Jan. 13, 1925. 1,522,981

W. E. ROYS

AUTOMATIC HEAT REGULATOR FOR RADIATORS

Filed Jan. 31, 1924

Fig. 1

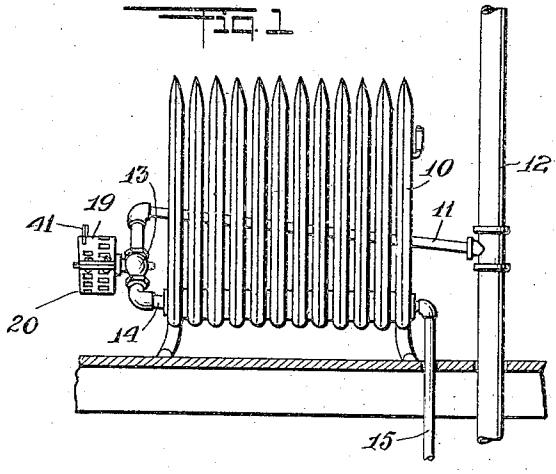


Fig. 2

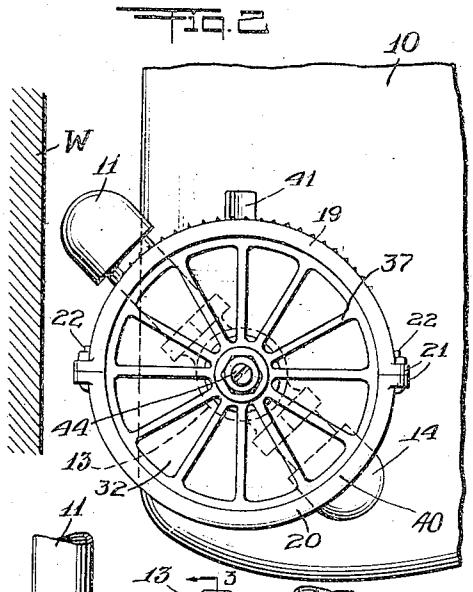


Fig. 4

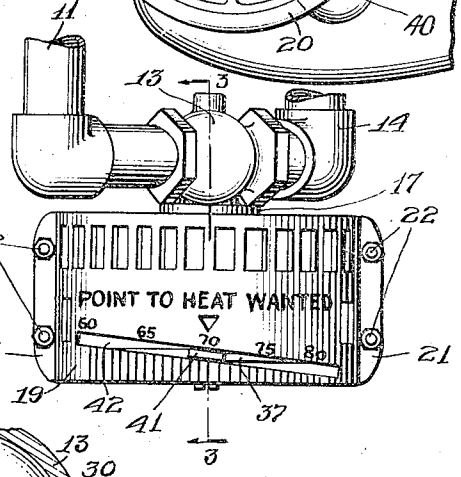


Fig. 3

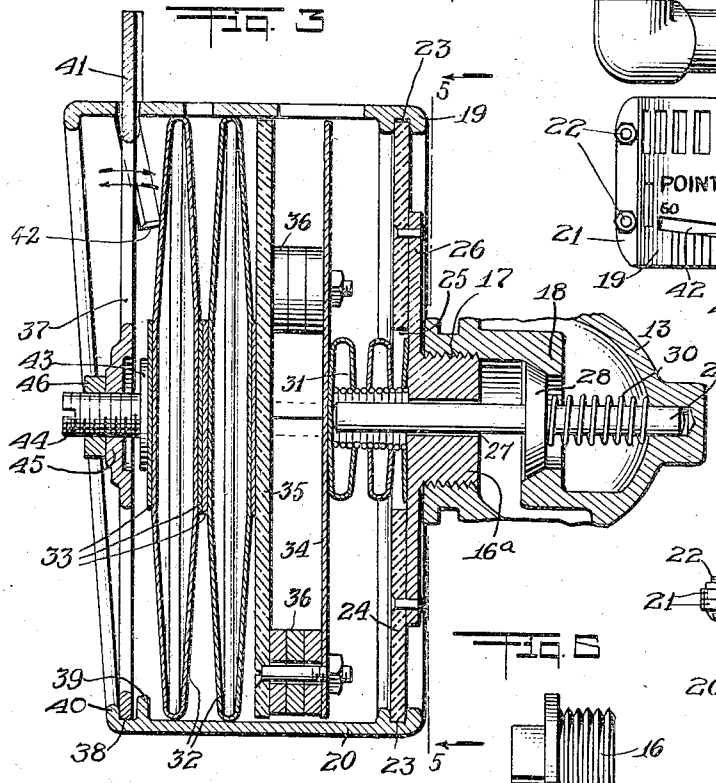


Fig. 5

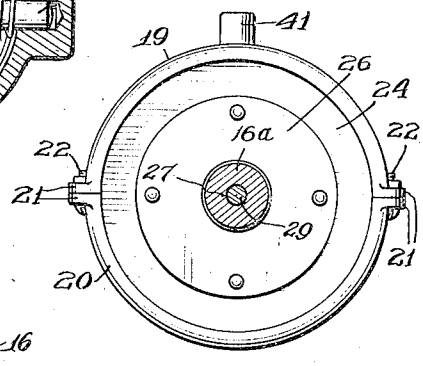
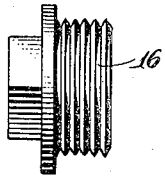


Fig. 6



INVENTOR

W. E. Roys

BY

Geo. H. Beeler

ATTORNEY

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UNITED STATES PATENT OFFICE.

WILLIS E. ROYS, OF BROOKLYN, NEW YORK.

AUTOMATIC HEAT REGULATOR FOR RADIATORS.

Application filed January 31, 1924. Serial No. 689,713.

To all whom it may concern:

Be it known that I, WILLIS E. ROYS, a citizen of the United States, residing at New York city, borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Heat Regulators for Radiators, of which the following is a specification.

This invention relates to means or devices for the automatic regulating of heating mediums such as steam or other hot fluids for use in connection with radiators for house or other building heating purposes, and the present invention has reference especially to improvements on the type of devices described and claimed in my copending application Serial No. 641,982, filed on the 28th day of May, 1923.

Among the objects of the present invention is to produce a regulator of a more compact nature and one that is more effective mechanically because of the fact that the thermostatic mechanism and casing or cage enclosing it are arranged symmetrically of the axis of the valve.

Another object of the invention is to provide a thermostatic regulator for steam or hot water so constructed that the cage is adapted for rotary adjustment around the axis of the valve stem from which it follows that the valve body may be connected to the radiator installation so as to lie or extend at any desired inclination with respect to the vertical, and yet the graduated or index portion of the casing or cage surrounding the thermostat may always be adjusted to be at the top thereof.

Further objects of the invention are to simplify and cheapen the construction and installation of the equipment and to render it feasible for the steam equipment to be installed complete either with or without the automatic regulator being attached.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a front elevation indicating the attachment of my improvement to a conventional radiator.

Fig. 2 is an end elevation of the same on a larger scale.

Fig. 3 is an enlarged vertical section on the line 3—3 of Fig 4.

Fig. 4 is a plan view.

Fig. 5 is a fragmentary elevation of the rear attachment plate, the nipple portion being in section on the line 5—5 of Fig. 3.

Fig. 6 is a detail view of the temporary plug.

Referring now more specifically to the drawings I show a radiator 10 toward which a pipe 11 serves to convey hot fluid such as steam from a main supply pipe 12 through a valve body or coupling 13 located between the pipe 11 and an inlet 14 to the bottom of the radiator and from the remote end of which a drain pipe 15 extends through the floor. The pipe 11 may be extended along the radiator in any suitable direction or place but commonly is located between the radiator and the wall W.

The valve body 13 is in the nature of a coupling or union inserted in the place indicated preferably at the time the heating apparatus is installed in the building, and at this time a temporary plug 16 is seated in the threaded collar 17 in axial alignment with the valve seat 18, the valve itself at this time not being in place. The heating apparatus as thus installed and controlled may be operated the same as any other conventional apparatus. When, however, the owner or manager of the building is ready to install the automatic appliance constituting the subject of this specification the plugs 16 will be removed and an automatic attachment will be put in place of each of them at each radiator. This arrangement simplifies and expedites the installation of

the main apparatus and the completion of the building, and, furthermore, it relieves the owner from the danger of breakage or damage to the automatic appliance prior to the actual occupancy of the building or apartment. Furthermore, the provision of the temporary plug 16 makes it expedient for any automatic apparatus to be removed for inspection, interchange, or other purposes at any time without putting the heating apparatus out of commission.

The attachment includes a housing or cage of approximately cylindrical form and comprising upper and lower parts 19 and 20 with flanges 21 through which fasteners 22 are passed for connecting them together. The cage has open ends and fitted in a groove 23 adjacent to the rear end is a circular plate or disk 24 of wood or other suitable insulating material, the same having a central opening 25 over which is secured the flange 26 of a permanent plug 16ª adapted to fit into and seal the collar 17 of the valve body. This plug has a central bore 27. For attaching the device to the valve body, the first step is to insert the valve 28 around the inner end of whose stem 29 is arranged an expansion spring 30 tending to open the valve and with the front end of the stem projecting through the smooth bore 27. The plug 16ª is then screwed into place making a tight joint at the collar and with the valve free to move toward or from the plug. The front end of the stem 29 is inclosed and the bore surrounding the valve is sealed fluid-tight by any suitable packing means such as a bellows structure 31, the otherwise open end of which is connected to the plug structure around the bore. The closed end of the bellows has direct bearing against the front end of the stem.

After the disk and plug are put in place as just described, irrespective of the position or inclination of the body 13, the cage parts 19 and 20 are put together so as to embrace the periphery of the disk 24 and with the other parts shown in Fig. 3 in place between them and then the fasteners 22 are put in place and screwed down tight or until the cage becomes securely fastened or gripped to the disk 24, preferably in vertical position where it is held from unintentional rotation.

Within the cage are arranged one or more, two shown by preference, thermostatic wafers 32 of a diameter to fit loosely within the cage and as usually made these wafers are hollow sheet metal structures filled with air or other gas subject to expansion under heat. These wafers are provided with contact plates 33 at their centers and the innermost of these plates bears against a composite insulating member comprising a sheet of zinc or other metal 34, a disk 35 of insulation such as wood or fiber, and a series of three spacer connections 36 holding these parts together as a unit. The center of the disk 34 is sufficiently stiff for the expansion of the wafers 32 to be transmitted directly to the end of the valve stem for closing the valve against the tension of the spring 30. The front central plate 33 reacts against an adjustable spider or member 37 mounted rotatably within the front end of the cage. The bottom portion of the spider rests in a seat 38 between a lug 39 and the front rim flange 40 and so the upper portion of the spider is adapted to tilt toward or from the valve according to the adjustment of the spider around its axis which is effected by means of a finger piece 41 projecting upward through a diagonal slot 42 along which a series of graduation marks are formed as an index. For the purpose of effecting an assemblage adjustment of the thermostatic wafers with respect to the other parts of the mechanism the front plate 33 bears preferably against the head 43 of a screw 44 tapped through the hub portion 45 of the spider. A lock nut 46 is then tightened to make such adjustment practically permanent, while the daily or service adjustment of the device will be effected by the finger piece or indicator 41.

From the foregoing specific description of the mechanism, the method of operation will be readily understood from the following summary: With the device attached to the valve body 13 and collar 17 as shown and described and properly adjusted at the screw 44, the operator has only to adjust the finger piece 41 along the slot to point to the degree of heat desired in that particular room. When the heat reaches such temperature the temperature of the air surrounding the wafers 32 will cause sufficient expansion thereof axially of the screw and valve stem to cause the valve to be closed, shutting off the admission of heating fluid to the raditor. Even though the pipe 11 and valve body may be heated as a result of the presence of the heating fluid, such heat will be shielded from the thermostat wafers by the insulation plates 24, 34, and 35 so that the wafers will be responsive only to the variation in temperature of the air at such place. If the temperature of the room drops below the degree to which the indicator is set the contraction of the wafers will permit the spring 30 to open the valve to admit hot fluid into the radiator and so restore the desired temperature. It is obvious that the spider 37 being freely rotatable in its seat the finger piece 41 may be adjusted along the slot 42 as frequently as may be desired. If a low temperature is desired, say for night service, the finger piece is moved to the left accordingly, and because of the inclination of such end of the slot toward the valve it is apparent that the wafers will be responsive

quicker for closing the valve than if the indicator be adjusted toward the opposite end of the slot.

I claim:

1. In an automatic heat regulator, the combination with a radiator and means for delivering heating fluid thereto, of automatic valve mechanism including a valve body and seat, a valve co-operating with said seat and having a stem projecting forward therefrom, a thermostatic member having its center substantially in the axis of the valve stem and expansible toward the stem to actuate the same to close the valve, a cage surrounding the thermostatic member, and means carried by the cage for adjusting the effect of the thermostatic member, the valve body being disposed at an angle from the vertical plane of the radiator and the cage structure being adjustable around the axis of the valve stem so that a particular part thereof is adapted to be on top irrespective of the inclination of the valve body.

2. In an automatic heat regulator, the combination with a radiator and means for delivering heating fluid thereto, of automatic valve mechanism including a valve body and seat, a valve co-operating with said seat and having a stem projecting forward therefrom, a thermostatic member having its center substantially in the axis of the valve stem and expansible toward the stem to actuate the same to close the valve, a cage surrounding the thermostatic member, and means carried by the cage for adjusting the effect of the thermostatic member, said adjustment means including a movable spider and a screw carried adjustably by the spider for movement longitudinally along the axis of the valve stem for an assemblage adjustment of the thermostat.

3. In an automatic heat regulator, the combination with a radiator and means for delivering heating fluid thereto, of automatic valve mechanism including a valve body and seat, a valve co-operating with said seat and having a stem projecting forward therefrom, a thermostatic member having its center substantially in the axis of the valve stem and expansible toward the stem to actuate the same to close the valve, a cage surrounding the thermostatic member, and means carried by the cage for adjusting the effect of the thermostatic member including a spider having means adapted to bear upon the thermostat, said spider being rotatable around the axis of the valve, and means upon the cage co-operating with the spider to cause it to approach or recede from the valve according to the direction of rotation and thereby to change the adjustment of the thermostat relative to the valve.

4. The combination with a valve body having a seat and a threaded collar surrounding the axis of the valve seat, a valve co-operating with said seat and having a stem projecting forward through said collar, a plug closing said collar and having a central bore from which the valve stem projects, means carried by the plug for surrounding the front end of the stem and sealing flexibly the bore from which the stem projects, a plate of insulation connected to the plug and surrounding said sealing means, a cage surrounding said plate of insulation, an expansible thermostatic member within the cage, a plurality of spaced plates between the thermostat and said sealing means and serving to cause the expansion of the thermostat to act directly upon the stem for closing the valve, and adjustable means against which the thermostat reacts for such closing of the valve, said plate of insulation connected to the plug being circular and the cage being supported thereby for rotation therearound.

5. In an automatic heat regulator, the combination with a pipe for the heating medium, a valve body interposed therein and mounted in inclined position, and a valve in said body, of heat regulating mechanism for said valve supported by said body and adapted to be rotated about the axis of the valve in a plane at an angle to the valve axis so as to occupy a predetermined position regardless of the inclination of the valve body.

6. In an automatic heat regulator, the combination with a valve body, a valve therein, a cage supported by the valve body, and a thermostat supported by said cage, said thermostat serving as an actuator to control the opening and closing of said valve, of means carried by said cage for adjusting said thermostat including a member rotatable substantially about the axis of the thermostat, and means upon said cage along a portion thereof remote from said axis co-operating with said member to cause a translatory motion of a portion of the same for the purpose of adjustment as aforesaid.

7. In an automatic heat regulator, the combination with a valve having a stem, and a thermostat arranged to actuate the stem to control said valve, of adjustment means for the thermostat including a helically rotatable member adapted to exert a force upon said thermostat to move the same for service adjustment as aforesaid, and means movably mounted upon said member for initially adjusting the position of said member relative to the thermostat.

8. In an automatic heat regulator, the combination with a valve body, of a circular plate fixed thereto, and a cage supported by said plate and surrounding the same,

said cage having a groove to receive slidably the peripheral portion of the plate for rotational adjustment of the cage relative to the valve body, said groove being constructed to grip said peripheral portion to prevent normal unintended rotation of the cage.

9. In an automatic heat regulator, the combination of a valve body, a valve therein, a cage rotatably adjustable relative to said body and axis of the valve, and a plate intermediate of the cage and body and connecting the same, said plate being fixed to one of said connected parts, the other of said parts having a groove to grip said plate for the purpose of preventing undesired relative movement between the cage and body.

In testimony whereof I affix my signature.

WILLIS E. ROYS.