No. 887,514. PATENTED MAY 12, 1908.

W. H. PEARCE.

OPERATING MECHANISM FOR RADIATOR VALVES, &c.

APPLICATION FILED JUNE 28, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

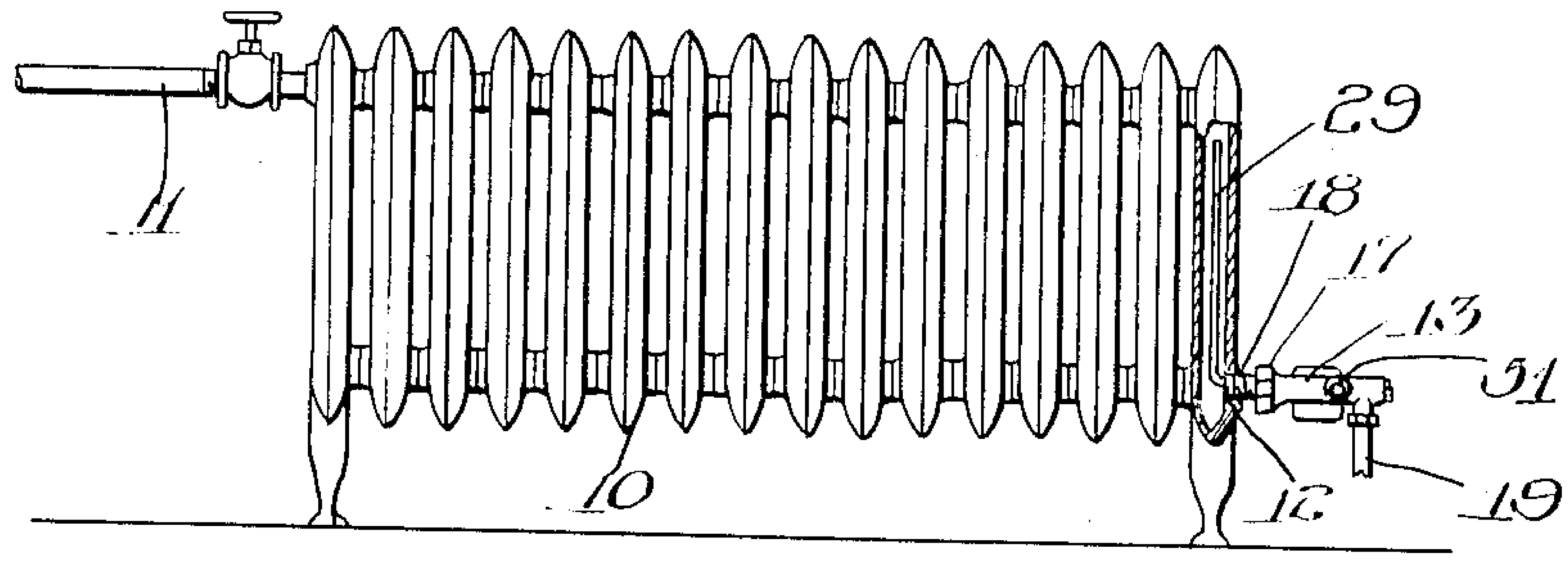


Fig. 2.

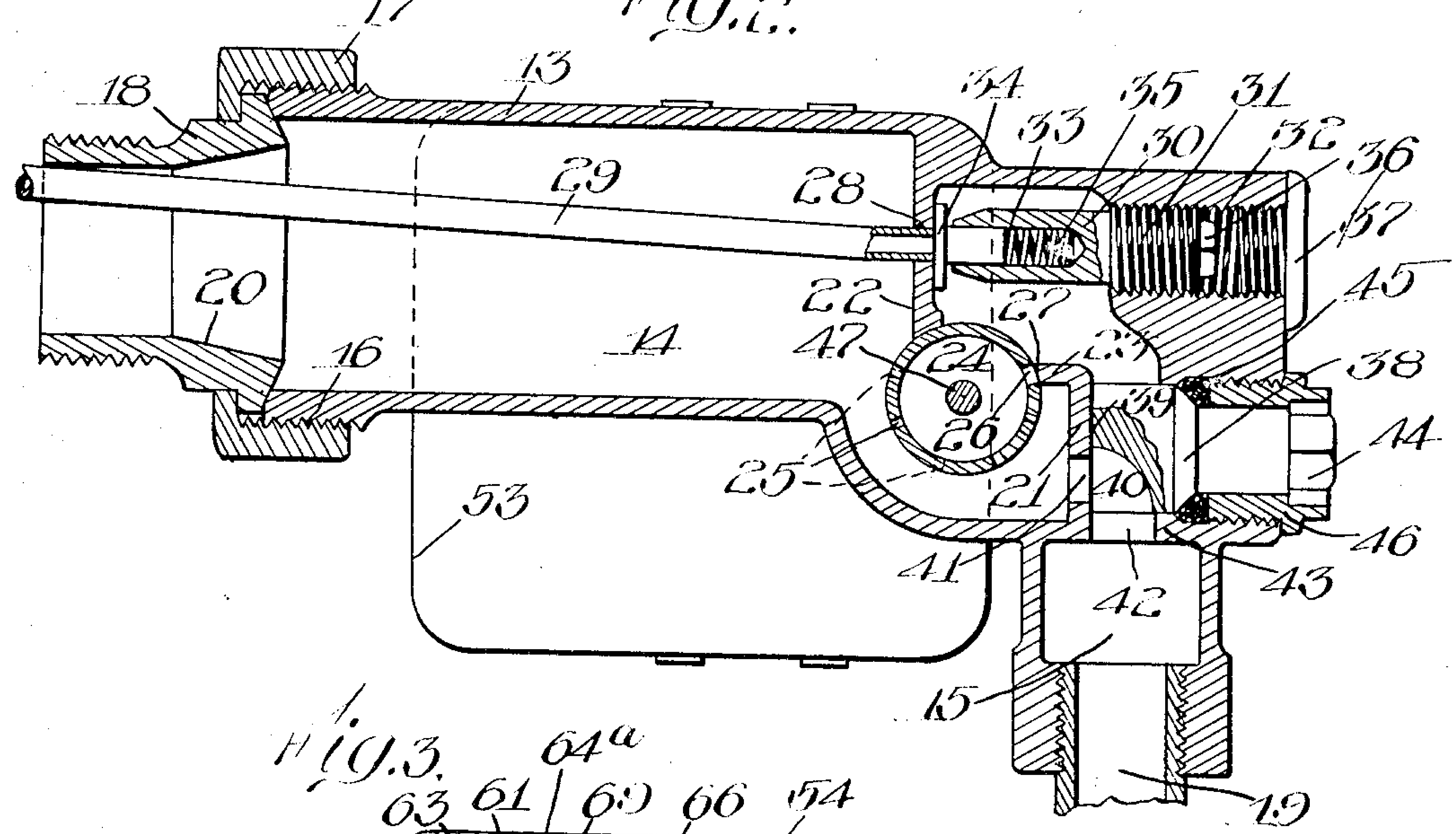
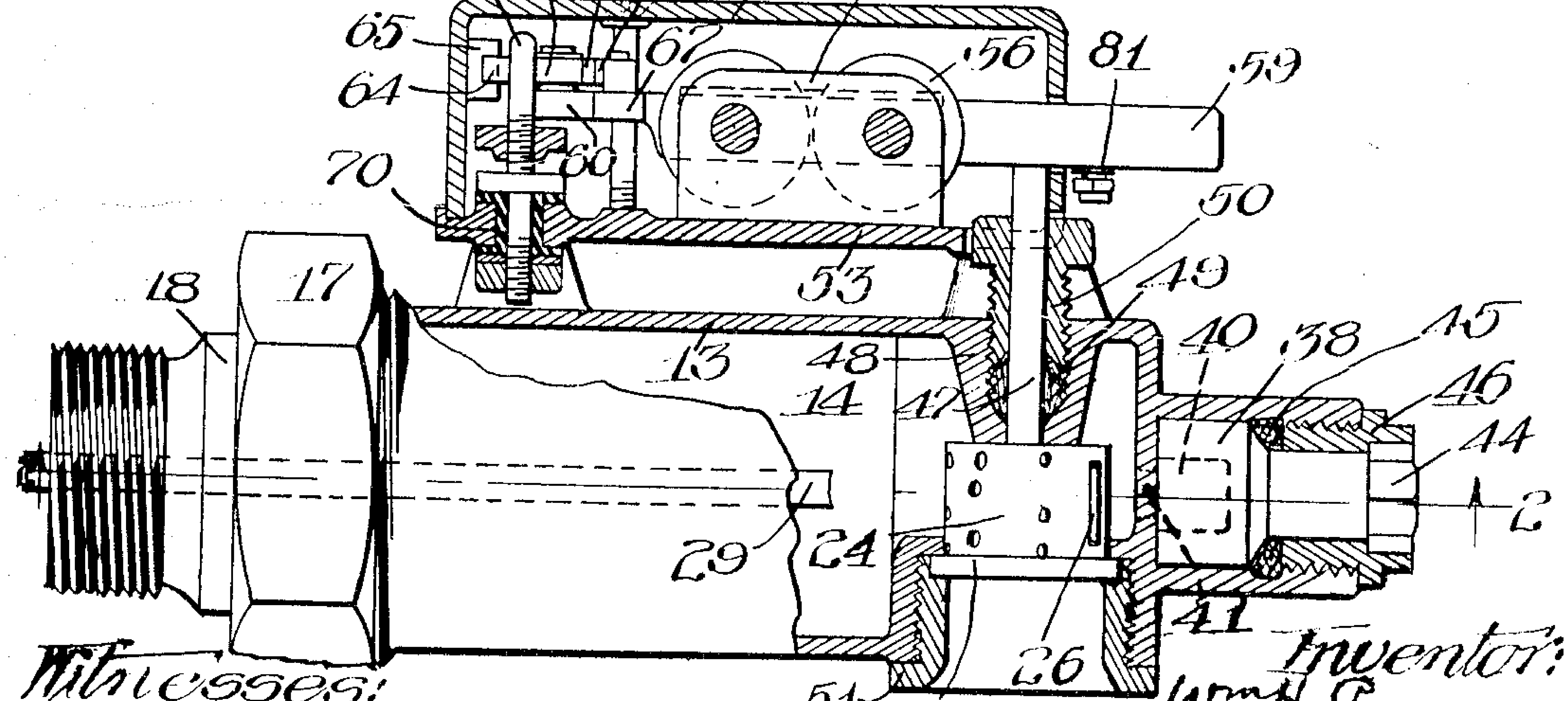


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

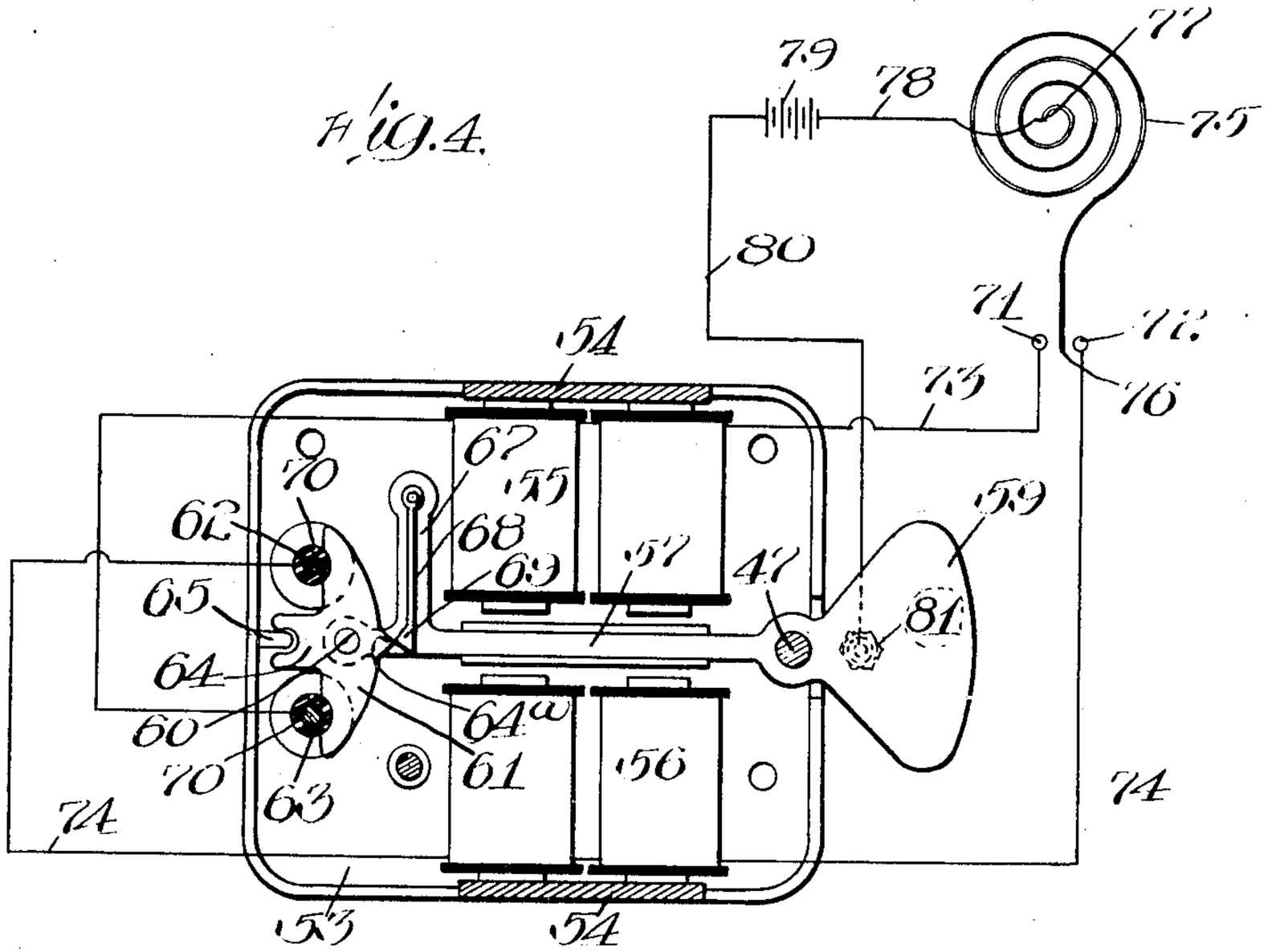


Fig. 5.

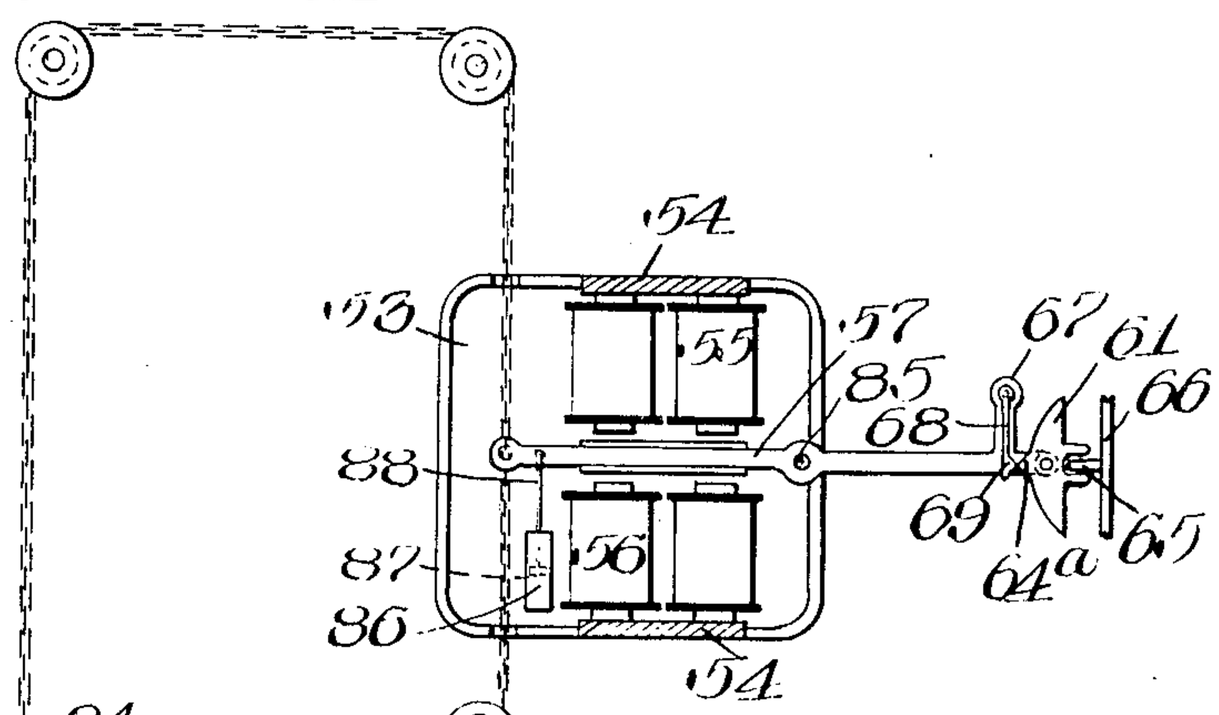
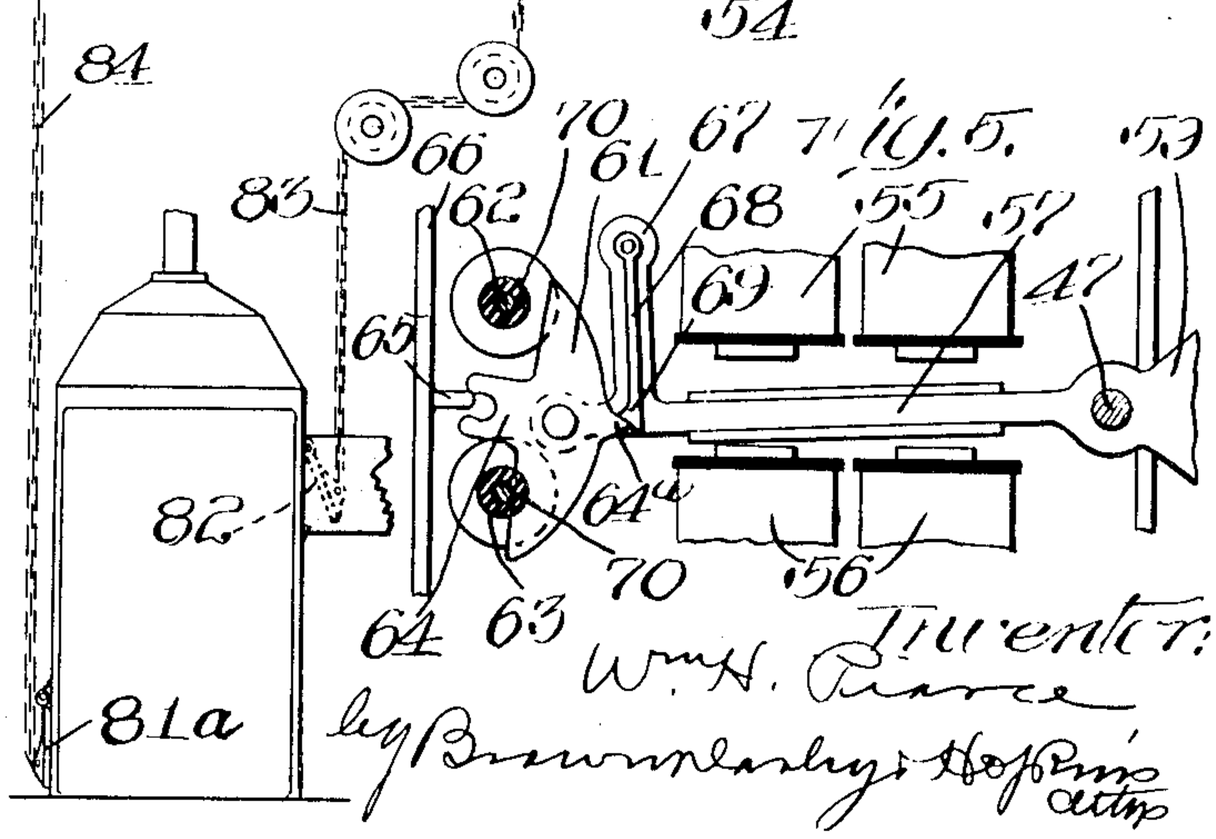


Fig. 6.



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UNITED STATES PATENT OFFICE.

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OPERATING MECHANISM FOR RADIATOR-VALVES, &c.

No. 887,514. Specification of Letters Patent. Patented May 12, 1908.

Application filed June 28, 1906. Serial No. 323,916.

To all whom it may concern:

Be it known that I, WILLIAM H. PEARCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Operating Mechanism for Radiator-Valves, &c., of which the following is a full, clear, and exact specification.

This invention relates to improvements, in operating mechanism for radiator valves, etc., and the object of the same is to produce an improved device of this character which will be simple and cheap in construction, compact in arrangement, easily applied and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty, in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed, and shown in the accompanying drawings, illustrating the embodiment of the invention, and in which

Figure 1 is an elevation of a radiator, partly in section, having this improvement applied thereto; Fig. 2 is a sectional view on line 2—2 of Fig. 3; Fig. 3 is a transverse sectional view of Fig. 2; Fig. 4 is a plan view of the armature and coils shown in Fig. 3 and with the thermostat connected thereto; Fig. 5 is an enlarged detail view of the armature and coils; and Fig. 6 is a modification of the invention, showing the same as applied to a furnace for operating the door and damper.

Referring more particularly to the drawings, and in which the same reference numerals designate similar parts throughout the several views; the numeral 10 indicates a radiator, which is preferably supplied with steam at one end through the pipe 11, located near the top thereof and exhausts through the outlet 12 located near the bottom of the opposite end.

The operation of this exemplification of the invention will be described as being used with steam as the heating medium, but it is to be understood that any other fluid may be used with equally good effect.

An improved form of valve adapted to be used with this invention will now be described but the improved system and the construction of said valve form the subject matter of a separate application. This exemplification of the valve comprises a casing 13 having a passage 14, and a discharge opening 15, and is preferably provided with screw threads 16 adjacent one end which are engaged by a collar 17 by means of which the casing 13 is secured to a nipple or coupling 18 which latter is in turn secured within the outlet opening 12 of the radiator 10. Secured to the casing 13 and communicating with the discharge opening 15 is a discharge or conductor pipe 19. The inner edge of the nipple or coupling member 18 adjacent the end of the casing 13 is preferably cut away or beveled as at 20, to form an enlarged opening communicating with the passage 14.

A suitable partition 23 is arranged within the casing adjacent the forward end thereof and across the passage 14. The lower portion 21 of the partition is preferably spaced from the upper portion 22, to form a valve seat 27, at the top of the partition 21, and journaled across the passage 14, so as to close the space formed between the partitions is a hollow valve 24, which is closed at its ends, and provided with perforations 25 and a slot 26 in its body portion. This slot is preferably elongated and is adapted to be moved into such a position as to be closed by the valve seat 27. The perforations 25 are so arranged with relation to the slot 26, that when the slot is adjacent or in contact with the seat 27, communication will be cut off between the passage 14 and the discharge outlet 15, in a manner to be set forth.

Passing through the portion 22 of the partition, preferably above the valve 24, is an aperture or opening 28 within which is secured one end of an air tube or pipe 29 in such a manner that the extremity thereof will preferably be flush with the outer face of the partition. The body of this pipe passes through the passage 14, through the opening 12 and into the radiator, and terminates at a point adjacent the top thereof. The free end of this pipe may be supported in any desired manner, such as by means of resting against the side of one of the sections of the radiator, or may be stiff enough to support itself.

A suitable bearing 30 provided with a threaded extremity 31 is mounted in a threaded aperture 32 in the face of the casing 13, preferably in line with the end of the tube or pipe 29, and is provided with a socket 33 in the end thereof within which is mounted a valve 34 which is adapted to engage and close the adjacent end of the pipe 29. This valve is held normally seated

against the end of the pipe by means of a suitable spring 35 seated in the socket 33 and bearing against the valve. The tension of the spring may be varied in any suitable manner, such as by adjusting the bearing 30, which latter may be accomplished by means of a suitable wrench engaging a projection 36 on the end thereof. The aperture 32 in the casing may be closed by a suitable cap or cover 37, if desired.

A suitable regulating valve 38 is mounted in the end of the casing preferably adjacent the bearing 30 and is so arranged that the face 39 thereof rests and bears against the portion 21 of the partition. This valve is provided with an aperture 40 which passes through the face 39 and one of the sides of the valve which is adapted to register with an opening or aperture 41 in the partition 21 and a similar opening or aperture 42 in a partition adjacent the discharge outlet of the valve casing to form a communicating passage between the passage 14 and discharge opening 15, for a purpose to be set forth. This valve is preferably provided with an angular extremity 44, by means of which it may be adjusted and is held in position by suitable packing 45 and an adjustable collar or bushing 46.

The valve 24 is preferably provided with a stem 47 which passes through a suitable bearing 48 on the casing 13 and beyond the side of the casing, and is held in position and prevented from leaking by means of packing 49 and an adjustable bushing or nut 50.

The valve may be placed in position in any desired manner, but preferably by inserting the same through a suitable opening in the side of the casing which is closed by means of a plug or nut 51 having peripheral screw threads engaging corresponding threads in the casing and resting against the end of the valve 24, which latter may be provided with a suitable flange or collar 52, if desired, to prevent displacement.

The heating system herein set forth comprises the subject matter of a separate application, but for a clear understanding of the invention, the operation will now be set forth.

The valve 38 is first adjusted to any desired position, that is, so that the passage or port 40 will stand in the desired position with relation to the ports 41—42 to form a restricted or full sized passage which will regulate the height of the water of condensation accumulated in the radiator by allowing it to pass off quickly or slowly, or the valve may be turned to entirely close the ports 41—42.

When properly adjusted, the steam on entering the radiator will condense and the water of condensation will accumulate therein. As the water of condensation rises in the radiator the air therein will be placed under pressure and will escape through the pipe 29, exerting its pressure upon the valve 34 to unseat the same against the tension of the spring 35, and will pass around the valve 38 and out through the discharge pipe 19; a portion of the water of condensation at the same time flowing through the port or passage 40 of the valve 38, if the latter is so adjusted. As the air pressure decreases the spring 35 will seat the valve 34. This valve 38 may also be used as a means for regulating the amount of heat, as will be understood. The valve 24, however, is preferably used for the purpose of regulating the heat and by manipulating the same will arrest or cause the flow of the water from the radiator.

Normally the valve 24 will be in the position shown in Fig. 2, with the slot or opening 26 against the seat 27 which will close the same and shut off communication between the passage 14 and the discharge pipe 19. When the temperature of the water decreases and it is desired to obtain more heat it is necessary to admit more steam into the radiator, necessitating the withdrawal of the water, or a portion thereof. This may be accomplished by rotating the valve 24, to cause the slot or aperture 26 to be moved above or out of engagement with the seat 27. In this position the water will flow through the passage 14, and enter the hollow valve 24 through the openings 25. From there it will flow through the slot or opening 26 around the valve 38 and out the discharge pipe 19. When the slot is moved back into engagement with the seat 27, the flow will cease, and the water will again accumulate in the radiator.

The improved means for automatically operating the valve 24, and which forms the subject matter of the present application, will now be described.

A base or support 53 is secured to the valve casing 13 and projecting above said base or support are ears or supports 54 which are preferably arranged diametrically opposite to each other and secured thereto are two pairs of coils 55—56 which are spaced from each other to receive and permit the movement of an armature 57 therebetween. This armature is preferably secured adjacent one end to the valve stem 47 and is preferably counterbalanced by a weight, as at 59. The opposite end 60 projects beyond the coils 55—56 and pivotally supported by this end is a contact member 61 which is of sufficient length to stand astride of and in contact with two contact points 62—63, which latter are suitably spaced from each other. This member 61 is provided with a projecting bifurcated portion 64 which stands between the contact points 62—63, and a projection 65 preferably carried by the cover 66 is adapted to enter and stand within the bifurcated portion of the projection 64, for a purpose to be set forth. The contact mem-

ber 61 is preferably provided with a rearwardly extending projection 64ª. Projecting from the end of the armature 57, and preferably in the same plane as the body portion thereof, is an arm or extension 67 to which is secured a spring dog 68 having a beveled nose or portion 69 which is adapted to normally stand adjacent the projection 64ª of the member 61 and with their points in line and contacting with each other, so that when the member 61 turns upon its pivot, in either direction, the end of the dog 68 will tend to engage the side of the projection and positively throw one end the member 61 away from the respective contact points 62—63, as will be set forth. These contact points are suitably insulated from the support 53 and the casing 13, as shown at 70.

Spaced contact points 71—72 are arranged within the room, the temperature of which is to be regulated. Leading from the contact 71 is a conductor 73 which connects with the coils 55 and from there across to the contact point 63. A similar conductor 74 leads from the contact point 72 to the coils 56 and across to the contact point or post 62. A suitable thermostat 75 is also arranged within the room, with one end 76 normally standing midway between the contacts 71 and 72. The other end 77 is connected by means of the conductor 78 to one side of a battery 79 and the other side of the battery is connected by means of the conductor 80 to the binding post 81 on the armature 57.

Assuming the parts to be in the position as shown in Fig. 4, the operation would be as follows: When the heat in the room expands the thermostat its end 76 will engage the contact 72 which will complete a circuit from the battery 79, through the conductor 74, coils 56 to contact point 62, through the contact member 61, armature 57, and conductor 80, back to the battery 79. This will energize the coils 56 and cause them to attract the armature 57. As the armature which is connected to the valve 24, moves, the valve will be rotated in a direction to cause the slot or aperture 26 to move out of engagement with the seat 27, which will permit the water of condensation to flow out of the radiator through the passage 14, valve 24 and discharge pipe 19. During the downward movement of the armature the contact member 61 will wipe across the two contact points 62—63 until the armature has about reached the limit of its movement, such wiping movement being permitted by means of the pivotal connection of the armature 57 and member 61. Just as the armature reaches this point of movement the part 69 of the spring dog 68 will act upon the projection 64ª of the member 61 to positively throw one end of the member 61 out of engagement with the contact 62 by moving the member 61 about the fulcrum 65, (as shown in Fig. 5) thereby breaking the circuit and de-energizing the coils 56. The valve 24 will remain in this position until the temperature of the room decreases sufficiently to cause the thermostat to contract so as to cause its end 76 to engage the contact 71 when the circuit will be completed through the coils 55 to move the armature 57 in the opposite direction to close the valve 24, which will remain closed until the temperature is increased to a point to cause the thermostat to engage the point 72, when the operation will be repeated, the normal position of the end of the thermostat being substantially midway of the contacts 71—72. Thus it will be seen that with this improvement the valve will be automatically controlled by the temperature of the room and that the water of condensation, usually wasted or allowed to escape when hot, is allowed to accumulate in the radiator, and that the heat radiated therefrom is utilized as a heating medium, and that by adjusting the valve 38, the height of the water may be regulated. Furthermore, the air is so controlled that it will not interfere with or interrupt the steady flow of steam into the radiator.

In the exemplification of the invention shown in Fig. 6, the automatic operating device is shown as applied to a furnace for operating the door 81ª and damper 82. In this form one end of the armature is connected by chains 83—84, respectively, to the damper and door, and when one is opened by the movement of the armature 57, which in this instance is pivoted as at 85 to the base 53, the other is closed. A suitable dash pot 86 is provided within which moves a piston 87 which is connected by a rod 88 to the armature 57 to take up the sudden jar and permit a steady movement of the armature, as will be understood.

In order that the invention might be fully understood the details of an embodiment thereof have been thus specifically described, but what I claim is:—

1. A valve operating mechanism for radiators and the like, comprising a valve, an armature, an operative connection between the valve and the armature, an electro-responsive device for moving the armature, contact points, means for completing the circuit to energize the device, a contact member pivotally supported by the armature, and means for moving said member about its pivot and out of engagement with one of the contact points for breaking the circuit when the armature approximately reaches the limit of its movement.

2. A valve operating mechanism for radiators and the like comprising a valve, an armature, an operative connection between the valve and the armature, an electro responsive device for moving the armature,

contact points a thermostat for completing the circuit to energize the device, a contact member pivotally supported by the armature, and means for moving said member about its pivot and out of engagement with one of the contact points for breaking the circuit when the armature approximately reaches the limit of its movement.

3. A valve operating mechanism comprising a valve, an armature, an operative connection between the valve and the armature, an electro-responsive device for moving the armature, means for completing the circuit through the said device for energizing the same, contact points, a contact member engaging said points and supported by the armature and movable independently of the armature, and means also supported by the armature for positively throwing the member out of engagement with one of the contact points when the armature approximately reaches the limit of its movement to break the circuit.

4. A valve operating mechanism comprising an armature, a valve, an operative connection between the valve and armature, an electro responsive device for moving the armature, a thermostat for completing the circuit through the said device for energizing the same, contact points, a contact member engaging said points and supported by the armature and movable independently of the armature, and means also supported by the armature for positively throwing the member out of engagement with one of the contact points when the armature approximately reaches the limit of its movement, to break the circuit.

5. A valve operating mechanism comprising an armature, a valve, an operative connection between the valve and armature, an electro responsive device for moving the armature, means for energizing said device to attract the armature, contact points, a contact member engaging said points, and pivotally supported by and movable with the armature, and a fulcrum for the member to cause said member to move about its pivot when the armature moves, and to disengage one of the contacts to break the circuit when the armature approximately reaches the limit of its movement.

6. A valve operating mechanism comprising an armature, a valve, an operative connection between the valve and armature, an electro responsive device for moving the armature, means for energizing said device to attract the armature, contact points, a contact member engaging said points, and pivotally supported by and movable with the armature, a fulcrum for the member, and means independent of the movement of the armature for moving the member about its pivot and out of engagement with one of the contacts to break the circuit when the armature has reached the limit of its movement.

7. A valve operating mechanism comprising an armature, a valve, an operative connection between the armature and the valve, an electro responsive device for moving the armature, means for energizing said device to attract the armature, contact points, a contact member pivotally supported by the armature and engaging said points, a fulcrum for said member, a spring supported by the armature and engaging the member, said member being adapted to move about its pivot when the armature moves and said spring being adapted to positively throw the member out of engagement with one of the contact points to break the circuit when the armature has reached the limit of its movement.

8. A valve operating mechanism comprising an armature, a valve, an operative connection between the armature and the valve, an electro responsive device for moving the armature, means for energizing said device to attract the armature, contact points, a contact member pivotally supported by the armature and engaging said points, said member being provided with a projecting portion having inclined faces, a fulcrum for said member, a spring supported by the armature and engaging said portion, said member being adapted to move about its pivot when the armature moves and said spring being adapted to engage one of the inclined faces of said portion to positively throw the member out of engagement with one of the contact points to break the circuit when the armature has reached the limit of its movement.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 23rd day of June A. D. 1906.

WILLIAM H. PEARCE.

Witnesses:

J. H. JOCHUM, Jr.,

CHAS. H. SEEM.