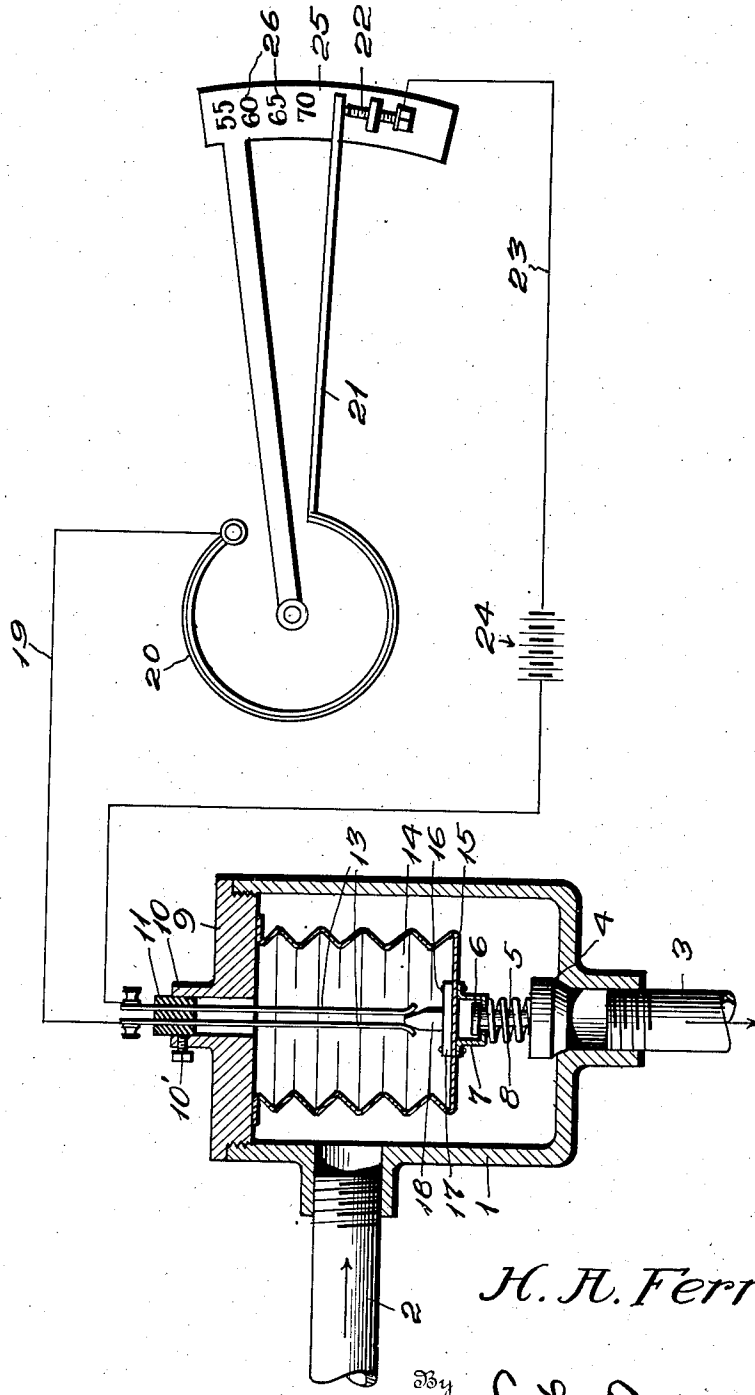


H. A. FERRIS.
ELECTROTHERMOSTATIC DEVICE.
APPLICATION FILED MAR. 2, 1917.

1,265,765.

Patented May 14, 1918.



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ELECTROTHERMOSTATIC DEVICE.

1,265,765.

Specification of Letters Patent.

Patented May 14, 1918.

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To all whom it may concern:

Be it known that I, HARRY A. FERRIS, a citizen of the United States, residing at Cheyenne, in the county of Laramie and State of Wyoming, have invented certain new and useful Improvements in Electro-thermostatic Devices, of which the following is a specification.

My invention relates to improvements in electro-thermostatic devices for shifting members, such as a valve or the like.

An important object of the invention is to provide a device of the above mentioned character, which is simple in construction, inexpensive to manufacture, and reliable in operation.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawing forming a part of this specification,

The figure is a side elevation of apparatus embodying the invention, parts being shown in section, and parts being shown diagrammatically.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 1 designates a shell or casing, having connection with a fluid inlet pipe 2, and a fluid outlet pipe 3, as shown. The passage of fluid into and through the pipe 3 is controlled by a cut-off valve 4, connected with a stem 5, as shown. The stem 5 has a head 6, mounted to reciprocate within a tubular coupling 7, and a compressible coil spring 8 is disposed between the coupling 7 and the valve 4 and surrounds the stem 5, as shown.

The shell 1 has a head or cover 9 secured thereto, provided with an apertured boss 10. Arranged within the boss 10 is an insulating plug 11, held therein by a set-screw 10', or the like. The insulating plug 11 holds a pair of electric-heating or resistance elements 13, which are spaced, and project into the shell 1.

Surrounding the electric-heating elements 13 is a longitudinally extensible and contractible preferably metallic resilient accordion-plait tube or chamber 14, the upper end of which is secured to the cover 9 and the lower end of which is closed by a head 15. This tube is adapted for the reception of a highly volatile liquid, and is longitudinally extended by the liquid when it is volatilized. The head 15 has the coupling 7 secured thereto

by means of screws or rivets 16, also serving to hold a plate 17 to the inner side of the head 15. The plate 17 carries a tapered contact 18, projecting between the electric-heating elements 13, and normally contacting therewith.

Having electrical connection with one of the electric-heating elements 13 is a wire 19, connected with a curved thermostatic element 20. The thermostatic element is preferably formed of two strips of metal, having different co-efficients of expansion, and secured together as is well known. The thermostat element 20 tends to straighten out upon being heated, and secured to the thermostat element 20 is a contact arm 21, adapted to engage and disengage an adjustable contact 22, having electrical connection with a wire 23, which is connected with the other electric-heating element 13. A source of current 24 is connected in the wire 23. The contact arm 21 is adapted to travel in proximity to a scale 25, having figures 26 thereon, for indicating the degrees of temperature.

The device is adapted for use in connection with a heating system, while the invention is in no sense restricted to the use. The heated fluid, such as hot water, steam or the like, is free to pass from the pipe 2 through pipe 3, when valve 4 is unseated and thence to the radiators or the like. As the temperature in the room rises, the thermostat device 20 is acted upon by the heat and tends to straighten out, thus causing the contact arm to engage the stationary contact 22. When this occurs, current flows from one pole of the source of current 24 through a portion of wire 23, one electric-heating element 13, contact 18, the other electric-heating element 13, wire 19, thermostat element 20, contact arm 21, contact 22, and through the other portion of the wire 23 back to the opposite pole of the source of current. The liquid within the tube 14 is heated by the electric-heating elements 13 and vaporized, thus longitudinally expanding the tube 14. The head 15 then moves the coupling 7 downwardly, which closes the valve 4 through the medium of the spring 8 and cutting off the flow of water through the pipe 3 and hence to the radiator in the room, containing the thermostat element 20.

After the valve is closed, further expansion of the tube 14 serves to draw the contact

18 out of contact with the electric-heating members 13, thus opening the circuit and preventing injury to the tube 14 by undue expansion thereof. When the pressure is reduced in the tube or chamber 14 by cooling the tube automatically longitudinally contracts and contact 18 again contacts with elements 13 to electrically connect them. By this means the tube 14 is automatically maintained properly distended, retaining the valve 4 seated while the contact arm 21 engages the contact 22. When the temperature is lowered in the room, contact arm 21 disengages contact 22, the circuit is opened, and the pressure reduced in the tube 14, whereby it automatically contracts and opens the valve 4.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In apparatus of the character described, the combination with an expansible chamber for receiving volatile liquid, of separate electric heating elements projecting into the chamber for heating the volatile liquid, means arranged within and connected with the expansible chamber to be shifted thereby and normally electrically connecting the separate electric heating elements and adapted to automatically break such connection upon the expansion of the chamber for a predetermined amount, a circuit connected with the electric heating elements, thermostat means connected with the circuit, and a member connected with the extensible chamber to be shifted thereby.

2. In apparatus of the character described, as a sub-combination, an expansible hollow member for holding a volatile liquid, electrical heating means arranged within the hollow expansible member, a circuit con-

nected with the electrical heating means, and means disposed within the hollow expansible member and connected therewith to be shifted thereby for operating the electrical heating means to open the circuit at the electrical heating means within the hollow expansible member.

3. In apparatus of the character described, as a sub-combination, a tubular expansion member to hold a volatile liquid, an electric heating device arranged within the tubular expansion member, and a contact normally engaging the device to complete a circuit through the same and connected with the tubular expansion member to be moved thereby.

4. In apparatus of the character described, as a sub-combination, a longitudinally extensible tube for receiving a volatile liquid, an electric heating device extending into the tube, a contact member connected with one end of the tube to be moved thereby and normally contacting with the electric heating device, and a member to be shifted by the tube and having a yielding connection therewith.

5. In apparatus of the character described, a shell having a fluid inlet and outlet, a longitudinally extensible tube disposed within the shell and having one end secured to the end of the shell and its opposite end closed and adapted for receiving a volatile liquid, an electric heating device extending into the tube, a contact connected with the closed end of the tube and normally contacting with the electric heating device, a valve having a yielding connection with the closed end of the tube and serving to control the passage of fluid through the outlet of the shell, a circuit connected with the electric heating device, and a thermostat connected in the circuit.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY A. FERRIS.

Witnesses:

ANNA S. FERRIS,
ZELLO E. FERRIS.