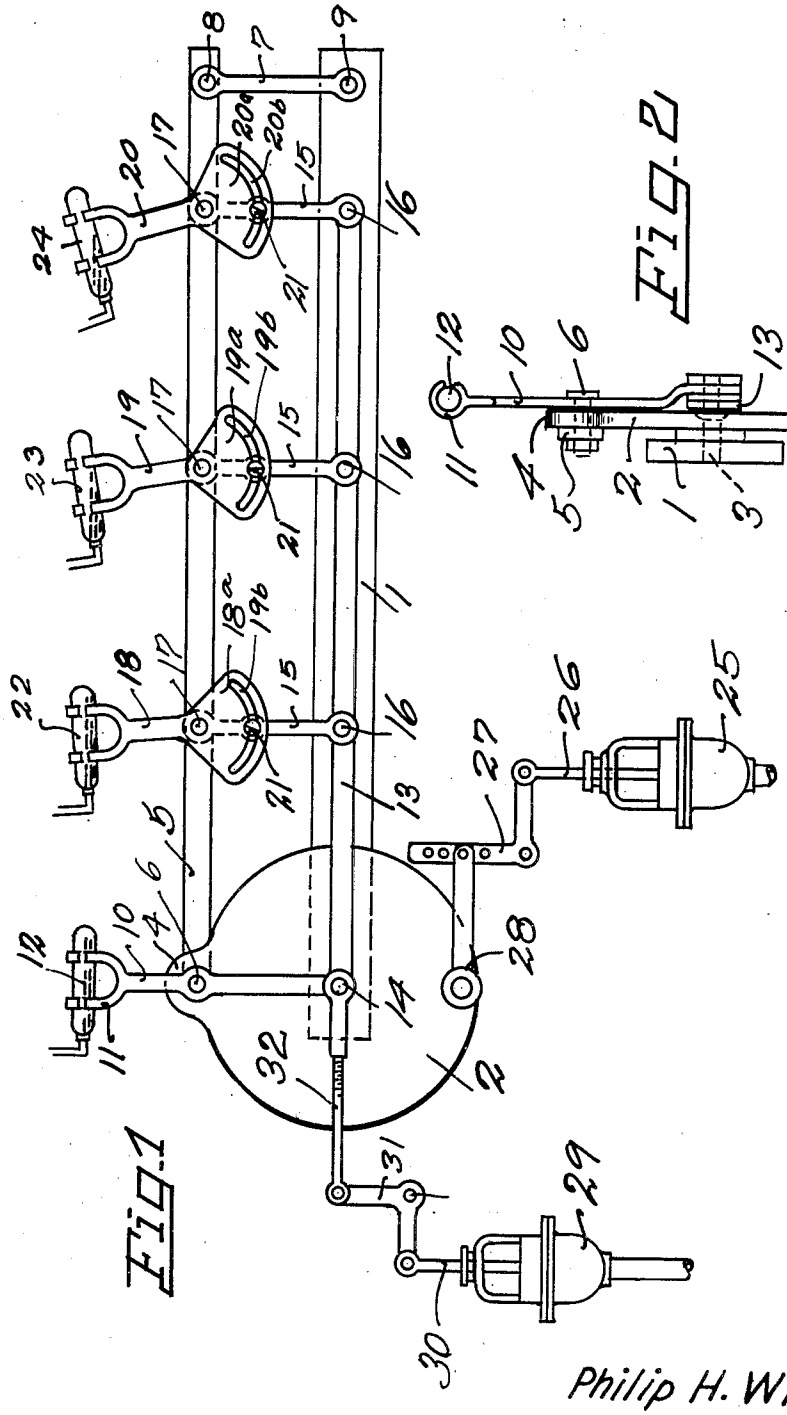


Fig. 1

Fig. 2

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SERIES SWITCH CONTROL

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4 Claims. (Cl. 200—81.5)

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This invention relates to an electric control apparatus, and while it is particularly adapted for use in the condensation return system constituting the subject matter of my Patent No. 2,357,440, issued September 5, 1944, it is to be understood that its use is not restricted to such systems.

One object of the invention is to provide an apparatus by means of which switches for a number of circuits may be moved to open and closed positions by a common actuating device, the switches being capable of being individually set so that opening and closing thereof will be in timed relation to each other and certain of the switches open sooner or later than others.

Another object of the invention is to provide an apparatus of this character wherein the switches are mounted on carriers pivoted to supporting arms for angular adjustment so that when the arms are tilted about pivots, the switches will open and close at the same time or one after another.

Another object of the invention is to provide an apparatus wherein a preliminary tilting may be imparted to the arms carrying the switches and further tilting movement then imparted to the arms for opening the switches.

Another object is to so mount the arms that they will tilt at the same time when the apparatus is actuated for opening or closing the switches.

Another object of the invention is to provide an apparatus of this character which is simple in construction, efficient in operation, and not liable to become deranged after setting.

In the accompanying drawings:

Fig. 1 is a front elevation of the improved apparatus.

Fig. 2 is an end view thereof.

The improved electric control apparatus has a base bar 1 which may be mounted horizontally on a suitable support in any desired manner. At one end of the base bar is a disc 2 pivotally mounted by a pin 3 for turning movement, and the upper end of the disc is formed with an ear 4 on which one end of a floating bar 5 is pivotally connected by a pin 6. The floating bar extends longitudinally of the base bar in upwardly spaced parallel relation thereto and the end of the floating bar opposite from the disc is supported by a link or bar 7 pivoted to the bars by pins 8 and 9. The pin 6 also serves to pivotally mount an arm 10 having forks 11 at its upper end and carrying a mercury switch tube 12, the lower end of arm 10 being pivotally connected with a rod or bar 13

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by a pin 14. Bar 13 extends longitudinally of the base bar 1 in front thereof and links 15 have their lower ends connected with the bar 13 by pins 16 and their upper ends connected with the floating bar 5 by pins 17. Since the links 15 and the switch arm 10 are all pivoted to the floating bar 5 and the actuating bar 13, turning of the disc 2 about the pin 3 will cause them to be simultaneously tilted and longitudinal shifting of the actuating bar 13 will also cause them to be simultaneously tilted.

Above the links are disposed arms or carriers 18, 19 and 20 pivotally mounted for angular adjustments by the pins 17 and having wide lower end portions 18*a*, 19*a* and 20*a* formed with arcuate slots 18*b*, 19*b* and 20*b* through which pass screws 21 carried by the links 15. By loosening the screws, the arms may be tilted about the pins 17 to angularly adjusted positions and mercury tube switches 22, 23 and 24 carried by forks at upper ends of the arms tilted from a horizontal position to an inclined position a predetermined extent. In the present illustration, switch 22 is at an incline of five degrees, switch 23 is at an incline of ten degrees, and switch 24 is at an incline of fifteen degrees, and, from an inspection of Fig. 1, it will be seen that when the arm 10 and the links 15 are tilted by movement of the actuating bar 13, the switches will be successively opened and closed in timed relation to each other. Turning of the disc 2 about its pivot pin 3 will also tilt the switch tubes in an opening or closing direction as means of controlling or timing opening and closing of the switches. Turning of the disc is accomplished by a pressure element 25 having its plunger 26 connected with a bell crank lever 27 which is connected with the disc by a link 28, and in order to shift the actuating bar 13 longitudinally and simultaneously tilt the arms 10, 18, and 19 and 20, there has been provided a temperature actuated element 29 having its plunger 30 pivoted to a bell crank lever 31 which is connected with pin 14 by a link 32. The temperature responsive element and the pressure responsive element are of the type illustrated and described in my Patent No. 2,357,440 issued September 5, 1944, and their specific construction and operation need not be herein set forth.

In describing the operation of this improved electric control apparatus, it will be assumed that it is installed in connection with a return system.

Assuming that it is desired to use the invention in connection with a return system wherein the flow of the returning condensate is regulated to control the temperature in the heating coils.

Assume that the system has a three position throttling valve on the pump discharge and a bypass valve around the pump by which the condensate can be re-circulated around the pump without draining the coils when the throttling valve is completely closed by high temperature.

Assume that it is desired to actuate the first solenoid of the throttling valve and bring the valve to half closed position when temperature of the condensate reaches 320° F., to still further close the valve through action of the second solenoid when condensate temperature reaches 325° F., and to open the bypass and so stop delivery of pump when temperature reaches 330° F.

Then in that case switch 12 will be set to close at 320° F., switch 22 to close at 325° F., and switch 23 to close at 330° F. Additional switches may be added and set at any desired point to operate ventilator fans, start conveyors or control pumps to spray cooling water as required all in proper sequence.

It will be evident that by altering the setting of the various parts and changing the angles of the switch tubes that many useful and novel effects may be attained in the operation of automatic machines. Also switches may be set to open in sequence or part to open and part to close on same action.

As the temperature rises, the arm 10, in response to action at 29, tilts the switch tube 12 toward the closed position. At the same time, the pin 14 moves the bar 13 and the pins 16 a distance equal to the movement of pin 14. The links 15 move in parallel relation to arm 10 and carry the extension arms 18, 19 and 20 to a position to close the other switches 22, 23 and 24, or open same according to the adjustment made in the angular position of the arms.

Having thus described the invention, what is claimed is:

1. In an electric circuit controlling device, a horizontal mounting member, a horizontal floating member, means for supporting said floating member in vertically spaced parallel relation to said mounting member and allow the floating member to move longitudinally while remaining parallel to the mounting member, a series of vertical switch arms pivoted to said floating member, horizontal switches carried by said arms and opened and closed by tilting movement of the arms, a pressure actuated element for shifting said floating member longitudinally and tilting said switch arms to adjusted positions toward and away from switch closing position, and a temperature actuated element connected with said switch arms for tilting same to close and open the switches in response to variations in pressure.

2. In an electric circuit controlling device, a mounting bar, a floating bar over said mounting bar in vertically spaced parallel relation thereto and shiftable longitudinally while remaining parallel to the mounting member, an actuating bar extending longitudinally of said mounting bar in front thereof, arms disposed vertically and pivoted at upper and lower ends to the floating bar and the actuating bar and tiltable about their upper ends for opening and closing switches, mercury switches mounted horizontally at upper ends of said arms and extending longitudinally of the floating bar, a disc rotatably carried by said mounting bar and having its upper portion pivoted to said floating bar, pressure actuated means for rotating said disc and shifting said floating bar longitudinally to angularly adjust said arms, and temperature actuated means connected with said actuating bar to shift the actuating bar longitudinally and tilt said arms to open and close the switches.

3. In an electric circuit controlling device, a horizontal mounting bar, a floating bar over said mounting bar in spaced parallel relation thereto and shiftable longitudinally while remaining parallel to the mounting bar, an actuating bar extending longitudinally of said mounting bar in front thereof, arms disposed vertically and pivoted at upper and lower ends to the floating bar and the actuating bar, switch carriers pivoted to upper ends of said arms, for tilting movement longitudinally of the floating bar and having lower portions overlapping the arms and formed with transversely extending arcuate slots, adjustable fasteners carried by said arms and passing through said slots for releasably holding the switch carriers in angularly set positions when tightened, pressure actuated means connected with said floating bar for shifting same longitudinally and angularly adjusting all of the arms and switch carriers, and temperature actuated means connected with said actuating bar for shifting same longitudinally and tilting the arms and switch carriers to close and open switches.

4. In an electric circuit controlling device, a mounting bar, a floating bar over said mounting bar in spaced parallel relation thereto and shiftable longitudinally while remaining parallel to the mounting member, an actuating bar extending longitudinally of said mounting bar in front thereof, arms disposed vertically and pivoted at upper and lower ends to the floating bar and the actuating bar, switch carriers pivoted to said arms, for tilting movement longitudinally of the floating bar and extending upwardly therefrom, means for releasably securing said switch carriers in angularly adjusted relation to their companion arms, pressure actuated means connected with said floating bar for shifting same longitudinally and angularly adjusting all of the arms and switch carriers, and temperature actuated means connected with said actuating bar for shifting same longitudinally and tilting the arms and the switch carriers to close and open switches.

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The following references are of record in the file of this patent:

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Number	Name	Date
1,667,056	Smith	Apr. 24, 1928
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