

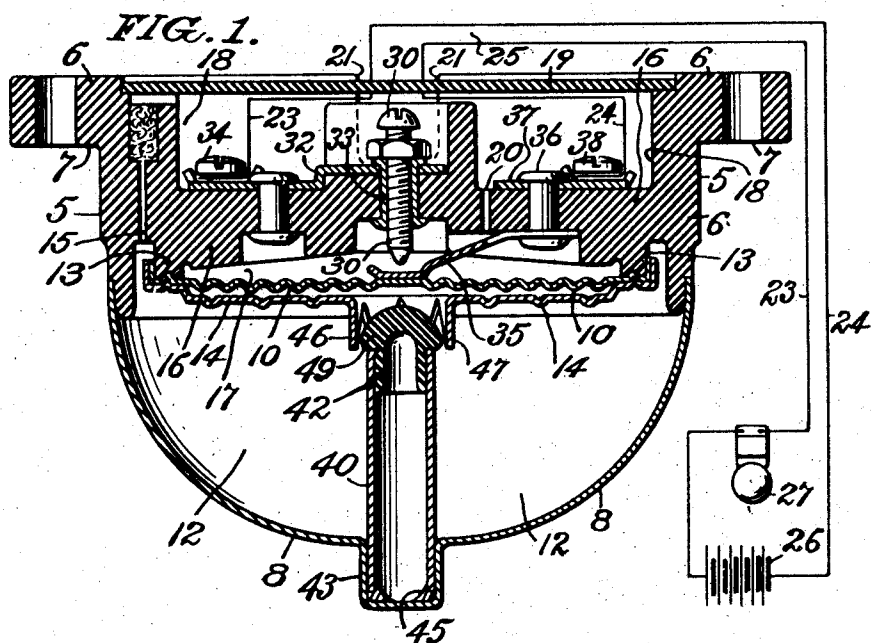
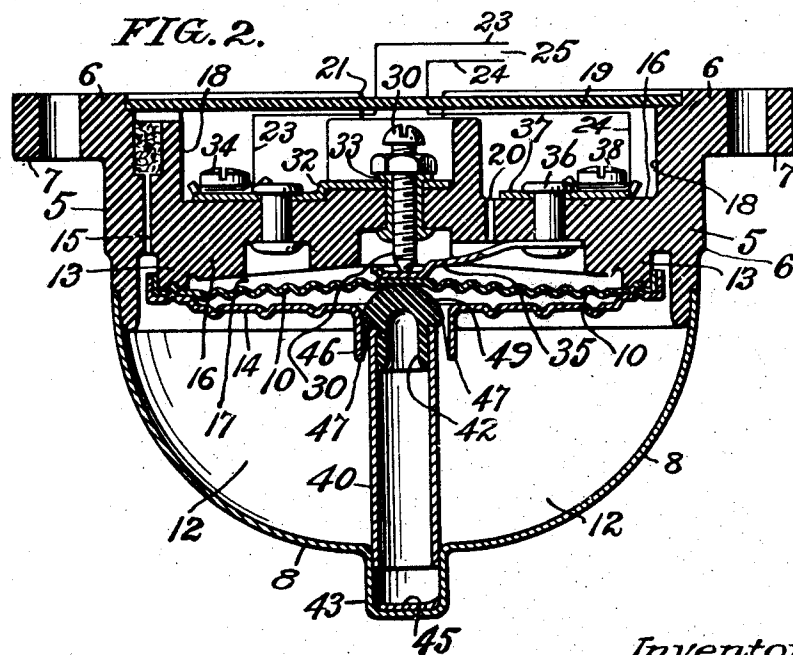
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THERMOSTATIC SWITCH

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THERMOSTATIC SWITCH

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This invention relates to improvements in a thermostat for use in connection with fire protection apparatus, for controlling an electric circuit adapted for operating an alarm, a signal and like devices, of the type disclosed in Patent No. 2,318,480, issued to me May 4, 1943.

The object of my invention is to provide a thermostat which is operable upon a rapid rate of rise in temperature or upon a predetermined fixed temperature, with novel means for insuring its effective operation.

A further object is to provide a thermostat, of the rate of rise type, with means actuated at a fixed temperature, in the form of a tubular container and a bearing mounting the container for axial movement when the temperature is sufficient for releasing the container, from the bearing by the fusing of solder, and permitting the container to be extended by the expansive action of air, or other expansive medium, sealed within the container.

A further object is to provide a thermostat having a diaphragm forming a movable wall of an air chamber adapted for controlling an electric circuit, provide a tubular container normally secured within the air chamber by means fusible at a predetermined temperature and arrange a bearing within the air chamber for mounting the container for movement into engagement with the diaphragm by the action of an expansive medium sealed within the container, upon the fusing of said means.

A further object is to provide a guide within the air chamber for directing the container toward the diaphragm for moving the latter into circuit closing position.

A further object is to provide a closure, formed of insulating material, for sealing the end of the container which engages the diaphragm and also for electrically insulating the container from the diaphragm and from the guide.

These together with various other novel features of construction and arrangement of the parts, which will be more fully hereinafter described and claimed, constitute my invention.

Referring to the accompanying drawing:

Fig. 1 is an enlarged vertical sectional view of a thermostat embodying my invention.

Fig. 2 is a view similar to Fig. 1, showing the parts in the operative position.

In the drawing, in which like reference characters refer to like parts, 5 represents a thermostat comprising a support, or base 6, formed of insulating material and provided with ears 7 for mounting the thermostat upon a wall or ceiling.

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A thin metal shell 8 is secured upon the support 6, and a flexible metal wall, or diaphragm 10, is also secured upon said support. The shell 8 forms an air chamber 12 and the diaphragm forms a distensible wall 10 of said chamber.

The periphery of the diaphragm, or wall 10, is secured upon a depending flange 13, formed upon the support 6. A guard 14, in the form of a metal disk, is also secured upon the flange 13 and extends adjacent to the wall 10, for limiting the movement of the latter toward the interior of the air chamber 12.

The support 6 is provided with the usual slow leak vent 15, through which the air in the chamber 12 may equalize with the atmosphere, during normal changes in temperature, and a rapid rate in rise of temperature, due to a fire, will distend the wall 10 and actuate the thermostat.

The support 6 has a relatively thin wall, or partition 16 located in spaced relation with the central portion of the diaphragm 10 and forms a cavity 17 for the free movement of the diaphragm. Said wall 16 also provides a cavity 18 adjacent to the cover plate 19. The wall 16 has a vent 20 through which the air in the cavity 17 may equalize through the cavity 18 with the atmosphere. The support 6 is provided with an opening 21 for the passage of wires 23 and 24, forming an electric circuit 25, including a source of current 26 and an alarm device 27.

An adjustable terminal 30, in the form of a screw, is mounted upon the wall 16 and is normally in spaced relation with the wall, or diaphragm 10. A conductor plate 32 is secured upon the wall 16 by a tubular rivet 33, in which the screw 30 is mounted for adjustment. A binding screw 34 upon the plate 32 forms a means for attaching the wire 23, and electrically connects the terminal 30 in said circuit.

A terminal 35 in the form of a spring metal plate is secured at one end thereof upon the wall 16 by a rivet 36, which is in electrical contact with a conductor plate 37, provided with a binding screw 38, for the attachment of the wire 24 of the circuit 25. The terminal plate 35 normally holds the diaphragm 10 in spaced relation with the terminal 30, and is adapted to engage the terminal 30 and complete the circuit 25, upon the wall or diaphragm 10 being distended, as shown in Fig. 2.

The present invention is adapted to be embodied in a rate of rise thermostat such as above described and comprises novel means for actuating the diaphragm and closing the circuit by

expansive means releasable by the fusing of solder at a predetermined temperature.

A container 40, preferably in the form of a metal tube, is mounted for axial movement within the air chamber 12, between the shell 8 and the diaphragm 10. The tube 40 is positioned with its axis approximately perpendicular to the plane of the diaphragm and is adapted for engaging the central portion of the latter and distending it into circuit closing position.

The end of the tube forming the container 40, which is located adjacent to the diaphragm 10, is permanently sealed by a closure in the form of a plug 42, secured in the tube 40.

A bearing 43 is provided upon the shell 8 for telescopically mounting the end of the tube 40 opposite to the diaphragm 10. Said bearing 43 is preferably in the form of a socket formed integrally with the metal shell 8 and projects outwardly from the air chamber 12 and forms a closed socket for receiving the open end of the tube 40. The tube 40 is secured and sealed within the socket 43 by fusible material, such as solder 45. Said material 45 secures the container 40 against movement, relatively to the wall or diaphragm 10, until the temperature surrounding the socket 43 increases sufficiently to fuse the solder and the expansion of the air within the container 40, due to said increase in temperature, will move the container, relatively to the socket 43, into engagement with the wall or diaphragm 10 and distend it into a position for closing the circuit between the terminals 30 and 35.

The solder 45, when fused, forms a lubricant between the socket 43 and the tube 40 and insures the free movement of the latter. The socket 43 is preferably formed so that it projects outwardly from the surface of the shell 8, which permits the tube 40 to have a greater length and capacity for the expansive medium contained therein, without increasing the size of the shell 8, and the heat, in the event of a fire, will be readily conducted through the exposed metal socket for fusing the solder and expanding the contents of the tube.

The plug 42 for confining the air, or expansive medium, within the tube 40, is secured in said tube after the tube has been soldered upon the socket 43 and the tube allowed to cool, so that the expansive medium will be sealed within the tube 40 at its normal density.

A guide 46 is provided for directing the tube 40 into engagement with the wall, or diaphragm 10, when the tube is moved relatively to the socket 43. Said guide 46 is formed by making radial slits in the center of the metal guard plate 14 and turning the points 47 so that they will form a sleeve projecting into the air chamber 12 and adapted for directing the tube 40 into engagement with the central portion of the wall or diaphragm 10.

The shell 8 and the container 40 are electrically insulated by the plug 42 which is formed of insulating material. Said plug 42 has a head 49 which extends beyond the metal tube 40 and is adapted to engage the diaphragm 10. The head 49 is of larger diameter than the tube 40 and prevents the latter from making electrical contact with the sleeve forming the guide 46. By this construction the current will not be conducted from the diaphragm through the container 40 to the shell 8.

The operation is as follows: When there is a rapid rate in rise of temperature in the air surrounding the thermostat, due to the occurrence

of a fire, the wall, or diaphragm 10, will be distended by an increase in pressure of the air within the chamber 12 and close the circuit between the terminals 30 and 35.

In the event of a slow smoldering fire the pressure of the air in the chamber 12 may equalize with the atmosphere, through the slow leak vent 15, without actuating the diaphragm, in which event the heat from the fire will be conducted through the thin metal socket 43 to the solder 45, which will fuse at a predetermined temperature and release the container 40 from the socket 43. The container 40 is then moved, relatively to the socket 43, by the expansive action of the air, or other expansive medium, sealed within the container 40, into engagement with the diaphragm 10 and distends the latter for closing the circuit between the terminals 30 and 35, and actuating the alarm.

It will be evident that the chamber 40 is completely closed prior to melting of the solder 45, whereas the chamber 12 is provided with a slow leak, so that on heating up, and especially on slow heating, when the chamber 40 is effective, the air in the chamber 40 will be confined and the air in the chamber 12 will be connected to the atmosphere through the leak 15. Accordingly the pressure in the chamber 40, especially during a slow fire, prior to the melting of the solder, will be reliably greater than the pressure in the chamber 12 and effective to operate the device when the solder 45 melts.

Various changes in the construction and arrangement of the parts may be made without departing from my invention.

I claim:

1. A thermostat comprising an insulating support, terminals upon said support adapted to be included in an electric circuit, a shell forming an air chamber mounted upon said support, a wall forming part of said chamber adapted to be distended by expanded air for closing the circuit between said terminals, a tubular container positioned in said chamber between said wall and said shell, a tubular socket upon said shell upon which the container is mounted for movement perpendicular to the plane of said wall, means fusible at a predetermined temperature adapted to secure the container upon said socket, and expansive medium within said container tending to move the latter relatively to the socket into engagement with said wall upon the fusing of said means and distend said wall into circuit closing position.

2. A thermostat comprising an insulating support, terminals upon said support adapted to be included in an electric circuit, a shell forming an air chamber mounted upon said support, a wall forming part of said chamber adapted to be distended by expanded air for closing the circuit between said terminals, a tube forming an air container positioned within said chamber between said wall and said shell, a tubular socket upon said shell upon which the end of the tube opposite to said wall is mounted for axial movement of the tube into engagement with said wall, means normally securing and sealing said end of the tube within said socket, a closure permanently sealing the end of said tube located adjacent to said wall, and said means fusible at a predetermined temperature for releasing the tube from the socket for movement by the expansive action of the air within the tube when heated for distending said wall into circuit closing position.

3. A thermostat comprising an insulating sup-

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port, terminals upon said support adapted to be included in an electric circuit, a shell forming an air chamber mounted upon said support, a wall forming part of said chamber adapted to be distended by expanded air for closing the circuit between said terminals, a tubular container positioned in said chamber between said wall and said shell, a tubular socket upon said shell upon which one end of said container is slidably mounted, a guide upon said support adapted to embrace the end of the container located adjacent to said wall, said socket and said guide positioned for holding the container with its axis approximately perpendicular to the plane of said wall, solder fusible at a predetermined temperature adapted to secure the container upon the socket, and means within the container tending to move the container relatively to the socket and into engagement with said wall and distend the latter into circuit closing position upon the fusing of the solder.

4. A thermostat comprising an insulating support, terminals upon said support adapted to be included in an electric circuit, a shell upon said support forming an air chamber, a wall of said chamber adapted to be distended for closing the circuit between said terminals, a metal tube forming a container positioned in said chamber between said wall and said shell, an expansible medium within said container, a metal socket upon the shell upon which one end of said tube is mounted for movement toward said wall, solder fusible at a predetermined temperature securing and sealing said tube upon the socket, and a

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closure of insulating material permanently sealing the end of said tube adjacent to said wall and adapted for engaging the latter by a movement of said tube upon the fusing of the solder.

5. A thermostat comprising an insulating support, terminals upon said support adapted to be included in an electric circuit, a shell forming an air chamber mounted upon said support, a wall forming part of said chamber adapted to be distended by expanded air in said chamber for controlling said circuit, a tube forming an air container positioned within said chamber, a tubular socket upon said shell for mounting the tube for movement for distending said wall, a guide upon said support adapted to embrace the end of the tube adjacent to said wall, a closure of insulating material permanently sealing the end of the tube located adjacent to said wall, an enlarged head upon said closure adapted for electrically insulating the tube from said guide and from said wall, means securing and sealing said tube upon said socket, and said means adapted to fuse at a predetermined temperature and release the tube for movement by the expansion of air within the tube for distending said wall.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,318,480	Griffith	May 4, 1943